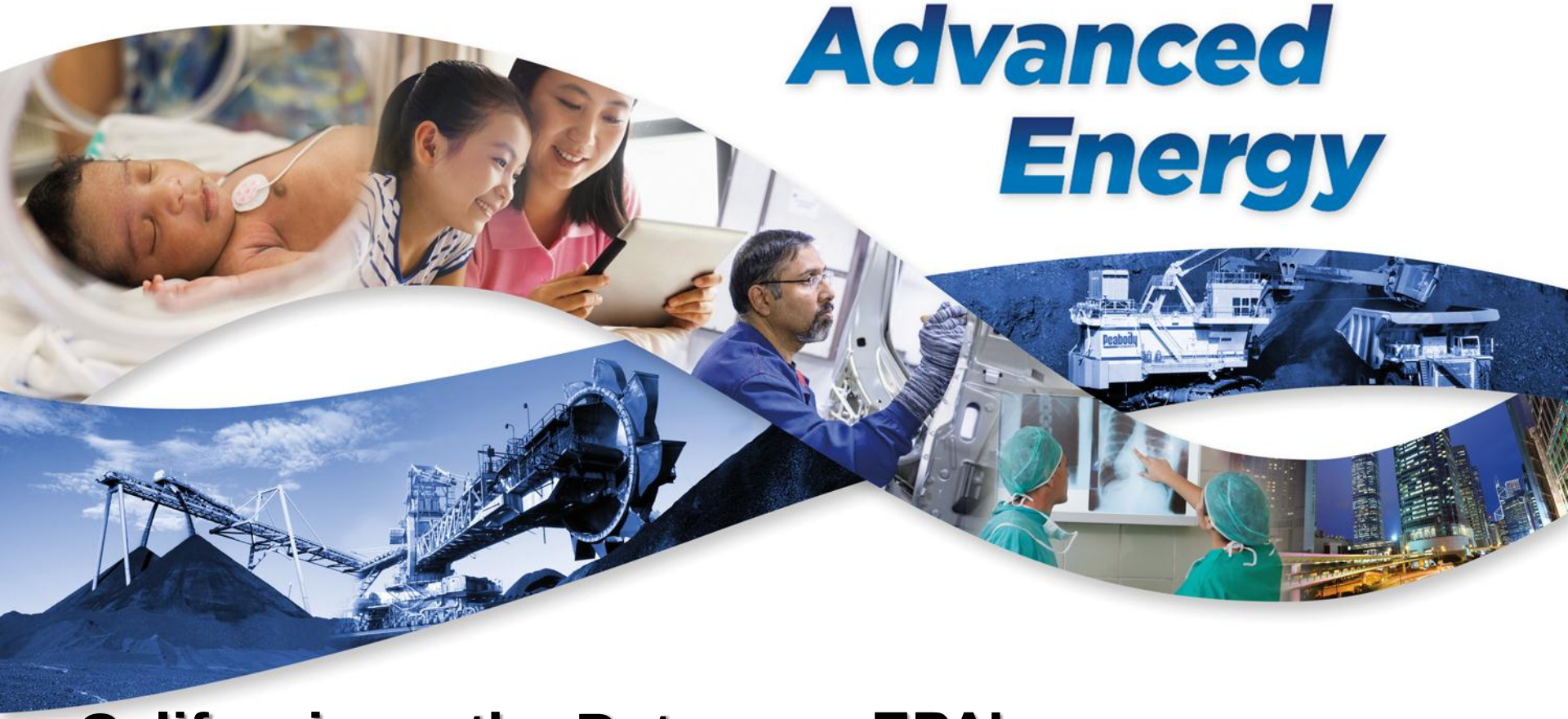


California on the Potomac: EPA's Carbon Policies Are Adverse to Human Health and Welfare

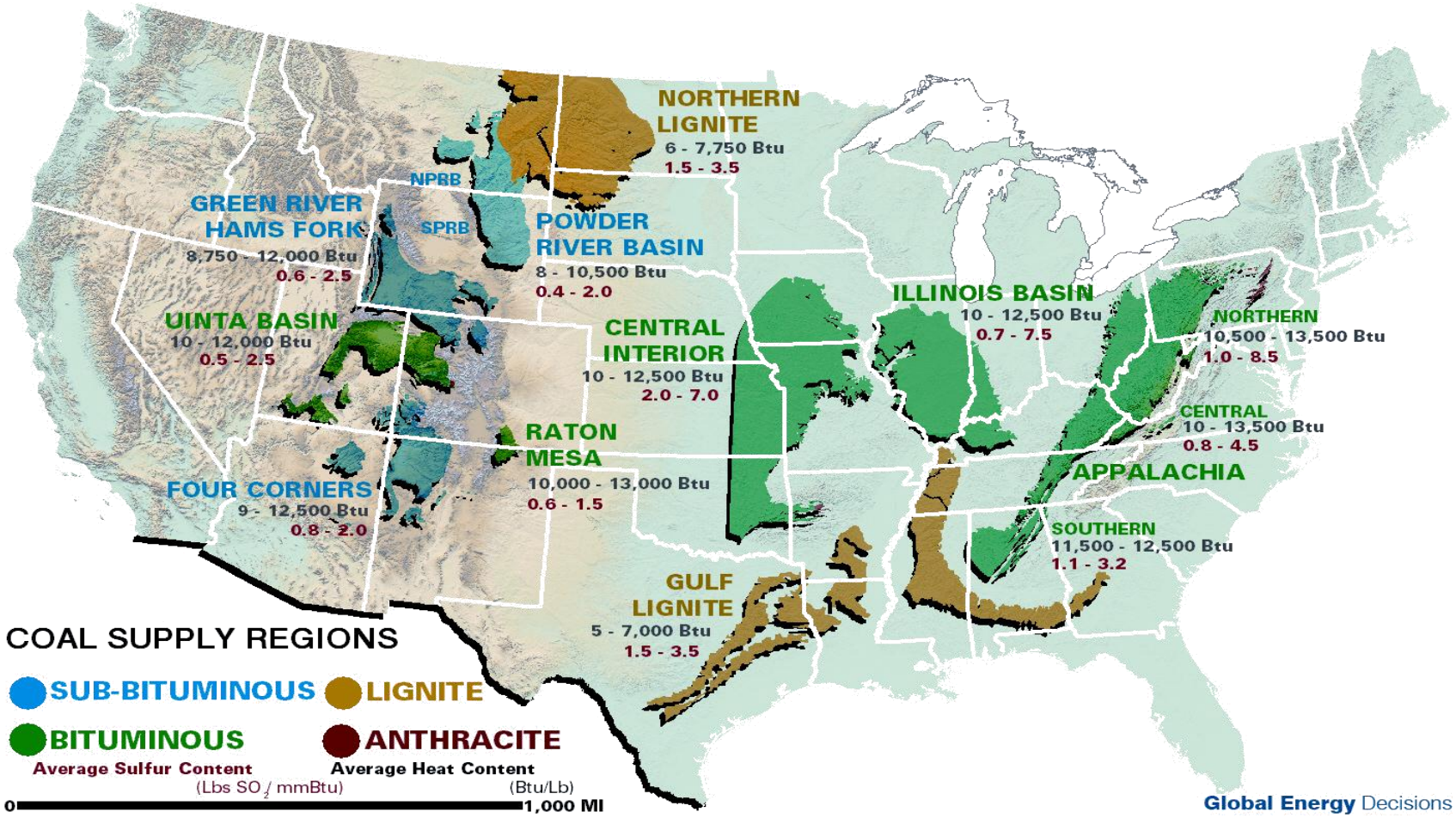
August 21, 2014

Fredrick D. Palmer
Senior Vice President, Government Relations
Peabody Energy

Peabody ENERGY

Coal: Made-in-America Energy Security

Why U.S. Will Remain Coal-Fueled: Home to 27% of the World's Coal



Electrification Powers Civilization

"The top-rated improvement to the life of earthlings in the 20th Century was electrification. If anything shines as an example… it is clearly the power that we use in our homes and businesses."

– Neil Armstrong
U.S. Astronaut, National Academy of Engineering

Electrification is Life;
Coal is Electricity

" High rates, of course, bear hard on the individual. But from a social standpoint they are chiefly to be regretted because they restrict the use of electricity."

– Franklin D. Roosevelt,1930

"As a country with coal dominating its energy structure, China still has a huge potential. We will… put in place a system that supplies stable, economical and clean energy. "

– President Hu Jintao, PRC, 2009

Only Universal Electrification Can Eradicate Energy Poverty

First, the United States

"I had seen first hand the grim drudgery and grind which had become the common lot of American farm women… growing old prematurely; dying before their time."

- Senator George Norris, sponsor, Rural Electrification Act of 1936

Then China

"Electrification in China is a remarkable success story… the most important lesson for other developing countries [is] that electrified countries reap great benefits, both in terms of economic growth and human welfare."

- IEA, 2007

And Now India

"India has more people without adequate access to energy than any country in the world."

- *National Resources Forum*, 2008

The Primary Challenge of 21st Century: Eradicating Energy Poverty

Peabody ENERGY

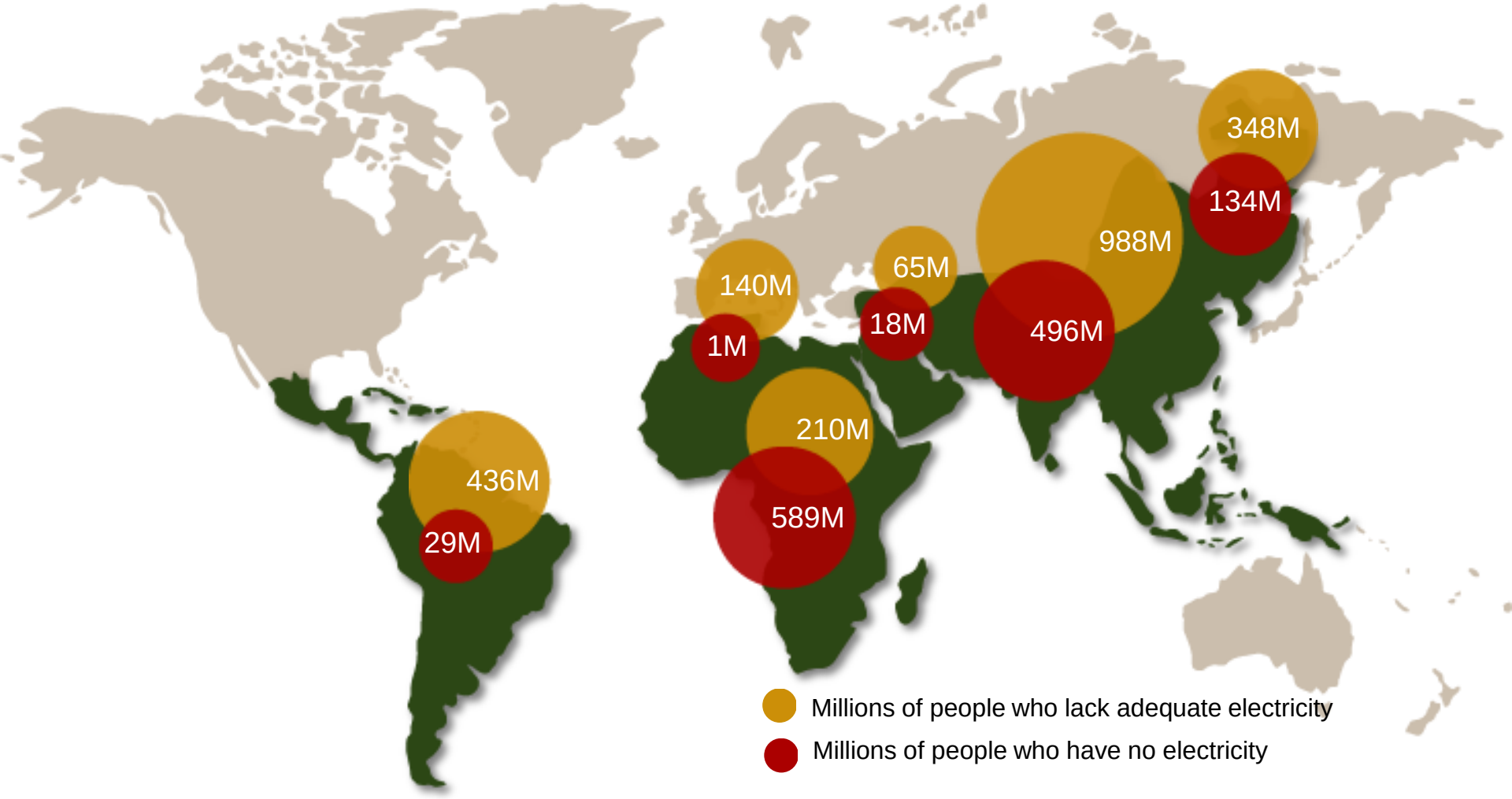
"The greatest crisis we confront in the 21st Century is not an environmental crisis predicted by computer models… but a human crisis fully within our power to solve.

Study after study – and pure common sense – tells us that access to electricity helps people live longer and better. For every agency voicing a 2050 GHG goal… we need 10 working toward the goal of broad energy access to reduce global poverty."

