Center for American Progress

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Big Oil Goes to College

An Analysis of 10 Research Collaboration Contracts between Leading Energy Companies and Major U.S. Universities

Jennifer Washburn

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With research assistance from Derrin Culp, and legal analysis and interpretation of university-industry research agreements by Jeremiah Miller

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Preface

The global market for clean energy technology is booming. By 2020, the renewable and efficient energy sectors are expected to reach $2.3 trillion in sales. But the United States is falling behind in this global market. While countries such as China, Germany, and Spain pull ahead, the United States is 19th in clean-energy product sales as a percent of Gross Domestic Product.[1]

To join in this worldwide clean-energy economy race—and to pull ahead in the race for climate stability and energy security as well—the United States needs to make major investments in the new technologies that will provide the low-carbon energy of the future. Our nation historically and currently excels at bringing new ideas to market—it is perhaps our economy's most fundamental competitive advantage. We boast the best research institutions in the world. We deploy hundreds of billions of dollars in public and private money each year in search of new ways of making things and doing things. We embrace the right to fail in business and start anew.

But this terrific combination of entrepreneurial flair and bold risk-taking combined with the best and brightest research-and-development ideas our universities can conceive of is not enough in today's global economy. Public investment in energy research and development is only at 1.6 percent of all federal R&D, down from a historic high of 18 percent during the oil crisis in the late 1970s and early 1980s.[2] Investment in the other stages of energy technology development, such as commercialization and manufacturing, has also stagnated in our country—even as other countries are stepping up their spending in these areas.

In the long term, the United States must implement policies, among them placing a cap and price on carbon pollution, to spur consistent demand for low-carbon products and help fund their development and deployment. But even in the absence of these policies, it is clear that we must dramatically scale up the amount of money being funneled into every stage of the clean-energy system, from invention all the way through to installation.

Given the stark reality of our national deficit and ongoing recession, most of these investment dollars will not come from the public sector.[3] Instead, the government is increasingly turning to private companies to partner in funding the research and development of cutting-edge technologies as well as the deployment of proven systems such as wind

turbines and solar cells. In many cases, federal research grants include corporate match requirements or cooperative research agreements with corporations, in an effort to use scarce public funds to leverage private dollars.

These public-private research partnerships are often run through large research universities. As a result, while only 6 percent of university R&D, overall, is directly funded by corporations, nearly 25 percent is influenced by corporate donors who are part of public-private partnerships.[4] This report takes a close look at one set of private sector investments in clean energy—those from some of the world's largest energy companies, collectively referred to as "Big Oil." These companies have increasingly turned to federal grant programs and to U.S. research universities, many of them publicly owned, to carry out research on low-carbon technologies, primarily in the biofuels sector.

CAP commissioned this paper from Jennifer Washburn because we thought it was critical to explore this development. Washburn, a visiting fellow at CAP in 2007-2008, identified more than 55 major research agreements, ranging from $1 million to $500 million, signed between major energy companies and U.S. universities during the past decade. This is likely only a small subset of the total number of similar agreements currently in existence, many of which are protected by limitations on access to university data and are not tracked nationally. In what the Center for American Progress believes is the first-ever close look at private industry-university contracts in the energy research sector, this report carefully evaluates 10 of these agreements, totaling $883 million in confirmed industry fundings over ten years.

Independent, outside legal experts performed a detailed analysis of each agreement. These experts' detailed contract reviews may be found in Appendices 1 through 10 beginning on page 75 of this report, and include responses from a number of the universities that entered into these agreements.

Because Big Oil seems poised to play such an important role in advancing cutting-edge energy technology development, it is critical that policymakers and the public better understand the implications and effects of these public-private partnerships. This report asks hard questions about the consequences of allowing private corporations to sponsor research at academic institutions that pride themselves on using high-quality scientific as well as independent peer-reviewed methods to come to impartial results. The author, Washburn, working with a recognized legal expert in intellectual property and public-private contracts, makes some startling discoveries:

- In a majority of the 10 contracts, the university gave up majority control over the governing body in charge of the university-industry research alliance, and in four cases actually ceded full control to the participating corporations.

- None of the contracts requires that faculty research proposals that fall under these partnerships be peer reviewed by independent experts; most of the contracts fail to adequately explain how faculty can even apply for grant funds; and in most of the contracts the university has given up majority control over academic-research project selection.

- While the contracts preserve the university's right to publish, several allow for long publication delays, in one case as long as seven months, and in another as long as one year.

- Most of these contracts severely limit the university's ability to broadly license the results of research stemming from the university-industry alliance; many fail to adequately protect the sharing of academic data and results with other academic investigators for research verification and other academic purposes, though there are notable exceptions.

In short, the 10 contracts examined in this report indicate that the balance between Big Oil's commercial interests and the university's commitment to independent academic research, high-quality science, and academic freedom seems to have tilted in favor of Big Oil. As the author argues, this balance can be righted through:

- More careful oversight of industry-sponsored research contracts signed by U.S. universities to protect their core academic functions, including the production of reliable, high-quality, public knowledge.

- Adoption of stronger contract language designed to safeguard university independence, impartial peer review, and the production of high-quality public knowledge.

The federal government, too, can include these important contract provisions and safeguards in its Requests for Proposals, or RFPs, when it issues grant guidelines for new clean-energy R&D funds.

These recommendations come at a critical moment. At the time of this writing, Congress is deciding whether to pass an energy bill, including whether and how to allocate funds for renewable and efficient energy research. The Department of Energy continues to make important programmatic decisions about spending money allocated in the American Recovery and Reinvestment Act, or ARRA, and in the March 2009 Omnibus appropriations bill. With both included, the total 2009 R&D budget for DOE jumped 68 percent over 2008 funding levels, to $16.3 billion, with the largest portions of this going to Basic Science ($6.1 billion) and Energy R&D ($6.4 billion), and the remainder ($3.8 billion) to DOE defense-related research. Of this, roughly $3.95 billion was slated for Energy Efficiency and Renewables specifically.[5] And in the long term, our country will have to decide whether to pursue a competitive and sustainable low-carbon econom or continue with business as usual.

All these decisions will involve major infusions of public research dollars, which will be used to leverage far larger infusions of private dollars from companies just like those analyzed here. As we make these momentous funding decisions, we would be wise to heed the detailed findings and recommendations in this report. If not, we may risk academic freedom in our pursuit of economic competitiveness and climate stability. Our nation's innate competitive advantage arises in large part from the quality and independence of our academic institutions combined with the entrepreneurialism of our economy. We cannot afford to sacrifice either one in favor of the other.

– Kate Gordon, Vice President for Energy Policy at the Center for American Progress

Introduction and summary

The world's largest oil companies are showing surprising interest in financing alternative energy research at U.S. universities. Over the past decade, five of the world's top 10 oil companies—ExxonMobil Corp., Chevron Corp., BP PLC, Royal Dutch Shell Group, and ConocoPhillips Co.—and other large traditional energy companies with a direct commercial stake in future energy markets have forged dozens of multi-year, multi-million-dollar alliances with top U.S. universities and scientists to carry out energy-related research. Much of this funding by "Big Oil" is being used for research into new sources of alternative energy and renewable energy, mostly biofuels.[1]

Why are highly profitable oil and other large corporations increasingly turning to U.S. universities to perform their commercial research and development instead of conducting this work in-house? Why, in turn, are U.S. universities opening their doors to Big Oil? And when they do, how well are U.S. universities balancing the needs of their commercial sponsors with their own academic missions and public-interest obligations, given their heavy reliance on government research funding and other forms of taxpayer support?

The answers to these three questions are critical to energy-related research and development in our country, given the current global-warming crisis and the role that academic experts have traditionally played in providing the public with impartial research, analysis, and advice. To unpack these questions and help find answers, this report provides a detailed examination of 10 university-industry agreements that together total $833 million in confirmed corporate funding (over 10 years) for energy research funding on campus. Copies of these contractual agreements were obtained largely through state-level public record act requests (see the table on pages 13 and 14 for a list of these 10 agreements, and see page 15 for the methodology used for obtaining and analyzing them). Each agreement spells out the precise legal terms, conditions, and intellectual-property provisions that govern how this sponsored research is carried out by the faculty and students on campus. (See methodology on page 15 for a discussion of how practices that are not required in these conflicts fit into the analysis.)

Independent, outside legal experts then performed a detailed analysis of each agreement. These experts' detailed contract reviews may be found in Appendices 1 through 10 beginning on page 75 of this report, and include responses from a number of the universities that entered into these agreements. It should be noted that our external reviewers' rankings for several of the "Contract Review Questions" are subjective because interpretations

of law and other intellectual property terms cannot be strictly quantified. Also, the provisions in these contracts have not to our knowledge been tested in a court of law, so their "legal" meaning has not been definitively established.

The results of this report's analysis of these 10 large-scale university-industry contracts raise troubling questions about the ability of U.S. universities to adequately safeguard their core academic and public-interest functions when negotiating research contracts with large corporate funders. This report identifies eight major areas where these contracts leave the door open to serious limitations on academic freedom and research independence. Here are just a few brief highlights:

- In nine of the 10 energy-research agreements we analyzed, the university partners failed to retain majority academic control over the central governing body charged with directing the university-industry alliance. Four of the 10 alliances actually give the industry sponsors full governance control.

- Eight of the 10 agreements permit the corporate sponsor or sponsors to fully control both the evaluation and selection of faculty research proposals in each new grant cycle.

- None of the 10 agreements requires faculty research proposals to be evaluated and awarded funding based on independent expert peer review, the traditional method for awarding academic and scientific research grants fairly and impartially based on scientific merit.

- Eight of the 10 alliance agreements fail to specify transparently, in advance, how faculty may apply for alliance funding, and what the specific evaluation and selection criteria will be.

- Nine of the 10 agreements call for no specific management of financial conflicts of interest related to the alliance and its research functions. None of these agreements, for example, specifies that committee members charged with evaluating and selecting faculty research proposals must be impartial, and may not award corporate funding to themselves. (See summary of main findings for details, pages 52-59, and the Appendices beginning on page 75.)

To our knowledge, this report represents the first time independent analysts have systematically examined a set of written university-industry agreements within a specific research area—in this case, the energy R&D sector—to evaluate how well they balance the goals of the corporate sponsors to produce commercial research that advances business profits with the missions of American universities to perform high-quality, disinterested academic research that advances public knowledge for the betterment of society.

Before Congress releases billions of dollars in much-needed federal funding for more research and development of alternative and renewable energy and energy efficiency via direct grants and other public-private partnerships, it should give careful consideration to the findings and recommendations made in this report. Indeed, this analysis could not be more timely. As proposals to put a cap and price on carbon pollution circulated earlier this in Congress, most major oil companies, including their main lobby, the American Petroleum Institute, continue to vigorously oppose any such carbon caps by running millions of dollars' worth of negative ads warning the public and politicians of the dire consequences of action. But whenever comprehensive energy legislation is finally implemented, then a significant portion of the funds generated through cap-and-trade legislation will likely be targeted toward efficiency and clean-energy R&D performed by academic experts at U.S. universities.[2]

What's more, these funds will likely be disbursed through a variety of public-private research partnerships similar to the ones examined in this report. In recent years the U.S. Department of Energy and other federal agencies have shown a strong preference for disbursing federal research dollars through public-private cost-sharing arrangements. According to Doug Hooker, the director of renewable energy at the DOE's Golden Field Office in Colorado (which handles grant making for DOE's Office of Energy Efficiency and Renewable Energy), roughly 80 percent to 90 percent of the federal research money that now goes to finance renewable-energy and efficiency R&D is disbursed through some form of public-private cost-sharing arrangement.[3]

Usually, says Hooker, the corporate beneficiary of this DOE research funding is asked to provide a 20 percent to 50 percent matching grant, depending on the stage of the research project and its proximity to commercial application. "We are leveraging the available dollars that are out there in the private sector," Hooker said in an interview. "We believe it helps with the success rate and the industry's commitment to these technologies."[4]

Yet the long-term effectiveness of this strategy remains unknown. John DeCicco, an expert on transportation and a senior lecturer in the School of Natural Resources and the Environment at the University of Michigan, remains skeptical. "The whole concept of using tax dollars in public-private arrangements needs much better scrutiny," he argues. "This strategy inherently threatens the essence of public-good research, and can blur the boundary lines between independent invention and analysis on the one hand, and strictly commercial R&D on the other."[5]

U.S. universities, of course, have long relied on a combination of federal government and industry grants to finance their research operations. U.S. academic institutions spent $52 billion on research and development in 2008, the last year for which complete data were available, with about 60 percent financed by U.S. taxpayers through a variety of federal grant-making agencies. Nationally, though, only about 6 percent of university research overall is funded by industry.[6]

Nevertheless, according to some estimates, because of the federal government's growing preference for allocating federal R&D funds through corporate matching grants and other cost-sharing and cooperative-research arrangements, private industry now directly influences anywhere from 20 percent to 25 percent of university research funding overall.[7] In this way, a significant share of U.S. taxpayer funding that starts out as "public" funding is effectively turned "private" by the time it reaches the university investigators in their academic labs.

Top Obama administration officials, including Energy Secretary Steven Chu and Undersecretary for Science at the Department of Energy Steven E. Koonin, are strong supporters of using industry-university-government partnerships to advance clean-energy R&D. In 2007, prior to joining the administration, both Chu and Koonin were instrumental in brokering a $500 million research collaboration (discussed in detail in this report) between the British oil giant BP PLC and three major U.S. taxpayer-financed research institutions: the University of California at Berkeley, the University of Illinois at Urbana-Champaign, and Lawrence Berkeley National Laboratory, a federal research lab managed by U.C. Berkeley. At the time, Chu, a Nobel Prize-winning scientist, was director of Lawrence Berkeley, and Koonin was serving as BP's chief scientist.

By academic standards, these multiyear, multimillion-dollar industry investments on campus certainly look huge. Yet relative to the oil industry's vast profit margins, this R&D spending remains infinitesimally small. Consider BP's 10-year, $500 million investment in the Energy Biosciences Institute at U.C. Berkeley, which is primarily dedicated to researching biofuels. Relative to BP's profit margins, this mega-size university deal represents little more than a drop in the proverbial bucket. Let's begin by conservatively estimating that BP's average business performance from 2006 to 2015 will remain roughly on a par with its 2003-2007 performance. During this time period, BP's average revenues were $233 billion, and its average profits hit $19.2 billion.[8] If such trends continue, and excluding any significant hit to BP's bottom line due to the consequences of the 2010 oil catastrophe in the Gulf of Mexico, then:

- BP's total 10-year, $500 million investment in the Energy Biosciences Institute will amount to a mere 0.021 percent of BP's total projected revenues, and just 0.26 percent of its total profits, during the period 2006-2015.[9]

- This level of R&D spending is not inconsistent with energy industry totals, but it remains well below the average for U.S. industry as a whole. According to energy experts Gregory Nemet and Daniel Kammen, during the years 1988 to 2003, the U.S. energy industry (in its entirety) invested just 0.23 percent of its revenues in R&D, far below the average of 2.6 percent for U.S. industry as a whole.[10]

Nevertheless, this redirection of industry R&D dollars to U.S. universities is significant. The reasons: A sizable portion of this university funding is now being directed to "alternative energy research" (especially biofuels), and this shift in the allocation of industry resources has the potential to significantly influence the academic research culture in this new energy arena.

Going green on campus

Big Oil's media blitz

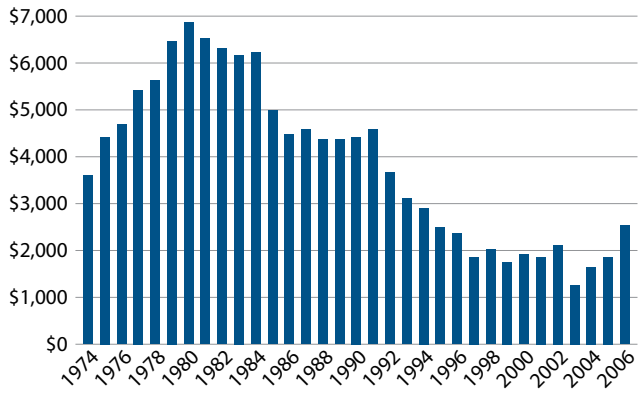
Big Oil hasn't been shy about exploiting its university-research connections to "green" its public image. In an eight-page magazine spread, Chevron proudly proclaims: "We're partnering with major universities to develop the next generation of biofuels."[11] In another ad, BP declared: "It's time to invest in our own backyard… we're investing $500 million over the next 10 years to establish the Energy Biosciences Institute"—a reference to the alliance, headquartered at U.C. Berkeley, that DOE secretaries Chu and Koonin helped to negotiate.[12]

The boldest of these ads appeared on the influential opinion pages of the *New York Times*. The ad touted Stanford University's research partnership with Exxon Mobil, among other companies, through the Global Climate and Energy Project—a deal signed in 2002 that is still ongoing today (and is reviewed in this report). The ad—bearing the official Stanford University seal side by side with the GCEP logo—deeply angered many faculty and students on campus because their perception of that ad strongly suggested that the scientific evidence regarding global climate change was still not conclusive. In addition to bearing the university's official seal, the ad was signed by Stanford Professor Lynn Orr, then-director of the Exxon-funded GCEP alliance.[13]

These investments in clean energy research by leading energy companies also appear to be part of the energy industry's current campaign to project a more pro-environmental public image. Turn on the TV or open virtually any magazine and you're likely to see an ad from a major oil, coal, gas, auto, agriculture, or other company touting its commitment to the research and development of clean-energy technologies: biofuels, "clean coal" technology, hydrogen fuel cells. Not infrequently, these "green ads" explicitly reference the industry's multimillion-dollar alliances with U.S. universities, whose prestige and public trust are an added selling point (see box above).

Funding falls for private-sector energy research and development

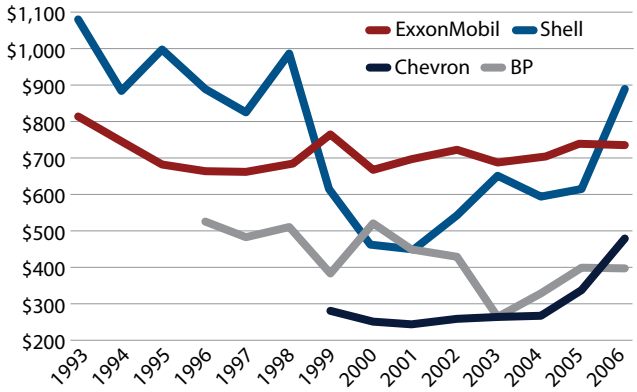
Private sector energy industry R &D expenditures, 1974–2006[16]



It's clear that Big Oil and other large energy companies have ramped up their advertising budgets to project a pro-environmental business orientation.[14] But if we crack open the industry's annual reports, it is also clear that today's climate and energy crises (and persistently high oil prices) haven't had anywhere near the impact on energy industry R&D spending that the

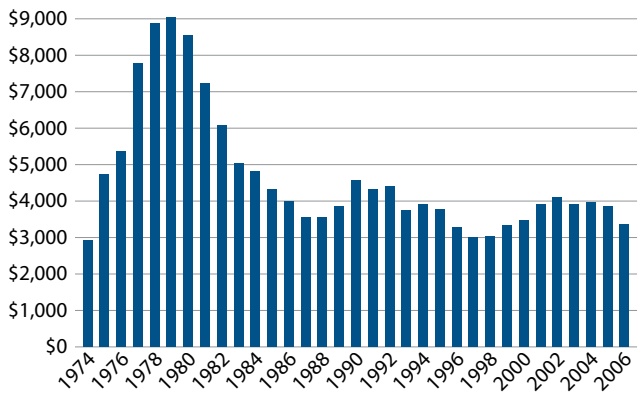
Big Oil's research and development spending trends

Reported R&D spending, major integrated energy companies, 1993–2006 (constant 2006 dollars, millions)[18]



Sliding federal support for energy research and development

U.S. public sector energy R&D, 1974–2006 (constant 2006 dollars, millions)[21]



earlier oil price shocks of the 1970s once had. After rising sharply in the 1970s, energy industry spending (adjusted for inflation) on all types of R&D has plummeted, from an annual average of nearly $6.4 billion in the early 1980s to an annual average of roughly $1.7 billion at the start of the last decade[15] (see graph).

The annual reports of four of the largest oil companies—ExxonMobil, BP, Shell, and Chevron—between 2000 and 2007 (before the Great Recession began) do show some *overall* gains in R&D spending. But these R&D gains, which are overwhelmingly directed toward enhanced oil and gas recovery, not clean energy, remain truly marginal, particularly in light of the oil industry's vast profit margins in recent years. In constant 2006 dollars, here's what these company reports reveal:

- ExxonMobil's total R&D spending has remained essentially flat since 1993, with barely any increase.
- Shell had the fastest growth in R&D expenditures over the past five years (out of the four companies); however, because Shell's R&D outlays had dropped dramatically throughout the 1990s, actual gains were marginal.
- BP continues to spend less on energy R&D than either ExxonMobil or Shell. Despite dubbing itself BP or "Beyond Petroleum" in 2000, BP's aggregate spending on all energy R&D is still roughly the same as it was a decade ago, although the company's pledge of $50 million per year over 10 years for the Energy Biosciences Institute will lift this total slightly.
- Chevron's aggregate spending on R&D remained extremely low and flat from 1999 through 2004. Since 2005, Chevron's R&D outlays rose, but they still remain the lowest of the four.[17] (see the graph above for details)

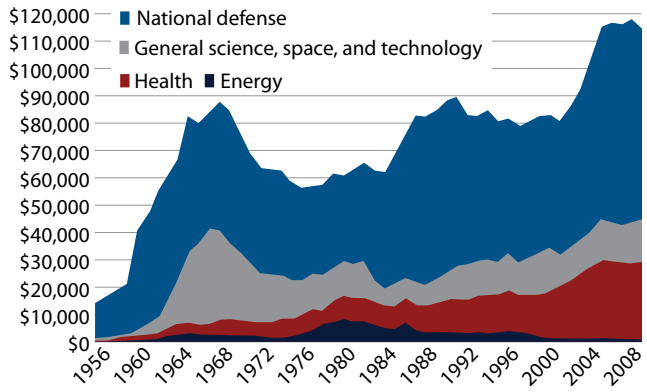
It is clear, then, that industry spending on all forms of energy R&D (especially low-carbon energy R&D) remains chronically low. Nevertheless, the industry's decision to shift more of its already limited R&D spending to U.S. universities is highly significant, and could

have far-reaching consequences for the future direction of energy R&D efforts nationally. In large part, this is because the U.S. government commitment to energy R&D has remained persistently low for decades, so every dollar of private industry funding that comes into university labs is urgently needed. Consider that:

From 1993 to 2006, U.S. government spending on all energy-related R&D (in real dollars) remained stuck at roughly $3 billion to $4 billion per year, averaging $3.6 billion per year over this period. This is 60 percent less than the $9 billion the U.S. government spent on energy R&D in 1979.[19] (see second graph on page 10)

Energy's shrinking share of the research and development pie

Federal outlays for R&D by budget function (constant 2006 dollars, millions)[22]



Over the same years, by contrast, real federal spending on defense R&D and health R&D averaged $58 billion and $22 billion per year, respectively.[20] (see graph above)

Industry financing of university research is certainly legitimate. Academic-industry research collaborations have led to critical advancements in science and engineering and should be nurtured. Yet industry funding can also have a powerful distorting influence on the quality, topics, and credibility of academic research when it is not properly managed.

Indeed, in recent years a large body of analytic and empirical research has shown that industry-funded studies in sectors ranging from pharmaceuticals to tobacco to food are associated with reported outcomes that strongly favor the corporate sponsor's products and/or interests compared to studies funded by government and non-profit sources.[23] (see box on page 12)

What do the 10 contractual agreements tell us?

Now let's turn to the centerpiece of this report: the university-industry-research agreements themselves. The central analysis that underpins this report, and the questions it raises, is drawn from a comprehensive analysis and independent expert level review of 10 recent alliance agreements among as many as 43 companies (some contracts boast fluctuating membership), 13 leading universities, and two federal research labs, totaling $833 million in confirmed industry funding over ten years.

Most of the copies of the 10 agreements were obtained through public record act requests filed with state-funded universities (although these often proved extremely time-consuming and difficult to obtain because many state-funded institutions stalled or outright refused our requests).[34] Several were also obtained from academic administrators through

The rise of academic commercialism

Benefits and costs

Dating back to the mid-1800s, academic scientists and private industry have enjoyed productive collaborations that led to the advancement of science and the creation of new scientific disciplines and innovative technologies. Few universities or their professors, however, ever sought to directly profit from their campus-based research, or go into business themselves, as they routinely do today. The rise of "academic commercialism" dates roughly to 1980, when a variety of forces pushed U.S. universities to forge closer ties with private industry, and become more overtly commercial themselves.

First, there was the rise of a knowledge-driven economy, which made academic research far more valuable to outside companies and venture capitalists. Second, changes in U.S. patent law vastly expanded the types of academic knowledge that were newly eligible for patenting, such as human genes, medical processes, and mathematical formulas. Third, the U.S. Congress passed landmark legislation, in 1980, known as the Bayh-Dole Act, named after its two original sponsors, Sens. Birch Bayh (D-IN) and Bob Dole (R-KS).[24]

The Bayh-Dole Act granted U.S. universities automatic rights to own all federally funded research performed on campus, and the right to patent and license that taxpayer-funded research to industry in exchange for a share of the commercial rewards (patent royalties, equity, licensing fees). Supporters of the act argued it would unleash new incentives for U.S. universities to commercialize academic inventions, and thereby speed the pace of U.S. technological innovation at a time when the United States was facing growing competition from Germany and Japan. The legislation's economic legacy, however, is distinctly mixed.[25]

After its passage, nearly every university set up extensive patenting and licensing operations to commercialize and profit from campus-based research. University patents to academic inventions certainly soared.[26] Yet several recent published studies have found that academic patenting is not, in fact, closely correlated with increased industrial use and/or commercial development of academic research discoveries.[27] Only roughly two dozen U.S. universities generate sizable income from all this heightened commercial activity due to a few blockbuster inventions that generate revenue. Indeed it has been observed that the vast majority of universities, however, barely break even, or lose money, on their patenting and licensing operations.[28]

This is not because the academic research at these other universities has no "commercial value." It is because most university inventions are more fundamental and diffuse in their research and commercial applications, making them harder for one firm to exclusively capture and profit from. Much of this academic research has such broad commercial applications that it is best left in the public domain, where all inventors are free to use it to generate new discoveries and diverse products.

Meanwhile, critics charge that heightened commercialism on campus is rapidly altering the university's unique research culture, and pulling universities away from their core academic research, teaching, and public-knowledge missions.[29] A large body of analytical and empirical research finds that industry-sponsored research is far more likely to favor the corporate sponsor's products and/or commercial interests compared to government- or non-profit-funded research.[30] Studies also find that industry-sponsored research is linked to growing corporate control of academic data, delays on publication, increased secrecy, and reduced academic sharing of research data and materials.[31]

Academic commercialism has also given rise to reports of growing financial conflicts of interest on campus.[32] Today it is common for both U.S. universities and their professors to have direct financial interests in their own campus-based research (through patents, licenses, equity stakes in new companies, and royalty agreements). Many individual professors also have extensive personal financial ties to companies that sponsor their own academic research (these professors receive additional fees for outside private consulting, positions on corporate speakers' bureaus and company boards, honorariums, conferences, and travel).

In recent years, there have been growing calls from Congress, academic journals, federal agencies, and professional societies for U.S. universities to more stringently regulate and/or eliminate their burgeoning financial conflicts of interest.[33] Because of the potential for scientific distortion, commercial collaborations on campus need to be carefully managed to protect the universities' core commitment to independent inquiry, public-good research, and high standards of academic excellence in accordance with the universities' heavy reliance on public financing.

personal phone requests, or had been previously made public. Private universities are not required to (and usually do not) publicly disclose their contract research agreements with industry. Stanford University made a rare exception when it chose to publicly disclose its contract with ExxonMobil and three other companies following campus pressure to do so (see table below for a complete list of the 10 agreements analyzed and the accompanying box on page 15 for an explanation of the methodology we employed).

The 10 contracts reviewed in Appendices 1-10 of this report

Universities, federal labs	Industry sponsors	Research alliance description	Aggregate funding and duration
1 Arizona State University	BP Technology Ventures, Inc., a unit of BP PLC	On November 2, 2007, ASU and BP announced a "significant research partnership" to develop biofuels, focusing on optimized photosynthetic bacterium to produce biodiesel. According to Neal Woodbury, deputy director of ASU's Biodesign Institute, BP formally ended its contract with ASU in October of 2009 after the company decided "that for their market interests, the cyanobacterial biofuels area was not something they currently wanted to pursue as part of their renewable energy portfolio." Since then, however, ASU's initial work—supported by BP, the Science Foundation of Arizona, or SFAz, a state funded non-profit, and ASU—has been awarded a Department of Energy Advanced Research Projects Agency-Energy grant worth $5,205,706. This work will specifically address the production and secretion of fatty acids for fuel production from cyanobacteria.	$5.2 million over initial 2 years BP initially contributed only $2.5 million toward this $5.2 million, 2-year project, with the rest of the research funds coming from the state of Arizona and ASU, a public university. The contract that BP and ASU signed did state that if the "effort proves the concept," BP would enhance its investment by $20 million to $25 million. This did not happen, but the project did win a subsequent Department of Energy grant worth $5.2 million.
2 **Energy Biosciences Institute** University of California at Berkeley; Lawrence Berkeley National Laboratory; University of Illinois at Urbana-Champaign	BP Technology Ventures, Inc., a unit of BP PLC	On November 14, 2007, a subsidiary of the U.K.-based oil giant BP established the Energy Biosciences Institute—the largest academic-industry-government research alliance ever negotiated. EBI will primarily focus on developing crops that can be converted into biofuels. It will also fund some biological research on the conversion of heavy hydrocarbons to clean fuels, improved recovery from existing oil and gas reservoirs, and carbon sequestration.	$500 million over 10 years
3 University of California at Davis	Chevron Technology Ventures, LLC, a unit of Chevron Corp.	On August 25, 2006, Chevron signed a major research partnership with U.C. Davis to study and develop affordable, renewable transportation fuels from farm and forest residues, urban wastes, and crops grown specifically to make biofuels.	$25 million over 5 years
4 **Chevron Center of Research Excellence** Colorado School of Mines	ChevronTexaco Energy Technology Co., a unit of Chevron Corp.	On January 1, 2004, the Colorado School of Mines entered into an agreement with Chevron to establish a Center of Research Excellence on campus to develop advanced technologies for interpretation of subsurface geology through computer modeling.	$2.5 million over 4 years; agreement ongoing with additional funding amounts unknown. In August 2008, Chevron gifted the school another $1.2 million to create the Chevron Education Center for Study of the Earth, to be housed in a new state-of-the-art petroleum engineering building on campus.
5 **Colorado Center for Biorefining and Biofuels** University of Colorado, Boulder; Colorado State University; Colorado School of Mines; National Renewable Energy Laboratory	27 firms originally, including ADM, Chevron, ConocoPhillips, Dow, DuPont, GMC, Shell, Suncor, Weyerhaeuser, and W.R. Grace.	On March 19, 2007, the U. of Colorado, Boulder established a major industry-funded research consortium known as the Colorado Center for Biorefining and Biofuels, or C2B2, together with three other prominent public research institutions in the state of Colorado. C2B2's purpose is to create new technologies for plant-based transportation fuels, fertilizers, synthetic fibers, plastics, and commercial chemicals. Corporate membership fluctuates.	$6 million estimated over the past 4 years (2007-2010); ongoing budget figures unknown. Each corporate member, depending upon its size, pays either $50,000 or $10,000 annually, with additional corporate-sponsored-research grants possible. In July 2008, ConocoPhillips signed a 5-year, $5-million sponsored-research grant with C2B2. C2B2 has also received $1.75 million in public support from the state of Colorado's Colorado Renewable Energy Collaboratory.

The 10 contracts reviewed in Appendices 1-10 of this report (continued)

Universities, federal labs	Industry sponsors	Research alliance description	Aggregate funding and duration
6 Georgia Institute of Technology	Chevron Technology Ventures LLC, a unit of Chevron Corp.	On June 15, 2006, Chevron and Georgia Tech formed a strategic research alliance to pursue advanced technologies aimed at making cellulosic biofuels from renewable resources such as forest and agricultural waste, as well as "hydrogen viable" transportation fuels.	$12 million over 5 years
7 Iowa State University	ConocoPhillips Co.	On April 10, 2007, ConocoPhillips and Iowa State University formed a multiyear research alliance dedicated to developing technologies that will produce biorenewable fuels.	$22.5 million over 8 years
8 **Global Climate and Energy Project** Stanford University	ExxonMobil Corp., General Electric Co., Toyota Motor Corp., and Schlumberger Technology Corp., a unit of Schlumberger Ltd.	On December 16, 2002, Stanford launched the Global Climate and Energy Project (GCEP) with an initial, 3-year funding commitment of $225 million from four major firms: Exxon Mobil, General Electric, Toyota, and Schlumberger. GCEP's mission is "to conduct fundamental research on technologies that will permit the development of global energy systems with significantly lower greenhouse gas emissions."	$225 million over 3 years; however, the GCEP alliance was extended 10 years until 2012, with the four sponsors making periodic funding updates (total additional contributions are not known). GCEP's original 2002 agreement was in effect for nearly six years. In September 2008, Stanford and its four original sponsors negotiated a new revised agreement. (Both agreements are reviewed in Appendix 8.)
9 **BioEnergy Alliance** Texas A&M University	Chevron Technology Ventures, a unit of Chevron Corp.	On May 30, 2007, Chevron and the university formed a research alliance to accelerate the conversion of crops for manufacturing ethanol and other biofuels from cellulose.	$5.2 million over 5 years. Information obtained via a public record act request filed on November 12, 2007. Texas A&M University originally refused to provide a copy of this contract or disclose its dollar value; instead it forwarded our public-record-act request to the TX Attorney General's office. The AG office ruled that, as a public university, they must comply.
10 **Advanced Energy Consortium** University of Texas at Austin, Rice University	Ten major energy companies: Baker Hughes Inc., BP PLC's BP America Inc., ConocoPhillips Co., Halliburton Energy Services Inc., Marathon Oil Co., Occidental Petroleum Corp.'s Occidental Oil and Gas Corp., Petroleo Brasileiro SA, Schlumberger Ltd.'s Schlumberger Technology Corp., Royal Dutch Shell Group's Shell International E&P, and Total SA	On January 15, 2008, the University of Texas at Austin and seven major energy companies created the Advanced Energy Consortium to develop micro- and nanotechnology applications to increase oil and gas production. Today, the AEC alliance has ten member company sponsors.	$30 million over 3 years ($1 million per company per year). The AEC alliance is renewable and ongoing.
Total number of universities and federal labs: 15	**Total number of industry sponsors: as many as 43 since some sponsor memberships fluctuate**		**Total confirmed industry funding for these 10 agreements over 10 years: $833 million (with tens of millions more in projected support from member company sponsors)**

Source: See methodology box on page 14.

Methodology used for reviewing the 10 agreements

To better understand the specific contractual requirements underlying each of these university-industry research alliances, we turned to Professor Sean O'Connor, a noted legal scholar at the University of Washington Law School with expertise in intellectual property law and university-industry contracting, and Jeremiah Miller, his former graduate assistant and now a practicing attorney in Seattle. O'Connor is Director of the Law, Technology and Arts Group at the University of Washington School of Law. He provides private legal- and IP-consulting assistance to many universities, nonprofits and for-profit organizations. Miller performed the primary analysis and interpretation of the contracts. O'Connor then reviewed his analysis. Their services were provided in a personal capacity. They do not necessarily endorse the conclusions of this report.

All the "academic benchmarks" used in our review of the 10 agreements were drawn from a set of detailed analyses of Strategic Corporate Alliances, or SCAs, on campus, developed by a prominent faculty-senate committee at Cornell University from 2004 to 2005.[35] Most of the 10 agreements reviewed here broadly fit Cornell's definition of a Strategic Corporate Alliance: "a comprehensive, formally managed company-university agreement centered around a major, multiyear, financial commitment involving research, programmatic interactions, intellectual property licensing, and other services."[36] Academic norms and public-interest commitments are not well codified in any single document, but they are frequently referred to and affirmed in university mission statements, faculty senate documents such as Cornell's SCA review, and statements and reports issued by government funding agencies and prominent university associations, including the Association of American Universities, Association of American Medical Colleges, and American Association of University Professors.

This report's author used the Cornell SCA analyses and their SCA management recommendations as the basis for developing a list of 17 Review Questions to structure this report's legal contract review. As such, the legal review is not from a purely business standpoint (since most legal contracts are assumed to involve two business entities) but rather from the standpoint of widely accepted academic norms and public-interest benchmarks, including the need to safeguard the university's core academic mission, and its commitment to self-governance, independent research, and the dissemination of high-quality, reliable, public knowledge.

With regard to the intellectual property provisions in these agreements, our outside legal experts were asked to rank each agreement on a scale of 1 to 10 to assess the amount of exclusive commercial control over academic research results that each agreement permits the industry sponsors, as well as the degree of flexibility afforded to the university partners (and faculty) to license discoveries nonexclusively and/or to share research with other academics. Knowledge sharing is widely seen as a fundamental duty of all academics, as detailed in "Nine Points to Consider in Licensing University Technology," a 2007 statement signed by more than 50 universities, and other federal agency guidelines.[37] It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Moreover, to the author's knowledge, these contracts have not been tested in a court of law, so their "legal meaning" has not been definitively elaborated.

The first round of legal reviews were completed in the summer of 2008. In July 2010, CAP invited the universities heading up these 10 alliances to provide written comments on the major contract findings, and any contract updates. Seven of the 10 universities provided feedback, two did not respond to our request, and one, Texas A&M University, requested permission from the state attorney general to deny our request for information relating to its Chevron alliance. To the best of our knowledge, the contract analyses in Appendices 1-10 beginning on page 75 are current.

Many university administrators, in their comments and interviews, raised objections to this report's reliance on written contracts, noting the existence of other academic customs, campuswide policies, and procedures and practices developed outside of the written contracts. Many of these administrators also objected to the report's predominant focus on academic and public-interest benchmarks to rate the contracts, arguing there also is an academic and public interest in drawing private-sector money and expertise into the research and development of alternative energy technologies. They felt this view was not sufficiently addressed in the analysis of their contracts as presented in our major contract findings at the time of their review. These comments from university administrators are presented in the individual appendices beginning on page 75 and are taken into account when germane in the appendices and the main body of the report.

Still, these legal agreements consitute the primary, if not the only, legally binding authority between the parties. Anything that is left up to informal practices and generalized policy is subject to alteration and inconsistent application, and may not be legally binding. Written contacts also enhance accountability, and engender public trust. Thus the focus of this report on the contracts themselves as the basis of the report's analysis.

Major findings—A brief synopsis

This report's analysis of the contracts underlying 10 large-scale university-industry alliances to finance energy research identifies eight major areas where serious limitations on academic freedom and academic research, and governing independence are permitted. What follows is a brief description of the eight areas where these agreements appear to fail to uphold the universities' core academic and public-interest obligations:

1. Do these agreements protect university independence and academic self-governance?

In nine of the 10 agreements, the university partners failed to retain majority academic control over the central governing body charged with directing the university-industry-research alliance.[38] Four of the 10 alliances allow for full industry sponsor control over the alliance's main governing body.[39]

In some cases the written agreement explicitly gives the industry sponsor or sponsors full control. In other cases, this is how the agreement is being interpreted and/or administered in practice. This finding is quite remarkable. "Academic independence" has been rooted, historically, in the university's core belief that it must retain the ability to govern its own internal affairs. This is often referred to as "academic self-governance" or "academic autonomy."

Ever since the birth of the academic freedom movement in the early 1900s, U.S. universities and their faculties have worked strenuously to prevent outside donors (whether a wealthy benefactor, a commercial sponsor, or a federal grant-making agency) from exerting undue influence over faculty teaching, research, and other internal academic governance decisions.[40] The rationale for this is quite straightforward: Without self-governance, research independence and free inquiry are meaningless.

2. Do these agreements require faculty research proposals to be evaluated and awarded funding on the basis of impartial "peer review"?

None of the 10 agreements requires faculty research proposals to be evaluated and awarded funding in each new grant cycle using academic methods of independent, impartial peer review. In the case of the Arizona State University-BP research alliance this question does not apply because all the research projects have been identified upfront so no other campus faculty are eligible to apply for funding.[41]

In interviews and written comments, several university officials told CAP that, even though their formal alliance agreements do not require peer review, they do frequently draw on the expertise of outside expert reviewers. Yet, in all the cases reviewed in this

report, it is the view of the author and our legal experts that the use of peer review is variable, inconsistent, and/or does not rise to the level of genuine, impartial, expert peer review. And because peer review is not secured in the alliance's legal contract, its weight in the research-selection process remains unclear, and its application can be altered or simply abandoned at any time. (For more discussion, please see the detailed contract reviews in Appendices 1-10.)

Consider Stanford University's Global Climate and Energy Project, which is funded by Exxon Mobil, General Electric, Toyota and Schlumberger. Neither of GCEP's formal written alliance agreements (originally signed in 2002 and renewed in 2008) requires the use of expert peer review for the selection of faculty research proposals. Both agreements' use of peer review is entirely optional and left to the discretion of the four industry sponsors. Stanford officials respond that GCEP uses an informal peer-review system even though it is not legally required, and that they posted written peer-review protocols on a public website to clarify how this peer review works in practice. But our outside legal experts say this informal peer review system is not legally binding and could be altered or abandoned at any time. (see Appendix 8 for details)[42]

Academic peer review has long been considered the gold standard when it comes to appropriately and fairly evaluating the quality and worthiness of scientific and academic research. When faculty research proposals are evaluated by independent experts using an impartial peer review process, it helps to ensure that corporate-research funding is awarded on the basis of both scientific and academic merit—not merely on the basis of one firm's short-term business needs or the narrow strategic goals of one industrial sector.

When Cornell University's faculty senate issued final recommendations in 2005 on how best to structure large-scale, university-industry research alliances, it strongly emphasized the centrality of independent peer review: "The important point—vital to honoring the principal that we are engaged in academic, not corporate research—is that genuine, disinterested peer review occur."[43]

3. Are these agreements fully transparent about how the faculty may apply for commercial funding, and what the methods and criteria for selection will be?

Eight of the 10 alliance agreements fail to specify in adequate detail how faculty may apply for alliance research funding, or what evaluation and selection criteria will be used.[44] Within the university and scientific communities it is widely understood that high standards cannot be maintained unless faculty research and scholarship is judged fairly and impartially based on academic merit and scientific excellence, not according to the narrow wishes or dictates of outside sponsors.

The notable lack of clarity and transparency in a majority of these 10 university-industry agreements (combined with their failure to require peer review) suggests that funding awarded through these academic-industry alliances will strongly favor the business and strategic interests of the corporate sponsors. Given that nine of the 10 agreements also clearly state that the university side will be responsible for administering and overseeing the research-selection process (on behalf of the alliance as a whole), this could leave university leaders vulnerable to accusations that they are putting the sponsors' commercial interests ahead of the universities' core commitment to high-quality research, and the disinterested quest for knowledge and truth for the benefit of the public.

4. Do these agreements adequately distinguish "academic research" from "corporate research for hire?"

The answer to this question largely rests on which party to the agreement defines the alliance's overarching research agenda, which party draws up the "request for faculty research proposals" in each new grant cycle, and which party retains majority control over the evaluation and final selection of academic research proposals. Let's consider each of these in turn.

In eight of the 10 agreements that we reviewed, the industry sponsor substantially defines the alliance's "overarching research agenda." (The exceptions were Arizona State University and Stanford University.) This is not unusual. No funding source is entirely neutral. Simply by defining what research questions will be asked, nearly every sponsor exerts some degree of influence over the academic research enterprise.

It also is not unusual for the corporate sponsors to play a subsequent role in setting the research agenda during each new grant cycle. In five of the 10 agreements, the industry sponsors and the university partners share some responsibility for drawing up a list of research topics in each new grant cycle, and issuing the request for new faculty research proposals. In four cases, the contact allows the industry sponsors to fully set the agenda in each new grant cycle.[45]

But in eight out of 10 contracts we examined, the agreements broke significantly from longstanding university commitments to academic self-governance. This finding is the most significant one. Usually, when it comes to internal academic governance decisions—including the evaluation and selection of faculty research—the university insists on majority academic representation and the right to use independent, expert peer reviewers. In 2007, for example, a U.C. Berkeley faculty senate committee reviewing the Energy Biosciences Institute partnership stressed that all BP-EBI funded research "should not in any way be conceived of or seen as work made for hire for the benefit of the corporate sponsor."[46]

Nonetheless, in eight of the 10 alliance agreements reviewed here, the university failed to retain majority control over the evaluation and final selection of faculty research proposals, or to require the use of impartial peer review, thus leaving the distinction between "academic research" and "corporate research for hire" quite unclear and uncertain.[47]

5. Is the university's fundamental right to publish protected?

Yes. Nine of the 10 agreements affirm the university's right to publish, but in many instances this contractural right is curtailed by potentially lengthy corporate delays.[48] The National Institutes of Health generally recommends no more than a 60-day delay on academic research publication, which it deems adequate time for the corporate sponsor to file a provisional patent application and remove any sensitive proprietary information.[49] None of the 10 agreements analyzed abide by this maximum-60-day federally recommended publication delay; most far exceed it.

One alliance agreement at the University of Colorado, Boulder and three other publicly funded research institutions in Colorado (known as the Colorado Center for Biorefining and Biofuels, or C2B2) permits the industry sponsors to delay publication for up to 210 days. Another alliance agreement at Stanford University, the Global Climate and Energy Project, gives the four sponsors a mandatory, 60-day review period to consider patent protection prior to release of any academic publications. After this, the agreement provides for no maximum delay on publications, leaving the potential, at least, for indefinite delays. A third alliance agreement with Chevron permits the sponsor to delay publication for up to one year, including student theses.

The timely release of academic information is what makes the university research sphere so exceptionally vibrant, innovative, and dynamic. Rapid dissemination of new knowledge helps to insure that all scientific research is subject to independent review and replication to verify its accuracy. Research should never be quarantined; it needs to be released rapidly so others can react to it and build upon it, continually driving the pursuit of new knowledge forward.

6. Does the corporate sponsor enjoy monopoly commercial rights to all the university's sponsored-research results?

We asked our outside legal examiners to rank each alliance agreement on a scale of 1 to 10, with 1 representing very weak contract language granting exclusive commercial rights to the industry sponsor, and 10 representing very strong language granting exclusive commercial rights. Seven of the 10 agreements ranked 8 or higher for their degree of exclusivity, thus giving the industry sponsors strong monopoly commercial control over the alliances' sponsored research results.

Seven of the 10 agreements left the university side with extremely limited power to license sponsored-research results nonexclusively to outside commercial users.[50] But there are three notable exceptions. The first is the so-called "shared side" of the Colorado Center for Biorefining and Biofuels.[51] The second is the alliance agreement between the University of Texas at Austin, Rice University, and ten companies. And the third is Stanford University's Global Climate and Energy Project agreement. GCEP was originally launched in 2002, but the university and its four industry sponsors negotiated a new, revised contract in September 2008 that greatly facilitated non-exclusive licensing and open academic sharing of GCEP research results through the elimination of a 5-year, sponsor exclusivity provision. (see Appendix 8 for details)

But the flip side is this: At least four of the 10 agreements (BP-Arizona State University, BP-Energy Biosciences Institute, Chevron-U.C. Davis, and Chevron-Texas A&M) explicitly permit the industry sponsors to extend the commercial rights to "background" academic research, which by definition was not funded by the industry sponsors but by public and other sources not party to the alliance agreement.

Because U.S. taxpayers continue to subsidize higher education substantially through general overhead for state universities, federal and state subsidies for student tuition, graduate-student fellowships, educational tax breaks, and federal research grants, most U.S. universities pledge their commitment to patenting and licensing academic research in a manner "consistent with the public interest."[52] This is generally understood to mean that universities will work to maximize broad public use of their academic inventions and research tools, and prevent any one private or commercial entity from exerting excessive monopoly control, unless it is absolutely necessary to promote commercial development.

Case in point: In one 2008 review of the BP-EBI alliance, a faculty senate Task Force on University-Industry Partnerships noted that "the use of exclusive licenses should be as limited as possible, given our public mission."[53] Such sentiments have also been affirmed by the National Institutes of Health, and by more than 50 universities that are signatories to a 2007 statement titled "Nine Points to Consider in University Licensing."[54]

Yet in seven of the 10 contracts we examined for this report, industry sponsors are granted broad, upfront, exclusive commercial rights to alliance research—even, in some cases, when certain "background knowledge" was developed prior to the creation of the alliance and not funded by the sponsor.

7. Are university faculty members free to share their sponsored-research results with other academic investigators?

Using our 1-to-10 scale, with 1 representing very weak protections for academic use and sharing and 10 representing very strong protections, the 10 agreements earned an average ranking of just 5.5 for protecting academic use and sharing. Given how important academic sharing is to the whole university and national scientific enterprise, this is troubling.

Since 2007, more than 50 U.S. research universities have endorsed a public statement listing nine core principles that all universities should be required to uphold in their licensing deals with industry.[55] The first of these principles calls for all universities to include a provision in their industry contracts—often known as a "research exemption" —that permits professors and students to freely share their sponsored-research results (including data, tools, and methods) with outside researchers for non-commercial research purposes, including verification of published research findings.

Nevertheless, only four of the 10 alliance agreements had strong academic-use and sharing provisions, receiving a rank of 7 or higher.[56] Five of the 10 agreements ranked 5 or lower (moderate to poor) for protecting the academic investigators' right to share sponsored-research with other academic scientists and scholars for purely research and non-commercial purposes, despite its centrality to the academic research enterprise.

8. Are conflicts of interest adequately regulated in these university-industry alliance agreements?

Nine of the 10 agreements fail to discuss the management of financial conflicts of interest related to the alliance and its research functions. The lone exception is Stanford University's Global Climate and Energy Project, where the agreement mentions the need to manage conflicts of interest only with regard to optional peer review panels (convened at the discretion of the industry sponsors) and third-party university grant recipients. This latter reference, however, was dropped from GCEP's, revised 2008 agreement.

None of the 10 agreements prohibit members who sit on the alliances' main governing body from having personal financial interests related to the research they are charged with overseeing and directing. At the BP-Arizona State University alliance there is no formal governing body so this question does not apply.

Similarly, none of the 10 agreements prohibits committee members charged with evaluating and selecting faculty research proposals from having financial conflicts of interest related to the research they are reviewing. Again, the lone exception is Stanford's Global Climate and Energy Project, where the agreement states that peer review panels must be free of conflicts, but these panels are optional, and used solely at the discretion of the management committee members, where the industry sponsors control all the votes.

Furthermore, none of the 10 agreements specifies that these committee members may not award commercial research funding to themselves, or their own labs. This type of potential conflict has already surfaced as a widespread problem at the BP-funded Energy Biosciences Institute administered by U.C. Berkeley. Specifically, after the EBI deal was finalized at the end of 2007, U.C. Berkeley's press office announced that the executive committee charged with evaluating faculty research projects for possible BP funding would have strong majority academic representation. And when the first formal executive committee convened in 2008 it had eight members, seven of whom were academics and one of whom was a representative from BP.[57] But when this report's author probed a bit deeper, she soon found that seven of these eight committee members had significant potential conflicts of interest, including all but one of the academics.

Two of the eight executive committee members, including the EBI's Academic Director and the lone BP representative, had financial ties to firms that could stand to profit from the EBI's academic research.[58] And five of the other committee members had a different potential conflict: All were listed on the EBI website, in the spring of 2008, as "primary investigators" on research projects funded by BP-EBI.[59] What this strongly suggests is that all five could award BP research grant money to themselves and their labs. At the very least, the application and receipt of BP-EBI funding calls into question whether these faculty members were capable of fairly and impartially evaluating other faculty research proposals.

More recently, these potential conflicts of interest on the EBI's executive committee seem to have only worsened. As of September 2010, the EBI listed a total of 13 executive committee members: 11 academics and two representatives from BP. Yet 10 of these academics are also listed as primary EBI investigators or heads of projects supported with BP-EBI funding, and one, EBI Director Chris Somerville, continues to have personal financial interests in an outside firm partnering with BP on research that is similar to that of EBI.[60] That means three of the executive committee's 13 members have financial ties to firms that could profit from EBI research, and the other 10 are academic researchers who have vested research and financial interests with the EBI that could compromise their ability to evaluate incoming faculty research in an impartial and disinterested manner, based on scientific merit (for more details, see the box on conflicts of interest on page 64).

Implications

The 10 university-industry agreements reviewed for this report reveal a considerable amount about the goals and expectations of the big energy companies as well as the research conditions and constraints that academic researchers at U.S. universities are now operating under as a condition of their acceptance of this private industry financing.

Our review found that the terms and conditions outlined in these 10 agreements do not always show parity between the two sets of research partners. Indeed, the report's analysis supports the author's view that, in fundamental respects, the vast majority of these contracts seriously challenge the historic research integrity and the independence of the universities involved.

In the recent past, private industry (through Bell Labs and numerous other corporate research hubs) conducted a substantial amount of scientific research and technological development. Over the past 30 years, however, many private companies have vastly reduced their R&D investments, and downsized or outright eliminated their own in-house scientific and technological expertise. What research these companies do continue to fund is increasingly contracted out to third parties, including private contract research labs and U.S. universities. This is not true of all firms, of course, but it is certainly true of most of the large, established energy companies, as this report demonstrates.

On campus, meanwhile, the research climate is also rapidly changing. Thirty years ago, large-scale, multi-year strategic corporate research alliances on campus were far less common, and overt academic commercialism was largely taboo. Today the boundary between academic research and commercial research is far more blurry. So far, the long-term consequences of this subtle but important shift in the nation's science-and-technology infrastructure have not been well explored. This shift is especially important to consider in the energy sector, where independent university scientists and experts are urgently needed to measure and interpret today's complex global-warming problems, uncover path-breaking new technologies, and provide impartial advice and expertise to the public and government agencies regarding effective public policy.

Because this independent university sector remains so vitally important, the Obama administration, Congress, federal agencies, and university leaders across the country would do well to carefully consider the findings of this report, which point to several intriguing new conclusions regarding the efficacy of developing new sources of alternative energy through joint university-industry research partnerships.

First of all, the manner in which these industry contracts were negotiated and concluded points to numerous potential challenges for future U.S. university negotiators. Many of these agreements fail to make any clear distinctions between independent, academic research and commercial research for hire. If more U.S. universities begin to work with the energy industry through these types of contract-research arrangements then it will be far more difficult for them to continue producing credible, independent energy research in these critical academic fields. One has only to review the extensive science literature on pharmaceutical industry influence and conflicts of interest in academic medicine to see the potential hazards that can arise from tearing down the boundary walls that separate academic and commercial research.[61]

Second, preserving an independent research sector inside top-ranked U.S. universities remains vitally important for the advancement of clean energy research and the health of the U.S. science and innovation system more broadly. U.S. universities have traditionally performed many types of research (curiosity-driven science, fundamental inquiry, disinterested research) that private firms were unable, or unwilling, to finance adequately on their own, because of shorter-term commercial, strategic, and profit considerations. Many of this nation's most path-breaking scientific discoveries—including those that launched the biotechnology, computing, and information-technology revolutions—were born out of publicly financed research, performed in academic labs.

Of course, private industry has also made enormous contributions to U.S. science and innovation. But until recently, most major firms operated their own independent, commercial R&D labs. It remains highly uncertain what will happen to our nation's unique academic sector if private industry continues to move its R&D operations onto U.S. campuses without showing adequate respect for the university's highly distinctive academic research culture.

Third, we need to preserve a research sphere that is committed to public-good research—research that has enormous social value, but which rarely generates commercial profits. In the area of energy research alone, this might include studies comparing the relative social, economic, energy, and environmental consequences of various competing alternative-energy technologies, or advanced research to measure carbon and other greenhouse gases emitted from various sources, or the development of effective carbon caps, taxes, trading, and measuring systems. Without this type of public-good research—carried out independently of specific commercial- or special-interest groups—it is far more difficult for political leaders and the public to develop effective, enlightened public policies.

Finally, public-private partnerships will certainly be necessary for bringing new clean-energy research and technologies into the commercial marketplace, whether they originate in academic labs, government labs, or commercial labs. But these partnerships should not be pursued in a manner that compromises the long-term health of this nation's public research sphere. When U.S. government agencies, including the Department of Energy, issue public-private R&D grants, they should clearly differentiate between the research objectives of American universities and the objectives of the individual private-sector partners. This can be done by crafting standard legal agreements between the federal funding agencies, U.S. universities, and private firms that vigorously protect the universities' core academic- and public-knowledge missions, including their commitment to self-governance, free inquiry, and research independence. Commercial firms should be required to accept these terms in exchange for government research support.

In the final section of the main report, we offer recommendations for avoiding what we see as the problems with the contracts at these 10 universities, through our "detailed contract reviews" featured in this report's appendices. The purpose: so the problems will not be repeated at other universities. The goal of these recommendations is to ensure that

corporations seeking to partner with U.S. universities to capitalize on academic expertise and resources are not granted excessive commercial influence over the academic research process and, in some instances, overly broad commercial advantages as well. We briefly detail these recommendations here.

Recommendations for the U.S. government

Launch an "Apollo Project" for clean-energy, climate, and efficiency R&D with strong academic and public-interest safeguards

In 2009, for the first time in several decades, the U.S. Congress significantly boosted energy R&D spending. When both stimulus money and appropriations funding are included, the 2009 Department of Energy budget for R&D bounced 68 percent (over 2008 funding levels) to $16.3 billion, with the largest portions going to Basic Science ($6.1 billion) and Energy R&D ($6.4 billion), and the remainder ($3.8 billion) going to DOE defense-related research. Of this, roughly $3.95 billion is slated for Energy Efficiency and Renewables R&D specifically. Such investments must continue.[62] It is time for the U.S. government to launch a major new initiative to finance cutting-edge research in clean energy and energy efficiency at U.S. universities on the scale of past federal science programs, such as the Apollo and Manhattan projects.

Before the U.S. government invests in additional R&D, however, it should develop "standard contract language" attached to every federal research grant for universities that obligates the university to uphold certain core academic and public interest obligations—no matter whether this funding comes via the federal government alone, or in combination with corporate matching grants.

Require all federal energy grants be issued using expert peer review

Renewed U.S. investment in energy-related R&D should be accompanied by a standard federal contract that requires use of impartial expert peer review by all federal, university, and private industry research partners. Allocating federal science funding through an independent, scientific peer-review process is the only way to ensure that taxpayer grants are awarded on the basis of true scientific merit. Use of independent expert peer-review should also be stipulated in all academic-industry-government R&D alliance agreements.

Allocate sufficient funds for fundamental, pre-commercial science and other vital public-good research

The federal government likes the idea of using public-private partnerships to maximize the economic impact of public science spending. And certainly using government R&D fund-

ing to leverage (and also stimulate) industry R&D spending can be a "win-win" combination. But public-good research should involve more than the pursuit of technologies with the potential for near-term commercialization. As transportation expert John DeCicco at the University of Michigan explains: "Ultimately, public-good research needs to be directed toward achieving critical public-good outcomes such as lowering global greenhouse gas emissions in the near term, not just the development of new technologies."[63] Academic expertise is urgently needed to tackle a broad array of public interest problems, and also to advance public knowledge and understanding.

Recommendations to U.S. universities

This report also offers recommendations on how to sustain America's vibrant public research infrastructure, and our universities' commitment to high-quality, disinterested, public-good energy research. Here, we briefly summarize these recommendations.

Police commercial conflicts of interests

U.S. universities must not allow their quest for research revenue or, increasingly, their quest for earnings from the transfer and commercialization of academic research, to distort their core academic and public-knowledge functions. Industry relationships and other commercial activities on campus should not compromise the universities' fundamental commitment to the pursuit of truth, impartial inquiry, and public-good knowledge.

This is not to say that U.S. universities and their faculties should disregard the potential commercial applications of their academic research and discoveries. Not at all. But universities need to make a far more vigorous effort to oversee and, whenever possible, eliminate financial conflicts of interest on campus (both at the faculty and at the institutional levels) to preserve their scientific and academic integrity, research independence, and public trust. This process, too, could be vastly aided by stronger federal conflict-of-interest guidelines attached to federal research grants.

Maximize faculty involvement in the design and oversight of large-scale corporate-research alliances

University faculty, through their main governing body—the academic or faculty senate—should be fully involved in the planning, execution, and monitoring of any large-scale, academic-industry research alliances proposed on campus. These large, multi-year corporate-research alliances tend to have a broad impact on the whole academic institution, due to their size, duration, and potential influence on the public perception of the institution compared to more common, smaller industry-sponsored research agreements. As such, they warrant far greater faculty-senate involvement

in their initial design, formation, and subsequent oversight. This will also engender greater campus support and public trust through enhanced transparency.

Safeguard academic autonomy

To protect the American university's valuable traditions of self-governance and research independence, academic representatives (not industry representatives) should retain strong (preferably two-thirds) majority representation and voting power on any academic governance bodies that are charged with overseeing or administering university-industry research alliances on campus. Equal distribution of voting power is not sufficient, because it does not protect the university's tradition of self-governance and research autonomy.

Retain academic control over research selection and the use of independent expert peer review

University representatives should retain majority representation (and voting power) on any academic body that is charged with evaluating faculty research proposals, and/or making final research awards, as part of any large-scale, multiyear, university-industry research alliance. Faculty research proposals should also always be evaluated using independent expert peer review so research excellence, not merely narrow commercial preferences or profit criteria, guide the academic selection process. And experts selected to judge faculty research proposals should never be in a position to derive any financial benefit from the alliance (or its corporate sponsors). They should remain free of personal financial interests that could in any way bias or prejudice their evaluations.

Minimize delays on publication

U.S. universities should not permit their industry sponsors to delay publication for longer than 60 days, which the National Institutes of Health and other federal agencies deem sufficient time for the commercial sponsor to file for provisional patent protection and remove any sensitive corporate proprietary information. Publication is an academic principle that helps ensure the rapid diffusion of public knowledge, which is independently scrutinized and verified for accuracy.

Protect academic knowledge sharing

Any university that enters into a large-scale industrial research alliance should include a legal clause—known as a "research exemption" or "academic-use exemption"—as part of its licensing agreement with the corporate sponsor. This "exemption" permits all univer-

sity professors to freely share their sponsored-project results (related to any published academic research) with other scientists, both within their own academic institution and at other non-profit and governmental institutions, for purely non-commercial, research purposes. Too many schools continue to overlook this critical knowledge-sharing function even though it is the first principle enshrined in a 2007 academic statement titled "In the Public Interest: Nine Points to Consider in Licensing University Technology," endorsed by more than 50 universities.[64]

Resist monopoly ownership of academic knowledge

Researchers rely on the wellspring of shared academic knowledge to stimulate their own creativity, research, and scientific and technological discovery. Over the past several decades, in an effort to extract rents from campus-based research, U.S. universities have imposed proprietary restrictions on a growing share of this academic research. Because U.S. universities remain heavily reliant on U.S. taxpayer support for their research-and-development funding, it is important for these academic institutions to resist the temptation to grant their corporate sponsors exclusive, monopolistic control over the universities' academic research, most of which is heavily subsidized by public sources. To the greatest extent possible, U.S. universities should license the bulk of their research nonexclusively so it may be used by multiple parties in diverse research and commercial applications.

Together, these sets of recommendations to the federal government and universities would help both private industry and the American public by preserving a vibrant, high-quality, public research sector. The analysis of these 10 university-industry research contracts alongside our observations and recommendations can help the Obama administration and Congress as they consider new measures, such as national limits on carbon pollution, a Clean Energy Technology Fund, and other programs to stimulate sustainable energy and clean energy technologies. By ensuring that the balance in these collaborative research efforts tilts strongly in favor of academic independence, the administration and Congress have a rare opportunity to restore this vital balance between our public and private research sectors. Our energy security, global environment, and economic competitiveness all hang in the balance.

Energy research at U.S. universities

Why are academic-industry alliances on the rise?

The 10 agreements that form the centerpiece of this report shine a rare spotlight on the growth of large-scale research alliances between U.S. universities and private energy companies across the academic energy sector. We begin this report by considering why these public-private research partnerships have become so prevalent at U.S. universities over the past decade. Specifically, we will examine:

- Why American universities are turning to major energy companies, collectively known as "Big Oil," for a growing share of their energy-research funding
- Why these private companies are outsourcing more of their commercial research and development needs to U.S. universities
- Why the U.S. government increasingly is driving the formation of these academic-industry partnerships

The consequences of these trends on the future direction and quality of U.S. research and development in more efficient, low-carbon, clean-energy technologies are far from clear today.

This analysis could not be more timely. President Barack Obama is clearly committed to boosting U.S. spending on basic science and applied R&D in the energy sector, as evidenced by his first budget for science and technology approved by Congress in March 2009.[1] The president has also repeatedly pledged to spend $15 billion annually over the next 10 years toward a new Clean Energy Technology Fund, hopefully to be financed from the receipts of a future national cap-and-trade program dedicated to curbing greenhouse gas emissions.[2]

A significant, as yet unspecified, portion of this fund would be devoted to energy R&D performed by U.S. university investigators, often in tandem with private industry partners. Top Obama administration officials, including Steven Chu, who heads the Department of Energy, and Steven E. Koonin, his undersecretary for science, have already exhibited strong support for using public-private partnerships to advance clean-energy R&D.

In fact, in 2007, prior to joining the administration, both Chu and Koonin were instrumental in brokering a $500 million research collaboration (discussed in detail in this report) between the British-based oil giant, BP PLC, and three major U.S. taxpayer-financed research institutions: the University of California at Berkeley, the University of Illinois at Urbana-Champaign, and Lawrence Berkeley National Laboratory, a federal research lab managed by U.C. Berkeley. At the time, Chu was a Nobel Prize-winning scientist and director of Lawrence Berkeley, and Koonin was serving as BP's chief scientist.

As we will learn, the DOE division dedicated to "energy efficiency and renewables" already has a strong preference for awarding federal research grants through public-private partnerships and other industrial cost-sharing arrangements. U.S. universities, meanwhile, are aggressively pursuing industry alliances on their own, in part to make up for chronically low federal investment in energy R&D, and to attract federal grants that support commercial collaborations, such as those issued by DOE.

This is why the 10 academic-industry research agreements analyzed in this report provide a unique opportunity for the Obama administration, Congress, and federal grant-making agencies, as well as public-interest and environmental groups, to reflect on this pattern of directing a growing share of our federal research dollars—and our academic expertise—to commercially directed energy-research pursuits. Congress and the administration need to know:

- How effective are these public-private partnerships in advancing clean-energy technologies and other public-good research to address climate change?
- Do they speed the commercial development of clean-energy technologies and bring them to market more quickly, as proponents claim?
- Or do they instead, if not properly regulated and aligned with public-interest goals, potentially narrow the research topics, scientific avenues, and preferred energy pathways that university scientists (and their students) feel free to explore?

To answer these questions, the first part of this report is divided into three sections. First, we'll consider the vantage point of the American university. Why are U.S. universities opening their doors to Big Oil and other large energy firms? And why, in turn, are academic energy experts turning to industry for a growing share of their research funding?

Second, we'll consider the perspective of Big Oil and other large energy-related companies. Why is Big Oil downsizing its own internal R&D capabilities while outsourcing more of its research needs to U.S. universities? Is Big Oil genuinely committed to clean energy, or is this largely a PR move designed to "green" its public image and influence the direction of public policy?

Third, we'll consider the perspective of the U.S. government. Why is the federal government pushing public-private research partnerships, and other industrial-cost-sharing arrangements in much of its grant making? What impact is this having on this nation's science and technology research infrastructure?

The university perspective

We'll examine this last question, not so much in terms of the distinction that is popularly drawn between "basic" and "applied" research—which is largely artificial in the area of targeted energy research—but rather in terms of the distinction between research that is directed toward public-interest goals versus commercial business goals.[3] These goals, of course, are not mutually exclusive, but neither are they always aligned.

Why are U.S. universities opening their doors to Big Oil?

In researching this report, we initially identified more than 55 large-scale energy-research agreements (ranging from $1 million to $500 million) negotiated over the past decade alone between private companies in the oil, gas, coal, electricity, auto, and agriculture sectors and 35 leading U.S. universities. In total, these 55 university-industry alliances are worth an estimated $1.3 billion to $2.2 billion over 10 years in projected R&D spending on campus.

There is no centralized national system for tracking individual academic-industry research grants, and most universities will not release comprehensive information, which means our tally of large-scale energy-research alliances—drawn largely from media reports, press releases, and database searches—is by no means comprehensive.[4] It focuses primarily on large-scale commercial deals, which are more frequently reported and easier to track. As such, our research does not include the numerous individual smaller-size grants (worth less than $1 million) that companies routinely award to university faculty. Case in point: Tadeusz W. Patzek, who chairs the Petroleum and Geosystems Engineering department at the University of Texas at Austin, says that his department alone has $8 million to $9 million worth of these smaller industry-sponsored grants, which did not appear in our public searches.[5]

Nonetheless, our initial research indicates that over the past decade, energy industry alliances with U.S. universities have proliferated throughout the academic energy-research sector.

