

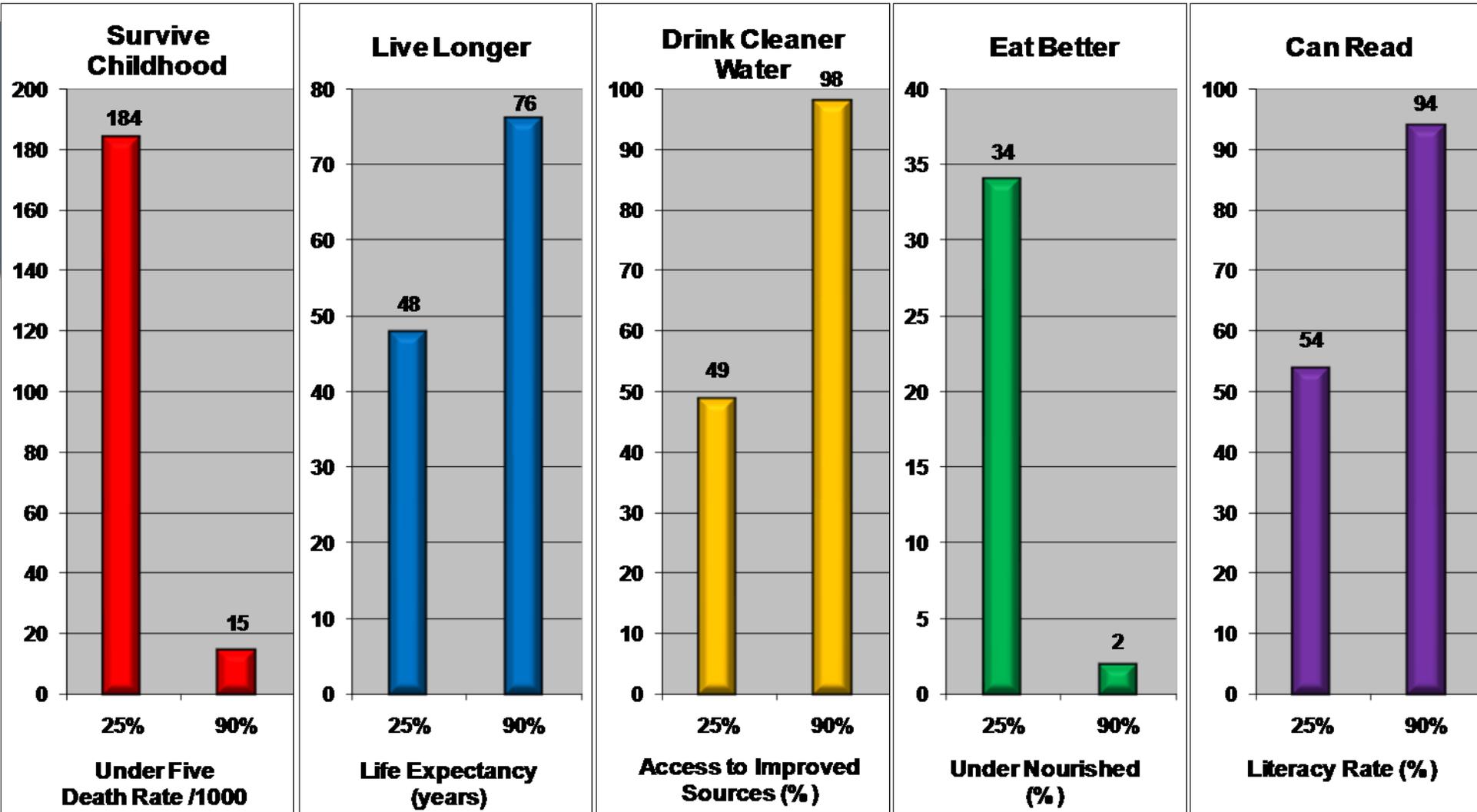


Why We Need More Coal Based Electricity: Energy Realities Facing the United States

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Energy is Good

People in Societies with Greater Access to Electricity:

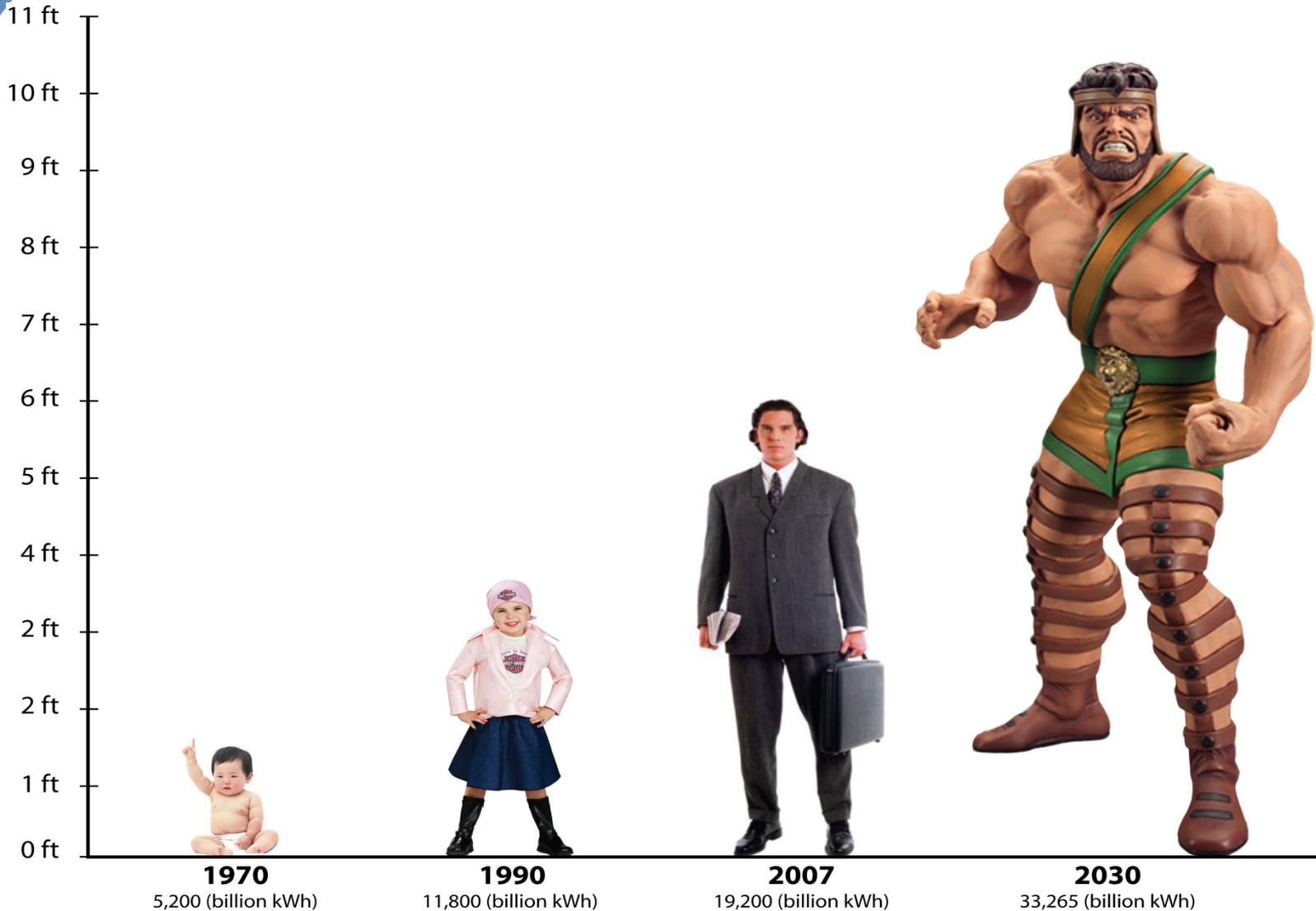


25% 90% average percent of population with access to electricity



SCALE SETS THE CONTEXT:

If Current Electricity Demand Was a 6 Foot Tall Man



Global Electricity Consumption-1970-2030



Everything, Everywhere, All the Time: Increases needed by 2030 to meet demand

- Nuclear power 38%
- Oil production 43%
- Renewable energy 61%
- NG production 64%
- Coal production 74%