— Gregory H. Boyce,
Peabody Energy
Chairman and CEO

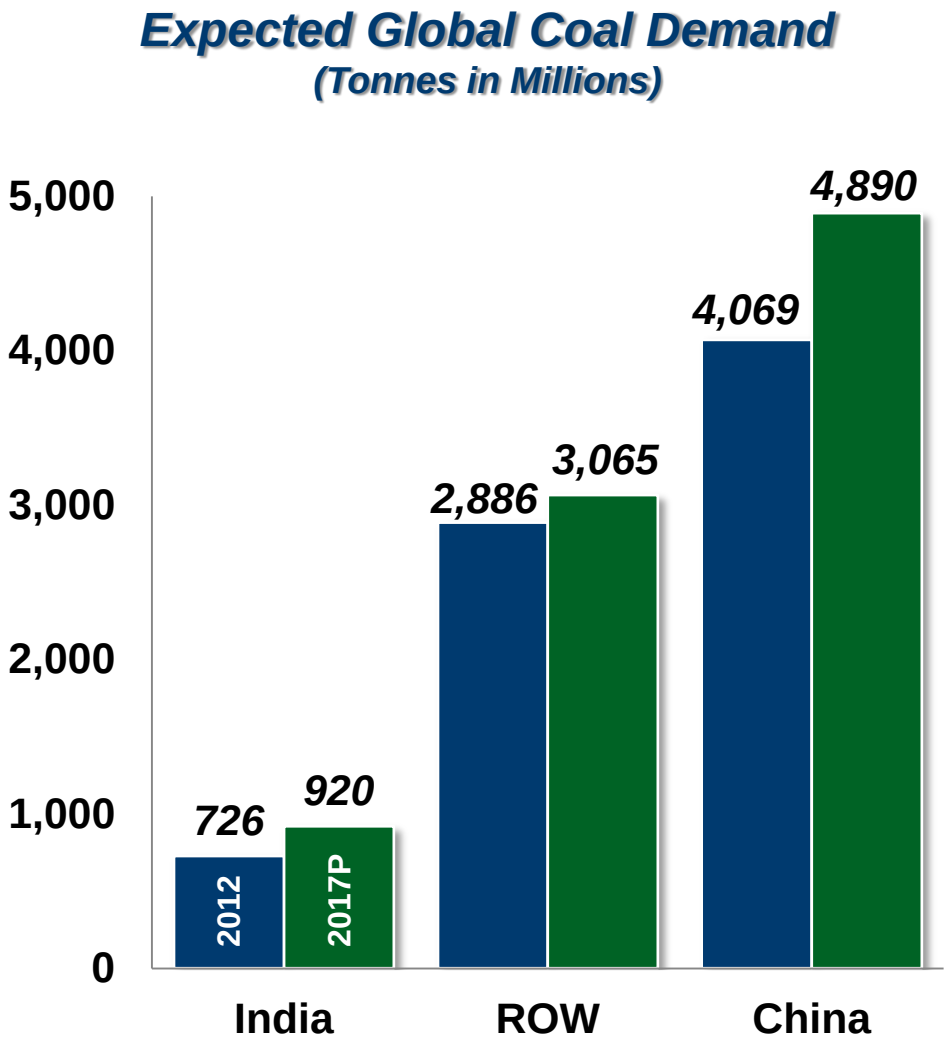
Energy is a Human Right and a Rapidly Rising Need

3.5 BILLION people lack proper access to electricity



Source: International Energy Agency, World Energy Outlook 2012, The World Bank World Development Indicators 2012, CIA World Factbook 2012.

Annual World Coal Demand to Grow 1.2 Billion Tonnes in Five Years

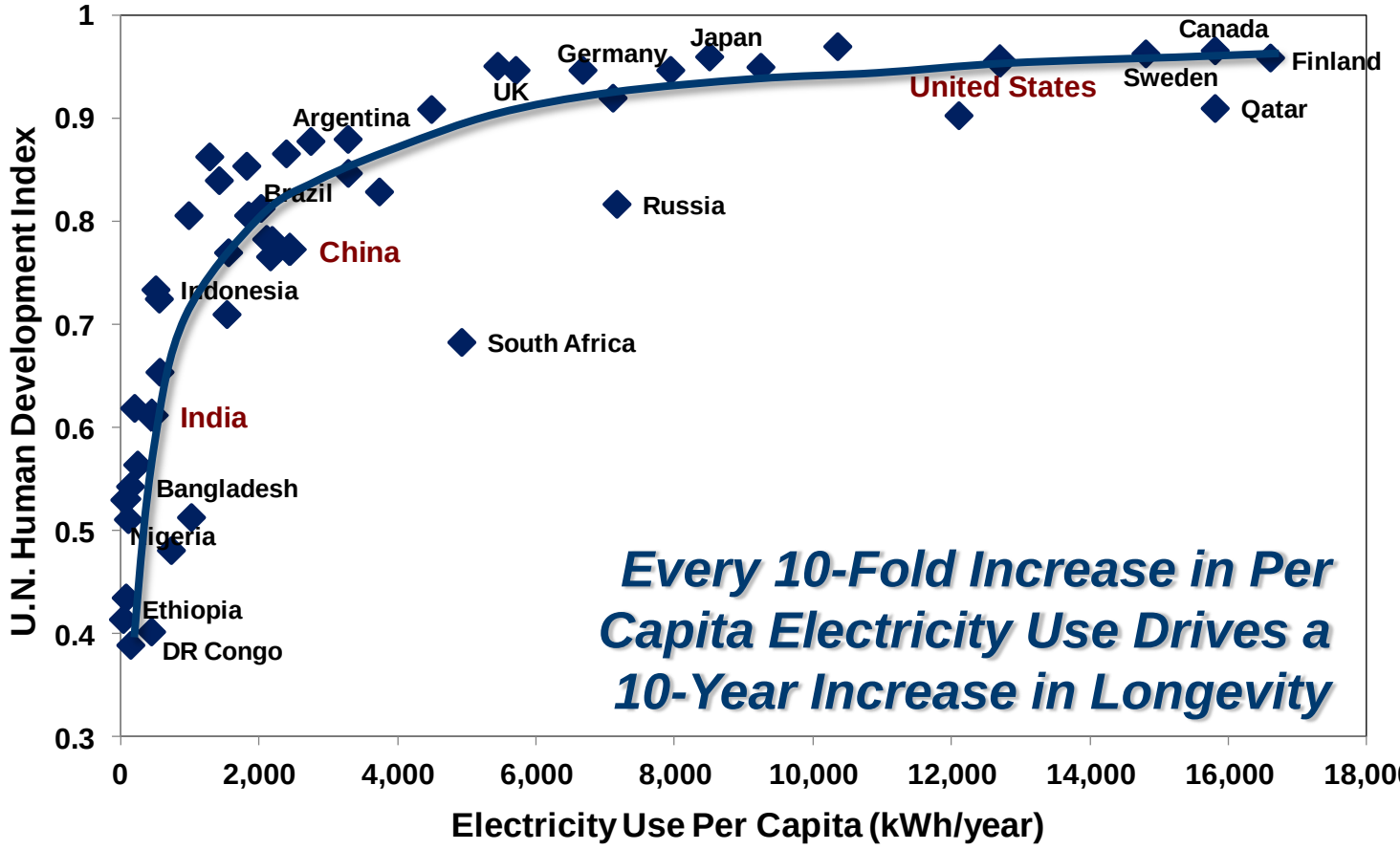


- New coal-fueled generation of ~425 GW by 2017
- Steel production growth requires additional 150 MTPY of metallurgical coal in 2017
- More than 80% of projected global demand growth in China/India

Source: Peabody Global Analytics.

Electricity Enables People to Live Longer and Better

United Nations Links Affordable Energy to Quality of Life



Source: CIA World Fact Book, United Nations Development Program's Human Development Report.

The Coal-Powered Path: More People Living Longer, Living Better

1

Beneficial Electrification: Improving the quality of life through Electricity

2

Ecowatts: Using more affordable kilowatts for economic growth and a cleaner environment by avoiding fossil fuel combustion at the point of use

3

Electrotechnologies: The means to drive the application of Ecowatts to create benefits for society, including enhanced energy efficiency

Economic Growth

Quality of Life

Workplace Improvement

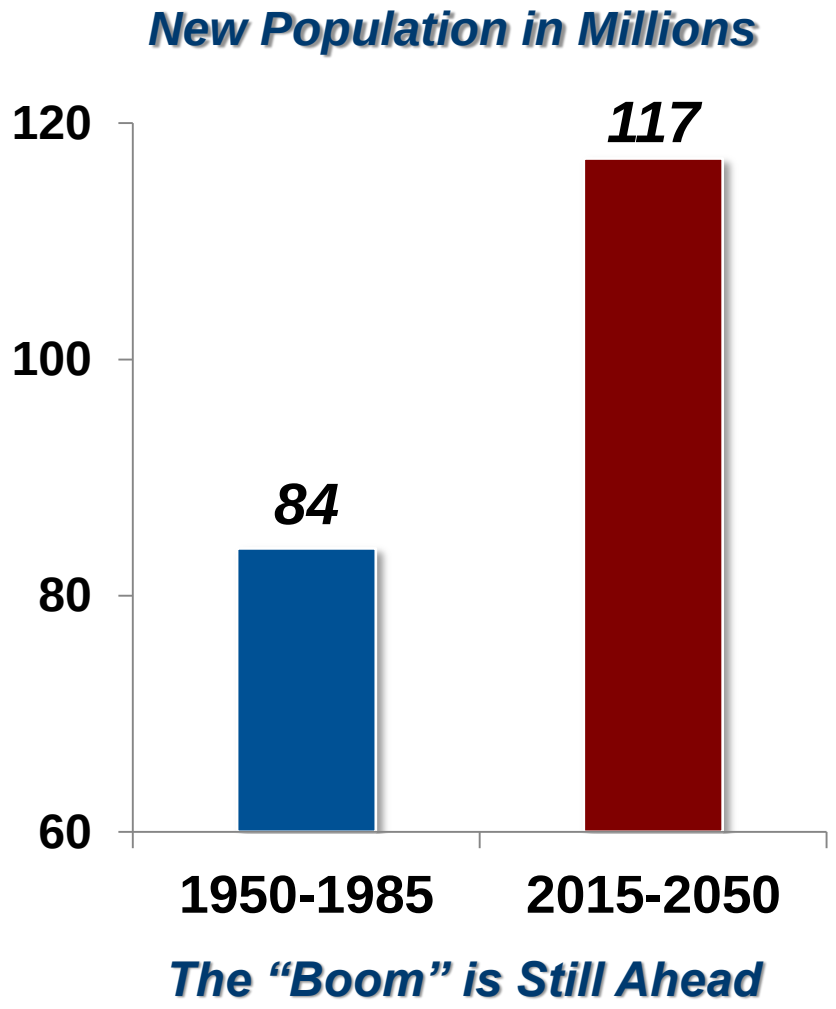
Environmental Progress

"Access to electricity is strongly correlated with every measurable indicator of human development"

- Berkeley Science Review, 2008

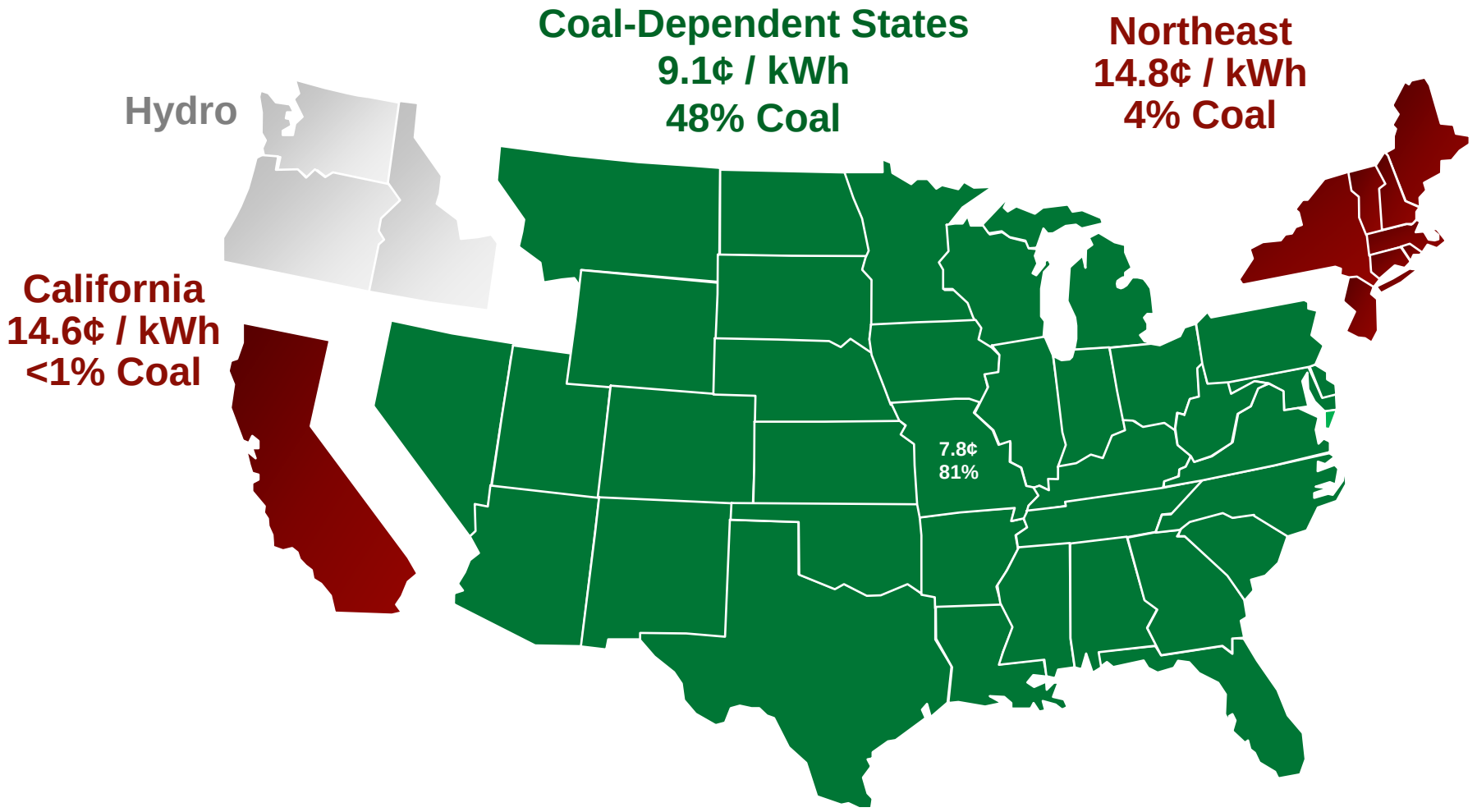
United States is a Developing Nation and Coal is Our Foundational Fuel