One of the main forces driving these academic-industry partnerships is clearly money. According to virtually every academic administrator and energy expert we interviewed for this report, persistent shortfalls in U.S. government outlays for energy research and

development propelled American universities to seek greater financial support from private industry. "We're intent on getting funding from wherever the sources are, and a lot of the sources right now are in industry," noted Roger Webb, the founder and interim director of the Strategic Energy Institute housed at the Georgia Institute of Technology.[6]

According to Webb, private industry now funds an astonishing 50 percent of Georgia Tech's energy-research activities, compared to roughly 20 percent of the school's academic research activities overall.[7] It is worth noting that industry-funding levels at Georgia Tech, an engineering school, are far higher than the average for U.S. universities nationally, which currently receive only roughly 6 percent of their overall academic research funding from industry sources.[8] Nevertheless, many top American universities—especially those with large engineering programs or medical schools—do derive far larger percentages of their research funding from private industry compared to this national average.[9]

Virtually all the major authoritative studies that examined U.S. federal spending on energy R&D (including ones by the President's Committee of Advisors on Science in 1997, the National Commission on Energy Policy in 2004, and a recent 2007 study by two prominent academic experts) arrived at the same basic conclusion: U.S. spending is woefully inadequate to address the climate-change and global energy challenges that lie ahead.[10] (see adjacent box and graph)

It is helpful to view the United States' current commitment to energy R&D within the larger context of overall federal R&D spending. Compared to the roughly $3 billion to $4 billion per year that the U.S. spent on energy R&D over the last decade, real federal spending on defense R&D and health R&D averaged $58 billion and $22 billion per year, respectively, over the same 10-year stretch.[14] (see graph on page 34)

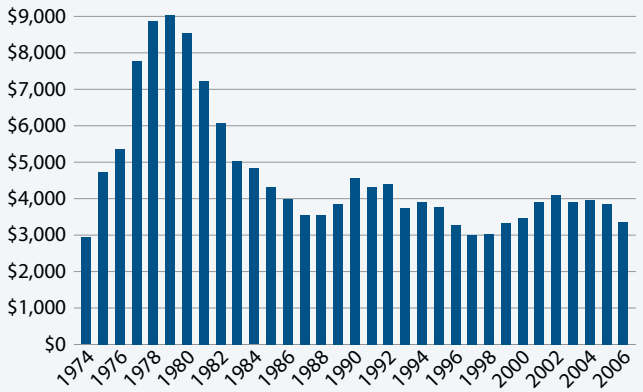
U.S. neglect of energy research and development

For more than a decade, U.S. spending (in real dollars, after accounting for inflation) on all energy-related R&D remained stuck at roughly $3 billion to $4 billion per year. This represents a major decline from 1979, the peak year of U.S. energy R&D spending, when the federal government—responding to the 1973 OPEC oil crisis and subsequent oil price shocks—raised energy R&D outlays to $9 billion.

Unfortunately, the worsening climate-change crisis and global energy challenges of the past several decades haven't had anywhere near the impact on U.S. energy R&D spending as the oil crises of the 1970s once did. Between the Carter administration and the second Clinton administration, for example, real U.S. government spending on all energy R&D plummeted from an annual average of nearly $8.3 billion to an annual average of just under $3.2 billion[11] (see graph below). What's more, according to the Federation of American Scientists, from 1980 to 2007 federal energy research in new energy technologies actually declined by more than 50 percent.[12]

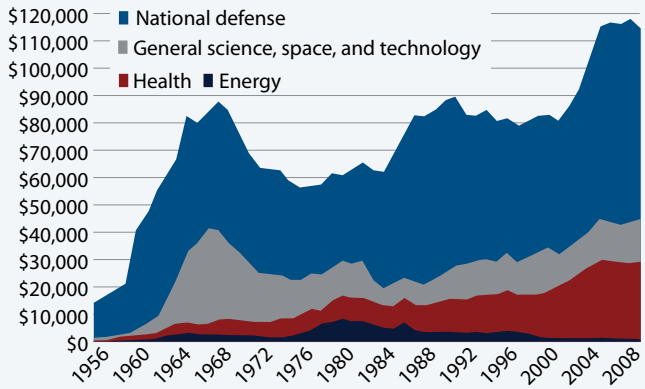
Sliding federal support for energy research and development

U.S. public sector energy R&D, 1974–2006 (constant 2006 dollars, millions)[13]



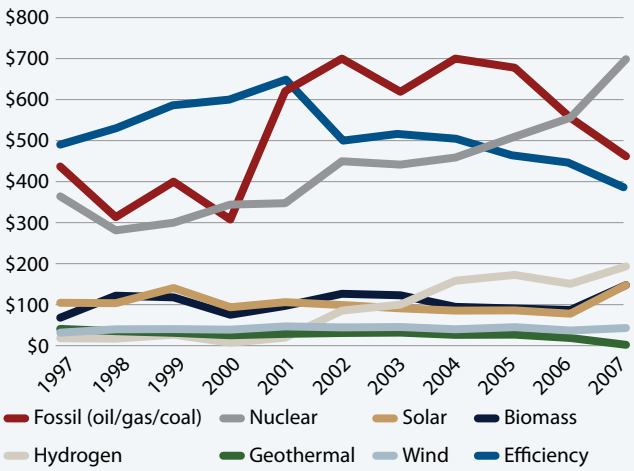
Energy's shrinking share of the research and development pie

Federal outlays for R&D by budget function (constant 2006 dollars, millions)[15]



U.S. renewable energy research and development shortchanged

DOE budget authority for research, development, and demonstration, FY 1997–2007
(constant 2006 dollars, millions)[17]



Worse still, only a small fraction of America's energy R&D budget is actually devoted to renewable and other clean-energy sources. Renewable energy is commonly defined as an energy source that is replaced by natural processes at a rate comparable to its use. This may include energy produced from wind, solar, water, geothermal, bioenergy, and landfill gas, depending upon the energy ratio that is achieved. From 1982 through 2007, every U.S. administration has spent at least 70 percent less on renewable energy R&D than the Carter administration did.[16] Over the past decade, renewable energy sources such as solar, wind, hydrogen, and biofuels have remained a shockingly low U.S. energy R&D priority. (see graph at left)w

Low federal investment in energy R&D is certainly one driver propelling U.S. universities to forge closer research ties to Big Oil. But it is by no means the only reason. Many academic scientists cite numerous benefits to working closely with outside companies, beyond just the funding to pay for academic research. These include:

- Open lines of communication with talented industry scientists, many of whom are outstanding researchers in their own right
- Industry input regarding the practical applications of new academic discoveries, market opportunities and limitations, as well as the feasibility of commercial scaling
- Access to corporate proprietary knowledge sources
- Heightened commercial involvement with early-stage academic research, which may help to speed subsequent commercial development

When Steven Chu, the current U.S. energy secretary, was still a full-time physicist and director of Lawrence Berkeley National Laboratory, a federal lab managed by the University of California at Berkeley, he strongly supported the formation of a $500 million research partnership—known as the Energy Biosciences Institute—between the British oil giant, BP, and U.C. Berkeley, LBNL, and the University of Illinois at Urbana-Champaign. In Chu's view, such collaborations are likely to speed the development of next-generation biofuels and other clean-energy technologies. In one online interview posted on the EBI's official website, Chu explained:

This is not just academic research. We're trying to solve the… energy problem… We don't have that much time… If we did it the normal academic way, meaning you do your research [and] you publish… this is going to go too slowly. So at the get-go you want to partner with private companies that can tell us, 'No this approach won't go right, it's not going to scale right.'[18]

Still, the long-term impact of such extensive university-industry engagement on campus remains to be seen. In more heavily applied research fields—engineering, chemistry, and clinical medicine—academic scientists are quite accustomed to working in collaboration with researchers based in industry. In recent years, however, a variety of forces have pushed U.S. universities to become more overtly commercial themselves, and to aggressively pursue more expansive research-and-financial relationships with private industry.

This includes not just the pursuit of industry funding to pay for academic research, but direct commercial engagement and business partnerships as well, giving rise to what some experts now refer to as "academic commercialism" or the "market-model university."[19] So far, this approach has had mixed results: Over the past three decades, despite extensive outreach to industry, U.S. universities have been able to draw only roughly 5 percent to 7 percent of their overall research funding from industrial sources.[20] Meanwhile, closer commercial engagement has produced numerous internal financial conflicts of interest and other unintended consequences that appear to threaten many of the universities' core academic and public-knowledge missions (see box on page 36).

A look at one major strategic corporate alliance—the BP-funded Energy Biosciences Institute, which is featured in one of our 10 detailed contract analyses—points directly to some of the key issues. Shortly after the BP-EBI deal was first announced in early 2007, then-U.C. President Robert Dynes commented, "It is my belief that we're reinventing the research university in these kinds of government-public-private partnerships."[31] Dynes was correct. One of the more unusual features of the EBI deal is that it allows BP to set up a major commercial-research hub directly on the U.C. Berkeley campus.

Traditionally, most U.S. universities have striven to maintain an "arm's-length relationship" with their financial sponsors to safeguard their internal governing autonomy and research independence. The EBI agreement, however, permits up to 50 BP employees to lease commercial research space inside the same university buildings that house the EBI's main academic labs. As such, EBI is split into two distinct parts. One part is slated to function like a traditional academic lab, where faculty and students (as well as BP employees) are free to discuss and share information openly. The other part is designed to function as a closed, proprietary lab where all research will be exclusively owned by BP, and access will be tightly controlled by card-key access and nondisclosure agreements.[32]

The rise of academic commercialism

Benefits and costs

Dating back to the mid-1800s, academic scientists and private industry have enjoyed productive collaborations that led to the advancement of science and the creation of new scientific disciplines and innovative technologies. Few universities or their professors, however, ever sought to directly profit from their campus-based research, or go into business themselves, as they routinely do today. The rise of "academic commercialism" dates roughly to 1980, when a variety of forces pushed U.S. universities to forge closer ties with private industry, and become more overtly commercial themselves.

First, there was the rise of a knowledge-driven economy, which made academic research far more valuable to outside companies and venture capitalists. Second, changes in U.S. patent law vastly expanded the types of academic knowledge that were newly eligible for patenting, such as human genes, medical processes, and mathematical formulas. Third, the U.S. Congress passed landmark legislation, in 1980, known as the Bayh-Dole Act, named after its two original sponsors, Sens. Birch Bayh (D-IN) and Bob Dole (R-KS).[21]

The Bayh-Dole Act granted U.S. universities automatic rights to own all federally funded research performed on campus, and the right to patent and license that taxpayer research to industry in exchange for a share of the commercial rewards (patent royalties, equity, licensing fees). Supporters of the act argued it would unleash new incentives for U.S. universities to commercialize academic inventions, and thereby speed the pace of U.S. technological innovation at a time when the United States was facing growing competition from Germany and Japan. The legislation's economic legacy, however, is distinctly mixed.[22]

After its passage, nearly every university set up extensive patenting and licensing operations to commercialize and profit from campus-based research. University patents to academic inventions certainly soared.[23] Yet several recent published studies have found that academic patenting is not, in fact, closely correlated with increased industrial use and/or commercial development of academic research discoveries.[24] Only roughly two dozen U.S. universities generate sizable income from all this heightened commercial activity due to a few blockbuster inventions that generate revenue. The vast majority of universities, however, barely break even, or lose money, on their patenting and licensing operations.[25]

This is not because the academic research at these other universities has no "commercial value." It is because most university inventions are more fundamental and diffuse in their research and commercial applications, making them harder for one firm to exclusively capture and profit from. Much of this academic research has such broad commercial applications that it is best left in the public domain, where all inventors are free to use it to generate new discoveries and diverse products.

Meanwhile, critics charge that heightened commercialism on campus is rapidly altering the university's unique research culture, and pulling universities away from their core academic research, teaching, and public-knowledge missions.[26] A large body of analytical and empirical research finds that industry-sponsored research is far more likely to favor the corporate sponsor's products and/or commercial interests compared to government- or non-profit-funded research.[27] Studies also find that industry-sponsored research is linked to growing corporate control of academic data, delays on publication, increased secrecy, and reduced academic sharing of research data and materials.[28]

Academic commercialism has also given rise to growing financial conflicts of interest on campus.[29] Today it is common for both U.S. universities and their professors to have direct financial interests in their own campus-based research (through patents, licenses, equity stakes in new companies, and royalty agreements). Many individual professors also have extensive personal financial ties to companies that sponsor their own academic research (these professors receive additional fees for outside private consulting, positions on corporate speakers' bureaus and company boards, honorariums, conferences, and travel).

In recent years, there have been growing calls from Congress, academic journals, federal agencies, and professional societies for U.S. universities to more stringently regulate and/or eliminate their burgeoning financial conflicts of interest.[30] Because of the potential for scientific distortion, commercial collaborations on campus need to be carefully managed to protect the universities' core commitment to independent inquiry, public-good research, and high standards of academic excellence in accordance with the universities' heavy reliance on public financing.

Over the past two decades, U.S. universities have entered into many similarly large-scale, multiyear, commercial-research alliances, which are more commonly referred to as "Strategic Corporate Alliances." This trend has been particularly visible in both the pharmaceutical and energy research sectors.[33] Here are but a few recent examples in the energy arena (each of these deals is reviewed in detail in the Appendices 1-10 of this report):

- In August 2006, Chevron signed a $25 million, five-year deal with University of California at Davis to develop low-cost biofuels for transportation.

- In April 2007, ConocoPhillips signed an eight-year, $22.5 million research collaboration with Iowa State University to study and develop biofuels.

- In March 2007, the University of Colorado at Boulder announced it was forming an alliance with 27 large firms, including Archer Daniels Midland Co., Chevron Corp., ConocoPhillips, Dow Chemical Co., E.I. du Pont de Nemours and Co., and Royal Dutch Shell Group, to finance the Colorado Center for Biorefining and Biofuels, a biofuels research consortium that has brought in $6 million over three years.[34]

Cornell University defines a strategic corporate alliance as "a comprehensive, formally managed company-university agreement centered around a major, multi-year, financial commitment involving research, programmatic interactions, intellectual property licensing, and other services."[35] Although the BP-EBI deal was exceptionally large—$500 million over ten years—most of the energy alliances analyzed in this report generally fit this description.

But will they work as planned? In the energy sector, in particular, there is some cause for concern. In *Engines of Innovation: U.S. Industrial Research at the End of an Era*, David C. Mowery and David J. Teece, two noted experts on academic-industry relationships, observe that such alliances are likely to be successful only if the corporate sponsor retains its own internal scientific expertise and in-house R&D capabilities. "Without some capability to understand and exploit the results produced in collaborative research relationships [with university researchers], the returns to these external investments are likely to be low," they write.[36]

Regrettably, as this report will demonstrate in the next section, BP, Chevron, and other major energy firms have largely dismantled their own internal scientific R&D capabilities, which could severely limit their ability to capitalize on these university-based R&D investments. To this we now turn.

The energy industry perspective

Why are private energy companies contracting out their research to U.S. universities?

The business interests of individual firms working within the energy sector are certainly not identical. As Peter Barnes—the author, environmentalist, and founder of Working Assets, a long-distance phone company that devotes a portion of its proceeds to social and environmental causes—explains in an online essay, it may be helpful to divide "the energy industry" into at least two broadly distinct categories: "legacy" energy firms and "sunrise" energy firms.[37]

In general, notes Barnes, the more established "legacy" energy firms—in the oil, coal, gas, auto, electric, agriculture, and chemical industries—are highly profitable and "want to reap maximum return from their past investments." Not surprisingly, they tend to "favor the least demanding changes" when it comes to climate change in order to protect their current business models.

By contrast, the "sunrise" companies tend to represent a diverse array of companies working in wind, solar, high-tech, architecture, manufacturing, and many other diverse energy-connected fields. These sunrise companies are mostly betting their economic future on the business of new, more efficient, clean-energy technologies. "They're comfortable with change," says Barnes, "and hope to profit from it."[38]

The 10 academic-industry agreements that are the focus of our analysis in this report involve larger, established legacy companies in the oil, gas, auto, and agricultural sectors during the years 2002-2008. This was precisely the period when Big Oil companies, together with their allies in the Bush administration, were actively fighting the reality of global warming. But it was also a time when the scientific community—and the American public—had started to acquire a far deeper awareness of the gravity of global climate change.

By the fall of 2007, the world's premier scientific body on climate change had issued a dire warning to all nations: Take action now to dramatically lower greenhouse gas emissions or the world will face near-certain catastrophe from warming oceans, melting ice caps, rising sea levels, floods, drought, famine, and species extinction. As Rajendra K. Pachauri, the

chairman of the United Nations' Intergovernmental Panel on Climate Change, forcefully proclaimed: "If there's no action before 2012, that's too late. What we do in the next two to three years will determine our future. This is the defining moment."[39]

By and large, "legacy" energy firms adopted a highly bifurcated strategy to address this rising tide of scientific concern. On the one hand, many companies clearly saw the writing on the wall regarding the reality of climate change, which prompted them to start investing a small portion of their vast profits into targeted areas of alternative-energy research, some of which they directed to U.S. university researchers. (see table on pages 13 and 14 for a list of the 10 academic-industry energy deals reviewed in this report, and appendices 1–10 for detailed reviews of each of the 10 agreements)

On the other hand—and rather contradictorily—many of these same companies simultaneously clung to the same political strategy that they had mapped out during the prior decade. This involved denying the gravity of the global warming crisis, manipulating the science on climate change, and stalling or blocking government regulations, including tougher fuel efficiency standards and a carbon cap-and-trade program to put a price on pollution, which might cut into industry profit margins (see box on page 40).

Given its long history of denying climate science, it is not surprising, perhaps, that Big Oil's arrival on campus has received a mixed reception. Some academic scientists remain hopeful, like Steven Chu, that the energy industry has finally seen the light and is genuinely committed to the commercial development of new, clean-energy technologies. However, other university faculty, students, environmental activists, and shareholders remain deeply skeptical, believing the investments are more about public relations than commercialization. (see box on page 41)

Turn on the T.V. or open up virtually any magazine and you're likely to see an ad from a major oil, auto, agriculture, or other company touting its commitment to clean-energy technologies: biofuels, "clean coal," hydrogen fuel cells. Not infrequently, these "green" ads explicitly reference industry's multimillion-dollar investments at U.S. universities. Case in point: Shortly after BP finalized a 2007 agreement worth $2.5 million with Arizona State University to explore new photosynthetic bacteria that could be converted into biofuels (one of the 10 agreements analyzed in this report), Tony Meggs, BP's group vice president of research and technology, asserted: "This is an exciting new collaboration for BP, demonstrating our commitment to the development of technologies that have real potential for bringing sustainable, low-carbon energy to the world."[55]

However, relative to this advertising blitz, actual private industry spending on all types of energy R&D—not just low-carbon or clean-energy R&D—has been marginal at best. Since the mid-1980s, the energy industry has steadily invested less—not more—in all types of energy R&D (see graph below). As we will see later in this report, the overwhelming majority of this R&D continues to be spent on technologies to enhance oil and gas extraction.[56]

The oil industry's manipulation of global warming science

Starting in the late 1990s, Big Oil and other large firms united in their efforts to deny the science of global warming. This concerted industry campaign involved manufacturing scientific uncertainty concerning the human-induced causes of global climate change, and forestalling government regulation of fossil fuels and other sources of greenhouse gas emissions. This was primarily achieved by suggesting that any government regulation was premature, because the science on global warming remained so highly "uncertain."[40]

The energy industry's strategy was clearly spelled out in an internal memorandum drawn up by the American Petroleum Institute in 1998, just one year after nations signing the Kyoto Protocol had tried to implement new international targets for the reduction of global greenhouse gas emissions. API's strategy, titled "Communication Action Plan," asserted that:

> *"Victory will be achieved when average citizens 'understand'… uncertainties in climate science…[and] recognition of uncertainties becomes part of the 'conventional wisdom.'"*[41]

All API member companies contributed to this public relations campaign, but ExxonMobil played a particularly strong leadership role. According to a 2007 study by the Union of Concerned Scientists, from 1998 to 2005 ExxonMobil funneled nearly $16 million (small change for a firm with Exxon's profits) to a network of 43 organizations that sought to discredit and downplay the gravity of published research on global warming.[42] Exxon's funding, along with that of other large energy firms, empowered a tight-knit group of global-climate-change skeptics—several of them based at prominent U.S. universities—to manipulate peer-reviewed research and create the appearance of a serious scientific debate about climate change.

What made these non-profit and academic scientists especially valuable is that, in the public's eye, they appeared to be "independent scientific experts" motivated by the quest for sound science, rather than any business self-interest. This lent their opinions far greater legitimacy, especially when their industry funding sources were not publicly disclosed in published papers, media articles, and government testimony.

The second prong of this industry-led public relations campaign involved extensive influence-peddling on Capitol Hill. Here the energy industry found a willing ally in the Bush administration. Shortly after President George W. Bush entered the White House in 2001, he appointed Vice President Dick Cheney to head a task force that was charged with developing a new U.S. energy policy. This task force was highly controversial because it relied heavily on the recommendations of Big Oil firms, including ExxonMobil, Conoco, Shell, BP, and Chevron.[43]

In 2002, it came to light that ExxonMobil had written a secret memorandum asking the Bush administration to oust Dr. Robert Watson from his position as then chairman of the United Nation's International Panel on Climate Change, the world's leading scientific body evaluating global warming. That same year, the Bush administration followed the industry's bidding and removed Watson from his post.[44]

Throughout this period, the Bush administration also worked closely with its oil company allies to suppress information, originating from inside the U.S. government, concerning the science of climate change. Most of this suppression was shrouded in secrecy. But in 2007, the U.S. House Committee on Oversight and Government conducted a detailed internal federal investigation, which found that:

> *White House officials and political appointees in the [federal] agencies censored congressional testimony on the causes and impacts of global warming, controlled media access to government climate scientists, and edited federal scientific reports to inject unwarranted uncertainty into discussions of climate change and to minimize the threat to the environment and the economy.*[45]

These findings led the committee to conclude that "the Bush Administration has engaged in a systematic effort to manipulate climate change science and mislead policymakers and the public about the dangers of global warming."[46]

Is Big Oil's move on campus just another public relations stunt?

Skeptics at U.S. universities contend that recent oil industry investments in campus-based research are little more than a PR stunt designed to burnish the industry's "green image." They note that the energy industry as a whole suffers from extensive bad publicity due to popular distaste for high gas prices, windfall oil profits, massive oil spills from poorly managed pipelines, expanded drilling in undisturbed wilderness areas, and corporate lobbying designed to undermine fuel efficiency standards and other restraints on greenhouse gas emissions. And it's certainly true that industry grants to U.S. universities do tend to attract positive PR.

When BP announced it was launching the Energy Biosciences Institute, U.C. Berkeley Chancellor Robert J. Birgeneau, flanked by Gov. Arnold Schwarzenegger and other smiling California politicians, glowingly declared EBI "our generation's moon shot." The chancellor went on to say: "We congratulate BP for their farsighted vision in tackling the most difficult problem of our time: solving the global energy crisis through technology that avoids damage to our environment."[47]

However, just 10 months after BP announced this high-profile biofuels investment, the company announced it would invest roughly $6 billion—more than 11 times the value of the EBI deal—in the notorious tar sands of Alberta, Canada, where oil drilling operations are known to be extremely difficult, costly, and also highly polluting.[48] Interestingly, part of the work scheduled to be performed at EBI is specifically directed at developing genetically modified microorganisms that would break down the tar and make it easier to extract with unknown impacts on the environment.

Glaring contradictions in Big Oil's commitment to clean energy are certainly not hard to find. In 2007, Tony Meggs, then BP's group vice president of research and technology, proudly announced: "The energy sector as a whole is going through a period of rapid and complex change, with an explosion of investment in the sustainable energy sector." Meggs's pronouncement came shortly after BP signed a $2.5 million agreement with Arizona State University (discussed in this report) to develop new photosynthetic bacteria that could be converted into biofuels.[49] But Meggs's assertion that the energy industry has witnessed an "explosion" of new investment in sustainable energy was certainly overblown.

Since the mid-1980s, energy industry investment in all types of R&D has plummeted (see graph on page 42). Industry investment in sustainable energy R&D is also unimpressive, although here reliable industry data is far more difficult to obtain. Most energy firms do not divulge breakdowns of their R&D expenditures, making it difficult to track their actual clean-energy expenditures. From time to time, however, these oil firms do publish estimated spending projections related to their alternative-energy business enterprise. These figures confirm Big Oil is investing precious little of its vast profits in low-carbon or other clean-energy R&D.

Consider BP's "2006 Sustainability Report," which states that the company is slated to invest $8 billion in BP's entire alternative energy business by 2015, though this figure represents far more than just R&D.[50] In a 2008 interview for this report, prior to his becoming undersecretary of science, Steven Koonin, then BP's chief scientist, confirmed that this 10-year estimate remains up-to-date.[51]

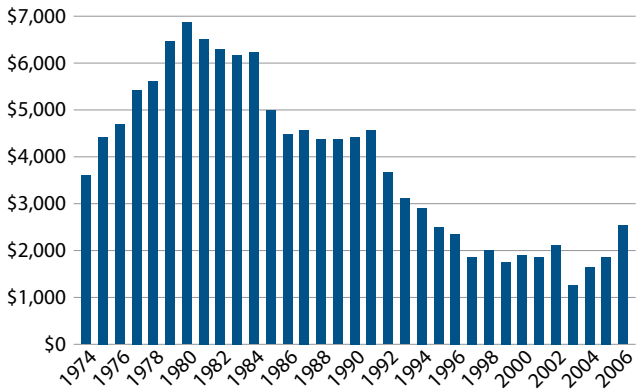
First, let's conservatively estimate that BP's average business performance from 2006-2015 will remain roughly on a par with its 2003-2007 performance. During this period, BP's average annual revenues stood at $233 billion, and its average profits at $19.2 billion. So using the company's own alternative-energy expenditure projections, we can extrapolate that BP is planning to spend a mere 0.34 percent of its revenues (and just 4.2 percent of its vast profits) on its entire alternative energy business over the next 10 years.[52]

Probing a bit deeper, let's consider BP's $500 million investment in EBI, headquartered at U.C. Berkeley. Inside the university setting, this level of investment looks massive. But once again, relative to BP's vast profits, it is a drop in the barrel: BP's total investment in EBI over 10 years will equal just 0.021 percent of BP's total projected revenues and 0.26 percent of its projected profits over the period 2006-2015.[53]

These figures help explain why many academics and other outside observers are dubious about the sincerity of Big Oil's commitment to researching and actually developing clean-energy alternatives to fossil fuels.[54]

Funding falls for private-sector energy research and development

Private sector energy industry R &D expenditures, 1974–2006[57]



It's true that, starting in 2006, industry spending on energy R&D did start to rise, but compared to the last global energy crisis of the 1970s, these R&D gains have been astonishingly small. The annual reports for four of the largest oil companies—ExxonMobil, BP, Shell, and Chevron—between 2000 and 2007 (before the Great Recession began) do show some overall gains in R&D spending, though none of these companies provide any breakouts of their low-carbon or clean-energy R&D spending specifically. But these gains—still directed overwhelmingly toward enhanced oil and gas recovery—remain truly marginal, especially in light of the industry's vast profit margins during this same time period. In constant 2006 dollars, here's what the companies' own annual reports reveal :

- ExxonMobil's total R&D spending has remained essentially flat since 1993, with barely any increase.
- Shell had the fastest growth in R&D expenditures over the past five years (out of the four firms), but because Shell's R&D outlays had dropped dramatically throughout the 1990s, actual gains were marginal.
- BP continues to spend less on energy R&D than either ExxonMobil or Shell. Despite dubbing itself BP or "Beyond Petroleum" in 2000, BP's aggregate spending on all energy R&D is still roughly the same as it was a decade ago, although BP's recent pledge of $50 million per year over 10 years for the Energy Biosciences Institute will lift this total slightly.
- Chevron's aggregate spending on R&D remained extremely low and flat from 1999 through 2004. Since 2005, Chevron's R&D outlays rose, but they still remain the lowest of the four.[58]

Relative to the rest of American industry, the energy industry's meager investment in R&D certainly stands out. According to a 2007 study by energy experts Gregory Nemet and Dan Kammen, during the years 1988 to 2003, the U.S. energy industry invested a mere 0.23 percent of its total revenues in R&D, well below the rate of 2.6 percent of GDP for U.S. industry as a whole.[60] This gap looks especially stark if you compare energy industry R&D expenditures with those of more research-intensive industries, such as drugs and medicine. Kammen and Nemet found that the energy industry's combined expenditures on R&D amount to less than the R&D budgets of individual biotech companies, such as Amgen and Genentech.[61](see graph above)

Indeed, according to the Society of Petroleum Engineers, "Within the oil and gas industries, fewer companies maintain internal research and development groups. Increasingly, companies rely on third-party R&D providers—universities, research institutes, and other organizations—for development of new technologies or new applications for existing technologies."[63] This industry downsizing helps to explain why Big Oil and other large legacy firms are now transferring, or "outsourcing," a larger share of the commercial R&D they do wish to perform to U.S. universities.

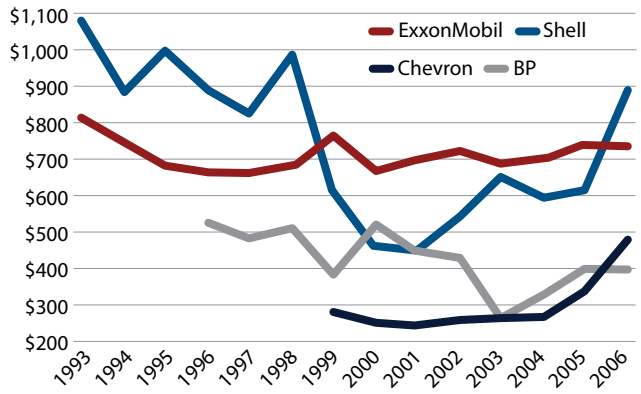
According to Alan Weimer, a chemical and biological engineering professor at the University of Colorado at Boulder, who serves as the executive director of the Colorado Center for Biorefining and Biofuels, or C2B2, a major industry-funded consortium examined in this report: "Nearly all the energy companies basically axed most of their research capacity, if not all of it. They don't have any expertise in areas like biofuels, so now you have these big oil companies funding academia because they're trying to get into new areas."[64]

Big Oil's interest in buying access to university-based scientific talent and energy-related expertise is certainly one of the primary factors now driving its move on campus. But according to Lisa Lorenzen, the current director of Industry Relations at Iowa State University, who helps administer a major biofuels research collaboration with ConocoPhillips (also examined in this report), universities bring additional strategic industry benefits as well. "I think a lot of the reason the industries are making these big [university] investments is because we don't know yet what [energy] technologies are going to work," Lorenzen explained in an interview. In the energy sector, she added, "it's not like there's only one direction you can go, there's about twenty directions you could go. So, these academic partnerships help corporate managers figure out what is the next strategic direction for the company."[65]

A final benefit to outsourcing industry research to academia is cost. According to Alan Weimer, head of C2B2, "academia is pretty cheap, because you've got these graduate students working like slaves making $24,000 a year with an overhead rate that's probably 50

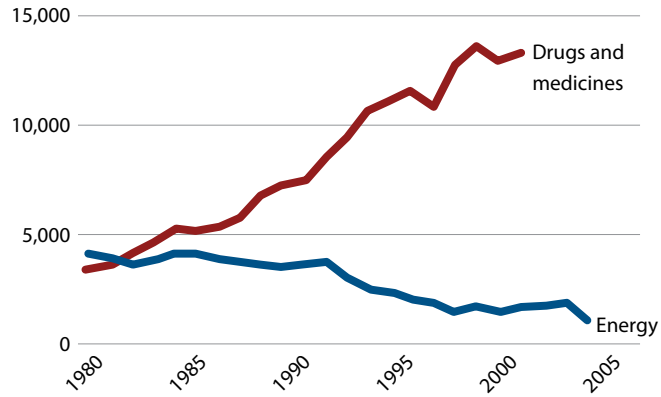
Big Oil's research and development spending trends

Reported R&D spending, major integrated energy companies, 1993–2006 (constant 2006 dollars, millions)[59]



Life sciences versus energy R&D investments

Private-sector R&D investment: energy versus drugs and medicines[62]



percent." Compare this, said Weimer, to the "[commercial research] companies out there with overhead rates of 150 percent, paying people $100,000 a year. It's a lot cheaper to do research in academia."[66]

Of course, university labs and their labor force (including world-class research faculty, graduate students, and post-doctoral candidates) are heavily subsidized by U.S. taxpayers through numerous channels, including federal research grants, fellowships for graduate students, and student tuition aid; state educational support; publicly financed buildings, labs, and equipment; not to mention substantial tax breaks. Companies, too, receive generous federal tax breaks whenever they invest in academic research.

In fact, the only real potential downside to university-research alliances from the industry vantage point could be that the corporate sponsor is not supposed to control or direct the universities' research inquiry. Traditionally, U.S. universities have strived to ensure that all corporate-sponsored research performed on campus is academically driven, and conducted fully independently of the sponsor. As a U.C. Berkeley Academic Senate "Task Force on University-Industry Partnerships," referring to BP's $500 million EBI grant, recently cautioned:

> *The research undertaken … should be in the tradition of university based research and consonant with our public mission. It should be an appropriate mixture of pure and applied research, and the research should not in any way be conceived of or seen as work made for hire for the benefit of the corporate sponsor.*[67]

But as our analysis of 10 current university-industry alliance agreements discussed a bit later in this report strongly suggests, this boundary between independent, academic research and commercial research "for hire" is fast eroding. Before turning to those agreements, however, this report will first examine the federal government's perspective on these strategic corporate alliances on campus and their value in promoting alternative energy and renewable energy research.

The U.S. government perspective

Why is the federal government promoting public-private partnerships?

Not just universities and private firms are pushing public-private partnerships to hurry the development of new sources of clean energy—the U.S. government is a strong proponent as well. In fact, over the past three decades, many federal funding agencies, including the U.S. Department of Energy, have started to disburse a growing share of their federal research dollars through public-private cost-sharing arrangements.

According to Doug Hooker, director of renewable energy at the DOE's Golden Field Office in Colorado, which handles grants issued by DOE's Office of Energy Efficiency and Renewable Energy, roughly 80 percent to 90 percent of federal research funds now going to finance renewable-energy and efficiency research are disbursed through some form of public-private cost sharing.[68] Usually, he says, the corporate beneficiary of this taxpayer money is asked to provide a 20 percent to 50 percent matching grant, depending on the research project and its proximity to commercial application.

"We are leveraging the available dollars that are out there in the private sector," Hooker explained in an interview. "We believe it helps with the success rate and the industry's commitment to these technologies."[69] This position is largely in line with views expressed by Energy Secretary Chu and his undersecretary for science, Steven Koonin, as well as other proponents of academic-industry alliances. They argue these public-private collaborations facilitate early-stage commercial input into the academic-research process, and improve the chance of both research success and subsequent commercial development of the resulting clean-energy technologies.

What's more, President Obama last year pledged that he is committed to spending $15 billion annually over the next 10 years to fund a new Clean Energy Technology Fund that, if created, would be financed with the receipts from a future national cap-and-trade program designed to rein in greenhouse gas emissions. A significant, as yet unspecified, portion of this fund would very likely be devoted to energy R&D performed by U.S. university researchers in tandem with private industry partners, not unlike the academic-industry alliances examined in considerable detail later in this report.[70]

At U.S. universities—especially those with large engineering and medical programs—the impact of this growing federal preference for industry cost-sharing and other types of public-private partnerships has been felt quite keenly. In an interview, Jilda Garton, the associate vice provost for research at Georgia Institute of Technology, noted that roughly half the industry money that now pays for academic research at Georgia Tech comes from federal grants that were issued originally to corporations.[71] After the corporation receives this federal research grant, it will frequently contract out the actual research to U.S. universities. In this way, U.S. taxpayer funding that started out as "public" effectively turns "private" by the time it reaches the university investigators in their labs.

This increasingly popular approach for disbursing U.S. science and technology funding may have considerable merits in terms of helping certain targeted American industries, and stimulating greater industrial R&D spending. But it also means that a shrinking portion of the U.S. science and engineering budget is spent on what is commonly referred to as "public good research," or research that has enormous public value but that private companies are unlikely to finance adequately on their own, because it tends to generate few, if any, short-term commercial profits.

Public good research includes fundamental and curiosity-driven science, which universities are uniquely qualified to perform. Historically, this type of free academic inquiry has played a leading role in expanding the frontiers of new knowledge, and generating breakthrough technologies that open up whole new industries. Recent examples include both biotechnology and information technology, which were born largely out of publicly funded academic and federal research labs. It also encompasses a wide range of research and analysis, related to public health, climate change, atmospheric pollution, environmental degradation, and social policy—all critical to public well-being.

This growing "privatization" of federal research funding has been all the more keenly felt on campus, due to persistent shortfalls in U.S. government support for energy-related R&D. These shortfalls in government spending support have made the federal-grant application process so highly competitive that many experts feel it is increasingly dysfunctional. Several academic energy experts we interviewed noted that they now spend less and less time on actual energy research and more time writing grant proposals, which are overwhelmingly rejected due to insufficient federal funds.

"It's a real problem for this country," said 3Weimer of the University of Colorado at Boulder, and who also sits on the National Science Foundation's peer-review panels that anonymously judge scientific research proposals. "I'm one of those people that wastes time trying to figure out what 6 percent [of scientific research proposals] should get funded. It is not very satisfying. These faculty are coming up with valuable ideas for energy development, clean renewable technologies, sustainable energy—and they want to fund their students, too."[72]

Weimer was specifically referring to a 2007 National Science Foundation energy-research solicitation, in which NSF received a total of 200 proposals, but had sufficient funds to support only 12—a funding-success rate of just 6 percent.[73] In Weimer's view, a lot of scientific talent in the United States is simply being wasted. "I have a very difficult time convincing my best Ph.D. students to go into academia because they look at how the faculty work like hell to get funding and they want absolutely no part of it," he explained. "So we're turning off our brightest scientists from going into energy research."[74]

Federal data show that, over the last nine years, NSF funding rates have dropped by more than one-half overall. In 1999, the NSF funded roughly 28 percent of the research proposals it received; by 2007, that number had dropped to roughly 11 percent.[75] "You have to think about the ramifications of this," Weimer said. "The National Science Foundation is the primary arm of the United States that funds what I'm going to call the innovation side of academic research across all disciplines."[76]

Unfortunately, such problems are not confined to NSF. Prashant Kamat, a noted energy expert and professor of chemistry and biochemistry at the University of Notre Dame, said the same problems have plagued the Department of Energy, the nation's largest sponsor of energy R&D. In 2006, DOE's Basic Science division issued a special request for proposals covering solar energy and hydrogen fuel. Problem was, the next year Congress provided the agency sufficient funds to cover just 8 percent of the solar proposals DOE received, and just 5 percent of the hydrogen proposals. Because DOE's scientific peer-review process rated many of the proposals that came in to be of outstanding quality, it retained them for possible funding in 2008. But the next year the agency's solicitation budget plummeted to zero.[77]

Fortunately, President Obama's first budget for science and technology raised spending on energy R&D significantly. According to a detailed analysis by the American Association for the Advancement of Science, the omnibus bill passed by Congress in March 2009 raised DOE's total R&D budget portfolio 12.6 percent to almost $11 billion. The DOE Office of Science, which is devoted largely to fundamental energy-related research, received a 17.3 percent boost, totaling $4.3 billion for R&D. Specifically, the DOE budget for:

- Energy efficiency and renewables R&D jumped 16.2 percent, to $1.4 billion
- Nuclear energy R&D grew 16.8 percent, to $515 million
- Fossil energy R&D also grew almost 45 percent, to $834 million

The Recovery Act boosted DOE's R&D portfolio by contributing $400 million to the Advanced Research Projects Agency-Energy, or ARPA-E, which was created under the 2007 America COMPETES Act but never funded, and nearly $1.6 billion in undistributed R&D funds for the Office of Science. With all this stimulus money included, total funding for DOE R&D jumped nearly 68 percent over 2008 funding levels to $16.3 billion, the largest portion of which went to Energy Efficiency and Renewables (totaling $3.95 billion), and Fossil Energy (totaling $1.83 billion).[78]

This is money that will be spent. But how will it be spent? And under what guidelines? We turn now to those questions—specifically, by examining how 13 universities and two federal research labs that received lots of federal funds for R&D over the past decade have structured 10 big corporate strategic alliances with private energy companies. As we will demonstrate, there are lessons to be learned from these agreements for the public, private, and non-profit players alike.

A detailed analysis of 10 university-industry agreements to finance energy research

Here we get to the meat of our analysis, delving into the specifics of each of the 10 written university-industry agreements we obtained. Our analysis is based on detailed, independent experts' review of each agreements' governing structures, research terms, and intellectual property provisions. Our primary goal with this analysis is to address the following question: How well do these agreements balance the goals of the corporate sponsors to produce research that is commercially profitable with the missions of U.S. universities to perform high-quality, disinterested research that advances reliable knowledge for the betterment of society?

For more on how these contracts were obtained and the methodology used for analyzing them using outside legal experts, see the box on our methodology. (on page 51)

Based on our extensive interviews with academic administrators and industry officials who helped to negotiate or oversee these university-industry agreements, it is clear that energy firms and U.S. universities do have a number of mutual interests that have prompted them to enter into these large-scale, multiyear research partnerships. Our analysis of the 10 agreements confirmed that a number of the parties' interests and goals are met by these sponsored-research alliances. (see table below)

Meeting of the minds

University-Industry Goals Met by the 10 Alliance Agreements

Industry Goals Served	University Goals Served
Access to world-renowned academic scientists and energy experts	Funding to pay for academic research
Access to advanced research laboratories, research equipment, and skilled graduate and post-doctoral students	Research ties with private companies that could promote faster commercialization of academic inventions
Access to university knowledge assets and labor resources at an excellent price (because faculty salaries, student labor, labs, and equipment are subsidized by state and federal sources). Plus the industry sponsor enjoys a federal tax deduction on all academic research grants.	Access to corporate proprietary knowledge sources
Ability to explore cutting-edge energy technologies that could have commercial value	Access to commercial input and expertise regarding marketing, scaling for commercial applications, and the practical applications of new academic discoveries
Positive publicity; good public and community relations	Possible improved opportunities for students to get jobs in the private sector after they graduate
Guarantees that the industry sponsor will have exclusive rights to commercialize any promising sponsored-research discoveries	Heightened public prestige through demonstration of the practical (and possible commercial) applications of academic knowledge

Source: Author's analysis based on reporting and interviews.

But in addition to the win-win attributes of these deals, we discovered that the commercial sponsors' business goals are also often highly distinct from the universities' academic research, teaching, and public-interest goals, among them:

- University autonomy and self-governance
- Academic freedom
- Independent scholarly research
- Disinterested or impartial academic inquiry
- Independent expert and scientific peer review for assessing research quality
- Rapid publication of academic research
- Free and open sharing of research results, materials, data, and knowledge
- Expert review and independent replication of research results to verify the accuracy of published research findings
- Advancement of reliable public knowledge across all fields, disciplines, and areas of inquiry

It remains to be seen how these academic objectives will square with the commercial objectives of the energy companies partnering with universities.

Specifically, it's not clear what the long-term consequences of these large, industrial research alliances will be on the scientific practices, governing norms, and academic culture of the university, or on the overall quality and output of U.S. universities. Our analysis of the 10 energy-research agreements, however, indicates that most of these industry alliance agreements fall far short of meeting the universities' core academic goals, and could actually undermine them. Consider the table on pages 52-59 that summarizes this report's primary findings for each of the 10 agreements reviewed. Our conclusion is clear: Many of the universities' traditional research priorities and public-interest missions are not being honored, or protected, by these industry-sponsored research-alliance agreements as currently negotiated.

In fact, in the vast majority of these deals it appears that the university side was persuaded to allow the corporate sponsor to swing the legal contract terms strongly in favor of sponsors' interests. After reviewing the summary table on pages 52-59, we'll turn to the eight primary issues we set out to address in our review of these 10 university-industry agreements.

Methodology used for reviewing the 10 agreements

To better understand the specific contractual requirements underlying each of these university-industry research alliances, we turned to Professor Sean O'Connor, a noted legal scholar at the University of Washington Law School with expertise in intellectual property law and university-industry contracting, and Jeremiah Miller, his former graduate assistant and now a practicing attorney in Seattle. O'Connor is Director of the Law, Technology and Arts Group at the University of Washington School of Law. He provides private legal- and IP-consulting assistance to many universities, nonprofits and for-profit organizations. Miller performed the primary analysis and interpretation of the contracts. O'Connor then reviewed his analysis. Their services were provided in a personal capacity. They do not necessarily endorse the conclusions of this report.

All the "academic benchmarks" used in our review of the 10 agreements were drawn from a set of detailed analyses of Strategic Corporate Alliances, or SCAs, on campus, developed by a prominent faculty-senate committee at Cornell University from 2004 to 2005.[79] Most of the 10 agreements reviewed here broadly fit Cornell's definition of a Strategic Corporate Alliance: "a comprehensive, formally managed company-university agreement centered around a major, multiyear, financial commitment involving research, programmatic interactions, intellectual property licensing, and other services."[80] Academic norms and public-interest commitments are not well codified in any single document, but they are frequently referred to and affirmed in university mission statements, faculty senate documents such as Cornell's SCA review, and statements and reports issued by government funding agencies and prominent university associations, including the Association of American Universities, Association of American Medical Colleges, and American Association of University Professors.

This report's author used the Cornell SCA analyses and their SCA management recommendations as the basis for developing a list of 17 Review Questions to structure this report's legal contract review. As such, the legal review is not from a purely business standpoint (since most legal contracts are assumed to involve two business entities) but rather from the standpoint of widely accepted academic norms and public-interest benchmarks, including the need to safeguard the university's core academic mission, and its commitment to self-governance, independent research, and the dissemination of high-quality, reliable, public knowledge.

With regard to the intellectual property provisions in these agreements, our outside legal experts were asked to rank each agreement on a scale of 1 to 10 to assess the amount of exclusive commercial control over academic research results that each agreement permits the industry sponsors, as well as the degree of flexibility afforded to the university partners (and faculty) to license discoveries nonexclusively and/or to share research with other academics. Knowledge sharing is widely seen as a fundamental duty of all academics, as detailed in "Nine Points to Consider in Licensing University Technology," a 2007 statement signed by more than 50 universities, and other federal agency guidelines.[81] It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Moreover, to the author's knowledge these contracts have not been tested in a court of law, therefore their "legal meaning" has not been finally determined.

The first round of legal reviews were completed in the summer of 2008. In July 2010, CAP invited the universities heading up these 10 alliances to provide written comments on our major contract findings, and any contract updates. Seven of the 10 universities provided feedback, two did not respond to our request, and one, Texas A&M University, requested permission from the state attorney general to deny our request for information relating to its Chevron alliance. To the best of our knowledge, our contract analyses in Appendices 1-10 beginning on page 75 are current.

Many university administrators, in their comments and interviews, raised objections to this report's reliance on written contracts, noting the existence of other academic customs, campuswide policies, and informally developed procedures and practices. Many of these administrators also objected to the report's predominant focus on academic and public-interest benchmarks to rate the contracts, arguing there also is an academic and public interest in drawing private-sector money and expertise into the research and development of alternative energy technologies. They felt this view was not sufficiently addressed in the analysis of their contracts as presented in our major contract findings at the time of their review. These comments from university administrators are presented in the individual appendices beginning on page 75 and are taken into account when germane in the appendices and the main body of the report.

Still, these legal agreements consitute the primary, if not the only, legally binding authority between the parties. Anything that is left up to practices and generalized policy is outside the scope of the agreement, and subject to alteration and inconsistent application, and may not be legally binding. Written contacts also enhance accountability, and engender public trust. Thus the focus of this report on the contracts themselves as the basis of the report's analysis.

Summary of main findings

Overview of our analysis of the 10 corporate strategic partnership agreements

	1	2	3	4	5
Host Universities & Public Research Institutions	Arizona State University	University of California at Berkeley; Lawrence Berkeley National Laboratory; University of Illinois at Urbana-Champaign	University of California at Davis	Colorado School of Mines	University of Colorado, Boulder; Colorado State University; Colorado School of Mines; National Renewable Energy Laboratory
Corporate Partners	BP Technology Ventures, Inc., a unit of BP PLC	BP Technology Ventures, Inc., a unit of BP PLC	Chevron Technology Ventures, LLC, a unit of Chevron Corp.	ChevronTexaco Energy Technology Co., a unit of Chevron Corp.	27 firms originally; membership fluctuates
Alliance Name, if applicable		Energy Biosciences Institute (EBI)		Chevron Center of Research Excellence	Colorado Center for Biorefining and Biofuels (C2B2)
Corporate Contribution Amount:	**$2.5 million over 2 years** (out of a total initial 2-year budget of $5.2 million, with state and university funds included).	**$500 million over 10 years**	**$25 million over 5 years**	**$2.5 million for 4 years; project ongoing with additional funding amounts unknown**	**$6 million estimated over the past 4 years (2007-2010); ongoing budget figures unknown.** Each corporate member, depending upon its size, pays either $50,000 or $10,000 annually, with additional corporate-sponsored-research grants possible. In July 2008, ConocoPhillips signed a 5-year, $5-million sponsored-research grant with C2B2. C2B2 has also received $1.75 million in public support from the state of Colorado's Renewable Energy Collaboratory.
Research Focus:	Biofuels made from bacterium	Largely biofuels research; Some fossil-fuel bioprocessing and carbon sequestration	Biofuels research	Advanced computer technology to improve interpretation of subsurface geology	Biofuels and biorefining
Term (Years):	**2007-2009** BP did not renew, but the project is continuing with $5.2 million in Dept. of Energy ARPA-E funding. See this note for details[1]	**2007-2017**	**2006-2011**	**2004-ongoing** Indefinite term	**2007-indefinite**
Type of Governance Structure: Strategic Corporate Alliance, Sponsored-Research Agreement, Industrial Research Consortium[2]	SCA-SRA Hybrid	SCA Broad	SCA Broad	SCA	SCA & IRC Hybrid
CONTRACT REVIEW QUESTIONS					
University autonomy					
REVIEW QUESTION #1 Does the university side retain majority control of the alliance's central governing body?	**Yes** However, this is a hybrid deal. There is no official governing body. Two faculty are named as project directors	**Open side: No** 4-4 vote split; shared veto power **Proprietary side: No** Fully BP controlled	**No** Governing structure very poorly defined	**No**	**Shared side: No** Industry sponsors dominate here because of current implementation of this agreement[3] (See agreement review) **Sponsored side: No**

Summary of main findings (continued)

	6	7	8	9	10
Host Universities & Public Research Institutions	Georgia Institute of Technology	Iowa State University	Stanford University	Texas A&M University	University of Texas at Austin, Rice University
Corporate Partners	Chevron Technology Ventures LLC, a unit of Chevron Corp.	ConocoPhillips Co.	ExxonMobil Corp., General Electric Co., Toyota Motor Corp., and Schlumberger Technology Corp., a unit of Schlumberger Ltd.	Chevron Technology Ventures, a unit of Chevron Corp,	Baker Hughes, BP, ConocoPhillips, Halliburton, Marathon Oil, Occidental Oil and Gas, Petroleo Brasileiro SA, Schlumberger, Shell, and Total SA
Alliance Name, if applicable			Global Climate and Energy Project (GCEP)	BioEnergy Alliance	Advanced Energy Consortium
Corporate Contribution Amount:	**$12 million over 5 years**	**$22.5 million over 8 years**	**$225 million over 3 years initially; alliance extended ten years to 2012, with periodic updates in sponsor funding (additional amounts unknown)**	**$5.2 million over /5 years**[5]	**$30 million over 3 years, renewable and ongoing**
Research Focus:	Biofuels processing and some hydrogen work	Biofuels and processing	Fundamental research on technology to curb greenhouse gas emissions	Biofuels research	Methods for increasing oil and gas production using micro- and nanotechnology applications
Term (Years):	**2006-2010**	**2007-2014**	**2002-2012** Renewed for 2008-2012 per an amended 2008 agreement (Both GCEP's 2002 and revised 2008 agreements are reviewed in Appendix 8)	**2007-2011** (Extension possible)	**2008, renewable and ongoing**
Type of Governance Structure: Strategic Corporate Alliance, Sponsored-Research Agreement, Industrial Research Consortium[2]	SCA Broad	SCA Broad	SCA Broad	SCA Broad	SCA-IRC Hybrid
CONTRACT REVIEW QUESTIONS					
University autonomy					
REVIEW QUESTION #1 Does the university side retain majority control of the alliance's central governing body?	**No** Governing structure very poorly defined	**No** Industry control	**No** Industry control: 4 of 4 voting seats	**No**	**No** Industry control: 10 of 10 voting seats

Summary of main findings (continued)

	1	2	3	4	5
Host Universities & Public Research Institutions	Arizona State University	University of California at Berkeley; Lawrence Berkeley National Laboratory; University of Illinois at Urbana-Champaign	University of California at Davis	Colorado School of Mines	University of Colorado, Boulder; Colorado State University; Colorado School of Mines; National Renewable Energy Laboratory
Corporate Partners	BP Technology Ventures, Inc., a unit of BP PLC	BP Technology Ventures, Inc., a unit of BP PLC	Chevron Technology Ventures, LLC, a unit of Chevron Corp.	ChevronTexaco Energy Technology Co., a unit of Chevron Corp.	27 firms originally; membership fluctuates
Impartial peer review					
REVIEW QUESTION #2 Does the agreement require all faculty research projects to be selected using impartial peer review?	**Question not applicable** Hybrid deal; faculty projects identified in advance	**No**[4]	**No**	**No** Research selection criteria strongly favor the sponsor's business interests.	**Shared side: No** **Sponsored side: No**
Transparency					
REVIEW QUESTION #3 Is the process for submitting faculty research applications fully transparent?	**Question not applicable** Hybrid deal; faculty investigators selected in advance	**Open side: No** **Proprietary side: Question not applicable** BP employees work here	**No**	**No**	**Shared side: No**[3] **Sponsored side: No** Agreement silent
Protection of academic publication rights					
REVIEW QUESTION #4 Is the university's core right to publish protected?	**Yes**	**Yes**	**Yes**	**No** Publication of student theses may be delayed by as long as 12 months	**Shared side: Yes** **Sponsored side: N/A** No info available; agreement silent
REVIEW QUESTION #5 What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?	**120 days**	**90 days**	**150 days**	**365 days**	**Shared side: 210 days** (for publications), **90 days** (for presentations) **Sponsored side: N/A** No info available; agreement silent
REVIEW QUESTION #6 Does this publication delay accord with recommended federal limits?	**No**	**No**	**No**	**No**	**No**
REVIEW QUESTION #7 Are there additional confidentiality restrictions?	**Yes** Lasting three years	**Yes**	**Yes** Lasting five years	Yes	**Yes**
Degree of industry control over the academic research agenda					
REVIEW QUESTION #8 Does the industry sponsor substantially define the alliance's overarching research agenda?	**No**	**Yes**	**Yes**	**Yes** Governing structure very poorly defined	**Shared side: Yes** Industry sponsors dominate here because of the way this contract is currently implemented[3] **Sponsored side: Yes**

Summary of main findings (continued)

	6	7	8	9	10
Host Universities & Public Research Institutions	Georgia Institute of Technology	Iowa State University	Stanford University	Texas A&M University	University of Texas at Austin, Rice University
Corporate Partners	Chevron Technology Ventures LLC, a unit of Chevron Corp.	ConocoPhillips Co.	ExxonMobil Corp., General Electric Co., Toyota Motor Corp., and Schlumberger Technology Corp., a unit of Schlumberger Ltd.	Chevron Technology Ventures, a unit of Chevron Corp,	Baker Hughes, BP, ConocoPhillips, Halliburton, Marathon Oil, Occidental Oil and Gas, Petroleo Brasileiro SA, Schlumberger, Shell, and Total SA
Impartial peer review					
REVIEW QUESTION #2 Does the agreement require all faculty research projects to be selected using impartial peer review?	**No**	**No**	**No** Peer review is only used at the discretion of industry sponsors[4]	**No**	**No** Sometimes peer review panels may be used, but they are heavily dominated by industry appointees and used solely at the discretion of the sponsors[4]
Transparency					
REVIEW QUESTION #3 Is the process for submitting faculty research applications fully transparent?	**No**	**No**	**No**	**No**	**Yes**
Protection of academic publication rights					
REVIEW QUESTION #4 Is the university's core right to publish protected?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
REVIEW QUESTION #5 What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?	**120 days**	**90 days**	**Indefinite** Research kept confidential for at least 60 days, afterwhich no maximum publication delay is specified	**90 days**	**75 days**
REVIEW QUESTION #6 Does this publication delay accord with recommended federal limits?	**No**	**No**	**No**	**No**	**No**
REVIEW QUESTION #7 Are there additional confidentiality restrictions?	**Yes** Lasting five years	**Yes** Lasting 10 years	**No** Some, but very minimal	**Yes** Lasting five years	**Yes**
Degree of industry control over the academic research agenda					
REVIEW QUESTION #8 Does the industry sponsor substantially define the alliance's overarching research agenda?	**Yes**	**Yes**	**No**	**Yes**	**Yes**

Summary of main findings (continued)

	1	2	3	4	5
Host Universities & Public Research Institutions	Arizona State University	University of California at Berkeley; Lawrence Berkeley National Laboratory; University of Illinois at Urbana-Champaign	University of California at Davis	Colorado School of Mines	University of Colorado, Boulder; Colorado State University; Colorado School of Mines; National Renewable Energy Laboratory
Corporate Partners	BP Technology Ventures, Inc., a unit of BP PLC	BP Technology Ventures, Inc., a unit of BP PLC	Chevron Technology Ventures, LLC, a unit of Chevron Corp.	ChevronTexaco Energy Technology Co., a unit of Chevron Corp.	27 firms originally; membership fluctuates
REVIEW QUESTION #9 Which parties set the alliance's research priorities each new grant round?	**ASU faculty** Faculty projects all identified in advance	**Open side: UCB, UIUC, LBNL & BP** **Proprietary side: BP**	**Chevron, U.C. Davis** However, this agreement lacks basic governance details, leaving Chevron largely in charge	**Chevron, Colorado School of Mines** With criteria strongly weighted to favor Chevron's business interests	**Shared side: Industry sponsors**[3] **Sponsored side: Industry sponsors**
REVIEW QUESTION #10 Does the university retain majority control over the selection of academic research projects?	**Question not applicable** Faculty projects all identified in advance	**Yes** But the agreement leaves the membership of this committee variable	**No**	**No**	**Shared side: No**[3] **Sponsored side: No**
REVIEW QUESTION #11 Does the industry sponsor have to approve all final research awards?	**Question not applicable** Faculty projects all identified in advance	**Yes**	**Yes**	**Yes**	**Shared side: Yes**[3] **Sponsored side: Yes**
Intellectual property ownership and sharing of academic knowledge					
REVIEW QUESTION #12 **Exclusive commercial rights:** On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?	**Ranking: 10** BP has an automatic option to license project results exclusively, and access to "background research" not funded by BP	**Overall ranking: 9** **Open side: 8** Sponsor has the option to negotiate for an exclusive license with favorable royalty rates. BP also enjoys rights to some research not funded by BP **Proprietary side: 10** BP owns and controls all IP	**Ranking: 8** Sponsor has automatic option to license exclusively, with favorable royalty rates, and rights to background research not funded by Chevron	**Ranking: 9** Sponsor has automatic right to exclusive use of research results for up to two years	**Shared side ranking: 2** Sponsors enjoy non-exclusive licenses to shared research **Sponsored side: N/A** No info available, agreement silent
REVIEW QUESTION #13 **Licensing to multiple commercial users:** On a scale of 1 to 10, is the university free to license project research nonexclusively to other outside commercial entities?	**Ranking: 2** The university has limited ability to license nonexclusively to other outside companies	**Overall ranking: 3.5** **Open side: 7** The universities have moderate ability to license nonexclusively to other outside companies **Proprietary side: 0**	**Ranking: 2** The university has very limited ability to license nonexclusively to other outside companies	**Ranking: 2** The university has very limited ability to license nonexclusively to other outside companies	**Shared side ranking: 9** The universities have extremely strong ability to license nonexclusively to other outside companies **Sponsored side: N/A** No info available, agreement silent

Summary of main findings (continued)

	6	7	8	9	10
Host Universities & Public Research Institutions	Georgia Institute of Technology	Iowa State University	Stanford University	Texas A&M University	University of Texas at Austin, Rice University
Corporate Partners	Chevron Technology Ventures LLC, a unit of Chevron Corp.	ConocoPhillips Co.	ExxonMobil Corp., General Electric Co., Toyota Motor Corp., and Schlumberger Technology Corp., a unit of Schlumberger Ltd.	Chevron Technology Ventures, a unit of Chevron Corp,	Baker Hughes, BP, ConocoPhillips, Halliburton, Marathon Oil, Occidental Oil and Gas, Petroleo Brasileiro SA, Schlumberger, Shell, and Total SA
REVIEW QUESTION #9 Which parties set the alliance's research priorities each new grant round?	**Chevron** The agreement gestures at shared control, but in practice Chevron sets the priorities (See detailed agreement review in Appendix 6)	**ConocoPhillips** The agreement itself is silent; however in practice ConocoPhillips sets the priorities (See detailed agreement review in Appendix 7)	**All parties** (Stanford U. and the four industry sponsors)	**Chevron, Texas A&M U.** Agreement gestures at shared control, but provides few concrete details leaving Chevron dominant	**The industry sponsors**
REVIEW QUESTION #10 Does the university retain majority control over the selection of academic research projects?	**No**	**No**	**No**	**No**	**No**
REVIEW QUESTION #11 Does the industry sponsor have to approve all final research awards?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Intellectual property ownership and sharing of academic knowledge					
REVIEW QUESTION #12 **Exclusive commercial rights:** On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?	**Ranking: 8** Sponsor gets automatic option to license exclusively	**Ranking: 8** Sponsor gets automatic option to license exclusively (and a 90-day exclusive commercial trial period)	**Composite 2002 & 2008 Ranking: 5** **2002-Original Ranking: 8** 4 sponsors enjoy exclusive use of inventions for 5 years **2008-Revised-Agreement Ranking: 2** 5-year-exclusivity provision removed (See detailed GCEP contract review in Appendix 8)	**Ranking: 9** Sponsor may elect an exclusive license anytime within one year, thus giving it de facto exclusive commercial control of project research for at least one year. Sponsor also enjoys rights to academic research not funded by Chevron.	**Ranking: 2** There is no mention of an automatic option for exclusive licensing to the sponsors
REVIEW QUESTION #13 **Licensing to multiple commercial users:** On a scale of 1 to 10, is the university free to license project research nonexclusively to other outside commercial entities?	**Ranking: 2** The university has very limited ability to license nonexclusively to other outside companies	**Ranking: 2** The university has very limited ability to license nonexclusively to other outside companies	**Composite 2002 & 2008 Ranking: 5.5** **2002-Original Agreement Ranking: 3** Non-exclusive licensing impeded by 5-year sponsor exclusivity provision **2008-Revised Agreement Ranking: 8** Broad licensing enhanced by removal of 5-year exclusivity provision (See detailed GCEP contract review in Appendix 8)	**Ranking: 2** The university has very limited ability to license nonexclusively to other outside companies	**Ranking: 8** The universities appear to have strong ability to license project technology nonexclusively to other outside companies

Summary of main findings (continued)

	1	2	3	4	5
Host Universities & Public Research Institutions	Arizona State University	University of California at Berkeley; Lawrence Berkeley National Laboratory; University of Illinois at Urbana-Champaign	University of California at Davis	Colorado School of Mines	University of Colorado, Boulder; Colorado State University; Colorado School of Mines; National Renewable Energy Laboratory
Corporate Partners	BP Technology Ventures, Inc., a unit of BP PLC	BP Technology Ventures, Inc., a unit of BP PLC	Chevron Technology Ventures, LLC, a unit of Chevron Corp.	ChevronTexaco Energy Technology Co., a unit of Chevron Corp.	27 firms originally; membership fluctuates
REVIEW QUESTION #14 **Royalty and other intellectual property (IP) advantages:** Does the industry partner enjoy special royalty and intellectual property terms?	**Not discussed**	**Yes** Royalties capped and numerous other special IP terms	**Yes** Favorable royalty rates	**Yes**	**Shared side: Yes** **Sponsored side: N/A** No info available; agreement silent
REVIEW QUESTION #15 **Academic sharing:** On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, noncommercial inquiry?	**Not discussed**	**Overall ranking: 4** **Open side: 8** Strong academic-use protections, except on the proprietary side **Proprietary side: 0**	**Ranking: 5** Moderate academic-use protections	**Ranking: 3** Weak language and overall academic-use protections	**Shared side ranking: 3** Weak academic-use language, plus agreement offers no guidance for sponsored side **Sponsored side: N/A** No info available; agreement silent
Management of conflicts of interest (COI)					
REVIEW QUESTION #16 Does the agreement call for management of conflicts of interest related to the alliance?	**No**	**No**	**No**	**No**	**No**
REVIEW QUESTION #17 Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?	**Question not applicable** Hybrid deal; there is no formal governing body	**No**	**No**	**No**	**No**

1 In May 2010, Neal Woodbury, Deputy Director of ASU's Biodesign Institute, explained that BP had formally ended its contract with ASU in October of 2009 after the company decided "that for their market interests, the cyanobacterial biofuels area was not something they currently wanted to pursue as part of their renewable energy portfolio." Since then, ASU's initial work—supported by BP, the Science Foundation of Arizona, SFAz, a state funded non-profit organization, and ASU—has been awarded a Dept. of Energy Advanced Research Projects Agency-Energy grant worth $5,205,706, bringing the total dollar value of this project up to $10.4 million over 4 years. This ARPA-E work will specifically address the production and secretion of fatty acids for fuel production from cyanobacteria.

2 These governing structures are discussed in the Appendices.

3 Our legal evaluation of this written C2B2 agreement was complicated by the fact that C2B2's Executive Director, Alan W. Weimer, told this report's author, in a taped phone interview in November 2007, that parties to this agreement have agreed to let C2B2's industrial sponsors play a more central role in evaluating and selecting faculty research proposals than C2B2's original written agreement and by-laws had envisioned (according to our outside legal analysis). Subsequent written comments, submitted to CAP from Alan Weimer on August 9, 2010, also affirmed this fact. (See our full contract review in Appendix 5 for details).

Summary of main findings (continued)

	6	7	8	9	10
Host Universities & Public Research Institutions	Georgia Institute of Technology	Iowa State University	Stanford University	Texas A&M University	University of Texas at Austin, Rice University
Corporate Partners	Chevron Technology Ventures LLC, a unit of Chevron Corp.	ConocoPhillips Co.	ExxonMobil Corp., General Electric Co., Toyota Motor Corp., and Schlumberger Technology Corp., a unit of Schlumberger Ltd.	Chevron Technology Ventures, a unit of Chevron Corp,	Baker Hughes, BP, ConocoPhillips, Halliburton, Marathon Oil, Shell, Occidental Oil and Gas, Schlumberger, Petrolea Brasiliero, and Total SA
REVIEW QUESTION #14 **Royalty and other intellectual property (IP) advantages:** Does the industry partner enjoy special royalty and intellectual property terms?	**Yes**	**Yes** Favorable royalties due to "prenegotiated agreement" (See agreement review in Appendix 7)	**Yes**	**Yes**	**Yes**
REVIEW QUESTION #15 **Academic sharing:** On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, noncommercial inquiry?	**Ranking: 5** Moderate academic-use protections	**Ranking: 7** Reasonably strong academic-use protections	**Composite 2002 & 2008 Ranking: 7** **2002-Original Agreement Ranking: 5** **2000-Revised Agreement Ranking: 9** (See detailed GCEP contract review in Appendix 8)	**Ranking: 7** Reasonably strong academic-use protections	**Ranking: 9** Unusually strong and broad academic use protections
Management of conflicts of interest (COI)					
REVIEW QUESTION #16 Does the agreement call for management of conflicts of interest related to the alliance?	**No**	**No**	**Yes, but only minimally** With regard to optional peer review panels, and external universities eligible for GCEP research grants	**No**	**No**
REVIEW QUESTION #17 Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?	**No**	**No**	**No** COIs are only addressed on optional GCEP peer review committees, convened at the discretion of the industry sponsors	**No**	**No**

4 Several university alliances, including this one, stated that, even though their formal industry-alliance agreements do not require peer review, they are currently using informal, peer-review-type systems to evaluate select faculty research proposals for grant awards. However, in each case we reviewed, it turns out use of peer review is actually variable, inconsistent, and/or it does not rise to the level of genuine, impartial, exper review. What's more, because peer review is not secure in the legal contract, its application in practice could be altered or abandoned at any time. (Please see detailed contract reviews in Appendices 1-10 for deta

5 The dollar value of this Chevron/Texas A&M contract was only disclosed following an extremely lengthy delay in response to the public record act (PRA) request that CAP filed with Texas A&M on November 12, 2 Texas A&M University originally refused to provide a copy of this contract or disclose its dollar value. Instead it forwarded our PRA request to the TX Attorney General's office to see if disclosure was required. The office ruled that, as a publicly funded institution, the university must comply. Even subsequent to this, however, in April 2010, when CAP asked Bob Avant, the Program Director for Texas AgriLife Research at Texa U. how much Chevron had invested thus far in the Texas A&M biofuels project, Mr. Avant refused to disclose any current information. On April 27, 2010, Mr. Avant wrote to this report's author, via email, with the f ing reply: "I am not at liberty to release information related to Chevron."