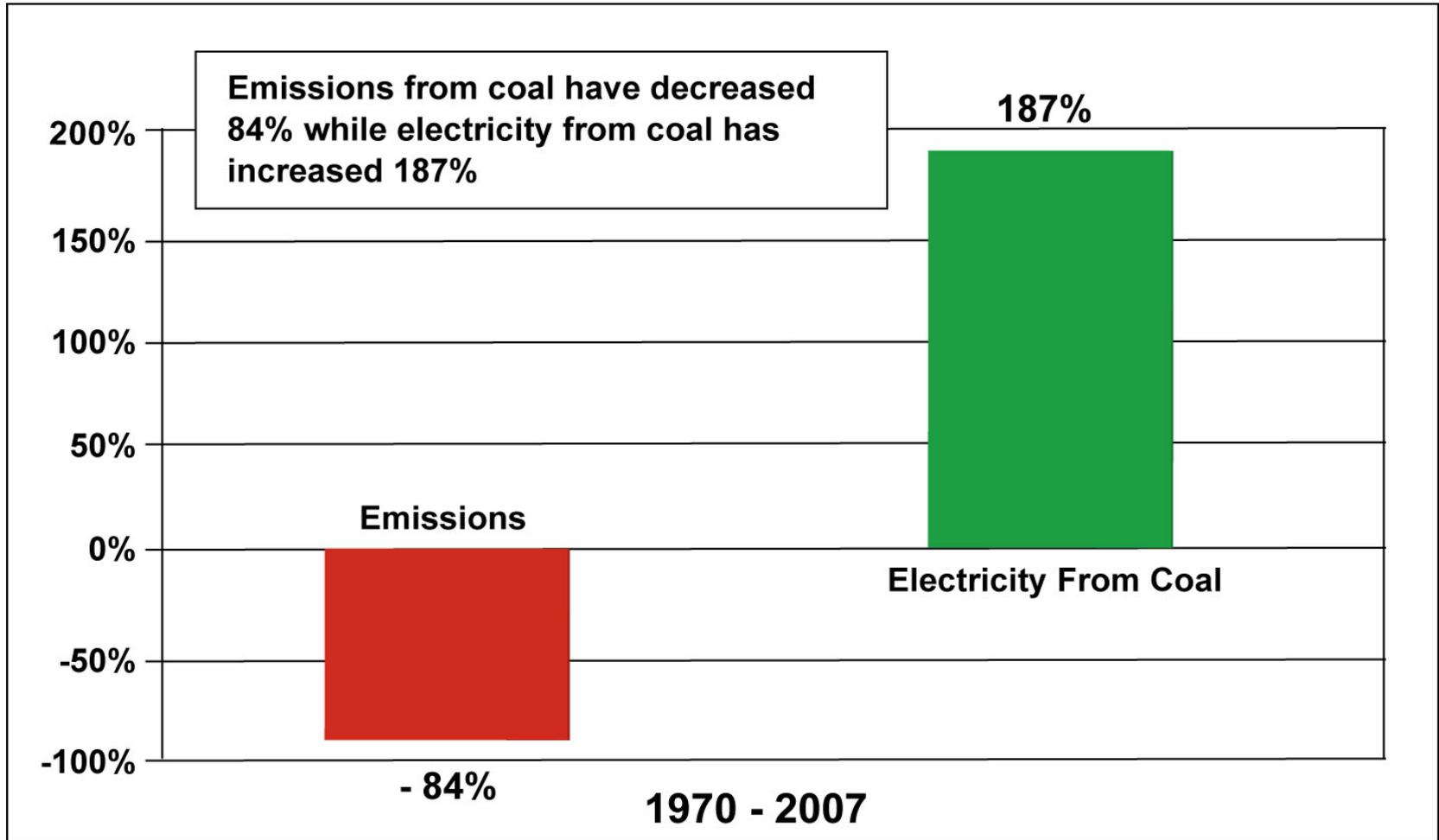
Five Basic Premises

- Worldwide growth in energy demand is unprecedented and will continue for decades
- Coal is the primary resource able to meet this demand in terms of scale, time, reliability, cost and versatility
- **Coal conversion** to electricity, liquid fuel and NG equivalents can greatly alleviate supply problems across the globe
- **Carbon capture and storage (CCS)** is the technological pathway to both meeting climate change goals and unlocking the full economic value of our greatest energy resource- coal
- The U.S. can both reduce global poverty and contribute to climate change policy by rapidly developing CCS and making it available, affordable and deployable to the global community



That Was Then

The Dramatic Success of Clean Coal Technology

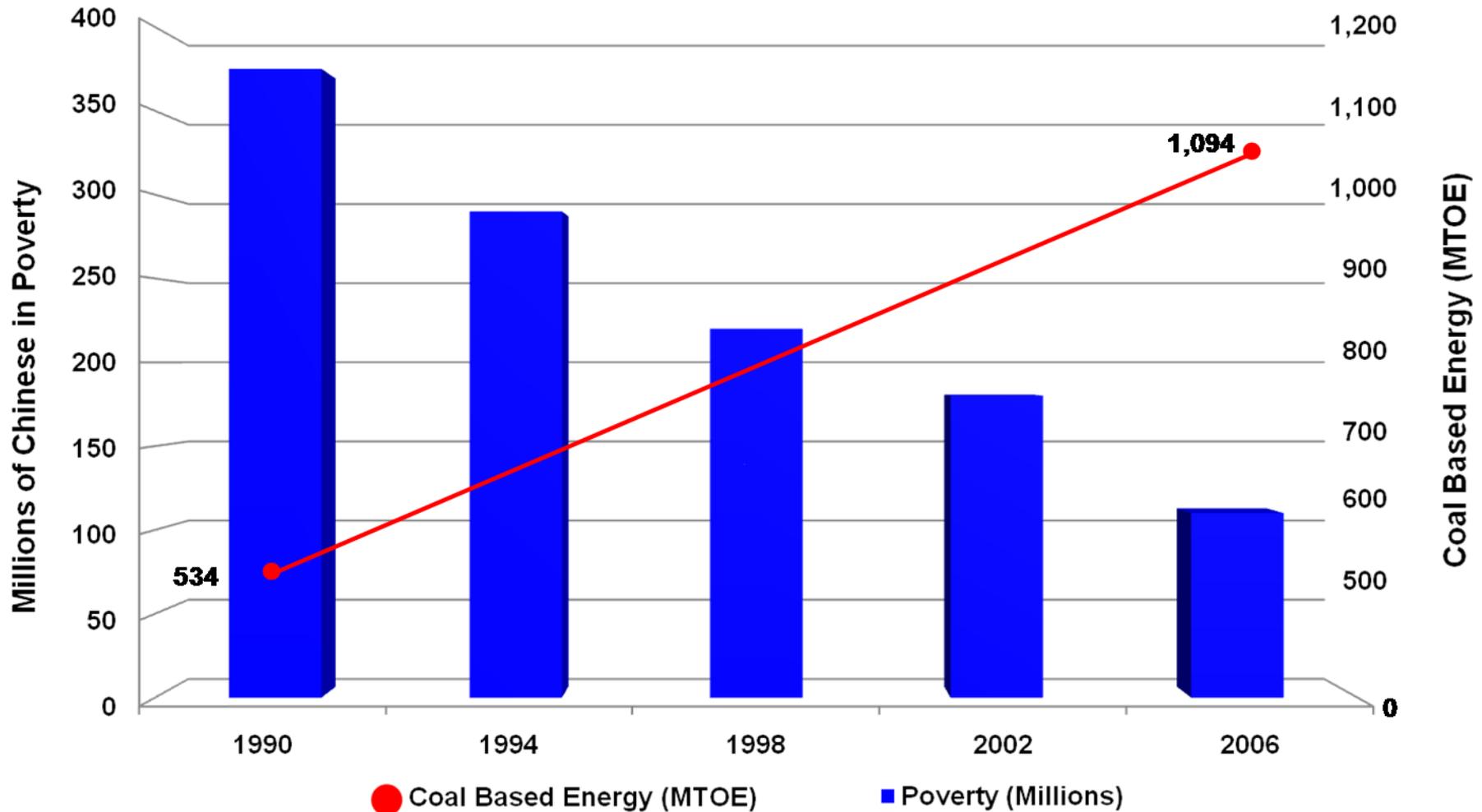




Two Different Worlds

- **“There is no such thing as clean coal”**
– National Resources Defense Council.
- When asked how China would ever meet the growing demand for electricity, liquid fuel and NG, Du Minghua, Director of the Beijing Research Institute replied: **“Coal is the solution to all three”**.

Out of Poverty: Coal Based Energy has Propelled China Forward



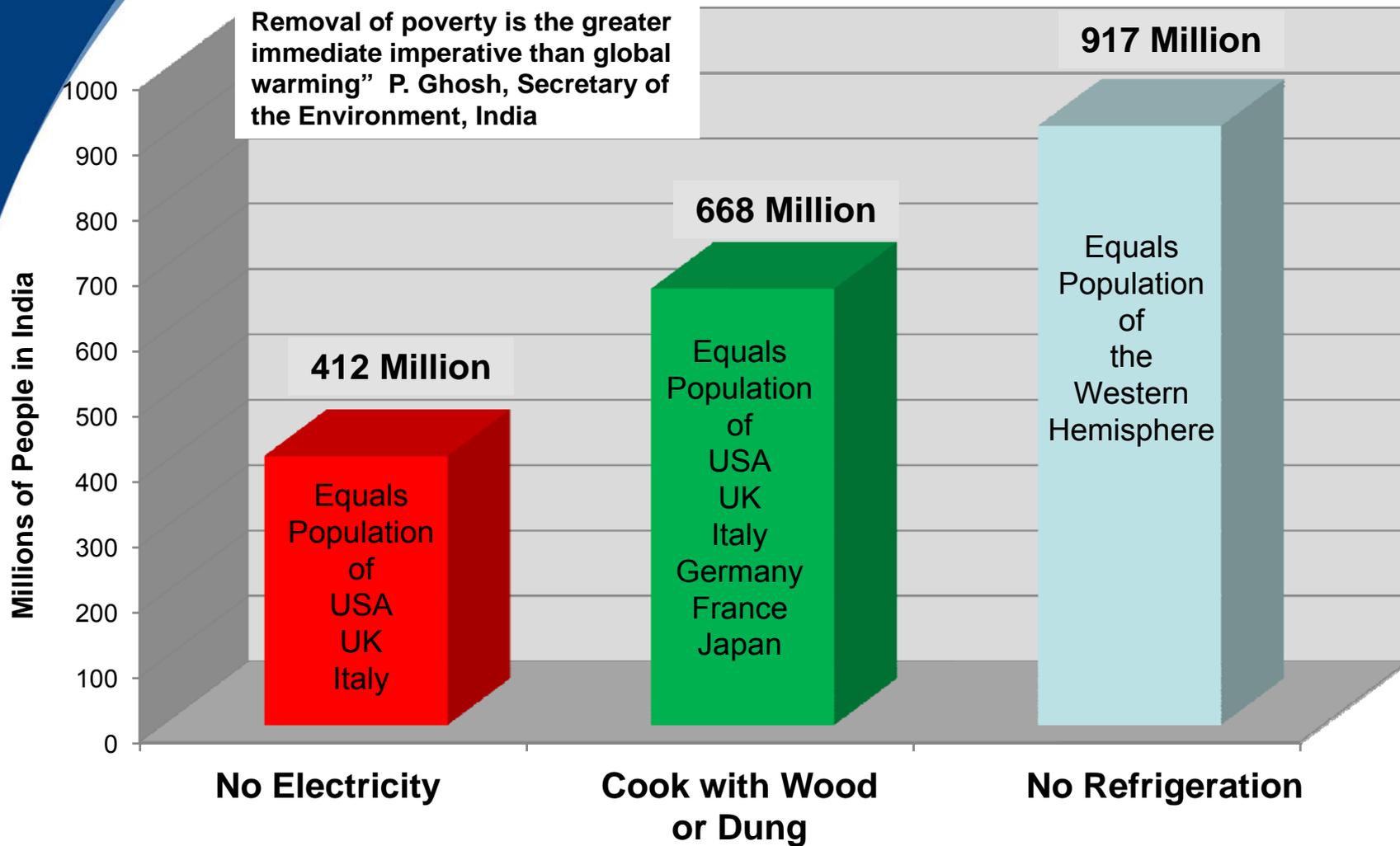
Note: Poverty measure follows World Bank Definition of \$1 per day income