- U.S. adds 3.3 million people per year, population will reach 430 million in 35 years
- Urbanization level will reach 90% in the next generation of Americans
- More people will be added to U.S. population in the next 35 years than were added in post-war boom from 1950 to 1985



Coal is the Rock that Built America's Middle Class

"Green States" Pay Considerably Lower Rates for Electricity



U.S. EIA, 2013 data (March 2014). Average retail electricity prices per kWh. Weighted average of CA and NE states equals 14.7 cents per kWh.

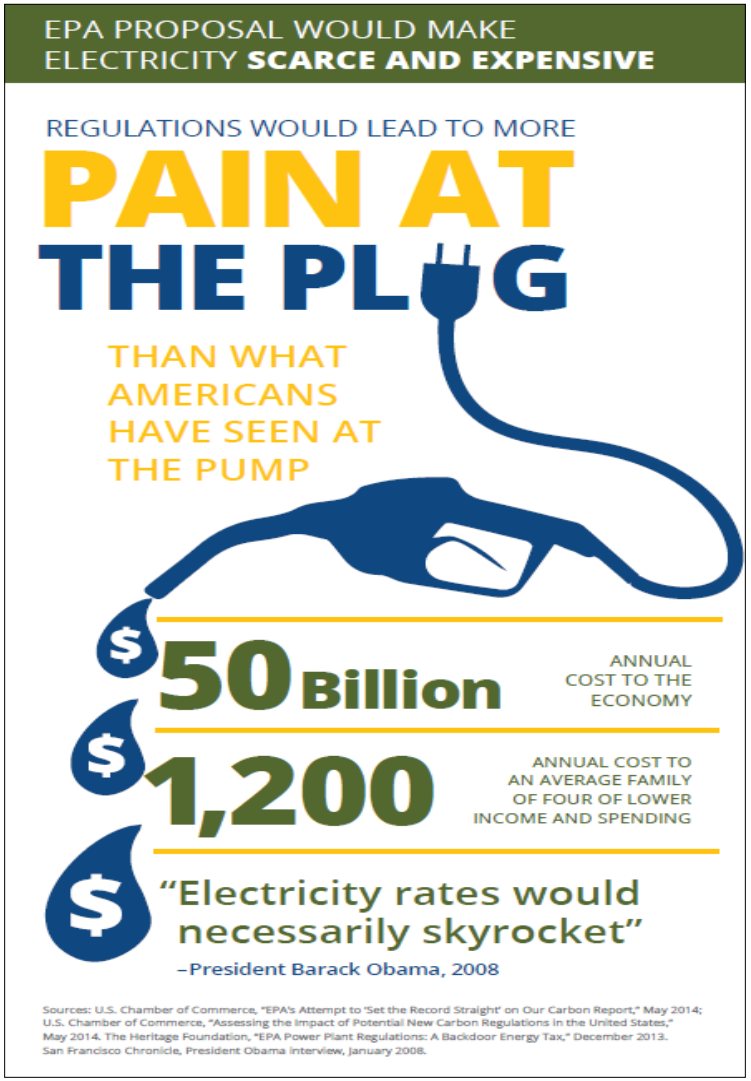
For America, Excessive Regulations Would Cause Pain at the Plug

- More than half of Americans say a monthly increase of as little as $20 in utility bills would create hardship
- Some 48 million Americans live in poverty, a number that has grown by 20 percent – or 8 million Americans – since 2008
- The poorest U.S. households pay, proportionately, nine times as much for energy as a percent of income as the most affluent
- Rural areas would be hardest hit by higher electricity prices; U.S. electric cooperatives are 70 percent dependent on coal-fueled generation

What is at Risk for America?

Proposed Carbon Rules Would Punish Consumers, Harm U.S. Poor

- The proposal would endanger human health and welfare by making electricity scarce and expensive
- Through the rule, the Administration turns its back on America's poor
- Even if enacted, these limits would have no emissions benefit under climate theory
- Administration's action flies in the face of recent actions of leading global nations
- Proposal does not carry force of law and is likely to be aggressively contested and litigated
- Proposed rules have no immediate impact on coal use

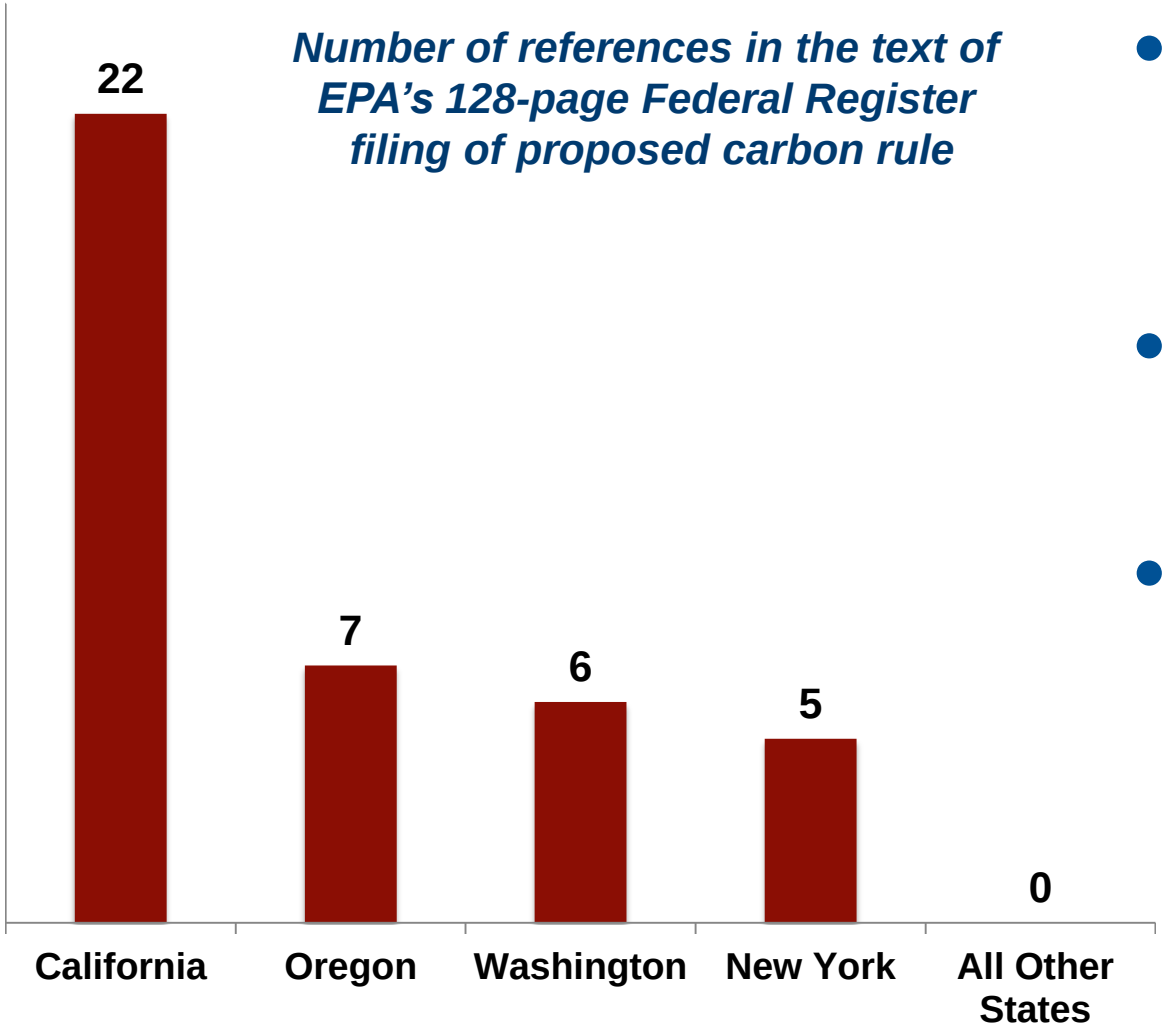


EPA's Proposed CO_2 Rule on Existing U.S. Electricity Generation Facilities

Opposition Building due to Legal, Economic and Other Concerns

- Proposes to reduce CO_2 in the power sector by 30% from 2005 levels
- System-based approach, not plant-by-plant as required by Clean Air Act and law in most states
- Implementation lies with states; assumes legal authority in the states that does not exist
- Substantial encroachment on state authority
  - Conflicts with FERC, State PUCs and DNRs, State Legislatures and Governors' authority to regulate electricity and environmental issues
- Does not provide promised "flexibility" for states; those unwilling to act face EPA threat of Federal Implementation Plan (FIP)
- Implications
  - Would stress the nation's electricity system and its reliability
  - Increased natural gas demand for electricity generation would impact both power and heating costs for consumers, as well as input costs for gas-reliant industries
    - Initial high-level analysis indicates an additional ~$180 billion annually in national power prices and gas bills in 2020 (versus 2012)
    - Some states experience 30 – 60% electric price increases

California is the Model For EPA's Proposed Existing Fleet Rule

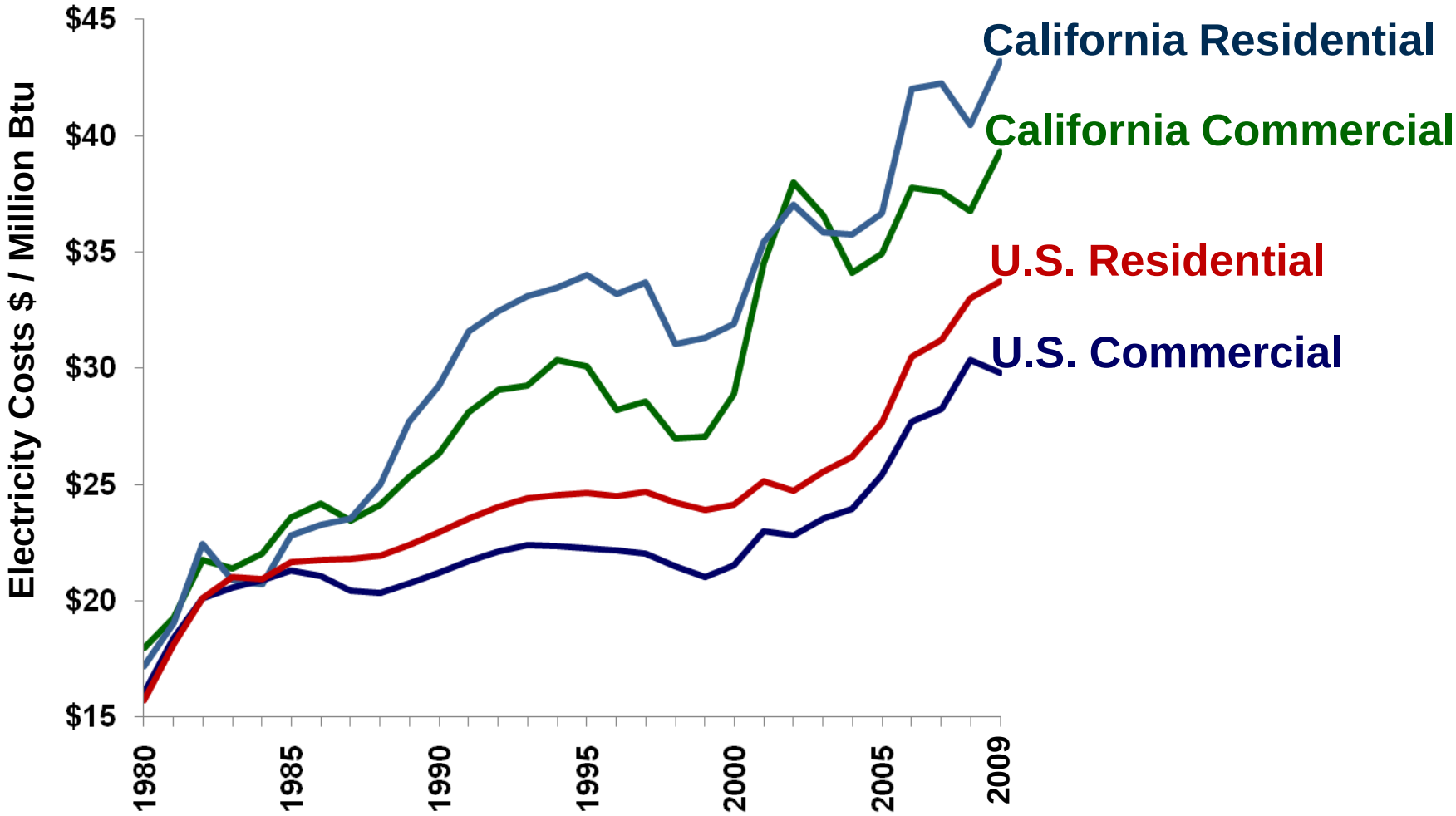


- California has the highest electricity rates west of the Mississippi
- New York's residential rates are 56% above U.S. average
- Washington and Oregon are hydro-based, thus not relevant to the rest of the country