Overview of the 10 agreements: Major findings

1. Do these contracts protect the university's independence and academic self-governance?

In nine of the 10 agreements, the university partners failed to retain majority academic control over the central governing body charged with directing the university-industry-research alliance.[82] Four of the 10 agreements actually give the industry sponsors full governance control.[83] In some cases the written agreement is explicit about giving the industry sponsor or sponsors full control; in other cases this is how the agreement is being interpreted and/or administered in practice.

This finding is quite remarkable. "Academic independence" has been rooted, historically, in the university's core belief that it must retain the ability to govern its own internal affairs. This is often referred to as academic "self-governance" or "academic autonomy." Ever since the birth of the academic freedom movement in the early 1900s, U.S. universities and their faculty have worked strenuously to prevent outside donors (whether a wealthy benefactor, a commercial sponsor, or a federal grant-making agency) from exerting undue influence over faculty teaching, research, and other internal governance decisions.[84] The rationale for this is quite straightforward: Without "self-governance," academic freedom and research independence are essentially meaningless.

2. Do these agreements require faculty research proposals to be evaluated and awarded funding on the basis of impartial peer review?

None of the 10 agreements require faculty research proposals to be evaluated and awarded funding in each new grant cycle using traditional academic methods of independent, impartial peer review. The only exception is the Arizona State University-BP agreement, where this question does not apply because all the research projects have been identified upfront so no other campus faculty are eligible to apply for funding.[85]

Again, this finding is startling, especially given that these are multiyear industrial alliances. Academic peer review has long been considered the "gold standard" when it comes to appropriately and fairly evaluating the quality and worthiness of all scientific and academic research.

Several of the university administrators we interviewed for this report or who submitted comments stated that, although peer review is *not* required in their written contracts, they do frequently draw on the expertise of outside expert reviewers. Stanford University, for example, currently uses an informal peer-review system for some portion of its research assessment process, even though it is not legally required, and posts written protocols on a public website that clarify how this peer review works in practice. But our external legal reviewers say this informal peer review system is not legally binding and could be altered or abandoned at any time. (see Appendix 8 for details) Neither of GCEP's formal written alliance agreements (originally signed in 2002 and renewed in 2008) requires use of expert peer review for the selection of faculty research proposals. Both agreements discuss the need to convene "peer review panels" that are free of conflicts of interest, but the use of peer review is entirely optional and left to the discretion of the management committee, where all of the voting members are sponsors.

Or consider the BP-funded Energy Biosciences Institute, headquartered at U.C. Berkeley. Chris Somerville, who directs the academic side of the EBI, says that even though the EBI agreement makes no mention of independent peer review, faculty research proposals are still submitted to independent expert reviewers "for technical reviews."[86]

According to Somerville, however, these external expert reviews are only a relatively small part of the overall research selection process. "It would be very strange to allocate decision-making to an outside party," he explained. "We are trying to make the best technical decisions. This is a technical process; this is not a political process." Somerville noted that the EBI executive committee, which is charged with evaluating and recommending a slate of faculty research projects to the EBI Governance Board for final funding approval (including final BP approval), is largely composed of senior faculty with extensive expertise in Chemistry, Chemical Engineering, and other disciplines. But as this report will discuss, the vast majority of the executive committee's members also have potential financial conflicts of interest that could gravely compromise their ability to evaluate and judge other scientists' research projects fairly and impartially (see the box on conflicts of interest within EBI on page 64).

In an interview, Somerville described the EBI research selection process as follows. First, the executive committee asks faculty investigators to submit "a short three-page concept paper." Then the executive committee reviews these papers to make sure "they are within the general topic area we support." After this vetting process, roughly half the faculty investigators are asked to submit longer, full-length research proposals, which are sent out to external experts for "technical reviews." Finally, says Somerville, "the executive committee reviews these external reviews to see which projects have technical merit, and are best and exciting."

These research proposals are then forwarded to the EBI Governance Board, where BP has equal voting power and can either reject or approve final funding support. At the end of the interview, Somerville emphasized that the same "group of colleagues that proposed

the EBI research alliance is the group that manages it." He adds that "we made an effort to truly open up the funding process; to be honest we didn't have to do that."[87]

Again, these findings are disturbing given that these are multiyear academic-industrial alliances. Academic peer review has long been considered the "gold standard" when it comes to appropriately and fairly evaluating the quality and worthiness of all scientific and academic research. When faculty research proposals are evaluated by independent experts using an impartial peer-review process it helps to insure that corporate-research funding is awarded on the basis of both scientific and academic merit, not merely on the basis of one firm's short-term business needs or the narrow strategic goals of one industrial sector. When Cornell University's faculty senate issued final recommendations, in 2005, on how best to structure large-scale, university-industry research alliances, it strongly emphasized the centrality of independent peer review: "The important point—vital to honoring the principle that we are engaged in academic, not corporate research—is that genuine, disinterested peer review occur."[88]

3. Are these agreements fully transparent about how the faculty may apply for commercial funding, and what the methods and criteria for research selection will be?

Eight of the 10 alliance agreements fail to specify, in adequate detail, how faculty may apply for alliance research funding, or what evaluation and selection criteria will be used.[89] It is the author's view that this notable lack of transparency in a majority of the 10 university-industry agreements (combined with their failure to require peer review) virtually guarantees that most of funding awarded through these academic-industry alliances will strongly favor the short-term business interests of the corporate sponsors.

Nine of the 10 agreements also clearly state the university side will be responsible for administering and overseeing the research-selection process on behalf of the academic-industry alliance as a whole. This leaves university leaders vulnerable to accusations that they are putting the sponsors' commercial interests ahead of the universities' core commitment to high-quality research and the disinterested quest for knowledge and truth for the benefit of the public.

4. Do these agreements adequately distinguish academic research from corporate research for hire?

The answer to this question largely rests on which party to the agreement defines the alliance's overarching research agenda, which party draws up the "request for faculty research proposals" in each new grant cycle, and which party retains majority control over the evaluation and final selection of academic research proposals. Let's consider each of these in turn.

In eight of the 10 agreements we reviewed, the contract allows the industry sponsor to substantially define the alliance's "overarching research agenda." (The exceptions were Arizona State University and Stanford University.) This is not unusual: No funding source is entirely neutral. Simply by defining what research questions will be asked, nearly every sponsor exerts some degree of influence over the academic research enterprise. It also is not unusual for the corporate sponsors to play a subsequent role in setting the research agenda during each new grant cycle. In five out of the 10 agreements, the industry sponsors and the university partners share some responsibility for drawing up a list of research topics in each new grant cycle, and issuing the request for new faculty research proposals. In four agreements, the industry sponsors are permitted to fully set the agenda in each new grant cycle.[90]

In eight of the 10 contracts we examined, however, the agreements did break significantly from longstanding university commitments to academic self-governance. This finding is the most significant one. Usually, when it comes to internal academic governance decisions—including the evaluation and selection of faculty research—the university insists on majority academic representation and the right to use independent, expert peer reviewers. In 2007, for example, a U.C. Berkeley faculty senate committee stressed that all BP-EBI funded research "should not in any way be conceived of or seen as work made for hire for the benefit of the corporate sponsor."[91]

Nonetheless, in eight of the 10 alliance agreements reviewed here, the university failed to retain majority control over the evaluation and final selection of faculty research proposals, or to require the use of impartial peer review, thus leaving the distinction between "academic research" and "corporate research for hire" quite unclear and uncertain.[92]

Specifically, all eight of these agreements either directly or indirectly allow the industry sponsor or sponsors to have full control over academic research selection. The only exceptions are the Arizona State University-BP alliance agreement (where this question does not apply) and the BP-funded Energy Biosciences Institute agreement, where there is some attempt to give the academic side majority control over the first stage of the research proposal evaluation process. This academic majority on EBI's research evaluation committee, however, is *not* guaranteed. What's more, many faculty appointed to sit on this committee have had potential conflicts of interest that could badly compromise their ability to impartially evaluate other faculty research (see box on conflicts of interest within EBI on page 64).

5. Is the university's fundamental right to publish protected?

Yes. Nine of the 10 agreements affirm the university's right to publish, though in many instances this right is curtailed by potentially lengthy corporate delays.[121] The National Institutes of Health generally recommends no more than a 60-day delay on the publication of academic research, which it deems adequate time for the corporate sponsor to file a provisional patent application and remove any sensitive proprietary information.[122] None of the 10 agreements we analyzed abide by this maximum-60-day federally recommended publication delay; most allow for delays that far exceed it.

Potential financial conflicts of interest at the Energy Biosciences Institute at U.C. Berkeley

The strategic corporate alliances examined in this report can boast some tricky relationships that highlight the potential for financial conflicts of interest. Here we detail several of them at the BP-financed Energy Bioscience Institute.

First, though, we should note comments about this report's review of conflicts of interest at EBI from U.C. Berkeley after we gave the university a last draft of our "major findings" at that time in Appendix 2 of this report in early August. In a comment letter dated August 9, 2010, Graham Fleming, U.C. Berkeley's Vice Chancellor for Research, said this report's discussion of conflicts of interest at the EBI was "ill informed," arguing that "this agreement and every other research contract is subordinate to the University of California's existing robust rules governing research [including] stringent provisions regarding conflict-of-interest." He said these policies were adequate to address any problems that might arise. (For further discussion of Fleming's comments, please see the EBI contract review in Appendix 2.) Here, in this box, we turn to the various conflicts of interest concerns that have surfaced at EBI.

Two of the university scientists who were originally named to lead the BP-financed EBI, one of whom now serves as the institute's director, had (and continue to have) significant personal financial interests in outside companies that could stand to profit from the EBI's academic research.[93] Two of those outside companies had (and continue to have) surprisingly close direct business ties to BP, and are pursuing research that closely parallels the work being performed at the EBI.

Let's begin with the EBI's current director, Chris Somerville. Somerville oversees and directs all of the "open" academic research performed at EBI's three partner non-profit institutions—U.C. Berkeley, Lawrence Berkeley National Laboratory, and the University of Illinois at Urbana-Champaign. This excludes only the fully proprietary research that BP controls in its commercial EBI labs on campus.[94]

Somerville is a co-founder of LS9, Inc., which dubs itself "the renewable petroleum company." Like the EBI, LS9 is using synthetic biology and other genetic engineering techniques to develop "next-generation" cellulosic biofuels, which the company hopes will be more energy-efficient and less polluting than current biofuels, such as corn-based ethanol.[95] Before he assumed directorship of EBI, Somerville also served as CEO and chairman of the board of a second start-up company he helped to found, Mendel Biotechnology Inc. Mendel has been working closely with the agricultural giant Monsanto to develop genetically engineered crops that could be converted into next-generation biofuels as well.[96]

In February 2007, in anticipation of taking over EBI's directorship, Somerville says he voluntarily gave up any controlling influence in both Mendel and LS9. In an interview, he confirmed that he continues to hold equity interests in both private firms.[97]

U.C. Berkeley's written policies require all faculty to disclose their personal financial interests related to their academic research (including salaries, consulting income, stock or stock options). If any real or perceived financial conflict is identified by the university's internal conflict-of-interest committee, the committee has discretion to either manage, monitor, or prohibit the financial conflict in question.[98]

Even though U.C.'s written policies clearly state that "conflict of interest situations should continue to be avoided" and "all University employees must disqualify themselves from participating in decisions in which they have a personal economic interest," Somerville told this report's author that U.C. Berkeley never required him to give up either his ownership stakes or his controlling positions in both of his startup companies; he gave up his controlling positions voluntarily, while retaining his founding stock holdings.[99]

"I wanted to set a higher standard," he explained in an interview, noting that the decision hurt him financially. "I knew that by managing the EBI I would see into faculty research labs. I would also see secrets inside these companies," he explained, "and I knew that in this way I could be contaminated. I didn't want to be a conduit for information passing between these parties."[100]

Just four months after Somerville stepped down from these corporate executive positions, Mendel Biotechnology announced a major new "strategic long-term collaboration" with BP to develop cellulosic, or next-generation, biofuels. As part of this alliance, BP also acquired equity stakes in Mendel.[101]

Much of the "academic research" that Somerville directs at BP-funded EBI is strikingly similar to the work that Mendel, his former company, is now also performing with BP. One possible synthetic fuel plant in particular—Miscanthus, native to China—happens to be a primary focus of the research now being carried out both by the BP-Mendel alliance and by the BP-EBI consortium.[102] And Chris Somerville's wife, Shauna Somerville, is listed as a primary investigator on a BP-funded EBI project that specifically targets Miscanthus.[103]

So could EBI's academic research directly benefit Mendel, thereby enhancing the value of both the Somervilles' and BP's equity stakes in that firm? Given their ongoing financial stakes in Mendel Biotechnology, it certainly seems as though the academic director of EBI, his wife (who is an EBI-funded professor), and BP (EBI's sole commercial sponsor) have parallel research and financial interests in the same outside company, which could represent quite a serious academic conflict of interest.

U.C. Berkeley policy clearly states that a related conflict of interest exists "when an individual's financial interest in an entity other than the sponsor might appear to be directly and significantly affected by the design, conduct, or reporting of the sponsored project." This is especially true, notes the U.C. guidance, when the outside commercial entity (in this case Mendel) "is likely to advance its commercial efforts as a result of the proposed research" being undertaken on campus.[104]

Now let's turn to Jay Keasling, a professor of bioengineering with joint appointments at both U.C. Berkeley and Lawrence Berkeley National Laboratory. Up until the summer of 2007, Keasling served as a "lead faculty scientist" with EBI and was a major spokesperson for the alliance.[105] Keasling is also an original founder of a Bay Area biofuels company, Amyris Biotechnologies, whose commercial research focus closely parallels that of EBI.

Keasling's company got its start developing a cheaper medicine to treat malaria through a major grant from the Bill and Melinda Gates Foundation. But Amyris soon shifted its attention to the biofuels business, in the process developing surprisingly tight business ties to BP. For instance, John G. Melo, Amyris's current chief executive, used to serve as president of BP's U.S. fuels operations.[106]

Keasling helped design and author the original EBI proposal that U.C. Berkeley submitted to BP in the hopes of winning its $500 million research competition. He also served on EBI's first interim Executive Committee, and helped to judge its first round of research projects.[107] The U.C. Berkeley administration also relied on Keasling to represent EBI and discuss its scientific goals at numerous public forums.[108]

In June 2007, however, just four months after the BP-EBI alliance was announced, Keasling stepped down from his leadership role at the EBI to become the chief executive officer of another major biofuels research consortium, known as the Joint BioEnergy Institute—financed with a $125 million grant from the Department of Energy.[109] The JBEI is a scientific partnership involving U.C. Berkeley, U.C. Davis, and four other preeminent research laboratories.

It is worth noting that Keasling's company hired BP's John Melo to be its CEO at a particularly auspicious time for U.C. Berkeley. As Richard Brenneman, a Bay Area investigative journalist, first reported, Amyris hired Melo in December of 2006, when BP was still in the process of reviewing five sets of university proposals (including the EBI proposal) to determine which one it wanted to fund with its $500 million research grant. Two months after Amyris hired Melo, BP declared Keasling's main academic employer—U.C. Berkeley—to be the winner.[110]

Then, during the summer of 2007, when BP and U.C. Berkeley were still hammering out the final terms of EBI's legal contract, Amyris announced it would hire three additional former BP officers to join the company: Paul Adams (the former manager of BP's U.S. oil portfolio; Jim Alderman (the former senior manager at BP); and Ena Chen Cratsenburg (a former BP manager in refining and marketing).[111]

According to Amyris's chief financial officer and public records, throughout this time Keasling continued to serve in his role as chairman of Amyris's Scientific Advisory Board (even though the author could not find his name anywhere on Amyris's website).[112] Keasling also continued to own substantial stock in the company he helped to found. On a 2006 financial disclosure statement filed with U.C. Berkeley (which this report's author obtained through an open records act request), Keasling reported owning 500,000 shares of Amyris stock, which he estimated to be worth roughly $1 million at the time.[113]

But at a fall 2007 press conference covered by the *San Francisco Chronicle*, Keasling insisted that his academic involvement in EBI and JBEI were not in conflict with his business ties to Amyris. According to the *Chronicle*, Keasling asserted that he had no plans to sever his business ties to Amyris because "he, unlike Somerville, occupies no leadership position at the firm. Thus, he said, his JBEI role does not violate UC or federal conflict-of-interest rules."

Nonetheless, due to today's growing academic-industry engagement, the web of commercial and financial ties that link EBI, BP, Mendel Biotechnology, and Amyris do run surprisingly deep. And EBI's potential financial conflicts do not end here. They extend to the EBI committee charged with evaluating faculty research.

One of the Energy Biosciences Institute's most important academic governing bodies is its executive committee, which is responsible for steering and overseeing the academic research program at EBI's three campuses, issuing annual calls for faculty research proposals, and evaluating and recommending a slate of faculty research projects to forward to the Governance Board for final BP funding approval. In early 2008, the executive committee began with only eight members—seven academics and one representative from BP. But seven of these eight committee members also appeared to have significant potential conflicts of interest, including all but one of the academics.[114]

Two of these eight committee members, including EBI's academic director Chris Somerville and the lone BP employee, had financial ties to firms that could stand to profit from the EBI's academic research.[115] Five of the other committee members had a different type of potential conflict. All five were listed on EBI's website in the spring of 2008 as "Primary Investigators" on research projects funded by the BP-EBI alliance.[116] This strongly suggests that all five may have awarded BP research grant money to themselves and their labs. At the very least the application and receipt of BP-EBI funding could have badly compromised the committee members' ability to fairly and impartialy evaluate and judge other faculty research proposals.

Within the university setting, failure to judge faculty research impartially represents a serious breach of academic protocol. At least one faculty member, appointed to EBI's first executive committee, recognized this. In a 2007 interview, Dan Kammen, a highly regarded energy expert at U.C. Berkeley, told this report's author that he had personally elected not to apply for, or accept, any research funding from BP while he served on the executive committee because it might compromise his impartiality. "I might change that view down the road," he noted, "but for right now that seems like a good way to address the concerns about objectivity."[117]

Kammen's position was certainly principled. For his part, Somerville said he sees no problem with faculty appointees to the executive committee awarding research funding to themselves. Because the research selection process is technical, "not political," he said it is reasonable to rely on internal EBI experts. As Somerville noted, the same "group of colleagues that proposed the EBI research alliance is the group that manages it."[118]

The EBI agreement itself fails to address conflict-of-interest issues related to the EBI. As a result, the executive committee's potential conflict-of-interest problems have only worsened, badly eroding, in this author's view, its scientific and academic legitimacy. As of July 2010, EBI's website listed a total of 13 executive committee members: 11 academics and two representatives from BP.[119] But once again, we see that 10 of these academic appointees are also listed as Primary EBI Investigators or heads of projects supported with BP-EBI funding. (For a list of these academics by name, see this endnote.[120])

The C2B2 alliance agreement at the University of Colorado, Boulder and three other publicly funded research institutions in Colorado permits the industry sponsors to delay publication for up to 210 days. Another alliance agreement, Stanford University's Global Climate and Energy Project, gives the four sponsors (ExxonMobil, General Electric, Toyota, and Schlumberger) a mandatory, 60-day review period (to consider patent protection) prior to release of any academic publications. After this, the agreement provides for no maximum delay on publications, leaving the potential for indefinite delays. A third alliance agreement with Chevron permits the sponsor to delay publication for up to one year.

The timely release of academic information is what makes the university research sphere so exceptionally vibrant, innovative, and dynamic. Rapid dissemination of new knowledge helps to insure that all scientific research is subject to independent review and replication to verify its accuracy. Research should never be quarantined; it needs to be released rapidly so others can react to it and build upon it, continually driving the pursuit of new knowledge forward.

6. Does the corporate sponsor enjoy monopoly commercial rights to all the university's sponsored-research results?

We asked our outside legal examiners to rank each alliance agreement on a scale of 1 to 10, with 1 representing very weak contract language granting exclusive commercial rights to the industry sponsor, and 10 representing very strong language granting exclusive commercial rights. Seven of the 10 agreements ranked 8 or higher for their degree of exclusivity, thus giving the industry sponsors, in our legal reviewers' view, strong monopoly commercial control over the alliances' sponsored research results. Our legal reviewers found that seven of the 10 agreements left the university side with extremely limited power to license sponsored-research results nonexclusively to outside commercial users.[123]

But there were three notable exceptions. The first is the so-called "Shared side" of the Colorado Center for Biorefining and Biofuels, headquartered at the University of Colorado, Boulder. [124] The second is the alliance agreement between University of Texas at Austin, Rice University, and ten companies. And the third is Stanford University's Global Climate and Energy Project agreement. GCEP was originally launched in 2002, but the university and its four industry sponsors negotiated a new, revised contract in September 2008 that greatly facilitated non-exclusive licensing and open academic sharing of GCEP research results through the elimination of a 5-year, sponsor exclusivity provision. (see Appendix 8 for details)

But the flip side is this: At least four of the 10 agreements (BP-Arizona State University, BP-Energy Biosciences Institute, Chevron-U.C. Davis, and Chevron-Texas A&M) explicitly permit the industry sponsors to extend their commercial rights to "background" academic research, which by definition was not funded by the industry sponsor but by public and other sources not party to the alliance agreement.

Because U.S. taxpayers continue to subsidize higher education substantially through general overhead for state universities, federal and state subsidies for student tuition, graduate-student fellowships, educational tax breaks, and federal research grants, most U.S. universities pledge their commitment to patenting and licensing academic research in a manner "consistent with the public interest."[125] This is generally understood to mean that universities will work to maximize broad public use of their academic inventions and research tools, and prevent any one private or commercial entity from exerting excessive monopoly control, unless it is absolutely necessary to promote commercial development.

Case in point: In one 2008 review of the BP-EBI alliance, a faculty senate Task Force on University-Industry Partnerships noted that "the use of exclusive licenses should be as limited as possible, given our public mission."[126] Such sentiments have also been affirmed by the National Institutes of Health, and by more than 50 universities that are signatories to a 2007 statement titled "Nine Points to Consider in University Licensing."[127]

Yet in seven of the 10 contracts we examined for this report, the alliances grant their industry sponsors broad, upfront, exclusive commercial rights to their research—even, in some cases, when certain "background knowledge" was developed prior to the creation of the alliance and not funded by the sponsor.

7. Are university faculty free to share their sponsored-research results with other academic investigators?

Using our 1-to-10 scale, with 1 representing very weak protections for academic use and sharing and 10 representing very strong protections, the 10 agreements earned an average ranking of just 5.5 for protecting academic use and sharing. Only the alliance agreement at the University of Texas at Austin had truly strong academic-use and sharing provisions, giving it a rank of 9.

Since 2007, more than 50 American research universities have endorsed a public statement listing nine core principles that all universities should be required to uphold in their licensing deals with industry.[128] The first of these principles calls for all universities to include a provision in their industry contracts—often known as a "research exemption"—which permits professors and students to freely share their sponsored-research results (including data, tools, and methods) with outside researchers for noncommercial research purposes, including verification of published research findings.

Nevertheless, only four of the 10 alliances agreements had truly strong academic-use and sharing provisions, receiving a rank of 7 or higher.[129] Five of the 10 agreements ranked 5 or lower (moderate to poor) for protecting the academic investigators' right to share sponsored-research with other academic scientists and scholars for purely research and noncommercial purposes. Again this is profoundly disconcerting, given the centrality of broad knowledge sharing to the academic research enterprise.

8. Are conflicts of interest adequately regulated in these university-industry alliance agreements?

Nine of the 10 agreements fail to discuss the management of potential financial conflicts of interest related to the alliance and its research functions. The lone exception is Stanford University's Global Climate and Energy Project agreement, where the agreement mentions the need to manage conflicts of interest only with regard to optional peer review panels (convened at the discretion of the management committee, where only the industry sponsors have the power to vote) and third-party university grant recipients. This conflict-of-interest rule was dropped from Stanford's revised GCEP contract in 2008.

None of the 10 agreements prohibit members who sit on the alliances' main governing body from having personal financial interests related to the research they are charged with overseeing and directing. At Arizona State University there is no formal governing body so this question does not apply.

Similarly, none of the 10 agreements prohibits committee members charged with evaluating and selecting faculty research proposals from having financial conflicts of interest related to the research they are reviewing. Again the lone exception is Stanford's Global Climate and Energy Project, where the agreement states that peer review panels must be free of conflicts, but these panels are optional, and used solely at discretion of the management committee, of which only the industry sponsors have the power to vote.

Furthermore, none of the 10 agreements specifies that these committee members in charge of selecting research may not award commercial research funding to themselves, or their own labs. This type of potential conflict has already surfaced at the BP-funded Energy Biosciences Institute, or EBI, administered by U.C. Berkeley (see box on potential conflicts of interest within EBI on page 64).

Recommendations

When President Obama was elected in November 2008, the American public voiced strong support for a concerted U.S. campaign to tackle global climate change, including transition to a new, clean-energy U.S. economy. Today, despite setbacks in Congress, the Obama administration continues to push for a major new energy bill that would include a national carbon cap-and-trade program, and enhanced spending for clean energy and efficiency research.

Over the next 10 years, President Obama has pledged he will spend $150 billion from the receipts of this eventual program "to catalyze private efforts to build a clean-energy future." In 2009, moreover, the U.S. Congress approved $16.3 billion in new Department of Energy R&D funding. The largest portion of this funding, which includes both stimulus and appropriations money, will go toward basic science ($6.1 billion), energy efficiency and renewables (totaling $3.95 billion), and fossil energy (totaling $1.8 billion).[130] A significant portion of this money will certainly be directed toward U.S. university-based R&D, in many cases with private industry research partners. Thus far, however, on Capitol Hill there has been precious little discussion about what role American universities should, or will, play in advancing this clean-energy future.[131]

These big investments in our future sources of energy need to be made swiftly according to appropriate academic- and public-interest guidelines. If the United States hopes to reduce its dependence on foreign oil and slash greenhouse gas emissions it will almost certainly need to marshal the extraordinary scientific talent and ingenuity housed at U.S. universities. But this must be done while preserving the integrity of science and free, independent inquiry at these universities. Here are some recommendations for what the federal government and U.S. universities should do to reinvigorate and protect this vital and valuable academic research sphere:

Recommendations for the U.S. government

Launch an "Apollo Project" for clean-energy, climate and efficiency R&D with strong academic and public-interest safeguards

The American Recovery and Reinvestment Act and the Omnibus appropriations bill of 2009 injected billions of dollars into new energy R&D, including roughly $3.95 billion

for Energy Efficiency and Renewable R&D specifically.[132] Such investments must continue. It is time for the U.S. government to launch a major long-term initiative to finance cutting-edge research in clean energy and energy efficiency at U.S. universities on the scale of past federal science programs, such as the Apollo and Manhattan projects.

Before the U.S. government invests in additional research and development, however, it should develop "standard contract language" attached to every federal research grant for universities that obligates the university to uphold certain core academic and public interest obligations—no matter whether this funding comes via the federal government alone, or in combination with corporate matching grants.

Of course, university research funded wholly by private sources would not be bound by these federal contract provisions. But it is very likely that all academic research would soon be judged according to its compliance with these federal contract standards similar to the federal financial conflict-of-interest rules that are currently attached to all Public Health Service research grants issued to U.S. universities, including all grants issued by the National Institutes of Health, which have now become the *de minimis* standard for all academic regulation of financial conflicts of interest.[133]

Require all federal energy grants be issued using expert peer review

Renewed U.S. investment in energy-related R&D should be accompanied by a standard federal contract that requires use of impartial expert peer review by all federal, university, and private industry research partners. Allocating federal science funding through an independent, scientific peer-review process is the only way to ensure that taxpayer grants are awarded on the basis of true scientific merit. Use of independent expert peer review should also be stipulated in all academic-industry-government alliance agreements.

Allocate sufficient funds for fundamental, precommercial science and other vital public-good research

The federal government likes the idea of using public-private partnerships to maximize the economic impact of public science spending. Certainly, using government R&D funding to leverage (and also stimulate) industry R&D spending can be a "win-win" combination. But public-good research should also involve more than the pursuit of technologies with the potential for near-term commercialization. As transportation expert John DeCicco, a senior lecturer at the School of Natural Resources and Environment at the University of Michigan explains: "Ultimately, public-good research needs to be directed toward achieving critical public-good outcomes such as lowering global greenhouse gas emissions in the near term, not just the development of new technologies."[134]

Academic expertise is urgently needed to tackle a broad array of public interest problems, and to advance public knowledge and understanding. Any serious effort to solve the global warming crisis will require high levels of public good research, in areas ranging from assessments of new energy technologies to basic climate science examining the full impact of global warming. Critical advancements in solar, wind, hydrogen, energy storage systems and other critical technologies will also require breakthroughs in fundamental science that almost always emanate from academic and federal research labs, due to their longer-term, more flexible research focus.

Recommendations for U.S. universities

Police commercial conflicts of interests

U.S. universities must not allow their quest for research revenue or, increasingly, their quest for earnings from the transfer and commercialization of academic research to distort their core academic and public-knowledge functions. Industry relationships and other commercial activities on campus should not compromise the universities' fundamental commitment to the pursuit of truth, impartial inquiry, and public-good knowledge.

This is not to say that U.S. universities and their faculty should disregard the potential commercial applications of their academic research and discoveries. Not at all. But universities need to make a far more vigorous effort to oversee and, whenever possible, eliminate financial conflicts of interest on campus (both at the faculty and at the institutional levels) to preserve their scientific and academic integrity, research independence, and public trust. This process, too, could be vastly aided by stronger federal guidelines attached to federal research grants.

Maximize faculty involvement in the design and oversight of large-scale corporate-research alliances

University faculty, through their main governing body—the academic or faculty senate—should be fully involved in the planning, execution, and monitoring of any large-scale, academic-industry research alliances proposed on campus. These large, multiyear corporate-research alliances tend to have a broad impact on the whole academic institution, due to their size, duration, and potential influence on the public perception of the institution compared to smaller, more common, industry-sponsored research agreements. As such, they warrant far greater faculty-senate involvement in their initial design, formation, and subsequent oversight. This will also engender greater campus support and public trust through enhanced transparency.

Safeguard academic autonomy

To protect the American university's valuable traditions of self-governance and research independence, academic representatives (not industry representatives) should retain strong (preferably two-thirds) majority representation and voting power on any academic governance bodies that are charged with overseeing or administering university-industry research alliances on campus. Equal distribution of voting power is not sufficient, because it does not protect the university's tradition of self-governance and research autonomy.

Retain academic control over research selection and the use of independent expert peer review

University representatives should retain majority representation (and voting power) on any academic body that is charged with evaluating faculty research proposals, and/or making final research awards, as part of any large-scale, multiyear, university-industry research alliance. Faculty research proposals should also always be evaluated using independent expert peer review so research excellence, not merely narrow commercial preferences or profit criteria, guides the academic selection process. And experts selected to judge faculty research proposals should never be in a position to derive any financial benefit from the alliance (or its corporate sponsors). They should remain free of personal financial interests that could in any way bias or prejudice their evaluations.

Minimize delays on publication

U.S. universities should not permit their industry sponsors to delay publication for longer than 60 days, which the National Institutes of Health and other federal agencies deem sufficient time for the commercial sponsor to file for provisional patent protection and remove any sensitive corporate proprietary information. Publication is an academic principle that helps ensure the rapid diffusion of public knowledge, which is independently scrutinized and verified for accuracy.

Protect academic knowledge sharing

Any university that enters into a large-scale industrial research alliance should include a legal clause—known as a "research exemption" or "academic-use exemption"—as part of its licensing agreement with the corporate sponsor. This "exemption" permits all university professors to freely share their sponsored-project results (related to any published academic research) with other scientists, both within their own academic institution and at other non-profit and governmental institutions, for purely noncommercial, research purposes. Too many schools continue to overlook this critical knowledge-sharing function

even though it is the first principle enshrined in a 2007 academic statement titled "In the Public Interest: Nine Points to Consider in Licensing University Technology," endorsed by more than 50 universities.[135]

Resist monopoly ownership of academic knowledge

Researchers rely on the wellspring of shared academic knowledge to stimulate their own creativity, research, and scientific and technological discovery. Over the past several decades, in an effort to extract rents from campus-based research, U.S. universities have imposed proprietary restrictions on a growing share of this academic research. Because U.S. universities remain heavily reliant on U.S. taxpayer support for their research-and-development funding, it is important for these academic institutions to resist the temptation to grant their corporate sponsors exclusive, monopolistic control over the universities' academic research, most of which is heavily subsidized by public sources. To the greatest extent possible, U.S. universities should license the bulk of their research nonexclusively so it may be used by multiple parties in diverse research and commercial applications.

Conclusion

Private industry has a critically important role to play in researching and developing new clean-energy technologies and bringing those technologies to market. Yet when it comes to this nation's science and technology infrastructure, the U.S. government and U.S. universities also have a pivotal role to play. It is time for the U.S. government to finally step up to the plate and commit itself to advancing clean-energy and efficiency R&D—the prerequisite to generating a truly vibrant, innovative, globally competitive green-technology and clean-energy industry in the United States.

America's top-ranked research universities and their star energy research faculty and students have operated too long with insufficient federal support. The U.S. government needs to commit to providing strong and steady public support to both U.S. universities and new technology companies, recognizing that these two science and technology R&D spheres are unique and distinctive. Their individual attributes must be preserved. In return, U.S. universities must balance their commitment to high-caliber, impartial, public-good research with the need to get these new technologies commercialized.

Most of the early scientific breakthroughs that launched both the biotechnology and the computer/information revolutions were born out of publicly funded academic and federal laboratory research, not industry research. There is a high probability that U.S. universities will generate many of the critical breakthroughs in alternative energy research as well. Our hope is that this report will stimulate a more productive and engaged national conversation about the future direction of U.S. energy R&D funding alongside the public-interest mission of U.S. research universities.

Appendix one

Detailed contract review

Arizona State University

&

BP Technology Ventures, Inc., a unit of BP PLC

Amount

According to Arizona State University, BP provided $2.5 million out of this project's total two-year budget of $5.2 million.

Agreement term

This agreement was originally signed with BP for 2 years (October 2007-October 2009), with possible extensions, though BP elected not to extend it. According to Neal Woodbury, deputy director and chief scientific officer of ASU's Biodesign Institute, BP formally ended its contract with ASU in October of 2009 after the company decided "that for their market interests, the cyanobacterial biofuels area was not something they currently wanted to pursue as part of their renewable energy portfolio." Since then, however, ASU's initial work supported by BP has been awarded a U.S. Department of Energy Advanced Research Projects Agency-Energy grant worth $5,205,706. This work will specifically address the production and secretion of fatty acids for fuel production from cyanobacteria.[1]

Public financing

Throughout, this project has involved extensive public financing from both state and university sources. During the first two years, BP's initial contribution of $2.5 million was matched by a grant from the Science Foundation of Arizona, a state funded non-profit, worth $2.2 million, and a grant from Arizona State University worth $454,384. After BP pulled out in October 2009, the project was awarded additional public support through a federal Department of Energy Advanced Research Projects Agency grant worth $5,205,706.[2]

Brief project description

On November 2, 2007, Arizona State University announced "a significant research partnership" with BP to research the use of optimized photosynthetic bacterium to produce biodiesel, a high-energy fuel that can be used in conventional engines.[3] According to Neal Woodbury, deputy director of ASU's Biodesign Institute, with new Department of Energy ARPA-E support, this project is now turning its attention more specifically to the production and secretion of fatty acids for fuel production from cyanobacteria.[4]

Method for obtaining the research contract,and CAP's request for university comments

We initially obtained a partially redacted version of this agreement through a formal, state-level, public record act request, filed by the author in November 2007 and filled by ASU twenty days later. This redacted agreement did not disclose the official dollar value of ASU's original, 2-year research alliance with BP, and some of the intellectual property terms also were redacted. But Exhibit A of the agreement, which we received as part of our original public record act request, did indicate the following projected funding figures: BP ($2.49 million), Science Foundation Arizona ($2.2 million) and ASU (nearly $1.5 million). Exhibit A of the agreement also noted that if the "effort proves the concept"—if the research project proves successful as well as commercially viable—then BP would increase its funding by a projected $20 million to $25 million. As we noted under the "Agreement term" section above, in October 2009, BP ultimately chose not to renew the ASU contract. The research project has continued with a new $5.2 million grant from the U.S. Department of Energy.

In July 2010, CAP invited ASU to provide written comments on the "Major Findings" contained in this appendix (based on our analysis at that time), which were drawn primarily from an independent, expert legal analysis of the BP-ASU agreement (for details please see the methodology box in the main report on pages 15 and 51). Along with its detailed written comments, ASU elected to provide CAP with an unredacted copy of its main BP alliance agreement, though this submission failed to include Exhibit A of the agreement, which we had earlier obtained through our public record act request.[5]

It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions #1-17 below are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Also, the contract provisions have not to our knowledge been tested in a court of law, so their "legal" meaning has not been definitively established.

Overview commentary: Major findings

Arizona State University's formal agreement with BP suggests that the alliance's overarching research agenda was designed largely by the faculty, not by the corporate sponsor. The BP-ASU deal has many characteristics in common with strategic corporate alliances (as defined by Cornell University), but it is more of a hybrid deal. Based on the formal alliance agreement, it seems that several university professors drew up the original research program, and persuaded BP to provide research financing. As such, the lead academic investigators and their research projects are all largely named and defined in advance, which obviates the need for any joint university-industry governing body, typical of most large strategic corporate alliances, to oversee the alliance and the selection of faculty research proposals. In this respect, ASU appears to have secured greater independence from the industry sponsor than is true of other industry alliance deals reviewed here.

Yet other features of the BP-ASU agreement, including its joint industry-university-state financing and its intellectual property terms (allowing for BP monopoly control over the research results), seem quite unusual, and raise a host of conflict-of-interest concerns, as detailed in our independent legal experts' contract review below.

According to Exhibit A of the agreement, included in our initial public record act request, ASU originally pledged it would provide the BP-ASU project with nearly $1.5 million in university funding. For a public university, this represents a large direct contribution to put toward such an overtly commercial research partnership, especially in today's tight educational fiscal climate. A financial arrangement such as this also raises questions about ASU's ability to maintain its own institutional autonomy, its research objectivity, and its academic independence from the industrial sponsor, BP. As it turns out, according to recent figures provided to CAP by ASU, the university only provided $454,384 of this projected $1.5 million, while the state of Arizona (through Science Foundation Arizona) did pay out the fully projected amount of $2.2 million.[6]

In written comments submitted to CAP in August 2010, ASU's Neal Woodbury requested revisions to our contract review findings and asserted that "this partnership did not give BP any 'monopoly control over the research results.'" [7] Our outside legal expert reevaluated the BP-ASU unredacted agreement and disagreed with Woodbury, finding that BP could exert monopoly commercial control over ASU's research results. The intellectual property provisions in the full, unredacted agreement clearly grant BP the right to choose among three possible licensing options for both ASU- and joint BP-ASU project research inventions. These options include a non-exclusive, royalty free worldwide license to practice the inventions; negotiating terms with ASU to spin off the invention into a stand alone corporate structure; or an exclusive, royalty bearing license. A letter included in Exhibit A of the agreement (left unredacted and included in our original public record act request) states that all parties are agreed that the final licensing agreement "shall include an exclusive license to BP and its affiliates to practice any technology covered by intellectual property resulting from the Project." Woodbury did not address this Exhibit A attachment or its import in his written comments.

It is important to note that these licensing provisions granted BP the right to exert exclusive commercial control over ASU research inventions funded not only by BP but also by state and university sources as well. It is true that BP funds might have grown to become a bigger portion of the project's overall funding later on (as Exhibit A noted, "if the effort proved the concept"), but Exhibit A indicates that BP was granted exclusive commercial rights to the project's research results upfront, well before this additional $20 million to $25 million in additional BP funding had been either guaranteed or secured.

The letter in Exhibit A further states that BP will get an "exclusive license" to any "background intellectual property" owned by ASU that may be necessary to practice inventions resulting from the alliance. By definition, this means that BP would acquire exclusive commercial rights to technology that was invented by ASU faculty before the alliance began,

which also was not funded by BP. Two critical pieces of "background intellectual property," which identify ASU faculty as inventors, are specifically cited in Exhibit B: "System and Method for Growing Cells" and "Modified Cyanobacteria."[8]

On the positive side, the agreement contains strong language protecting the academic investigators' right to publish. It asserts that the "work performed under this Agreement must be publishable," and further emphasizes that BP "shall have no right to object to the proposed publication or release of any such information except for reasons relating to the patenting of any invention resulting from the work."[9] This publication right, however, may be subject to a publication delay of up to 120 days to remove proprietary information, which is twice the maximum intellectual property delay that federal agencies recommend.[10] The agreement also requires all confidential information to be kept secret for three years.

In his August 2010 written comments, ASU's Woodbury emphasized the importance of university-industry collaborations, such as the BP-ASU partnership, in the advancement and commercialization of research. Woodbury wrote: "Federal agencies such as the National Science Foundation are now implementing programs to facilitate the translation of university research into useful products and services through close partnerships between industry and universities. Of course, conflicts of interest must be managed and scientific objectivity and independence must be maintained through appropriate processes and procedures, but we believe that private/university/state partnerships are important and necessary vehicles for advancing innovation and technology development for the public welfare." In the main report, the author discusses the importance of university-industry partnerships and the role that the federal government is now playing in fostering public-private-research partnerships, and calls upon the federal grant-making agencies and U.S. universities to adopt stricter, collective, contract-research standards to better protect and safeguard the universities' distinctive academic commitment to high quality, independent research and the broad dissemination of reliable, public-good knowledge.

In his written comments, ASU's Woodbury also refuted our external legal interpretation of several key provisions in the BP-ASU contract, including its 120-day-maximum publication delay, its exclusive licensing terms, and its confidentiality provisions. ASU further disputed our finding that BP's follow-on funding (in the $20 million to $25 million range) was contingent on ASU's ability to meet commercial milestones. Woodbury concluded by stating: "In sum, nothing in the contract between ASU and BP 'raises questions about ASU's ability to maintain its own institutional autonomy, its research objectivity, and its academic independence from the industrial sponsor, BP.' The IP provisions were neither unusual nor inconsistent with standard practices in university technology transfer."[11] Each of these issues is addressed, point by point, by our independent, expert legal contract review below.

Detailed contract review

REVIEW QUESTION #1

University autonomy

Does the university side retain majority control of the alliance's central governing body?

Yes; but no governing body

The only governing structure referred to in the agreement is the appointment of two ASU faculty members as "Project Directors." If these directors leave, "they shall be replaced by qualified successors who shall be acceptable to the Sponsor."[12] There is no further description of the duties of the project directors, their terms, or their responsibilities. BP is explicitly given an option, however, to cancel the agreement if ASU and the sponsor cannot agree on project director replacements.[13]

REVIEW QUESTION #2

Impartial peer review

Does the agreement require all faculty research projects to be selected using impartial peer review?

Not applicable

Because of the hybrid nature of this agreement, this question does not apply. This agreement appears to name all the lead faculty investigators and their research projects in advance so it does not require the creation of joint university-industry governing body to oversee the alliance. Nor does it require any method for evaluating and selecting faculty research proposals.

REVIEW QUESTION #3

Transparency

Is the process for submitting faculty research applications fully transparent?

Not applicable

The agreement seems to read more like a traditional industry-sponsored research agreement and less like a strategic corporate alliance, so this question does not apply. Despite its size and the large number of lead faculty investigators involved, all the research projects funded by this alliance appear to be largely defined in advance within the agreement. The agreement states that it will fund at least nine primary faculty investigators to carry out the project research, together with their graduate students and lab assistants. There is no indication that other ASU faculty will be able to apply for any of the project funds. As such, the BP-ASU deal is quite different from most of the other deals reviewed in this report, and does not require a transparent application process.

Protection of academic publication rights

REVIEW QUESTION #4

Is the university's right to publish protected?

Yes

The agreement is both strong and emphatic on this point. It states: "[BP] recognizes that under [Arizona State] policy the results of work performed under this Agreement must be publishable."[14] The agreement further states that BP "shall have no right to object to the proposed publication or release of any such information except for reasons relating to the patenting of any invention resulting from the work." But it is important to note that this publication right is subject to publication delays that the contract allows to run longer than federally recommended. (see Questions #5 and #6 below for details)

Protection of academic publication rights

REVIEW QUESTION #5

What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?

120 days

The agreement allows BP a full 90 days to review publications and presentations in order to decide if it wishes to file for patent protection, and another 30 days to file the patent.[15]

In his August 2010 comments, Neal Woodbury, Deputy Director and Chief Scientific Officer of ASU's Biodesign Institute, contested our outside expert's finding that the BP-ASU agreement permits academic publications and presentations to be delayed for up to 120 days. Our legal expert found that Mr. Woodbury failed to back up his claims, and reconfirmed his assessment that the formal agreement permits BP 90 days to review a proposed publication. If BP objects to publication on the basis that it wishes ASU to patent an invention described in that publication, then it can delay publication an additional 30 days. Thus, project publications can be delayed for a total maximum of 120 days.

Protection of academic publication rights

REVIEW QUESTION #6

Does this publication delay accord with recommended federal limits?

No

The National Institutes of Health and other federal agencies recommend academic-publication delays of no more than 30-60 days, which is considered sufficient time for the industry sponsor to file a provisional patent and/or vet any confidential proprietary information.[16]

REVIEW QUESTION #7

Are there additional confidentiality restrictions?

Protection of academic publication rights

Yes

Confidential information provided by either party to the other must be kept confidential for three years.[17]

In his August 2010 written comments, ASU's Woodbury contested our legal expert's findings concerning the agreement's confidentiality terms. Woodbury writes that "this provision, as it applies to ASU, only covers proprietary or confidential information *received from BP*. As noted earlier, nothing in the agreement protects any research results as confidential information [emphasis in original]." Our independent legal expert found that Mr Woodbury's reading of the agreement is inconsistent with the definition of confidential information in Article IV, 5, which defines "confidential information" as "proprietary or confidential information" disclosed by either ASU or BP to the other party.

REVIEW QUESTION #8

Does the industry sponsor substantially define the alliance's overarching research agenda?

Degree of industry control over the academic research agenda

No

Unlike most agreements reviewed in this report, the BP-ASU alliance's overarching research agenda appears to have been largely designed by the faculty, not by the corporate sponsor. Based on the formal alliance agreement, it seems that several university professors drew up the original research program, and persuaded BP, the state of Arizona (through Science Foundation Arizona), and Arizona State University itself to provide research financing.

REVIEW QUESTION #9

Which parties set the alliance's research priorities each new grant round?

Degree of industry control over the academic research agenda

ASU Faculty

The BP-ASU alliance's overarching research agenda appears to have been largely designed by the faculty (see comments in Question #8 above).[18]

REVIEW QUESTION #10

Does the university retain majority control over the selection of academic research projects?

Degree of industry control over the academic research agenda

Not applicable

Again, this question does not apply. The agreement appears to identify, in advance, all the primary investigators and the research projects eligible to receive alliance funding. Unlike

other agreements reviewed in this report, there is no indication that other ASU faculty, who are not already named in the agreement, will be eligible to apply for funding. Yet the "Agreement may be modified or extended at any time by mutual written consent of both parties," so this situation could be altered at any time.

Degree of industry control over the academic research agenda

REVIEW QUESTION #11

Does the industry sponsor have to approve all final research awards?

Not applicable

Question does not apply; see discussion above under Question #10.

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #12

Exclusive commercial rights: On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?

Ranking: 10

The unredacted BP-ASU agreement covers three categories of intellectual property: inventions by ASU personnel ("ASU IP"), inventions by BP personnel ("BP IP"), and inventions deriving from both ASU and BP employees ("Joint IP").[19] BP is permitted to choose among three licensing options for ASU IP and Joint IP: a non-exclusive, royalty free worldwide license to practice the inventions; negotiating terms with ASU to spin off the invention into a stand alone corporate structure; or an exclusive, royalty bearing license.[20] The exclusive license option requires that BP pay patenting costs and a 15 percent patent maintenance administration charge for the term of the license, but the precise terms of the license are left to "industry standards."[21] But a letter included as "Exhibit A" of the agreement—received pursuant to our public records act request, and signed by ASU's director of research administration and BP's biotechnology program manager—clearly asserts that the parties have agreed that the final licensing agreement "shall include an exclusive license to BP and its affiliates to practice any technology [resulting from the alliance]."[22]

If these exclusive licensing provisions are contained in the final licensing agreement (which they almost certainly are, given the letter's high-level signatories, and its inclusion in the final agreement), then BP enjoys exclusive commercial rights to a substantial body of academic research that was funded not exclusively by BP, but by public sources as well.

In written comments submitted to CAP in August 2010, ASU's Woodbury strenuously objected to our legal reviewers' finding that BP was offered, and elected to take, an upfront, exclusive commercial license to ASU's project research results. In his letter, Woodbury

writes: "the agreement between ASU and BP specifically provided that patent applications on intellectual property developed solely by ASU or jointly with BP shall be filed and controlled by ASU's technology transfer organization—not by BP. Thus, any suggestion that BP had some 'monopoly control' over research results is incorrect."[23]

According to our legal reviewer's analysis, Woodbury is correct that the unredacted agreement does require ASU to file all patent applications for project inventions, but BP also has the right to compel ASU to initiate the patenting process.[24] What's more, regardless of who files and/or owns the patent, the unredacted agreement leaves BP in charge of making the ultimate decision about which type of license it wants to take. Thus, ASU may own the patent, but BP can choose to control it. The unredacted agreement does provide some flexibility in the assignment of intellectual property rights related to project research, however because BP is allowed to choose the type of license it desires, including an exclusive license, and Exhibit A of the agreement (obtained via our original public record act request) indicates that BP specifically selected upfront, exclusive licensing rights to project research, this flexibility is largely unrealized. Thus, we stand by our interpretation that BP was granted exclusive commercial control over project research.

During the first two years of this contract BP was slated to provide only an estimated $2.5 million of the alliance's total two-year, $6 million budget, with the state of Arizona and Arizona State University providing the remaining $3.5 million. Nonetheless, per the letter in Exhibit A, BP was granted exclusive commercial rights to research funded not only by BP but also by state and university sources as well. While it is true that BP funding for this project might have grown to become a bigger source of the project's overall funding (Exhibit A did state that "if the effort proved the concept" then BP funding support could grow by $20 million to $25 million), the contract letter grants BP sweeping exclusive commercial rights to the project's research results, upfront, well before this additional $20 million to $25 million in projected BP funding had been either guaranteed or secured.

What's more, the same letter featured in Exhibit A states that BP will also receive an exclusive license to any "background intellectual property" owned by ASU that may be necessary to practice inventions resulting from the alliance. By definition, this means that BP would acquire exclusive commercial rights to technology that was invented by ASU faculty before the alliance began, and was also not funded by BP. Two critical pieces of "background intellectual property," which identify ASU faculty as the inventors, are specifically identified in Exhibit B: "System and Method for Growing Cells" and "Modified Cyanobacteria."[25]

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #13

Licensing to multiple commercial users: On a scale of 1 to 10, is the university free to license project research non-exclusively to other outside commercial entities?

Ranking: 2

The unredacted contract we received from ASU does indicate the possibility of some flexibility in licensing project research, as discussed above under Review Question #12. But the unredacted letter included in "Exhibit A" of the BP-ASU agreement, which we received as part of our initial public information act request, clearly confirms that the final license agreement "shall include an exclusive license to BP and its affiliates to practice any technology [resulting from the alliance]." This letter provides no indication that any flexibility in non-exclusive licensing of academic inventions has been protected.

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #14

Royalty and other intellectual property advantages: Does the industry partner enjoy special royalty and intellectual property terms?

Not discussed

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #15

Academic sharing: On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, non-commercial inquiry?

Not discussed.

Management of conflicts of interest

REVIEW QUESTION #16

Does the agreement call for management of conflicts of interest related to the alliance?

No

There is no mention of conflicts of interest or their management.

Management of conflicts of interest

REVIEW QUESTION #17

Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?

Not applicable

This project has no governing body (see previous discussion above for details).

Appendix two

Detailed contract review

Energy Biosciences Institute

University of California at Berkeley; Lawrence Berkeley National Laboratory; University of Illinois at Urbana-Champaign

&

BP Technology Ventures, Inc., a unit of BP PLC

Amount

$500 million (spanning three public research campuses)[1]

Agreement term

10 years (July 1, 2007-June 30, 2017)

Public financing

Energy Biosciences Institute's main research labs will be headquartered inside the U.C. Berkeley Helios Energy Research Facility, now under construction with public funding on property adjacent to the central U.C. Berkeley campus. A second, smaller Helios lab is also under construction at Lawrence Berkeley National Laboratory. Initially, U.C. Berkeley reported that the estimated total cost of constructing the Helios complex would be $159 million. Of this, $70 million was due to come from state lease revenue bonds, another $74 million from external financing in the form of U.C. bonds, and $15 million from outside private support. The bonds are to be repaid partly through overhead from the BP grant, and partly by funds that BP has agreed to pay to lease corporate proprietary laboratory space inside the Helios complex.[2] In 2009, however, U.C. Berkeley lowered its cost projections to $85 million for building the central Helios building due to house the Energy Biosciences Institute, with no new estimates provided for the second Helios lab.[3]

Brief project description

In early 2006, BP invited more than five separate university groups to compete for its $500 million grant, devoted mostly to biofuels-related research. In February of 2007, BP announced it would spend $500 million over 10 years to fund a new Energy Biosciences Institute, spanning three public research campuses, devoted primarily to the study and development of biofuels.[4] EBI will also conduct some research on other energy-related areas, including fossil fuel bioprocessing (converting heavy hydrocarbons to cleaner fuels) and carbon sequestration (removing or preventing increases in atmospheric carbon).[5]

BP has agreed to provide U.C. Berkeley with a minimum of $35 million per year over 10 years to fund the academic—or "open component"—of EBI, with an estimated 33 percent of this funding expected to go to the University of Illinois at Urbana-Champaign and the rest shared between U.C. Berkeley and Lawrence Berkeley National Laboratory. The remaining $15 million per year (over 10 years) in BP grant funds will be spent exclusively

inside BP's own commercial lab space—otherwise known as the "proprietary component" of EBI—which will be situated inside academic laboratory space adjacent to EBI's open academic labs in U.C. Berkeley's Helios Facility and at UIUC.[6]

Method for obtaining the research contract, and CAP's request for university comments

After BP announced its $500 million research award on February 1, 2007, U.C. Berkeley initially declined to make a copy of its BP-EBI research proposal, the basis for this award, available to the public. Only after numerous faculty, students, and journalists had called for its release (and a copy was eventually leaked to several journalists, including the author of this report) did U.C. Berkeley's administration make its original BP-EBI proposal public, roughly one month after the alliance was announced.[7] For the next nine months, from February to November 2007, BP and its three academic partners worked to finalize the terms of their formal legal research agreement.

The final BP-EBI agreement is publicly available online at www.energybiosciencesinstitute.org/images/stories/pressroom/FINAL_Execution_11-9.pdf.

In July 2010, CAP invited U.C. Berkeley, the lead academic institution administering EBI, to provide written comments on the " Major Findings" contained in this appendix based on our analysis at that time, which were drawn primarily from an independent, expert, legal analysis of the BP-EBI agreement (for details please see the methodology box in the main report, on pages 14 and 51). When Graham Fleming, U.C. Berkeley's Vice Chancellor for Research, provided us with his comments he confirmed that there have been no formal changes or revisions to the EBI agreement since November 2007, thus our review of the contract is still current.[8]

It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions #1-17 below are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Also, the contract provisions have not to our knowledge been tested in a court of law, so their "legal" meaning has not been definitively established.

Overview commentary: Major findings

When BP invited U.C. Berkeley and two other major public research partners—the University of Illinois at Urbana-Champaign and Lawrence Berkeley National Laboratory—to apply for its $500 million grant, it specified a relatively narrow agenda: the research and development of plants and other organic materials that can be efficiently converted into fuels—known as biofuels—through genetic engineering and other chemical and biological processes. A smaller portion of BP's grant was also designated for researching new biological methods for processing fossil fuels to enhance oil recovery, and sequestering carbon. In written comments, dated August 9, 2010, Graham Fleming, U.C. Berkeley's

Vice Chancelor for Research, disagreed with the author's description of this research agenda as narrow, even though EBI's focus on biofuels does exclude many other alternative energy technologies and pathways.[9] (See endnote 9 to see how the agreement itself describes EBI's research focus.[10])

Many U.C. Berkeley faculty and administrators on campus embraced this new source of much-needed energy research funding. One of the deal's most prominent supporters, throughout the negotiations with BP, was Dr. Steven Chu, now the Obama administration's energy secretary, who then worked as a Nobel Prize-winning physicist and director of LBNL. In one March 2007 interview, posted on the EBI's official website, Chu explained that the BP alliance would help scientists tackle the global warming crisis: "Partnering with BP we will have the resources to actually carry out some of the things that we want to do in order to help save the world."[11]

It is not unusual for a university sponsor (whether a government agency or a private company) to specify the overarching research area it wants to fund. But due to its massive scope—more than double the size of any previous academic-industry-research partnership ever negotiated—some faculty on campus, as well as outside critics and public interest groups, felt the BP-EBI alliance went too far, permitting one foreign-owned oil company to exert excessive influence over the research portfolios of three major public U.S. research institutions.[12] Over 10 years, the BP-EBI alliance will draw on the scientific expertise of roughly 60 distinct research groups, comprised of 120 faculty members and 200 postdoctoral researchers, graduate, and undergraduate students spread across three prominent, taxpayer-financed institutions. Additional research facilities include a 320-acre Energy Farm connected with the U. of Illinois and an 112,000-sq-ft Helios Building connected to U.C. Berkeley and LBNL, which will be completed in 2013.[13]

When the BP-EBI alliance was first announced, it sparked vocal campus and external public-interest concerns. Here is a summary of what some of those concerns are:

1. The EBI agreement allows BP to set up a fully proprietary, commercial research lab inside an academic facility at a world-renowned public university. Traditionally, most U.S. universities have sought to maintain an "arm's-length relationship" with their corporate sponsors to protect their institutional autonomy and research independence. Specifically, the EBI deal permits up to 50 BP employees to lease "proprietary" commercial lab space inside the same university buildings that house EBI's "open" academic labs. (Currently, BP has 16 employees who work behind closed doors in a private suite on the third floor of the main EBI facility at U.C. Berkeley. More BP employees are expected to join the institute when it moves into a new facility due to be completed in 2013.)[14] The EBI is thus split into two parts: One part is slated to function like a traditional academic lab, where faculty, students, and BP employees are free to discuss and share information openly; the other part is structured as a "closed" corporate lab, where all scientific inquiry and research is exclusively owned and controlled by BP, and is also subject to

strict confidentiality and proprietary restrictions. Critics contend this highly unusual physical and legal arrangement effectively turns California's leading public university (and two other public research facilities) into the commercial research arms of one major foreign-owned oil company.

But many faculty and administrators at U.C. Berkeley, see BP's role quite differently. According to Graham Fleming, U.C. Berkeley's Vice Chancellor for Research: "The synergies that can arise when universities and industry cooperate have spawned and nurtured entire industries that stimulate our state, national and global economies.... The kind of translational research that is at the core of the EBI's mission is greatly facilitated by direct interaction between academic and industry scientists. The arrangement whereby the campus leases laboratory space to BP researchers that is adjacent to UC Berkeley's academic labs allows for that kind of productive interaction between industry and university scientists. This kind of arrangement is uncommon, but not unprecedented, on UC campuses."[15]

2. When U.C. Berkeley finalized its legal agreement with BP in November 2007, many observers noted one especially striking difference from the EBI draft proposal (dated November 2006), which BP had originally selected to be the winner of its grant competition.[16] The final agreement did not preserve majority academic control over EBI's main governing body, the Governance Board.[17] In the original, widely circulated EBI proposal, the three non-profit research partners retained strong governing control: Out of five member seats on the EBI Governance Board, three were held by the non-profit partners, and the remaining two were held by BP.[18] This provision of the original proposal was consistent with longstanding academic traditions of university-self-governance, designed to protect the university's research independence and its autonomy from outside financial benefactors.

In a detailed 2004 analysis of Strategic Corporate Alliances, or SCAs, on campus (referenced often in this report), a prominent faculty committee at Cornell University strongly emphasized the importance of protecting university self-governance. "The corporate sponsor appropriately has a voice in management decisions," noted the Committee; "[h]owever, the sponsor should not be in the position of… having equal representation on the [SCA's governing body]."[19]

Following nine months of legal negotiations, U.C. Berkeley amended its original proposal to give BP and the three academic partners equal voting power on the EBI's main Governance Board. Because all board decisions require majority approval, this gives both BP and the academic partners (collectively) the power to veto all major alliance decisions, including the final selection of faculty research awards and other major EBI governance decisions.

In a 2007 press release, U.C. Berkeley explained that it had agreed to this 4-4 vote split in order to encourage "collaborative decision making."[20] In his August 9, 2010 comments, U.C. Chancellor Fleming also echoed this sentiment: "Equal representation on the Governance Board was a negotiated compromise to encourage collaborative decision-

making and is reflective of the spirit of cooperation that epitomizes the EBI endeavor." He went on to say: "The goal of the initial proposal for majority academic control over EBI's main governing body was to ensure that BP would not have veto power over operational and research decisions. That goal was preserved and protected in the final agreement."[21] Our outside legal experts' detailed review of the EBI agreement, however, finds that BP does have veto power over operational and research decisions due to the Governance Board's 4-4 vote split. (See Review Question #1 below) Because BP retains overwhelming control over the EBI's finances, as its sole sponsor, it remains highly uncertain whether the academic side of the EBI will feel equally at liberty to exercise its veto power, since this could alienate BP and jeopardize the EBI's long-term research support.[22]

Many professors were dismayed to see U.C. Berkeley cave in on something it had so admirably defended in its original EBI grant proposal. Dan Kammen, a Berkeley professor of energy policy who helped draft the original EBI proposal, told the *San Francisco Chronicle*: "I don't fully understand it. It doesn't strike me as a beneficial change. So far, I've been really impressed with BP to empower the scientific process here and to make the [academic side of EBI] strong and let it call the shots." Without this academic majority, BP will, to a far larger extent, have the potential to call the shots at EBI.

Yet it is noteworthy that the final agreement does make an attempt (at least during the first three years of the alliance) to limit BP's ability to threaten the academic side with sudden termination of the research alliance. Under the agreement, BP cannot terminate the EBI contract before three years have passed, unless the EBI's research partners default on any of their obligations, or breach central contract provisions.[23] Most of the other SCAs reviewed here do not have such strong contractual safeguards against sudden industry sponsor termination. Also, as our legal consultant Sean O'Connor points out, the EBI agreement stipulates that the academic partners, if they are not satisfied, also have the power to terminate the alliance. Most other university-industry alliance agreements reviewed in this report fail to grant the academic parties this basic termination option. "That really troubles me," notes O'Connor, "because it means that the universities are really shackled to these deals."[24]

3. The EBI agreement blurs traditional boundary lines that have long separated "academic research" from "commercial research for hire." There is no written requirement anywhere in the EBI agreement that faculty research proposals be selected through a disinterested, scientific peer review process, based on academic merit rather than commercial criteria. U.C. Berkeley has indicated, in its own press releases, that all EBI grants will be awarded through "a competitive peer-reviewed process each year."[25] Yet it is disturbing that the issue of whether impartial peer review will be required at all times is never stated, or assured, in the actual legal agreement that U.C. Berkeley and its non-profit partners signed with BP. Moreover, in practice, in the opinion of our outside legal experts and the author based on the written comments from U.C. Chancellor Graham Fleming and a 2010 interview with EBI Director Chris Somerville (see page 61 of the main report), EBI does not appear to be using a genuine independent or impartial peer review process for selecting faculty research proposals. For a

deeper discussion of this issue, please see Review Question #2 in the detailed contract review section just below.

4. The EBI agreement also appears to violate U.C. Berkeley's current ban on the performance of classified and/or non-publishable research on campus. Berkeley's own written policies clearly state that "classified projects are not consistent with the teaching, research, and public service missions of the Berkeley campus."[26] The policy goes on to assert that: "The University of California at Berkeley is committed to maintaining a teaching and research environment that is open for the free exchange of ideas among faculty and students in all forums—classrooms, laboratories, seminars, meetings, and elsewhere … There can be no fundamental limitation on the freedom to publish as the result of accepting extramural research support."[27] But the EBI agreement expressly permits BP employees to carry out "private, confidential, and proprietary research," and to keep that research secret, despite their physical presence and collaboration with U.C. Berkeley professors and students inside an academic research building.[28]

A similar confidentiality provision, in the 2006 EBI draft proposal, prompted the editorial board at the *San Francisco Chronicle* to observe: "On the face of it, this arrangement conflicts not only with the 'open' nature of a university, especially a public one, but also with Berkeley's prohibition against classified research on campus."[29]

The U.C. Berkeley administration argues the EBI agreement does not violate its own ban prohibiting classified and non-publishable research from being performed on campus, because it says that ban only applies to "academic research" performed by faculty, students and staff researchers. The administration contends the ban does not extend to the proprietary research that BP will perform within the company's own leased lab space adjacent to Berkeley's open academic labs.[30] But many Berkeley faculty as well as students feel this violates the ban's intended goal, which was to banish all confidential and non-publishable research from the campus during a time when secret government- and defense-related research contracts were seen as posing a grave threat to the university's core academic and open-knowledge missions.

5. The EBI agreement also contains several unusual intellectual-property provisions, detailed in the agreement review below. First, it grants BP the option of an exclusive license to commercialize any EBI discoveries, with a generous decision-making period of up to 180 days for the sponsor, and future royalties (owed to the academic partners) capped at no more than $100,000 per invention per year. Only in "exceptional circumstances" can the academic parties negotiate for a higher fee. This arrangement marks a significant departure from standard U.C. licensing policy, and is considered financially advantageous to BP.[31]

But according to our legal consultant, Sean O'Connor, few U.C. inventions ever generate more than $100,000 per year, so this provision could eliminate inefficient haggling over academic licensing fees while still enabling the academic institutions to recoup higher

royalties should any blockbuster commercial inventions emerge out of the EBI.

BP also secured privileged, royalty-free access to what is known as "background intellectual property," or BIP, which may be defined as inventions made by faculty, prior to their involvement in the EBI, that are necessary to practice inventions reduced to practice inside the EBI. The agreement provides for two kinds of BIP: BIP wholly owned by participants in the EBI; and BIP partially owned by individuals outside of EBI. For BIP owned by EBI participants, BP is granted a nonexclusive, royalty-free license, provided that the BIP is not already fully licensed to another party. For BIP owned by parties outside of the EBI, BP is granted a non-exclusive license, with the consent of the extra-EBI inventors. The royalty payments for such a license are capped at $20,000 per year for an individual patent ($50,000 for a bundle of patents).[32]

"The issue [of BIP] came up only in the contract negotiations," noted a U.C. Berkeley faculty senate committee, known as the "Gang of Four," which was invited to review the EBI negotiations, "and both we and the administration would have preferred to treat BIP [Background Intellectual Property] in the standard manner, relegating the issue to subsequent licensing negotiations. The resulting position represents a compromise between UC and BP."[33]

Another issue that aroused considerable faculty unease involved the revelation by BP that it had several, preexisting "non-compete Agreements" with other outside institutions that could potentially collide with the EBI's targeted areas of biofuels-related research. "Ordinarily," noted the U.C. Berkeley "Gang of Four" faculty committee, "an industrial sponsor subject to non-compete Agreements simply does not propose to sponsor research [at a university] that might lead to conflicts with those Agreements." Because EBI is not a corporate entity, noted the faculty committee, this "presents a risk both to BP, that it might find itself afoul of its non-compete Agreements, and to the university, that it might find the basic science mission of the EBI unduly constrained by BP's particular corporate obligations."[34]

6. Beyond this, the BP-EBI agreement generated deep rifts among faculty, especially inside the U.C. Berkeley faculty senate. In late March of 2007, the U.C. administration agreed to enhance faculty participation in the final contract negotiations with BP, after more than 130 Berkeley professors signed a protest petition asking Berkeley's chancellor to investigate whether the EBI agreement had been subjected to sufficient faculty-senate consultation and review.[35] Among the faculty's listed concerns were possible excessive corporate-sponsor control over EBI's academic research; the creation of new faculty positions, financed by BP, without adherence to normal academic hiring procedures; insufficient protection for faculty whose research might run contrary to BP's interests; and inadequate safeguards for graduate students, who could be recruited to work on proprietary research that limits their ability to publish, and advance their own academic research and careers.[36]

7. The BP-EBI deal raised troubling potential conflict-of-interest concerns beyond the peer review concerns discussed in Question #2 of this overview. Three "faculty scientists" were originally named to lead the BP-EBI alliance. But two of those lead university scientists, Jay Keasling and Chris Somerville, were soon found to have substantial personal financial interests in outside companies that could stand to profit directly from the EBI's biofuels-related research, prompting questions to be raised on campus and in the media. Notably, several of those firms also happen to have close biofuels-related business ties to BP. (For details, please see the box on conflicts of interest within the EBI on pages 64-65 of the main report.)