Source: IEA, 2007; EIA, 2008



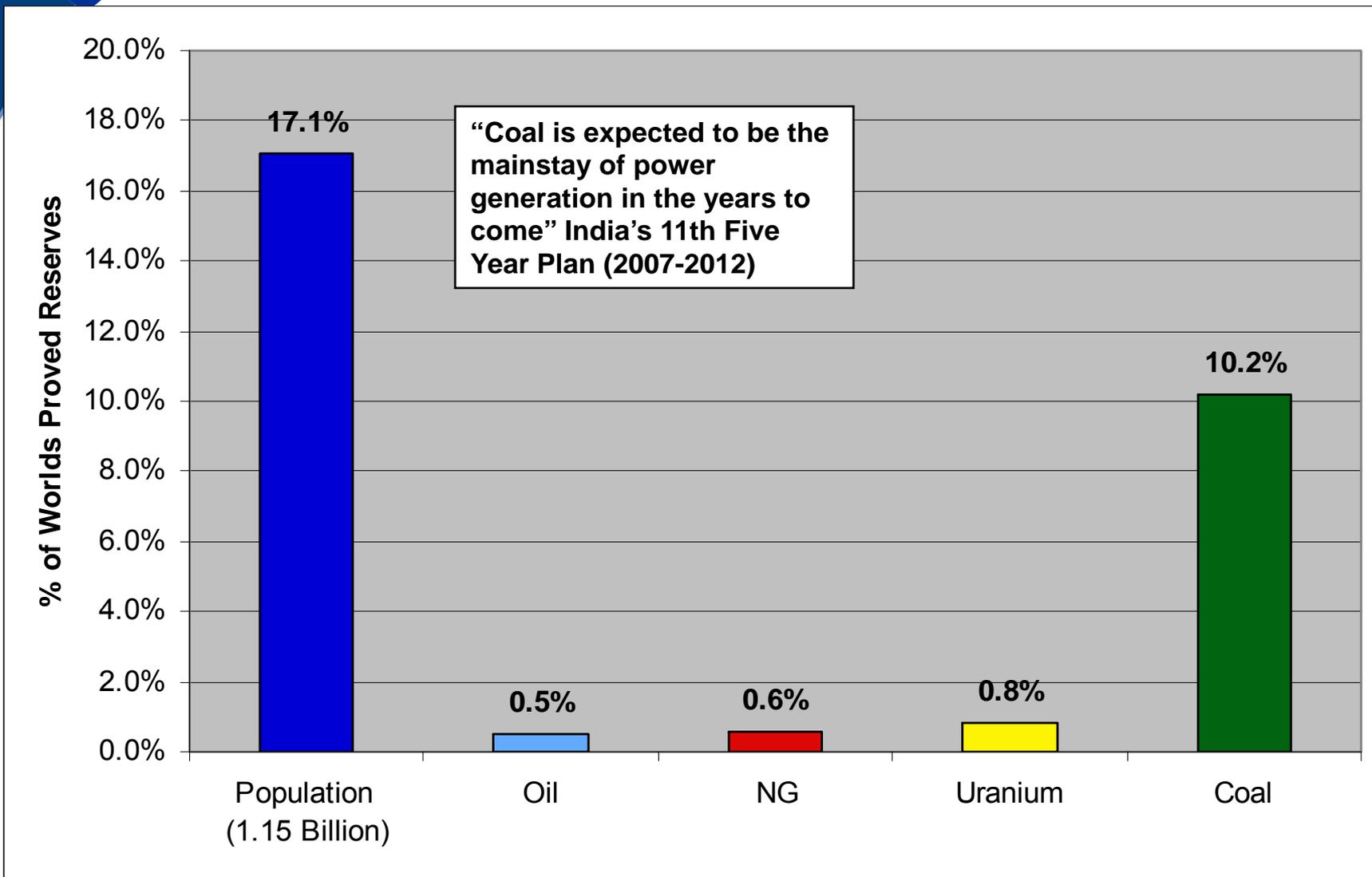
INDIA NEEDS ELECTRICITY----DESPERATELY

Removal of poverty is the greater immediate imperative than global warming” P. Ghosh, Secretary of the Environment, India





Coal is India's only Energy Advantage

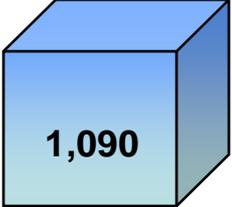


India's Share of the World's Energy Reserves



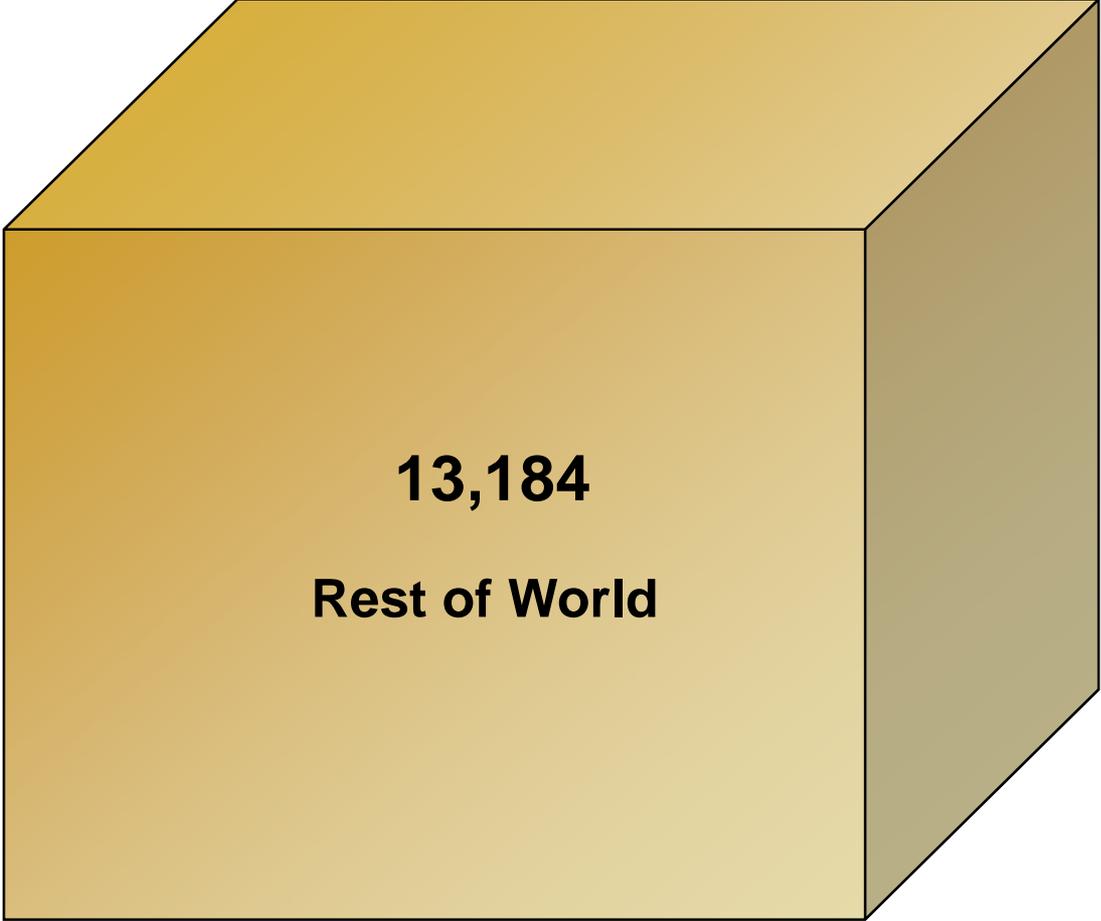
The Future of Electricity is Being Formed at the Global Level