Source: EPA, Federal Register, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Proposed Rule, June 18, 2014: Note: Contiguous U.S.; excludes listings of all 50 states

California Model: Escalating Electricity Costs

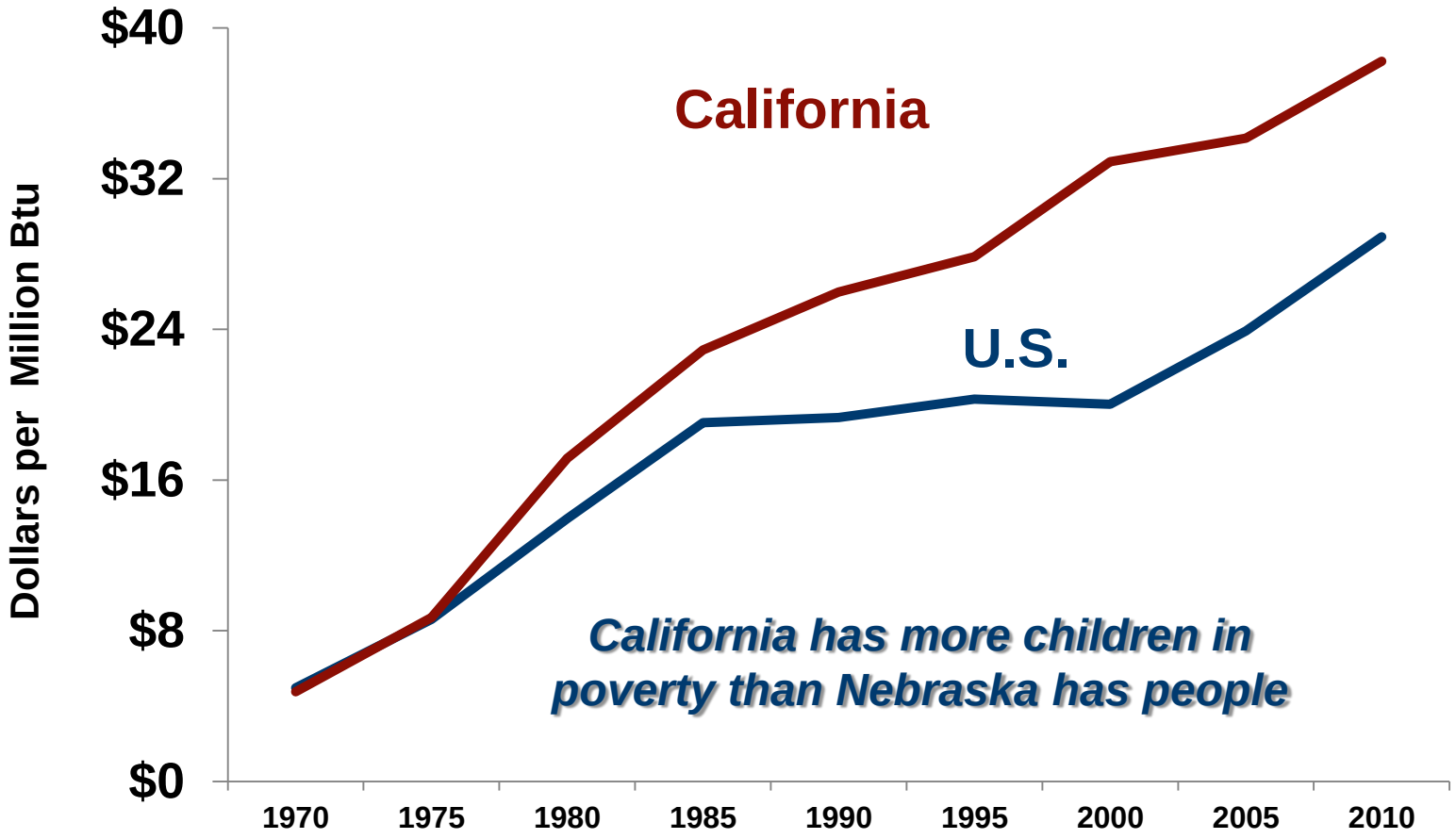
"Excessive energy costs have helped obliterate the state's manufacturing base." – Wall Street Journal



Source: U.S. Energy Information Administration; 2010.

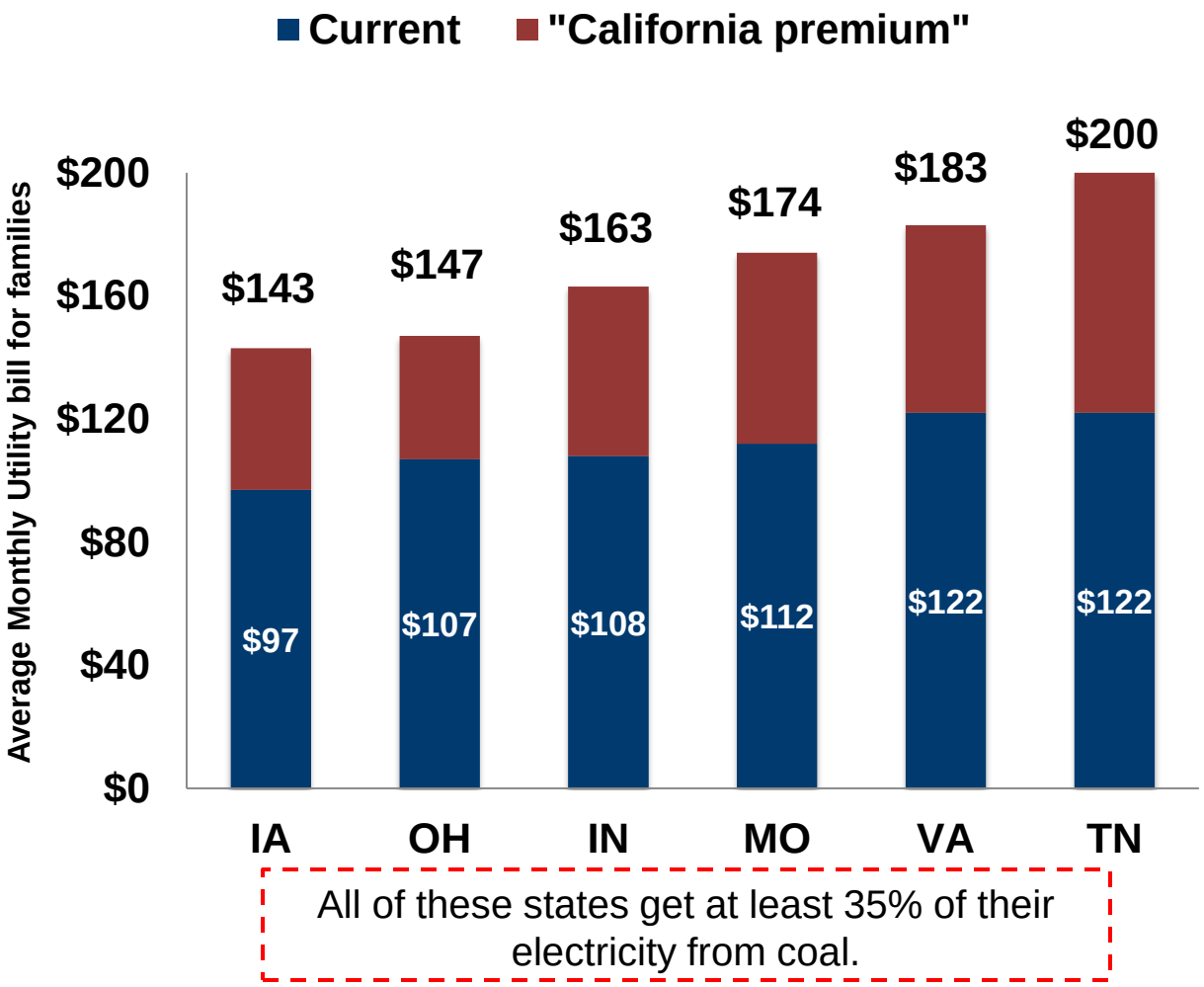
California's Anti-Coal Policies Massively Increase Prices for Ordinary Consumers

"Excessive energy costs have helped obliterate the state's manufacturing base." – Wall Street Journal, March 29, 2013



Source: San Diego Union Tribune (July 28, 2012); U.S. Energy Information Agency, 2013; U.S. Census Bureau

If Coal States Had California Policies, Families Would Face California Prices



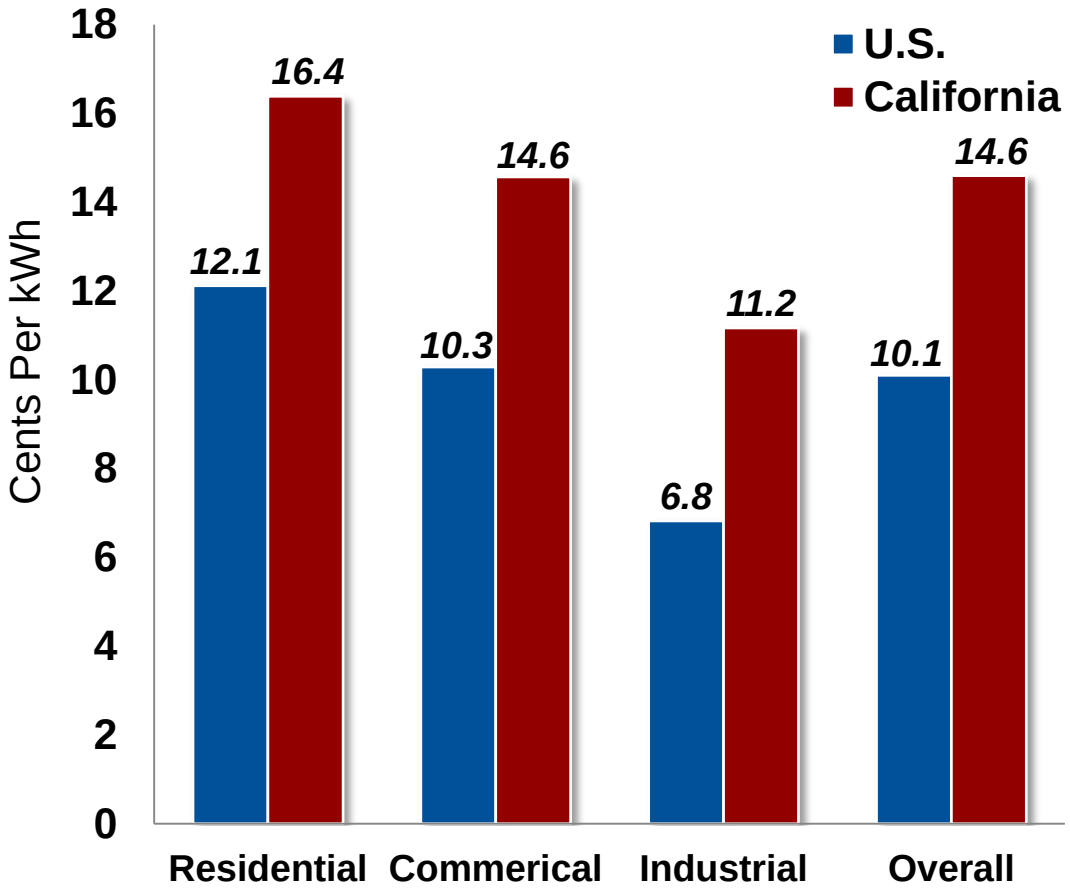
- California has electricity rates 40% above the national average of 34% of Americans on welfare.