In June 2007, however, just four months after the BP-EBI alliance was announced, Keasling stepped down from his leadership role at the EBI to become the chief executive officer of another major biofuels research consortium, known as the Joint BioEnergy Institute, financed with a $125 million grant from the Department of Energy.[37] Meanwhile, Chris Somerville, the EBI's academic director, voluntarily stepped down from the various managerial positions he once held in two outside biofuels-related companies, but as of April 12, 2010, he continued to hold founding stock in both firms.[38]

The EBI's potential conflict-of-interest concerns do not end there. The EBI agreement fails to prohibit faculty members who are appointed to sit on EBI's Executive Committee—charged with evaluating and selecting faculty research proposals—from awarding BP grant money to themselves. Within the university setting this represents a potentially glaring oversight, since it allows professors (who, by definition, have a vested research and financial interest and may not be impartial) to evaluate and pass judgment on the merits of competing academic research proposals, including their own.

Our own investigation found that, of the eight faculty members who were originally appointed to sit on the executive committee, seven were primary investigators in labs that had received BP-EBI funding, indicating that they could have been instrumental in awarding BP grant money to themselves and/or would be in a position to do so in the future. This, of course, raises troubling concerns about potential bias, favoritism, and commercial interests skewing EBI's academic-research-selection process, and thereby undermining U.C. Berkeley's oft-stated commitment to the conduct of impartial, high-quality, academically driven research. (For details, please see the box on conflicts of interest within the EBI on pages 64-65.)

In his August 9, 2010 comments, U.C. Berkeley Vice Chancellor for Research Graham Fleming stated that this report's "criticism of the EBI agreement for failing to address conflict-of-interest issues is ill-informed." Fleming pointed out that "this [EBI] agreement and every other research contract is subordinate to the University of California's existing robust rules governing research that include stringent provisions regarding conflict-of-interest, hazardous materials, human subjects, animals care, export controls, laboratory safety, personnel practices and more," and emphasized that "these overarching policies and rules are not reproduced in each individual contract."[39] The fact remains that the agreement itself is neither subject to nor incorporates these university policies, and as a result these are not contractually binding. Moreover, the existence of these "overarching

policies and rules" does not explain how these policies will be applied to the administrative positions and governing structures newly created by the EBI, such as the Executive Committee and the position of EBI director.

In his written comments, Chancellor Fleming further stated that he sees no problem with permitting faculty who sit on the Executive Committee—and who lead BP-EBI funded research projects—from overseeing the evaluation and selection of competing faculty research projects that are also soliciting the same source of funding. "Executive Committee members are required to recuse themselves and leave the room when their own proposals are being discussed," Fleming noted in his comment letter (for more direct quotes see this endnote).[40] Whatever interpretation is correct, these practices certainly diverge quite significantly from the traditional definition of impartial, competitive peer review. (See Review Question #2 below for further discussion of peer review.)

8. Although the Obama administration has stated it wants to see federal R&D spending stimulate new green industries and jobs here in the United States, the EBI agreement includes a special U.S. Department of Energy "waiver" that allows BP to shift actual manufacturing of any EBI-generated energy technologies overseas. In an October 3, 2007 letter (included in Exhibit 3 of the EBI agreement), the U.S. DOE agreed to waive a federal government preference for U.S. manufacturing, which normally pertains to all inventions that stem from publicly financed research scientists and institutions. According to BP's own written documents, this exemption "permit[s] BP to substantially manufacture outside the United States, certain products that are bound for sale in the United States."[41] In other words, if any publicly funded scientist at the LBNL (or another EBI-affiliated public research institution) develops a promising invention related to next-generation biofuels or low-carbon technologies, this waiver grants BP advance permission from the DOE to manufacture those technologies outside the United States. Corporate waivers such as these, from federal legal provisions related to U.S. manufacturing, have grown relatively common.[42]

In his written comments, Graham Fleming, U.C. Berkeley's Vice Chancellor for Research, expressed the opinion that this report "suffers from a fundamental methodological flaw" because, rather than evaluating the day-to-day operations and research activities of the EBI, the report is "based simply on an extrapolation from the legal contract signed between BP and our University." Our outside legal expert, however, notes that the report's methodology was not based on an extrapolation or expansion of the meaning of the contract, but "rather we analyzed what would be possible under the legal agreement as written."

Fleming said that he would have preferred that we reference "a host of overarching regulations, policies, guidelines, practices, and cultural norms " in determining the meaning of the EBI contract. This is not the methodology we chose to employ in this report (see methodology box on pages 14 and 51). And our outside legal expert points out that from a legal standpoint Fleming's suggestion is incompatible with the EBI agreement itself,

which reads as follows: "This Agreement...[and its component parts] constitute the entire agreement between the Parties as of the Effective Date in respect to the subject matter of this Agreement and supersedes any previous written or oral representations, statements, negotiations, or agreements."[43] As such, if parties to the EBI agreement elect to follow practices that diverge from this written agreement without entering into a formal, written signed amendment to the agreement, such election does not alter the legally enforceable nature of their relationship as defined by the contract.

In his August 9, 2010 comments, Chancellor Fleming also stated that many aspects of this report's analysis were factually wrong, including the total dollar value of the BP-EBI contract, the role of the Helios building, and the extent of BP's control over the EBI. Our outside legal expert reviewed Fleming's written comments and found no factual grounds for changing these or other aspects of the report's original analysis, with the exception of one clarification to the section dealing with Background Intellectual Property. For a more detailed discussion of Fleming's critique and our responses, please see the detailed contract review below and this endnote.[44]

Detailed contract review

University autonomy

REVIEW QUESTION #1

Does the university side retain majority control of the alliance's central governing body?

No

EBI has one central governing body, the "Governance Board." The Governance Board consists of eight voting members—four are appointed by U.C. Berkeley (with at least one representative from each of the three collaborating public research institutions) and the other four are appointed by BP. Three additional nonvoting members also sit on the board: the EBI director, associate director, and deputy director.[45]

At first glance, this 4-4 voting structure might appear quite egalitarian and fair. Indeed, a U.C. Berkeley press release, issued shortly after the EBI agreement was finalized in the fall of 2007, asserted that this 4-4 split on the Governance Board would encourage "collaborative decision making."[46] Yet in U.C. Berkeley's original EBI proposal (dated November 2006), the university was careful to retain majority academic control: Out of five voting member seats on the original Governance Board, three were reserved for the academic partners, and the remaining two were held by BP. This academic majority was consistent with longstanding traditions of academic self-governance.

In comments submitted to CAP on August 9, 2010, Graham Fleming, U.C. Berkeley's Vice Chancellor for Research explained the disappearance of academic-majority control as follows: "Equal representation on the Governance Board was a negotiated compromise to encourage

collaborative decision-making and is reflective of the spirit of cooperation that epitomizes the EBI endeavor." He went on to explain: "The goal of the initial proposal for majority academic control over EBI's main governing body was to ensure that BP would not have veto power over operational and research decisions. That goal was preserved and protected in the final agreement."[47] According to our outside legal review, however, because all actions of the Governance Board require a majority vote, this effectively gives both BP and the three academic partners (collectively) the power to veto all final Governance Board decisions, including the final selection of faculty research proposals and other critical alliance governance issues.[48]

Traditionally, U.S. universities have sought to prevent outside sponsors (whether the federal government, a corporate sponsor, or a wealthy donor) from exerting disproportionate control over the university's internal governance and academic affairs. Normally, this commitment to self-governance would encompass the kinds of decisions that EBI's Governance Board is slated to undertake, including the final selection of academic research proposals. The rationale for this traditional academic resistance to outside influence is simple: Inside the university, all academic- and research-related decisions are supposed to be governed, to the greatest extent possible, by academic standards of excellence, scientific methods, and meritocratic forms of evaluation (peer review), not by the narrow commercial interests or dictates of one financial donor (in this case, BP).

The seeming "equality" of the 4-4 vote split on the EBI Governance Board is also limited by what the author considers to be overwhelming financial power wielded by BP over the entire EBI and its research operations through BP's ability to control yearly funding. It is noteworthy, however, that the agreement does make an admirable attempt, at least during the first three years of the alliance, to limit BP's ability to pressure the academic partners through any abrupt termination of funding. Under the agreement, BP cannot terminate the EBI contract before three years have passed, unless the EBI's research partners default on any of their obligations or breach central contract provisions. There are also safeguards designed to limit any resulting disruption to the academic research that might occur should a sudden cut-off of sponsor funding occur.[49] Few of the other university-industry agreements reviewed for this report went so far in attempting to address this problem of sudden sponsor termination of funding.

Another factor that would seem to erode "university autonomy" is the physical structure of EBI, which is divided into two parts: one an academic "open component" and the other a closed "proprietary component." Only the open component of EBI is controlled directly by the alliance contract, and its associated governance structure. Even though the proprietary component of EBI occupies leased space inside the same academic building as the open component, it is governed and operated at the sole discretion of BP. In essence, the "proprietary component" of EBI is no different from a fully commercial R&D lab, except that it is situated inside a publicly financed academic building on university property. BP has plans to lease similar proprietary lab space on the UIUC campus as well, which will also be governed and controlled exclusively by BP.[50]

Impartial peer review

REVIEW QUESTION #2

Does the agreement require all faculty research projects to be selected using impartial peer review?

No

There is no mention anywhere in the agreement of using an independent, scientific peer review process for evaluating and selecting which faculty research proposals will receive BP funding.[51]

U.C. Berkeley has indicated in press releases that all EBI grants will be awarded through "a competitive peer-reviewed process each year."[52] Both Graham Fleming, U.C. Berkeley's Vice Chancellor of Research, and Chris Somerville, EBI's current academic director, said that EBI is now using its own voluntary, external peer review process.

In his August 9 comments, U.C. Chancellor Fleming acknowledged that there is "no written requirement" anywhere in the EBI contract regarding the use of impartial, expert peer review for the evaluation and selection of faculty research projects for possible BP funding. In his comments, Fleming described what he characterized as a "peer review process" that EBI has elected to employ voluntarily for research selection and funding. Use of this informal "peer review process" did not alter the ranking of the EBI Agreement, because the outside legal expert said that "whenever a process such as peer review is adopted voluntarily, it can also be terminated at any time."

Fleming's description of EBI's current peer review process is broadly similar to the description that Chris Somerville, EBI's academic director, gave to this report's author (featured on page 61 of the main report). Our outside legal expert said that EBI's current, voluntary, research-selection process "may be more biased than traditional peer review" because the EBI executive committee first selects the universe of proposals that will be sent out for external, independent expert scientific peer review, and subsequently the executive committee also dominates the selection of final research proposals that are forwarded to the Governance Board for final BP funding approval. And most of the faculty appointed to sit on the EBI Executive Committee are themselves recipients of BP-EBI research funding (see conflicts of interest box on pages 64-65 of the main report), which inherently calls into question their ability to be either neutral or unbiased when selecting and evaluating the quality of other faculty researchers' proposals that are competing for the same pool of BP funding.

Transparency

REVIEW QUESTION #3

Is the process for submitting faculty research applications fully transparent?

No

The agreement states that EBI's executive committee will solicit and recommend which faculty research proposals are forwarded to the Governance Board for possible final

approval. Yet the executive committee's internal process of reviewing faculty research proposals, and its voting methods, are not clearly delineated in the agreement, making the process far from transparent (see #2 above and #10 and #17 below for more details on the lack of transparency and potential conflicts of interest on the executive committee).

REVIEW QUESTION # 4

Is the university's right to publish protected?

Protection of academic publication rights

Yes

The agreement states the research partners "will have the right to copyright, publish, disclose, disseminate, and use, in whole and in part, any data or information received or developed under this Agreement."[53] This right is subject to publication review and possible deletion of confidential commercial information by BP, as outlined below.

REVIEW QUESTION #5

What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?

Protection of academic publication rights

90 days

Faculty and students performing EBI research must disclose their publications and presentations to BP a full 30 days before they are made public for "review, comment, and identification of any BP confidential information that may have been included and which BP wishes to have deleted." If BP wishes to file a patent on any of this material, it can delay publication or public release of this information for up to an additional 60 days.[54]

REVIEW QUESTION #6

Does this publication delay accord with recommended federal limits?

Protection of academic publication rights

No

The National Institutes of Health and other federal agencies recommend academic-publication delays of no more than 30-60 days, which is considered sufficient time for the industry sponsor to file a provisional patent and/or vet any confidential proprietary information.[55]

REVIEW QUESTION #7

Are there additional confidentiality restrictions?

Protection of academic publication rights

Yes

"The Parties contemplate that the majority of the work under Approved Research Projects may be carried out without disclosing or exchanging Confidential Information." But

"such disclosure(s) will be subject to the form of Confidential Disclosure and Non Use Agreement set forth in Exhibit 6 …."[56]

Degree of industry control over the academic research agenda

REVIEW QUESTION #8

Does the industry sponsor substantially define the alliance's overarching research agenda?

Yes

BP substantially defined EBI's overarching research agenda in advance when the company invited five separate university groups (including U.C. Berkeley and its two other non-profit research partners) to apply for its $500 million competitively awarded research grant. In this solicitation, BP spelled out in advance what commercial research areas it was interested in researching and funding, primarily related to biofuels.[57]

According to the agreement, EBI will study "biofuels production and other application of biology to the production, conversion, improvement, or delivery of fuels, energy, or the reduction or elimination of greenhouse gases or other pollutants of harmful byproducts of energy use, including but not limited to the following specific areas:

- Feedstock development (growing and harvesting plant material that can be used in biofuels)
- Biomass depolymerization (breaking down plant material for use in biofuels)
- Fossil-fuel bioprocessing (converting heavy hydrocarbons to cleaner fuels)
- Carbon sequestration (removing or preventing increases in atmospheric carbon)
- Discovery and development support centers
- Socio-economic systems (social and economic issues related to these new technologies)
- Biofuels production.

Degree of industry control over the academic research agenda

REVIEW QUESTION #9

Which parties set the alliance's research priorities each new grant round?

BP and the three non-profit partners

According to the agreement, the executive committee—currently composed of U.C. Berkeley, LBNL, UIUC, and BP personnel (see below for further details on the membership of the executive committee)— is charged with drawing up the annual research agenda. This agenda must also receive approval from the Governance Board (where BP and the academic partners have a 4-4 vote split). The agreement language reads as follows: The executive committee will "develop and propose an annual EBI strategic work plan for approval by the Board." It will further "make an annual call for [faculty research] proposals consistent with the strategic plan and budget allocation approved by the Board, and review Research Project Proposals...."[58]

REVIEW QUESTION #10

Does the university retain majority control over the selection of academic research projects?

Yes, mostly

According to the agreement, the executive committee is charged with evaluating and recommending a slate of faculty research proposals for possible funding by the BP-EBI. Yet the executive committee does not make any final research selections, or final grant awards. All recommendations must be forwarded to the Governance Board for final approval, where either BP or the academic partners can exercise their veto power. Nowhere does the agreement itself specify that the executive committee must have an academic majority.

That said, the EBI agreement does gesture toward giving the academic members greater voting powers. The agreement asserts that the executive committee "shall at all times have at least, five members" (two of whom are BP representatives). These five members will include:

- An executive committee director (UCB faculty)
- Deputy director (UIUC appointee)
- Associate director (BP employee)
- At least one EBI science program director (presumably an academic faculty member)
- A representative appointed by BP

The agreement, however, further states that the composition of the executive committee can be altered with only 30 days notice, which makes this academic majority far from secure (see below for details).

In 2008, U.C. Berkeley's press office told the author of this report that EBI's first executive committee had a total of eight members, only one of whom was a BP employee, giving it a strong academic majority.[59] Yet seven of those original eight committee members had significant potential financial conflicts of interest because they were listed as heads of labs that were receiving BP-EBI grant funding, indicating that these members could have been instrumental in awarding BP grant money to themselves, or would be in a position to do so in the future. By definition, this vested financial interest could have badly compromised these committee members' ability to judge other faculty research proposals fairly and impartially.

More recently, in July 2010, the EBI website listed 13 members on the executive committee, including 11 academics and two representatives for BP—a strong academic majority. Yet 10 of these 11 academic members were named on the EBI website as primary investigators or heads of projects currently supported with BP-EBP funding, once again giving them vested research and financial interests that could seriously compromise their ability to evaluate other faculty research proposals in a truly disinterested or impartial manner. As of September 2010, the membership of this committee has not changed.

As noted above, U.C. Berkeley's press office has frequently emphasized that the EBI's executive committee is dominated by academic appointees. That's why our external legal experts were surprised to find the EBI agreement leaves this academic majority completely insecure. According to the agreement, the EBI director can, with only 30 days prior notice, amend the "composition of the executive committee." He also can establish "an alternative methodology for executive committee decision making … if approved by the Governance Board."[60] This language leaves the voting distribution on the executive committee (between BP and the academic sides) uncertain. Because the executive committee is charged with carrying out so many explicitly academic functions, this contract language ambiguity is especially disconcerting.[61]

Further adding to the ambiguity of the executive committee's balance of power is the issue of voting quorums. The agreement states that the number of committee members that must be present to make a "voting quorum" can vary. Whenever the committee is voting on an annual project work plan and budget for EBI, the agreement specifies there must be an affirmative vote from 2/3 of all the committee members (this presumably means that four of the five core members must vote to approve).[62] However, whenever executive committee members vote on whether to approve or reject a faculty research proposal (for final consideration by the Governance Board), and other decisions, as few as four executive committee members can be present to constitute a voting quorum, including "at least one member representing BP and three members representing [the research partners]" including one U.C. Berkeley representative.[63] In general, this ambiguity surrounding voting quorums makes the balance of voting power on the executive committee (between the BP side and academic side) nearly impossible to verify, because the committee's total membership is not fixed, voting quorum numbers vary, and the director can impose an "alternative methodology for executive committee decision making" with only 30 days prior notice and Governance Board approval.

Due to all these factors, it certainly cannot be said that the EBI agreement insures that there is always a clear (or consistent) academic majority controlling the executive committee. Given that BP can already veto all major EBI decisions through the Governance Board, and given that most executive committee decisions also require final Governance Board approval, it is striking to find that EBI agreement leaves the executive committee's basic membership numbers, voting structure, quorums, and methods of decision-making so variable—especially because the executive committee is supposed to serve as the EBI's primary academic-led governing body.

Degree of industry control over the academic research agenda

REVIEW QUESTION #11

Does the industry sponsor have to approve all final research awards?

Yes

After the executive committee selects which faculty research proposals it wishes to recommend for funding, these are forwarded to the Governance Board for final approval. The

Governance Board consists of eight voting members, four of them BP representatives. Because all decisions require a majority vote, both BP and the academic partners (collectively) have veto power over all decisions, including the selection and rejection of faculty research proposals for funding.[64] The agreement is absolutely clear on this point: It states that whenever a dispute arises "over approval of a research project or a slate of research projects, failure to agree shall be rejection of the project or slate of projects."[65]

Additionally, every faculty research proposal must be signed off on by a BP representative in a separate letter, before any EBI funds are transferred.[66]

REVIEW QUESTION #12

Exclusive commercial rights: On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?

Intellectual property ownership and sharing of academic knowledge

Overall ranking: 9

Open side: 8

Our outside legal experts ranked the open side of the EBI an 8, for the high level of licensing exclusivity—or monopoly commercial control—it grants to BP. BP is presumptively allowed the option of an exclusive license to any academic research discoveries that emerge from the academic or "open component" of EBI. In the author's view, BP is also likely to be a co-inventor with other academic investigators on many of the EBI's inventions, due to the proximity of BP's proprietary labs to the academic labs within the EBI.

In most cases, when BP and the academic partners are "co-owners" of an EBI invention made on the academic side, either party is free to license out the resulting patent non-exclusively (absent a clear contractual obligation to the contrary). But each party would likely need to account to the other partners for such transfers. The invention would also have to be turned down, first, for an exclusive license by BP.

Also, "in consideration of BP's support of EBI," the agreement gives the sponsor "enhanced" intellectual property rights, which permit BP to take a generous amount of time (up to 180 days from the time that a university invention is disclosed) to decide if the company wants to negotiate for an exclusive license.[67] The terms of these exclusive BP licenses are also substantially pre-set in advance, due to the royalty caps (discussed below).

Proprietary side: 10

Our outside legal experts correspondingly gave the "proprietary side" of the EBI a ranking of 10, for the complete proprietary control it grants the sponsor, BP, within EBI's commercial lab space on campus. Inside EBI's "Proprietary Component," BP will automatically own all inventions outright even in cases where academic collaborators may have been involved.

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #13

Licensing to multiple commercial users: On a scale of 1 to 10, is the university free to license project research nonexclusively to other outside commercial entities?

Overall ranking: 3.5

Open side: 7

Our outside legal experts ranked the "open component" of EBI a 7, for the moderate-to-good flexibility that it affords the non-profit and academic partners to license EBI research non-exclusively to other outside commercial entities. BP automatically enjoys a non-exclusive license to all EBI discoveries that are solely or jointly invented by the EBI's three non-profit/academic partners.[68] Yet according to the agreement, the academic partners may also grant third parties (including energy or petrochemical companies) a non-exclusive license to university inventions generated by the EBI. The academic partners, however, may not issue an exclusive license to any energy or petrochemical company other than BP.[69]

Although BP retains strong exclusive rights to commercialize EBI-sponsored research on the open component side (see Question 12 above), this provision does give the academic partners some leeway to license EBI research non-exclusively to other parties, including competitors to BP.

Proprietary side: 0

Our outside legal experts ranked the "Proprietary Component" of the EBI a 0, because the agreement grants BP full exclusive ownership and commercial control of all research performed in its labs on campus, even in cases where academic collaborators may have been involved.

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #14

Royalty and other intellectual property advantages: Does the industry partner enjoy special royalty and intellectual property terms?

Yes

First, whenever BP obtains an exclusive license to an EBI discovery on the "open" academic side, the royalties returned to the academic partners will be capped at no more than $100,000 per year for each licensed invention. This royalty rate is adjusted for inflation, and may be increased only in "exceptional" cases.[70]

Second, the agreement asserts that BP will *not* have to pay more than one royalty on two or more "substantially similar" licensed inventions, with criteria for determining similarity that appear to favor BP (according the outside legal consultants who interpreted these agreements).[71]

Third, whenever BP needs access to "background technology"—academic technology that relates to the EBI's research, but was not invented at the EBI or financed by BP—royalties are capped at $20,000 per year for a single background invention and $50,000 per year for multiple background inventions.[72]

The EBI agreement does express some concern that these royalty caps could shortchange the university partners: "In truly exceptional cases there could be circumstances in which the agreed cap on a royalty bearing exclusive license granted under this agreement results in severely deficient compensation to the research collaborator licensor." The agreement then spells out an elaborate process for adjudicating this further down the road.[73]

Ownership of intellectual property gets quite complicated in this multi-institutional agreement. One complication arises from research performed at Lawrence Berkeley National Laboratory, a federal research lab managed by U.C. Berkeley. Letters attached to the EBI agreement show that BP sought waivers from various federal government statutes that apply to all U.S. research labs, including LBNL. At least one of these waiver requests—secured and approved prior to BP signing the final EBI agreement—will exempt BP from a U.S. manufacturing statute, known as the "preference for United States industry," which requires the licensee (of any federally funded research discoveries) to manufacture substantially in the United States. Corporate waivers such as these (from provisions of the U.S. Bayh-Dole Act) are now reasonably common.[74]

In an Oct. 3, 2007 letter (included in Exhibit 3 of the EBI agreement), the U.S. Department of Energy agrees to waive this preference for U.S. manufacturing. According to BP's own written documents, this exemption "permit[s] BP to substantially manufacture outside the United States, certain products that are bound for sale in the United States…," even when these products originated from research discoveries invented at public research institutions.[75] In other words, if any publicly funded scientist at the LBNL (or another EBI-affiliated public research institution) develops a promising invention related to next-generation biofuels or another type of low-carbon technology, this waiver gives BP advance permission from the U.S. government to manufacture those technologies outside the United States.

REVIEW QUESTION #15

Academic sharing: On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, noncommercial inquiry?

Intellectual property ownership and sharing of academic knowledge

Overall ranking: 4

Open side: 8

Our outside legal experts ranked the "open component" side of EBI an 8, for its strong language protecting academic use and sharing of EBI-related data, materials, and inventions. The agreement states: "All license and option agreements granted to BP by the Research

Collaborators will be subject to the Research Collaborators' reserved rights to practice the licensed rights on their own behalf for their own research and educational uses and to allow others in the nonprofit sector to practice the licensed rights for the same purposes."[76] The EBI agreement contains similarly strong language related to copyrighted software created with BP funding, which may be shared internally and with other outside institutions for educational and academic research purposes.[77]

Both of these extremely admirable provisions are consistent with the fact that the University of California was one of the first signatories to an important public interest statement, issued in March 2007, titled "In the Public Interest: Nine Points to Consider in Licensing University Technology." The first principle of this statement asserts that "universities should reserve the right to practice licensed inventions and to allow other non-profit and governmental organizations to do so" in all their licensing agreements signed with private industry. The Nine Points statement, which has now been endorsed by more than 50 universities, further explains that this is critically important for "preserving the ability of all universities to perform research, ensuring that researchers are able to publish the results of their research in dissertations and peer reviewed journals and that other scholars are able to verify published results without concern for patents."[78]

According our outside legal experts, the only reason the EBI's ranking in this academic-use category is not higher is because the rest of the agreement is so heavily loaded toward BP's exclusive commercial licensing rights, and its ability to impose strict confidentiality restrictions on all the EBI research performed inside its fully proprietary labs on campus.

Proprietary side: 0

Our outside legal experts ranked the "proprietary side" of EBI a 0 for its failure to protect academic use and sharing since there is no indication that BP's scientists, working from their fully proprietary labs on campus, will uphold this academic-use or knowledge-sharing provision. It is this 0 ranking that brought EBI's average ranking for protection of academic use and sharing way down.

Management of conflicts of interest

REVIEW QUESTION #16

Does the agreement call for management of conflicts of interest related to the alliance?

No

The agreement almost entirely overlooks the possibility that this public-private partnership might generate conflict–of-interest issues and concerns. No management of financial conflicts of interest related to the governance of the alliance and its research funding procedures are prescribed. Only two places in the entire agreement refer obliquely to conflicts of interest at all, both with regard to the LBNL exclusively.

One place notes that licenses to copyrightable software may not be made in BP's favor, if this would conflict with existing LBNL policies on copyright. Another place refers, somewhat cryptically, to the LBNL's "Technology Transfer Mission," which sets "conflict of interest procedures relating to technology transfer."[79] Other than this, the agreement is completely silent regarding financial conflict of interest concerns that could arise in relation to this 10-year commercial research alliance. (Please see pages 64-65 of the main report for a detailed discussion of the potential conflicts of interest that have already surfaced at the EBI.)

REVIEW QUESTION #17

Management of conflicts of interest

Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?

No

The agreement makes no mention of prohibiting members who sit on EBI's main Governance Board from having outside personal financial interests that relate to (and might be affected by) the outcome of the EBI's research activities. Also, there is no agreement requirement that persons appointed to EBI's executive committee—which is charged with evaluating and ranking faculty research proposals—should be free of financial conflicts of interest (see conflict of interest discussion on pages 64-65 of the main report).

The agreement does affirm that Governance Board members are allowed to maintain outside fiduciary and other loyalties to their primary employer. This section provides that "no Board member will owe any fiduciary duty of care or loyalty, other than to his/her employer under this Agreement, or otherwise at law or in equity, to the EBI, any Party, any Research Collaborator, or any other Board member in connection with the granting or withholding of any approval of the Board."[80] But the larger issue of managing and/or prohibiting personal financial conflicts of interests within the EBI is not discussed anywhere in this lengthy agreement.

Appendix three

Detailed contract review

University of California at Davis

&

Chevron Technology Ventures, LLC, a unit of Chevron Corp.

Amount

$25 million.

Agreement term

5 years (August 25, 2006 through August 25, 2011). Renewal possible.

Public financing

Not discussed.

Brief project description

On August 25, 2006, Chevron signed a major research alliance agreement with University of California at Davis to study and develop affordable, renewable transportation fuels from farm and forest residues, urban wastes, and crops grown specifically for conversion into biofuels.[1] On January 13, 2009, Chevron Corp. also gave U.C. Davis a $2.5 million endowment for a permanent chair to head its Energy Efficiency Center. EEC was founded in 2006 with a $1 million matching grant from the state of California's Clean Energy Fund, and industry grants of $500,000 each from six corporate sponsors—Chevron, Edison International, Goldman Sachs Group Inc., Pacific Gas and Electric Co., Sempra Energy and Wal-Mart Stores Inc.—which were also invited to sit on the ECC's board of advisors.[2]

Method for obtaining the research contract,and CAP's request for university comments

U.C. Davis made this agreement publicly available online, with some redacted proprietary information, at http://bioenergy.ucdavis.edu/agreement.html.

In July 2010, CAP invited U.C. Davis to provide written comments on the "Major Findings" that appear in this Appendix review below, which were drawn primarily from an independent, expert, legal analysis of the U.C. Davis agreement (for details please see the methodology box in the main report on pages 14 and 51). U.C. Davis did not respond to our request for comments. As such, we assume no formal revisions were made to this U.C. Davis-Chevron agreement and our analysis is still current.

It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions #1-17 below are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Also, the contract provisions have not to our knowledge been tested in a court of law, so their "legal" meaning has not been definitively established.

Overview commentary: Major findings

This agreement provides no recital of the overarching purpose—or research focus—of this U.C. Davis-Chevron alliance, except in the most general, nonspecific terms.[3] The agreement states only that U.C. Davis will "actively engage in and facilitate energy technology development, assessments, demonstration projects, and policy guidance based on scientific facts, engineering principles and economic realities."[4]

This vagueness might imply that the alliance's overarching research agenda is quite broad and open. But a U.C. Davis press office announcement, titled "Chevron to Fund Major Biofuel Research Projects," outlines a far more specific research focus. According to this announcement, U.C. Davis researchers will work to "develop affordable, renewable transportation fuels from farm and forest residues, urban wastes and crops grown specifically for energy."[5] In other words, the alliance would appear to be devoted principally to biofuels research, an area very similar to other Chevron-funded university projects discussed in this report.

The U.C. Davis-Chevron agreement is very weak in providing any details regarding the alliance's governance structure, including:

- The composition of its solely named governing body, the Joint Management Committee
- The decision-making structure of this Committee
- The criteria it will use to determine which faculty research projects should receive funding

This vagueness and/or silence concerning the alliance's academic management, oversight, and research selection process leaves the balance of power (between U.C. Davis and Chevron) highly uncertain. The agreement also tends to give Chevron a strong de facto advantage in controlling the terms of the alliance, because it is Chevron that ultimately pays the monthly research bills.

Academic methods of research selection (such as independent expert peer review) are not discussed at all in the agreement. This leaves the selection of faculty research projects subject to the narrow commercial criteria and interests of the sponsor, Chevron. The agreement loosely talks about making all the alliance's research selections by "agreement," yet Chevron controls the purse strings, and it must approve (or "agree") all final academic research award decisions via the Joint Management Committee.

This agreement also permits excessively long publication delays (to remove corporate proprietary information and/or file for patent protection). The National Institutes of Health recommends no more than a 60-day commercial delay on any academic publication or public presentation; the U.C. Davis-Chevron agreement allows a 150-day publication delay.[6] If publication deadlines do not permit such lengthy delays, the agreement does state that parties *are* required to use "reasonable efforts" to perform the review in less time.

But obviously at a public research university shorter maximum delays would be far preferable and more in keeping with the university's academic mission and public purpose.[7]

Under this agreement, Chevron also enjoys highly favorable royalty terms. If Chevron chooses an exclusive license to an academic-alliance invention, U.C. Davis must grant the license together with royalty payments restricted to a pre-determined range.[8] According to our external legal reviewers, the agreement seems to give Chevron a strong comparative advantage in these royalty-rate negotiations, which occur even before the "agreement to begin a particular research project," based on a commercially weighted list of specific criteria.[9]

If Chevron chooses a nonexclusive license to any alliance invention, this license is royalty free; Chevron does not pay anything additional for its non-exclusive licensing of project technology.[10] Interestingly, U.C. Davis also cannot spend any of its earned royalties however it pleases. A significant portion of this "royalty money" must be plowed back into an energy research fund, jointly directed by U.C. Davis and Chevron.[11]

Finally, U.C. Davis is bound to extend a nonexclusive license to Chevron for all "background technology" meaning intellectual property owned or controlled by U.C. Davis that is necessary for the company's use of any piece of exclusively licensed sponsored research. Even though, by definition, this "background technology" was created prior to the formation of the alliance and was not paid for by Chevron (and may well have been financed by state and federal sources), this agreement obligates U.C. Davis to license these inventions to Chevron without any apparent additional royalty compensation.[12]

Detailed contract review

University autonomy

REVIEW QUESTION #1

Does the university side retain majority control of the alliance's central governing body?

No

The U.C. Davis-Chevron agreement is weak in describing the alliance's governance structure. This agreement provides almost no specificity regarding the alliance's only named governing body, the Joint Management Committee, including any details concerning its composition, its decision-making structure, and the criteria that it will use to determine which faculty research projects should be granted alliance funding. This vagueness, and often silence, concerning the alliance's academic management and oversight leaves the balance of power between U.C. Davis and Chevron open to question; it also tends to give Chevron a strong de facto advantage in controlling the terms of the alliance, because it is Chevron that pays the bills.

REVIEW QUESTION #2

Impartial peer review

Does the agreement require all faculty research projects to be selected using impartial peer review?

No

Academic methods of research selection (such as independent expert peer review) are not discussed at all in the agreement. This may leave the selection of faculty research projects subject to the potentially narrow commercial criteria and interests of the sponsor, Chevron.

REVIEW QUESTION #3

Transparency

Is the process for submitting faculty research applications fully transparent?

No

The U.C. Davis-Chevron agreement is weak in describing the governance structure (see discussion above, regarding the Joint Management Committee). It also provides few specifics on how faculty research proposals will be weighed and selected for funding. For example, the agreement states that "[e]ither Party may propose research projects from time to time," but final decisions will be made by "agreement."[13] As such, this agreement lacks adequate academic transparency regarding the faculty application and research selection process.

REVIEW QUESTION #4

Protection of academic publication rights

Is the university's right to publish protected?

Yes

The agreement states that U.C. Davis "may catalog and place reports" of sponsored research in the campus library "to ensure that such results are available to the interested public, and they may issue publications based on the Research Project and use any results non-proprietary to [Chevron] in their research and educational programs."[14] This right is subject to the corporate-sponsor review provisions for publications and presentations referenced below.

REVIEW QUESTION #5

Protection of academic publication rights

What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?

150 days

Proposed academic publications and public presentations must be submitted to Chevron for review 90 days prior to publication. If Chevron determines that the publication contains patentable subject matter, Chevron may request either that the information be

removed or an additional 60-day delay "in order to protect the potential patentability of any inventions described therein." If Chevron does not respond to U.C. Davis' disclosure of a publication within 90 days, then U.C. Davis is free to make the proposed information public. Confidential information supplied by Chevron must be deleted and protected.[15] If publication deadlines do not allow such long delays, the parties are parties are required to use "reasonable efforts" to perform the review in less time.[16]

Protection of academic publication rights

REVIEW QUESTION #6

Does this publication delay accord with recommended federal limits?

No

The National Institutes of Health and other federal agencies recommend academic-publication delays of no more than 30-60 days, which is considered sufficient time for the industry sponsor to file a provisional patent and/or vet any confidential proprietary information.[17]

Protection of academic publication rights

REVIEW QUESTION #7

Are there additional confidentiality restrictions?

Yes

Confidential information must be kept confidential for five years.[18]

Degree of industry control over the academic research agenda

REVIEW QUESTION #8

Does the industry sponsor substantially define the alliance's overarching research agenda?

Yes

The agreement provides no recital of the overarching purpose—or research focus—of this U.C. Davis-Chevron alliance, except in the most general, nonspecific terms.[19] The agreement states only that U.C. Davis will "actively engage in and facilitate energy technology development, assessments, demonstration projects, and policy guidance based on scientific facts, engineering principles and economic realities."[20]

This might imply the alliance's overarching research agenda is quite broad and open. But a U.C. Davis press office announcement, titled "Chevron to Fund Major Biofuel Research Projects," outlines a far more specific research focus. According to the announcement, U.C. Davis researchers will work to "develop affordable, renewable transportation fuels from farm and forest residues, urban wastes and crops grown specifically for energy."[21] In other words, the alliance would appear to be devoted principally to biofuels research, similar to other Chevron-funded university projects.

REVIEW QUESTION #9

Which parties set the alliance's research priorities each new grant round?

Degree of industry control over the academic research agenda

Chevron & U.C. Davis

The agreement is vague on how the research agenda will be set each new term. The agreement provides only that "[e]ither Party may propose research projects from time to time." It further states that final decisions will be made by "agreement."[22] Given that Chevron holds disproportionate financial power going into the agreement, this legal arrangement allows Chevron to have the dominant hand in setting the research agenda and choosing which faculty research projects will receive funding.

REVIEW QUESTION #10

Does the university retain majority control over the selection of academic research projects?

Degree of industry control over the academic research agenda

No

See discussion above.

REVIEW QUESTION #11

Does the industry sponsor have to approve all final research awards?

Degree of industry control over the academic research agenda

Yes

Chevron must approve (or "agree") to all final academic research award decisions (via the Joint Management Committee).

REVIEW QUESTION #12

Exclusive commercial rights: On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?

Intellectual property ownership and sharing of academic knowledge

Ranking: 8

Our outside legal experts ranked this agreement an 8, for the strong exclusive licensing rights its grants to the sponsor, Chevron. If Chevron wishes to obtain an exclusive license to any piece of sponsored research, U.C. Davis must agree to grant it within a predetermined range of royalty rates.

REVIEW QUESTION #13

Licensing to multiple commercial users: On a scale of 1 to 10, is the university free to license project research nonexclusively to other outside commercial entities?

Intellectual property ownership and sharing of academic knowledge

Ranking: 2

Our outside legal experts ranked this agreement a 2, for its weak protections allowing the university to license its academic discoveries to multiple commercial firms. The agreement gives Chevron an automatic option to secure an *exclusive* worldwide license to all intellectual property resulting from the sponsored research.[23] The agreement also grants Chevron an automatic, non-exclusive, worldwide license to project research. As discussed below under Question #14, these licenses are also essentially royalty free.

The agreement emphasizes that "Chevron understands," once it receives an automatic non-exclusive license to an invention, U.C. Davis "has an obligation to grant the same terms to others"—unless Chevron wants an exclusive license.[24] However, because Chevron's right to obtain an exclusive license is so strong (including pre-determined royalty ranges), U.C. Davis's ability to license its research non-exclusively to multiple commercial parties seems limited at best.

U.C. Davis is also bound to extend a nonexclusive license to Chevron for all "background technology" meaning intellectual property owned or controlled by U.C. Davis that is necessary for the company's use of any piece of exclusively licensed sponsored research. Even though, by definition, this "background technology" was not paid for through the Chevron alliance (and may well have been financed by state and federal sources), U.C. Davis is obligated to license these inventions to Chevron without any apparent additional royalty compensation.[25]

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #14

Royalty and other intellectual property advantages: Does the industry partner enjoy special royalty and intellectual property terms?

Yes

Chevron enjoys highly favorable royalty terms. If Chevron chooses an exclusive license, U.C. Davis must grant this license together with royalty payments restricted to a predetermined range.[26] According to our external legal reviewers, the agreement suggests Chevron would have a strong comparative advantage in these royalty-rate negotiations, which occur even before "agreement to begin a particular research project."[27] First, forecasting reasonable royalty rates so early is highly risky in many technology fields; often it is difficult to guess what a given research discovery will actually be worth. Second, many of the factors listed in this agreement for determining a reasonable royalty at this stage would rely on information more likely to be in the possession of Chevron, and thus would likely result in a far more favorable (low-ball) rate for Chevron.[28] Finally, if Chevron chooses to obtain a nonexclusive license to any of U.C. Davis's sponsored research inventions, these licenses are essentially royalty-free. Chevron does not pay anything additional for its non-exclusive license to project technology.[29]

U.C. Davis also is not free to spend its earned royalties however it pleases. A significant portion of this "royalty money" must be plowed back into an energy research fund, jointly directed by U.C. Davis and Chevron.[30]

REVIEW QUESTION #15

Academic sharing: On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, noncommercial inquiry?

Intellectual property ownership and sharing of academic knowledge

Ranking: 5

Our outside legal experts ranked this agreement a 5, for its very moderate protection of academic use and sharing of data, materials, and academic inventions stemming from the academic research alliance. The agreement fails to protect U.C. Davis's open research mission. If Chevron exercises its exclusive licensing rights, U.C. Davis can still use those covered inventions for "internal research, testing and teaching purposes."[31] Yet no protection is granted for sharing this research with scientists at other outside non-profit institutions for purely academic, non-commercial research purposes. This is a significant oversight, especially in light of the fact that the University of California is one of the original signatories to a high-profile statement of principles, issued in March 2007, titled "In the Public Interest: Nine Points to Consider in Licensing University Technology." The very first principle of this statement asserts that "universities should reserve the right to practice licensed inventions and to allow other non-profit and governmental organizations to do so" in all their licensing agreements signed with private industry. The statement further explains that this is critically important for "preserving the ability of all universities to perform research, ensuring that researchers are able to publish the results of their research in dissertations and peer reviewed journals and that other scholars are able to verify published results without concern for patents."[32]

REVIEW QUESTION #16

Does the agreement call for management of conflicts of interest related to the alliance?

Management of conflicts of interest

No

Not discussed.

REVIEW QUESTION #17

Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?

Management of conflicts of interest

No

Not discussed.

Appendix four

Detailed contract review

Chevron Center of Research Excellence

Colorado School of Mines

&

ChevronTexaco Energy Technology Co., a unit of Chevron Corp.

Amount

$2.5 million/four years, though the agreement is ongoing. (In August 2008, Chevron also gave the school another $1.2 million to create the Chevron Education Center for Study of the Earth, to be housed in a "new state-of-the-art petroleum engineering building" on campus.)[1]

Agreement term

Originally four years (January 1, 2004-January 1, 2008); however, the agreement was modified by amendment in 2005 and is still ongoing with ongoing funding amounts unknown.[2]

Public financing

Unknown

Brief project description

On January 1, 2004, the Colorado School of Mines and ChevronTexaco Energy Technology Corp. formally launched a new Center of Research Excellence to develop technologies to improve interpretation of subsurface geology through advanced computer modeling and access to Chevron proprietary software.[3] In 2001, Chevron acquired Texaco and became Chevron Texaco. In 2005, it reverted back to using its original name, Chevron Corp.

Method for obtaining the research contract,and CAP's request for university comments

We obtained this agreement through a formal, state-level, public record act request, filed by the author in November 2007 and filled by the Colorado School of Mines sixteen days later.

In July 2010, CAP invited the Colorado School of Mines to provide written comments on the "Major Findings" that appear in this Appendix review, which were drawn primarily from an independent, expert, legal analysis of the Colorado School of Mines-Chevron agreement (for details please see the methodology box in the main report,on pages 14 and 51). The Colorado School of Mines did not respond to our request for comments. As such, we assume no formal revisions were made to this agreement and our analysis is still current.

It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions #1-17 below are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Also, the contract provisions have not to our knowledge been tested in a court of law, so their "legal" meaning has not been definitively established.

Overview commentary: Major findings

This agreement poses a grave threat to academic autonomy. Under the agreement, the Colorado School of Mines does not enjoy majority academic representation on any of the alliance's governing bodies. The agreement describes a research alliance whose management, annual research agenda, selection of faculty research projects, even its teaching activities are strongly geared toward the service of Chevron's commercial interests. On its own website, prominently featuring Chevron's corporate logo, the Colorado School of Mines states that the facilities of the Chevron Center for Research Excellence, or CoRE, "are intended to provide the Chevron employee student...with many aspects of a "virtual Chevron office."[4]

The agreement also lacks basic transparency. According to the outside legal experts with whom we consulted, this agreement is poorly written and often quite obscure. The full agreement (including the amendments and attachments) also frequently makes use of abbreviations and terms that are never defined; these abbreviations also change throughout (for example, in different parts of the agreement Chevron's business name is variously and confusingly referred to as: OpCo's, EPTC, and CVX).

The agreement further fails to clearly spell out the decision-making procedures that will guide the selection of faculty research projects. Academic methods of research selection (such as independent expert peer review) are not discussed at all in the agreement. The agreement simply states that the steering committee (with its 50/50 CSM-Chevron vote split) must "agree upon work plans, schedules, deliverables, and acceptance criteria relating to the Program."[5] The awarding of alliance research funds also appears to tilt heavily in favor of the business goals and objectives of the sponsor, Chevron. The agreement does state that Chevron and CSM will draw up CoRE's annual research portfolios and approve them by "agreement." However, an amendment also lays out a series of "strategic research criteria" that will guide formulation of the alliance's academic research portfolio—most of which are explicit about meeting Chevron's business goals.[6] Some of these criteria include:

- "Has the potential to make a large impact ($5 million to $50 million a year) on [Chevron's] business."
- "Requires a corporate level effort to occur."
- "Is beyond the time horizon of [Chevron] business plans."
- "Has potential to change the rules of the game for a business."

This agreement contains some seemingly strong language regarding academic publishing: "[Chevron] acknowledges that a major consideration of CSM in entering into this Agreement is the ability to publish student theses and scholarly papers derived from projects under the Program." However, the agreement then goes on to include language that most universities would likely consider abhorrent. All academic publications must be submitted 30 days prior to publication for review by Chevron for confidential information. These publication delays are not limited to securing patent protection; the agreement

states that publication delays are broadly permitted "to ameliorate any negative impact upon [Chevron's] business interests." The agreement then proposes what it describes as a "reasonable" time delay, not to exceed 12 months.[7] Even student theses are not exempt from this exceptionally long one-year corporate publication delay. One year is an extremely long publication delay for any academic institution to accept under any circumstances, let alone with respect to student theses, which all students depend upon both to graduate and to advance their own academic and professional careers.

Finally, this agreement has exceptionally strong licensing provisions that grant Chevron more than a mere option to an exclusive license. Whenever any university invention is disclosed, Chevron enjoys automatic, exclusive rights to "further develop, commercialize, and license [the invention] either alone or in cooperation with others" for at least two years. In other words, Chevron automatically enjoys a two-year monopoly, during which time it can experiment with all of the CoRE's academic research discoveries to simply determine whether it actually has any interest in commercial development, all without facing external business competition.

Detailed contract review

University autonomy

REVIEW QUESTION #1

Does the university side retain majority control of the alliance's central governing body?

No

This agreement compromises academic autonomy by failing to give the university side majority representation on any of the alliance's governing bodies. The agreement describes a research alliance whose management, annual research agenda, selection of faculty research projects, and even its teaching activities are strongly geared toward serving Chevron's commercial interests.

According to the agreement, the CoRE alliance is managed by a "Decision Review Board" composed of two members from CSM and two members from Chevron. Some of the work of this board is handled by a "Steering Committee," which has a similar 50/50 split in membership. Decisions by the board require unanimity.[8] Chevron alone must approve all budgets.[9]

The agreement also calls for the creation of an executive committee (composed of CSM and Chevron appointees) charged with "[o]versight of and feedback regarding performance" of the CoRE. This performance feedback is supposed to be delivered to board members, research managers, and "to respective CSM & [Chevron] Decision Executives."[10] The agreement does not spell out what measures and "performance standards" the executive committee should use when reporting back to both Chevron and CSM. It also fails to say whether any of this oversight and feedback will relate to the

academic mission of CSM, or exclusively the business goals of the corporate sponsor.

REVIEW QUESTION #2

Impartial peer review

Does the agreement require all faculty research projects to be selected using impartial peer review?

No

Based on the selection criteria spelled out in the agreement, the awarding of academic research funds appears to be heavily tilted in favor of the goals and objectives of Chevron. (for details, see below) There is no mention of impartial peer review.

REVIEW QUESTION #3

Transparency

Is the process for submitting faculty research applications fully transparent?

No

The agreement lacks transparency on many levels. It fails to clearly spell out the decision-making procedures that will be used for selecting faculty research projects. The agreement states that the steering committee (with its 50/50 vote split) must "agree upon work plans, schedules, deliverables, and acceptance criteria relating to the Program."[11]

The agreement itself is also poorly written and often obscure. The full agreement (including the amendments and attachments) frequently makes use of abbreviations and terms that are never defined; these abbreviations used also change throughout (for example, in different parts of the agreement Chevron's business name is variously and confusingly referred to as OpCo's, EPTC, and CVX).

REVIEW QUESTION #4

Protection of academic publication rights

Is the university's right to publish protected?

No

The agreement starts out with some strong language regarding academic publishing: "[Chevron] acknowledges that a major consideration of CSM in entering into this Agreement is the ability to publish student theses and scholarly papers derived from projects under the Program." However, the agreement then contains language that most universities would likely consider abhorrent: "[CSM] will negotiate in good faith with [Chevron] to pursue student publication goals in a manner designed to ameliorate any negative impact upon [Chevron's] business interests, including delaying public access to the written thesis or scholarly paper for a reasonable period of time, not to exceed twelve months."[12]

This maximum 12-month delay is an extremely long maximum publication delay for any academic institution to accept under any circumstances, let alone with respect to student theses, which all students depend upon to graduate and to advance their own educational and professional careers (see section on confidentiality restrictions for more details).

Protection of academic publication rights

REVIEW QUESTION #5

What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?

365 days

Publications must be submitted 30 days prior to publication for review by Chevron for confidential information. The agreement states that academic publications should not be "unduly" delayed; however, the agreement then goes on to permit just the opposite: an exceptionally long potential one-year delay.

The delays in this agreement are not limited to securing patent protection. The agreement clearly asserts that publication delays are broadly permitted "to ameliorate any negative impact upon [Chevron's] business interests," and then proposes what it describes as a "reasonable time" delay not to exceed 12 months.[13] As noted already, under Question 4 above, student theses are also explicitly included in this astonishingly long potential delay.

Protection of academic publication rights

REVIEW QUESTION #6

Does this publication delay accord with recommended federal limits?

No

The National Institutes of Health and other federal agencies recommend academic-publication delays of no more than 30 to 60 days, which is considered sufficient time for the industry sponsor to file a provisional patent and/or vet any confidential proprietary information.[14]

Protection of academic publication rights

REVIEW QUESTION #7

Are there additional confidentiality restrictions?

Yes

This agreement provides for fairly standard restrictions on the disclosure of any confidential information, with exceptions for information compelled by court order, and the like.[15] However, Chevron also explicitly focuses on the need to remove confidential information from student theses. Normally, a student should be apprised, well in advance, about any confidential information they may have been privy to, since no student wants to jeopardize future publication of his or her own PhD research.[16]

REVIEW QUESTION #8

Does the industry sponsor substantially define the alliance's overarching research agenda?

Degree of industry control over the academic research agenda

Yes

The agreement states that Chevron and CSM will draw up CoRE's annual research portfolios and approve them by "agreement," but an amendment to the agreement also outlines a series of "strategic research criteria" to guide the formulation of the alliance's academic research portfolio. Many of these are strongly tilted to favor the sponsor's explicit business interests."[17] Two of the primary criteria are:

- "Has the potential to make a large impact ($5 million to 50 million a year) on [Chevron's] business"
- "Involves significant technical risk"

Secondary criteria are:

- "Focuses on new and emerging science and technology"
- "Requires a corporate level effort to occur"
- "Is beyond the time horizon of [Chevron] business plans"
- "Can result in a step [sic] change in technology"
- "Has potential to change the rules of the game for a business"

REVIEW QUESTION #9

Which parties set the alliance's research priorities each new grant round?

Degree of industry control over the academic research agenda

Chevron & CSM

The agreement does not describe any procedures for how the research agenda will be set each term, or how faculty research proposals will be selected. An amendment to the agreement does say the following criteria, many weighted strongly toward Chevron's explicit business interests, will be used:[18]

- "[Chevron] strategic business fit"
- "CSM educational mission"
- "Technical merit"
- "Cost/benefit"
- "Time to complete"
- "Overall CSM CoRE Alliance Balance"
- "Leverage factor"
- "Linkage to other [Chevron] projects"
- "Overall CSM CoRE objectives"
- "Alignment with current scope of technical areas"
- "EH&S" [abbreviation undefined in agreement, possibly Environmental Health and Safety]"

It is worth noting that many of these selection criteria, in addition to their commercial orientation, are also poorly defined, such as whose cost/benefit analysis?

Degree of industry control over the academic research agenda

REVIEW QUESTION #10

Does the university retain majority control over the selection of academic research projects?

No

See discussion of the Decision Review Board and its functions, under Question #1 above.

Degree of industry control over the academic research agenda

REVIEW QUESTION #11

Does the industry sponsor have to approve all final research awards?

Yes

Chevron alone must approve all budgets, and final research awards.[19]

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #12

Exclusive commercial rights: On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?

Ranking: 9

Our outside legal experts ranked this agreement a 9 because of the very strong "exclusive commercial licensing" terms that it grants to Chevron. This agreement grants Chevron more than an option to an exclusive license. Whenever any university invention is disclosed, Chevron enjoys automatic, exclusive rights to "further develop, commercialize, and license [the invention] either alone or in cooperation with others" for at least two years.[20] If, after 24 months, Chevron chooses not to continue with commercial development of the technology, then the invention simply reverts back to the Colorado School of Mines to use or license.[21] In other words, Chevron automatically enjoys a two-year monopoly, during which time it can experiment with all of the CoRE's academic research discoveries to simply determine whether it actually has an interest in commercial development, all without facing business competition.

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #13

Licensing to multiple commercial users: On a scale of 1 to 10, is the university free to license project research non-exclusively to other outside commercial entities?

Ranking: 2

Our outside legal experts ranked this agreement a 2, because it gives the academic partner only very weak ability to license the alliance's academic research non-exclusively to other commercial firms. CSM receives only a residual, nonexclusive license to the sponsored technology. It can license that technology to other commercial entities only if Chevron chooses not to exercise its exclusive right to develop the technology commercially within the first 24 months.[22]

REVIEW QUESTION #14

Royalty and other intellectual property advantages: Does the industry partner enjoy special royalty and intellectual property terms?

Intellectual property ownership and sharing of academic knowledge

Yes

Chevron's royalty payments to CSM for any exclusively licensed inventions are set within a predetermined range: "CSM will receive an agreed percent, within the range of five to fifty percent, of [Chevron's] net licensing revenue resulting from licensing the results of the Program." The exact percentage is determined by the fair market value of the technology as determined by both parties.

REVIEW QUESTION #15

Academic sharing: On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, noncommercial inquiry?

Intellectual property ownership and sharing of academic knowledge

Ranking: 3

Our outside legal experts ranked this agreement a 3, because academic sharing is very weakly protected. CSM retains a nonexclusive license to use CoRE's intellectual property, but this is "limited to CSM's educational and internal research purposes."[23] This appears likely to prevent sharing with outside academics and scientists at other non-profit institutions. This is a significant oversight, especially in light of the fact that more than 50 U.S. universities are now signatories to a high-profile statement of principles, issued in March 2007, titled "In the Public Interest: Nine Points to Consider in Licensing University Technology," whose first principle asserts that "universities should reserve the right to practice licensed inventions and to allow other non-profit and governmental organizations to do so" in all their licensing agreements signed with private industry. The statement further explains that this is critically important for the purpose of "preserving the ability of all universities to perform research, ensuring that researchers are able to publish the results of their research in dissertations and peer reviewed journals and that other scholars are able to verify published results without concern for patents."[24]

REVIEW QUESTION #16

Does the agreement call for management of conflicts of interest related to the alliance?

Management of conflicts of interest

No

Not discussed.

REVIEW QUESTION #17

Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?

Management of conflicts of interest

No

Not discussed.

Appendix five

Detailed contract review

Colorado Center for Biorefining and Biofuels

University of Colorado, Boulder; Colorado State University; Colorado School of Mines; National Renewable Energy Laboratory

&

Numerous industrial partners, including Chevron Corp., ConocoPhilips, General Motors Corp., Royal Dutch Shell Group's Shell Global Solutions unit, Valero Energy Corp., and Genencor International Inc.

Originally, C2B2 was launched with 27 member companies, including Archer Daniels Midland Co., Dow Chemical Co., and W.R. Grace & Co., but industry membership fluctuates. In 2008, C2B2 reported having 32 member companies; in May 2010, its website listed 22 industry sponsors, including those companies named above.[1]

Amount

$6 million

Brief project description

The $6 million total is the combined total budget for C2B2 (on both the "shared-" and "sponsored-research" sides) since this alliance's inception in March 2007 until September 2010. (Please see the Overview Commentary section below for a discussion of C2B2's "shared-" and sponsored-research sides.) The total budget for the "shared side" of C2B2, including both membership fees and matching state funds, since its inception is roughly $3.65 million. The total budget for the "sponsored-research" side of C2B2 since its inception amounts to $5 million, with about $2 million of this total from ConocoPhilips already spent.[2]

C2B2's corporate membership numbers vary, as do the amounts of funding that each corporate sponsor elects to spend on individual sponsored research projects in any given year. C2B2's Executive Director Alan W. Weimer estimates that C2B2 since its inception has generated roughly $1.9 million in industry membership fees, which go toward its shared-side activities. (Companies with more than 500 employees pay $50,000 per year in membership fees, and companies with fewer than 500 employees pay $10,000 per year.) [3]

Agreement term

Not specified, indefinite; C2B2 launched in March 2007.

Public financing

C2B2 is supported by state, institutional, and industry funds. When C2B2 was launched, it became eligible for state-matching-grant funding through the Colorado Renewable Energy Collaboratory, developed by state lawmakers. Taking advantage of this industry-

state, 1-to-1, matching-grant challenge, C2B2 received $500,000 in 2007, $750,000 in 2008, and $497,500 in 2009, for a combined state funding total of $1.75 million.[4] This money can only be spent on the "shared side" of C2B2.

Brief project description

Launched on March 19, 2007, the Colorado Center for Biorefining and Biofuels is an industry-financed research consortium, involving three Colorado-based, publicly funded research facilities: University of Colorado at Boulder; Colorado State University; Colorado School of Mines; and the National Renewable Energy Laboratory, a federal research lab affiliated with the Department of Energy. C2B2's goal is to harness the skills of some 60 publicly employed scientists to research and develop new biofuels and biorefining technologies and transfer these advances as rapidly as possible to the private sector.[5] In 2007, C2B2 announced it had secured funding commitments from 27 large and small energy and agriculture companies, through a combination of "membership fees" and separately negotiated sponsored-research grants, plus a possible $2 million matching grant from the state of Colorado (discussed above). C2B2 is headquartered at the University of Colorado, Boulder.

Method for obtaining the research contract,and CAP's request for university comments

We obtained a copy of C2B2's Agreement and By-Laws via personal phone request in December 2007. In July 2010, CAP invited the University of Colorado Boulder and C2B2 to provide written comments on the "Major Findings" contained in this appendix based on our analysis at that time, which were drawn primarily from an independent, expert, legal analysis of the C2B2 agreement (for details please see the methodology box in the main report on pages 14 and 51). On August 9, 2010 we received written comments back from C2B2's Executive Director Alan W. Weimer, which are addressed in this review.

It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions #1-17 below are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Also, the contract provisions have not to our knowledge been tested in a court of law, so their "legal" meaning has not been definitively established.

Overview commentary: Major findings

Our formal evaluation of this written C2B2 agreement was complicated by the fact that Alan W. Weimer, C2B2's executive director, told this report's author in a taped phone interview in November 2007 that parties to this agreement had agreed to let C2B2's industrial sponsors play a more central role in evaluating and selecting faculty research proposals than C2B2's original written agreement and by-laws had envisioned.[6] The author's and our outside legal experts' interpretation of subsequent written comments submitted to CAP from Alan Weimer, on August 9, 2010, further affirm this conclusion.[7]

According to C2B2's written agreement, C2B2 is clearly divided into a "shared research" side, devoted to "pre-competitive research projects" and a "sponsored research" side, devoted to "focused [industry] sponsored projects." [8] Research on the shared side is supposed to be more academically driven, pre-commercial, and less constricted by short-term profit imperatives because it is financed through a general funding pool made up of annual "industry membership fees." In recent written comments, Weimer clarified that these corporate membership fees amount to roughly $50,000 per year for large companies and $10,000 per year for smaller companies. The written agreement clearly states that faculty research proposals on the shared research side will be chosen and awarded by a governing board with majority academic representation (from the three partnering non-profit research institutions).[9]

Research on the sponsored research side is solicited by the industry partners and is more explicitly commercial in its orientation, according to C2B2's written agreement. On this side, industry members award sponsored-research grants to individual C2B2-affiliated faculty to conduct research and testing on industry-approved research projects.

There are many ambiguities in the written C2B2 agreement, which leave important aspects of C2B2's day-to-day operations uncertain and variable from a legal standpoint. This is especially true regarding the evaluation and voting procedures that will be used for selecting which faculty research proposals will receive funding on both the "industry-sponsored" and "shared" sides of C2B2.

On the shared side of C2B2, Weimer in his written comments to CAP dated August 9, 2010, reiterated that the overall governance is administered by a Center Executive Board, or CEB, which is dominated by the four academic and non-profit research partners. The CEB is comprised of an Executive Director, a non-voting Managing Director, and a Site Director from each of C2B2's four partner institutions—University of Colorado, Colorado State University, Colorado School of Mines, and the National Renewable Energy Laboratory. [10] According to our outside legal experts, this description comports well with the written contract agreement.[11]

When it comes to how C2B2 evaluates, selects, and funds faculty research proposals on the shared side, Weimer's description of current practices do not comport as well with the written C2B2 agreement, although here the agreement also lacks adequate detail. In his written comments, Weimer laid out an elaborate research-selection process on the shared side of C2B2, involving "a tiered review with input from industrial sponsors." Weimer emphasized that review criteria on the shared side "are designed to promote a balance between academic and more industrially oriented projects." [12]

Weimer provided a detailed breakdown of how C2B2's research-selection procedures work in practice. First, C2B2 issues a request for research proposals (targeting six research-areas or "research thrusts." Second, the industry sponsors "provide a score on proposals

that [the] academic scientists have submitted." Simultaneously, the CEB—representing the academic side—"identifies a subset of proposals chosen for oral presentation through an academic review of proposal submissions." [13]

Then, says Weimer, "the sub-set of proposals selected by the CEB undergoes a second review by industrial scientists via an oral presentation,"after which C2B2's sponsoring companies (all of which have equal voting rights) "propose a slate of research projects for funding." Finally, according to Weimer, "the final research funding decision is made by the CEB."

According to our outside legal experts, the C2B2 written legal agreement "lays out no such detailed process for selecting faculty research projects and issuing grants." C2B2's written agreement also strongly suggests that shared-side research activities will be solely under the control of the academic-dominated CEB.[14] By extension, the agreement suggests that research-selection on the shared side will also be dominated by the non-profit partners. The agreement, however, provides insufficient detail in this area.

Weimer's description of current C2B2 operations indicates the industry sponsors now exercise significant voting authority in the research-selection process on the shared side of C2B2. Allowing the industry sponsors to vote on the slate of proposals that go before the CEB allows the sponsors to narrow the research proposal options before the CEB. In practice, according to our outside legal expert, this "implies that C2B2 has ceded more authority to the industry sponsors than provided for in the written C2B2 Agreement."

In a taped phone interview on November 29, 2007, nearly eight months after C2B2 was launched, Alan Weimer said that the industry sponsors had been granted greater influence over the research-selection process on the shared side of C2B2, in part to avoid a possible perceived conflict of interest if representatives from the non-profit side of C2B2 were charged with evaluating and ranking their own research proposals.[15] In his August 2010 comments, Weimer said that C2B2 had not departed from the written contract at all: "C2B2 follows written policies in our agreement. The C2B2 CEB [led by the non-profit side] ultimately decides which shared side research proposals will be awarded funding via a formal voting process."

According to one of our outside legal experts, "this shift in the balance between CEB (led by the academic side) and the industry sponsors is precisely why ambiguities in contracts of these sort can be potentially dangerous …The parties to this C2B2 agreement may agree to an informal research-selection process, but without a legally binding document, one party or the other can simply stop using that informal process at any time. Without explicit contractual provisions, the aggrieved party would have little legal recourse if they were harmed."[16]

On C2B2's sponsored research side, the agreement also lacks adequate clarity regarding the research selection process and the ground rules that govern sponsored-research agreements with individual firms. Readers who are interested may read Alan Weimer's description of how the research selection process works, in practice, on the sponsored side, by visiting this endnote.[17]

The agreement's By Laws clearly state that they will govern both the sponsored and the shared research sides.[18] But whenever the industry members negotiate separate sponsored-research agreements with individual university faculty (as they are encouraged to do), these research projects are governed by separate agreements that are not discussed at all in the C2B2 agreement.[19]

In his written comments dated August 9, 2010, Weimer said the agreement's By-Laws could not have applied to industry-sponsored research agreements, or SRAs, on C2B2's sponsored side because "[t]he specific nature of sponsored research agreements precludes the Center from specifying any language in shared side documents that would describe details of the SRAs."[20] Our outside legal expert disagrees, noting that "there is no reason that basic ground rules could not have been set in the master agreement covering issues like publication rights and intellectual property ownership."[21]

C2B2's written agreement provides virtually no guidance regarding the sponsored research side of the alliance, which is far larger in dollar terms. This means four prominent, publicly funded U.S. research institutions entered into a major, multiyear research alliance with some 20 to 30 outside firms without carefully articulating, in advance, any common protocols for governing this extensive industrial research alliance, including methods for research selection, academic publishing rights, sharing of research results, IP ownership, licensing, and protection of academic research independence.

Detailed contract review

University autonomy

REVIEW QUESTION #1

Does the university side retain majority control of the alliance's central governing body?

Shared research side: No

If the Colorado Center for Biorefining and Biofuels had adhered more closely to its written agreement (see Overview Commentary discussion above), then the answer to this question on the shared research side would be Yes. Based on the descriptions provided by Weimer, however, this does not appear to be the case.

According to the written agreement, C2B2 is administered by a six member Center Executive Board whose members are drawn from and selected by the four non-profit research institutions (known as the Participating Institutions).[22] The CEB consists of an Executive Director (initially appointed by UC-Boulder, thereafter selected by the CEB) with unanimous consent of "senior research officers from the Participating Institutions;" the non-voting Managing Director (nominated by the Executive Director and approved by the CEB; and four Site Directors (one from each of the four non-profit research institutions, and selected by each institution).[23] There is also a Center Advisory Board, comprised of 7 representatives drawn from the private participants; when there are more than

10 private companies participating in the collaboration, the representatives are elected. It is unclear how representatives are selected when there are less than 10 companies involved.[24] The CAB, in turn, elects a Steering Committee to act on its behalf.[25]

According to our interpretation of comments made by C2B2's Executive Director Alan Weimer (see the discussion of Weimer's interview in 2007, and his written comments in 2010, which were addressed in the Overview Commentary section above), the academic and non-profit partners no longer retain majority decision-making authority over either the shared or the sponsored research sides of C2B2.

Sponsored research side: No

On the sponsored research side, both in practice and in the written agreement, the industry sponsors negotiate individual agreements with C2B2 investigators for the specific commercial research they want to fund. Research operations on the sponsored research side are strongly industry controlled and directed.

REVIEW QUESTION #2 Impartial peer review

Does the agreement require all faculty research projects to be selected using impartial peer review?

Shared and Sponsored research sides: No

The agreement makes no reference to using any impartial, independent, expert peer review process for selecting faculty research projects, either on the shared or sponsored research sides.

REVIEW QUESTION #3 Transparency

Is the process for submitting faculty research applications fully transparent?

Shared research side: No

If the parties were adhering to the written C2B2 agreement, the answer to this question would be a qualified Yes. The agreement spells out a relatively clear process for how faculty would apply for funding, but it lacks adequate specificity regarding the research evaluation and selection process. The agreement suggests that, on the shared research side, faculty research projects will be "selected and prioritized" by a majority of the Center Executive Board, which has clear majority academic representation.[26] But in practice, in the opinion of our legal reviewer and the author based upon written comments submitted in August 2010 by Executive Director Weimer, C2B2's industry sponsors now exercise significant voting influence and control over the entire research selection process on both the shared and the sponsored-research sides (see Overview Commentary section above for details).

Sponsored research side: No

This written agreement fails to provide any specific guidance or protocols regarding the selection of academic research on C2B2's sponsored research side.

Protection of academic publication rights

REVIEW QUESTION #4

Is the university's right to publish protected?