Billion Kilowatt Hours



1,090

USA

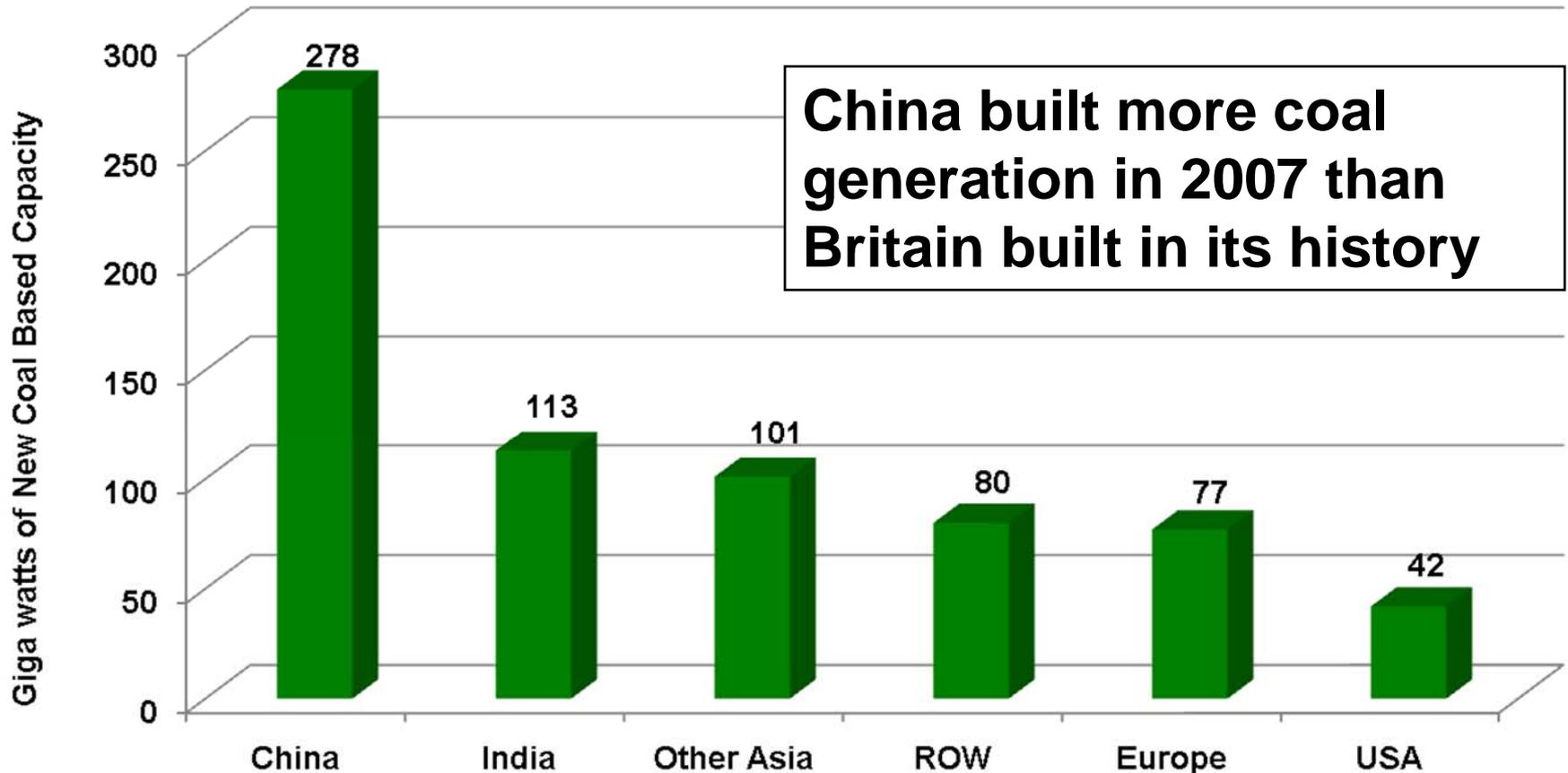


13,184

Rest of World

**Increase in Billion Kilowatt Hours
2006 - 2030**

And that Future is Based on Coal





A Transmission Line for Much of the World



In Africa, women typically carry 20 kilograms of fuel wood an average of 5 kilometers every day – it takes 5 hours



WHERE WILL THE ELECTRICITY COME FROM IN THE UNITED STATES?