Source: EIA; UT San Diego, July 28, 2012

EPA's Model is California: A Cautionary Tale of Forcing Out Coal

California = 12% of U.S. Population, 34% of U.S. Welfare Recipients

2013 Electricity Rates



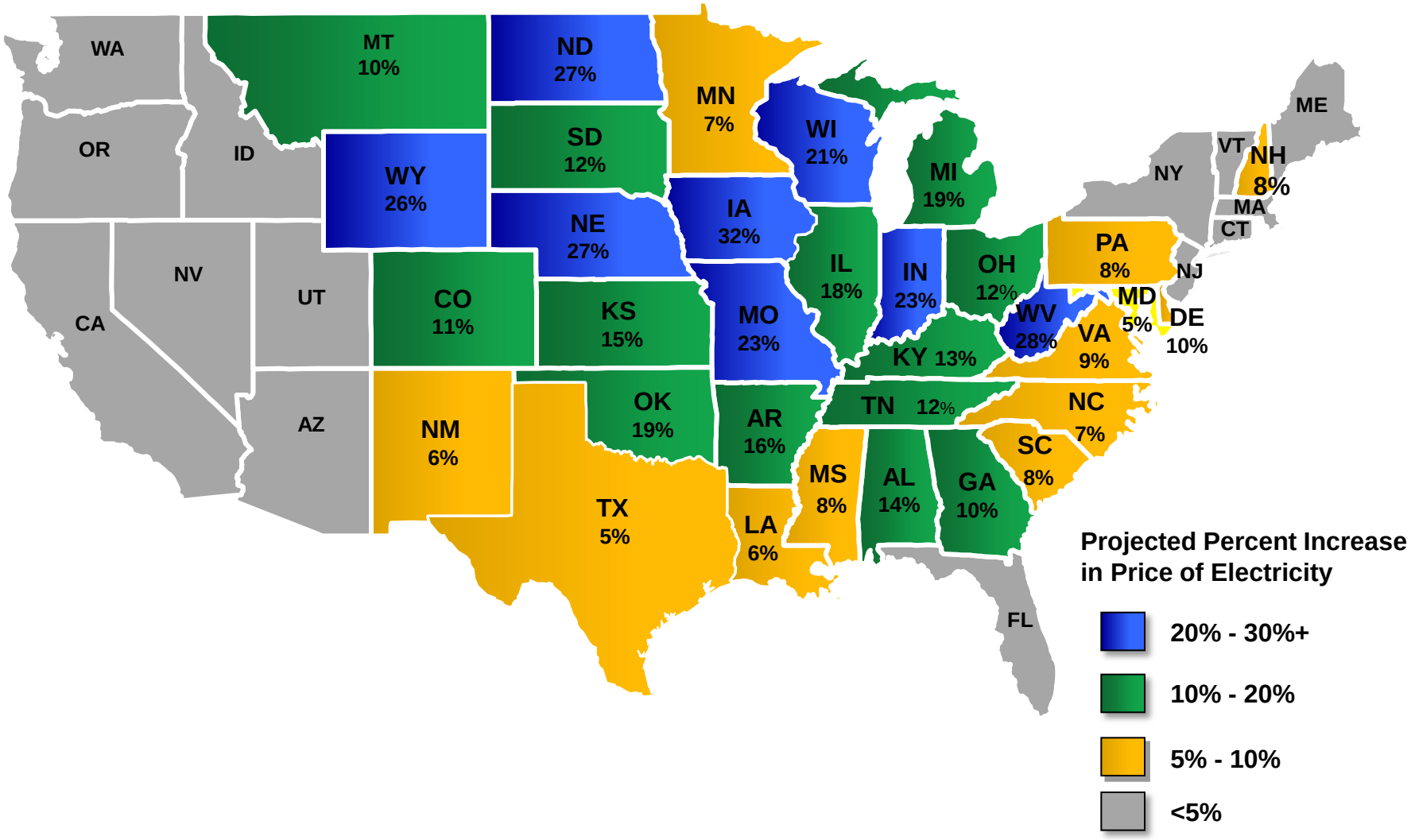
California

- Electric rates 45% > national average and 64% > Missouri
- 12 million people eligible for low income energy assistance
- More than 2 million children in poverty including 868,000 in extreme poverty
- 700,000 manufacturing jobs lost since 2000

Source: San Diego Union Tribune (July 28, 2012); U.S. Energy Information Agency, 2013; U.S. Census Bureau

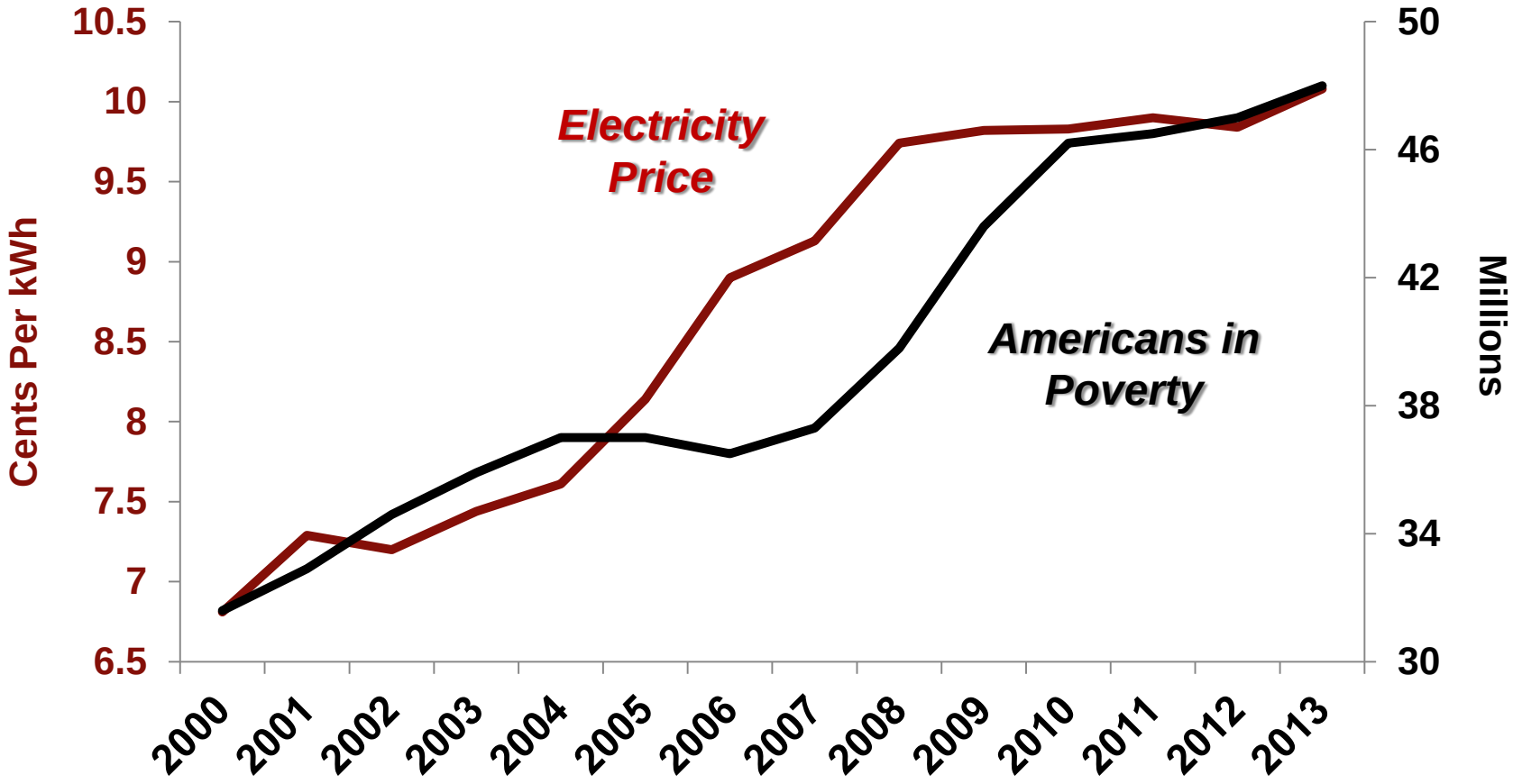
EPA Regs Forecast to Hit Midwest and Eastern States Hardest

Nearly 1.2 Million Jobs Lost by 2015; Unemployment Hits Double Digits



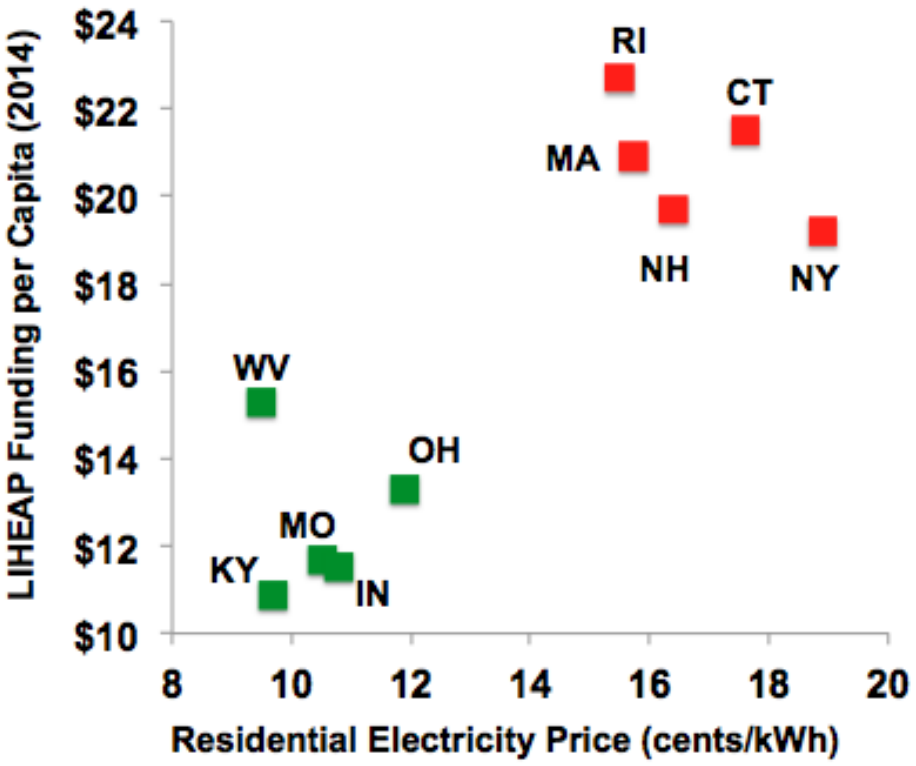
Higher Electricity Prices Lead to More Poverty

Since 2008, U.S. Population in Poverty Grew 20%



Sources: EIA, State Electricity Profiles, Electric Power Monthly, February 2013; U.S. Census Bureau, Poverty 2000-2012

Less Coal = Higher Rates = More LIHEAP



- No wonder LIHEAP funding will be cut 45% from 2010-2015:
  - Although they use half the amount of electricity, non-coal states have residential rates 60% higher than coal states and thus require 67% more LIHEAP funding to pay bills.

Source: LIHEAP Facts; EIA

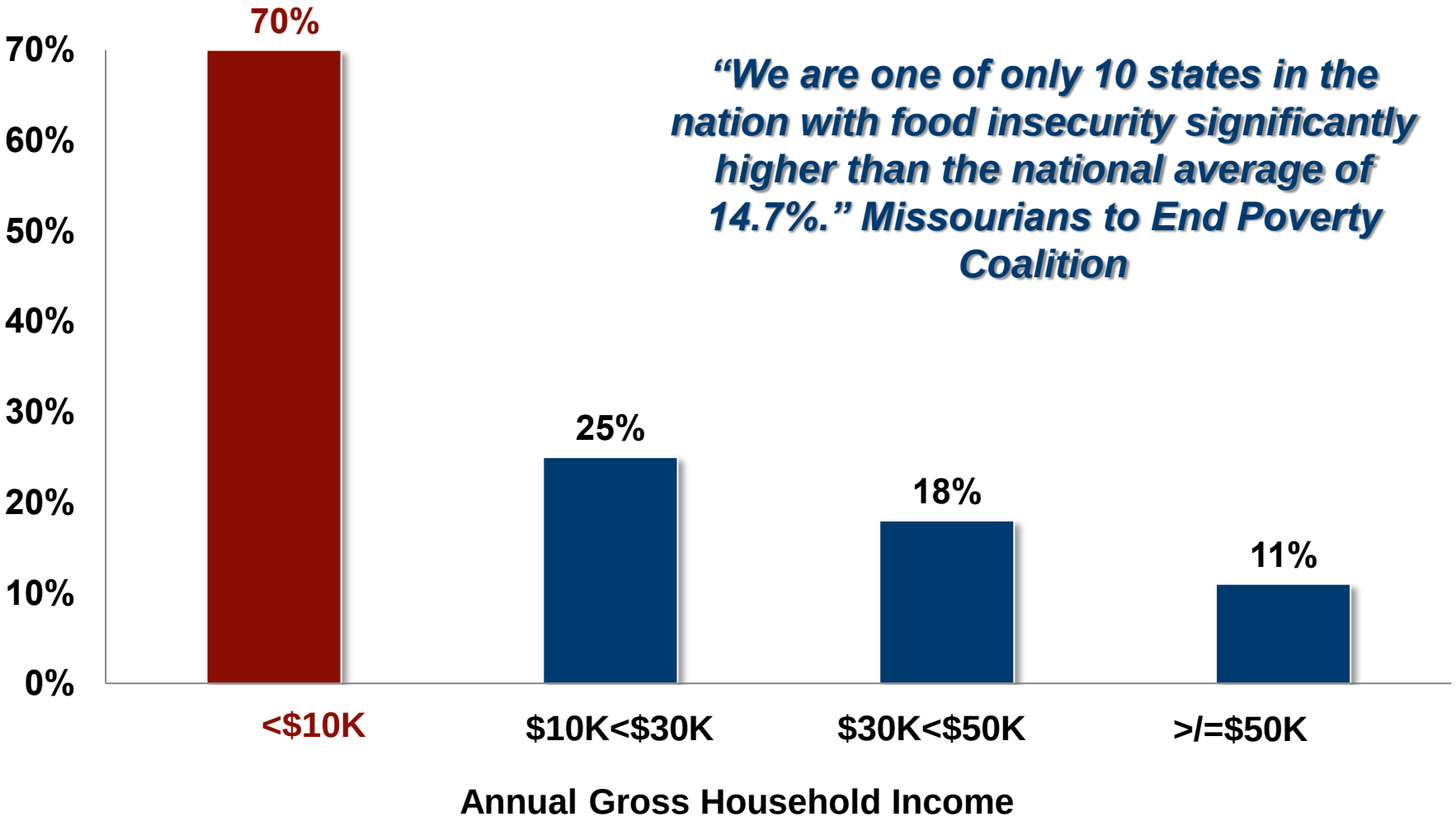
Health Implications for LIHEAP Families of Increased Home Energy Bills