Shared research side: Yes

On the shared research side, the written C2B2 agreement does reserve the right of the participating institutions to publish and/or publicly present the results of C2B2's shared research activities.[27]

Sponsored research side: Contract silent

On the sponsored research side, the written agreement is completely silent on the issue of academic publication.

Protection of academic publication rights

REVIEW QUESTION #5

What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?

Shared research side: 210 days

Academic publications: On the shared research side, the written agreement states that research manuscripts must be submitted to the industry members 30 days before publication. At any time during that period of review, an industry member may request a further delay of 180 days for the purposes of protecting potentially patentable intellectual property, and to request that proprietary information be deleted.[28] The agreement's By Laws state that a publication or a presentation could ultimately be delayed for as long as six months to allow patenting of inventions found therein.[29] But since these By Law delays are all couched in terms of a "request" by an industry member, the request could, at least in theory, be denied.[30]

Academic presentations: According to the written agreement, academic presentations are governed separately, but here the language is far less clear, according to our external legal reviewers. These academic presentations must be shared with the industry sponsors 90 days before the presentation date. During the first 15 days, the industrial sponsor may request "to review the detailed presentation materials for an additional 45 days," apparently within this same 90-day period for purposes of protecting potentially patentable intellectual property.[31] Both these rights to review publications and presentations survive termination of the agreement for three years.

Sponsored research side: Contract silent

On the sponsored research side, this written agreement is again silent regarding academic publications and presentations.

REVIEW QUESTION #6

Does this publication delay accord with recommended federal limits?

Protection of academic publication rights

No

The National Institutes of Health and other federal agencies recommend academic-publication delays of no more than 30-60 days, which is considered sufficient time for the industry sponsor to file a provisional patent and/or vet any confidential proprietary information.[32]

REVIEW QUESTION #7

Are there additional confidentiality restrictions?

Protection of academic publication rights

Yes

Sponsors have the right to remove any confidential information from publications or presentations.[33]

REVIEW QUESTION #8

Does the industry sponsor substantially define the alliance's overarching research agenda?

Degree of industry control over the academic research agenda

Shared research side: Yes

According to our outside legal reviewers' and the author's interpretation of written comments submitted to CAP by C2B2's Executive Director Weimer, the industry partners do at present define the alliance's overarching research agenda on both the shared and the sponsored research sides. But if C2B2 were more closely following its written contract, then control over the research agenda would be more balanced. The purpose of dividing C2B2 into a sponsored research side and a shared research side was to give the academic partners greater influence and control over at least some portion of the alliance's academic research agenda and research selection process. On the shared research side, the written agreement states that selection of faculty research projects will be decided by the Center Executive Board, a six-member body with majority academic representation. The CEB consists of an executive director (initially appointed by the University of Colorado and afterward by the four participating non-profit research institutions); a managing director (who is nonvoting); and four site directors (one from each of the non-profit research institutions).[34] Research on the shared side is funded through pooled Membership Fees that each of C2B2's industry sponsors must pay annually to participate in C2B2.[35]

This written agreement also calls for creation of a Center Advisory Board, comprising representatives drawn from the Member Company Sponsors.[36] The CAB, in turn, elects a Steering Committee to act on its behalf.[37] But whatever recommendations the steering committee makes regarding shared research activities are reviewed and implemented at the discretion of CEB, which is free to "select and prioritize" the suggested shared research

activities.[38] In conclusion, the written agreement clearly intended that the non-profit-majority-led CEB would largely control and direct all research decisions on the shared research side. This does not seem to have come to pass, since C2B2 described a process that the legal expert and author find diverge from the agreement as written. (see Overview Commentary section above for details)

Sponsored research side: Yes

On the sponsored research side, both in the written agreement, the industry sponsors negotiate individual agreements with C2B2 investigators for the specific commercial research they want to fund. Research operations on the sponsored research side are strongly industry-controlled and -directed.

Degree of industry control over the academic research agenda

REVIEW QUESTION #9

Which parties set the alliance's research priorities each new grant round?

Shared research side: Industry sponsors

As currently implemented in practice based on Alan Weimer's written comments to CAP, the industry sponsors substantially control the C2B2's research priorities—and the setting of the research agenda— for each new grant round. In the opinion of our legal reviewer, had C2B2 adhered more closely to its written agreement, then in this respect there could have been more balance between the sponsored side and the shared side. The academic/non-profit representatives on the CEB would have largely controlled the setting of the alliance's research agenda on the shared research side, with some input and advice from the sponsor-controlled CAB Steering Committee.(see Overview Commentary section above for details)

Sponsored research side: Industry sponsors

On the sponsored research side, in the written agreement, the industry sponsors negotiate individual agreements with C2B2 investigators for the specific commercial research they want to fund. Research operations on the sponsored research side are strongly industry controlled and directed.

Degree of industry control over the academic research agenda

REVIEW QUESTION #10

Does the university retain majority control over the selection of academic research projects?

Shared research side: No

As C2B2 is presently run, No. Again, if C2B2 were adhering to its own written agreement in this respect, which the legal reviewer and the author believes, it is not based on C2B2's written comments, then this answer would have been Yes. (see Overview Commentary section above for details)

As noted above, according to written comments provided to CAP by C2B2's Alan Weimer, the industry sponsors now exert strong voting influence and control over the research selection process, on both the shared and the sponsored sides. First, as Weimer explains, the industry sponsors are invited to "provide a score" on the faculty research proposals that are submitted on the shared side of C2B2. Second, the companies' scientists perform "a second review…via an oral presentation" on a subset of the proposals. Third, the industry sponsors (which have equal voting rights) are invited to vote on "a slate of research projects for funding." Finally, after the industry sponsors have already narrowed down the "slate of research projects" they want to fund, the non-profit-led CEB votes to grant final funding authorization. This process does not preserve majority academic control over the research evaluation and selection process, and represents a departure from the written C2B2 agreement's description of more enhanced non-profit control on the shared side of C2B2.

Sponsored research side: No

On the sponsored research side, both in the written agreement and in practice, the industry sponsors negotiate individual agreements with C2B2 investigators for the specific commercial research they want to fund. Research operations on the sponsored research side are strongly industry controlled and directed.

REVIEW QUESTION #11

Does the industry sponsor have to approve all final research awards?

Degree of industry control over the academic research agenda

Shared research side: Yes

As C2B2 is presently run, per Alan Weimer's written comments to CAP, Yes. But if C2B2 were adhering to its written agreement in this respect, which our external legal reviewers and the author believe it is not based on C2B2's comments, this answer would have been No. (see Overview Commentary section above for details)

Sponsored research side: Yes

On the sponsored research side, both in practice and in the written agreement, the industry sponsors negotiate individual agreements with C2B2 investigators for the specific commercial research they want to fund. Research operations on the sponsored research side are strongly industry-controlled and -directed.

REVIEW QUESTION #12

Exclusive commercial rights: On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?

Intellectual property ownership and sharing of academic knowledge

Ranking: 2

Shared research side

Our outside legal experts ranked this agreement a 2, for the limited exclusive licensing rights it grants to the industry partners on, at least, the shared research side. But it is impor-

tant to note that in his interview and written comments, Weimer did not address C2B2's current licensing practices, so it is unclear whether these more open, academic licensing provisions are currently being followed. According to the written agreement, on the shared research side, the industry partners have only 60 days to review shared research intellectual property to decide if they want a non-exclusive license to that IP. Exclusive licenses to shared research IP do not appear to be available, again in the written agreement.

Sponsored research side: Contract silent

Once again, on the sponsored research side, the C2B2 agreement is silent regarding IP and licensing terms. But because the industry sponsors exert far more control on the sponsored research side and are free to negotiate separate sponsored research agreements, these separate agreements probably grant the industry sponsors far stronger exclusive commercial rights to C2B2 research results as well. C2B2's current website advertises that Directed Research Sponsorship projects "allow individual C2B2 sponsors to obtain exclusive rights to Intellectual Property generated as a result of customized research agreements."[39]

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #13

Licensing to multiple commercial users: On a scale of 1 to 10, is the university free to license project research nonexclusively to other outside commercial entities?

Ranking: 9

Shared research side

Our outside legal experts ranked this agreement a 9, for its strong provisions granting the academic partners the right to license C2B2's research—on the shared research side—non exclusively, including to more than one commercial entity. Again, on the shared research side, exclusive licenses are apparently unavailable, if this agreement's intellectual property provisions are currently being followed. According to the written agreement, industry sponsors have 60 days from the time of disclosure to elect "a non-exclusive, paid-up, worldwide, royalty-free license" to any shared research discoveries. The license must be granted by C2B2 and the Non-Profit Partner Institutions, but in exchange, the industry sponsor must contribute a portion of the costs of obtaining IP protection. These nonexclusive licenses also do not preclude the participating academic/non-profit institutions from licensing C2B2 research to other commercial entities on a nonexclusive basis as well.[40] If no industry sponsor opts to exercise its nonexclusive-license option within the 60-day window, then the industry sponsors' rights to this IP terminate. This allows the non-profit partner institutions to license the technology to any third party they may choose.[41]

Sponsored research side: Contract silent

Even though it seems that much of C2B2's research will be performed on the sponsored research side, here the written agreement is silent.

REVIEW QUESTION #14

Royalty and other intellectual property advantages: Does the industry partner enjoy special royalty and intellectual property terms?

Intellectual property ownership and sharing of academic knowledge

Shared research side: Yes

Industry sponsors enjoy royalty-free, nonexclusive licenses to all discoveries produced on the shared research side, according to the written agreement.

Sponsored research side: Contract silent

Even though it appears that much of C2B2's research will be performed on the sponsored research side, here the written agreement is silent.

REVIEW QUESTION #15

Academic sharing: On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, noncommercial inquiry?

Intellectual property ownership and sharing of academic knowledge

Shared research side: 3

Our outside legal experts ranked this agreement a 3, for the limited degree of flexibility it affords the non-profit partners to share C2B2 research with other investigators (both inside and outside the university) for purely academic, non-commercial purposes. Despite strong limitations on exclusive licensing on the shared research side, C2B2's written agreement fails to provide any specific language affirming the rights of the non-profit partner institutions to share their research results with other outside researchers for purely educational, academic, noncommercial research and teaching purposes, both at C2B2 institutions and beyond. The ability to grant nonexclusive licenses to any third party necessarily implies that the non-profit partners could share research with any academic institution they choose, but this lack of clarity, combined with the agreement's failure to offer any guidance at all on the sponsored research side, prompted our outside legal experts to give this agreement a far lower ranking than it would have received otherwise.

Sponsored research side: Contract silent

Even though it seems that much of C2B2's research will be performed on the sponsored research side, the agreement is silent and offers no guidance. This is a significant oversight, especially in light of the fact that more than 50 U.S. universities are now signatories to a statement of principles, issued in March 2007, titled "In the Public Interest: Nine Points to Consider in Licensing University Technology," whose first principle asserts that "universities should reserve the right to practice licensed inventions and to allow other non-profit and governmental organizations to do so" in all their licensing agreements signed with private industry. The statement further explains that this is critically important for the purpose of "preserving the ability of all universities to perform research, ensuring that researchers are able to publish the results of their research in dissertations and peer reviewed journals and that other scholars are able to verify published results without concern for patents."[42]

Management of conflicts of interest

REVIEW QUESTION #16

Does the agreement call for management of conflicts of interest related to the alliance?

No

Not discussed.

Management of conflicts of interest

REVIEW QUESTION #17

Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?

No

Not discussed.

Appendix six

Detailed contract review

Georgia Institute of Technology

&

Chevron Technology Ventures LLC, a unit of Chevron Corp.

Amount

$12 million

Agreement term

5 years (June 1, 2006 to June 1, 2011) with extension possible.

Public financing

Unknown

Brief project description

On June 1, 2006, Chevron Corp. and the Georgia Institute of Technology (Georgia Tech) announced the formation of a strategic research alliance to pursue advanced technology aimed at making cellulosic biofuels and hydrogen viable transportation fuels. Chevron plans to contribute $12 million over five years to the Strategic Energy Institute, a preexisting energy center located at Georgia Tech, to finance research and development of emerging energy technologies.

Method for obtaining the research contract, and CAP's request for university comments

We obtained this Agreement from the Georgia Institute of Technology via interview and phone requests, which were made in October and November of 2007.[1]

In July 2010, CAP invited Georgia Tech to provide written comments and updates on the "Major Findings" that appear in this Appendix review, which were drawn primarily from an independent, expert, legal analysis of the Georgia-Tech-Chevron agreement (for details, please see the methodology box in the main report on pages 14 and 51). GeorgiaTech did not respond to our request for comments. As such, we assume no formal revisions were made to this U.C. Davis-Chevron agreement and our analysis is still current.

It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions #1-17 below are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Also, the contract provisions have not to our knowledge been tested in a court of law, so their "legal" meaning has not been definitively established.

This agreement is extremely vague when it comes to defining what the alliance's overarching research agenda is, stating only that it will "actively engage in and facilitate energy technology development, assessments, demonstration projects, and policy guidance based on scientific facts, engineering principles and economic realties."[2] This is almost identical to the language used in Chevron's agreement with the University of California at Davis, suggesting that the company used the same original template. Georgia Tech's own website is far more precise: It states the Chevron-Georgia Tech alliance is devoted to researching and developing processes for manufacturing biofuels, in addition to some hydrogen-related research.

The Chevron-Georgia Tech agreement is also similar to the U.C. Davis agreement in that it lacks any real specificity regarding the governance structure and management of this large-scale, multiyear academic-industry research alliance. The only management structure referenced is a Joint Management Committee. The JMC is "comprised of representatives from [Georgia Tech Strategic Energy Institute] and [Chevron]."[3] The agreement says nothing about the relative balance of power between Georgia Tech and Chevron representatives on the JMC. There is no indication that Georgia Tech retains majority representation on any governing body, or anything resembling true academic research autonomy.

According to Roger Webb, who sits on the Chevron-Georgia Tech JMC, and is also the founder and interim director of Georgia Tech's Strategic Energy Institute, the alliance's governance structure is highly fluid, and membership numbers vary. In an interview with the author, Webb explained the agreement as follows:

> **Interviewer:** So, regarding the Joint Management Committee, it doesn't say in the agreement how many representatives from Georgia Tech and how many representatives from Chevron sit on that.
>
> **Roger Webb:** Well, there's an overall management function, which is probably about three or four people for each operation. But then, with each collaboration, there may be other people in Chevron and certainly other people in Georgia Tech that are associated with it. But the overall oversight is done with four or five people.
>
> **Interviewer:** Wait, you said originally three or four. I'm just trying to get a–
>
> **Roger Webb:** Yeah, I'm sorry. Three or four from each operation.
>
> **Interviewer:** So you're not really concerned about the exact numerical composition of this governing committee?

Roger Webb: Yeah, it floats around a little bit. We don't designate people and assign them time to do this function … The whole thing is a collaborative research project, so we work closely with [Chevron's staff]. We meet with them periodically. We describe what our capabilities are. We talk about what areas they need research done in. We kind of try to marry those two concepts, and end up with a research project, and it's fairly fluid" [end of interview].[4]

The agreement makes no mention of using academic methods of research evaluation, such as independent, impartial, expert peer review, to determine which faculty research projects will be awarded alliance funding. The agreement lacks transparency and fails to spell out, in advance, any clear procedures for how university faculty may apply for alliance funding, or what the basis for final research selection will be. The agreement provides only that the JMC is "to discuss the identification of research projects, to provide comprehensive oversight of the ongoing research activities, and to discuss new research initiatives …."[5] This seems to leave the selection of faculty research projects subject to the potentially narrow commercial criteria and interests of the sponsor, Chevron. The agreement loosely talks about making all alliance-research selections by "agreement"; however, Chevron controls the purse strings, and it must approve (or "agree") to all final academic research award decisions so the dictates of the sponsor and its commercial interests will almost certainly dominate.[6]

The author's interview with Roger Webb appears to further confirm that the alliance's research agenda is tightly controlled by Chevron's needs and business interests:

Interviewer: So Chevron defines what its needs are, and then Georgia Tech uses its [academic and scientific] expertise to address those needs?

Roger Webb: Well, yeah, it's probably a little bit less specific than that. That is, they [Chevron] will define a general area where the technology is not sufficient in their view... So the question is asked: 'Does Georgia Tech have capability to contribute in that area?' So it's not like [Chevron] will define: 'Please do A, B, C, D and produce a report….'

Interviewer: So you're free to come up with your own solutions and methodologies –

Roger Webb: Surely.

Interviewer: But the research areas and the questions that are being asked are primarily coming from Chevron's analysis of where they see gaps.

Roger Webb: Well, yeah, but to a certain extent there's a Georgia Tech contribution to that as well. Because we can look at what they do and say, 'Here's a way to attack that problem from a different perspective, and here's the way we would go about it.' So it's not a unilateral decision either way [end of interview]. [7]

Our outside legal experts ranked this agreement an 8 for granting the corporate sponsor strong exclusive commercial rights to all of the alliance's academic research. Under this agreement, Chevron automatically receives an option "to obtain an exclusive, worldwide" license to any sponsored Georgia Tech inventions or joint inventions with the royalty rate fixed within a pre-determined range.

In preparing this report, the author learned from Roger Webb that Georgia Tech has been working very closely with a small, state-subsidized, start-up company—named C2 Biofuels—to perform research that is similar to the research it is pursuing with Chevron. According to Webb, scientists based at Georgia Tech gave C2 Biofuels the underlying research discoveries that launched its commercial business plan. Now, both C2 Biofuels and Chevron are funding Georgia Tech to develop chemical catalysts and other process technologies to more efficiently convert plant materials into biofuels. Georgia Tech is working with C2 Biofuels to break down southern pine, which is abundant in Georgia, while Chevron is working with Georgia Tech to break down a variety of cellulosic plants.

In his interview with this report's author, Webb acknowledged that there is considerable research overlap and the potential for conflicts of interest. "The stuff we're doing with Chevron would be relevant to the processing of whatever feed stock [including the southern pine C2 Biofuels is focused on]," he explained. "So there is potential conflict. And the way you manage that is keep it all open so all parties know what's going on. That's what we do, so everybody is well aware of the research that's ongoing and where it will apply."[8]

Webb also expressed confidence that if Georgia Tech develops a breakthrough catalyst or processing method to break down plants and convert them to biofuels using Chevron funding, then the university would still be free to license its technology to whomever it wants to and Chevron would not interfere. According to Webb, "the situation with Chevron is—our agreement with Chevron is strictly a joint ownership thing. So any intellectual property that's generated on their funding is jointly owned by Chevron and by Georgia Tech and either party can take that intellectual property forward to commercialization, where there's knowledge of the other party certainly."[9]

According to our outside legal analysts, however, Webb's interpretation of the university's intellectual property rights does not appear to be consistent with the actual Georgia Tech-Chevron agreement. Webb is correct when he says that joint-ownership does not limit the parties' right to license to third parties. But because the agreement grants Chevron automatic rights to obtain an exclusive, worldwide license to any alliance discoveries, Georgia Tech could only license a sponsored invention to a third party (such as C2 Biofuels) if Chevron declined to take an exclusive license and/or agreed to partner with C2 Biofuels.[10]

Detailed contract review

REVIEW QUESTION #1

University autonomy

Does the university side retain majority control of the alliance's central governing body?

No

This agreement is unspecific regarding the governance structure and management of this large-scale academic-industry alliance, and there is no indication that the university has secured anything approaching majority control.

The only management structure referred to is a Joint Management Committee. The JMC is "comprised of representatives from [Georgia Tech Strategic Energy Institute] and [Chevron]."[11] The agreement says nothing about the relative balance of power (between Georgia Tech and Chevron representatives) on the JMC. There is no indication that Georgia Tech retains majority representation on any governing body, or anything resembling true academic research autonomy.

REVIEW QUESTION #2

Impartial peer review

Does the agreement require all faculty research projects to be selected using impartial peer review?

No

Not discussed.

REVIEW QUESTION #3

Transparency

Is the process for submitting faculty research applications fully transparent?

No

The agreement does not spell clear procedures for how Georgia Tech faculty may apply for Chevron funding. The agreement provides only that the JMC is "to discuss the identification of research projects, to provide comprehensive oversight of the ongoing research activities, and to discuss new research initiatives …."[12] Decisions are made by "agreement." The written agreement is no more specific than that.[13]

REVIEW QUESTION #4

Protection of academic publication rights

Is the university's right to publish protected?

Yes

There is an important nod in this direction: Chevron may review academic scholarly publication "for the limited purpose of determining whether the proposed publication discloses patentable subject matter or confidential information belonging to [Chevron]."

The agreement also states that "[Chevron] will use its best efforts to comply with [Georgia Tech's] time frame" regarding academic publication dates; however, allowing a delay of up to 120 days is hardly consistent with this.[14]

Protection of academic publication rights

REVIEW QUESTION #5

What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?

120 days

Georgia Tech must supply Chevron with proposed publications (or other proposed public disclosures) 60 days prior to publication. Chevron has 60 days to review the publication "for the limited purpose of determining whether the proposed publication discloses patentable subject matter or confidential information belonging to [Chevron]."[15] If Chevron determines that there is patentable subject matter in *any* disclosed publication, the agreement's legal language suggests it could delay publication an additional 60 days beyond the 60-day review period. According to our outside legal experts, the agreement could have been more clear on this score, but it strongly indicates a 120-day delay is permissible.

Protection of academic publication rights

REVIEW QUESTION #6

Does this publication delay accord with recommended federal limits?

No

The National Institutes of Health and other federal agencies recommend academic-publication delays of no more than 30-60 days, which is considered sufficient time for the industry sponsor to file a provisional patent and/or vet any confidential proprietary information.[16]

Protection of academic publication rights

REVIEW QUESTION #7

Are there additional confidentiality restrictions?

Yes

Any confidential information provided by Chevron to Georgia Tech must be kept confidential for five years. Chevron may remove its confidential information from a proposed publication or other public presentations.[17]

Degree of industry control over the academic research agenda

REVIEW QUESTION #8

Does the industry sponsor substantially define the alliance's overarching research agenda?

Yes

The agreement is extremely vague when it comes to defining what the alliance's overarching research agenda is, stating only that it will "actively engage in and facilitate energy technology development, assessments, demonstration projects, and policy guidance based on scientific facts, engineering principles and economic realties."[18] Georgia Tech's own website is far more precise: It says the Chevron alliance is devoted to researching and developing processes for manufacturing biofuels, in addition to some hydrogen-related research. According to the author's taped phone interview with Roger Webb, the Interim Director of this alliance, Chevron seems to define the alliance's "overarching research agenda" by identifying what research areas and business needs it wishes to address and soliciting Georgia Tech's expertise and ideas.[19]

REVIEW QUESTION #9

Which parties set the alliance's research priorities each new grant round?

Degree of industry control over the academic research agenda

Unclear (In practice, Chevron appears to set the research priorities.)

The agreement does not spell out any clear procedures for how the alliance's research agenda is set. This critical academic issue is left largely unaddressed. The agreement asserts only that the JMC is "to discuss the identification of research projects, to provide comprehensive oversight of the ongoing research activities, and to discuss new research initiatives …."[20] According to the agreement, the alliance's research agenda is formulated simply by "agreement" among whichever members are present on the JMC at the time of the vote. But in practice, according to the author's interview with Georgia Tech's Roger Webb, it seems to be Chevron that largely controls the alliance's research agenda. Chevron comes to Georgia Tech in each new grant cycle with a set of research issues and business problems that it wishes to address, and the faculty at Georgia Tech are invited to offer input on possible research approaches and solutions (see interview with Webb in the Overview Commentary section above).

REVIEW QUESTION #10

Does the university retain majority control over the selection of academic research projects?

Degree of industry control over the academic research agenda

No

(See interview with Roger Webb in the Overview Commentary section above)

REVIEW QUESTION #11

Does the industry sponsor have to approve all final research awards?

Degree of industry control over the academic research agenda

Yes

The agreement provides that "[e]ither Party may propose research projects from time to time," but both Chevron and Georgia Tech must agree to undertake those projects.[21]

There is no further guidance on how these faculty research projects are evaluated and chosen, or what criteria will be used. No academic research project can be awarded funding without Chevron's agreement, per the terms of the contract.

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #12

Exclusive commercial rights: On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?

Ranking: 8

Our outside legal experts ranked this agreement an 8, due to the strong exclusive commercial licensing rights it grants to the corporate sponsor, Chevron. Under this agreement, Chevron automatically receives an option "to obtain an exclusive, worldwide" license to any Georgia Tech inventions or joint inventions, with the royalty rate fixed within a predetermined range. Chevron and Georgia Tech are bound to enter into good-faith negotiations concerning Chevron's acquisition of an exclusive license within six months of closing the project.[22] Georgia Tech is also compelled to grant Chevron a "royalty free, nonexclusive, worldwide right and license" to all intellectual property arising from the project.[23]

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #13

Licensing to multiple commercial users: On a scale of 1 to 10, Is the university free to license project research nonexclusively to other outside commercial entities?

Ranking: 2

Our external legal experts ranked this Agreement a 2, for its very weak provisions allowing alliance research to be licensed nonexclusively to multiple users. Georgia Tech has very little freedom, under this agreement, to license sponsored-research inventions or tools nonexclusively to other commercial entities—even if it believes the technology has multiple applications and broader commercial licensing would maximize the value of the intellectual property. The university can only license an invention to another commercial entity, if Chevron turns down its own right to obtain an exclusive license.

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #14

Royalty and other intellectual property advantages: Does the industry partner enjoy special royalty and intellectual property terms?

Yes

First, Chevron gets an automatic royalty-free nonexclusive license to any discoveries stemming from the alliance. Second, in a somewhat unusual move (evident in other Chevron-academic agreements reviewed in this report), the agreement calls for setting "a range of acceptable royalty rates" for an exclusive license "prior to" the agreement to even begin a

particular research project.[24] This royalty rate range is determined based upon a long list of factors, including many that would appear to strongly favor Chevron.[25]

REVIEW QUESTION #15

Academic sharing: On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, noncommercial inquiry?

Intellectual property ownership and sharing of academic knowledge

Ranking: 5

Our outside legal experts ranked this agreement a 5, for the moderate protections it affords for academic use and sharing. The agreement does allow use of project results for "internal use, internal research, testing and teaching purposes" by either Chevron or Georgia Tech free of charge, provided confidential information is protected. Also, significantly, no future licenses granted by either party may restrict this kind of internal use.[26] But the agreement does not address the important right of the academic faculty to share their sponsored research (including the data that underlies academic publications) with other scientists based at other external non-profit institutions for purely academic, noncommercial research purposes. This is a significant oversight, especially in light of the fact that more than 50 U.S. universities are now signatories to a statement of principles, issued in March 2007, titled "In the Public Interest: Nine Points to Consider in Licensing University Technology," whose first principle asserts that "universities should reserve the right to practice licensed inventions and to allow other non-profit and governmental organizations to do so" in all their licensing agreements signed with private industry.[27]

REVIEW QUESTION #16

Does the agreement call for management of conflicts of interest related to the alliance?

Management of conflicts of interest

No

Not discussed.

REVIEW QUESTION #17

Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?

Management of conflicts of interest

No

Not discussed.

Appendix seven

Detailed contract review

Iowa State University
&
ConocoPhillips Co.

Amount
$22.5 million

Agreement term
8 years (2007–2014)

Public financing
Iowa State University reports no public funding is involved.[1]

Brief project description
On April 10, 2007, ConocoPhillips announced it would spend $22.5 million over eight years on a research program at Iowa State University devoted to researching and developing technologies capable of producing biorenewable fuels. In 2007, ConocoPhillips issued an initial $1.5 million grant to support Iowa State researchers, with additional grants of $3 million per year over the next seven years.[2]

Method for obtaining the research contract, and CAP's request for university comments
We obtained this agreement (with some of the Intellectual Property portions redacted) from Iowa State University via phone interview and personal request.

In July 2010, CAP invited ISU to provide written comments and updates on the "Major Findings" in this appendix review based on our analysis at that time, which were drawn primarily from an independent, expert, legal review of the ConocoPhillips-Iowa State University agreement (for details, please see the methodology box on pages 14 and 51 of the main report). Iowa State University submitted written comments on August 11, 2010 and indicated that no formal legal updates have been made to this contract. As such, this analysis is still current.

It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions #1-17 below are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Also, the contract provisions have not to our knowledge been tested in a court of law, so their "legal" meaning has not been definitively established.

Overview commentary: Major findings

This agreement leaves ConocoPhillips in charge of almost all facets of the research alliance. The agreement fails to spell out any formal governance structure, method of collective decision-making, or system of voting to guide the management of this eight-year university-industry research collaboration. The agreement states that ConocoPhillips will fund research that is "of mutual interest and benefit to [Iowa State], [Iowa State University Research Foundation] and [Conoco]."[3] Conoco agrees to repay Iowa State for funds expended only on agreed-upon research projects.

Despite the Conoco-ISU agreements size and eight-year duration, in written comments dated August 11, 2010, Iowa State University's legal counsel, Paul Tanaka, stated that it is inaccurate to "assume that voting and management structures are necessary" for administering such an agreement.[4]

Tanaka also complains that our analysis of the ConocoPhillips-ISU contract "contains no organized comparison between standard research agreements and the Conoco agreement. Nor does it refer to any existing statute, regulation, practice, standard or custom affecting research contracting."[5]

As this report discusses (in the methodology section on pages 14 and 51 of the main report), there is no "standard research agreement" for university-industry contracting against which this report's author could compare the ConocoPhillips-ISU agreement. One of the recommendations of this paper is for the various U.S. federal grant-making agencies to lead the way by proposing stronger baseline standards for all university research contracting because many federal grants are now frequently paired with corporate matching funds. There are some federal government statutes and regulations that do impact on university research contracting (such as the Bayh-Dole Act, related to intellectual property, and laws designed to protect human subjects in clinical research), but these provide marginal guidance regarding university-industry contract standards more broadly. There are also "academic customs" that affect research contracting, but again these are not well codified. This is why the author contracted with outside legal experts to analyze and evaluate these legal university agreements to see what rights and responsibilities they do, and do not, protect.

The Conoco-ISU agreement says nothing about using an independent, scientific peer review process for selecting faculty research proposals. When a high-level faculty body at Cornell University issued final recommendations, in 2005, on how best to structure large-scale, university-industry research alliances, it strongly emphasized the centrality of independent peer review: "The important point—vital to honoring the principal that we are engaged in academic, not corporate research—is that genuine, disinterested peer review occur."[6] In his August 2010 comments, ISU's Tanaka asserted that an assumption that peer review should be required for research is "fundamentally mistaken."[7]

The ConocoPhillips-ISU agreement also is almost entirely silent regarding the procedures that will be followed for submitting, evaluating, and selecting which Iowa State faculty research proposals will be awarded alliance funding. In a taped phone interview in October 2007 with this report's author, Lisa Lorenzen, Iowa State University's then vice president of research and economic development and current director of Industry Relations, clarified how this process actually works in practice. Essentially, according to Lorenzen, ConocoPhillips puts out the request for proposals, defines the areas of research it wants to pursue, and hand picks which faculty research project it wants to fund. Here's how Lorenzen described the process:

> *Most of the time, [ConocoPhillips' employees will] say—and I'm kinda making this up…. 'We're interested in thermal chemical technology.' So an email goes out to all the faculty [affiliated with biorenewables] explaining ConocoPhillips is interested in thermal chemical technology. 'Please submit your application and budget by X date.' And then we collect all those [faculty research submissions], and then we send them to Conoco. They [Conoco's employees] look them over and they'll usually come back with a dozen of them, and they say, 'We think these are interesting; we'd like to talk to the faculty.' And then we organize a day where they come to campus… and then [the Conoco employees will] pick four or five or six, or however many that fit within the budgeted amount and then those people are funded.*

According to Lorenzen, ConocoPhillips will also sometimes ask Iowa State University to evaluate and rate its own faculty research proposals prior to making research awards because it lacks the internal scientific expertise to do so itself:

> *The process we use with Conoco is they don't tell us what to do. They come to us and they tell us, 'Here's the problems that we think need to be solved. So then we take those questions to our faculty and we say, 'Here are the kind of things ConocoPhillips is interested in; here's the problems they have an interest in solving; here's the issues they're interested in looking at.' And our faculty comes back to us with proposals that include budgets, and then ConocoPhillips reviews those proposals and selects which ones they'd like to fund. In some cases, like plant biotechnology, they [ConocoPhillips] said, 'We don't have all the expertise in this area. We'd like your opinion on which ones to fund.' So we put together an Internal Review Committee and gave them our evaluations of the proposals, which they [ConocoPhillips] took into consideration in deciding what to fund.*[8]

Lorenzen never clarified precisely who is appointed to sit on these internal Iowa State University review committees, or whether any effort is made to ensure that its members are free of conflicts of interest, and capable of being truly impartial. She suggested the committees were organized in a very ad hoc, impromptu way simply to help out the industry sponsor:

[I]n the thermal chemical area, ConocoPhillips has more experts than we do. So, they can read a proposal, understand it, evaluate it. In the plant bio-tech area, [the company] lacks that expertise. So, we just put a step in there where we evaluated [the faculty proposals] and rated them internally, to say whether we thought that this research would fit within ConocoPhillips goals and then they— you know, of course it was more than a checkbox, but that just gave [the ConocoPhillips staff] some information to help as they were evaluating the proposal, so that they didn't accidentally pick one that was in left field when they want to be in right field.

Interviewer: So that gave them your [Iowa State University's]ranking of the faculty proposals, from a more expert plant-bio-tech perspective, which ConocoPhillips could weigh in its decision?

Lisa Lorenzen: *Exactly*. [End interview]

Unless the work of this Internal Review Committee is farmed out to independent expert reviewers (with no ties whatsoever to ConocoPhillips, Iowa State, or the alliance), then this arrangement places Iowa State University in the potentially compromised position of evaluating its own professors' research proposals on behalf of a major corporate donor. As such, this arrangement raises institutional conflict-of-interest concerns, and erodes the university's perceived institutional independence from the outside corporate sponsor. No reputable U.S. research university should ever put itself in the position of aiding a corporate sponsor in evaluating or judging "the value" of its own professors' research, except through use of impartial, academic methods of expert peer review.

In written comments on August 11, 2010, Paul Tanaka, ISU's General Counsel, stated that ISU no longer evaluates faculty research proposals *on behalf of Conoco* in the manner Lorenzen described in her 2007 interview, but he emphasized that such practices are not uncommon within the university world. According to Tanaka, Lisa Lorenzen's description of the research-selection process was accurate only for the first round of ConocoPhillips research awards in 2007; since then, he says, the "process for evaluation of proposals has been changed." Tanaka's description of the current research-selection process at the ConocoPhillips-ISU alliance is not that dissimilar from Lorenzen's original description. (Please see this endnote to read Tanaka's own description).[9]

This variability in research-selection procedures points to a serious problem. As our external legal expert noted in response to Tanaka's comments: "The fact that the agreement leaves so many elements undefined remains troubling; the failure to spell out clear procedures leaves the internal process for academic research evaluation and selection completely subject to change at any time at the whim of the corporate sponsor or university administrator. Without clear written procedures, there is no legally enforceable standard or practice to which all parties may be held accountable."[10]

Turning to a different area of ISU's agreement, the intellectual property provisions contained in this contract are highly favorable to ConocoPhillips, giving the company strong exclusive commercial control over ISU's academic research results. In his written comments to CAP on August 11, 2010, ISU's Tanaka asserted that, contrary to our analysis, "ConocoPhillips does not control the research results, and in fact Paragraph 6.9 states that ISU can publish scholarly papers without consulting ConocoPhillips." Our outside legal review reached a different conclusion.

First, regarding "control of research results," our outside legal experts ranked this agreement an '8' because of the strong exclusive commercial licensing rights it grants the sponsor. ConocoPhillips *automatically enjoys a royalty-free, 90-day license to use and evaluate* any alliance invention to see if it wants to obtain a patent and an exclusive commercial license, which is highly advantageous to a commercial firm.[11] And Tanaka is overreaching when he asserts that ISU researchers and students "can publish scholarly papers without consulting ConocoPhillips." It is true that ISU's written agreement (under Section 6.9) attempts to give ISU the opportunity to publish new developments related to the sponsored research without review by Conoco, when these new developments are the result of "non-commercial research." But ISU's ability to publish without Conoco review is also severely constrained by other contract provisions that give Conoco broad rights to review publications stemming from alliance research (both to seek patent protection and/or to remove any corporate proprietary information), which could delay academic publication by up to three months, or ninety days. Such rights also extend beyond the termination of this agreement.[12]

According to Iowa State's Lorenzen, the redacted portion of this agreement also contains "a prenegotiated licensing agreement" with ConocoPhillips covering any forthcoming inventions related to the production of liquid fuels. In our interview, Lorenzen said this type of "prenegotiated licensing agreement" is both unusual in the academic sphere, and tends to be financially favorable to the corporate sponsor:

Lisa Lorenzen: Well, we got into licensing terms, which we normally don't do in a research agreement.

Interviewer: Normally the university does this [setting of licensing and royalty terms] in a separate agreement after a specific invention has emerged from the sponsored research, right?

Lisa Lorenzen: "We were trying to get this done very quickly but ConocoPhillips has a fairly well defined process for how commercialization happens that is independent of a specific technology and the license agreement was structured accordingly. So we thought it was a good idea at the time to combine [the setting of licensing and royalty terms] for a core defined area, where we don't know exactly what the technologies will be, but we do know they will be used to produce liquid fuel. We kind of went the next step and laid out

better how would that commercialization happen… Here's how we'll manage it. We also have a provision for technologies that fall outside of the normal commercialization process."

Interviewer: Do you think that's unusual to have spelled that out?

Lisa Lorenzen: More and more companies would like to do that because it reduces their risk. And that's understandable.

Interviewer: What's the argument against it?

Lisa Lorenzen: You don't know what the invention is, so how do you know what its worth?

Interviewer: Was this a make or break issue in negotiations with ConocoPhillips?

Lisa Lorenzen: No, no.

Interviewer: It was just something you felt you could give them, and it would make the relationship a little stronger?

Lisa Lorenzen: Right. [End interview]

Our external legal experts ranked this agreement a 7, for its relatively strong protection of academic use and sharing, due primarily to one very important provision. Whenever the university licenses its own faculty inventions (including joint-inventions) to ConocoPhillips, the agreement states that these licenses reserve the right for Iowa State scientists and students to use the invention for research, to publish on the invention and related research, and to license the invention to third parties for noncommercial and educational purposes. As such this noteworthy provision protects academic use and sharing at both Iowa State University and at other research institutions.[13]

Detailed contract review

REVIEW QUESTION #1 University autonomy

Does the university side retain majority control of the alliance's central governing body?

No

The agreement leaves ConocoPhillips in charge of almost all facets of the research alliance. The agreement fails to spell out any formal governance structure, method of collective decision-making, or system of voting to guide the management of this eight-year university-industry research collaboration.

The agreement states that ConocoPhillips will fund research that is "of mutual interest and benefit to [Iowa State], [Iowa State University Research Foundation] and [Conoco]."[14] Conoco agrees to repay Iowa State University for funds expended only on agreed-upon research projects.

According to the agreement, this research "will further the instructional and research objectives of [Iowa State] in a manner consistent with its status as a non-profit, tax exempt, educational institution, and should derive benefits for [Conoco], [Iowa State], and [the university's non-profit research foundation]."[15]

Impartial peer review

REVIEW QUESTION #2

Does the agreement require all faculty research projects to be selected using impartial peer review?

No

The agreement says nothing about using an independent peer review process for selecting faculty research proposals. According to our interview in 2007 with Lisa Lorenzen, then ISU's Vice President of research and economic development, and more recent written comments in 2010 from Paul Tanaka, ISU's general counsel, the academic research selection process is almost entirely controlled by the ConocoPhillips.

In his written comments, Tanaka acknowledges that ISU and Conoco are not using any impartial, expert peer review system to evaluate faculty research proposals, but he emphasizes there is also no law requiring this and many universities and their sponsors do not use peer review. For further discussion, please see the Overview Commentary section above, discussing why peer review might be advisable in the case of a large-scale, corporate research alliance of this size and duration. For direct quotes from Tanaka, please see this endnote.[16]

Transparency

REVIEW QUESTION #3

Is the process for submitting faculty research applications fully transparent?

No

The agreement does not spell out how Iowa State University faculty will apply for ConocoPhillips' funding during this eight-year research alliance, or what criteria and methods of research selection will be used to judge the scientific merits and academic value of their research proposals. (For details on how the selection process now works in practice, see the Overview Commentary section above).

REVIEW QUESTION #4

Is the university's right to publish protected?

Protection of academic publication rights

Yes

"The parties, inclusive of University Project Leaders, graduate students, post doctoral students and scientific employees, engaged in a Research Project work shall be permitted to present at symposia, national or regional professional meetings and to publish in journals, or other venues of his/her choosing, accounts of the results of such work," provided that the agreement's confidentiality and patent delay provisions are honored.[17]

REVIEW QUESTION #5

What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?

Protection of academic publication rights

90 days

ConocoPhillips must receive copies of all publications or other public presentations 45 days in advance of dissemination to vet them of proprietary information and to decide if it wants to pursue patent protection. If Conoco pursues a patent, the agreement authorizes a further 45 days to prepare a patent application.[18]

REVIEW QUESTION #6

Does this publication delay accord with recommended federal limits?

Protection of academic publication rights

No

The National Institutes of Health and other federal agencies recommend academic-publication delays of no more than 30-60 days, which is considered sufficient time for the industry sponsor to file a provisional patent and/or vet any confidential proprietary information.[19]

REVIEW QUESTION #7

Are there additional confidentiality restrictions?

Protection of academic publication rights

Yes

Iowa State University faculty and students must keep any proprietary information they obtain from ConocoPhillips confidential for "ten years from the date of receipt of Proprietary Information."[20]

Degree of industry control over the academic research agenda

REVIEW QUESTION #8

Does the industry sponsor substantially define the alliance's overarching research agenda?

Yes

Only academic research projects that meet ConocoPhillips approval will receive funding, according to the terms of this eight-year-research-alliance agreement.[21]

Degree of industry control over the academic research agenda

REVIEW QUESTION #9

Which parties set the alliance's research priorities each new grant round?

ConocoPhillips

The agreement provides virtually no particulars regarding the submission and selection of faculty research proposals. In an interview with ISU's Lorenzen and in written comments from ISU's Tanaka, they explained how this process works in practice. (for details see the Overview Commentary section above)

Degree of industry control over the academic research agenda

REVIEW QUESTION #10

Does the university retain majority control over the selection of academic research projects?

No

The agreement is largely silent concerning the alliance's formal governance structure, but it does expressly state the provision of research funding is "[c]ontingent upon [ConocoPhillips] and [Iowa State] entering into specific Research Projects," which they both have agreed to pursue.[22] In practice, in the opinion our outside legal experts based on descriptions provided by ISU, the research selection process is principally controlled by ConocoPhillips (see Lorenzen interview and Tanaka letter in Overview Commentary section above).

Degree of industry control over the academic research agenda

REVIEW QUESTION #11

Does the industry sponsor have to approve all final research awards?

Yes

Only academic research projects that meet ConocoPhillips' approval will receive funding, according to the terms of this eight-year-research-alliance agreement.[23] In practice, in the opinion of our legal experts and the author, based on descriptions provided by ISU, the research selection process is principally controlled by ConocoPhillips (see Lorenzen interview and Tanaka letter in Overview Commentary section, above).

REVIEW QUESTION #12

Exclusive commercial rights: On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?

Intellectual property ownership and sharing of academic knowledge

Ranking: 8

Our outside legal experts ranked this agreement an 8, because of the strong licensing exclusivity rights it grants to the corporate sponsor. ConocoPhillips automatically enjoys a royalty-free, 90-day license to use and evaluate any alliance invention to see if it wants to obtain a patent and an exclusive commercial license.[24] If ConocoPhillips takes an exclusive license to any invention related to liquid fuels, then the licensing terms and royalty structure are also likely to be highly favorable to Conoco (see royalty discussion under Question #14 below).

REVIEW QUESTION #13

Licensing to multiple commercial users: On a scale of 1 to 10, Is the university free to license project research nonexclusively to other outside commercial entities?

Intellectual property ownership and sharing of academic knowledge

Ranking: 2

Our outside legal experts ranked this agreement a 2, due to the very limited freedom it grants the university to license sponsored-alliance research nonexclusively to more than one commercial firm. Such freedom is permitted only if Conoco turns down its automatic right to obtain an exclusive license.[25] Even if ConocoPhillips turns down an exclusive commercial license, the company receives an automatic, nonexclusive, worldwide license to the technology, royalty-free.

REVIEW QUESTION #14

Royalty and other intellectual property advantages: Does the industry partner enjoy special royalty and intellectual property terms?

Intellectual property ownership and sharing of academic knowledge

Yes

If ConocoPhillips takes an exclusive license to any invention related to liquid fuels (the main target of the alliance research project), then the royalty terms are likely to be highly favorable to the company due to a "prenegotiated licensing agreement" it set up with Iowa State University at the outset (see Lorenzen interview, quoted in the Overview Commentary section above).

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #15

Academic sharing: On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, noncommercial inquiry?

Ranking: 7

Our external legal experts ranked this agreement a 7 for its reasonably strong protection of academic use and sharing, due primarily to one very commendable provision. Whenever the university licenses its own faculty inventions (including joint-inventions) to ConocoPhillips, the agreement states that these licenses reserve the right for Iowa State scientists and students to use the invention for research, to publish on the invention and related research, and to license the invention to third parties for noncommercial and educational purposes. As such, this provision protects academic use both at Iowa State and at other research institutions.[26]

Management of conflicts of interest

REVIEW QUESTION #16

Does the agreement call for management of conflicts of interest related to the alliance?

No

Not discussed.

In his written comments submitted to CAP on August 11, 2010, Paul Tanaka, ISU's legal counsel, contends that it was unnecessary for ISU to incorporate any specific, conflict-of-interest provisions into this ConocoPhillips alliance agreement because ISU's general, campus-wide, conflict-of-interest rules would be sufficient to address any conflicts that might arise. But as our outside legal experts point out, this agreement specifically says this contract is the entire agreement between the parties, foreclosing the resort to external authority.[27] (Please see the Methodology section on pages 14 and 51 of the main report, for a discussion of the limits of relying on general, campus-wide policies to address contractual relationships between universities and private firms; please also see the "The rise of academic commercialism" box on pages 11 and 34, which addresses recent, mounting calls from lawmakers academic journals, federal agencies, and professional societies for U.S. universities to more stringently regulate and/or eliminate situations that could give rise to financial conflict of-interests concerns.)

In his comments, Tanaka further says that this report uses the term "conflict of interest" in "an amorphous manner inconsistent with current regulations and standards." Citing one National Institutes of Health definition, Tanaka goes on say that "under current accepted practice, and as required for participation in federally sponsored grants, 'conflict of interest' refers to a researcher having a significant financial interest in the outcome of the research which may hinder objectivity." In contrast, he says the analysis in the "Major Findings" sent to ISU for review in August 2010 "assumes that anyone who is seeking funding for research has an inherent conflict of interest. That is certainly not an accepted, nor coherent,

standard." He adds that the analysis he reviewed "uses the term 'institutional conflict of interest,' but fails to define it, or to indicate that there is neither a regulatory requirement nor generally accepted standard or policy for institutional conflicts.

Tanaka says that NIH's definition of an *individual* financial conflict of interest is the only one "under current accepted practice." In April 2009, however, the Institute of Medicine at the National Academies of Science published a prominent, high-level policy report on the growth of conflicts of interest throughout the univerisity and academic medical spheres. The report cites a number of situations that raise concerns about conflicts of interest in research. Examples listed include: Research institutions failing to evaluate and respond to the risks posed when researchers have a financial stake in the outcome of their research; sponsors and academic investigators failing to publish negative results from industry-funded research and delaying publication of results for over a year; and researchers failing to disclose financial relationships with industry to their employers.[28] The IOM's preferred definition of a conflict of interest reads as follows: *A conflict of interest is a set of circumstances that creates a risk that professional judgment or actions regarding a primary interest will be unduly influenced by a secondary interest.*[29] The IOM report also dedicates substantial space to discussing both "individual" as well as "institutional" financial conflicts of interests. It notes, for example, that "a conflict of interest exists when an *individual or institution* has a secondary interest (e.g., an ownership interest in a start-up biotechnology company) that creates a risk of undue influence on decisions or actions affecting a primary interest (e.g., the conduct of objective and trustworthy medical research)."[30] The IOM points out that this definition "frames a conflict of interest in terms of the risk of such undue influence and not the actual occurrence of bias."[31]

REVIEW QUESTION #17

Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?

Management of conflicts of interest

No

Not discussed.

Appendix eight

Detailed contract review

Global Climate and Energy Project

Stanford University

&

ExxonMobil Corp., General Electric Co., Toyota Motor Corp., and Schlumberger Technology Corp., a unit of Schlumberger Ltd.

Amount

$225 million, with additional funding commitments from the industry sponsors made through periodic updates to Exhibit A of the Agreement.[1]

Agreement term

Initial term, three years starting in December 2002;[2] however, the alliance has been extended until 2012. The Global Climate and Energy Project, or GCEP, has been operating continuously for eight years now, and it is expected to run for a total of at least 10 years. In September 2008, GCEP's four original sponsors extended and made some significant revisions to their original alliance agreement with Stanford University (for details, please see the discussion below, under "Method for obtaining the contract" and this Appendix contract review).[3]

Brief project description

On December 16, 2002, Stanford launched GCEP with initial funding commitments from four major energy firms: ExxonMobil ($100 million), General Electric ($50 million), Toyota ($50 million) and Schlumberger ($25 million). According to Stanford, "additional funding commitments [from the four sponsors] are made through periodic updates to Exhibit A of the Agreement."[4] GCEP's stated mission is to support "fundamental research on technologies that will permit the development of global energy systems with significantly lower greenhouse gas emissions."[5]

Method for obtaining the research contract, and CAP's request for university comments

Shortly after GCEP was announced in 2002, Stanford University posted a copy of its industrial research alliance agreement online, an unusual step for a private research university not subject to public record laws. This original 2002 GCEP agreement, signed December 16, 2002, was in effect for nearly six years, from 2002 until September 2008. It has now been taken offline, but is available from the author upon request.

In the fall of 2008, Stanford replaced this GCEP agreement with a new, revised agreement, which the university renegotiated with its four original industry sponsors, and which became effective September 1, 2008. A copy of Stanford's revised GCEP agreement, dated September 1, 2008, is available online at: http://gcep.stanford.edu/about/agreement.html.

Our external legal consultants performed a detailed review of Stanford's original 2002 GCEP agreement, which governed the alliance for nearly six years, and the amended 2008 GCEP agreement, which has governed the alliance from September 2008 to the present. Where a ranked score was required, the external reviwers gave the GCEP agreement *a composite overall score* (averaging the separate scores assigned to the 2002 and 2008 agreements, due to different provisions in each agreement).

In July 2010, CAP invited Stanford University to provide written comments and updates on the "Major Findings" contained in this Appendix review based on our analysis at that time, which were drawn primarily from an independent, expert, legal analysis of the contractual provisions guiding GCEP (for details, please see the methodology box on pages 14 and 51 of the main report). In its written comments, Stanford confirmed that there have been no further legal changes or revisions to GCEP's 2008 agreement, thus our review of this alliance (encompassing both the first six years under the 2002 contract, and the last two under the 2008 contract) is current as of August 2010. Also, on July 14, 2010, Stanford notified CAP that it had obtained a leaked draft copy of this full report in advance of publication. In this Appendix review, we seek to address issues raised by Stanford both in its July and August 2010 comments.[6]

It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions #1-17 below are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Also, the contract provisions have not to our knowledge been tested in a court of law, so their "legal" meaning has not been definitively established.

Overview commentary: Major findings

When Stanford University first launched this alliance in December 2002, GCEP's overarching mission was strongly criticized by some members of the university community, including both faculty and students. Critics pointed out that, despite its name—the Global Climate and Energy Project—no alliance funds could be used to study the phenomenon of global climate change or its possible adverse effects, which many found troubling, especially in light of the perception that ExxonMobil made longstanding efforts to deny the scientific realities of global warming.

GCEP's funds were specifically targeted toward "fundamental research" into new energy technologies capable of reducing greenhouse gas emissions globally. Some viewed this mission critically, noting that strict emphasis on "fundamental research" might actually preclude more substantive "applied" research on energy technologies that have real promise, in the nearer term, to actually reduce greenhouse gas emissions more expeditiously. In recent written comments, GCEP's Director Sally Benson noted that "this focus on fundamental research into new technologies was a deliberate one for two reasons. First, significant

advances are needed in energy technologies that are best addressed by fundamental research. Department of Energy Programs such as ARPA-E, the Energy Hubs and Energy Frontier Research Centers, attest to the importance of this work. Second, academic style research is best suited to fundamental research carried out by Ph.D. students and post-docs."[7]

Another objection to the GCEP alliance has centered around its administrative steering committee—the Management Committee—which the agreement allows to be entirely controlled by the industry sponsors in terms of their voting power. The agreement provides that the management committee comprises four voting members (each representing one of the corporate sponsors), and one *nonvoting* representative from Stanford University, the Project Director. Under the agreement, the GCEP management committee wields final control over the selection of faculty research projects, approves the annual budget, and determines what research results will be patented.[8] In GCEP's 2008 amended agreement, this industry-controlled governance system was not altered, despite violating longstanding university traditions of self-governance and academic autonomy from outside funders.[9] In written comments, Sally Benson, GCEP's current director, stated that such criticism is "unfounded" because GCEP's academic director "is responsible for leading and supervising the project." GCEP's director, however, lacks any voting power, and as Benson acknowledges, GCEP's management committee must still "provide approval for recommendations made by the GCEP Director," which this report's external legal reviewers and the author find greatly diminishes the university's operational and academic autonomy.[10]

From a purely contractual standpoint, according to our external legal reviewers, the GCEP agreement is well drafted. It is important to understand that there are two decisive stages to the formulation of GCEP's annual research efforts. First, GCEP identifies the broad energy technologies that it is interested in researching each year, with some degree of academic input. In its very first grant cycle, for example, GCEP targeted four research areas: Integrated Assessment of Technology Options; Hydrogen Production and Utilization; Advanced Combustion Systems; Geologic Sequestration of CO2. The fact that GCEP funds an array of diverse energy-research areas, and that these technology options change each new grant round, is distinctive from many of the other single-company agreements analyzed in this report, which tend to concentrate on one commercial research area. Second, GCEP reviews all the faculty research proposals that it receives in each grant cycle, and chooses which ones it wants to fund. Here, however, the research selection process is very poorly delineated in both the 2002 and 2008 agreements, and final research awards must be approved by the management committee, where the industry sponsors control all the votes.

According to our independent legal analysts, both the 2002 and 2008 GCEP agreements provide little exposition of how GCEP will evaluate and select which faculty research proposals are most meritorious and deserving of GCEP funding—a critical issue for any university dedicated to high-quality research. The GCEP alliance is one of the few we reviewed for this report that even mentions the use of traditional, academic methods of

expert "peer review" for independently evaluating faculty research proposals. But in both the 2002 and 2008 agreements, the use of "peer review" is not required; the management committee, where the industry sponsors control all the votes, actually has to request it.

In written comments relating to this report, Stanford University noted that GCEP (with the consent of its industry sponsors) has chosen to adopt a two-tiered, impartial, expert peer review system to evaluate faculty research proposals. Also, Stanford has taken the added step of posting written protocols on a public website that seek to clarify how GCEP's research-selection and external-peer-review system actually works in practice (see: http://gcep.stanford.edu/about/projectselectionprocess.html). Sally Benson, GCEP's director, described GCEP's current use of peer review in her written comments to CAP, dated August 9, 2010: "This, or slight variations of this [peer review] process, has been used in selecting all full-term research programs at GCEP following the very initial awards."

According to our external legal experts, however, because the GCEP alliance contract (under both the 2002 and the revised 2008 versions) failed to require use of expert peer review there is "no guarantee that such practices will continue" or that Stanford's current peer-review procedures will be applied consistently to all research proposal submissions. That's why our external legal experts answered "No" to Review Question #2 below—"Does the agreement require impartial peer review?"

In her comments, Benson asserted that this report "misrepresents the use of peer review in GCEP." She further asserted that "[a] rigorous and independent, peer review process is used to select all of the projects; which is at the heart of how GCEP makes funding decisions."[11] But this report's external reviewers and the author find that GCEP's current use of impartial peer review is more variable and insecure than Benson asserts, and ultimately its use is still contingent on the formal consent of GCEP's management committee, where the industry partners control all of the votes.

According to our outside legal analysts, the GCEP agreement also lacks precision when it comes to specifying how long an academic publication can be delayed for patenting or other commercial reasons. Stanford University and the industry sponsors are bound to hold sponsored project research discoveries "in confidence as a trade secret until sixty days" after the university first distributes them to the industry sponsors. But the agreement spells out no maximum delay period, leaving it, potentially indefinite. More than likely, both Stanford University and GCEP's industry sponsors do envision rapid publication of sponsored academic research after this mandatory 60-day hold, but not specifying any maximum-publication-delay period is noteworthy given the importance of rapid publication within the university sphere. Stanford objected to our external legal review on this point. (for more detailed discussion please see Review Question #5, below)

The GCEP alliance is quite exceptional in reducing commercial-confidentiality restrictions within the academic sphere. It states that information disclosed by the four industry sponsors or their affiliates, including any technical data, "will be nonconfidential and may

be freely used and disclosed by the other parties." This provision fosters an atmosphere of openness in place of proprietary knowledge hoarding. Compared to large-scale research alliances with only one firm—which tend to impose tighter proprietary controls on academic knowledge sharing—industrial research consortia can be constructed, like this one, in a way that fosters greater scientific openness.

A final aspect of this GCEP agreement that warrants particular attention involves research ownership, and commercial control over research results. Here, one significant, distinguishing difference exists between the 2002 and the 2008 GCEP agreements. Under the original 2002 GCEP agreement, which governed GCEP's research operations for nearly six years, there was no explicit reference to "exclusive licenses." But that 2002 agreement did contain a provision that automatically granted all four industry sponsors (collectively) what might be described as a five-year "de facto exclusive license" over GCEP's research results.[12] Under this "de facto exclusivity" period, no outside company or party, other than Stanford University and the industry sponsors, was allowed to take a license to any of GCEP's patented technology for five years from the date that a patent issued (unless the management committee unanimously waived that condition). As such, our legal reviewers found that the four industry sponsors enjoyed strong commercial control over any patented GCEP inventions—and, very possibly, over a broader swath of GCEP research as well, for at least five years. (See Review Questions #12 and #13, below, for a detailed discussion of the five-year exclusivity provision in GCEP's 2002-2008 contract.) The potential effect of this five-year exclusivity was to make it far less likely that academic researchers would feel comfortable disseminating their research results outside of GCEP for fear of alienating one of the corporate sponsors.

In September 2008, Stanford University negotiated a revised GCEP agreement with its four industry sponsors, which removed this de-facto, five-year exclusivity provision entirely.[13] Now the agreement states that Stanford and each sponsor will have "a perpetual, nonexclusive, worldwide, irrevocable, royalty-free right and license to use, disclose, publish, republish, distribute, copy, prepare derivative works, sell, or otherwise transfer without limitation to any third party, whether affiliated or not, all or any part of [GCEP-sponsored research], including patented inventions."[14] As such, GCEP's new agreement, which went into effect on September 1, 2008, permits a degree of scientific openness and academic sharing that certainly deserves emulation.

Interestingly, the GCEP sponsors' willingness to forgo five-year exclusivity may have led Stanford to adopt a somewhat more aggressive patenting stance: "Primarily in order to promote freedom of operation by the parties and to establish a platform for licensing Project Technology to third parties, the University will seek patent coverage in the United States of America on all significant Project Technology that is patentable." Still, this dramatic shift on exclusivity suggests that the research relationship between Stanford University and its four industry partners has grown more secure, and matured to the point where all parties are comfortable with a rare degree of academic openness and knowledge sharing.

In its written comments in July and August 2010, Stanford informed CAP that GCEP's Management Committee has agreed to make removal of this five-year exclusivity provision "retroactive to all GCEP research efforts—current and completed."[15] Based on this, GCEP's director, Sally Benson, stated that this report "should be rewritten [to] eliminat[e] any reference to the 2002 Agreement and its 'de facto exclusivity license' period."[16]

But our external legal expert pointed out that even if Stanford and its industry sponsors did elect to voluntarily make removal of the 5-year-exclusivity period retroactive, "inventions from 2002 and 2003 would still have been treated as if they were exclusively controlled by GCEP's corporate sponsors for the full five-year period; with each subsequent year's inventions exclusively licensed for progressively one less year." In other words, during the first six years, GCEP's professors and students operated under the assumption that this five-year-commercial-exclusivity provision was either in effect, or could be exercised. For this reason, the report's author and external legal reviewers have chosen not to excise all discussion of this five-year exclusivity provision from the report, while at the same time recognizing GCEP's admirable commitment in 2008 to enhancing scientific openness and academic knowledge exchange, both within GCEP and beyond.

Detailed contract review

REVIEW QUESTION #1

University autonomy

Does the university side retain majority control of the alliance's central governing body?

No

The original 2002 GCEP agreement and the revised 2008 agreement establish one principal administrative steering committee—the Management Committee, which the agreements allow to be entirely controlled by the industry sponsors in terms of number of votes. The management committee comprises four voting members (each representing one of the corporate sponsors) and one nonvoting representative from Stanford University, the Project Director.[17]

The management committee handles all communications between the industry sponsors and Stanford, and oversees and controls all major decisions related to the administration of the GCEP alliance.[18] The management committee further controls the final selection of faculty research projects, approves the annual budget, and determines what research results will be patented.[19] The management committee meets at least every six months. Administrative matters are decided by a majority vote.[20] Stanford University (including GCEP's Project Director and staff) is charged with carrying out the management committee's decisions, and administering and supervising the research undertaken.[21]

In written comments, Sally Benson, GCEP's current director, emphasized that GCEP's academic director "is responsible for leading and supervising the project." GCEP's director, however, lacks any voting power, and as Benson acknowledges, GCEP's management committee must still "provide approval for recommendations made by the GCEP Director," which this author and our legal experts find greatly diminishes the university's operational and academic autonomy, since the industry representatives are authorized by the contract terms to exercise voting power.[22]

Impartial peer review

REVIEW QUESTION #2

Does the agreement require all faculty research projects to be selected using impartial peer review?

No

Both the original 2002 and the revised 2008 written GCEP agreements fail to require use of impartial, expert peer review for the selection of faculty research proposals and the awarding of GCEP funding. Both agreements do mention the use of traditional academic methods of "peer review" for evaluating and selecting faculty research proposals, but they only require its use when members of the management committee, where only the industry sponsors have voting power, request it. Both the 2002 and 2008 agreements read as follows: "At the request of the Management Committee, the Project Director from time to time will constitute one or more peer review committees to provide to the University and Sponsors independent technical peer review of selected aspects of the Project, for example, proposed research projects."[23]

In written comments, Stanford University stated that GCEP's industry-controlled Management Committee has approved the use of an independent, expert peer review system to evaluate and select faculty research projects. GCEP has also attempted to delineate in writing, on a public website, how this research-selection and use of external peer review actually works in practice (see http://gcep.stanford.edu/about/projectselectionprocess.html). This is commendable given that the written legal agreement lacks adequate exposition in this area. But as one of our external legal reviewers noted, because GCEP's 2002 and revised 2008 legal agreements do not require peer review, "there is no guarantee that such a practice will continue" or that it will be applied consistently.[24] This failure to require the use of independent peer review seems contradictory when the agreement goes to some lengths to insure that, if utilized, these "Peer Review Committees" will be independent and free of conflicts of interest.[25]

It should be noted that the expert peer-review process described on Stanford-GCEP's website, in August 2010, also fails to specify the actual weight or authority that will be assigned to these external peer-reviewer evaluations within the overall GCEP research-selection and final-award-making process. Based on the website description, GCEP's peer review process may be a determinative factor or merely a component in a larger review. As

such, according to our external legal experts, Stanford's informal peer review system may or may not be adequate to protect traditional notions of meritocratic, impartial, academic research selection. This variability regarding the use of peer review, and failure to require it in GCEP's legal agreements, undermines, in this author's view, the very purpose of utilizing an independent academic peer review system. Since use of peer review remains variable and uncertain, the GCEP agreement fails to provide any genuine assurances that GCEP's research-selection process will be guided by scientific merit and objective standards of excellence, rather than, for example, the narrower, business preferences of its commercial sponsors.

REVIEW QUESTION #3

Transparency

Is the process for submitting faculty research applications fully transparent?

No

While the original GCEP agreement is well drafted, it lacks transparency in at least one critical area: its exposition of the process that will be used to select which faculty research proposals are most meritorious and deserving of funding. In this author's view, this is a critical issue for any university dedicated to high-quality research.

The agreement fails to spell out how faculty at Stanford and other domestic as well as international universities should apply for GCEP funding, or how the management committee (where all voting power resides with the industry sponsors) will evaluate and choose which faculty research proposals to fund. The GCEP agreement makes clear that grants will be issued to researchers at Stanford and other universities both domestic and international. The agreement says that the management committee may request that independent peer review committees be used to evaluate faculty proposals "from time to time," but this is not required, thus leaving the independence and scientific objectivity of the selection process very unclear in the contract.[26]

Whatever selection process the sponsors on the management committee choose to employ, the agreement clearly states that ultimate approval of these faculty research proposals, as well as the annual budget, resides entirely with the industry sponsors who sit on the management committee.[27]

REVIEW QUESTION #4

Protection of academic publication rights

Is the university's right to publish protected?

Yes

The agreement clearly states "the University and each Sponsor is specifically authorized and encouraged to publish Project Technology in peer-reviewed professional journals and other appropriate publications." This authorization is subject only to a review period for possible filing of patent applications.[28]

Protection of academic publication rights

REVIEW QUESTION #5

What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?

Research kept confidential at least 60 days; No precise maximum delay is specified

According to our outside legal analysts, the GCEP agreement is far from precise when it comes to specifying a maximum delay on academic publications, leaving open the possibility, at least, of an indefinite delay. In written comments submitted to CAP on August 9, 2010, Stanford asserted that this report "repeatedly misrepresents the GCEP policy on publication, implying that the sponsors can 'hold up publication' indefinitely." In fact, wrote Stanford, "the agreement states that the sponsors can have a maximum of 60 days following invention disclosure to review the materials."[29]

It is true that the industry sponsors can hold up publication for sixty days to determine if they want to seek any intellectual property protection. But according to our external legal experts, this does not change our answer to Review Question #5 because there is no language in either the 2002 or the 2008 GCEP agreements that limits academic publication delays to a "maximum of 60 days" or that specifies any outer limit regarding the total time that an academic publication can be delayed due to efforts to seek patent- or other types of commercial- and intellectual-property protection.

Both the 2002 and 2008 agreements assert that Stanford University and the industry sponsors are bound to "hold Project Technology in confidence as a trade secret until sixty days after the University first distributes the Project Technology in question in tangible form to the Management Committee." The only purpose spelled out for this confidentiality requirement is to evaluate the technology for patentability. If a decision is made to patent the technology, the duty to hold the technology in confidence as a trade secret extends "for such additional, reasonable time periods as may be necessary" to enable the university to file an application for a provisional patent.[30] Practically speaking, this means that academic publication can be delayed for whatever period of time (beyond the initial 60 days) that all parties consider "reasonable" for filing this provisional patent (which grants the owner one year's worth of protection while the U.S. Patent Office decides the merits of issuing an actual, formal patent).

Section 7.03 of the 2002 and 2008 agreements are nearly identical, but the 2008 agreement adds the following sentence at the end of this section: "[i]f a patent application on the Project Technology in question is filed before the end of the sixty-day period referred to above, the confidentiality obligation will end when the patent application is filed." This sentence does not alter the conclusion that, if a patent application has not been filed until after this 60-day, mandatory, confidentiality period, then an academic publication could

be delayed for whatever period is deemed "reasonable" for preparing and securing patent and/or other intellectual property protection. No outer time limit is specified. More than likely, both Stanford University and GCEP's corporate sponsors do envision relatively rapid publication of sponsored academic research after this mandatory 60-day-hold period, however not specifying any maximum publication delay is noteworthy, given the importance of rapid publication within the university sphere.

REVIEW QUESTION #6

Does this publication delay accord with recommended federal limits?

Protection of academic publication rights

No

The National Institutes of Health and other federal agencies recommend academic-publication delays of no more than 30-60 days, which is considered sufficient time for the industry sponsor to file a provisional patent and/or vet any confidential proprietary information.[31]

REVIEW QUESTION #7

Are there additional confidentiality restrictions?

Protection of academic publication rights

Some (but very minimal)

The agreement is exceptional regarding the effort it makes to reduce commercial-confidentiality restrictions within the academic sphere. Information disclosed by the industrial sponsors or their affiliates, including any technical data, "will be nonconfidential and may be freely used and disclosed by the other parties."[32] Prior to passing along any information to Stanford University (or any other university funded through GCEP), the industry sponsors will try in advance to vet anything they consider proprietary (to the greatest extent possible). The only exception relates to patentable inventions developed by the industry sponsors outside the strictures of the GCEP alliance.