Scale Sets the Context: If Power Plants Were Draft Animals



Workhorse
Coal- 49%



Mule
Natural Gas- 21%



Sled Dog
Hydro- 6%



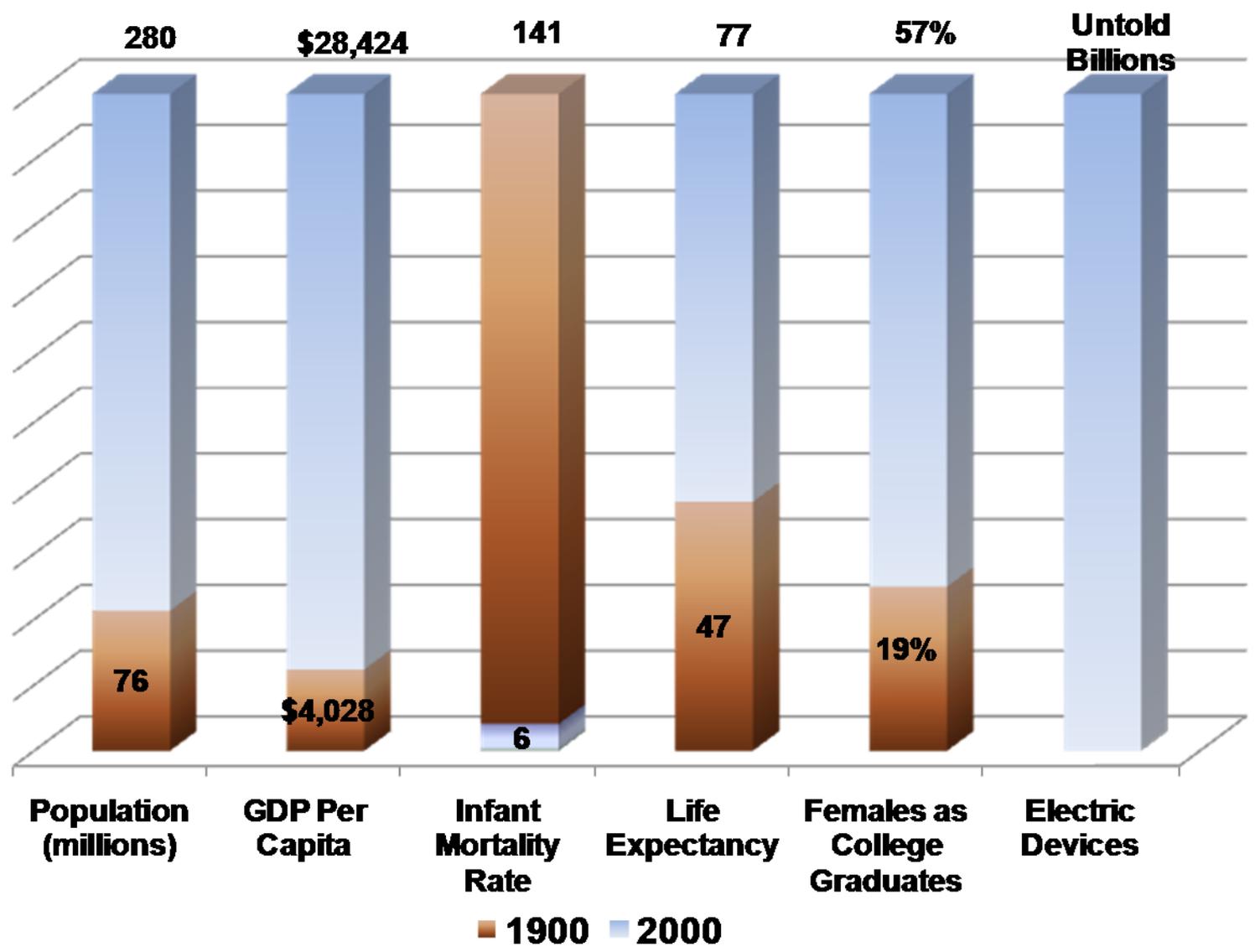
Burro
Nuclear—19%



Carrier Pigeon
Wind- 1%



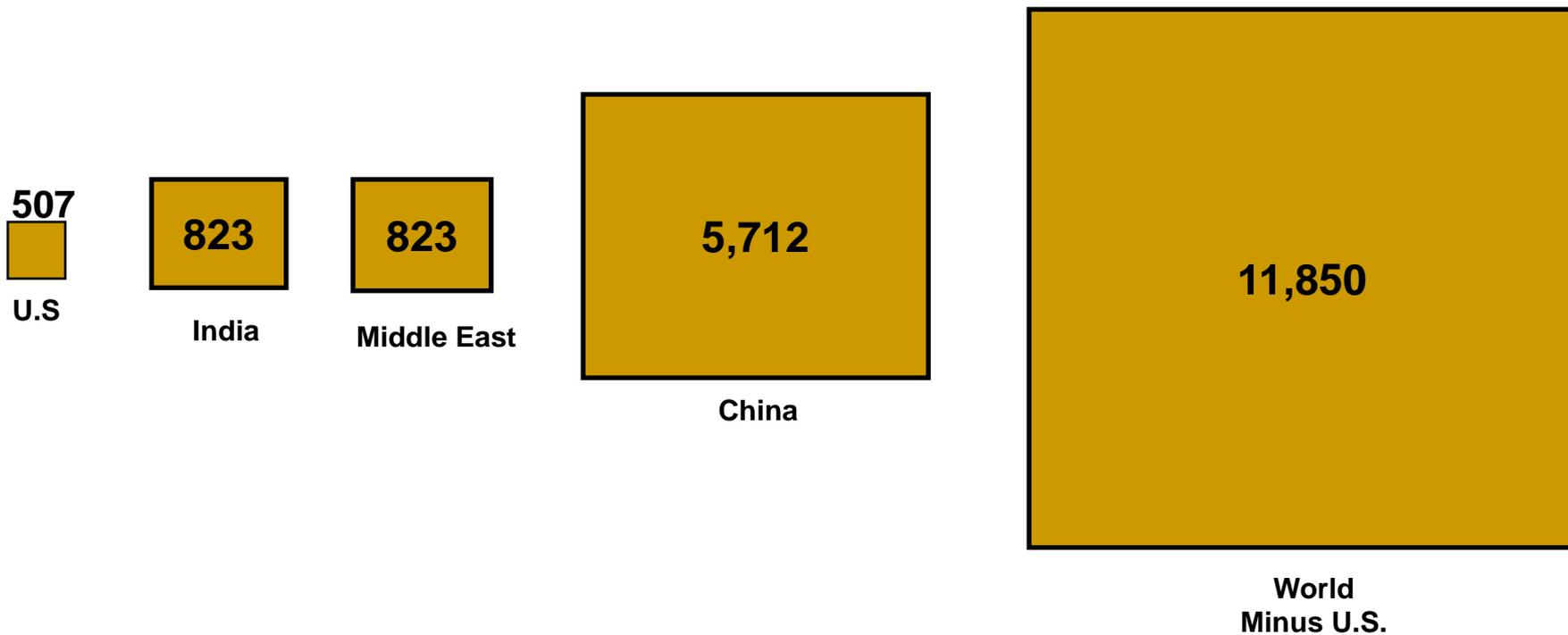
What America Looked Like Before Electricity and When CO2 Emissions were 80% Lower





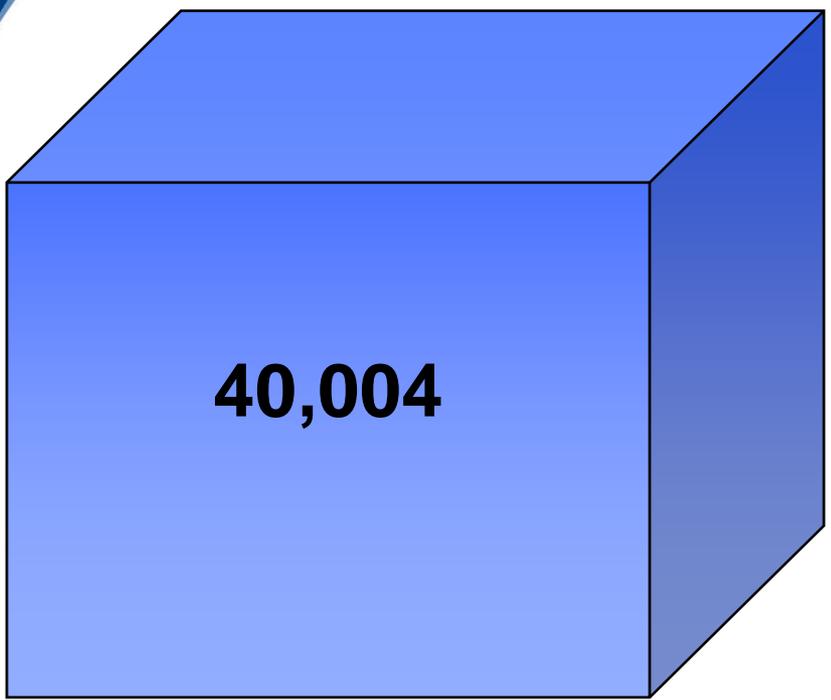
Why We Need Coal With Carbon Capture and Storage

Incremental Million Tons of CO₂ (per year)

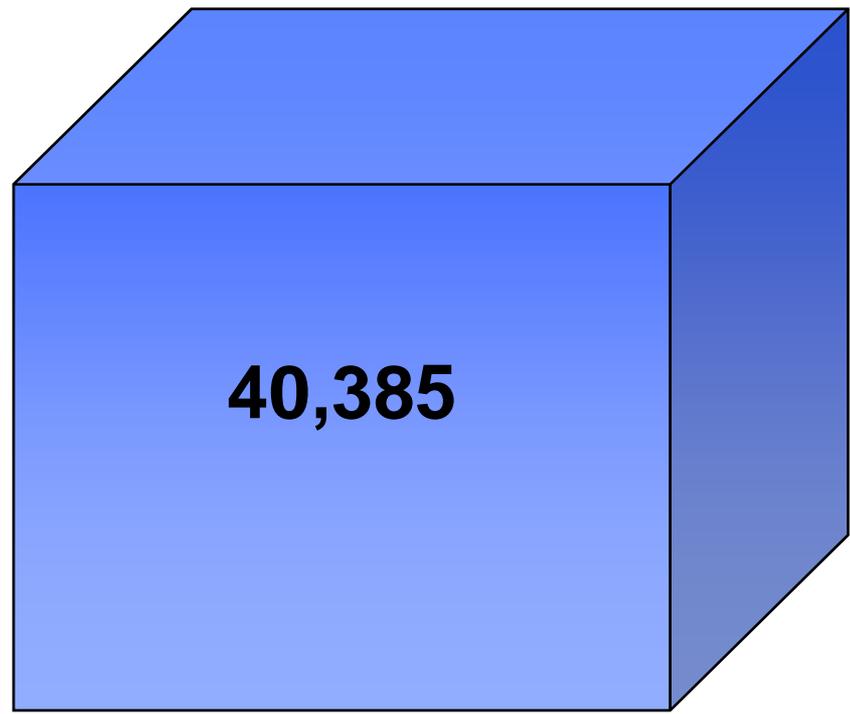




Much Ado About Nothing (By 2030)