Question	Percent of Respondents
Went Without Food for at Least One Day	30%
Went Without Medical or Dental Care	41%
Didn't Fill Prescriptions or Took Less than Full Dose	33%
Unable to Pay Energy Bill Due to Medical Expenses	22%

Source: National Energy Assistance Directors' Association, May 12, 2013

Mo. Is Example: Family Energy Costs As % of After-Tax Income

16% of the State Lives in Poverty, Up from 13% in 2008

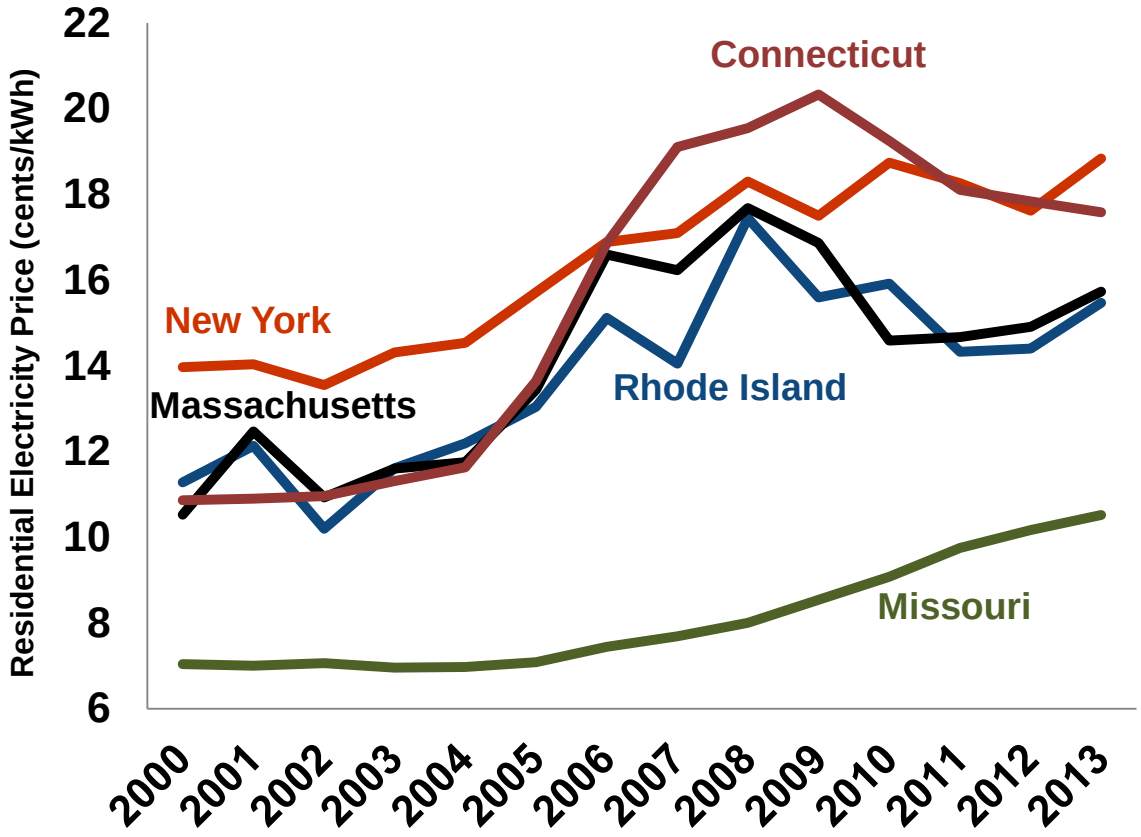


"We are one of only 10 states in the nation with food insecurity significantly higher than the national average of 14.7%." Missourians to End Poverty Coalition

Sources: Trisko, ACCCE, Energy Cost Impacts on American Families, July 2013; St. Louis Public Radio, "Coalition Urges State Action To Curb Rising Poverty In Missouri," January 15, 2014

But… Coal Keeps Missouri's Rates Lower

Coal 83% of Mo. Power, Keeps Rates 35% Lower Than New England

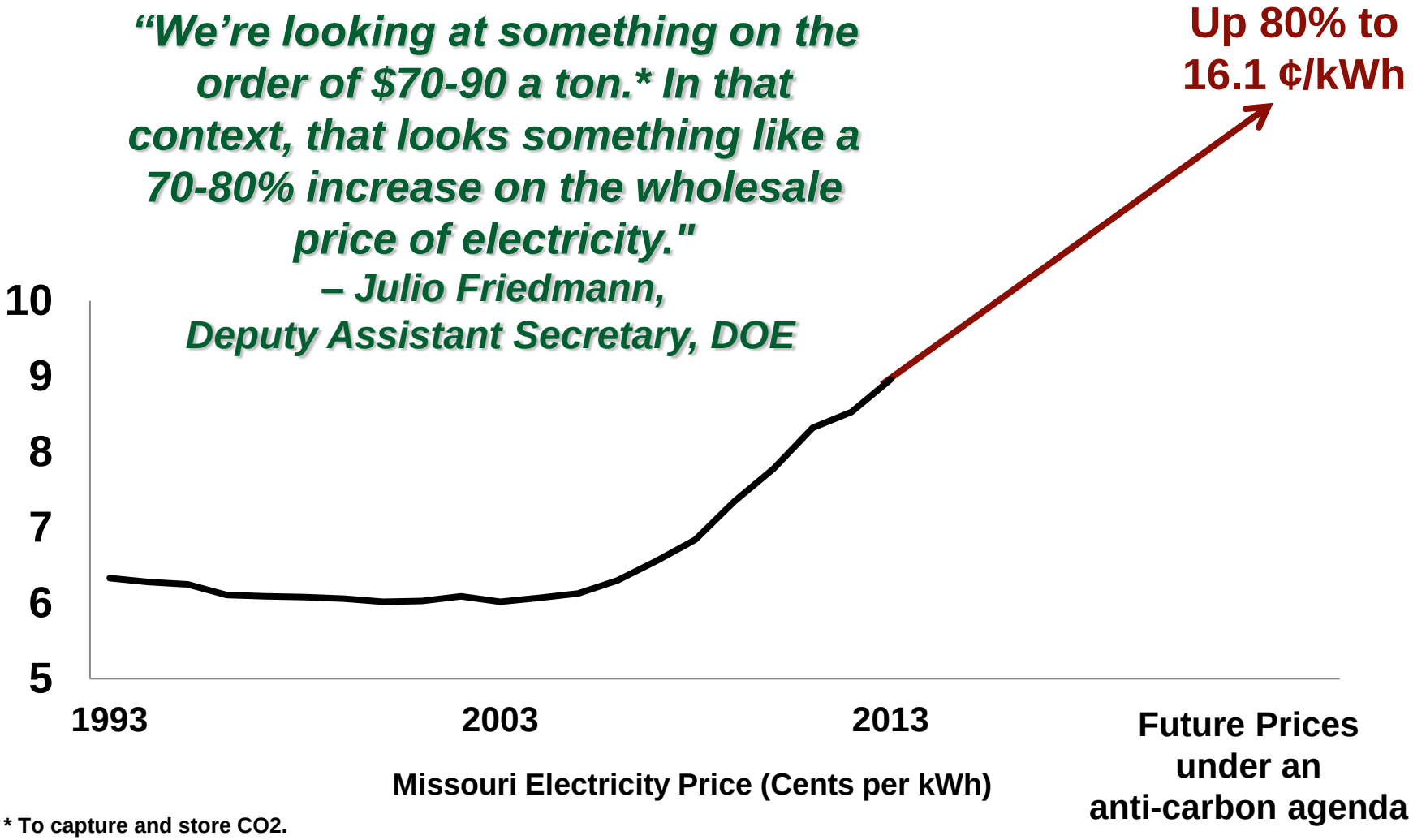


- Health wise, coal is cheaper and thus gives us more money to take care of ourselves.
- "Higher income has been routinely shown to be a significant inverse predictor of morbidity and morality," Dr. Harvey Brenner, Johns Hopkins School of Health

Source: EIA; Brenner, 2005

Missouri: EPA's Anti-Carbon Agenda is Increasing the Cost of Electricity

"We're looking at something on the order of $70-90 a ton.* In that context, that looks something like a 70-80% increase on the wholesale price of electricity."
– Julio Friedmann,
Deputy Assistant Secretary, DOE

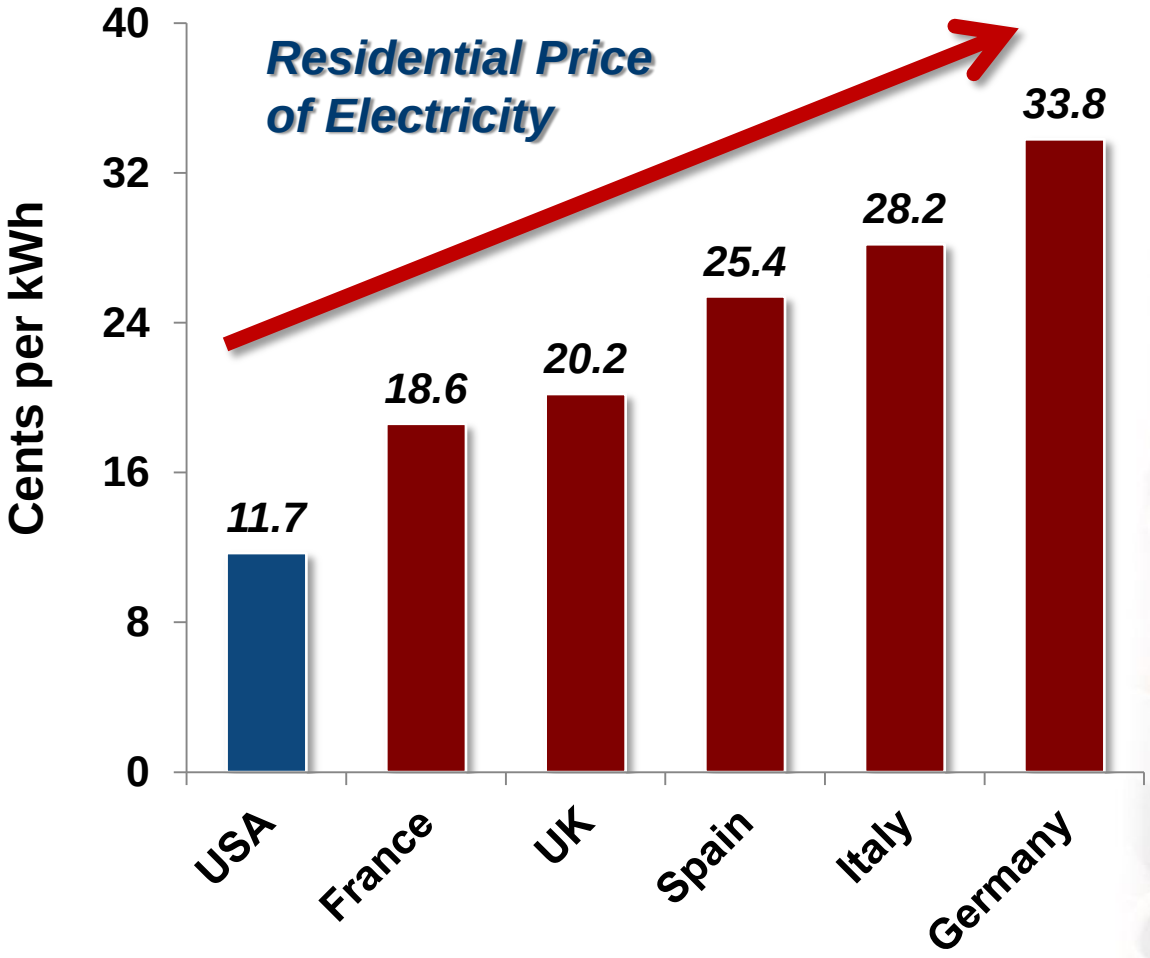


*** To capture and store CO2.**

Sources: EIA, Geography, U.S. States, State Electricity Summaries; EIA, Electric Power Monthly, February 2014, February 2013; Power Magazine, Feb. 13, 2014