This provision of the agreement strives to maintain a more open, academic research culture where information can be freely shared. This provision may also be more agreeable to GCEP's multiple industry sponsors, which may in fact prefer not to release commercial, proprietary information to one another.

Degree of industry control over the academic research agenda

REVIEW QUESTION #8

Does the industry sponsor substantially define the alliance's overarching research agenda?

No

This aspect of the agreement is somewhat tricky to interpret, but it appears that the actual setting of GCEP's overarching annual research agenda is largely a joint endeavor. In this sense, the research agenda is less strictly controlled by the industry sponsors than is the case with many of the other university-industry agreements reviewed here in this report.

GCEP's annual research agenda must, at the very least, be signed and approved by all parties, the four industry sponsors and Stanford. The agreement states "revisions to the Core Project Description" must be "signed by representatives of each party."[33]

When Stanford University first launched this alliance, GCEP's overarching mission was strongly criticized by some members of the university community, including both faculty and students. Critics pointed out that, despite the alliance's name—the Global Climate and Energy Project—no alliance funds were to be used to study the phenomenon of global climate change or its effects, which many found troubling, especially in light of the perception that ExxonMobil made longstanding efforts to deny the scientific realities of global warming. GCEP's funds were specifically targeted toward "fundamental research" into new energy technologies capable of reducing greenhouse gas emissions globally. Some viewed this mission quite skeptically, fearing that the emphasis on "fundamental research" might actually preclude more substantive "applied" research on energy technologies that have real promise to actually reduce greenhouse gas emissions in the nearer term.

Degree of industry control over the academic research agenda

REVIEW QUESTION #9

Which parties set the alliance's research priorities each new grant round?

All parties (Stanford and its four industry sponsors)

There are two decisive stages to the formulation of GCEP's annual research efforts. First, GCEP identifies the broad energy technologies that it is interested in researching and funding each year—the "annual research agenda." In its very first grant cycle, for example, GCEP targeted four areas: Integrated Assessment of Technology Options, Hydrogen Production and Utilization, Advanced Combustion Systems, and Geologic Sequestration of CO2.[34] This part of the process is handled jointly by Stanford and the four industry sponsors. Second, GCEP reviews all the faculty research proposals it receives (each grant round), and chooses which ones it finds most promising. All final research rewards must be approved by the four industry sponsors, which control the management committee.

REVIEW QUESTION #10

Degree of industry control over the academic research agenda

Does the university retain majority control over the selection of academic research projects?

No

Under the agreement, GCEP's management committee—composed of one nonvoting Stanford member and four voting industry-sponsor representatives—must grant final approval to all research awards. This committee also has full discretion when it comes to deciding how faculty research proposals will be evaluated, for example whether to use any independent expert peer review.

The agreement indicates that GCEP's project director and staff (all Stanford employees) will put together "a detailed executive plan and budget," including "the portfolio of specific potential research programs" (faculty research proposal submissions), and present them as recommendations to the management committee. The management committee is then free to amend this budget and portfolio of potential research programs prior to giving final approval.[35] A majority—three of the four industry sponsors—must vote to approve all research projects funded.

REVIEW QUESTION #11

Degree of industry control over the academic research agenda

Does the industry sponsor have to approve all final research awards?

Yes

See discussion above.

REVIEW QUESTION #12

Intellectual property ownership and sharing of academic knowledge

Exclusive commercial rights: On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?

Composite 2002 and 2008 Ranking: 5
2002 GCEP Agreement Ranking: 8
2008 GCEP Agreement Ranking: 2

Our outside legal experts ranked GCEP's original 2002 agreement an 8 for the lengthy five-year commercial exclusivity it granted to the four industry sponsors. This contract governed GCEP's operations for nearly six years, from December 2002 to September 2008. There is no explicit reference to "exclusive licenses" anywhere in the 2002 contract. But the agreement does clearly grant all the industry sponsors (collectively) what might be described as a "de facto exclusive license": a five-year period of collective, exclusive, commercial control over GCEP research. (See discussions below, and in the Overview Commentary section above, for details.)

Significantly, in September 2008, GCEP removed this controversial, five-year exclusivity provision from its GCEP's contract, thus providing for far greater nonexclusive licensing, openness, and knowledge-sharing. The 2008 agreement states that Stanford University and each of the four industry sponsors will have "a perpetual, nonexclusive, worldwide, irrevocable, royalty-free right and license to use, disclose, publish, republish, distribute, copy, prepare derivative works, sell, or otherwise transfer without limitation to any third party, whether affiliated or not, all or any part of [GCEP-sponsored research], including patented inventions."[36] Because of this change, our outside legal examiners ranked the 2008 GCEP agreement a 2, for the very limited commercial licensing exclusivity it grants upfront to the industry sponsors. (For more details, see the discussion below, and the Overview Commentary section above.)

The five-year exclusivity provision in the original 2002 agreement, in addition to generating widespread public criticism, lacked clarity and transparency. Under this "de facto exclusive license," no one other than Stanford University and the four original industry sponsors was permitted a license to any of GCEP's patented technology for five years from the date that a patent issues (unless the management committee unanimously waives that condition).[37] As such, during the term of this 2002 contract (covering GCEP's first six years), the four industry sponsors (as the sole voting powers on the management committee) enjoyed effective monopoly commercial control over any patented GCEP inventions—and, very possibly, over all of GCEP research and inventions (although here the agreement is less clear)—for at least five years. It appears as if the university was not allowed contractually to grant any license (exclusive or otherwise) to any outside entity for this original-2002-contractual, five-year period. The ambiguity surrounding the reach of this exclusive-use provision caused this agreement to score somewhat higher (in terms of the degree of exclusive control it permits) than might have been the case, otherwise. However, on the flip side, it is important to note that, even under the 2002 contract, each of the sponsors and Stanford faculty were free to use GCEP inventions, permitting greater openness and academic sharing internally within GCEP, if not outside (see discussion in Question #15 below for more details).[38] GCEP's amended 2008 agreement has dramatically enhanced GCEP's commitment to nonexclusive licensing, academic openness, and knowledge-sharing.

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #13

Licensing to multiple commercial users: On a scale of 1 to 10, is the university free to license project research nonexclusively to other outside commercial entities?

Composite 2002 and 2008 Ranking: 5.5
2002 GCEP Agreement Ranking: 3
2008 GCEP Agreement Ranking: 8

Our outside legal experts ranked the original 2002 GCEP agreement a 3, which is quite low, on the question of "nonexclusive licensing to multiple parties," largely because of the ambiguity and uncertainty generated by the five-year, de facto exclusive-use provisions

in the contract, discussed above under Question #12. (For a more detailed of this ambiguity on non-exclusive licensing in the original 2002 GCEP contract, see the discussion directly below.) Significantly, GCEP's revised 2008 agreement eliminated these five-year, exclusive licensing provisions, thus permitting far greater flexibility in terms of non-exclusive licensing and sharing of GCEP's project research.

The 2008 agreement clearly states that Stanford University and each of the four industry sponsors will have "a perpetual, nonexclusive, worldwide, irrevocable, royalty-free right and license to use, disclose, publish, republish, distribute, copy, prepare derivative works, sell, or otherwise transfer without limitation to any third party, whether affiliated or not, all or any part of [GCEP-sponsored research], including patented inventions."[39] Because of this change, our outside legal examiners ranked the 2008 GCEP agreement an 8 for the strong licensing flexibility this alliance affords both Stanford University and GCEP's academic researchers, based at universities worldwide.

Under the 2002 contract, which ran for nearly six years, GCEP's four industry sponsors collectively enjoyed exclusive commercial protection from competitors lasting for a minimum of five years. It's not entirely clear (even after extensive independent legal analysis of the 2002 agreement) whether paragraph 6.07 largely preempts these nonexclusive licenses, or whether the five-year, exclusive-use provisions contained therein only apply to a smaller subset of inventions that the management committee is specifically seeking to patent. This is a huge level of uncertainty to leave in an academic agreement, particularly one drafted so carefully elsewhere.

If the five-year, exclusive use provision only applied to materials GCEP was actively trying to patent (or had patented), then this provision allowed the academic research community greater freedom to share and exchange other nonpatented GCEP discoveries, preserving more of the universities' open science traditions. If, however, the de facto exclusive-use provision was more broadly defined and granted Stanford and its four industry sponsors monopolistic control over essentially all project research for five years, then the 2002 GCEP agreement protected academic openness very poorly indeed. Given its importance, this GCEP agreement language should not have been so tricky to interpret. The possible effect of this five-year exclusivity (combined with this less-than-clear legal language), in the opinion of legal experts, was to make it far less likely that academic researchers would have felt comfortable disseminating their research results outside of GCEP for fear of alienating one of the corporate sponsors.

REVIEW QUESTION #14

Royalty and other intellectual property advantages: Does the industry partner enjoy special royalty and intellectual property terms?

Intellectual property ownership and sharing of academic knowledge

Yes

Under the 2008 agreement, industry sponsors are still entitled to a non-exclusive, royalty-free license to project technology.[40] But because the five-year de facto exclusive license has been removed, the industry sponsors no longer enjoy exclusive access to the technology without paying royalties.

Under the original 2002 agreement, ExxonMobil, Toyota, Schlumberger, and General Electric enjoyed a de facto exclusive license to GCEP's most promising inventions for five years, without being contractually required to pay any royalties to Stanford University (as would be customary with most traditional university-industry agreements). After the five-year exclusive license period expired, the industry sponsors also enjoyed an automatic, royalty-free, nonexclusive license in perpetuity.[41]

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #15

Academic sharing: On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, noncommercial inquiry?

Composite 2002 & 2008 Agreement Ranking: 7

2002-Original Agreement Ranking: 5

The 2002 agreement asserts that Stanford "is specifically authorized and encouraged to use the results of the sponsored research to educate and train students, post-doctoral research scientists, faculty, and other members of the University community."[42] This command, however, was somewhat diluted by the 2002 agreement's confusing language regarding nonexclusive licensing to third parties in light of the five-year exclusivity provision for the four sponsors. (See discussion under Question #13 above).

2008-Revised Agreement Ranking: 9

By abolishing the five-year de facto exclusive license, the 2008 Agreement's exhortation to publish and share GCEP research is much stronger and more compelling.[43] (For more discussion of the 2008 GCEP revisions, see the Overview Commentary section above)

Management of conflicts of interest

REVIEW QUESTION #16

Does the agreement call for management of conflicts of interest related to the alliance?

Yes, but only minimally

The original 2002 agreement, which was in effect from December 2002 to September 2008, addressed management of conflicts of interest related to the GCEP alliance in only two places: the creation of optional peer review committees (which are formed only when requested by the management committee, where all voting power resides with industry sponsors have voting powers, as discussed under Question #2 above); and the awarding of GCEP grant money to outside universities through subagreements. The 2002 GCEP agreement strongly encourages Stanford to award a portion of GCEP's funding to researchers based outside Stanford, at other American and international universities. In the 2008-revised GCEP "Subagreement," these conflict-of-interest provisions for non-Stanford university grantees were dropped.[44]

The 2002 "Subagreement" had stated explicitly that outside universities must either have conflict-of-interest policies already in place, or adopt Stanford's existing, general, campus-wide conflict-of-interest policies. According to this subagreement, the primary concern is that "all identified conflict of interests under this Subagreement will have been satisfactorily managed, reduced or eliminated."[45] This language at least provided some acknowledgement of the gravity and importance of addressing conflicts of interest within academia. In its 2008 revised contract Subagreement," Stanford dropped this explicit reference to conflict-of-interest rules. As of the 2008 revision, Stanford no longer requires subcontractors to the GCEP agreement to formally address conflict of interest issues.

Neither the original 2002 GCEP agreement or the 2008 revised agreements made any specific attempt to address the larger issue of how Stanford and other university grantees should tailor their current, campus-wide conflict-of-interest policies (which many outside experts consider highly variable and weakly enforced) to address the specific new challenges raised by large-scale, multiyear industrial research alliances, such as GCEP, which these existing policies were never specifically designed to address. This is the issue the next review question, below, seeks to address.

REVIEW QUESTION #17

Management of conflicts of interest

Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?

No

Neither the original 2002 agreement nor the revised 2008 agreement specifically prohibits conflicts of interest on GCEP's governing bodies, or on committees charged with evaluating and selecting faculty research. Both agreements do acknowledge the importance of eliminating conflicts of interest on "Peer Review Committees," but these committees are not required and are only utilized "from time to time" at the discretion of the management committee, where only the industry sponsors have voting power.[46] Stanford University asserts that it is now using a peer-review-type system to select most of its research awards (see the Overview Commentary section above), but the university did not make any changes to this section of its 2008 revised GCEP agreement. Both the 2002 and the 2008 agreements go to some length to insure that, if they are utilized, these peer review committees must be independent and free of conflicts of interest, but since their use is entirely at the discretion of the management committee, and variable, it is the view of our legal reviewers that this obviates the security that genuine peer-review would normally provide that all faculty research will be judged impartially and competitively on the basis of scientific merit, without deference to commercial sponsor biases or undue sponsor influence.

Appendix nine

Detailed contract review

BioEnergy Alliance

Texas A&M University

&

Chevron Technology Ventures, a unit of Chevron Corp.

Amount

$5.2 million over 5 years.

Contract term

5 years (April 9, 2007 through April 9, 2011); the agreement may also be extended.

Public financing

Unknown

Brief project description

In April 2007, Chevron Corp.'s Chevron Technology Ventures unit signed a major research alliance with two divisions of the Texas A&M University System—the Texas Agricultural Experiment Station and the Texas Engineering Experiment Station— to fund the BioEnergy Alliance, a research center devoted to the study and development of biofuels made from nonfood crops.[1] (Throughout our analysis below, the Texas A&M University System, the Texas A&M Office of Technology Commercialization, the TAES, and the TEES will be referred to collectively as simply "Texas A&M.")

Method for obtaining the research contract, and CAP's request for university comments

We obtained this Texas A&M University agreement through a formal, state-level, public record act request, which the author filed on November 12, 2007. Even though Texas A&M is a publicly funded state university, it declined to disclose this research contract with Chevron, suggesting that it contained corporate proprietary information and was not subject to state public record laws. This resulted in a roughly three-and-a-half month long delay in fulfilling our request. First, Texas A&M notified Chevron of its right to object to public disclosure. Second, the university requested direction from the Texas Attorney General's office to ascertain if public disclosure was mandatory. On February 5, 2007, the office of the Texas AG instructed Texas A&M University to disclose a redacted version of the contract, holding back 14 pages.[2] The university complied and sent a copy of this redacted contract to the author on February 21, 2007.

Subsequent to this, in April 2010, this report's author asked Bob Avant, program director for Texas AgriLife Research at Texas A&M, for more up-to-date numbers on how much Chevron had invested in the BioEnergy project thus far. On April 27, 2010, Avant wrote back an email with the following reply: "I am not at liberty to release informa-

tion related to Chevron."[3] In July 2010, CAP invited Texas A&M University to provide written comments and updates on the "Major Findings" in this Appendix, which were drawn primarily from an independent, expert, legal analysis of the Chevron-Texas A&M research alliance agreement (for details, please see the methodology box on pages 14 and 51 of the main report). On August 20, 2010, Texas A&M University informed CAP that it had, once again, written to the Texas AG's office arguing that it should not be required to comply with our public information request (seeking basic comments and updates on this report's Major Findings) because, according to the university, this information pertains to commercial trade information that is exempt from the state's public record law.[4] Due to Texas A&M University's refusal to respond to our basic request for comments prior to our publication deadline, we assume that our analysis of the Chevron-Texas A&M agreement is still valid and current.

It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions #1-17 below are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Also, the contract provisions have not to our knowledge been tested in a court of law, so their "legal" meaning has not been definitively established.

Overview commentary: Major findings

The BioEnergy Alliance agreement contains no description, even in general terms, of the purpose of Chevron's funding. The description above is taken from press coverage of the deal. The agreement itself simply describes the BioEnergy Alliance as "enhanc[ing] the ability of these two preeminent agricultural and engineering agencies [TAES and TEES] to serve the citizens of Texas and beyond."[5]

The agreement allows Chevron to wield strong influence over this entire academic research partnership. The BioEnergy Alliance's main governing body, the "Joint Management Committee" (which is composed of Texas A&M and Chevron representatives), must agree on all the faculty research projects approved for funding. The agreement lacks any specifics regarding the numerical composition of the JMC, the voting structure of the JMC, and the criteria and methods of selection that JMC members will use to evaluate faculty research projects and award funding.

This lack of detail regarding the alliance's general management does not favor, or protect, the public-research and core academic missions of Texas A&M. It is highly likely that leaving these management issues open to future determination—particularly in light of Chevron's ability to unilaterally terminate the agreement (with just 30 days notice)—will enable Chevron to dictate the terms of the research alliance far more than an academic institution should permit. Chevron's ability to unilaterally terminate with such short notice is worrisome for any university launching a major initiative involving faculty, graduate students, and labs that all require a steady stream of uninterrupted financing to sustain

their research. The agreement also makes no mention of using traditional academic methods of faculty research selection, such as independent, expert "peer review."

Although the agreement permits publications to be delayed by 90 days, which is longer than the 30 days to 60 days recommended by federal agencies, it does make an important exception for student theses. Chevron's 60-day publication delay does not apply to "the filing or publication of any student thesis dissertation." Thus, a student thesis has to be submitted to Chevron for review only 30 days before it is filed or published, with no further delays permitted. This provision indicates that more rigorous university attention to legal contracting with industry can result in research alliances with industry sponsors that are more respectful of the university's culture and its academic, education, and public responsibilities. By way of comparison, Chevron's agreement with Colorado School of Mines allows student theses to be delayed by up to 365 days.

But it is important to note that the agreement does contemplate a much closer relationship between Chevron and the individual labs than is customary in academia, with no additional contractual student protections. This includes the appointment of Chevron personnel to Texas A&M's academic labs, which could cause students to devote more time to Chevron's commercial research needs, and less time to aspects of their own education (teaching, class work, personal research projects) than is appropriate.[6]

The agreement gives Chevron strong, exclusive commercial licensing rights. If Chevron wishes to obtain an exclusive license, the agreement states that the sponsor may take up to one year from the time that Texas A&M formally discloses the intellectual property before it has to make a final decision about whether it wants to exercise this exclusive licensing option. And if Chevron obtains an exclusive license, all royalty payments paid back to Texas A&M University are automatically capped within a predetermined range. This arrangement almost certainly puts Texas A&M at a disadvantage. Forecasting a reasonable royalty rate before a research project has even been funded is risky because it is extremely difficult at this early stage in the process to estimate what a given invention will actually be worth. As such, Chevron may be able to low-ball the royalty rate, based on the uncertainty involved. The criteria listed in the agreement for making this royalty rate determination also favors Chevron (see Question #14 below for details).

Finally, all the university parties to this BioEnergy Alliance agreement are obligated to offer Chevron first-refusal rights for a nonexclusive license to "any Background Intellectual Property" that is necessary to complete work on a specified research project. By definition, this "Background IP" consists of research that was developed by university investigators, prior to the formation of the BioEnergy Alliance alliance, and not financed by Chevron. The agreement further grants Chevron a generous 50 percent of any royalties earned on project technology that gets commercialized by any third parties to whom Texas A&M has licensed the technology, up to 200 percent of the total funding Chevron has provided under the agreement.

The agreement contains one section designed to protect the university's commitment to broad knowledge sharing and academic use. This section states that Texas A&M and its academic divisions are entitled to use project research for "internal use, internal research, testing and teaching purposes;" they are also free to grant nonexclusive licenses to project results to third parties outside the alliance "for research and educational purposes," not commercial purposes. This language safeguards the right of researchers at Texas A&M and other outside research institutions to use the project's discoveries, reagents, tools, and methods for purely academic and noncommercial purposes, including the independent verification of published research results, which is a critical academic duty. As such, this section of the agreement stands out relative to most of the other university-industry alliance agreements reviewed in this report.

Detailed contract review

REVIEW QUESTION #1 University autonomy

Does the university side retain majority control of the alliance's central governing body?

No

The agreement identifies only one governing body charged with administering the research partnership—the "Joint Management Committee," which is "comprised of representatives from [Texas A&M] and [Chevron]."[7] The agreement provides no further details on the numerical composition of this committee or its decision-making structure, except to say that all research decisions are made by "agreement," thus allowing Chevron to exercise strong managerial as well as financial control.

REVIEW QUESTION #2 Impartial peer review

Does the agreement require all faculty research projects to be selected using impartial peer review?

No

Peer review is never discussed.

REVIEW QUESTION #3 Transparency

Is the process for submitting faculty research applications fully transparent?

No

The agreement offers precious few specifics on how the partnership's research priorities will be shaped, how faculty will apply for funding, or how final research projects will be selected.

Protection of academic publication rights

REVIEW QUESTION #4

Is the university's right to publish protected?

Yes

The agreement says the "BioEnergy Alliance shall have the right to publish and disseminate information derived from the Research Project."[8] But the agreement does not affirm that Chevron may not interfere with the content of these publications, even it finds the results undesirable.

Protection of academic publication rights

REVIEW QUESTION #5

What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?

90 days

Texas A&M must supply Chevron with proposed publications or proposed presentations 30 days prior to publication or the presentation date. After receiving copies, Chevron may request an additional 60-day delay "in order to protect the potential patentability of any inventions described therein." If Chevron does not respond to Texas A&M's disclosure of a publication within 60 days, then Texas A&M is free to make the proposed information public.[9]

Protection of academic publication rights

REVIEW QUESTION #6

Does this publication delay accord with recommended federal limits?

No

The National Institutes of Health and other federal agencies recommend academic-publication delays of no more than 30-60 days, which is considered sufficient time for the industry sponsor to file a provisional patent and/or vet any confidential proprietary information.[10] But the agreement makes an important exception for student theses, which does conform to federal standards, and provides additional protection for students. Chevron's 60-day publication delay does not apply to "the filing or publication of any student thesis dissertation."[11] Thus, a student thesis has to be submitted to Chevron only 30 days before it is filed or published, with no further delays permitted.

It is important to note that the agreement does contemplate a much closer relationship between Chevron and the individual labs than is customary in academia, with no additional contractual student protections. This includes the appointment of Chevron personnel to Texas A&M's academic labs, which could cause students to devote more time to Chevron's commercial research needs, and less time to aspects of their own education (teaching, class work, personal research projects) than is appropriate.[12]

REVIEW QUESTION #7

Are there additional confidentiality restrictions?

Protection of academic publication rights

Yes

Confidential information supplied by Chevron must be protected; it must also be kept confidential for five years.[13]

REVIEW QUESTION #8

Does the industry sponsor substantially define the alliance's overarching research agenda?

Degree of industry control over the academic research agenda

Yes

The agreement terms allow Chevron to exert strong influence over the entire academic research alliance. The alliance's main governing body, the "Joint Management Committee," which is composed of Texas A&M and Chevron representatives, must agree on all the faculty research projects approved for funding. The agreement—like the other Chevron agreements reviewed in this report—lacks any specifics regarding the numerical composition of the JMC, the voting structure of the JMC, and the criteria and methods of selection that the JMC members will use to evaluate faculty research projects and award funding. This absence of detail or specificity regarding the research alliance's general management does not favor, or protect, the academic interests of Texas A&M at all; it leaves the door open to disproportionate de facto control by the sponsor, Chevron.

REVIEW QUESTION #9

Which parties set the alliance's research priorities each new grant round?

Degree of industry control over the academic research agenda

Chevron & Texas A&M

The agreement says the Joint Management Committee (composed of representative from Chevron and Texas A&M) is to "convene periodically…. to discuss the identification of research projects, to provide comprehensive oversight of the ongoing research activities, and to discuss new research initiatives…."[14] But the agreement provides inadequate detail on how this decision-making process works; as such, disproportionate power is almost certainly wielded by Chevron. Either party may propose research projects, but the projects that get funded are selected by consensus.[15]

REVIEW QUESTION #10

Does the university retain majority control over the selection of academic research projects?

Degree of industry control over the academic research agenda

No

See discussion for Question #9 above.

Degree of industry control over the academic research agenda

REVIEW QUESTION #11

Does the industry sponsor have to approve all final research awards?

Yes

The agreement clearly states both the Texas A&M and Chevron (through the Joint Management Committee) must reach "agreement" on all research projects approved for funding. No academic research will be funded without Chevron's final approval.[16]

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #12

Exclusive commercial rights: On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?

Ranking: 9

Our outside legal experts ranked this agreement a 9 for giving extremely strong exclusive licensing rights to the industry sponsor. If Chevron wishes to obtain an exclusive license to any faculty invention developed with sponsored funding, it may do so within a predetermined range of royalty rates. The agreement states that Chevron may also take up to one year from the time that Texas A&M formally discloses the intellectual property before it has to make a final decision about whether it wants to exercise this exclusive licensing option, thus giving Chevron de facto, monopoly control over all the alliance's research for one year without any outside commercial competition. Texas A&M and Chevron are bound to enter into good faith negotiations concerning Chevron's acquisition of an exclusive license, which should be concluded within 120 days of Chevron's exercise of the option. These negotiations may be extended upon agreement of the parties.[17]

In addition to this exclusivity option, Chevron enjoys a nonexclusive, worldwide, royalty-free license to all patented project materials (provided Chevron pays for patenting costs). If the project generates any copyrightable material, Chevron would appear to get an automatic nonexclusive license.[18]

The agreement further states that all the university parties to the agreement are obligated to offer Chevron first refusal rights for a nonexclusive license to "any Background intellectual property" that is necessary to complete work on a specified BioEnergy Alliance research project. By definition, this "Background IP" consists of research that was developed by university investigators prior to the formation of the BioEnergy Alliance and not financed by Chevron.[19]

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #13

Licensing to multiple commercial users: On a scale of 1 to 10, Is the university free to license project research nonexclusively to other outside commercial entities?

Ranking: 2

Our outside legal experts ranked this agreement a 2 for the very limited flexibility it gives Texas A&M University and its various divisions to determine if broader dissemination of research results (through a nonexclusive license to multiple commercial entities) would enhance the use and value of its academic technology.

If Chevron chooses to exercise its option to obtain an exclusive license after its maximum one-year, de facto period of exclusive commercial control then Texas A&M is foreclosed from granting a nonexclusive license for commercial purposes. But there is an important exception made for academic sharing and use, which is certainly noteworthy (see Question #15 below).

REVIEW QUESTION #14

Royalty and other intellectual property advantages: Does the industry partner enjoy special royalty and intellectual property terms?

Intellectual property ownership and sharing of academic knowledge

Yes

If Chevron wishes to obtain an exclusive license then all royalty payments paid back to Texas A&M University are automatically capped within a predetermined range. This arrangement almost certainly puts Texas A&M at a disadvantage. Forecasting a reasonable royalty rate, before a research project has even been funded, is risky; it is extremely difficult, at this early stage in the process, to estimate what a given invention will actually be worth. As such, Chevron may be able to low-ball the royalty rate based on the uncertainty involved. According to our outside legal examiners, the criteria listed in the agreement for making this royalty rate determination also favor Chevron.[20]

Finally, the agreement grants Chevron a generous 50 percent of any royalties earned on project technology that gets commercialized by any third parties to whom Texas A&M has licensed the technology, up to 200 percent of the total funding Chevron has provided under the agreement.

REVIEW QUESTION #15

Academic sharing: On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, noncommercial inquiry?

Intellectual property ownership and sharing of academic knowledge

Ranking: 7

This agreement's intellectual property provisions grant Chevron strong exclusive commercial rights to project results. But the agreement also contains one exception designed to protect the university's commitment to broad knowledge sharing and academic use: Texas A&M is free to grant nonexclusive licenses to project results "for research and educational purposes," although it is careful to emphasize that these licenses must not be used "for commercial purposes or the commercial benefit of third parties."

This language admirably safeguards the right of researchers at Texas A&M and other outside research institutions to use the project's discoveries (including technologies, reagents, tools, and methods) for academic research purposes, including the independent verification of published research results.[21] The agreement further states that project research may be used for "internal use, internal research, testing and teaching purposes" by either Chevron or Texas A&M, free of charge.[22]

This is extremely important. More than 50 U.S. universities are now signatories to a high-profile statement of principles, issued in March 2007, titled "In the Public Interest: Nine Points to Consider in Licensing University Technology," whose first principle asserts that "universities should reserve the right to practice licensed inventions and to allow other non-profit and governmental organizations to do so" in all their licensing agreements signed with private industry. The statement further explains that this is critical for the purpose of "preserving the ability of all universities to perform research, ensuring that researchers are able to publish the results of their research in dissertations and peer reviewed journals and that other scholars are able to verify published results without concern for patents."[23]

Management of conflicts of interest

REVIEW QUESTION #16

Does the agreement call for management of conflicts of interest related to the alliance?

No

Not discussed.

Management of conflicts of interest

REVIEW QUESTION #17

Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?

No

Not discussed.

Appendix ten

Detailed contract review

Advanced Energy Consortium

University of Texas at Austin, Rice University

&

Ten major energy companies: Baker Hughes Inc., BP PLC's BP America Inc., ConocoPhillips Co., Halliburton Energy Services Inc., Marathon Oil Co., Occidental Petroleum Corp.'s Occidental Oil and Gas Corp., Petroleo Brasileiro SA, Schlumberger Ltd.'s Schlumberger Technology Corp., Royal Dutch Shell Group's Shell International E&P, and TOTAL SA

Amount

$30 million over three years ($1 million per company per year).[2]

Contract term

Initially, a three year term (January 2008 to January 2010), with a renewal option in the second year for another two years. The consortium is still ongoing and continues to grow in new members. According to UT Austin's Scott Tinker the initial term for AEC member companies has been increased to four years, until 2011, but this is not stated in the AEC contract provided to us. See this endnote for details.[3]

Public financing

UT Austin's Scott Tinker reports no public funding is involved.[4]

Brief project description

On January 15, 2008, the University of Texas at Austin and Rice University[5] launched the Advanced Energy Consortium, an academic-industry partnership originally financed by seven major energy companies to research and develop micro- and nanotechnology applications to increase oil and gas production.[6] As of August 2010, the AEC has ten member companies, the most recent being Petroleo Brasileiro (also known as Petrobras).[7]

The formation of AEC required special approval from the Department of Justice to verify that AEC did not violate U.S. antitrust law, which the department granted in August 2007 (see below for additional details).

According to UT Austin: "The AEC currently funds over 36 research projects at more than 25 universities, primarily in the U.S. but also globally. Research is precompetitive and focused on basic chemistry, physics, biology and engineering problems in micro- and nanotechnology science and engineering. It is hoped that such research will eventually lead to the creation of sensors to increase oil and gas production, although such development and commercialization will not be done by the AEC."[8]

Method for obtaining the research contract, and CAP's request for university comments

We obtained this AEC agreement (with some of the Intellectual Property portions redacted) from UT Austin through a formal, state-level public records act request, filed by this report's author on November 9, 2007. UT Austin's public information office provided a copy of the contract on January 20, 2008.

In July 2010, CAP invited UT Austin's AEC to provide written comments and updates on the "Major Findings" contained in this appendix based on the analysis at the time, which were drawn primarily from an independent, expert, legal analysis of the AEC agreement (for details please see the methodology box on pages 14 and 51 of the main report). UT Austin submitted suggested revisions to this report's Major Findings section on August 13, 2010, and indicated that no formal legal updates have been made to the contract.[9] As such, this analysis is current.

For this report, we analyzed Advanced Energy Consortium's agreement with Schlumberger Technology Corp., which is identical to the agreements that AEC signed with the nine other industry partners.

It should be noted that our external legal reviewers' scored rankings for several of the Contract Review Questions #1-17 below are necessarily subjective because interpretations of law and other intellectual property terms cannot be strictly quantified. Also, the contract provisions have not to our knowledge been tested in a court of law, so their "legal" meaning has not been definitively established.

A Special Note Regarding This Agreement's Hybrid Structure:

At first glance, the AEC agreement looks like a traditional academic-industry sponsored research agreement because it names two principal faculty investigators and the research projects they are being funded to perform.[10] But the alliance is a multiyear, research collaboration—the Advanced Energy Consortium—forged between UT Austin's Bureau of Economic Geology (with Rice University as a partner) and ten member companies.[11] Each of these companies has its own Sponsored Research Agreements with individual academic investigators, focused on one targeted research area—micro- and nanotechnology sensors to increase oil and gas production—making this alliance more of a hybrid cross between an Industrial Research Consortium and a Strategic Corporate Alliance.[12]

Overview commentary: Major findings

This agreement is explicit that AEC's university-based research is industry driven: "The structure of the AEC is an industry-driven organization overseen and directed by a Member Company Board of Management."[13] The agreement also notes that AEC's overarching research agenda—to develop micro- and nanotechnology applications to increase oil and gas production—was arrived at through "extensive analysis and Member Company input."[14]

This is clearly reflected in the AEC's management structure: UT Austin and Rice University do not have any voting authority on AEC's main governing body, the "Board of Management." According to the original seven-member AEC agreement we reviewed, which has not changed, the Board of Management is composed of seven voting member seats and all seven are held by the member companies; there is also one nonvoting *ex officio* seat reserved for UT Austin, held by the AEC's current director, Scott Tinker. Now that several new companies have joined the AEC, each company has presumably also been awarded one seat on the management board, likely giving these major energy firms ten of the ten voting member seats.

According to an interview in a geology industry newsletter with Scott Tinker, director of the Bureau of Economic Geology at UT Austin, which administers the AEC alliance: "The consortium was formed because none of [the industry members] are deeply engaged in nanotech currently, and they can see the potential upside—in improved reserve management and a significant upside in enhanced recovery."[15] Nanotechnology involves engineering at the scale of atoms and molecules. Tinker says it is a positive sign that industry is "collaborating to do pre-competitive research" and is willing to invest in more long-term, academic-based research.[16] The central goal of most of the AEC's research is to develop useful applications of nanotech for the oil and gas industry, especially new nanotech sensors that could dramatically enhance oil and gas recovery.

The AEC agreement provides for the possible formation of a Technical Review Panel, composed of all the member-company representatives and at least four independent experts to review and "rate" faculty research projects.[17] Tinker says that "external reviewers were used to help evaluate each of the over 100 proposals received in initial response to two major AEC RFPs [requests for research proposals from university faculty], and have served very well to provide independent scientific input and autonomy into the AEC's research selection process." He also notes that "the evaluation of research projects is ongoing and considerably more rigorous than what is done in typical government funded programs, such as the NSF [National Science Foundation]."[18]

The NSF and other government agencies issue the vast majority of their research grants using independent, expert scientific peer review system, but our external legal experts found that under AEC's written agreement the formation of external technical review panels is not required or mandated for all faculty research idea submissions. What's more, under the agreement, the industry sponsors' own representatives are permitted to dominate these technical panels when and if they are formed. Tinker says this is a strength, noting that "the academic community took a bit of time getting used to this type of external interest [sponsor involvement], but faculty and students alike are now consistent in their praise for the process and appreciate the interest in their research."[19]

The research-application process is transparent and clearly spelled out in this agreement. UT Austin's Tinker emphasized in a separate email to CAP that "the AEC members have no say or influence in the outcome of the research, other than to provide feedback as

requested by the PIs [Primary Investigators]." Still, the AEC's research-selection and funding system described in the agreement is still heavily industry controlled, and this has a potentially enormous influence on which faculty scientists and which research approaches are supported by AEC. According to the agreement, the selection of faculty research proposals is handled primarily by a "Seed Grant Review Committee" composed of representatives from each of the member companies; technical review panels, when they are convened, are heavily industry controlled; and final research award decisions must be signed off on by the AEC Board of Management, which is controlled by the member companies. [See Review Questions # 1,2, and 10 for details.]

Our outside legal experts ranked this agreement a 9 for the unusually broad academic knowledge-sharing it preserves. This is because the alliance is a multi-industry research collaboration so greater knowledge-sharing is seen as an advantage and quite possibly a necessity. Unlike most of the other academic-industry alliances reviewed in this report, this agreement does not grant any of the ten industry sponsors automatic, exclusive licenses to consortium project technology. All the technology and inventions resulting from AEC's sponsored research belongs to UT Austin—even technology that is jointly developed with an industry sponsor. The AEC agreement states that UT Austin (and its technology transfer office) will be the principal overseer of all the intellectual property generated by the AEC. UT Austin is charged with administering this IP, and any of the proceeds that stem from it, per the terms of the contract.[20] This research may be licensed to third parties with the approval of the sponsors, who in turn share in any royalties. In this regard, AEC's "multi-sponsor" structure offers a degree of openness and knowledge sharing that is far more compatible with the university's traditional open science culture.

Some academics, such as Jim Tour, an AEC grant recipient and an award-winning nanotech researcher and professor of Chemistry at Rice University in Houston, welcome the idea of forging close university-industry collaborations to solve a formidable technological challenge—even if it is one designated by industry. In an interview published by the American Association of Petroleum Geologists, Tour noted that it will take some time for the AEC-funded scientists and researchers to develop practical oilfield applications in nanotechnology. "A lot of it depends on what the consortium [industry] partners do," Tour explained. "If they leave us academic types alone, it's going to take a long time." Tour admits that he knows a lot about nanotechnology, but little about oil field work and petroleum geology. "A lot of guys who've gotten funding [from AEC] are like me," he noted. "If [the AEC member companies are] willing to come up to bat and to help us and to stand beside us in the lab, it will go much faster," he said. "If they're going to leave us alone, it's not going to go very fast."[21]

Detailed contract review

REVIEW QUESTION #1

University autonomy

Does the university side retain majority control of the alliance's central governing body?

No

UT Austin does not have any voting authority on the AEC's main governing body—the "Board of Management." The BOM comprises one voting representative from each of the Member Companies, and one nonvoting UT member.[22]

UT Austin's Bureau of Economic Geology manages and administers AEC's research programs on behalf of the BOM. The BOM must approve all major functions carried out by AEC, including the selection of faculty research projects and grant awards. Also, according to the agreement: "The BOM provides the overall vision and technical program direction for the consortium, establishes advisory bodies as necessary, approves strategic and annual operating plans, and reviews progress of AEC activities."[23]

REVIEW QUESTION #2

Impartial peer review

Does the agreement require all faculty research projects to be selected using impartial peer review?

No

The agreement does provide for possible formation of a technical review panel, composed of member company representatives and at least four independent experts to review and "rate" faculty research projects.[24] This is clearly an attempt to inject some independent scientific opinion into AEC's research selection process, but because the formation of such technical panels is not required, and the industry sponsors' own representatives are allowed to dominate these panels, they do not constitute impartial peer review.

Some of the language in Appendix I of the agreement suggests that a technical review panel will be a regular element of the review, but elsewhere the agreement indicates the technical panels will be convened only at the discretion of the sponsors. Even if they are convened, these technical panels are strongly weighted toward the sponsors, and the industry sponsors on the BOM must approve all final research awards (see below for further discussion of the technical review panels).

Transparency

REVIEW QUESTION #3

Is the process for submitting faculty research applications fully transparent?

Yes

The faculty research application process is transparent and clearly spelled out, certainly a great deal more so than is true for many of the other agreements reviewed for this report. But the agreement allows for selection of faculty research projects and the awarding of funding to be heavily controlled by industry sponsors (see discussion under Question #2 above for details).

Protection of academic publication rights

REVIEW QUESTION #4

Is the university's right to publish protected?

Yes

The agreement provides that UT Austin "shall have final authority to determine the scope and content of any UT publications, subject to its obligations to not disclose [any of the Member Companies'] Confidential Information."[25]

Protection of academic publication rights

REVIEW QUESTION #5

What is the maximum publication delay permitted to allow the industry sponsor to remove proprietary information and/or file for patent protection?

75 days

The agreement requires that all publications be submitted to all of AEC's corporate sponsors 45 days in advance of publication; and each corporate sponsor has 45 days to review the publication for confidential information and patentable inventions. A member company may ask for an additional delay to protect proprietary information, however, according to the agreement, "in no event shall the delay exceed seventy-five (75) days" from the time that UT Austin gave notification of proposed publication.[26]

Protection of academic publication rights

REVIEW QUESTION #6

Does this publication delay accord with recommended federal limits?

No

The National Institutes of Health and other federal agencies recommend academic-publication delays of no more than 30-60 days, which is considered sufficient time for the industry sponsor to file a provisional patent and/or vet any confidential proprietary information.[27]

REVIEW QUESTION #7

Are there additional confidentiality restrictions?

Protection of academic publication rights

Yes

The agreement provides that UT Austin shall control publication, but this will be "subject to its obligations to not disclose [any of the Member Companies'] Confidential Information."[28]

REVIEW QUESTION #8

Does the industry sponsor substantially define the alliance's overarching research agenda?

Degree of industry control over the academic research agenda

Yes

The agreement is up front that AEC's university-based research is industry driven: "The structure of the AEC is an industry-driven organization overseen and directed by a Member Company Board of Management."[29]

The agreement also notes that AEC's overarching research agenda—to develop micro- and nanotechnology applications to increase oil and gas production—was arrived at through "extensive analysis and Member Company input."[30]

REVIEW QUESTION #9

Which parties set the alliance's research priorities each new grant round?

Degree of industry control over the academic research agenda

The ten industry sponsors

According to the agreement, 95 percent of AEC's budget is devoted to microsensors and nanosensors research, which the member companies identified in advance as their primary area of commercial interest.[31]

REVIEW QUESTION #10

Does the university retain majority control over the selection of academic research projects?

Degree of industry control over the academic research agenda

No

The agreement refers to AEC as an "industry-driven organization," and this holds true for the selection of faculty research proposals as well. Just as the overall governance of the AEC is controlled by the industry-sponsor representatives who control the BOM, the selection of faculty research proposals is handled primarily by a "Seed Grant Review Committee," also composed of representatives from each of the participating companies.

According to the agreement, this seed grant committee is "directed by" UT Austin's management team, but the industry-sponsor representatives formally appointed to this seed committee would appear to have the controlling votes, and thus the controlling authority,

just as they do on the BOM (although the voting structure is notably not spelled out).[32] This section of the agreement devoted to the seed grant committee explicitly affirms that the purpose of the AEC is to "sponsor leading-edge, pre-competitive research and development to drive advanced technology improvements to enhance the productivity and competitiveness of energy industry participants."[33]

After the seed grant committee makes its own recommendations on which faculty research proposals it wants to fund, these may be sent to a "Technical Review Panel" for scoring. But these expert reviews are not required: The agreement specifically states that the technical review panel "will be appointed at the request of the AEC Seed Grant Review Committee," which appears to be controlled by the industry sponsors.[34] If convened, this technical review panel will consist of four experts from outside the AEC (appointed by UT Austin) and one representative from each sponsoring company, providing only a small modicum of independent scientific opinion. The technical review panel's final scores for each faculty proposal are then sent back to the AEC seed grant committee for further review and ranking.[35] Final research awards must be approved by the BOM.

Degree of industry control over the academic research agenda

REVIEW QUESTION #11

Does the industry sponsor have to approve all final research awards?

Yes

According to the agreement, the BOM, controlled by the AEC's member company representatives, has final say over which academic research proposals will be awarded funding.

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #12

Exclusive commercial rights: On a scale of 1 to 10, does the industry sponsor enjoy strong exclusive commercial rights to project results?

Ranking: 2

Our outside legal experts ranked this AEC agreement a 2, due to the very limited exclusive commercial licensing rights it grants to the industry sponsors. The agreement does not grant any of the industry sponsors automatic, exclusive licenses to project technology. In this regard, the AEC functions less like a Strategic Corporate Alliance and more like a shared, collaborative Industrial Research Consortium.

All the technology and inventions resulting from AEC's sponsored research belongs to UT Austin, even technology that is jointly developed with an industry sponsor.[36] This is noteworthy, as a growing number of academic-industry agreements do not allow the university to retain ownership of faculty inventions. UT Austin's technology transfer office manages this intellectual property according to the terms of the contract on behalf of all the participants.

After a project invention is disclosed to the BOM, a majority of AEC's sponsoring companies must approve to pay for UT Austin to file for patent protection on their behalf. If this vote to pay for patent protection fails, then UT may choose to patent the invention at its own expense.[37]

If the industry representatives who sit on the BOM grant their approval, UT Austin may also exclusively license AEC technology to a third party. The royalties resulting from such licensing are to be shared between the industry sponsors, UT, Rice University, and other university participants. The approval of the BOM on this matter may not be "unreasonably withheld."[38]

REVIEW QUESTION #13

Licensing to multiple commercial users: On a scale of 1 to 10, Is the university free to license project research nonexclusively to other outside commercial entities?

Intellectual property ownership and sharing of academic knowledge

Ranking: 8

Our outside legal experts ranked this AEC agreement an 8 for the considerable flexibility it gives the university side to license project research nonexclusively. But the industry partners still retain considerable power over exclusive licensing decisions according to the agreement.

In this agreement, the industry sponsors do not receive automatic exclusive licenses that would block other outside companies from accessing the AEC's academic inventions and technology. This is significant because it grants the university partners, in this case UT Austin , Rice University, and any other academic collaborators, far more freedom to broadly disseminate AEC research and inventions. Because the only automatic licenses issued to the industry sponsors are nonexclusive, this would appear to give UT Austin and Rice University considerable freedom to license project research nonexclusively to outside firms.

The agreement states that, whether or not the industry sponsors pay for patenting, they are automatically granted an "irrevocable, worldwide, royalty free, perpetual, paid-up, non-exclusive license" for "internal, non-commercial use."[39] If the sponsors elect to pay for patent costs, this license is for commercial use as well.[40] Either of these licenses may be extended to affiliates of the AEC's member companies, or to an outside oil and gas exploration company provided one of the AEC member companies owns at least 25 percent of the firm.[41] These licensing rights do not extend to technology developed after a member company has stopped participating in the AEC.[42]

However, UT Austin is authorized to license project technology exclusively, only if the BOM members grant approval.[43] The approval of the BOM on this matter may not be "unreasonably withheld."[44]

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #14

Royalty and other intellectual property advantages: Does the industry partner enjoy special royalty and intellectual property terms?

Yes

The agreement states that all of the automatic, non-exclusive licenses issued to AEC's industry sponsors (whether commercial or noncommercial) are royalty free.[45]

Additionally, if any "background" technology developed or owned by UT (and not funded by the AEC's industry sponsors) is necessary to "exploit" AEC sponsored research, then UT is required to grant a license to that background technology on "reasonable and most favored terms" by separate agreement.[46]

Intellectual property ownership and sharing of academic knowledge

REVIEW QUESTION #15

Academic sharing: On a scale of 1 to 10, can project results be shared both inside and outside the university for purely academic, noncommercial inquiry?

Ranking: 9

Our outside legal experts ranked this AEC agreement a 9 for the unusually broad knowledge-sharing and academic-use rights it preserves. This is quite exceptional. The agreement states that UT is allowed to use any of AEC's nonexclusively licensed technology for "teaching, research or other [UT] purposes."[47] Presumably, "other purposes" would include the dissemination of AEC research and technology to other outside academics at outside institutions. According to the agreement, this sharing of AEC technology is anticipated to grow so extensive as to create joint inventions.[48] If a third party becomes a joint inventor, UT Austin is to use good faith efforts to ensure that AEC's core industry sponsors get royalty rights in the invention.[49] But it is not entirely clear in this agreement how these academic-use provisions will apply to inventions developed at Rice University, or any of the many other universities that are expected to be recipients of AEC funding.

Management of conflicts of interest

REVIEW QUESTION #16

Does the agreement call for management of conflicts of interest related to the alliance?

No

Not discussed with regards to UT Austin, Rice University, or the many other U.S. universities that have been granted industry sponsor funding already through the auspices of AEC.

REVIEW QUESTION #17

Does the agreement prohibit conflicts of interest on alliance governing bodies, and committees charged with evaluating and selecting faculty research proposals?

No

Not discussed with regard to UT Austin, Rice University, or the many other U.S. universities that have been granted industry-sponsor funding already through the auspices of AEC.

Endnotes

Preface endnotes

1 Kate Gordon, Julian L. Wong, and J.T. McLain, "Out of the Running? How Germany, Spain, and China Are Seizing the Energy Opportunity and Why the United States Risks Getting Left Behind" (Washington: Center for American Progress, March 2010), available at http://www.americanprogress.org/issues/2010/03/out_of_running.html; Roland Berger, "Clean Economy, Living Planet: Building strong clean energy technology industries" (Amsterdam: WWF-Netherlands, November 2009), available at http://assets.panda.org/downloads/rapport_wwf_cleaneconomy_inter- national_def.pdf.

2 Intersociety Working Group, "AAAS Report XXXIV: Research & Development FY 2010" (Washington: American Association for the Advancement of Science, 2009), data available at http://www.aaas.org/spp/rd/rdreport2010/tbli04.pdf; National Science Foundation, Division of Science Resources Studies, "Federal Funds for Research and Development, Detailed Historical Tables: Fiscal Years 1951–2002" (Arlington, VA: National Science Foundation, August 2003), calculation based on data available at http://www.nsf.gov/statistics/nsf03325/pdf/hista.pdf.

3 Michael Ettlinger and Michael Linden, "Deal with It: A Guide to the Federal Debt and Deficit" (Washington: Center for American Progress, September 2009), available at http://www.americanprogress.org/issues/2009/09/deal_with_it.html.

4 National Science Foundation, "Science and Engineering Indicators, 2010," Chapter 5, Academic Research and Development, available at: http:// www.nsf.gov/statistics/seind10/c5/c5s1.htm ; Denis O. Gray, Mark Lindblad, and Joseph Rudolph, "Industry-University Research Centers: A Multivariate Analysis of Member Retention," Journal of Technology Transfer, 26 (3) (2001): 247-254. The authors write: "According to research by Cohen and his colleagues (1994), industry-university research centers in the U.S. had research expenditures of $2.53 billion, accounting for roughly 15 percent of university research funding. Add to this support for traditional cooperative activities like consulting and contract research and industry-sponsored and industry-leveraged government research probably accounts for 20 percent to 25 percent of university R&D" (p. 247). According to the National Science Foundation's "Science and Engineering Indicators: 2010": "Universities and colleges historically have been the main performers of U.S. basic research, an estimated 56 percent of total U.S. basic research in 2008. The federal government has been the prime source of basic research funding, accounting for 57 percent of the nation's total in 2008." Available at http://www.nsf.gov/statistics/seind10/c4/c4h.htm.

5 American Association for the Advancement of Science R&D Budget and Policy Program, "American Recovery and Reinvestment Act (ARRA)" (Washington: American Association for the Advancement of Science, October 2009), available at: http://www.aaas.org/spp/rd/ARRA/sum_arra.pdf. American Association for the Advancement of Science, press release, "R&D Funding Update on the 2009 Omnibus Bill - Congress Finalizes Omnibus Budget for FY2009 Increases Across All Major R&D Agencies," March 20, 2009, available at www.aaas.org/spp/rd/FY2009update.pdf.

Introduction and summary endnotes

1 This report's author and investigators were able to identify at least 55 large-scale energy-related research agreements, ranging from $1 million to $500 million that were negotiated over the past decade alone. These contracts, negotiated between 35 leading research universities and dozens of companies in the oil, gas, coal, electricity, auto, and agriculture sectors, are likely only a small subset of the total number of similar agreements currently in existence, many of which are protected by limitations on access to university as well as industry data. This list of industry-sponsored research grants and gifts (worth $1 million or more) awarded to U.S. universities for the performance of energy-related research is certainly far from comprehensive, because there is no centralized database for tracking individual university-industry grants and few U.S. universities will make comprehensive listings of their industry research grants public. The energy industry also divulges few details concerning its own R&D expenditures. As such, in developing this list of 55 deals, this report's author and investigators relied heavily on press releases (from universities, companies, and the Department of Energy); news stories; company annual reports (where larger deals are sometimes mentioned); and other public documents and databases (including Google, ABI/INFORM Global [ProQuest], and LexisNexis Academic). Each of these sources is biased in favor of mentioning only larger-size university-industry research grants and gifts. Therefore, this analysis fails to encompass the numerous smaller-size research grants that companies routinely award to university faculty.

2 President Barack Obama, "Remarks by the President at the National Academy of Sciences Annual Meeting," delivered April 27, 2009, available at http://www.whitehouse.gov/the_press_office/Remarks-by-the-President-at-the-National-Academy-of-Sciences-Annual-Meeting.

3 Personal communication from Doug Hooker, Division Director for Renewable Energy Projects Division, Golden Field Office, and Carolyn Elam, Golden Field Office solar activities manager, January 22, 2008. According to the office's website: "The mission of the Golden Field Office is to support DOE's Office of Energy Efficiency and Renewable Energy through research and development partnerships, outreach to stakeholders nationwide to further the use of EE technologies, and laboratory contract administration." Available at http://www.eere.energy.gov/golden/About_The_Office.aspx.

4 Personal communication from Doug Hooker and Carolyn Elam, January 22, 2008.

5 Written comments from John M. DeCicco, an expert on transportation and the environment and a senior lecturer at the School of Natural Resources and the Environment at the University of Michigan, December 13, 2009.

6 National Science Foundation, "Science and Engineering Indicators, 2010," Chapter 5, Academic Research and Development, available at: http:// www.nsf.gov/statistics/seind10/c5/c5s1.htm

7 Denis O. Gray, Mark Lindblad, and Joseph Rudolph, "Industry-University Research Centers: A Multivariate Analysis of Member Retention," Journal of Technology Transfer, 26 (3) (2001): 247-254. The authors write: "[A]ccording to research by Cohen and his colleagues (1994), industry-university research centers in the U.S. had research expenditures of $2.53 billion, accounting for roughly 15 percent of university research funding. Add to this support for traditional cooperative activities like consulting and contract research and industry-sponsored and industry-leveraged government research probably accounts for 20 percent to 25 percent of university R&D" (p. 247).

8 Research by Derrin Culp. Five-year revenue and profit averages for the 2003-2007 period were derived from company financial reports available at www.bp.com.

9 Research by Derrin Culp. Five-year revenue and profit averages for the 2003-2007 period were derived from company financial reports available at www.bp.com. Percentages represent $8 billion divided by 10 times these five-year averages.

10 Gregory F. Nemet and Daniel M. Kammen, "U.S. Energy Research and Development: Declining Investment, Increasing Need, and the Feasibility of Expansion," *Energy Policy* 35 (1) (2007): 752, available at www.iaee.org/en/students/best_papers/Gregory_Nemet.pdf. For the 2.6 percent figure representing U.S. industry as a whole, see BEA, 2004; Wolfe, 2004, referenced in Nemet and Kammen's article.

11 Chevron ad, "Human Energy," *New Yorker*, October 15, 2007.

12 BP ad, "Beyond Petroleum," *New Yorker*, December 10, 2007.

13 ExxonMobil ad, "The Global Climate and Energy Challenge," *New York Times*, February 6, 2003. The ad, in part, reads: "[T]oday there is a lively debate about ... the climate's response to the presence of more greenhouse gases in the atmosphere." For additional discussion of this controversy, see: Jennifer Washburn, "Stanford's Deal With Exxon Mobil Raised Concerns," *Sacramento Bee* editorial page, April 8, 2007.

14 Merrill Goozner, "Big Oil U." (Washington: Center for Science in the Public Interest, 2008), available at http://www.cspinet.org/reports/index.html.

15 Data analysis performed by Derrin Culp. In the referenced graph and comments, all data have been expressed as 2006 constant dollars based on current OMB GDP deflators. Sources and methods: James J. Dooley, "U.S. National Investment in Energy R&D: 1974-1999," Battelle Memorial Institute, July 2001, p. 9; and G.F. Nemet and D. M. Kammen, "U.S. Energy Research and Development: Declining Investment, Increasing Need, and the Feasibility of Expansion," Energy Policy 35 (1) (2007), pp. 746-755, U.S. Energy Research and Development Data, updated 28 March 2006, available at http://rael.berkeley.edu/RandD_Nemet_2006.html. These sources provide private energy R&D investment; In the case of Dooley, the data are in nominal and 1995 constant dollars for 1974-1999, in the case of Nemet and Kammen, the data are in 2002 constant dollars for 1985-2003. The private data series is derived from Dooley for the period 1974-1984; the average of the two sources for 1985-1999; and Nemet and Kammen for 2000-2003. Values for 2004-2006 come from email correspondence between Daniel Kammen and Derrin Culp.

16 Research and graph prepared by Derrin Culp. Source and methods: James J. Dooley; G.F. Nemet and D. M. Kammen (cited above).

17 Research by Derrin Culp. Source: Annual reports and supplements, SEC filings and financial and operating information, readily available on each company's website.

18 Research and graph prepared by Derrin Culp. Sources: Company annual reports, SEC filings, and statements of operations.

19 Research, data analysis, and graph by Derrin Culp. For sources and methods, see graph on page 11, and endnote 21 below.

20 Research by Derrin Culp. Source: Office of Management and Budget, Fiscal Year 2008 Budget, Historical Tables, Table 9.8, "Composition of Outlays for the Conduct of Research and Development: 1949-2008."

21 Research, data analysis, and graph by Derrin Culp. Sources and methods: (1) James J. Dooley, "U.S. National Investment in Energy R&D: 1974-1999," Battelle Memorial Institute, July 2001, p. 9; (2) G.F. Nemet and D.M. Kammen, "U.S. Energy Research and Development: Declining Investment, Increasing Need, and the Feasibility of Expansion," Energy Policy 35, 1 (2007), pp. 746-755, U.S. Energy Research and Development Data, updated March 28, 2006, available online; and (3) K.S. Gallagher and others,"DOE Budget Authority for Energy Research, Development, and Demonstration Database," Energy Technology Innovation Project, John F. Kennedy School of Government, Harvard University, 2007, available at http://belfercenter.ksg.harvard.edu/publication/3237/doe_budget_authority_for_energy_research_development_and_demonstration_database.html?breadcrumb=%2Fpublication%2F2602%2Fdoe_budget_authority_for_energy_research_development_and_demonstration_database; Excel spreadsheet data available at http://belfercenter.ksg.harvard.edu/files/FederalEnergyTechRDSpending1978-2008REQUEST_02_12_07.xls. Dooley provides public R&D investment for 1974-1999 in nominal and 1995 constant dollars; Nemet and Kammen provide values for 1974-2005 in 2002 constant dollars. All data have been expressed as 2006 constant dollars based on current OMB GDP deflators. For 1974-1999, the values are an average of the two sources. For 2000-2005, the values are from Nemet and Kammen. For 2006 only, the value is from Source 3, above, Row 159.

22 Research by Derrin Culp. Source: Office of Management and Budget, Fiscal Year 2008 Budget Historical Tables, Table 9.8—Composition of Outlays for the Conduct of Research and Development: 1949–2008.

23 One meta-analysis, combining a wide array of studies, found that pharmaceutical industry-funded research was four times more likely to reflect favorably on a drug, compared with research not funded by industry. Another study found that scientific review articles on the effects of secondhand smoke exposure written by researchers with industry ties were 88 times more likely to find no harm, compared with articles penned by researchers with no industry ties. In published studies comparing different brands of cholesterol drugs head-to-head, the drug that comes out looking better is 20 times more likely to have been manufactured by the company funding the study. In the field of nutrition, David Ludwig, director of the obesity program at Children's Hospital Boston, analyzed 206 studies of milk, fruit juice, and soft drinks, and found that when a company sponsored studies of its own or a competitor's products, the results were four to eight times more likely to be favorable to the company's financial interests than studies funded independently. Sources in order: Joel Lexchin and others, "Pharmaceutical Industry sponsorship and Research Outcome and Quality: Systematic Review," *BMJ*, (2003):1167-1170, available at http://www.bmj.com/cgi/content/abstract/326/7400/1167; Deborah E. Barnes; Lisa A. Bero, "Why Review Articles on the Health Effects of Passive Smoking Reach Different Conclusions," *Journal of the American Medical Association*. 1998; 279(19): 1566-1570, available at http://jama.ama-assn.org/cgi/content/abstract/279/19/1566 ; L. Bero and others, "Factors Associated with Findings of Published Trials of Drug-Drug Comparisons: Why Some Statins Appear More Efficacious Than Others," *PLoS Med*, 2007, 4(6), available at http://www.plosmedicine.org/article/info:doi/10.1371/journal.pmed.0040184. (Also see the University of California San Francisco press release, "Drug Company Funding of Drug Trials Greatly Influences Outcome," June 4, 2007, available at http://pub.ucsf.edu/newsservices/releases/200705311)

24 The University and Small Business Patent Procedures Act, S. 414, 98th Cong. 1 sess (Government Printing Office, 1980), available at http://www.access.gpo.gov/nara/cfr/waisidx_02/37cfr401_02.html.

25 Anthony So and others, "Is Bayh-Dole Good for Developing Countries? Lessons from the U.S. Experience," *PLoS Biology*, Vol. 6, Issue 10, October 2008.

26 The number of patents issued to U.S. universities more than doubled between 1979 and 1984, and doubled again between 1989 and 1997. The number of universities with dedicated patenting and licensing offices increased from 25 in 1980 to 200 in 1990. Source: Richard R. Nelson, "Observations on the Post-Bayh-Dole Rise in University Patenting," in Maryann P. Feldman and Albert N. Link, eds., *Innovation Policy in the Knowledge-Based Economy* (New York: Association for Public Policy Analysis and Management, Kluwar Academic Publishers, 2001), p.165.

27 David C. Mowery and others, *Ivory Tower and Industrial Innovation: University-Industry Technology Transfer Before and After the Bayh-Dole Act* (California: Stanford University Press, 2004), pp. 176, 183-184. See also: Wesley M. Cohen and Richard R. Nelson, "Links and Impacts: The Influence of Public Research on Industrial R&D," pp. 1-23; and Ajay Agrawal and Rebecca Henderson, "Putting Patents in Context: Exploring Knowledge Transfer from MIT," pp.44-60, both in *Management Science*, 48 (2002): 1-23.

28 According to Anthony So, Bhaven Sampat, and others, in "Is Bayh-Dole Good for Developing Countries? Lessons from the U.S. Experience" (*PLoS Biology* 6 (10), (2008) :2078-2084), a recent econometric analysis using data on academic licensing revenues from 1998 to 2002 suggests that, after subtracting the high costs of patent management, net revenues earned by U.S. universities from patent licensing were "on average, quite modest" nearly three decades after Bayh-Dole took effect. This study concludes that "universities should form a more realistic perspective of the possible economic returns from patenting and licensing activities" (H. Bulut and G. Moschini, "U.S. Universities' Net Returns From Patenting and Licensing: A Quantile Regression Analysis," Center for Agricultural and Rural Development at Iowa State University Working Paper 06-WP 432, 2006, available at http://www.card.iastate.edu/publications/DBS/PDFFiles/06wp432.pdf). Similarly, the head of the technology licensing office at MIT (who formerly served as president of the Association of University Technology Managers) notes that "the direct economic impact of technology licensing on the universities themselves has been relatively small (a surprise to many who believed that royalties could compensate for declining federal support of research)... [M]ost university licensing offices barely break even." Original sources: H. Bulut and G. Moschini, "U.S. Universities," and L. Nelsen, "The Rise of Intellectual Property Protection in the American University, 1998, *Science* 279: 1460-1461.

29 Derek Bok, *Universities in the Marketplace: The Commercialization of Higher Education* (Princeton: Princeton University Press, 2003); Daniel S. Greenberg, *Science for Sale: The Perils, Rewards, and Delusions of Campus Capitalism* (Chicago: University of Chicago, 2007); Sheldon Krimsky, *Science in the Private Interest*, Lanham, MD: Rowman & Littlefield Publishers, Inc., 2003; Jennifer Washburn, *University Inc.: The Corporate Corruption of Higher Education* (New York: Basic Books, 2005).

30 One meta-analysis, combining a wide array of studies, found that pharmaceutical industry-funded research was four times more likely to reflect favorably on a drug, compared with research not funded by industry. Another study found that scientific review articles on the effects of secondhand smoke exposure written by researchers with industry ties were 88 times more likely to find no harm, compared with articles penned by researchers with no industry ties. In published studies comparing different brands of cholesterol drugs head-to-head, the drug that comes out looking better is 20 times more likely to have been manufactured by the company funding the study. In the field of nutrition, one detailed analysis of 206 studies of milk, fruit juice, and soft drinks found that, when a company sponsored studies of its own or a competitor's products, the results were four to eight times more likely to be favorable to the company's financial interests than studies funded independently. Sources in order: Joel Lexchin and others, "Pharmaceutical Industry sponsorship and Research Outcome and Quality: Systematic Review," *BMJ*, 326 (2003):1167-1170, available at http://www.bmj.com/cgi/content/abstract/326/7400/1167; Deborah E. Barnes ; Lisa A. Bero, "Why Review Articles on the Health Effects of Passive Smoking Reach Different Conclusions," *Journal of the American Medical Association*. 279(19) (1998): 1566-1570, available at http://jama.amaassn.org/cgi/reprint/279/19/1566?maxtoshow=HITS=10hits=10RESULTFORMAT=fulltext=lisa+berosearchid=1FIRSTINDEX=0resourcetype=HWCIT; L. Bero and others, "Factors Associated with Findings of Published Trials of Drug-Drug Comparisons: Why Some Statins Appear More Efficacious Than Others," *PLoS Med*, 4(6) (2007), available at http://www.plosmedicine.org/article/info:doi/10.1371/journal.pmed.0040184. Also see the following University of California San Francisco press release, "Drug Company Funding of Drug Trials Greatly Influences Outcome," June 4, 2007, available at http://pub.ucsf.edu/newsservices/releases/200705311; L.I. Lesser and others, PloS *Med*. 4 (5) (2007).

31 According to one study, nearly 60 percent of agreements between academic institutions and life science companies required that university investigators keep information confidential for more than six months—considerably longer than the 30 to 60 days that NIH considers reasonable for the purpose of filing a provisional patent application. Source: D. Blumenthal and others, "Relationships Between Academic Institutions and Industry in the Life Sciences: An Industry Survey," *New England Journal of Medicine* 334: 1996, pp. 368-374. In a more recent survey of university geneticists and life scientists, one in four reported the need to honor the requirements of an industrial sponsor as one of the reasons for denying requests for post-publication information, data, or materials. Source: E.G. Campbell and others, "Data Withholding in Academic Genetics: Evidence from a National Survey," *Journal of the American Medical Association*, 287 (2002): 473-480. In a study of 44 industry-financed pharmaceutical trials approved by Denmark's regional scientific ethical committees in 1994 and 1995 that resulted in publication, Peter Gøtzsche of the Nordic Cochrane Centre in Copenhagen, Denmark, found that the industry sponsor either owned the data or was required to approve a manuscript before publication in 50 percent of the cases, although resulting papers often failed to note those restrictions. In 36 percent of the trials reviewed, the sponsor reserved the right to terminate the trial at any time. The study also assessed the first 44 industry-initiated trials that were approved in 2004, and in 61 percent of cases the sponsor either owned the data or had the right to approve the manuscript. Source: P.C. Gøtzsche and others, *Journal of the American Medical Association* 295 (2006): 1645–1646; also reported in Robin Mejia, "Taking the Industry Road," *Nature*, 453 (2008): 1138-1139. For more studies documenting how patenting, licensing, and industry relationships are encumbering open scientific exchange inside the university, see E.G. Campbell, K.S. Louis and D. Blumenthal, "Looking a Gift Horse in the Mouth: Corporate Gifts Supporting Life Sciences Research," *Journal of the American Medical Association* 279 (1998): 995-999; E.G. Campbell and others, "Data Withholding in Academic Medicine: Characteristics of Faculty Denied Access to Research Results and Biomaterials," *Res Pol* 29 (2000): 303-312.

32 A recent survey found that roughly two-thirds of academic medical centers hold equity interest in companies that sponsor research within the same institution. Source: Justin E. Bekelman and others, "Scope and Impact of Financial Conflicts of Interest in Biomedical Research: A Systematic Review," *Journal of the American Medical Association*, January 22, 2003. A study of medical school department chairs found that two thirds received departmental income from drug companies and three fifths received personal income from the drug industry. Source: Eric G. Campbell and others, "Institutional Academic–Industry Relationships," *Journal of the American Medical Association*, October 17, 2007. Both cited in Marcia Angell, "Drug Companies Doctors: A Story of Corruption," *New York Review of Books* 56,(1) (2009). Outside the field of biomedicine, financial conflicts of interest have been far less well examined; however, commercial financial relationships such as these have now become pervasive across many academic science and engineering disciplines.

33 Most recently, Sen. Charles Grassley (R-IA) has waged a concerted campaign to expose financial conflicts inside medicine, while also pushing for stronger public disclosure and regulation of commercial conflicts at U.S. universities and medical schools. Doug Lederman, "Drawing Lines on Conflicts of Interest," Inside Higher Ed.com, available at http://www.insidehighered.com/news/2009/06/11/conflicts. In May 2009, the National Institutes of Health announced that it was considering toughening conflict-of-interest regulations governing all research funded by the Public Health Service, much of which is allocated to U.S. university researchers; see Department of Health and Human Services, "Responsibility of Applicants for Promoting Objectivity in Research for Which Public Health Service Funding is Sought...; Request for Comments," *Federal Register*, 74, (88) (2008), available at http://edocket.access.gpo.gov/2009/E9-10666.htm. For a brief overview of past (largely failed) attempts by the U.S. Congress and other federal grant-making agencies to attach stricter conflict-of-interest regulations to federal research grants issued to American universities, see Jennifer Washburn, *University Inc.: The Corporate Corruption of Higher Education* (New York: Basic Books, 2005), pp.98-102; 133-136.