**World With No New
Coal Generation in
U.S**

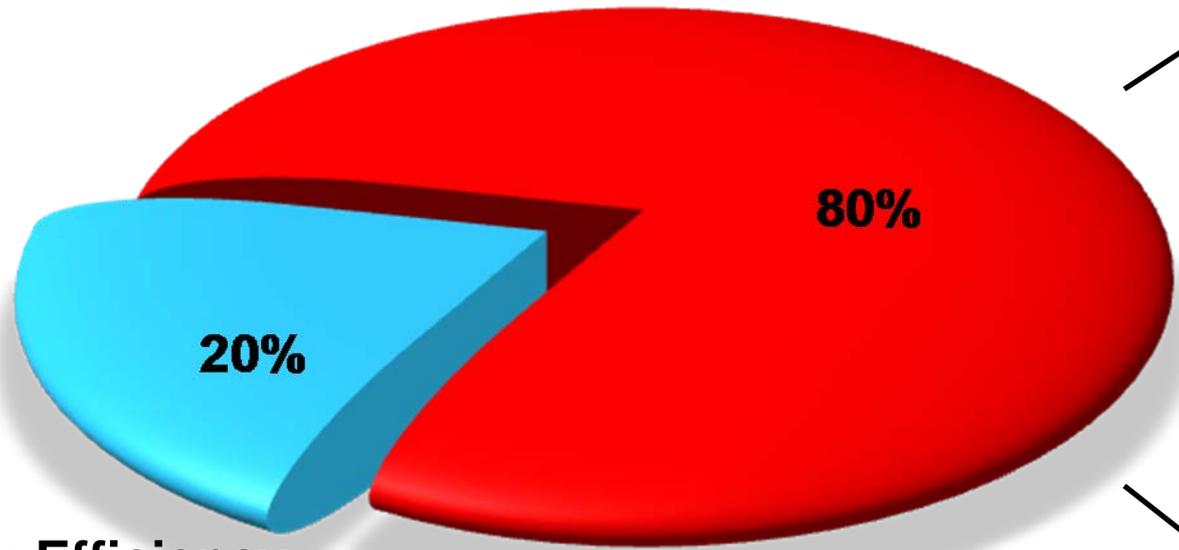


**World With Projected
New Coal Generation
in U.S.**

Million Metric Tons of CO₂



California: The real story on why they use less electricity



Energy Efficiency Programs

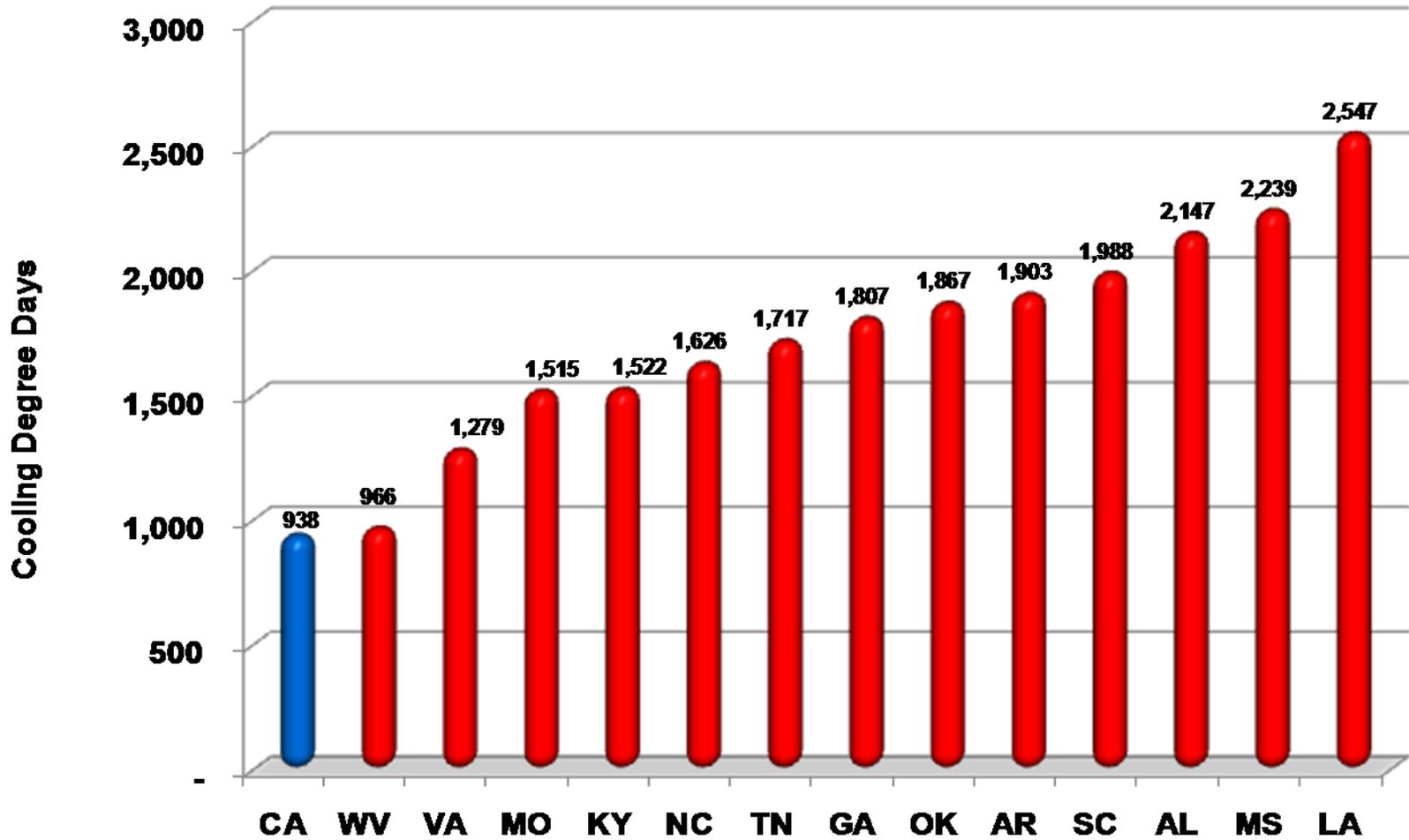
Highest electric rates west of New York

27% fewer cooling degree days than rest of U.S.

Smaller houses with more people

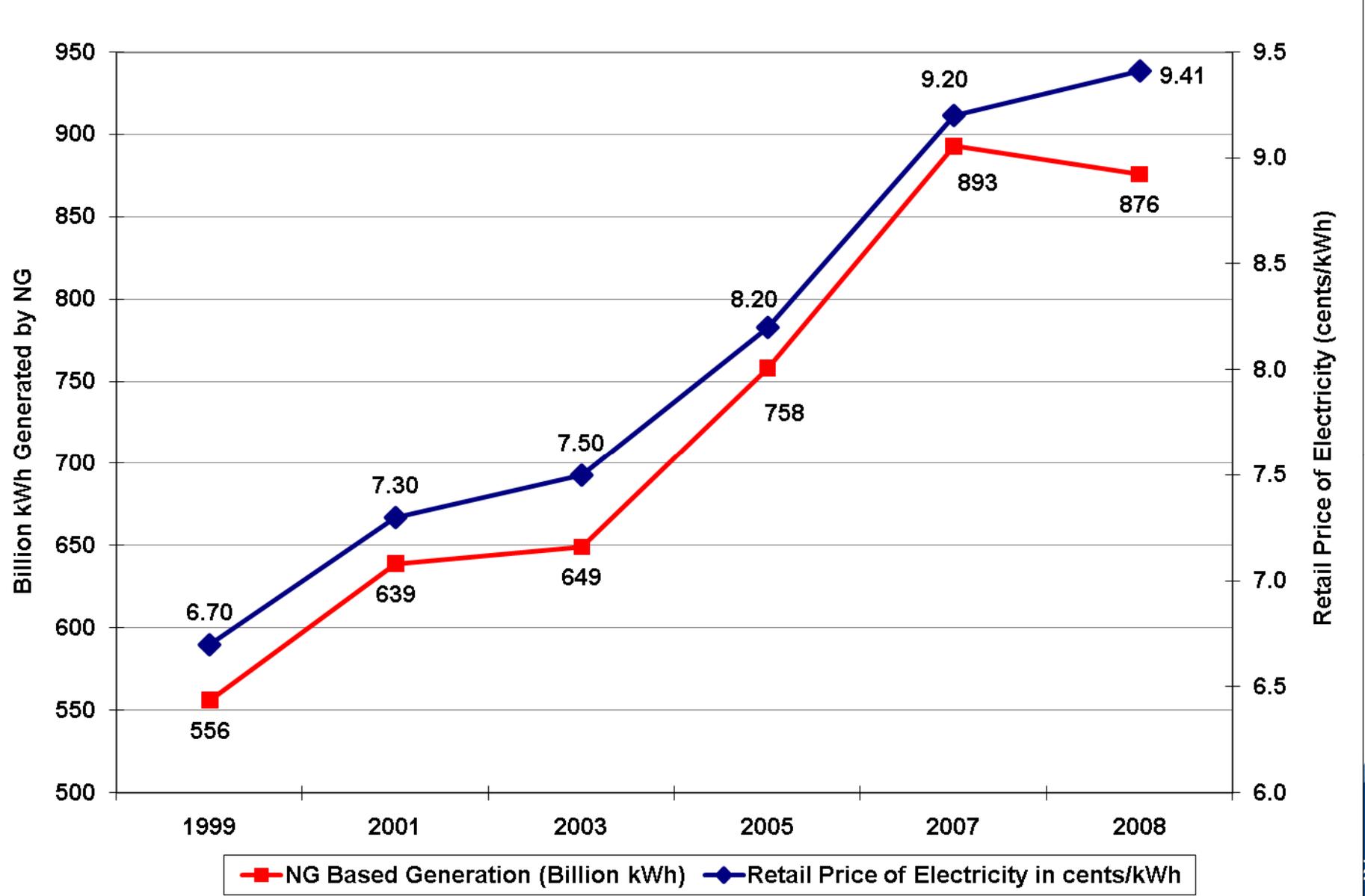


Cooling Degree Days April, May, June, July, August, September





More NG Means Higher Electric Rates

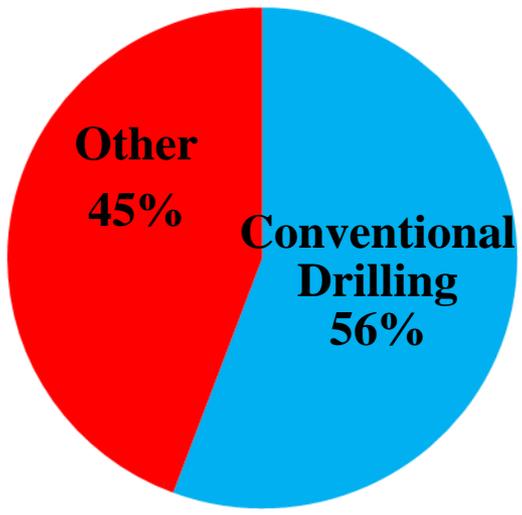




THERE ARE NO NATURAL GAS EXPERTS

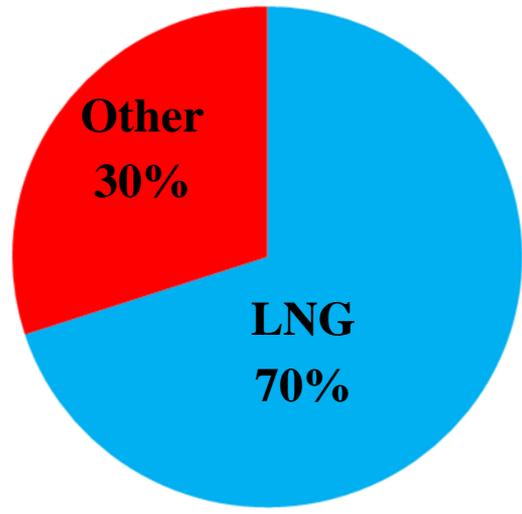
Bouncing Ball of EIA Forecasts of new NG in 2015

In 2001 it was
Conventional
Drilling



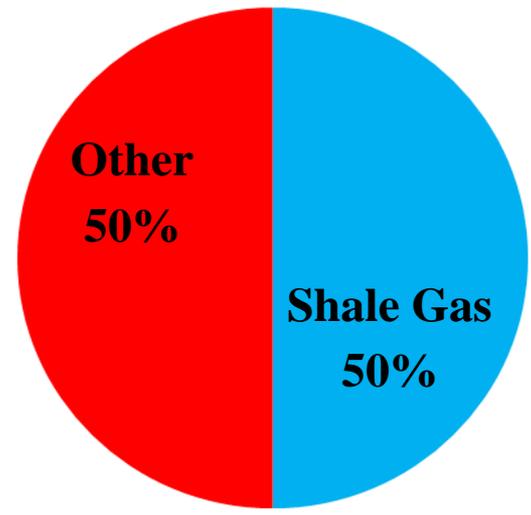
2001

In 2005 it was
Imported LNG



2005

In 2009 it is Shale
Gas



2009

EIA forecast of what the major source
of incremental NG will be by 2015



Why the Validity of EIA Forecasts is Crucial

EIA Data Projections are Used

- 1. By energy policy makers throughout the U.S. and other countries**
- 2. To estimate the impact of climate change policy**
- 3. To develop renewable portfolio standards**
- 4. To justify cancelation of coal based generation**



Impact of Coal Plant Cancellations

- **Increase time NG sets the price of electricity**
- **Significantly increase NG consumption**
- **Increase NG prices over 175%**
- **Have minimal impact on CO2 emissions from the electricity sector**



ALTERNATIVE FUELS: The Scale Needed to Replace Coal in the U.S.