Europe's Disastrous Carbon Emissions Trading System Sent Prices Soaring

"Instead of a model for the world to emulate, Europe has become a model of what not to do." – The Washington Post, April 21, 2013

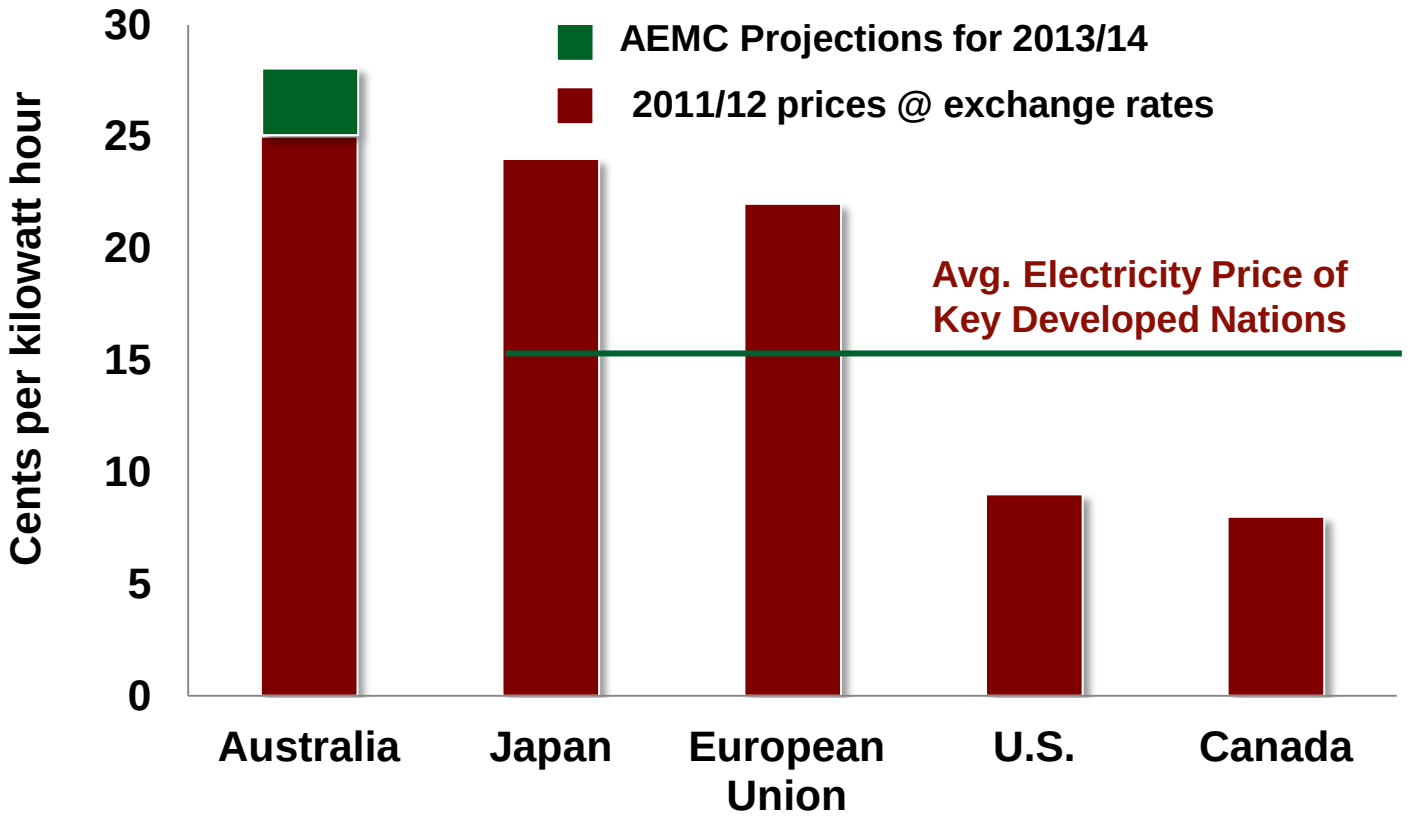


Sources: Europe's Energy Portal; EIA, 2011 and 2012.

Australia's Repealed Carbon Tax Led to Highest Power Prices in Developed World

Rates Were Nearly Double the Average of Other Developed Nations

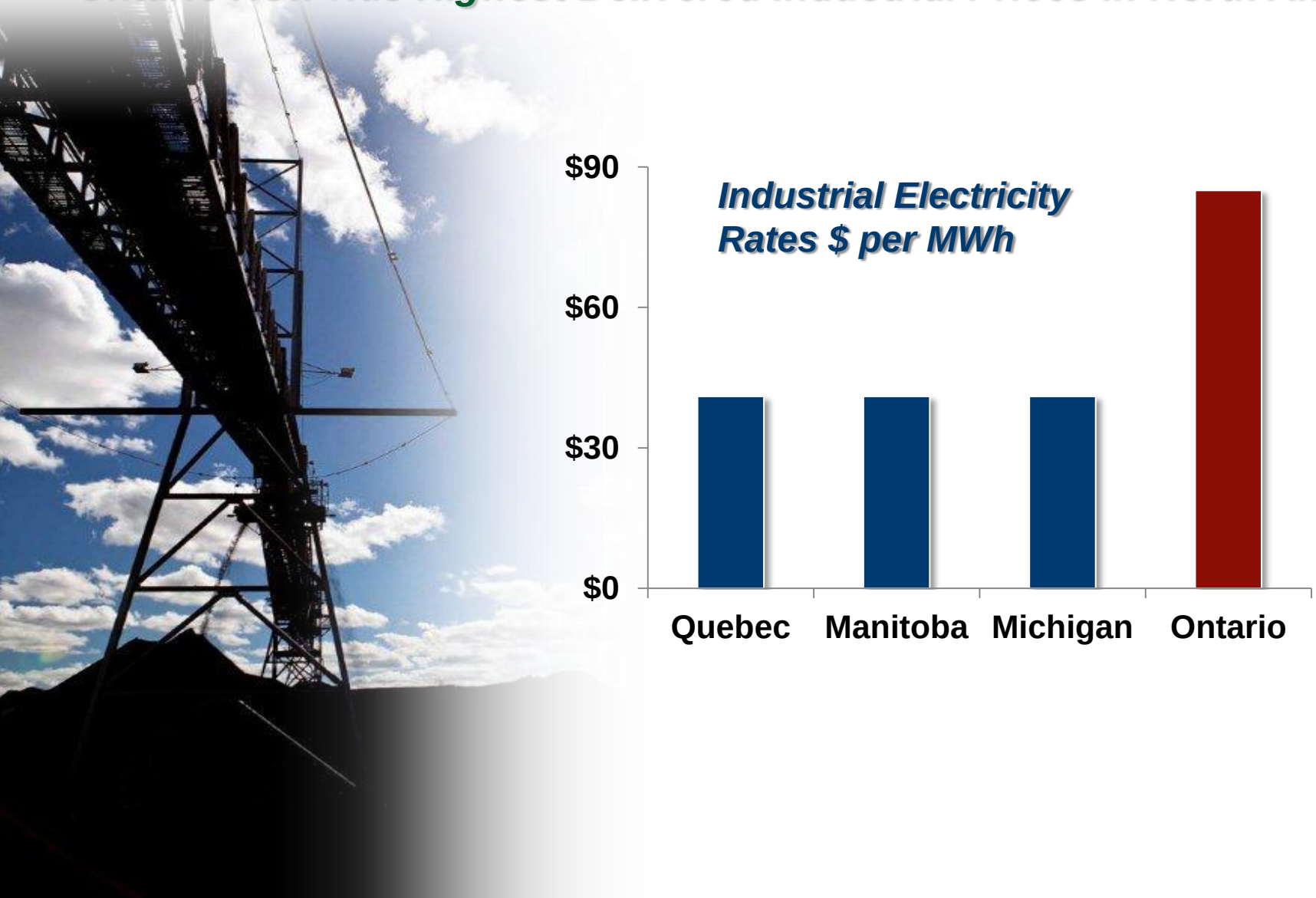
Average Household Electricity Prices



Source: CME, 2012.

Ontario: Anti-Coal Polices Increased Rates, Reduced Competitiveness

Ontario Now Has Highest Delivered Industrial Prices in North America



Clean Coal Solutions

GreenGen Power Plant and
Carbon Research Center; Tianjin, China

Clean Coal: The Power Fueling Advanced Energy for Life

Advanced Coal Technologies Lower Emissions

Advanced generation and control technologies drive improved efficiency and lower emissions; Large suite of technologies available today

Proven Results Show Path Forward

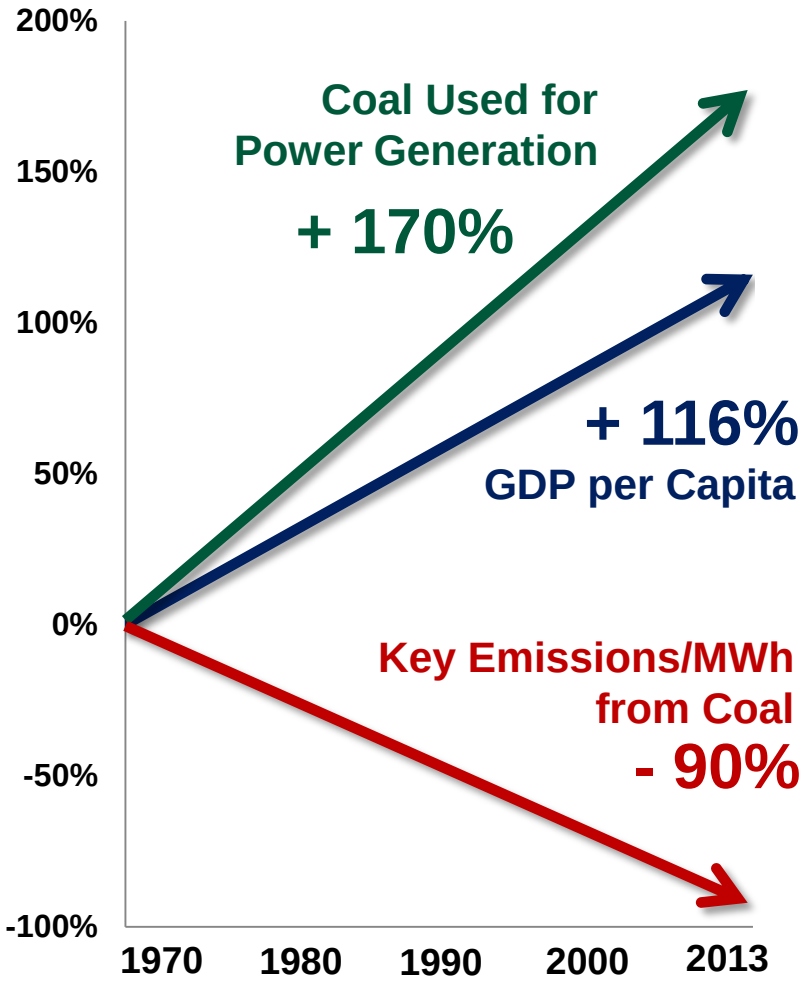
U.S. experience demonstrates tremendous environmental results while increasing coal use with today's advanced coal technologies

Next-Generation Technologies to Further Progress

Research and development underway to advance goal of coal-fueled power virtually free of emissions, including carbon capture technologies

Technology Provides the Proven Path for Addressing Emissions

More Coal Use Underpinning Economic Growth….with Cleaner Air



Source: USDA 2011; Energy Information Administration 2013; U.S. EPA Air Trends Data, 2013

Today's Advanced Coal Technologies Remove Majority of Localized Emissions

Peabody ENERGY

Low-NO_X Boiler Technology

Today's super-critical power plants are highly efficient, creating more energy per ton of coal used. Within the boiler, NO_X levels are reduced by lowering the temperature of the flame.

Selective Catalytic Reduction (SCR)

An SCR further controls NO_X emissions by injecting product into the air stream as it passes over a catalyst, converting the NO_X to nitrogen and water. The SCR also helps control mercury.