34 Out of a total of 35 requests for specific university-industry alliance agreements, the author issued 24 as formal "public record act" (PRA) filings, citing the actual public record laws applicable in each state. State-funded universities are normally subject to public record act laws, due to their receipt of substantial state funding. (The author made the remainder of our requests more informally via phone and email, often in conjunction with scheduled phone interviews with university staff and administrators.) State universities failed to fulfill or outright ignored more than half of these 24 legal public record act requests. Often documents were released only after substantial delays. In two instances, both the University of Houston and Texas A&M University forwarded our public record act requests (related to major academic-industry research alliances with General Motors and Chevron, respectively) all the way up to the Texas Attorney General's office. In both cases, the Texas AG's office required the universities to make those requested documents public; however, this resulted in roughly two- and four-month-long delays, respectively. Sources: Email correspondence between the author and officials at the University of Houston and Texas A&M University, pertaining to public record act requests that the author filed on November 9, 2007 and November 12, 2007 respectively.

35 Cornell University, ad hoc Faculty Committee on Strategic Corporate Alliances, "Statement of Principles and Best Practices," April 2004 draft, available from the author. See also Cornell University, "Faculty Statement of Principles & Best Practices Concerning Strategic Corporate Alliances," Fall 2005 Final Document, available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html. Please Note: To locate the final 2005 Cornell report, first click on "Strategic Corporate Alliances (Oct 2003)," then in the next window click on "Final Document."

36 Cornell University, "Cornell University Strategic Corporate Alliance Plan" (2003), available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html.

37 Stanford University, the Association of American Medical Colleges, and others, "In the Public Interest: Nine Points to Consider in University Licensing" (2007), available at http://www.autm.net/source/NinePoints/ninepoints_endorsement.cfm. See also Stanford University, "Guidelines Offered for Responsible University Licensing" (2007), available at http://news-service.stanford.edu/news/2007/march7/tech-030707.html. See also: Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register 64 (246) (1999): 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html. This National Institutes of Health guidance, which is addressed to all recipients of NIH grants (including U.S. universities), reads in part as follows: "The right of Recipients to retain title to inventions made with NIH funds comes with the corresponding obligations to promote utilization, commercialization, and public availability of these inventions. The Bayh-Dole Act encourages Recipients to patent and license subject inventions as one means of fulfilling these obligations. However, the use of patents and exclusive licenses is not the only, nor in some cases the most appropriate, means of implementing the Act. Where the subject invention is useful primarily as a research tool, inappropriate licensing practices [i.e. exclusive and/or unnecessarily restrictive licenses] are likely to thwart rather than promote utilization, commercialization and public availability of the invention."

38 It should be noted that the lone exception is the hybrid deal between Arizona State University and BP, where this question is not applicable, because the agreement does not call for any central governing body. See the "Detailed agreement review" for ASU in the appendix section for details.

39 The alliances we reviewed that clearly give the industry sponsor(s) full control over the main governing body are: (1) Iowa State University (ConocoPhillips); (2) Stanford University (ExxonMobil, Toyota, General Electric, Schlumberger); (3) University of Texas, Austin and Rice University (BP, Baker Hughes, ConocoPhillips, plus seven other firms); and (4) University of Colorado, Boulder plus three other public Colorado research institutions, C2B2 (22 private firms currently).

40 American Association of University Professors, *AAUP Policy Documents & Reports*, 10th Edition, 2006, published by American Association of University Professors, in Washington DC, and distributed by Johns Hopkins University Press, Baltimore MD. In particular see: "1940 Statement of Principles on Academic Freedom and Tenure" with subsequent interpretive comments (p. 3); "Statement on Corporate Funding of Academic Research (p. 130); Statement on Government of Colleges and Universities (p. 133); and "1915 Declaration of Principles on Academic Freedom and Academic Tenure, (Appendix, p. 291)

41 See the "Detailed agreement review" for ASU in the appendix section for details.

42 See the "Detailed agreement review" for Stanford University in the appendix section for details. Here we discuss Stanford's 2002 and revised 2008 GCEP agreements, as well as written comments provided to CAP in August 2010 by GCEP's director Sally Benson. For further information posted on GCEP's website, concerning its research selection procedures and current use of peer review, go to: http://gcep.stanford.edu/about/projectselectionprocess.html

43 Cornell University, "Faculty Statement of Principles Best Practices Concerning Strategic Corporate Alliances" (2005), p 21, available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html Please Note: To locate the final 2005 report, first click on "Strategic Corporate Alliances (Oct 2003), then at the next window click on "Final Document."

44 The only exceptions are the alliance at Arizona State University, where this question is not applicable, and the University of Texas at Austin, where the faculty research application process is well explicated.

45 The four that allow industry sponsors to fully set the research agenda each new grant cycle are:
Colorado Center for Biorefining and Biofuels (C2B2), headquartered at the University of Colorado, Boulder; the Iowa State University-ConocoPhillips alliance; the alliance between the University of Texas at Austin, Rice University, and ten industry partners; and the Georgia Tech-Chevron alliance.

46 U.C. Berkeley, Academic Senate, faculty committee letter/report, addressed to Prof. William Drummond, Chair of the Berkeley Division of the Academic Senate, dated November 2, 2007. In this letter, a Senate committee made up of five

faculty members (Ellwood, Hesse, Kutz, Villas Boas, Moore), informally known as the "Gang of Four-plus," reported back to the Chair, William Drummond, regarding eight stated areas of Academic Senate concern regarding the BP-funded Energy Biosciences Institute, p.1.

47 All eight of these agreements either directly or indirectly give the industry sponsor(s) full control over final faculty research project selection.. The only exceptions are the Arizona State University-BP alliance (where this question does not apply) and the BP-funded Energy Biosciences Institute (EBI), where there is some attempt to give the academic side majority control over the first stage of the evaluation process. However, the author found that this academic majority on the EBI's research evaluation committee is not guaranteed. What's more, many faculty appointed to sit on this committee have had clear conflicts of interest that should have disqualified them from evaluating other faculty research. (For details, see box on page 64 of the main report on Conflicts of Interest within the EBI).

48 The sole exception is the alliance between the Colorado School of Mines, a public university, and Chevron. This agreement states that publication rights are protected, but because the sponsor is permitted to delay publication for up to 365 days, including student theses, the university's true rights to timely academic publication are negated almost entirely.

49 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at: http://ott.od.nih.gov/policy/rt_guide_final.html. Under the heading "Prompt Publication," this National Institutes of Health guidance reads in part as follows: "Agreements to acquire materials for use in NIH-funded research are expected to address the timely dissemination of research results. Recipients should not agree to significant publication delays, any interference with the full disclosure of research findings, or any undue influence on the objective reporting of research results. A delay of 30-60 days to allow for patent filing or review for confidential proprietary information is generally viewed as reasonable."

50 The outside legal experts ranked seven of the 10 agreements a 3.5 or less for nonexclusive licensing, because the university partners have very little ability to license sponsored-research results nonexclusively to other outside commercial users.

51 It is unclear, however, whether the Colorado Center for Biorefining and Biofuels, or C2B2, is adhering to these more open licensing provisions because many aspects of the written agreements are not being followed, according to an interview with Alan Weimer, C2B2's executive director. (See Appendix 5 for the detailed agreement review).

52 As noted already, 60 percent of all university-based R&D is still financed by U.S. taxpayers, not by private industry. Source: National Science Foundation, "Science and Engineering Indicators, 2010," Chapter 5, Academic Research and Development, available at: http:// www.nsf.gov/statistics/seind10/c5/c5s1.htm

53 U.C. Berkeley Academic Senate Task Force on University-Industry Partnerships, "Principles and Guidelines for Large-Scale Collaborations between the University and Industry, Government, and Foundations" (2006), pp.1-23 (see p.16 for quote), available at: http://academic-senate.berkeley.edu/sites/default/files/recommendations-reports/tf_uip_report-final1.pdf.

54 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, 64 (246) (1999), pp. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html. This National Institutes of Health guidance reads in part as follows: "The right of Recipients to retain title to inventions made with NIH funds comes with the corresponding obligations to promote utilization, commercialization, and public availability of these inventions. The Bayh-Dole Act encourages Recipients to patent and license subject inventions as one means of fulfilling these obligations. However, the use of patents and exclusive licenses is not the only, nor in some cases the most appropriate, means of implementing the Act. Where the subject invention is useful primarily as a research tool, inappropriate licensing practices [i.e. exclusive and/or unnecessarily restrictive licenses] are likely to thwart rather than promote utilization, commercialization and public availability of the invention." See also: Stanford University, the Association of American Medical Colleges, and others,"In the Public Interest: Nine Points to Consider in University Licensing" (2007), available at http://www.autm.net/source/NinePoints/ninepoints_endorsement.cfm. This "Nine Points to Consider" statement reads in part as follows: "When significant investment of time and resources in a technology are needed in order to achieve its broad implementation, an exclusive license often is necessary and appropriate. However, it is important that technology transfer offices be aware of the potential impact that the exclusive license might have on further research, unanticipated uses, future commercialization efforts and markets. Universities need to be mindful of the impact of granting overly broad exclusive rights and should strive to grant just those rights necessary to encourage development of the technology." Many other academic and scientific institutions have also emphasized the importance of maintaining broad, open distribution of academic knowledge.

55 Stanford University, the Association of American Medical Colleges and others, "In the Public Interest: Nine Points to Consider in University Licensing" available at http://www.autm.net/source/NinePoints/ninepoints_endorsement.cfm. See also: Stanford University,"Guidelines Offered for Responsible University Licensing" (2007), available at http://news-service.stanford.edu/news/2007/march7/tech-030707.html.

56 The alliances that scored 7 or higher for academic-use and sharing are: Iowa State-ConocoPhillips; Texas A&M-Chevron; University of Texas at Austin, Rice University, and ten corporate sponsors. Stanford University's Global Climate and Energy Project (See Appendix 8 for details on how Stanford vastly enhanced protection of academic knowledge sharing in its revised 2008 contract, which raised Stanford-GCEP's composite 2002 & 2008 ranking). The BP-funded Energy Biosciences Institute got an 8 ranking on the Shared side, but the BP-controlled proprietary side pulled its overall ranking down.

57 Personal communication from Robert Sanders, manager of science communications, U.C. Berkeley, March 3, 2008. U.C. Berkeley's Office of Media Relations confirmed that the executive committee had eight members. They are: Chris Somerville, EBI director and UC Berkeley faculty member; Stephen Long, EBI deputy director and UIUC faculty member; Paul A. Willems, EBI associate director and BP employee; Adam Arkin, UCB faculty member and LBNL scientist; Evan H. DeLucia, UIUC faculty member; Daniel M. Kammen, UCB faculty member; Michael Marletta, UCB faculty member; David Zilberman, UCB faculty member.

58 The two executive committee members with commercial interests related to the EBI are: Christopher Somerville, the EBI's academic director who has equity interests in Mendel Biotechnology, a biofuels firm with close business ties to BP; and Paul Willems, a BP employee who also serves as the EBI's Associate Director. For more details, see box on page 64 on Conflicts of Interest in the EBI in the main report.

59 The five academic executive committee members with funding conflicts are: Stephen Long, EBI deputy director and UIUC faculty member; Adam Arkin, UCB faculty member and LBNL scientist; Evan H. DeLucia, UIUC faculty member; Michael Marletta, UCB faculty member; David Zilberman, UCB faculty member. The only executive committee academic member who was not listed as having received BP-EBI funding in the spring of 2008 was Daniel M. Kammen, a highly regarded energy expert at U.C. Berkeley, who told the author that he had personally elected not to seek BP-EBI funding to protect his ability to evaluate research projects impartially.

60 Current executive committee members who received BP-EBI funding as of July 2010: 1) Adam Arkin, lead project primary investigator on the BP-EBI-funded program titled "Microbial Characterization Facility"; 2) Alexis Bell, lead project primary investigator (PI) on the BP-EBI-funded program titled "Biomass Pretreatment Chemical Synthesis of Transportation Fuels"; 3) Douglas Clark, lead project primary investigator (PI) on the BP-EBI-funded program titled "Enhanced Conversion of Lignocellulose to Biofuels: Bioprocess Optimization from Cellulose Hydrolysis to Product Fermentation"; 4) Evan DeLucia, lead project primary investigator (PI) on the BP-EBI funded program titled "Environmental Impact and Sustainability of Feedstock Production"; 5) Jody Endres, senior regulatory associate in the Law and Regulation Program at the Energy Biosciences Institute, based at the U. of Illinois, which obviously receives funding from BP-EBI; 6) Terry Hazen, a primary investigator (PI) on the BP-EBI-funded program titled "Mirocbially Enhanced Hydrocarbon Recovery (MEHR)"; 7) Madhu Khanna, lead project primary investigator (PI) on two major BP-EBI-funded programs:"Economic and Environmental Impacts of Biofuels: Implications for Land Use and Policy" and "Regional Socioeconomic and Environmental Impacts of Alternative Biofuel Pathways"; 8) Stephen Long, deputy director of the Energy Biosciences Institute and also a lead project primary investigator (PI) on two major BP-EBI-funded programs: "Feedstock Production/Agronomy Program" and "Model Development to Predict Feedstock Production of Miscanthus and Switchgrass as Affected by Climate, Soils, and Nitrogen Management"; 9) Michael Marletta, lead project primary investigator (PI) on the BP-EBI-funded program titled "Cellulosomes Optimized for Biofuel Production"; 10) David Zilberman, lead project primary investigator (PI) on one major BP-EBI-funded program titled "Economics of Biofuel Adoption and Impacts," as well as a BP-EBI-funded project titled "Development of Biofuel Productivity Potentials for Analysis Under Changing Climate, Land Use, and Societal Demands." The two EBI excutive committee members who are BP employees are: 1) Paul A. Willems, Technology Vice President for Energy Biosciences at BP and also Associate Director of EBI; and 2) Tom Campbell, Manager for Strategy and Planning for BP Technolog Ventures. See http://www.energybiosciencesinstitute.org/index.php?option=com_content&task=category&sectionid=2&id=34&Itemid=103. Finally, there is Chris Somerville, EBI's academic director, who holds a seat on the EBI executive committee and also holds equity in Mendel Biotechnology, a biofuels company that has a close business partnership with BP.

61 David J. Rothman, "Academic Medical Centers and Financial Conflicts of Interest," *Journal of the American Medical Association*, 2008; 299(6):695-697; Justin E. Bekelman, et al., 2003. "Scope and Impact of Financial Conflicts of Interest in Biomedical Research," *Journal of the American Medical Association*, vol. 289(4), p. 456; Thomas Bodenheimer, "Uneasy Alliance--Clinical Investigators and the Pharmaceutical Industry," *New England Journal of Medicine*, May 18, 2000; 342(20):1539-1544. See also Kassirer J., *On the Take: How Medicine's Complicity With Big Business Can Endanger Your Health*, New York, NY: Oxford University Press; 2004.

62 American Association for the Advancement of Science, press release, "R&D Funding Update on the 2009 Omnibus Bill - Congress Finalizes Omnibus Budget for FY2009 Increases Across All Major R&D Agencies," March 20, 2009, available at www.aaas.org/spp/rd/FY2009update.pdf.

63 Written comments from John M. DeCicco, an expert on transportation and the environment and a senior lecturer in the School of Natural Resources and the Environment at the University of Michigan, December 13, 2009.

64 Stanford University, the Association of American Medical Colleges and others,"In the Public Interest: Nine Points to Consider in University Licensing" available at http://www.autm.net/source/NinePoints/ninepoints_endorsement.cfm

Main paper endnotes

1 American Association for the Advancement of Science (AAAS), "Congress Finalizes Omnibus Budget for FY2009 Increases Across All Major R&D Agencies" (2009), available at http://www.aaas.org/spp/rd. This is a summary of AAAS estimates and analyses of federal R&D appropriations in final FY 2009 appropriations bill signed by President Obama on March 10, 2009.

2 President Obama referenced this $150 billion spending projection in his April 27, 2009, speech to the National Academy of Sciences. The Obama administration's FY2010 budget also states that this $150 billion Clean Energy Technology Fund would support energy R&D and technology implementation, which are the foundations of the president's "green jobs" initiative. However, according to the Federation of American Scientists, which monitors national science policy and spending, the American Clean Energy and Security Act (H.R. 2454), which passed the House in 2009, provides less than one-fifteenth of the amount that President Obama had previously pledged for these federal energy research, development, and demonstration programs. The legislation also provides no stable, specific funding for sustained research in the Department of Energy's Office of Science, or for the energy research and associated technology-development programs of DOE (at the Energy Efficiency and Renewable Energy, Electricity Deliverability, Fossil, and Nuclear offices). See American Federation of Scientists, "34 Nobel Laureates Urge Inclusion of President Obama's $150 Billion Clean Energy Technology Fund in Climate Legislation" (2009), available at http://www.fas.org/press/news/2009/july_nobelist_letter_to_obama.html.

3 Contrary to popular belief, most scientific and technological research in academia does not fit neatly into either the purely "basic" or purely "applied" category. Instead it falls into a hybrid realm of "use-oriented basic research," sometimes referred to as "Pasteur's quadrant," a term coined by Donald Stokes in his 1997 book of the same name, where research is undertaken with a quest for both practical application and fundamental knowledge. See Donald Stokes, *Pasteur's Quadrant* (Washington: Brookings Institution, 1997).

4 Most corporate research grants awarded to U.S. universities are worth far less than $1 million and are awarded to one academic investigator or one lab. However, these smaller grants are also far more difficult to track, because they are less apt to be reported in university press releases, corporate annual reports, and other publicly accessible sources. Most universities do not divulge comprehensive data on their outside corporate research funding. The energy industry also divulges few details concerning its R&D expenditures. As such, in developing this list of 55 deals, CAP's investigators relied heavily on press releases (from universities, companies, and the Department of Energy); news stories; company annual reports (where larger deals are sometimes mentioned); and other public documents and databases (including Google, ABI/INFORM Global [ProQuest], and LexisNexis Academic). Each of these sources is biased in favor of mentioning only larger-size university-industry research grants and gifts, which again explains why this list is far from comprehensive.

5 Interview with Tadeusz W. Patzek, November 29, 2009.

6 Interview with Roger Webb, November 6, 2007.

7 Ibid.

8 National Science Foundation, "Science and Engineering Indicators, 2010," Chapter 5, Academic Research and Development, available at: http://www.nsf.gov/statistics/seind10/

9 Some schools, with large engineering, business, and medical programs, receive anywhere from 15 percent to 30 percent of their research funding from industry. For more discussion see Sheldon Krimsky, *Science in the Private Interest* (Oxford: Rowman & Littlefield, 2003), pp.80-81. For up-to-date statistical tables on aggregate industry research funding at individual U.S. universities, see http://www.nsf.gov/statistics/nsf05320/tables.htm#rd2.

10 Sources in order: President's Committee of Advisors on Science and Technology (PCAST), *Report to the President on Federal Energy Research and Development for the Challenges of the Twenty-First Century* (Office of the President, 1997); National Commission on Energy Policy, "Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges" (2004), available at http://www.energycommission.org/ht/d/sp/i/492/pid/492. Gregory F. Nemet and Daniel M. Kammen, "U.S. Energy Research and Development: Declining Investment, Increasing Need, and the Feasibility of Expansion," Energy Policy 35 (2007): 746-755, available at http://rael.berkeley.edu/files/2007/NemeKamm_EP07.pdf.

11 Analysis performed by Derrin Culp, based on annual averages from 1977-1981 and 1996-2000. In both cases, it is a five-year average. Data sources noted in graph referenced below.

12 Federation of American Scientists, "34 U.S. Nobel Laureates Urge Inclusion of President Obama's $150 Billion Clean Energy Technology Fund in Climate Legislation" (2009), available at http://www.fas.org/press/news/2009/july_nobelist_letter_to_obama.html.

13 Research, data analysis, and graph by Derrin Culp. Sources and methods: (1) James J. Dooley, "U.S. National Investment in Energy R&D: 1974-1999," Battelle Memorial Institute, July 2001, p. 9; (2) G.F. Nemet and D.M. Kammen, "U.S. Energy Research and Development: Declining Investment, Increasing Need, and the Feasibility of Expansion," Energy Policy 35, 1 (2007), pp. 746-755, U.S. Energy Research and Development Data, updated March 28, 2006, available online; and (3) K.S. Gallagher and others,"DOE Budget Authority for Energy Research, Development, and Demonstration Database," Energy Technology Innovation Project, John F. Kennedy School of Government, Harvard University, 2007, available at http://belfercenter.ksg.harvard.edu/publication/3237/doe_budget_authority_for_energy_research_development_and_demonstration_database.html?breadcrumb=%2Fpublication%2F2602%2Fdoe_budget_authority_for_energy_research_development_and_demonstration_database; Excel spreadsheet data available at http://belfercenter.ksg.harvard.edu/files/FederalEnergyTechRDSpending1978-2008REQUEST_02_12_07.xls. Dooley provides public R&D investment for 1974-1999 in nominal and 1995 constant dollars; Nemet and Kammen provide values for 1974-2005 in 2002 constant dollars. All data have been expressed as 2006 constant dollars based on current OMB GDP deflators. For 1974-1999, the values are an average of the two sources. For 2000-2005, the values are from Nemet and Kammen. For 2006 only, the value is from Source 3, above, Row 159.

14 Analysis performed by Derrin Culp. Source: Office of Management and Budget, Fiscal Year 2008 Budget, Historical Tables, Table 9.8—Composition of Outlays for the Conduct of Research and Development: 1949–2008.

15 Graph created by Derrin Culp. Source: Office of Management and Budget, Fiscal Year 2008 Budget Historical Tables, Table 9.8— Composition of Outlays for the Conduct of Research and Development: 1949–2008.

16 Analysis by Derrin Culp. Average annual expenditures for renewable R&D during each four-year or eight-year administration is based upon analysis of U.S. federal government energy R&D expenditures 1974-2005 from the International Energy Agency (IEA) database, available at http://wds.iea.org/WDS (requires anonymous registration as "guest"). As the IEA database did not cover FY 2007 or 2008 when this analysis was performed, Derrin Culp constructed energy R&D budget authority for FY 2006-2008—the first three budgets of George W. Bush's second term—from various data provided by Kei Koizumi, director of the R&D Budget and Policy Program at the American Association for the Advancement of Science (AAAS).

17 Graph created by Derrin Culp. Sources: K.S. Gallagher and others, "DOE Budget Authority for Energy Research, Development, and Demonstration Database," Energy Technology Innovation Project, John F. Kennedy School of Government, Harvard University, 2007, available at http://belfercenter.ksg.harvard.edu/publication/3237/doe_budget_authority_for_energy_research_development_and_demonstration_database.html?breadcrumb=%2Fpublication%2F2602%2Fdoe_budget_authority_for_energy_research_development_and_demonstration_database

18 Robert J. Birgeneau, University of California, Berkeley chancellor, and Steven Chu, director of the Lawrence Berkeley National Laboratory, Bear in Mind Conversation Series, "What the Energy Biosciences Institute Means for UC Berkeley—and the World," March 2, 2007, available at http://www.berkeley.edu/news/chancellor/bim/mar07_transcript.shtml#two.

19 Derek Bok, *Universities in the Marketplace: The Commercialization of Higher Education* (Princeton: Princeton University Press, 2003); Jennifer Washburn, *University Inc.: The Corporate Corruption of Higher Education* (New York: Basic Books, 2005); Daniel S. Greenberg, *Science for Sale: The Perils, Rewards, and Delusions of Campus Capitalism* (Chicago: University of Chicago, 2007).

20 National Science Foundation, "Where Has the Money Gone? Declining Industrial Support of Academic R&D," NSF 06-328 (2006), available at http://www.nsf.gov/statistics/infbrief/nsf06328.

21 The formal name of this legislation is the University and Small Business Patent Procedures Act, available at http://www.access.gpo.gov/nara/cfr/waisidx_02/37cfr401_02.html.

22 Anthony So and others, "Is Bayh-Dole Good for Developing Countries? Lessons from the U.S. Experience," *PLoS Biology*, Vol. 6, Issue 10, October 2008. See also: David C. Mowery and others, *Ivory Tower and Industrial Innovation: University-Industry Technology Transfer Before and After the Bayh-Dole Act* (California: Stanford University Press, 2004).

23 The number of patents issued to U.S. universities more than doubled between 1979 and 1984, and doubled again between 1989 and 1997. The number of universities with dedicated patenting and licensing offices increased from 25 in 1980 to 200 in 1990. Source: Richard R. Nelson, "Observations on the Post-Bayh-Dole Rise in University Patenting," in Maryann P. Feldman and Albert N. Link, eds., *Innovation Policy in the Knowledge-Based Economy*, *Association for Public Policy Analysis and Management* (Kluwar Academic Publishers, 2001), p. 165.

24 David C. Mowery and others, *Ivory Tower and Industrial Innovation: University-Industry Technology Transfer Before and After the Bayh-Dole Act* (California: Stanford University Press, 2004), pp. 176, 183-184. See also Wesley M. Cohen and Richard R. Nelson, "Links and Impacts: The Influence of Public Research on Industrial R&D," pp. 1-23; and Ajay Agrawal and Rebecca Henderson, "Putting Patents in Context: Exploring Knowledge Transfer from MIT," pp.44-60, both in *Management Science* 48 (2002):1-23.

25 According to Anthony So, Bhaven Sampat, and others, a recent econometric analysis using data on academic licensing revenues from 1998-2002 suggests that, after subtracting the high costs of patent management, net revenues earned by U.S. universities from patent licensing were "on average, quite modest" nearly three decades after Bayh-Dole took effect. This study concludes that "universities should form a more realistic perspective of the possible economic returns from patenting and licensing activities" [Bulut and Moschini (2006)]. Similarly, the head of the technology licensing office at MIT (who formerly served as president of the Association of University Technology Managers) notes that "the direct economic impact of technology licensing on the universities themselves has been relatively small (a surprise to many who believed that royalties could compensate for declining federal support of research)... [M]ost university licensing offices barely break even." Anthony D. So and others, "Is Bayh-Dole Good for Developing Countries? Lessons from the U.S. Experience," *PloS Biology* 6 (10) (2008): 2078-2084. Original sources: H. Bulut and G. Moschini, "U.S. Universities' Net Returns From Patenting and Licensing: A Quantile Regression Analysis," Center for Agricultural and Rural Development at Iowa State University, Working Paper 06-WP 432, 2006, available at http://www.card.iastate.edu/publications/DBS/PDFFiles/06wp432.pdf ; and L. Nelsen, "The Rise of Intellectual Property Protection in the American University," *Science* 279 (1998): 1460-1461.

26 Derek Bok, *Universities in the Marketplace: The Commercialization of Higher Education* (Princeton: Princeton University Press, 2003); Daniel S. Greenberg, *Science for Sale: The Perils, Rewards, and Delusions of Campus Capitalism* (Chicago: University of Chicago, 2007); David L. Kirp, *Shakespeare, Einstein, and the Bottom Line* (Cambridge: Harvard University Press, 2004); Sheldon Krimsky, *Science in the Private Interest* (Lanham, MD: Rowman & Littlefield, 2003); Jennifer Washburn, University Inc.: *The Corporate Corruption of Higher Education* (New York: Basic Books, 2005).

27 One meta-analysis, combining a wide array of studies, found that pharmaceutical industry-funded research was *four times more likely to reflect favorably on a drug, compared with research not funded by industry*. Another study found that scientific review articles on the effects of secondhand smoke exposure written by researchers with industry ties were *88 times more likely to find no harm, compared with articles penned by researchers with no industry ties*. In published studies comparing different brands of cholesterol drugs head-to-head, the drug that comes out looking better is *20 times more likely* to have been manufactured by the company funding the study. In the field of nutrition, one detailed analysis of 206 studies of milk, fruit juice, and soft drinks found that, when a company sponsored studies of its own or a competitor's products, the results were *four to eight times more likely to be favorable to the company's financial interests than studies funded independently*. Sources in order: Joel Lexchin and others, "Pharmaceutical Industry sponsorship and Research Outcome and Quality: Systematic Review," *BMJ* 326 (2003):1167-1170, available at http://www.bmj.com/cgi/content/abstract/326/7400/1167; Deborah E. Barnes and Lisa A. Bero, "Why Review Articles on the Health Effects of Passive Smoking Reach Different Conclusions," *Journal of the American Medical Association* 279(19) (1998): 1566-1570, available at http://jama.ama-assn.org/cgi/content/abstract/279/19/1566; L. Bero and others, "Factors Associated with Findings of Published Trials of Drug-Drug Comparisons: Why Some Statins Appear More Efficacious Than Others," *PLoS Med* 4 (6) (2007), available at http://www.plosmedicine.org/article/info:doi/10.1371/journal.pmed.0040184. Also see the University of California San Francisco press release, "Drug Company Funding of Drug Trials Greatly Influences Outcome" (2007), available at http://pub.ucsf.edu/newsservices/releases/200705311; L.I. Lesser and others, PloS *Med*. Vol. 4, e5 (2007).

28 According to one study,, nearly 60 percent of agreements between academic institutions and life science companies required that university investigators keep information confidential for more than six months—considerably longer than the 30 to 60 days that NIH considers reasonable for the purpose of filing a provisional patent application. Source: D. Blumenthal and others, "Relationships Between Academic Institutions and Industry in the Life Sciences: An Industry Survey," *New England Journal of Medicine* 334:(1996): 368-374. In a more recent survey of university geneticists and life scientists, *one in four reported the need to honor the requirements of an industrial sponsor as one of the reasons for denying requests for post-publication information, data, or materials*. Source: E.G. Campbell and others, "Data Withholding in Academic Genetics: Evidence from a National Survey," *Journal of the American Medical Association* 287 (2002): 473-480. In a study of 44 industry-financed pharmaceutical trials approved by Denmark's regional scientific ethical committees in 1994 and 1995 that resulted in publication, Peter Gøtzsche of the Nordic Cochrane Centre in Copenhagen, Denmark, found that *the industry sponsor either owned the data or was required to approve a manuscript before publication in 50 percent of the cases, although resulting papers often failed to note those restrictions. In 36 percent of the trials reviewed, the sponsor reserved the right to terminate the trial at any time*. The study also assessed the first 44 industry-initiated trials that were approved in 2004, and *in 61 percent of cases the sponsor either owned the data or had the right to approve the manuscript*. Source: P.C. Gøtzsche and others, *Journal of the Amer Med Asso,* 295 (2006): 1645–1646; also reported in Robin Mejia, "Taking the Industry Road," *Nature* 453, (2008): 1138-1139. For more studies documenting how patenting, licensing, and industry relationships are encumbering open scientific exchange inside the university, see E.G. Campbell, K.S. Louis, and D. Blumenthal, "Looking a Gift Horse in the Mouth: Corporate Gifts Supporting Life Sciences Research, *Journal of the American Medical Association* 279 (1998): 995-999; E.G. Campbell and others, "Data Withholding in Academic Medicine: Characteristics of Faculty Denied Access to Research Results and Biomaterials," *Res Pol* 29 (2000): 303-312.

29 A recent survey found that roughly *two-thirds of academic medical centers hold equity interest in companies that sponsor research within the same institution*. Source: Justin E. Bekelman and others, "Scope and Impact of Financial Conflicts of Interest in Biomedical Research: A Systematic Review," *Journal of the American Medical Association*, January 22, 2003. A study of *medical school department chairs found that two-thirds received departmental income from drug companies and three-fifths received personal income from the drug industry*. Source: Eric G. Campbell and others, "Institutional Academic–Industry Relationships," *Journal of the American Medical Association*, October 17, 2007. Both cited in Marcia Angell, "Drug Companies & Doctors: A Story of Corruption," *New York Review of Books* 56 (1) (2009). Outside the field of biomedicine, financial conflicts of interest have been far less well examined; however, commercial financial relationships such as these have now become pervasive across many academic science and engineering disciplines.

30 Most recently, Sen. Charles Grassley (R-IA) has waged a concerted campaign to expose financial conflicts inside medicine, while also pushing for stronger public disclosure and regulation of commercial conflicts at U.S. universities and medical schools. For details see Doug Lederman, "Drawing Lines on Conflicts of Interest," Inside Higher Ed.com, available at http://www.insidehighered.com/news/2009/06/11/conflicts. In May 2009, the National Institutes of Health announced that it was considering toughening conflict-of-interest regulations governing all research funded by the Public Health Service, much of which is allocated to U.S. university researchers; see Department of Health and Human Services, "Responsibility of Applicants for Promoting Objectivity in Research for Which Public Health Service Funding is Sought...; Request for Comments", *Federal Register* 74 (88) (2009), available at http://edocket.access.gpo.gov/2009/E9-10666.htm. For a brief overview of past (largely failed) attempts by the U.S. Congress and other federal grant-making agencies to attach stricter conflict-of-interest regulations to federal research grants issued to American universities, see Jennifer Washburn, *University Inc.: The Corporate Corruption of Higher Education* (New York: Basic Books, 2005): pp.98-102; 133-136. Finally, for details on actions taken by science and medical journal editors to address conflicts of interest, see Catherine D. DeAngelis and others, "Clinical Trial Registration: A Statement From the International Committee of Medical Journal Editors," *Journal of the Amer. Med. Assoc*.. 2004;292(11):1363-1364, available at http://jama.ama-assn.org/cgi/reprint/292/11/1363.pdf .

31 Barry Bergman, U.C. Berkeley News Press Release, "Berkeley, LBNL, Illinois join forces with BP" (2007), available at http://berkeley.edu/news/berkeleyan/2007/02/08_energy.shtml.

32 Master Agreement, BP Technology Ventures Inc. and Regents of the University of California, Recitals, November 9, 2007, Section 2.2.2. See also Appendix 2 for a detailed review of the EBI contract.

33 Cornell University offers the following helpful definition for a Strategic Corporate Alliance: "A comprehensive, formally managed company-university agreement centered around a major, multiyear, financial commitment involving research, programmatic interactions, intellectual property licensing, and other services." Source: Cornell University, "Cornell University Strategic Corporate Alliance Plan" (2003), available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html. Also see: Cornell University, "Faculty Statement of Principles & Best Practices Concerning Strategic Corporate Alliances" (2005), available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html. Please Note: To locate the final 2005 Cornell report, first click on "Strategic Corporate Alliances (Oct 2003), then at the next window click on "Final Document." According to the *Financial Times*, "colleges and universities have become the next generation research and development labs for drugmakers at a time when they are battling increased generic competition for top-selling medicines, and a dearth of drugs in the pipeline." See Rebecca Knight, "Big Pharma Gravitates to the Academe," *Financial Times*, September 2, 2008, available at http://www.ft.com/cms/s/841ff7e0-7872-11dd-acc3-0000779fd18c,dwp_uuid=d7e814a8-3012-11da-ba9f-00000e2511c8,print=yes.html.

34 Funding figures come from Alan Weimer, executive director of C2B2 in written comments in August 2010. See Appendix 5 for details.

35 Cornell University, "Cornell University Strategic Corporate Alliance Plan" (2003), available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html. Also see: Cornell University, "Faculty Statement of Principles & Best Practices Concerning Strategic Corporate Alliances" (2005), available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html. Please Note: To locate the final 2005 Cornell report, first click on "Strategic Corporate Alliances (Oct 2003), then at the next window click on "Final Document."

36 David C. Mowery and David J. Teece, "Strategic Alliances and Industrial Research," Chapter 3, pp.111-129, quote found on p. 122, in Richard S. Rosenbloom and William J. Spencer, eds., *Engines of Innovation: U.S. Industrial Research at the End of an Era* (Boston: Harvard Business School Press, 1996).

37 Peter Barnes is the author of *Who Owns the Sky: Our Common Assets and the Future of Capitalism*, (Island Press, 2003). Barnes' quotes, here, come from an online essay: Peter Barnes, "The Politics of Climate Change," February 29, 2008, blog post at the Powell's Bookstore website, http://www.powells.com/blog/?p=2983.

38 Ibid.

39 International Panel on Climate Change (IPCC), 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and A. Reisinger, eds.], IPCC, Geneva, Switzerland, 104 pp., available at http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm. See also: Elisabeth Rosenthal and James Kanter, "Grim Report on Climate is Described as Too Rosy," *International Herald Tribune*, November 18, 2007.

40 The first iteration of this campaign (to highlight the uncertainties of climate science) began under the auspices of an industry front organization known as the Global Climate Coalition (GCC). GCC was created in 1989, shortly after the International Panel on Climate Change's first meeting, and disbanded in 2002. Until 1997, the GCC operated out of the offices of the National Association of Manufacturers and its members comprised a Who's Who list of big business, including Amoco, the American Forest & Paper Association, the American Petroleum Institute, Chevron, Chrysler, Exxon, Ford, General Motors, Shell Oil, Texaco, and the United States Chamber of Commerce. Starting in 1997, some member companies, including BP/Amoco and other oil firms, pulled out of the GCC because they feared negative publicity if they appeared too closely associated with an industry group vigorously denying the threat of global warming. But most big industry trade groups stayed on as members. For more details see http://www.sourcewatch.org/index.php?title=Global_Climate_Coalition.

41 Joseph Walker, Draft global climate science communications plan, American Petroleum Institute, April 1998, memo to Global Climate Science Team, available at http://www.euronet.nl/users/e_wesker/ew@shell/API-prop.html. Among the GCST members cited in the plan as having contributed to it are Randy Randol, Exxon Corp.; Steve Milloy, the Advancement of Sound Science Coalition; and Joseph Walker, American Petroleum Institute.

42 Seth Shulman and others, "Smoke, Mirrors & Hot Air: How ExxonMobil Uses Big Tobacco's Tactics to 'Manufacture Uncertainty' on Climate Science," Union of Concerned Scientists report, January 3, 2007, p.1, available at http://www.ucsusa.org/assets/documents/global_warming/exxon_report.pdf. See also Greenpeace USA, "ExxonMobil's Continued Funding of Global Warming Denial Industry" (2007), available at http://www.greenpeace.org/usa/Global/usa/binaries/2007/5/exxon-secrets-analysis-of-fun.pdf

43 Lindsay Renick Mayer, "Big Oil, Big Influence," Public Broadcasting Service (PBS), NoW, Nov. 23, 2007, available at http://www.pbs.org/now/shows/347/oil-politics.html. This PBS broadcast was based on research performed at the Center for Responsive Politics, http://www.opensecrets.org/index.php.

44 Greenpeace, "Denial and Deception: A Chronicle of ExxonMobil's Efforts to Corrupt the Debate on Global Warming" (2002), available at http://www.greenpeace.org/usa/global/usa.binaries/2007/5/exxon-secrets-analysis-of-fun.pdf.

45 U.S. House of Representatives, Committee on Oversight and Government Reform, *Political Interference With Climate Change Science Under the Bush Administration,* December 2007, available at http://oversight.house.gov/index.php?option=com_content&view=article&id=3373%3Acommittee-report-white-house-engaged-in-systematic-effort-to-manipulate-climate-change-science-&catid=44%3Alegislation&Itemid=1.

46 Ibid. For more information on the energy industry's manipulation of scientific inquiry within the federal government and elsewhere, see "Restoring Scientific Integrity in Policy Making," a Union of Concerned Scientists public statement originally endorsed and signed by 62 preeminent scientists, including Nobel laureates, and eventually signed by 15,000 additional scientists, issued February 18, 2004, available at http://www.ucsusa.org/scientific_integrity/abuses_of_science/scientists-sign-on-statement.html. A companion report, "Scientific Integrity in Policy Making," is available at http://www.ucsusa.org/assets/documents/scientific_integrity/rsi_final_fullreport_1.pdf. Also see Seth Shulman, *Undermining Science: Suppression and Distortion in the Bush Administration* (California: University of California Press, 2007).

47 Bonnie Azab Powell, "Our Generation's Moon Shot: Launching the Energy Biosciences Institute," (California: U.C. Berkeley Press release, 2007), available at http://www.berkeley.edu/news/media/releases/2007/02/01_EBI_press.shtml.

48 Jon Harding, "Husky and BP Forge US$5.5B Oil Sands Alliance," *Financial Post* (2007), available at http://www.financialpost.com/story.html?id=146348, states that the total value of the BP-Husky partnership was valued at $11.7 billion. "BP Enters Canadian Oil Sands with Husky Energy," BP press release, available at http://www.bp.com/genericarticle.do?categoryId=2012968&contentId=7038865, states that the oil sands assets BP acquired from Husky and the refinery assets Husky acquired from BP were "equally valued." For a discussion of the environmental consequences of drilling in the tar sands see Environmental Defense, "Canada's Toxic Tar Sands, The Most Destructive Project on Earth,"(2009), available at http://www.environmentaldefence.ca/reports/pdf/TarSands_TheReport.pdf.

49 Arizona State University, "ASU Partnership Explores Biofuel Feasibility" (2007), available at http://asunews.asu.edu/20071102_BiodesignBP.

50 British Petroleum, "BP Sustainability Report," (2006), p.32, available at http://www.bp.com/liveassets/bp_internet/globalbp/STAGING/global_assets/downloads/B/bp_sustainability_report_2006.pdf.

51 Personal communication from Steven Koonin, January 18, 2008.

52 Analysis performed by Derrin Culp. Five-year revenue and profit averages for the 2003-2007 period were derived from company financial reports available at www.bp.com.

53 Ibid.

54 In a 2007 press release, Chevron said it "expects to spend approximately $2.5 billion on alternative and renewable energy technologies and energy efficiency services between 2007 and 2009." Averaging Chevron's 2003-2007 business performance—annual revenues of $181 billion and average profits of $14 billion—this amounts to just under one half of 1 percent (.46%) of the firm's projected revenues, and just under 6 percent of profits. Source: Chevron, "Press release, Oct. 31, 2007," available at: http://www.chevron.com/news/press/release/?id=2007-10-31,

55 Arizona State University, "ASU Partnership Explores Biofuel Feasibility" (2007), available at http://asunews.asu.edu/20071102_BiodesignBP.

56 See, for example, the Royal Dutch Shell PLC Annual Report and Form 20-F for the year ended December 31, 2007 (available at www.shell.com/annualreport), which contains extensive discussion of Shell's R&D efforts regarding deep-water exploration, enhanced oil recovery, tight gas, contaminated gas, heavy oil conversion, subsurface and unconventional oil and gas technologies, LNG technology, "gas to liquids" technology, coal and biomass gasification, oil sands, refining, and chemicals. The only specific mention of alternative or renewable energy R&D in this entire 220-page document concerns transport biofuels.

57 Analysis performed by Derrin Culp. Sources and methods: (1) James J. Dooley, "U.S. National Investment in Energy R&D: 1974-1999," Battelle Memorial Institute, July 2001, p. 9; and (2) G.F. Nemet and D.M. Kammen, "U.S. Energy Research and Development: Declining Investment, Increasing Need, and the Feasibility of

Expansion," Energy Policy 35, 1 (2007), pp. 746-755, U.S. Energy Research and Development Data, updated 28 March 2006, available at http://rael.berkeley.edu/RandD_Nemet_2006.html. These sources provide private energy R&D investment, Dooley in nominal and 1995 constant dollars for 1974-1999, Nemet and Kammen in 2002 constant dollars for 1985-2003. In the referenced graph and comments, all data have been expressed as 2006 constant dollars based on current OMB GDP deflators. The private data series is derived from Dooley, 1974-1984; the average of the two sources for 1985-1999; and Nemet and Kammen for 2000-2003. Values for 2004-2006 per email correspondence between Daniel Kammen and author.

58 Analysis performed by Derrin Culp. Source: Annual reports and supplements, SEC filings and financial and operating information, readily available on each company's website.

59 Graph prepared by Derrin Culp. Sources: Company annual reports, SEC filings, and statements of operations.

60 Gregory F. Nemet and Daniel M. Kammen, "U.S. Energy Research and Development: Declining Investment, Increasing Need, and the Feasibility of Expansion," Energy Policy 35 (2007):752, available at http://rael.berkeley.edu/files/2007/NemeKamm_EP07.pdf.

61 Ibid., p. 749.

62 Graph taken from Gregory F. Nemet and Daniel M. Kammen, "U.S. Energy Research and Development," p. 749.

63 Society of Petroleum Engineers, "R&D Providers Directory," available at http://www.spe.org/spe-app/spe/industry/ps/rd_providers_dir.htm.

64 Personal interview with Alan Weimer, November 29, 2007. See also the Colorado Center for Biorefining and Biofuel's website, http://www.c2b2web.org.

65 Personal interview with Lisa Lorenzen, the current director of industry relations at Iowa State University, and former vice president of research and economic development at ISU, October 10, 2007.

66 Personal interview with Alan Weimer, November 29, 2007.

67 Letter from the U.C. Berkeley Academic Senate, "Task Force on University-Industry Partnerships," to William Drummond, Chair of the Berkeley Division of the Academic Senate, dated November 2, 2007. In this letter, a special Academic Senate committee, made up of five faculty (Ellwood, Hesse, Kutz, Villas Boas, Moore) informally known as the "Gang of Four-plus," reported back to Drummond regarding eight areas of Academic Senate concern in relation to the BP-funded Energy Biosciences Institute; see p.1 for quote. Copy available from the author. See also "Final Report by Senate Task Force on University-Industry Partnerships: Principles and Guidelines for Large-Scale Collaborations between the University and Industry, Government, and Foundations," available at http://academic-senate.berkeley.edu/sites/default/files/recommendations-reports/tf_uip_report-final1.pdf This final report reads in part as follows: "Sponsored research projects at the University, as opposed to work-for-hire or off-site consulting, are, by definition, projects of academic value and so must reflect the principles and interests of the University and its faculty. Protecting the freedom of Berkeley researchers, and the autonomy of the institution, are hence prerequisites of any acceptable collaboration."

68 Personal communication from Doug Hooker, division director for Renewable Energy Projects Division, Golden Field Office, January 22, 2008. According to its official website, "The mission of the Golden Field Office is to support DOE's Office of Energy Efficiency and Renewable Energy through R&D partnerships, outreach to stakeholders nationwide to further the use of energy efficiency and renewable energy technologies, and laboratory contract administration," available at www.eere.energy.gov/golden/About_The_Office.aspx.

69 Ibid.

70 President Obama referenced this $150 billion spending projection in his April 27, 2009, speech to the National Academy of Sciences. The Obama administration's FY2010 budget also states that this $150 billion Clean Energy Technology Fund would support energy R&D and technology implementation, which are the foundations of the president's "green jobs" initiative. However, according to the Federation of American Scientists, which monitors national science policy and spending, the American Clean Energy and Security Act (H.R. 2454), which recently passed the House, provides less than one-fifteenth of the amount that President Obama had previously pledged for these federal energy research, development, and demonstration programs. The legislation also provides no stable, specific funding for sustained research in the Department of Energy's (DOE) Office of Science, or for the energy research and associated technology-development programs of DOE (at the Energy Efficiency and Renewable Energy, Electricity Deliverability, Fossil, and Nuclear offices). See press release, "34 Nobel Laureates Urge Inclusion of President Obama's $150 Billion Clean Energy Technology Fund in Climate Legislation," available at www.fas.org/press/news/2009/july_nobelist_letter_to_obama.html.

71 Personal interview with Jilda Garten, October 18, 2007.

72 Personal interview with Alan Weimer, November 29, 2007.

73 These figures, which originate from the National Science Foundation, are featured in a Power Point presentation Alan Weimer provided to this report's author: Alan (Al) Weimer, "NSF Funding Issues," presented November 2007 at the American Institute of Chemical Engineers, Fellows Breakfast, Salt Lake City, Utah.

74 Personal interview with Alan Weimer, November 29, 2007.

75 These figures, which originate from the National Science Foundation, are featured in a Power Point presentation that Alan Weimer provided to this report's author: Alan (Al) Weimer, "NSF Funding Issues," presented November 2007 at the American Institute of Chemical Engineers, Fellows Breakfast, Salt Lake City, Utah.

76 Personal interview with Alan Weimer, November 29, 2007.

77 "Results of BES FY2007 Solicitations," available at www.er.doe.gov/bes/BES.html.

78 American Association for the Advancement of Science press release, "R&D Funding Update on the 2009 Omnibus Bill - Congress Finalizes Omnibus Budget for FY2009 Increases Across All Major R&D Agencies," available at www.aaas.org/spp/rd/FY2009update.pdf.

79 Cornell University, ad hoc Faculty Committee on Strategic Corporate Alliances, "Statement of Principles and Best Practices," April 2004 draft, available from the author. See also Cornell University, "Faculty Statement of Principles & Best Practices Concerning Strategic Corporate Alliances," Fall 2005 Final Document, available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html. Please Note: To locate the final 2005 Cornell report, first click on "Strategic Corporate Alliances (Oct 2003)," then in the next window click on "Final Document."

80 Cornell University, "Cornell University Strategic Corporate Alliance Plan" (2003), available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html.

81 Stanford University, the Association of American Medical Colleges, and others, "In the Public Interest: Nine Points to Consider in University Licensing" (2007), available at http://www.autm.net/source/NinePoints/ninepoints_endorsement.cfm. See also Stanford University, "Guidelines Offered for Responsible University Licensing" (2007), available at http://news-service.stanford.edu/news/2007/march7/tech-030707.html. See also: Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register 64 (246) (1999): 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html. This National Institutes of Health guidance, which is addressed to all recipients of NIH grants (including U.S. universities), reads in part as follows: "The right of Recipients to retain title to inventions made with NIH funds comes with the corresponding obligations to promote utilization, commercialization, and public availability of these inventions. The Bayh-Dole Act encourages Recipients to patent and license subject inventions as one means of fulfilling these obligations. However, the use of patents and exclusive licenses is not the only, nor in some cases the most appropriate, means of implementing the Act. Where the subject invention is useful primarily as a research tool, inappropriate licensing practices [i.e. exclusive and/or unnecessarily restrictive licenses] are likely to thwart rather than promote utilization, commercialization and public availability of the invention."

82 The only exception is the hybrid deal at Arizona State University (BP), where this question is not applicable. This ASU agreement does not call for any central governing body.

83 The alliances we reviewed that clearly give the industry sponsor(s) full control over the main governing body are: Iowa State University (ConocoPhillips); Stanford University (ExxonMobil, Toyota, General Electric, Schlumberger); U. of Texas, Austin (BP, Baker Hughes, ConocoPhillips plus seven other firms); and U. of Colorado, Boulder plus three other public Colorado research institutions, and currently 22 private firms).

84 American Association of University Professors, *AAUP Policy Documents & Reports*, 10th Edition, 2006, published by American Association of University Professors, in Washington DC, and distributed by Johns Hopkins University Press, Baltimore MD. In particular see: "1940 Statement of Principles on Academic Freedom and Tenure" with subsequent interpretive comments (p. 3); "Statement on Corporate Funding of Academic Research (p. 130); Statement on Government of Colleges and Universities (p. 133); and "1915 Declaration of Principles on Academic Freedom and Academic Tenure, (Appendix, p. 291).

85 See the "Detailed agreement review" for ASU for details.

86 Comments provided by Chris Somerville, the academic director of the Energy Biosciences Institute, on April 12, 2010. Chris Somerville's bio on the official Energy Biosciences Institute website is available here http://www.energybiosciencesinstitute.org/index.php?option=com_content&task=view&id=49&Itemid=103

87 Comments provided by Chris Somerville, the academic director of the Energy Biosciences Institute, on April 12, 2010.

88 Cornell University, "Faculty Statement of Principles & Best Practices Concerning Strategic Corporate Alliances," (2005), cited above, p.21.

89 The only exceptions are the alliance at Arizona State University, where this question is not applicable, and the U. of Texas at Austin, where the faculty research application process is well explicated.

90 These four are: Colorado Center for Biorefining and Biofuels (C2B2), headquartered at University of Colorado, Boulder; the Iowa State University-ConocoPhillips alliance; an alliance between University of Texas at Austin, Rice University, and eight industry partners; and the Georgia Tech-Chevron alliance..

91 U.C. Berkeley, Academic Senate, faculty committee letter addressed to Prof. William Drummond, Chair of the Berkeley Division of the Academic Senate, November 2, 2007. In this letter, a Senate committee made up of five faculty (Ellwood, Hesse, Kutz, Villas Boas, Moore), informally known as the "Gang of Four-plus," reported back to the Chair, William Drummond, regarding eight stated areas of Academic Senate concern regarding BP-funded Energy Biosciences Institute, p.1.

92 All eight of these agreements either directly or indirectly give the industry sponsor(s) full control. The only exceptions are the Arizona State University-BP alliance (where this question does not apply) and the BP-funded Energy Biosciences Institute, where there is some attempt to give the academic side majority control over the first stage of the evaluation process. But the author of this report found that this academic majority on the EBI's research evaluation committee is not guaranteed. For details, please see our detailed analysis of the BP-EBI legal agreement in the Appendix section of this report. What's more, many faculty appointed to sit on this committee have had clear conflicts of interest that should have disqualified them from evaluating other faculty research. (For details, see box on page 64 of the main report on Conflicts of Interest within the EBI.)

93 For evidence that both Jay Keasling and Christopher Somerville were lead scientists involved in authoring and developing the Energy Biosciences Institute (EBI) proposal, see the Energy Biosciences Institute or EBI Bulletin, May 2007, available at http://www.energybiosciencesinstitute.org/index.php?option=com_content&task=view&id=38&Itemid=73. Keasling and Somerville sat on the EBI's first interim executive committee, consisting of Keasling, Somerville, Stephen Long, Dan Kammen, Diane Leite, and Jim Breson and Paul Willems (both BP employees).

94 Master Agreement, BP Technology Ventures Inc. and Regents of the University of California, November 9, 2007, Section 5.1. See also Chris Somerville's bio on the official Energy Biosciences Institute website, available at http://www.energybiosciencesinstitute.org/index.php?option=com_content&task=view&id=49&Itemid=103

95 LS9 website, see the following links: http://www.ls9.com/about/founders.html and http://www.ls9.com/about, and http://www.ls9.com/products/.

96 Mendel Biotechnology, press release, "Monsanto Company and Mendel Biotechnology, Inc. Announce Cellulosic Biofuels Collaboration," April 28, 2008, available at http://www.biospace.com/news_story.aspx?NewsEntityId=94113.Also, see http://www.ls9.com/about/founders.html

97 Personal communication from Chris Somerville, academic director of the Energy Biosciences Institute, on April 12, 2010. See also: Mendel Biotechnology Inc., press release, "Neil Gutterson is Promoted to President and Chief Executive Officer of Mendel Biotechnology, Inc.," February 12, 2007, available at http://www.biospace.com/news_story.aspx?NewsEntityId=45640. For other media discussion of Somerville's effort to eliminate his conflicts of interest, see Mathew Herper, "BP's Biotech Bet," *Forbes*, July 3, 2007; and Charles Burress, "Emeryville Biofuels Crib to See How Plants Can Fuel Vehicles," *San Francisco Chronicle*, October 23, 2007, available at http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/10/23/BA9BSU9U2.DTL&hw=Emeryville+biofuels+crib&sn=001&sc=1000. Regarding Somerville's and BP's equity interests in Mendel, see "Biofuels Institute Revs Up," *San Francisco Business Times*, July 6, 2007, which states that "BP and Somerville, a Stanford biology professor who will lead the EBI, have equity stakes in Mendel," available at http://sanfrancisco.bizjournals.com/sanfrancisco/stories/2007/07/09/story2.html.

98 See U.C. Berkeley, Office of Research Compliance and Administration, "Conflict of Interest in Research," which reads, in part: "The faculty Conflict of Interest Committee (COI), which operates in conjunction with the Office of Research Administration and Compliance, is responsible for the review and assessment of financial disclosures related to research projects. The Committee seeks first to 'manage' conflict of interest. Remedies may include modification of the research or project plan and monitoring of the project by independent reviewers. If the conflict is deemed 'unmanageable,' the Committee can require that the proposal be withdrawn or that the relationships that created the conflict be severed." Also see University of California Berkeley, Conflict of Interest Committee, "Frequently Asked Questions About UC Berkeley's Conflict of Interest Policy and Procedures," available at http://researchcoi.berkeley.edu/coifaq.html. This FAQ document reads, in part: "A financial interest is anything of economic value, including a fiduciary relationship with an outside entity. While not an exhaustive list, examples of financial interests include positions such as director, officer, partner, founder, consultant or manager of an entity (whether paid or unpaid)*; scientific advisory board or technical advisory board membership; salaries; consulting income; stock or stock options (vested or not vested); honoraria; gifts; loans; and travel payments… A financial interest does not automatically constitute a conflict...The UCB Conflict of Interest Committee and the Vice Chancellor for Research have determined that financial interests must be assessed within a specific factual context and that most conflicts of interest can be reduced, eliminated or managed....The Committee applies standards that have evolved over time, based on their prior experience, the appearance of new types of conflicts, and input from the local and national research community." See also "Guidelines for Disclosure and Review of Principal Investigator's Financial Interest in Private Sponsors of Research," April 27, 1984, still in effect and referenced in the guidance above, which reads: "Traditional conflict of interest situations should continue to be avoided. In the conventional sense, conflict of interest refers to situations in which employees may have the opportunity to influence the University's business decisions in ways that could lead to personal gain or give advantage to associates or firms in which employees have an interest. Principle investigators, like all UC employees, are expected to continue to separate their University and private interests in accordance with existing University policies and State law," available at: http://www.ucop.edu/ucophome/coordrev/policy/4-26-84.html

99 These direct quotations from U.C. policy documents may be found in the following locations: 1) "Guidelines for Disclosure and Review of Principal Investigator's Financial Interest in Private Sponsors of Research," and here 2) U.C. Berkeley, Office of Comptroller website, "Conflict of Interest Overview," available at http://controller.berkeley.edu/ConflictOfInterest/index.htm The1984 guidance, cited above, is still in effect, and continues to be referenced on the U.C. Berkeley Conflict of Interest Committee's website, under: "Frequently Asked Questions About UC Berkeley's Conflict of Interest Policy and Procedures," available at: http://researchcoi.berkeley.edu/coifaq.html. This FAQ guidance also reiterates many of the same points: "Traditional conflict of interest situations should continue to be avoided. In the conventional sense, conflict of interest refers to situations in which employees may have the opportunity to influence the University's business decisions in ways that could lead to personal gain or give advantage to associates or firms in which employees have an interest. Principle investigators, like all UC employees, are expected to continue to separate their University and private interests in accordance with existing University policies and State law."

100 Personal interview with Christopher Somerville, April 12, 2010.

101 Mendel Biotechnology Inc., press release, "Mendel Biotechnology Announces Collaboration with BP on Biofeedstocks", June 13, 2007, available at http://www.biospace.com/news_story.aspx?NewsEntityId=59907. This release reports a major, new, five-year research and business collaboration with BP to develop biofeedstocks for the production of cellulosic biofuels. According to the release, "BP will become a shareholder of Mendel, with representation on Mendel's Board." Also see discussion of the BP-Mendel alliance on Mendel's website, Strategic Partners section, available at http://www.mendelbio.com/strategicpartners/index.php.

102 See Mendel website, Strategic Partners section, at http://www.mendelbio.com/strategicpartners/index.php, which states: "The focus of the collaboration is the development and commercialization of seed products, both conventional and biotech varieties, *for dedicated energy crops such as Miscanthus and switchgrass*."

103 See the EBI's official website, under "Programs" and "Research," where Miscanthus comes up repeatedly as a major research focus in the academic research projects that BP has approved for funding: www.energybiosciencesinstitute.org. Christopher Somerville's wife, Shauna Somerville, is specifically listed as a primary investigator on a project titled "Assessing the Potential Impact of Insect Pests and Plant Pathogens on Biomass Production of Miscanthus X Giganteus and Switchgrass (Panicum Virgatum)," along with Michael E. Gray, Carl Bradley, Terry Niblack, and Kevin Steffey; see http://www.energybiosciencesinstitute.org/index.php?option=com_content&task=view&id=126&Itemid=20.

104 Quotes may be found at University of California Berkeley, Conflict of Interest Committee, "Frequently Asked Questions About UC Berkeley's Conflict of Interest Policy and Procedures," available at http://researchcoi.berkeley.edu/coifaq.html.

105 When the EBI was first launched, Keasling was listed prominently on the website as one of three designated "Faculty Scientists," the same designation he had been given in the original EBI grant proposal that U.C. Berkeley submitted to BP. See "Proposal from the University of California at Berkeley, Lawrence Berkeley National Laboratory and the University of Illinois at Urbana-Champaign to Create the Energy Biosciences Institute," November 2006, p.81. See also endnote 108 below.

106 Keasling's founding role in Amyris is discussed here: http://otl.berkeley.edu/page.php?nav=47. Melo's background is discussed here: http://www.amyrisbiotech.com/index.php?option=com_content&task=view&id=20&Itemid=9.

107 See Energy Biosciences Institute website, "EBI Bulletins," May 2007 and August 2007, available at http://www.energybiosciencesinstitute.org/index.php?option=com_content&task=view&id=38&Itemid=73.

108 Keasling was asked by the U.C. administration to speak about the science guiding the EBI at an "open forum" held at U.C. Berkeley on March 8, 2007; see U.C. Berkeley press release, "Energy Biosciences Institute Timeline," April 12, 2007: http://berkeley.edu/news/berkeleyan/2007/04/12_ebi-timeline.shtml. Keasling again spoke as a faculty scientist on behalf of the EBI at a "teach in" convened by the U.C. administration on March 19, 2007. A copy of his power point presentation was posted on the EBI website, but has more recently been removed.

109 "Keasling Heads New BioEnergy Institute," Bioengineering in the News, U.C. Berkeley press release, June 2007, available at: http://bioeng.berkeley.edu/keasling/heads/new/bioenergy/institute.php

110 Richard Brenneman, "Corporate-Academic Web Entangles UC-BP Proposal," *Berkeley Daily Planet*, March 23, 2007, available at http://www.berkeleydaily-planet.com/issue/2007-03-23/article/26618. See also Amyris's website, http://www.amyris.com/index.php?option=com_contact&task=view&contact_id=3&Itemid=281.

111 Richard Brenneman, "Regents Vote Wednesday on Lease for Biofuel Lab," *Berkeley Daily Planet*, 2007-09-18, available at http://www.berkeleydaily.org/issue/2007-09-18/article/28030. See also "Amyris Biotechnologies Announces New Board Member Additions to its Biofuels Management Team," June 26, 2007, Business Wire, Genetic Engineering & Biotechnology News, available at http://www.genengnews.com/news/bnitem_print.aspx?name=19543478.

112 Email correspondence between the author and Jeryl Hilleman, chief financial officer at Amyris, dated February 24, 2010.

113 On a 2006 conflict-of-interest reporting statement (obtained by this author through a public record act request), which Keasling filed with the U.C. Berkeley administration *as required by CA state law*, Keasling reported serving as Chair of Amyris's Scientific Advisory Board. He also disclosed owning 500,000 shares of Amyris stock, which he estimated to be worth $1 million at that time. Finally, he reported being paid $2,500 per month in consulting fees from Amyris. In October 2006, these financial ties prompted U.C. Berkeley's conflict-of-interest committee to recommend "expanded management," which appears to have involved assigning an ad hoc committee to review (one time per year) how Keasling's graduate students were being advised.

114 In an email dated March 3, 2008, Robert Sanders, the manager of science communications at U.C. Berkeley's Office of Media Relations, confirmed that the executive committee had eight members were: Chris Somerville, EBI director and U.C. Berkeley faculty member; Stephen Long, EBI deputy director and UIUC faculty member; Paul A. Willems, EBI associate director and BP employee; Adam Arkin, UCB faculty member and LBNL scientist; Evan H. DeLucia, UIUC faculty member; Daniel M. Kammen, UCB faculty member; Michael Marletta, UCB faculty member; David Zilberman, UCB faculty member.

115 The two executive committee members with commercial interests related to the EBI are Chris Somerville, the EBI's academic director who has equity interests in Mendel Biotechnology, a biofuels firm with close business ties to BP; and Paul Willems, a BP employee who also serves as the EBI's associate director.

116 The five academic executive committee members with identifiable BP-EBI research funding conflicts were Stephen Long, EBI deputy director and UIUC faculty member; Adam Arkin, UCB faculty member and LBNL scientist; Evan H. DeLucia, UIUC faculty member; Michael Marletta, UCB faculty member; and David Zilberman, UCB faculty member. The only executive committee academic member who did not receive BP-EBI funding, in the spring of 2008, was Daniel M. Kammen, a highly regarded energy expert at U.C. Berkeley, who told CAP's author that he had personally elected not to seek BP-EBI funding to protect his ability to evaluate research projects impartially.

117 Personal communication with Dan Kammen, January 11, 2007.

118 Personal communication from Chris Somerville on April 12, 2010.

119 See the U.C. Berkeley Energy Biosciences Institute website, http://www.energybiosciencesinstitute.org/index.php?option=com_content&task=category&sectionid=2&id=34&Itemid=103. The two EBI excutive committee members who are BP employees are: 1) Paul A. Willems, Technology Vice President for Energy Biosciences at BP and also Associate Director of EBI; and 2) Tom Campbell, Manager for Strategy and Planning for BP Technolog Ventures, see http://www.energybiosciencesinstitute.org/index.php?option=com_content&task=category&sectionid=2&id=34&Itemid=103.

120 Current executive committee members who received BP-EBI funding as of July 2010: 1) Adam Arkin, lead project primary investigator on the BP-EBI-funded program titled "Microbial Characterization Facility"; 2) Alexis Bell, lead project primary investigator (PI) on the BP-EBI-funded program titled "Biomass Pretreatment Chemical Synthesis of Transportation Fuels"; 3) Douglas Clark, lead project primary investigator (PI) on the BP-EBI-funded program titled "Enhanced Conversion of Lignocellulose to Biofuels: Bioprocess Optimization from Cellulose Hydrolysis to Product Fermentation"; 4) Evan DeLucia, lead project primary investigator (PI) on the BP-EBI funded program titled "Environmental Impact and Sustainability of Feedstock Production"; 5) Jody Endres, senior regulatory associate in the Law and Regulation Program at the Energy Biosciences Institute, based at the U. of Illinois, which obviously receives funding from BP-EBI; 6) Terry Hazen, a primary investigator (PI) on the BP-EBI-funded program titled "Mirocbially Enhanced Hydrocarbon Recovery (MEHR)"; 7) Madhu Khanna, lead project primary investigator (PI) on two major BP-EBI-funded programs:"Economic and Environmental Impacts of Biofuels: Implications for Land Use and Policy" and "Regional Socioeconomic and Environmental Impacts of Alternative Biofuel Pathways"; 8) Stephen Long, deputy director of the Energy Biosciences Institute and also a lead project primary investigator (PI) on two major BP-EBI-funded programs: "Feedstock Production/Agronomy Program" and "Model Development to Predict Feedstock Production of Miscanthus and Switchgrass as Affected by Climate, Soils, and Nitrogen Management"; 9) Michael Marletta, lead project primary investigator (PI) on the BP-EBI-funded program titled "Cellulosomes Optimized for Biofuel Production"; 10) David Zilberman, lead project primary investigator (PI) on one major BP-EBI-funded program titled "Economics of Biofuel Adoption and Impacts," as well as a BP-EBI-funded project titled "Development of Biofuel Productivity Potentials for Analysis Under Changing Climate, Land Use, and Societal Demands."The two EBI excutive committee members who are BP employees are: 1) Paul A. Willems, Technology Vice President for Energy Biosciences at BP and also Associate Director of EBI; and 2) Tom Campbell, Manager for Strategy and Planning for BP Technolog Ventures, Source: http://www.energybiosciencesinstitute.org/index.php?option=com_content&task=category&sectionid=2&id=34&Itemid=103. Also look under research programs on the EBI website for a list of projects as of July 2010.

121 The sole exception is the alliance between the Colorado School of Mines, a public university, and Chevron. This agreement states that publication rights are protected, but because the sponsor is permitted to delay publication for up to 365 days, including student theses, the university's true rights to timely academic publication are negated almost entirely.

122 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at: http://ott.od.nih.gov/policy/rt_guide_final.html. Under the heading "Prompt Publication," this National Institutes of Health guidance reads in part as follows: "Agreements to acquire materials for use in NIH-funded research are expected to address the timely dissemination of research results. Recipients should not agree to significant publication delays, any interference with the full disclosure of research findings, or any undue influence on the objective reporting of research results. A delay of 30-60 days to allow for patent filing or review for confidential proprietary information is generally viewed as reasonable."

123 The outside legal experts ranked seven of the 10 agreements a 3.5 or less for nonexclusive licensing, because the university partners have very little ability to license sponsored-research results nonexclusively to other outside commercial users.

124 However, it is unclear whether the C2B2 alliance is actually adhering to these more open licensing provisions, because many aspects of this written agreement are currently not being followed, according to an interview with Alan Weimer, C2B2's executive director. (See "Detailed agreement review" for more details.)

125 As noted already, 60 percent of all university-based R&D is still financed by U.S. taxpayers, not by private industry. National Science Foundation, "Science and Engineering Indicators, 2010, "Chapter 5, Academic Research and Development, available at http://www.nsf.gov/statistics/seind10/c5/c5s1.htm.