- **NUCLEAR: 250 more reactors**
- **NATURAL GAS: 17 more Trillion Cubic Feet**
- **HYDRO: 500 facilities size of Hoover Dam.**

The reality of physics is that electricity cannot be stored in large quantities – an inevitable constraint on solar and wind generation.



Not All Power Plants Are Created Equal

The Power Of One Coal Plant



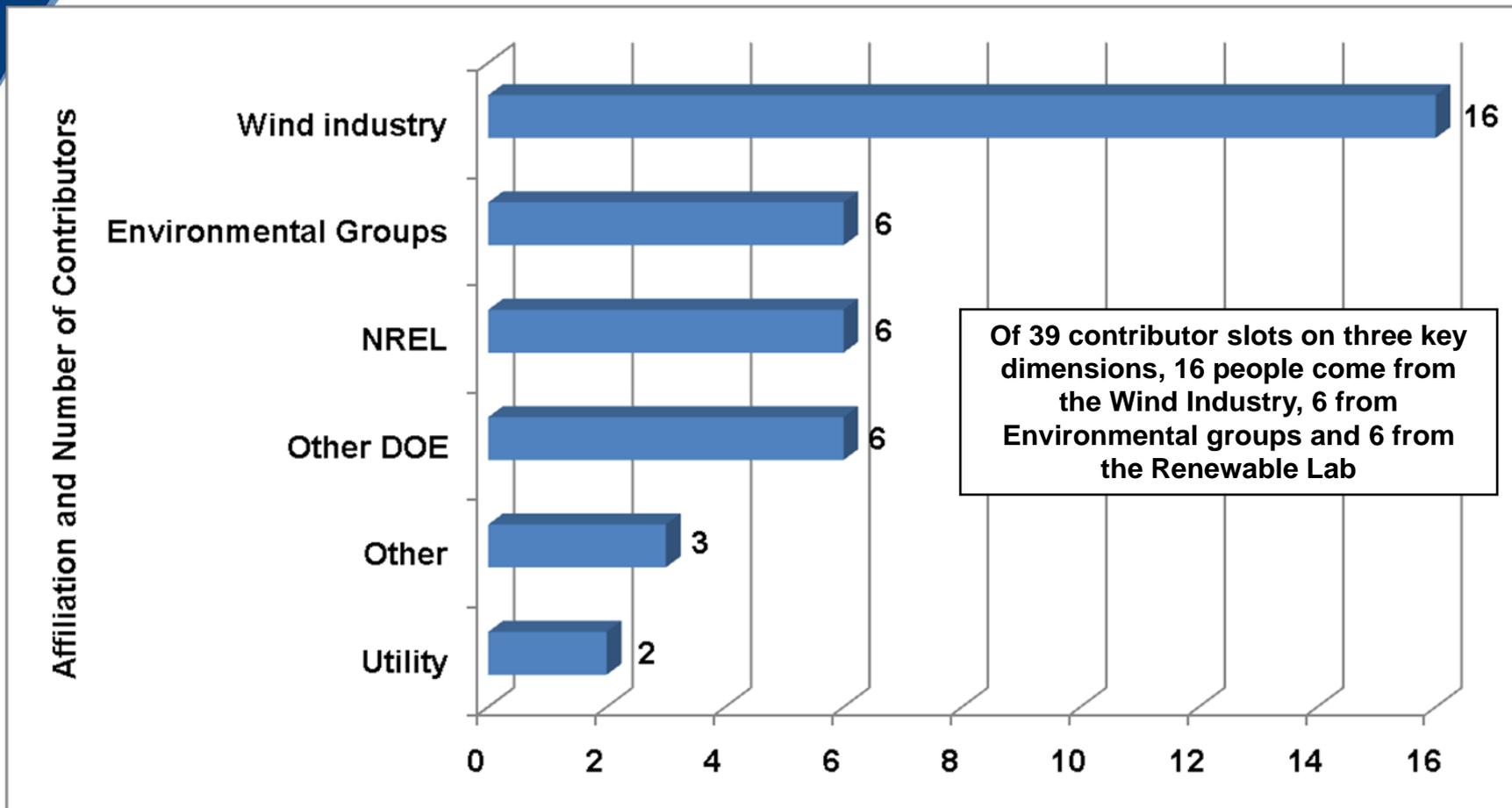
Roxboro, NC
Coal Power Plant
2,462 MW

The True Cost Of Wind Generation

1. 4500 turbines at 1.5mw and each 400 feet high
2. 120,000 acres of wind turbines
3. 1,500 or more MW of NG plant to back up wind
4. More than 1,000 miles of ridgeline consumed.



Stacking the Deck: Affiliation of Key Contributors to DOE Report "20% Wind Energy by 2030"



Affiliation of Contributors to three key dimensions of DOE's "20% Wind Energy by 2030"
(a) Strategic Guidance Group, (b) Executive summary and (c) Environmental



IT'S ALL ABOUT PERCEPTION



**The
Man**



**The
Tree**



**The
Image**



**The
Reality**



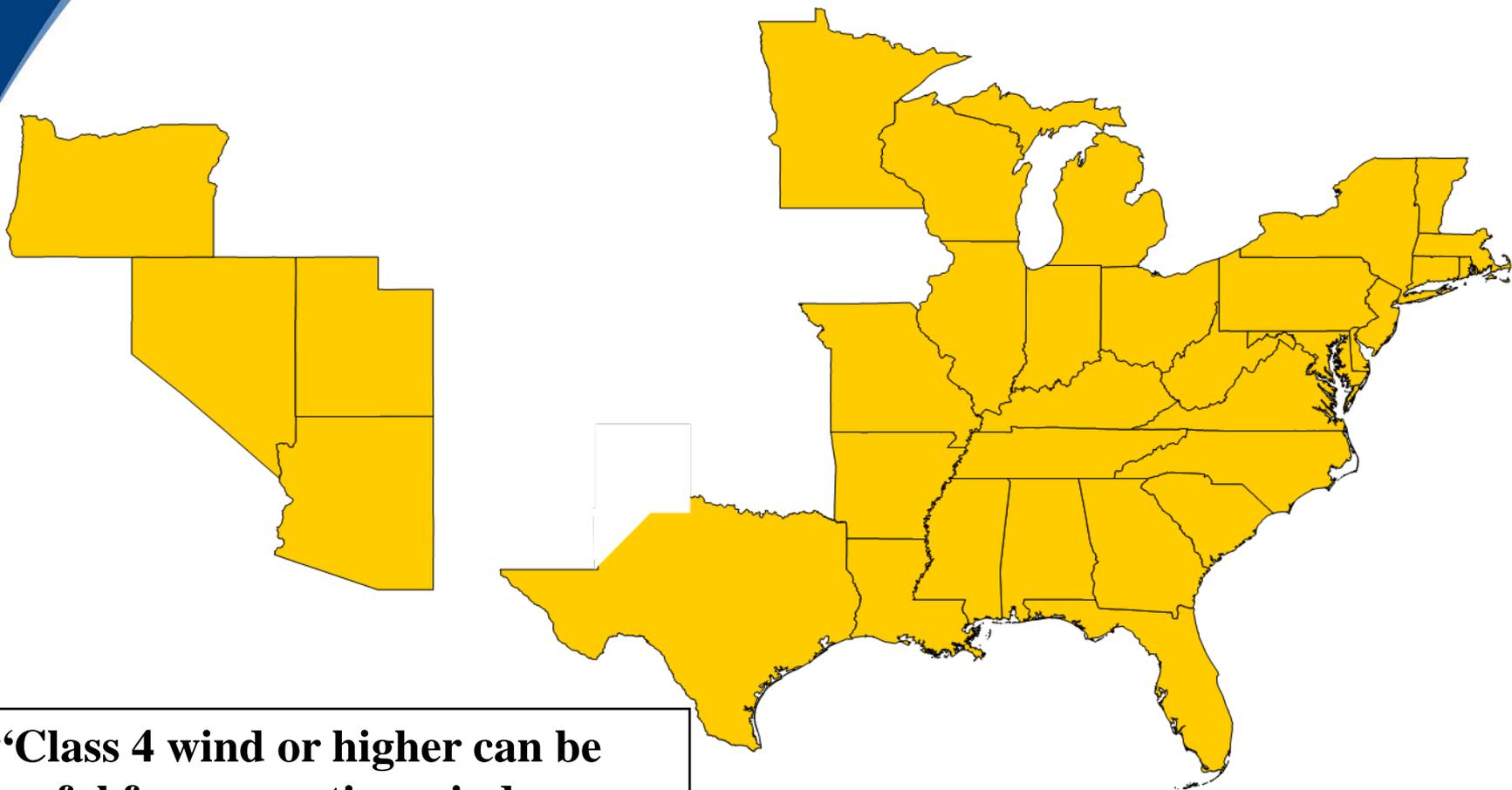
THE NEW APPALACHIAN TRAIL



Thousands of miles of ridgeline for wind turbines and associated high voltage transmission.