126 U.C. Berkeley Academic Senate, "Principles and Guidelines for Large-Scale Collaborations between the University and Industry, Government, and Foundations," report by the "Task Force on University-Industry Partnerships," FINAL, undated, pp.1-23, see p.16 for quote, available at academic-senate.berkeley.edu/index.html. Also directly available at http://academic-senate.berkeley.edu/sites/default/files/recommendations-reports/tf_uip_report-final1.pdf.

127 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at ott.od.nih.gov/policy/rt_guide_final.html. This National Institutes of Health guidance reads in part as follows: "The right of Recipients to retain title to inventions made with NIH funds comes with the corresponding obligations to promote utilization, commercialization, and public availability of these

inventions. The Bayh-Dole Act encourages Recipients to patent and license subject inventions as one means of fulfilling these obligations. However, the use of patents and exclusive licenses is not the only, nor in some cases the most appropriate, means of implementing the Act. Where the subject invention is useful primarily as a research tool, inappropriate licensing practices [i.e. exclusive and/or unnecessarily restrictive licenses] are likely to thwart rather than promote utilization, commercialization and public availability of the invention." See also "In the Public Interest: Nine Points to Consider in University Licensing," drafted and signed by Stanford University, the Association of American Medical Colleges, and 10 other leading U.S. universities in March 2007. Now available on the Association of University Technology Managers' website, with a list of more than 50 university signatories: "Endorse the Nine Points to Consider," available at www.autm.net/source/NinePoints/ninepoints_endorsement.cfm. Many other academic and scientific institutions have also emphasized the importance of maintaining broad, open distribution of academic knowledge.

128 "In the Public Interest: Nine Points to Consider in University Licensing," drafted and signed by Stanford University, the Association of American Medical Colleges, and 10 other leading U.S. universities in March 2007. Now available on the Association of University Technology Managers' website, with a list of more than 50 university signatories: "Endorse the Nine Points to Consider," available at www.autm.net/source/NinePoints/ninepoints_endorsement.cfm. See also "Guidelines Offered for Responsible University Licensing," available at http://news.stanford.edu/news/2007/march7/tech-030707.html?view=print

129 The four alliance agreements that scored 7 or higher for academic-use and sharing are: Iowa State-ConocoPhillips; Texas A&M-Chevron; University of Texas at Austin, Rice University and ten corporate sponsors; and Stanford University's Global Climate and Energy Project. (See Appendix 8 for details on how Stanford vastly enhanced protection of academic knowledge sharing in its revised 2008 contract, which raised Stanford-GCEP's composite 2002 & 2008 ranking). The BP-funded Energy Biosciences Institute agreement got an 8 ranking on the Shared side, but the BP-controlled proprietary side pulled its overall ranking down.

130 American Association for the Advancement of Science, press release, "R&D Funding Update on the 2009 Omnibus Bill - Congress Finalizes Omnibus Budget for FY2009 Increases Across All Major R&D Agencies," March 20, 2009, available at www.aaas.org/spp/rd/FY2009update.pdf. The Obama-Biden energy proposals are available at http://www.barackobama.com/issues/newenergy/index.php.

131 In the Obama campaign literature (see "Barack Obama and Joe Biden: New Energy for America", available at http://www.barackobama.com/pdf/factsheet_energy_speech_080308.pdf), there is no mention of U.S. universities as participants in this process.

132 American Association for the Advancement of Science, press release, "R&D Funding Update on the 2009 Omnibus Bill - Congress Finalizes Omnibus Budget for FY2009 Increases Across All Major R&D Agencies," March 20, 2009, available at www.aaas.org/spp/rd/FY2009update.pdf.

133 Code of Federal Regulations, Title 42: Public Health, Part 50: Policies of General Applicability, Subpart F: Responsibility of Applicants for Promoting Objectivity in Research for Which PHS Funding Is Sought, 42 U.S.C. 216, 289b–1, 299c–3, available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=9c7b4c7963318d568d2f03e3392768c2&rgn=div6&view=text&node=42:1.0.1.4.21.6&idno=42--as For more information, please also see "Frequently Asked Questions: Responsibility of Applicants for Promoting Objectivity in Research for which PHS Funding is Sought," available at http://grants2.nih.gov/grants/policy/coifaq.htm.

134 Written comments provided by John M. DeCicco, an expert on transportation and environment expert and a senior lecturer at the School of Natural Resources and Environment at the University of Michigan, December 13, 2009.

135 "In the Public Interest: Nine Points to Consider in University Licensing," a public interest statement drafted and signed by Stanford University, the Association of American Medical Colleges, and 10 other leading U.S. universities in March 2007. Now available on the Association of University Technology Managers' website, with more than 50 university signatories: "Endorse the Nine Points to Consider," available at www.autm.net/source/NinePoints/ninepoints_endorsement.cfm. See also "Guidelines Offered for Responsible University Licensing," available at news-service.stanford.edu/news/2007/march7/tech-030707.html.

Appendix one endnotes

1 Personal email communication with Neal Woodbury, Deputy Director and Chief Scientific Officer at the Biodesign Institute at Arizona State University, April 15 and April 30, 2010. For further information, see the following links: http://www.biodesign.asu.edu/research/projects/ better-biofuel ; http://asunews.asu.edu/20091102_energygrants

2 Personal email communication with Neal Woodbury, Deputy Director and Chief Scientific Officer at the Biodesign Institute at Arizona State University, April 15 and April 30, 2010. Final BP-ASU project funding figures were provided to this report's author by Grace O'Sullivan, Resource Proposal Analyst at Arizona State University's Biodesign Institute, in email correspondence dated April 30, 2010.

3 Joe Caspermeyer, "ASU Launches Renewable Biofuel Research Initiative with BP and SFAz," Arizona State University press release, November 2, 2007, available at http://www.biodesign.asu.edu/news/asu-launches-renewable-biofuelresearch-initiative-with-bp-and-sfaz.

4 Personal email communication with Neal Woodbury, Deputy Director and Chief Scientific Officer at the Biodesign Institute at Arizona State University, April 15 and April 30, 2010.

5 In response to CAP's July 2010 request for comments, one of our external legal experts, Jeremiah Miller, reviewed written comments provided by Neal Woodbury, Deputy Director and Chief Scientific Officer at the Biodesign Institute at Arizona State Univeresity, (August 8, 2010); and Augustine V. Cheng, Managing Director and Chief Legal Officer at Arizona Technology Enterprises at Arizona State University (August 9, 2010). On August 19, 2010, CAP later received additional comments from Dr. Rick Shangraw, Senior Vice President for Knowledge Enterprise Development at Arizona State University, which were not substantially different and so were not included in our final legal review.

6 Final funding contribution figures were provided to the author by Grace O'Sullivan, a Resource Proposal Analyst at Arizona State University's Biodesign Institute, in email correspondence dated April 30, 2010.

7 Letter with comments to CAP from Neal Woodbury, Deputy Director and Chief Scientific Officer at Arizona State University's Biodesign Institute, August 8, 2010.

8 Agreement No. 07088396 between BP Technology Ventures Inc. and Arizona Board of Regents (for and on behalf of Arizona State University), effective October 15, 2007 (hereafter referred to simply as the "BP-ASU Agreement") See letter included in Appendix A where these terms are explicitly referenced.

9 BP-ASU Agreement, Article IV (2)(b).

10 The National Institutes of Health generally recommends no more than a 30-to-60-day delay on academic research publication, which it considers adequate time for the corporate sponsor to file a provisional patent application and remove any sensitive proprietary information. See: Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html.

11 Letter with comments to CAP from Neal Woodbury, Deputy Director and Chief Scientific Officer at Arizona State University's Biodesign Institute, August 8, 2010.

12 BP-ASU Agreement, Article II.

13 BP-ASU Agreement, Article II.

14 BP-ASU Agreement, Article IV(2).

15 BP-ASU Agreement, Article IV (2)(a) and (b).

16 Original CCEP Agreement, 2002-2008, Section 3, 3.04.

17 BP-ASU Agreement, Article IV 6.

18 BP-ASU Article I defines the scope of work to be performed by reference to Exhibit A.

19 BP-ASU Agreement, Article IV, 4(a).

20 BP-ASU Agreement, Article IV, 4(c)

21 BP-ASU Agreement, Article IV, 4(c)(3)

22 BP-ASU Agreement, see letter included in Appendix A where these terms are explicitly referenced.

23 Letter with comments to CAP from Neal Woodbury, Deputy Director and Chief Scientific Officer at Arizona State University's Biodesign Institute, August 8, 2010.

24 BP-ASU Unredacted Agreement, Article IV, 4(b).

25 BP-ASU Agreement, see letter included in Appendix A where these terms are explicitly referenced.

Appendix two endnotes

1 In written comments dated 8/9/10, Graham Fleming, U.C. Berkeley's Vice Chancellor for Research, disagreed with the $500 million amount, asserting it to be $350 million. The author and our independent legal reviewer stand by the $500 million as described in the "Brief project description."

2 "Energy Biosciences Institute: Frequently asked questions," U.C. Berkeley press release, November 14, 2007, available at: http://www.berkeley.edu/news/media/releases/2007/11/14_ebi-faq.shtml.

3 Richard Brenneman, "UC Seeks Contractor for Helios Building," Berkeley Daily Planet, October 8, 2009, available at http://www.berkeleydailyplanet.com/issue/2009-10-08/article/33902.

4 Robert Sanders, "BP Selects UC Berkeley to Lead $500 Million Energy Research Consortium with Partners Lawrence Berkeley National Lab, University of Illinois," U.C. Berkeley press release, February 1, 2007, available at http://berkeley.edu/news/media/releases/2007/02/01_ebi.shtml. The final Energy Biosciences Institute (EBI) legal agreement, signed after nine months of intensive negotiations, is titled "Master Agreement, Between BP Technology Ventures Inc. and the Regents of the University of California," Final Execution, dated November 9, 2007 (hereafter referred to as "EBI Master Agreement") and is available at http://www.energybiosciencesinstitute.org/index.php?option=com_easyfaq&task=view&id=19&Itemid=93. The overall goal of the EBI is "to develop technically feasible and economically viable solutions to global energy challenges, with an emphasis on biofuels." See: EBI Master Agreement, Section 1.1.

5 EBI Master Agreement, Section 2.1.

6 "Energy Biosciences Institute: Frequently asked questions," U.C. Berkeley press release, November 14, 2007, available at http://www.berkeley.edu/news/media/releases/2007/11/14_ebi-faq.shtml.

7 On February 1, 2007, U.C. Berkeley formally announced that its EBI grant proposal had been accepted as the winner of BP's $500 million grant competition; see Rick DelVecchio, Mark Martin, "Cal to Be Hub for Study of Alternate Fuel: Group Headed by U.C. Berkeley Wins $500 Million Grant from BP," *San Francisco Chronicle*, February 1, 2007. After U.C. Berkeley issued this announcement it refused to make a copy of its EBI proposal to BP available to the public or journalists for nearly one month, arguing that the proposal was still in draft form and still needed to be finalized. U.C. Berkeley posted its original EBI proposal (dated November 2006) on the U.C. Berkeley website only after faculty members and students called for greater transparency, and several copies of the 2006 draft proposal were leaked to journalists. See Rick DelVecchio, "Blueprint for New Cal Bioscience Institute Plant Researcher from Stanford Likely to Be Director," *San Francisco Chronicle*, February 27, 2007, which is based on reporting from one of these leaked copies.

8 Letter with comments to CAP from Graham Fleming, U.C. Berkeley Vice Chancellor for Research, August 9, 2010.

9 Letter with comments to CAP from Graham Fleming, U.C. Berkeley Vice Chancellor for Research, August 9, 2010.

10 The overall goal of the EBI is "to develop technically feasible and economically viable solutions to global energy challenges, with an emphasis on biofuels." (EBI Master Agreement Section 1.1). Specifically, EBI will "encompass the study of biofuels production and other application of biology to the production, conversion, improvement, or delivery of fuels, energy, or the reduction or elimination of greenhouse gases or other pollutants of harmful byproducts of energy use, including but not limited to the following specific areas: 1) feedstock development (growing and harvesting plant material that can be used in biofuels), 2) biomass depolymerization (breaking down plant material for use in biofuels), 3) fossil fuel bioprocessing (converting heavy hydrocarbons to cleaner fuels), 4) carbon sequestration (removing or preventing increases in atmospheric carbon), 5) discovery and development support centers, 6) socio-economic systems (social and economic issues related to these new technologies), and 7) biofuels production." (EBI Master Agreement Section 2.1).

11 U.C. Berkeley Bear in Mind Conversation Series, online conversation between University of California, Berkeley Chancellor Robert J. Birgeneau and Dr. Steve Chu, Director of the Lawrence Berkeley National Laboratory, "What the Energy Biosciences Institute Means for U.C. Berkeley — and the World," March 2, 2007, available at http://www.berkeley.edu/news/chancellor/bim/mar07_transcript.shtml#two.

12 For a sampling of this campus and public criticism see: Editorial, "UC and the Perils of Partnerships," *San Francisco Chronicle*, Sunday, April 1, 2007; U.C. Berkeley Academic Senate, "Faculty forum on the Energy Biosciences Institute," March 8, 2007, with testimony from Robert Reich, the former Labor Secretary and other UC faculty and graduate students, Webcast available at: http://webcast.berkeley.edu/event_details.php?webcastid=19207 ; Consumer Watchdog.org, press release, "UC Deal With Oil Giant Sells Out University's Values," November 14, 2007; Rick DelVecchio, "UC faculty Critical of BP Deal: Professors Rail on Lack of Transparency, Academic Freedom," *San Francisco Chronicle*, March 9, 2007; Goldie Blumenstyk, "Skeptics Seek A Voice In Berkeley's Controversial Energy-Research Deal With BP," *Chronicle of Higher Education*, April 5, 2007; Stop BP-Berkeley Campaign (U.C. Berkeley student opposition group), press release, "UC Berkeley Releases Missing Section of BP Proposal Under Pressure From Student Campaign," April 12, 2007; Jennifer Washburn, "An Unholy Alliance? UC Berkeley's $500Million Deal With BP Challenges Traditional PublicPrivate Partnerships," *Sacramento Bee*, April 8, 2007.

13 See Energy Biosciences Institute Website, "EBI At-A-Glance," available at: http://www.energybiosciencesinstitute.org/index.php?option=com_content&task=blogsection&id=2&Itemid=3 .

14 For the figure cited here of "up to 50 BP employees," see the original EBI grant proposal to BP, dated November 2006, 91 pages, copy available from the author. Figures on the number of BP employees presently working at the EBI come from Graham Fleming, U.C. Berkeley's Vice Chancellor of Research, in written comments submitted to CAP on August 9, 2010. For a journalistic account of current EBI operations, see: Laurel Rosenhall, "BP Funds Search for Green Fuels at UC Berkeley," *Sacramento Bee*, June 6, 2010, available at: http://www.sacbee.com/2010/06/06/2801531/bp-funds-search-for-green-fuels.html#ixzz0xSCYF2Cj

15 Letter with comments to CAP from Graham Fleming, U.C. Berkeley Vice Chancellor for Research, August 9, 2010.

16 For more on BP's competitive grant competition, see discussion immediately above in text.

17 Charles Burress, "U.C. Berkeley, BP Finally Sign Contract for Research Project," *San Francisco Chronicle*, November 15, 2007.

18 Original EBI grant proposal to BP, dated November 2006, 91 pages, copy available from the author.

19 Cornell University, ad hoc Faculty Committee on Strategic Corporate Alliances, "Statement of Principles and Best Practices," April 2004 draft, available from the author. See also, Cornell University, "Faculty Statement of Principles & Best Practices Concerning Strategic Corporate Alliances," Fall 2005 Final Document, available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html. Please Note: To locate the final 2005 Cornell report online, first click on "Strategic Corporate Alliances (Oct 2003)," then at the next window click on "Final Document."

20 U.C. Berkeley Press Release, "Energy Biosciences Institute: Frequently Asked Questions," November 14, 2007, available at http://www.berkeley.edu/news/media/releases/2007/11/14_ebi-faq.shtml.

21 Letter with comments to CAP from Graham Fleming, U.C. Berkeley Vice Chancellor for Research, August 9, 2010.

22 Graham Fleming, U.C. Berkeley's Vice Chancellor for Research, argued against such a possibility in his written comments to CAP dated August 9, 2010: "The suggestion that the academic partners would feel constrained about exercising veto power over the funding sponsor is not accurate. UCB, UIUC and LBNL are top-tier research institutions. If the EBI partnership with BP proved not to be collegial and productive, we would seek alternative funding sources for our biofuels research. The potential for this university/private partnership hold great promise, but faculty would not participate in a venture that dictates their research directions or otherwise subverts their autonomy."

23 EBI Master Agreement, Section 12.

24 Personal comments provided by Sean O'Connor, the University of Washington law professor who served as a legal consultant.

25 See, for example, U.C. Berkeley Press Release, "Energy Biosciences Institute: Frequently Asked Questions," November 14, 2007, available at http://www.berkeley.edu/news/media/releases/2007/11/14_ebi-faq.shtml.

26 "Policy Guidelines Governing Openness and Freedom to Publish," issued by Joseph Cerny, U.C. Berkeley Provost of Research, to all deans, directors, department chairs, and administrative officers on May 6, 1991, available at http://research.chance.berkeley.edu/page.cfm?id=171#cerny.

27 "Policy Guidelines Governing Openness and Freedom to Publish."This policy further states: "The principal reasons that classified projects are unacceptable are (1) the resultant requirement for a campus facility clearance and (2) the inherent publication restrictions. In general, classified projects are not consistent with the teaching, research, and public service missions of the Berkeley campus."

28 The Recitals section of the final EBI Master Agreement asserts: "the Proprietary Component [of the EBI]…will conduct private, confidential and proprietary research, the product of which will be the sole property of BP," p. 4.

29 Regarding the external public criticism this provision elicited, see: Editorial, "UC and the Perils of Partnership," *San Francisco Chronicle*, April 1, 2007, available at http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2007/04/01/EDG5GOTV2L1.DTL. See also Jennifer Washburn, Opinion Commentary, "Big Oil Buys Berkeley," *Los Angeles Times*, March 24, 2007, available at http://www.latimes.com/news/opinion/la-oe-washburn-24mar24,0,4865913.story?coll=la-opinion-center. In U.C. Berkeley's original draft EBI proposal to BP (dated November 2006), this language granting BP the right to perform confidential, non-publishable research on campus was expressed even more baldly: "BP personnel will engage in proprietary research in the leased space and will have no obligation to publish research performed in the leased space." See U.C. Berkeley EBI Draft Proposal to BP, dated November 2006, Section II, Intellectual Property, p. 73.

30 Letter with comments to CAP from Graham Fleming, U.C. Berkeley Vice Chancellor for Research, August 9, 2010.

31 EBI Master Agreement. Also see Goldie Blumenstyk, "BP Gets Good Terms in U. of California Deal," *The Chronicle of Higher Education*, Pg. 21, Vol. 54, No. 13, November 23, 2007, quoting U.C. Berkeley's assistant vice chancellor for intellectual property and industry research alliances Carol Mimura.

32 EBI, Sponsored Research Agreement 8.12.1(a), (b).

33 U.C. Berkeley Academic Senate, faculty committee letter/report addressed to Professor William Drummond, Chair of the Berkeley Division of the Academic Senate, dated November 2, 2007. In this letter, a Senate committee made up of five faculty (Ellwood, Hesse, Kutz, Villas Boas, Moore), informally known as the "Gang of Four-plus," reported back to Chairman Drummond, regarding eight stated areas of Academic Senate concern regarding BP-funded Energy Biosciences Institute; see pp. 3-4 for quoted section.

34 Ibid.

35 Rick DelVecchio, "UC Faculty to Join Talks on Big BP Biofuels Deal; They Want Campus Values Retained Despite Partnership," *San Francisco Chronicle*, March 31, 2007, p. B1, available at http://articles.sfgate.com/2007-03-31/bay-area/17237632_1_academic-senate-bp-faculty. See also: Goldie Blumenstyk, "Berkeley Professors Seek Voice in Research Institute Deal with Energy Company," *Chronicle of Higher Education*, April 13, 2007, Vol. 53, Issue 32, p. A33, available at http://chronicle.com/article/Berkeley-Professors-Seek-Voice/27238.

36 U.C. Berkeley Academic Senate, faculty committee letter/report addressed to Professor William Drummond, Chair of the Berkeley Division of the Academic Senate, dated November 2, 2007, cited just above; this letter lists many of the Academic Senate's stated concerns regarding the BP-EBI.

37 "Keasling Heads New BioEnergy Institute," Bioengineering in the News, U.C. Berkeley press release, June 2007, available at: http://bioeng.berkeley.edu/keasling/heads/new/bioenergy/institute.php

38 See main report's Conflict of Interest sidebar on pages 64 and 65.

39 Letter with comments to CAP from Graham Fleming, U.C. Berkeley Vice Chancellor for Research, August 9, 2010.

40 Regarding possible conflicts of interest on the EBI Executive Committee, U.C. Chancellor Graham Fleming wrote: "The report's purported discovery of conflict of interest problems in the operation of EBI's Executive Committee is also unfounded and inaccurate. Because the Executive Committee is charged with making decisions about all aspects of the EBI function, it is important that members of the committee be actively engaged in EBI research. The academic members of the EBI Executive Committee are among Berkeley's and the University of Illinois-UC's most committed and talented scientists in the area of the EBI's research mission. It would be absurd to bar them either from a leadership role in the institute or from receiving EBI funding for their research. Executive Committee members are required to recuse themselves and leave the room when their own proposals are being discussed," (Source: Letter with comments to CAP from Graham Fleming, U.C. Berkeley Vice Chancellor for Research, August 9, 2010.)

41 EBI Sponsored Research Agreement, Exhibit 3, DOE Waiver Materials.

42 Stephen P. Rothman, Thelen Reid Brown Raysman & Steiner LLP, "Preference for United States Manufacturing," posted at http://www.sbir.gov/links/topics/rothman_stephen_us_manufacturing.htm.

43 EBI Master Agreement, 17.1

44 What follows are responses from our outside legal expert, Jeremiah Miller, to the three purported factual errors in this paragraph that Graham Fleming, U.C. Berkeley's Vice Chancellor for Research, cited in his comment letter to CAP dated August 9, 2010. 1) Regarding Fleming's assertion that the total dollar value of the EBI agreement is $350 million, not $500 million: This number appears to be derived from BP's promise to pay a minimum of $35 million per year into the Open Side of the EBI. (Master Agreement 3.1). As the term of the agreement is 10 years, the total obligated to the Open side is $350 million (Master Agreement 12.1). However, the EBI also has a Proprietary Side, run by and for BP (Master Agreement, 2.2, 4.1.9, 8.2.2, 8.2.6, 16.2.5). According the EBI website set up by Berkeley, BP has pledged to pay $15 million per year into that proprietary component. This gives a total BP investment in the EBI of $500 million over 10 years, as explained in our report.

2) Regarding Mr. Fleming assertion that the Helios building is "not related" to the EBI: This is contradicted by Fleming, himself, when his letter later states that the Helios building, now being constructed, will house EBI. Chancellor Fleming also confirms that the building was partially funded by a state bond. Ultimately, this description is consistent with our report.

3) Regarding Fleming's assertion that BP does not exert "excessive influence" over the research portfolios of the EBI's three academic partners. In his written comments, Fleming asserts that: "Equal representation on the Governance Board was a negotiated compromise to encourage collaborative decision-making and is reflective of the spirit of cooperation that epitomizes the EBI endeavor. The goal of the initial proposal for majority academic control over EBI's main governing body was to ensure that BP would not have veto power over operational and research decisions. That goal was preserved and protected in the final agreement." Our outside legal experts disagree in their detailed contract review (see Review Question #1 in this Appendix for a detailed discussion).

45 EBI Master Agreement, Section 4.1.3.

46 U.C. Berkeley Press Release, "Energy Biosciences Institute: Frequently Asked Questions," November 14, 2007, available at http://www.berkeley.edu/news/media/releases/2007/11/14_ebi-faq.shtml.

47 Letter with comments to CAP from Graham Fleming, U.C. Berkeley Vice Chancellor for Research, August 9, 2010..

48 EBI Master Agreement Section 4.1.6(a).

49 EBI Master Agreement, Section 12,

50 EBI Master Agreement, Section 2.2.2 and 2.2.2(a).

51 EBI Master Agreement Section 6.4; EBI Sponsored Research Agreement, Exhibit 2.

52 See, for example, U.C. Berkeley Press Release, "Energy Biosciences Institute: Frequently Asked Questions," November 14, 2007, available at http://www.berkeley. edu/news/media/releases/2007/11/14_ebi-faq.shtml ;and U.C. Berkeley Press Release, Energy Biosciences Institute, «Energy Biosciences Institute Funds First 49 Projects,» May 5, 2008, availalble at: http://www.energybiosciencesinstitute.org/index.php?option=com_content&task=view&id=184

53 EBI Sponsored Research Agreement, Section 6.

54 Ibid.

55 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html.

56 EBI Sponsored Research Agreement, 5.

57 EBI Section 2.1.

58 EBI Master Agreement, 5.5.2.

59 In an email dated March 3, 2008, Robert Sanders, the Manager of Science Communications at U.C. Berkeley's Office of Media Relations, confirmed that the EBI executive committee had eight members. They are: Chris Somerville, EBI director and U.C. Berkeley faculty member; Stephen Long, EBI deputy Director and UIUC faculty member; Paul A. Willems, EBI associate director and BP employee; Adam Arkin, UCB faculty member and LBNL scientist; Evan H. DeLucia, UIUC faculty member; Daniel M. Kammen,

60 EBI Master Agreement, Section 5.5.1 and 5.5.4.

61 According to the EBI Agreement, these academic-type functions include: developing the "annual EBI strategic work plan and budget": making the "annual call for faculty research proposals consistent with the strategic plan"; reviewing and evaluating those faculty proposals; and making recommendations to the Governance Board on which ones should be selected for final grant awards. See: EBI Master Agreement, Section 5.5.2.

62 EBI Master Agreement, 5.5.4.

63 EBI Master Agreement, 5.5.3.

64 EBI Master Agreement, Sections 5.5.2 through 6.5.

65 EBI Master Agreement, 6.4.

66 EBI Sponsored Research Agreement, Exhibit 2.

67 EBI Sponsored Research Agreement Section 8.4, 8.5.

68 EBI Sponsored Research Agreement Section 8.3.1.

69 EBI Sponsored Research Agreement Section 8.3.2.

70 EBI Sponsored Research Agreement, Exhibit 8, Section 3.

71 EBI Sponsored Research Agreement, 8.5.3.

72 EBI Sponsored Research Agreement, Section 8.12.1(b).

73 EBI Sponsored Research Agreement, Exhibit 8 Section 3.

74 Stephen P. Rothman, Thelen Reid Brown Raysman & Steiner LLP, "Preference for United States Manufacturing," posted at http://www.sbir.gov/links/topics/rothman_stephen_us_manufacturing.htm.

75 EBI Sponsored Research Agreement, Exhibit 3, DOE Waiver Materials.

76 EBI Sponsored Research Agreement, Disclaimer, Section 8.14.3.

77 The Contract's language related to software inventions reads as follows: "It is understood that if BP enters into an exclusive license in respect of Project Software, Research Collaborators' retained rights to use, reproduce, distribute, perform, display and prepare derivative works within the Field shall be limited to the research and education purposes within each of the applicable Research Collaborators *and other academic institutions and not-for-profit institutions* [emphasis added]." See: EBI, Sponsored Research Agreement, Copyright, Section 8.9.

78 "In the Public Interest: Nine Points to Consider in Licensing University Technology," a collective academic statement regarding best practices in academic licensing, issued on March 6, 2007, which has now been signed by more than 50 prominent U.S. universities (including the University of California, an original signer, available at http://www.autm.net/Nine_Points_to_Consider.htm. For an up-to-date list of all the universities that have endorsed this "Nine Points" statement, see the Association of University Technology Managers at http://www.autm.net/source/NinePoints/ninepoints_endorsement.cfm.

79 EBI Sponsored Research Agreement, Exhibit 4.

80 EBI Master Agreement, Section 4.1.6(c).

Appendix three endnotes

1 University of California at Davis press release, "Chevron to Fund Major Biofuel Research Projects at U.C. Davis," Sept. 19, 2006, available at http://www.news.ucdavis.edu/search/printable_news.lasso?id=7873&table=news.

2 "Chevron Endows Chair in Energy Efficiency at the University of California, Davis," Chevron press release, available at http://www.chevron.com/News/Press/release/?id=2009-01-13.

3 See "Research Agreement Between Chevron Technology Ventures, LLC and Regents of University of California," effective August 25, 2006 (hereafter referred to as "UC Davis-Chevron Agreement"). The Agreement states only that U.C. Davis will be "engag[ing] in and facilitate[ing] energy technology development, assessments, demonstration projects, and policy guidance based on scientific facts, engineering principles and economic realties," Recitals, Section B.

4 U.C. Davis-Chevron Agreement, Recitals Section B.

5 U.C. Davis press release, "Chevron to Fund Major Biofuel Research Projects at U.C. Davis," September 19, 2006, available at: http://www.news.ucdavis.edu/search/news_detail.lasso?id=7873.

6 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html.

7 U.C. Davis-Chevron Agreement, Section 6.3.1.

8 U.C. Davis-Chevron Agreement, Section 6.6.2.

9 U.C. Davis-Chevron Agreement, Section 6.6.3.

10 U.C. Davis-Chevron Agreement, Section 6.6.1.

11 U.C. Davis-Chevron Agreement, Section 6.10.

12 U.C. Davis-Chevron Agreement, Section 6.4.2.

13 U.C. Davis-Chevron Agreement, Section 3.1.

14 U.C. Davis-Chevron Agreement, Section 6.3.1.

15 U.C. Davis-Chevron Agreement, Section 6.2.1.1.

16 U.C. Davis-Chevron Agreement, Section 6.3.1.

17 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html.

18 U.C. Davis-Chevron Agreement, Section 6.2.1.2.

19 The U.C. Davis-Chevron Agreement states only that U.C. Davis will be "engag[ing] in and facilitate[ing] energy technology development, assessments, demonstration projects, and policy guidance based on scientific facts, engineering principles and economic realties," Recitals, Section B.

20 U.C. Davis-Chevron Agreement, Recitals, Section B.

21 U.C. Davis press release, "Chevron to Fund Major Biofuel Research Projects at U.C. Davis," September 19, 2006, available at http://www.news.ucdavis.edu/search/news_detail.lasso?id=7873.

22 U.C. Davis-Chevron Agreement, Section 3.1.

23 U.C. Davis-Chevron Agreement, Section 6; 6.6.2.

24 U.C. Davis-Chevron Agreement, Section 6.6.1.

25 U.C. Davis-Chevron Agreement, Section 6.4.2.

26 U.C. Davis-Chevron Agreement, Section 6.6.2.

27 U.C. Davis-Chevron Agreement, Section 6.6.3.

28 28 The range of acceptable royalties is to be determined based on the following list of factors cited in the U.C. Davis-Chevron Agreement:

(i) "[t]ime and [e]ffort supplied by the licensee, subsequent to licensing the developed technology" (Section 6.6.3.1);

(ii) "[a]mount of cost savings to licensee through use of the licensed technology" (Section 6.6.3.2);

(iii) "[l]ikelihood of commercializing the licensed technology" (Section 6.6.3.3);

(iv) "[r]oyalties for comparable technologies" (Section 6.6.3.4);

(v) "[r]oyalties found by courts to be reasonable for comparable technologies" (Section 6.6.3.5);

(vi) "[p]rofit margin for comparable technologies" (Section 6.6.3.6)

29 U.C. Davis-Chevron Agreement, Section 6.6.1

30 U.C. Davis-Chevron Agreement, Section 6.10.

31 U.C. Davis-Chevron Agreement, Section 6.7.

32 "In the Public Interest: Nine Points to Consider in Licensing University Technology," a collective academic statement regarding best practices in academic licensing, issued on March 6, 2007, which has now been signed by more than 50 prominent U.S. universities (including the U. of California, an original signer; available at http://www.autm.net/Nine_Points_to_Consider.htm. For an up-todate list of all the universities that have endorsed this "Nine Points" statement, see the Association of University Technology Managers website at http://www.autm.net/source/NinePoints/ninepoints_endorsement.cfm.

Appendix four endnotes

1 "Colorado School of Mines Receives $1.2 Million Gift From Chevron," Colorado School of Mines press release, August 27, 2008, available at http://www.mines.edu/Colorado_School_of_Mines_receives_1_2_million_gift_from_Chevron.

2 The agreement was modified by an amendment, effective May 9, 2005; the amendment changed some terminology and the composition of the governing board. (Amendment, Section 1)

3 See description of Center for Research Excellence (CoRE) facilities at the Colorado School of Mines website, http://ccore.mines.edu/About_CoRE/About_CoRECoRE_Facilities.html.

4 Ibid.

5 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," dated February 23, 2004, Sections 4.1, 4.1.2.

6 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Amendment Section 3.2.

7 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Attachment B, Section 1.

8 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Amendment, Section 4.1; Agreement Sections 1, 4.

9 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Agreement, Section 11.

10 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Amendment, Attachment A, Oversight.

11 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Agreement, Sections 4.1, 4.1.2.

12 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Attachment B, Section 1, emphasis added.

13 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Attachment B, Section 1.

14 See: Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html.

15 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Attachment C, Sec. 1 and 3.

16 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Attachment B, Section 1.

17 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Amendment Section 3.2.

18 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Amendment, Attachment A, "Project Selection Criteria."

19 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Agreement, Section 11.

20 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Attachment B, Section 2.3.

21 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines,",Attachment B, Sections 2.3, 2.5.

22 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Attachment B, Section 2.5.

23 "Agreement for the Center of Research Excellence at the Colorado School of Mines, between ChevronTexaco Energy Technology Company and the Colorado School of Mines," Attachment B, Section 2.4.

24 "In the Public Interest: Nine Points to Consider in Licensing University Technology," a collective academic statement regarding best practices in academic licensing, issued on March 6, 2007, which has now been signed by more than 50 prominent U.S. universities (including the U. of California, an original signer; available at http://www.autm.net/Nine_Points_to_Consider.htm. For an up-todate list of all the universities that have endorsed this "Nine Points" statement, see the Association of University Technology Managers website at http://www.autm.net/source/NinePoints/ninepoints_endorsement.cfm.

Appendix five endnotes

1 Colorado Center for Biorefining and Biofuels, Sponsoring Members, available at http:// www.c2b2web.org/2SponsorMem.php.

2 Calculations based on written comments we received on August 9, 2010 from C2B2's Executive Director Alan W. Weimer,

3 Ibid.

4 Comment letter to CAP from Alan W. Weimer, Executive Director of C2B2, based at the U. of Colorado at Boulder, dated August 9, 2010.

5 "Biofuels Center Formed," *Denver Business Journal*, March 19, 2007, available at http://www.bizjournals.com/denver/stories/2007/03/19/daily2.html ; "CSU, institutional research partners announce Colorado Center for Biorefining and Biofuels," Colorado State University press release, March, 19, 2007 available at http://today.colostate.edu/index.asp?url=display_story&story_id=1001550. Also see the preamble to the "Center for Biorefining and Biofuels, Center for Shared Research and Training, Membership Agreement," which reads: "the parties to this Agreement intend to join together in a collaborative effort to support [C2B2] and to develop and maintain facilities whereby the capabilities of the Participating Institutions can be used to advance research, education, and training in the broad areas of biorefining and biofuels."

6 Author's taped phone interview with Alan W. Weimer, C2B2's Executive Director, November 29, 2007.

7 Comment letter to CAP from Alan W. Weimer, Executive Director of C2B2, headquartered at the U. of Colorado at Boulder, dated August 9, 2010.

8 C2B2 Membership Agreement, A(3)(4).

9 The C2B2 Membership Agreement and By-Laws state that selection of faculty research projects will be decided by the Center Executive Board (CEB) composed of six members: an executive director (initially appointed by the University of Colorado and afterward by the four participating non-profit research institutions); a managing director (who is nonvoting); and four site directors (one from each of the non-profit research institutions). This would suggest that faculty research projects are selected by an academic board, if the written agreement were being followed. Center for Biorefining and Biofuels, CEB By-Laws, Organization 2, 4, 5 and Sponsoring Members 4(ii).

10 Comment letter to CAP from Alan Weimer, Executive Director of C2B2, headquartered at the U. of Colorado at Boulder, August 9, 2010, page 1.

11 According to the agreement, C2B2 is administered by a 6 member Center Executive Board whose members are drawn from and selected by the four Participating Institutions (By-Laws, Organization (4)). The CEB consists of an Executive Director (initially appointed by UC-Boulder, thereafter selected by the CEB with unanimous consent of "senior research officers from the Participating Institutions" (By-Laws, Organization (2)); the non-voting Managing Director

(nominated by the Executive Director and approved by the CEB (By-Laws, Organization (5)); and four Site Directors (one from each of the four Participating Institutions (the four publicly funded research institutions) and selected by each Institution).

12 Weimer listed the following criteria: "innovation and impact, quality of research team, responsiveness to topical areas, alignment with Center mission," (Comment letter to CAP from Alan Weimer, Executive Director of C2B2, headquartered at the U. of Colorado at Boulder, August 9, 2010, page 1).

13 Comment letter to CAP from Alan Weimer, Executive Director of C2B2, headquartered at the U. of Colorado at Boulder, August 9, 2010, page 1.

14 C2B2 By-Laws, Sponsoring Members (4)(ii).

15 In a taped phone interview with the author, on November 29, 2007, Alan Weimer said the following: "So we have 27 companies [the industry sponsors] and they all have an equivalent voting power, the small and the big, and there's a request for proposals from the [industry] members. So they'll give us a one- or two-sentence description of an area where they're looking for a proposal to be submitted. Then we go back to our principle [academic] investigators, and they write up project descriptions and propose different projects.

"We ended up getting 65 of those [faculty proposals]. And then we put those on a secure server with a password and an ID that the 27 companies could use to evaluate those proposals. Based upon their evaluations, the top 20 proposals were selected and those PIs [Principal Investigators] were invited to the meeting and had five minutes to actually present the work. So in the end industry selects the final 10."

According to Weimer, on C2B2's shared research side, which the agreement stated was supposed to be more academically driven, it is the industry sponsors who write up the «requests for faculty research proposals» and make all final research award selections. "The reason that we let them [the industry sponsors] decide, instead of us, is because some of the academic directors of C2B2 [including Weimer, himself, he said] had proposals [they had submitted for possible funding] and so there was a concern with conflicts of interest," he explained. "So to avoid conflict of interest, we let the companies make the decision on this." When the author asked Weimer if this research selection procedure would be permanent, or if it was an exception, he replied: "No, that'll probably always be the case."

16 This quote comes from Jeremiah Miller, one of two legal experts that CAP consulted with to perform an independent analysis of the 10 university-industry alliance agreements featured in this report. Here he is responding specifically to written comments from C2B2's Alan Weimer to CAP, dated August 9, 2010.

17 Alan W. Weimer writes: "For sponsored research programs the corporate member (sponsor) provides broad areas for research in a request for proposals and C2B2affiliated faculty provide research project descriptions in response. The corporate sponsor elects if they are interested in funding a particular submitted project proposal and the C2B2 affiliated faculty member can elect to accept funding or decline funding based on the terms," (Comment letter to CAP from Alan Weimer, Executive Director of C2B2, headquartered at the U. of Colorado at Boulder, August 9, 2010, page 5.)

18 C2B2 By-Laws, Activities (2) and (3).

19 C2B2 Membership Agreement, A(4).

20 Comment letter to CAP from Alan Weimer, Executive Director of the Colorado Center for Biofuels and Biorefining, headquartered at the U. of Colorado at Boulder, August 9, 2010, page 7.

21 This quote comes from Jeremiah Miller, one of two legal experts that CAP consulted with to perform an independent analysis of the 10 university-industry alliance agreements featured in this report. Here, he is responding specifically to written comments from C2B2's Alan Weimer to CAP, dated August 9, 2010.

22 C2B2 By-Laws, Organization (4)

23 C2B2 By-Laws, Organization (2)(5)

24 C2B2 By-Laws, Sponsoring Members (3)(4).

25 C2B2 By-Laws, Sponsoring Members (4)(i).

26 C2B2 By-Laws, Sponsoring Members 4(ii).

27 C2B2 Membership Agreement E(1) and (2); By-Laws, Publications and Patents (1).

28 C2B2 Membership Agreement E(1).

29 C2B2 By-Laws, Publications and Patents (1). Note that the agreement does not provide for any delay in presentation, merely for review, C2B2 Agreement E(2). However, since the By-Laws set a maximum allowable delay on presentations as well as publications, our external reviewers have assumed such a delay could be applied.

30 C2B2 Membership Agreement E(1).

31 C2B2 Membership Agreement E(2).

32 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html.

33 C2B2 By Laws, Activities (5).

34 C2B2 CEB By-Laws, Organization 2, 4, 5 and Sponsoring Members 4(ii).

35 C2B2 By-Laws, Sponsoring Members (4)(ii).

36 C2B2 By-Laws, Sponsoring Members (3)-(4).

37 C2B2 By-Laws, Sponsoring Members (4)(i).

38 C2B2 By-Laws, Sponsoring Members (4)(ii).

39 Colorado Center for Biorefining and Biofuels website, see industry sponsorship tab, available at http://www.c2b2web.org/3RSponsor.php.

40 C2B2 Membership Agreement F(5).

41 C2B2 Membership Agreement, F(8).

42 "In the Public Interest: Nine Points to Consider in Licensing University Technology," a collective academic statement regarding best practices in academic licensing, issued on March 6, 2007, which has now been signed by more than 50 prominent U.S. universities (including the U. of California, an original signer; available at http://www.autm.net/Nine_Points_to_Consider.htm. For an up-to-date list of all the universities that have endorsed this "Nine Points" statement, see the Association of University Technology Managers website, http://www.autm.net/source/NinePoints/ninepoints_endorsement.cfm.

Appendix six endnotes

1 The author conducted phone interviews with Jilda Garton, Associate Vice Provost for Research at Georgia Tech, on October 18, 2007, and with Roger Webb, founder and Interim Director of the Strategic Energy Institute at Georgia Tech, on November 6, 2007.

2 Georgia Tech-Chevron Agreement, Recitals Section.

3 Georgia Tech-Chevron Agreement, Section 2.3.

4 These quotes come from the author's taped phone interview with Roger Webb, founder and Interim Director of the Strategic Energy Institute at Georgia Tech, on November 6, 2007.

5 Georgia Tech-Chevron Agreement, Section 2.3.

6 Georgia Tech-Chevron Agreement, Section 3.1.

7 These quotes come from the author's taped phone interview with Roger Webb, the founder and Interim Director of the Strategic Energy Institute at Georgia Tech, on November 6, 2007.

8 These quotes all come from the author's taped phone interview with Roger Webb, the founder and Interim Director of the Strategic Energy Institute at Georgia Tech, on November 6, 2007.

9 These quotes come from the author's taped phone interview with Roger Webb, the founder and Interim Director of the Strategic Energy Institute at Georgia Tech, on November 6, 2007.

10 Georgia Tech-Chevron Agreement, Section 6.5.4.

11 Georgia Tech-Chevron Agreement, Section 2.3.

12 Georgia Tech-Chevron Agreement, Section 2.3.

13 Georgia Tech-Chevron Agreement, Section 3.1.

14 Georgia Tech-Chevron Agreement, Section 6.3.1.

15 Georgia Tech-Chevron Agreement, Section 6.3.1.

16 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html.

17 Georgia Tech-Chevron Agreement, Section 6.2.1.2 and 6.3.1.

18 Georgia Tech-Chevron Agreement, Recitals Section.

19 Author's taped interview with Roger Webb, founder and Interim Director of the Strategic Energy Institute at Georgia Tech, on November 6, 2007

20 Georgia Tech-Chevron Agreement, Section 2.3.

21 Georgia Tech-Chevron Agreement, Section 3.1.

22 Georgia Tech-Chevron Agreement, Section 6.6.2.

23 Georgia Tech-Chevron Agreement, Section 6.6.1.

24 Georgia Tech-Chevron Agreement, Section 6.6.3.

25 (i) "[v]alue and extent of either Party's Background IP required for practicing the licensed technology" (Section 6.6.3.1);

(ii) "[a]mount of funding provided by [Chevron]" (Section 6.6.3.2);

(iii) "[t]ime and [e]ffort supplied by [Chevron]" (Section 6.6.3.3);

(iv) "[t]ime and [e]ffort supplied by GTRC" (Section 6.6.3.4);

(v) "[a]mount of cost savings to licensee through use of the licensed technology" (Section 6.6.3.5);

(vi) "[l]ikelihood of commercializing the licensed technology" (Section 6.6.3.6);

(vii) "[r]oyalties for comparable technologies" (Section 6.6.3.7);

(viii) "[r]oyalties found by courts to be reasonable for comparable technologies" (Section 6.6.3.8);

(ix) "[p]rofit margin for comparable technologies" (Section 6.6.3.8).

26 Georgia Tech-Chevron Agreement, Section 6.7.

27 "In the Public Interest: Nine Points to Consider in Licensing University Technology," a collective academic statement regarding best practices in academic licensing, issued on March 6, 2007, which has now been signed by more than 50 prominent U.S. universities (including the U. of California, an original signer; available at http://www.autm.net/Nine_Points_to_Consider.htm. For an up-to-date list of all the universities that have endorsed this "Nine Points" statement, see the Association of University Technology Managers website, http://www.autm.net/source/NinePoints/ninepoints_endorsement.cfm. This statement further explains that this academic use provision is critically important for the purpose of "preserving the ability of all universities to perform research, ensuring that researchers are able to publish the results of their research in dissertations and peer reviewed journals and that other scholars are able to verify published results without concern for patents."

Appendix seven endnotes

1 Written comment letter to CAP from Paul Tanaka, University Counsel, Iowa State University, August 11, 2010.

2 "ConocoPhillips Establishes $22.5 Million Biofuels Research Program at Iowa State," Iowa State University press release, April 10, 2007, available at http:// www.public.iastate.edu/~nscentral/news/2007/apr/biofuels.shtml.

3 ConocoPhillips-ISU Sponsored Projects Agreement, Recitals.

4 Responding to the sentence above, Paul Tanaka writes: "This sentence assumes that voting and management structures are necessary. This assumption is certainly not based on any legal requirement. Establishment of consonance of interest occurs through the proposal process. ISU, based upon its capacity and expertise proposes areas of research. ConocoPhillips decides whether the proposal fits with its interest in funding the research." (Source: Written comment letter to CAP from Paul Tanaka, University Counsel, Iowa State University, August 11, 2010.)

5 Written comment letter to CAP from Paul Tanaka, University Counsel, Iowa State University, August 11, 2010, cover letter, page 1.

6 Cornell University, "Faculty Statement of Principles Best Practices Concerning Strategic Corporate Alliances" (2005), p 21, available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html Please Note: To locate the final 2005 report, first click on "Strategic Corporate Alliances (Oct 2003), then at the next window click on "Final Document."

7 Here is what Iowa State's General Counsel, Paul Tanaka, wrote regarding peer review: "The assumption here is that independent peer review is always required for research. This is fundamentally mistaken. The Federal model of funding based upon peer review is only one model. Funding for research for years has occurred through multiple channels, the majority of which do not require independent peer review (as the term is used here: review by persons outside the funding agency and the entity seeking the funding). The way funding occurs depends generally on the party funding the research. Sometimes there is great trust, and sometimes there are great controls on selection of processes. Universities receive bequests and gifts to conduct research in specific areas. It is common to have internal peer review of proposals with donated funds, even if the bequest or gift does not require it. If independent peer review is not required by the bequest or gift, is there something per-se wrong? (Source: Written comment letter to CAP from Paul Tanaka, University Counsel, Iowa State University, August 11, 2010.)

8 Personal tape-recorded interview with Lisa Lorenzen, Iowa State University's then vice president of research and economic development and current Director of Industry Relations, on October 10, 2007.

9 Here is how Paul Tanaka, Iowa State University's General Counsel, described how the ConocoPhillips-ISU alliance is now evaluating, selecting and awarding funds to faculty research projects: "Each year, in late spring we issue an RFP (Request for Proposals) that lists the areas of research they [ConocoPhillips' staff] are interested in. The proposals are due mid-summer. In late summer they [ConocoPhillips' staff] select the subset of proposals that they are interested in and have face-to-face meetings with the [ISU] researchers that prepared the proposals. Based on these meetings, they [ConocoPhillips' staff] select the proposals that will be funded in early fall. The timing is based on ConocoPhillips fiscal year, which follows the calendar year, and allowing enough time for faculty to make commitments to graduate students starting in January.

I want to emphasize that ConocoPhillips does not prescribe the research—they describe the areas of research they are interested in, or the problems that need solved and our researchers prepare proposals on how to address these issues." (Source: Written comment letter to CAP from Paul Tanaka, University Counsel, Iowa State University, August 11, 2010.)

10 Comments from Jeremiah Miller, one of the external legal experts who analyzed the 10 university-industry-research alliance agreements featured in this report.

11 ConocoPhillips-ISU Sponsored Projects Agreement, Section 6.1.

12 ConocoPhillips-ISU Sponsored Projects Agreement, Section 5.1.

13 ConocoPhillips-ISU Sponsored Projects Agreement, Section 6.9.

14 ConocoPhillips-ISU Sponsored Projects Agreement, Recitals.

15 ConocoPhillips-ISU Sponsored Projects Agreement, Recitals.

16 Here is what Iowa State University's General Counsel, Paul Tanaka, wrote to CAP regarding peer review: "The assumption here is that independent peer review is always required for research. This is fundamentally mistaken. The Federal model of funding based upon peer review is only one model. Funding for research for years has occurred through multiple channels, the majority of which do not require independent peer review (as the term is used here: review by persons outside the funding agency and the entity seeking the funding). The way funding occurs depends generally on the party funding the research. Sometimes there is great trust, and sometimes there are great controls on selection of processes. Universities receive bequests and gifts to conduct research in specific areas. It is common to have internal peer review of proposals with donated funds, even if the bequest or gift does not require it. If independent peer review is not required by the bequest or gift, is there something per-se wrong?" (Source: Written comment letter to CAP from Paul Tanaka, University Counsel, Iowa State University, August 11, 2010.)

17 ConocoPhillips-ISU Sponsored Projects Agreement, Section 5.1.

18 ConocoPhillips-ISU Section 5.1.

19 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html

20 ConocoPhillips-ISU Sponsored Projects Agreement, Section 4.3.

21 ConocoPhillips-ISU Sponsored Projects Agreement, Section 3.5.

22 ConocoPhillips-ISU Sponsored Projects Agreement, Section 3.5.

23 ConocoPhillips-ISU Sponsored Projects Agreement, Section 3.5.

24 ConocoPhillips-ISU Sponsored Projects Agreement, Section 6.1.

25 ConocoPhillips-ISU Sponsored Projects Agreement, Section 6.6.

26 ConocoPhillips-ISU Sponsored Projects Agreement, Section 6.9.

27 ConocoPhillips-ISU Sponsored Research Agreement, Section 14.3.

28 Institute of Medicine, Report Brief, "Conflict of Interest in Medical Research, Education, and Practice," Committee on Conflict of Interest in Medical Research, Education, and Practice, National Academy of Sciences, Washington DC, 2009, available at: http://www.iom.edu/Reports/2009/Conflict-of-Interest-in-Medical-Research-Education-and-Practice.aspx

29 Ibid, p. 46.

30 Ibid, p. 26.

31 Ibid, p. 26.

Appendix eight endnotes

1 Written comments, emailed to the Center for American Progress from Sally Benson, GCEP's director, cover letter and comments, 9 pages total, August 9, 2010.

2 Section 1.03 of the 2002 GCEP Agreement states: "The Project will commence on December 16, 2002, and, unless sooner terminated pursuant to Article 11, or unless extended by agreement of the parties, will terminate on the date specified in Part II of Exhibit A: August 31, 2005." This is a total of close to 32 months or nearly three years. (GCEP Agreement, 2002, Section 1.03.)

3 Written comments emailed to the Center for American Progress from Sally Benson, GCEP's director, cover letter and comments, 9 pages total, August 9, 2010.

4 Written comments emailed to the Center for American Progress from Sally Benson, GCEP's director, cover letter and comments, 9 pages total, August 9, 2010.

5 GCEP mission, as stated on GCEP website: http://gcep.stanford.edu/about/index.html.

6 Written comments, emailed to Center for American Progress from Sally Benson, GCEP's director, cover letter and attachment, 9 pages total, August 9, 2010; and "GCEP Preliminary Comments," emailed to Center for American Progress via email by Maxine Lym, Communications Manager, Global Climate and Energy Project, 10 pages, July 14, 2010.

7 Written comments to CAP from Sally Benson, GCEP's director, cover letter and attachment, 9 pages total, August 9, 2010.

8 "Agreement for Global Climate and Energy Project (G-CEP)," effective December 16, 2002, between the Board of Trustees of the Leland Stanford Junior University, Exxon Mobil Corporation, General Electric Company, Schlumberger Technology Corporation, and the Toyota Motor Corporation, (hereafter referred to as "Original GCEP Agreement 2002-2008"), see Section 3, 3.04, 5.06, 6.02. Regarding this aspect of the alliance, the revised 2008 GCEP agreement— «Agreement for Global Climate and Energy Project (GCEP)," effective September 1, 2008, between the Board of Trustees of the Leland Stanford Junior University, Exxon Mobil Corporation, General Electric Company, Schlumberger Technology Corporation, and the Toyota Motor Corporation, (hereafter referred to as "Revised 2008 GCEP Agreement"), September 1, 2008—reflects no significant changes.

9 With regards to this aspect of the alliance, the Revised 2008 GCEP Agreement reflects no significant changes. For more on the importance of self governance and academic autonomy, see for example the 2004 Cornell University faculty-senate analysis of large-scale, multi-year, Strategic Corporate Alliances, SCAs, (referenced often in this report), which observed. "The corporate sponsor appropriately has a voice in management decisions…[h]owever, the sponsor should not be in the position of... having equal representation on the [SCA's governing body]." Source: Cornell University, ad hoc Faculty Committee on Strategic Corporate Alliances, "Statement of Principles and Best Practices," April 2004 draft, available from the author. See also, Cornell University, "Faculty Statement of Principles & Best Practices Concerning Strategic Corporate Alliances," Fall 2005 Final Document, available at http://www.theuniversityfaculty.cornell.edu/forums/forums_main.html. Please Note: To locate the final 2005 Cornell report, first click on "Strategic Corporate Alliances (Oct 2003)," then at the next window click on "Final Document."

10 With regards to this aspect of the alliance, the are no significant differences between the Original GCEP Agreement 2002-2008 and the Revised 2008 GCEP Agreement, Section 3.01 (a).

11 Written comments to CAP from Sally Benson, GCEP's director, cover letter and attachment, 9 pages total, August 9, 2010. This Benson direct quote appears twice, both in her cover letter, and under her "General Comments."

12 Original GCEP Agreement 2002-2008, Section 6.07.

13 Revised 2008 GCEP Agreement, Section 6.07.

14 Revised 2008 GCEP Agreement, Section 6.05.

15 "GCEP Preliminary Comments," emailed to Center for American Progress via email by Maxine Lym, Communications Manager, Global Climate and Energy Project, 10 pages, July 14, 2010.

16 Written comments to CAP from Sally Benson, GCEP's director, cover letter and attachment, 9 pages total, August 9, 2010.

17 Original GCEP Agreement 2002-2008, Section 3, 3.04. Regarding this aspect of the alliance, the revised 2008 GCEP agreement— «Agreement for Global Climate and Energy Project (GCEP)," effective September 1, 2008, between the Board of Trustees of the Leland Stanford Junior University, Exxon Mobil Corporation, General Electric Company, Schlumberger Technology Corporation, and the Toyota Motor Corporation, (hereafter referred to as "Revised 2008 GCEP Agreement"), September 1, 2008—reflects no significant changes.

18 Original GCEP Agreement 2002-2008, Section 3.01.

19 Original GCEP Agreement 2002-2008, Sections 3, 5.06, 6.02.

20 Original GCEP Agreement 2002-2008, Sections 3.07, 3.05.

21 Original GCEP Agreement 2002-2008, Section 2.

22 With regards to this aspect of the alliance, the are no significant differences between the Original GCEP Agreement 2002-2008 and the Revised 2008 GCEP Agreement, Section 3.01 (a).

23 Original GCEP Agreement 2002-2008, Section 2; and Revised 2008 GCEP Agreement, Section 4.2.

24 "The Management Committee may have elected to ask the Project Director to establish peer review for projects, but the Agreement does not require the Management Committee to make such a request. If it were mandatory, the Agreement would simply say the Project Direct "shall" institute a peer review system.» Comments from Jeremiah Miller, one of the expert legal experts CAP consulted with to review the 10 major university-industry research alliance agreements featured in this report.

25 Original GCEP Agreement 2002-2008, Section 4.02.

26 Original GCEP Agreement 2002-2008, Section 4.02.

27 Original GCEP Agreement 2002-2008, Section 5.06.

28 Original GCEP Agreement 2002-2008, Section 7.05

29 Quote from Sally Benson, GCEP's Director, in written comments to CAP, 9 pages total, August 9, 2010. See also

30 Original GCEP Agreement 2002-2008, Section 7.03.

31 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html.

32 Original GCEP Agreement 2002-2008, Section 7.04.

33 Original GCEP Agreement 2002-2008, Sections 1.03, 3.07.

34 Original GCEP Agreement 2002-2008, Exhibit A.

35 Original GCEP Agreement 2002-2008, Section 5.06.

36 Revised 2008 GCEP Agreement, Section 6.05.

37 Original GCEP Agreement 2002-2008, Section 6.07.

38 Original GCEP Agreement 2002-2008, Section 6.07.

39 Revised 2008 GCEP Agreement, Section 6.05.

40 Revised 2008 GCEP Agreement, Sections 6.05-6.06.

41 Original GCEP Agreement 2002-2008, Section 6.05.

42 Original GCEP Agreement 2002-2008, Section 7.05.

43 Revised GCEP Agreement, Section 7.05.

44 See the revised 2008 GCEP Subagreement, where this language is missing, available at: http://gcep.stanford.edu/pdfs/subcontract_agreement.pdf.

45 Original GCEP Agreement 2002-2008, See attached Subagreement Agreement, Section 2.04..

46 Original GCEP Agreement 2002-2008, Section 4.02. This section of the revised 2008 GCEP agreement reflects no significant changes.

Appendix nine endnotes

1 "Chevron, Texas A&M Will Research Biofuels," Chemical and Engineering News, May 31, 2007, available at http://pubs.acs.org/cen/news/85/i23/8523news5.html.

2 Copies of all state-level, public record act request filings, including legal and letter exchanges with Texas A&M University and the Texas Attorney General's office, regarding this Chevron research alliance agreement, are available from the author, upon request.

3 Email correspondence from Bob Avant, Program Director for Texas AgriLife Research at Texas A&M University, dated April 27, 2010, responding to a request from this report's author for up-to-date information on how much Chevron has contributed to the Chevron-Texas A&M research alliance since its inception.

4 Letter legal brief titled "Request for Open Records Decision regarding public information request from Ed Paisley [Center for American Progress] to Texas AgriLife Research," from R. Brooks Moore, Assistant General Counsel, Office of General Counsel, Texas A&M University System, to Amanda Crawford, Chief of the Open Records Act Division, Office of the Attorney General (Austin, Texas), August 20, 2010. A copy of this letter was sent via email to Ed Paisley, Vice President, Editorial, at the Center for American Progress, by Diane Callcott, Legal Assistant/ Public Information, Office of General Counsel, Texas A&M University, on August 20, 2010.

5 Research agreement between Chevron Technology Ventures and the Texas Agricultural Experiment Station and the Texas Engineering Experiment Station, effective April 9, 2007, Recitals, Section D. (hereafter referred to as the Chevron-Texas A&M Agreement)

6 Ibid, Section 5.

7 Ibid, Section 2.3.

8 Ibid, Section 6.3.1.

9 Ibid, Section 6.3.1.

10 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html.

11 Chevron-Texas A&M Agreement, Section 6.3.1.

12 Ibid, Section 5.

13 Ibid, Section 6.2.1.1-2.

14 Ibid, Section 2.3.

15 Ibid, Section 3.1.

16 Ibid, Section 3.1.

17 Ibid, Section 6.6.2.

18 Ibid, Section 6.6.1.

19 Ibid, Section 6.4.1 and 6.4.2.

20 In a somewhat unusual move, the agreement calls for establishment of "a range of acceptable royalty for an exclusive license prior to" agreement to begin a particular research project. Ibid, Section 6.6.3. The range of acceptable royalties is to be determined based on the following list of non-exclusive factors:

(i) "[t]ime and [e]ffort supplied by the licensee, subsequent to licensing the developed technology" (Section 6.6.3.1);

(ii) "[a]mount of cost savings to licensee through use of the licensed technology" (Section 6.6.3.2);

(iii) "[l]ikelihood of commercializing the licensed technology" (Section 6.6.3.3);

(iv) "[r]oyalties for comparable technologies" (Section 6.6.3.4);

(v) "[r]oyalties found by courts to be reasonable for comparable technologies" (Section 6.6.3.5);

(vi) "[p]rofit margin for comparable technologies" (Section 6.6.3.6);

21 Ibid, Section 6.6.2.

22 Ibid, Section 6.7.

23 "In the Public Interest: Nine Points to Consider in Licensing University Technology," a collective academic statement regarding best practices in academic licensing, issued on March 6, 2007, which has now been signed by more than 50 prominent U.S. universities (including the University of California, an original signer), available at http://www.autm.net/Nine_Points_to_Consider.htm. For an up-to-date list of all the universities that have endorsed this "Nine Points" statement, see the Association of University Technology Managers website, http:// www.autm.net/source/NinePoints/ninepoints_endorsement.cfm.

Appendix ten endnotes

1 U.T. Austin's Bureau of Economic Geology is the only name listed on the cover page of AEC agreement; the main agreement only lists "The University of Texas at Austin" as the principle academic partner that will administer the AEC, (AEC Agreement, Introduction.) However, Appendix B of the AEC Agreement specifies that UT's Bureau of Economic Geology will collaborate with Rice University to "manage and conduct the technical aspects of the AEC." The Agreement also states that Rice University laboratory space will be used to house AEC research activities. This is why Rice University is listed here as an academic participant in this alliance, and not merely a research grantee.

2 AEC Agreement, Section 4.1. Total AEC funding figures comes from Dr. Scott Tinker, Director of the Bureau of Economic Geology & State Geologist of Texas, responding to the Center for American Progress' July 29, 2010 request for comments, with suggested revisions to the "Major Findings" section of this Appendix agreement review, dated August 13, 2010 (hereinafter referred to as Tinker, Scott, email with "Suggested Revisions," August 13, 2010). See also: "Advanced Energy Consortium power point presentation, "A Brief Introduction to AEC," August, 2008, available at http://www.beg.utexas.edu/aec/pdf/ Brief%20Intro%20to%20AEC_1Aug2008.pdf

3 This three year initial term is confirmed in AEC Agreement, Appendix E. But UT Austin's Scott Tinker informed CAP that the "initial term of the AEC member company contract is "four years (January 2008 to December 2011, with a renewal option in the third year." It is not clear if this was a formal revision to the contract, or not since Tinker did not provide any formal, revisions to the actual AEC contract we received through our public record act request. (Source: Tinker, Scott, email with "Suggested Revisions," August 13, 2010).

4 Tinker, Scott, email with "Suggested Revisions," August 13, 2010.

5 U.T. Austin's Bureau of Economic Geology is the only name listed on the cover page of this AEC agreement; the main agreement only lists "The University of Texas at Austin" as the principle academic partner that will administer the AEC,

(AEC Agreement, Introduction.) However, Appendix B of the AEC Agreement specifies that UT's Bureau of Economic Geology will collaborate with Rice University to "manage and conduct the technical aspects of the AEC." The Agreement also states that Rice University laboratory space will be used to house AEC research activities. This is why Rice University is listed here as an academic participant in this alliance, and not merely a research grantee.

6 Press release, January 15, 2008, available at http://www.utexas.edu/news/2008/01/15/beg_hydrocarbon

7 See the members list on the Advanced Energy Consortium's website: http://www.beg.utexas.edu/aec/members.php

8 Tinker, Scott, email with "Suggested Revisions," August 13, 2010.

9 Tinker, Scott, email with "Suggested Revisions," August 13, 2010.

10 AEC Agreement, Section 3.1, Appendix A

11 AEC Agreement, Section 3.2.

12 AEC Agreement, Preamble, Appendix D.

13 AEC Agreement, Appendix D, Governance.

14 AEC Agreement, Appendix A.

15 David Brown Explorer, "Consortium Eyes Applicaions," American Association of Petroleum Geologists newsletter, December 2007, available at http://www.aapg.org/explorer/2007/12dec/nanotechnology.cfm.

16 Ibid.

17 AEC Agreement, Appendix I.

18 Tinker, Scott, email with "Suggested Revisions," August 13, 2010.

19 In this set of comments, UT Austin's Scott Tinker refers to a "Technical Advisory Council," but according to our independent legal experts "there is no mention of such a committee anywhere in the AEC Agreement or its Appendices." Here are Tinker's complete remarks on this point: "The evaluation of research projects is ongoing and considerably more rigorous than what is done in typical government funded programs, such as the National Science Foundation. The AEC has a Technical Advisory Council (TAC) comprising representatives from the BEG and member companies who review progress on projects quarterly via teleconference calls, occasional planned site visits, and an annual review that brings all researchers together to present findings in front of their academic peers." He added that "the academic community took a bit of time getting used to this type of external interest, but faculty and students alike are now consistent in their praise for the process and appreciate the interest in their research. It has proven to be a great way to forge industry and academic links, and has not impinged on academic freedom as far as we know." [Source: Tinker, Scott, email with "Suggested Revisions," August 13, 2010.]

20 See AEC Agreement, Appendix B-Collaboration and AEC Agreement, Appendix D-Governance. In these Appendices it explains that the "University of Texas at Austin and Rice University have established a strong working relationship" and that "UT will hold the prime contract for the AEC [Advanced Energy Consortium], and BEG (UT Austin's Bureau of Economic Geology) will serve as the management organization." Later, in Appendix D, it further explains that UT's BEG "will manage all financial and institutional operations. This includes technology transfer and the filing of patent applications in accordance with the BOM vote."

21 David Brown Explorer, "Consortium Eyes Applications."

22 AEC Agreement, Section 3.2, Appendix D.

23 AEC Agreement, Appendix D.

24 AEC Agreement, Appendix I.

25 AEC Agreement, Part VII.

26 AEC Agreement, Part VII.

27 Department of Health and Human Services, National Institutes of Health, "Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources: Final Notice," Federal Register, Vol. 64, No. 246, December 23, 1999, p. 72093, available at http://ott.od.nih.gov/policy/rt_guide_final.html.

28 AEC Agreement, Part VII.

29 AEC Agreement, Appendix D, Governance.

30 AEC Agreement, Appendix A.

31 AEC Agreement, Appendix A.

32 AEC Agreement, Appendix I.

33 AEC Agreement,Appendix I 26 27 28 Section 9.1. 29 Section 9.3. 30 Section 10.3. 31 Section 10.1(a). 32 Section 10.1(b). 33 Section 10.1. 34 Section 10.2. 35 Section 10.3. 36 Section 10.3. 37 Section 10.1. 38 Section 10.4. 39 Section 10.3. 40 Section 10.5. 41 Section 10.5.

34 AEC Agreement, Appendix I.

35 AEC Agreement, Appendix I.

36 AEC Agreement, Section 9.1.

37 AEC Agreement, Section 9.3.

38 AEC Agreement, Section 10.3.

39 AEC Agreement, Section 10.1(a).

40 AEC Agreement, Section 10.1(b).

41 AEC Agreement, Section 10.1.

42 AEC Agreement, Section 10.2.

43 AEC Agreement, Section 10.3.

44 AEC Agreement, Section 10.3.

45 AEC Agreement, Section 10.1.

46 AEC Agreement, Section 10.4.

47 AEC Agreement, Section 10.3.

48 AEC Agreement, Section 10.5.

49 AEC Agreement, Section 10.5.

About the author

Jennifer Washburn is an investigative journalist and independent researcher. In 2007-2008 she was a visiting fellow at the Center for American Progress, where she began her research for this report. In 2009-2010, she was awarded New York University's Frederic Ewen Academic Freedom fellowship, where she completed her work on this report. Washburn is the author of *University, Inc.: The Corporate Corruption of Higher Education* (Basic Books, 2005), which received critical acclaim both inside and outside academia. Her book explores the commercial transformation of U.S. higher education over the last 30 years, and the effect this is having on research, education, disinterested inquiry, innovation, and the free flow of public knowledge. Washburn is a highly visible expert, consultant, and public speaker on issues related to the U.S. research university and university-industry relationships. Her journalism articles and opinion pieces have appeared in a range of publications, including *Atlantic Monthly*, *Los Angeles Times*, *Discover* magazine, *The Washington Post*, *Mother Jones*, and *The Washington Times*. In 2001, Washburn was the recipient of the prestigious National Association of Science Writers' Science-in-Society Journalism Award.

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