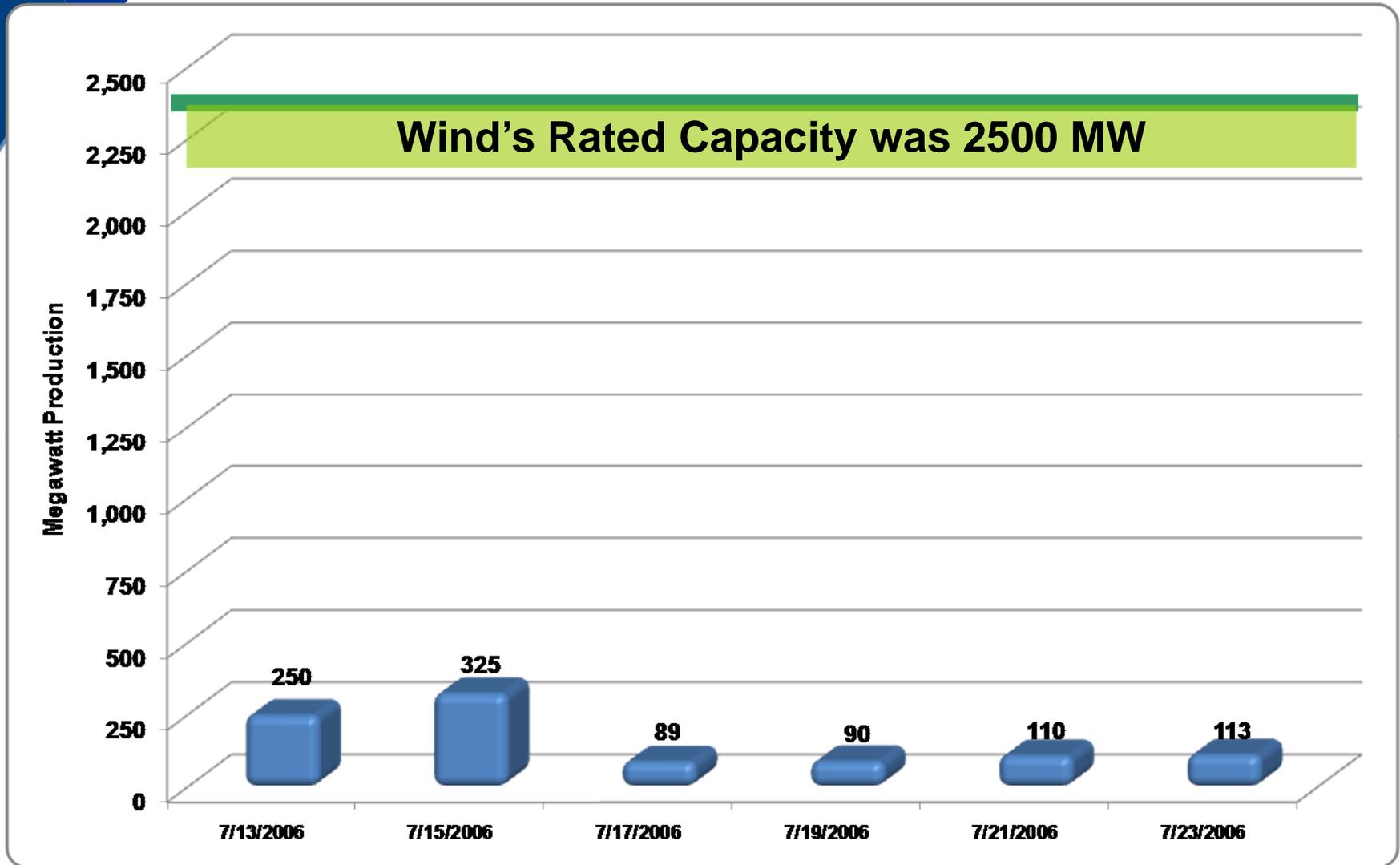
**Note to 20% wind advocates:
These areas have minimal Class 4 wind sources (and
most have none at all)**



**“Class 4 wind or higher can be
useful for generating wind power
with large turbines” EIA, 2009**



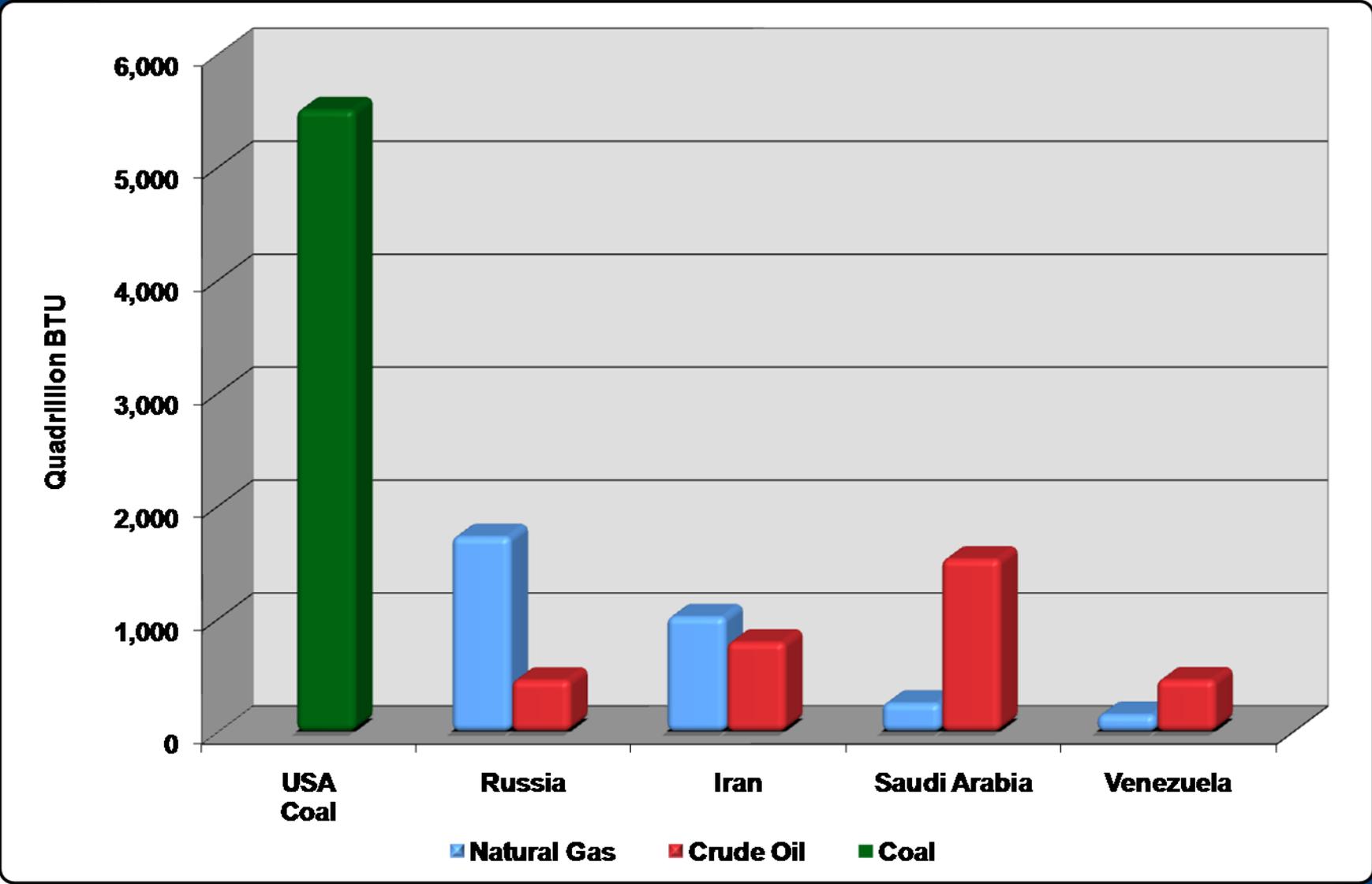
Wind Generation's Performance During 2006 California Heat Wave



* Adapted and estimated from Dixon, U.S. DOE (2006)



Lest We Forget : US Coal Reserves vs. Oil and NG Reserves



Source: EIA, 2008



Electricity Makes the Difference: Korea



South Korean preschool children average 3 inches taller and 7 pounds heavier than North Korean Children

The Infant Mortality Rate in North Korea is 12 times higher than South Korea

South Korea ranks 32nd in GDP/capita. North Korea ranks 156th

Only 20% of North Koreans have access to electric power. South Korean access approaches 100%