Dry Electrostatic Precipitator (ESP)

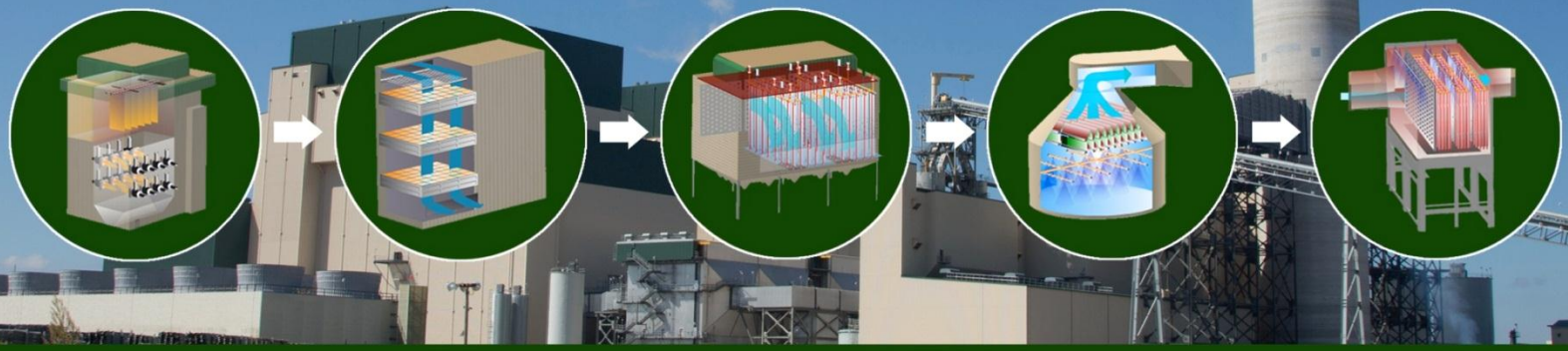
The dry ESP removes virtually all particulates from the air stream in addition to some mercury. The dry ESP uses electrodes to place an electric charge on the particles, which are captured on an oppositely charged plate. The particles are then shaken from the plates and collected.

Sulfur Dioxide (SO_2) Scrubber

SO_2 is dramatically reduced by injecting a lime-stone and water mixture into the air stream, where it reacts to capture or "scrub" the SO_2. Scrubbers also help control mercury.

Wet Electrostatic Precipitator (ESP)

The air stream passes through the scrubber into a wet ESP, which will remove fine particulates and other constituents. Wet ESPs use multiple high-voltage fields to attract the particles to an electrode, which is then washed with water to capture the constituents, including some mercury.

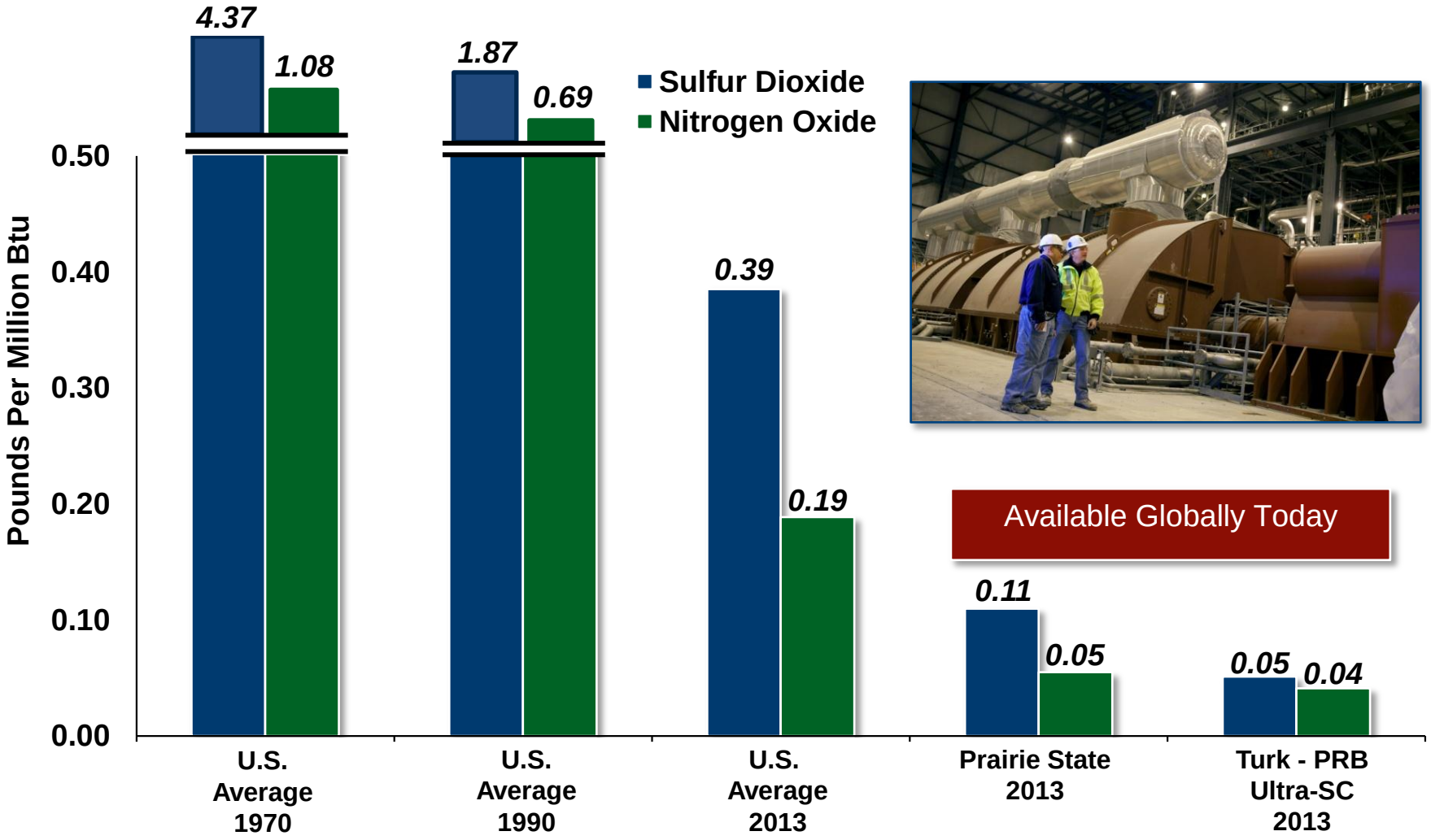


Supercritical coal plants operate at high efficiencies that significantly reduce emissions on a per kilowatt hour basis. In the United States, these plants can achieve a carbon dioxide emission rate that is as much as 25 percent lower than the oldest coal plants.

Source: U.S. Energy Information Administration.

Prairie State Energy Campus: Removing Vast Majority of Local Emissions

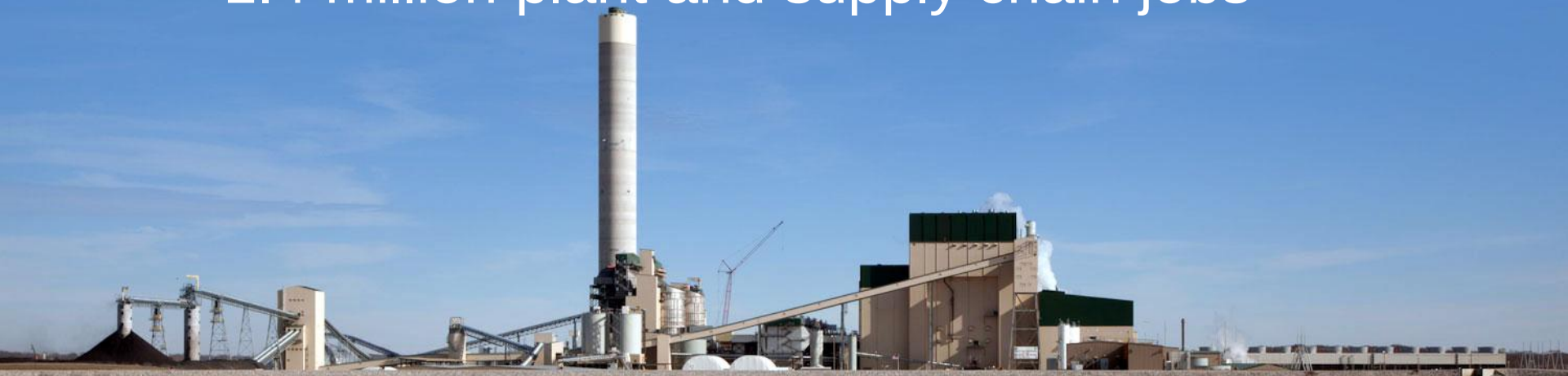
CO_2 *Emissions Rate Also 25% Lower Than Oldest U.S. Coal Plants*



Sources: EPA's Clean Air Markets database; EPA National Air Pollutant Trends; SNL; EPA CEMS filing, October 2013.

Global Supercritical Program Would Create Major Reindustrialization

- Replacing traditional coal plants with supercritical plants would drive global reindustrialization
- Annual benefit of operating these plants includes:
  - $470 billion in economic output
  - $170 billion boost to personal income
  - $89 billion of tax revenues
  - 1.4 million plant and supply chain jobs



Source: International Energy Agency, Management Information Services and Peabody analysis.

Advanced Coal is the Ultimate Stimulus

Replace Older U.S. Fleet With 160 'Prairie States'

- The United States has 308 GW of traditional coal plants
- Replacing the fleet over four-year construction period:
  - $1.2 trillion in economic benefit
  - 6 million jobs created
  - 437 million tonnes of CO_2 avoided

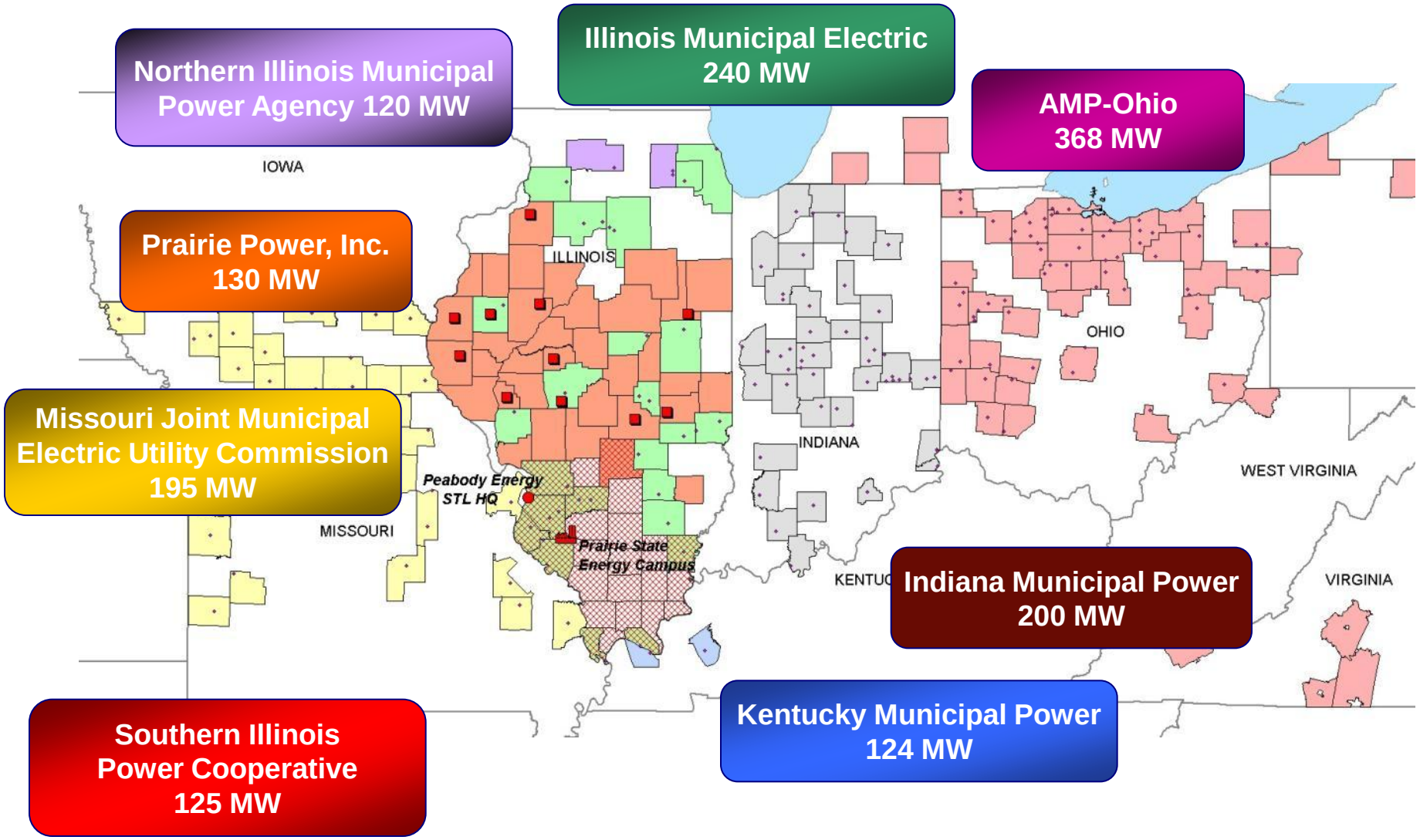
The Prairie State Energy Campus is in late stage construction in Southern Illinois.

Source: Energy Information Administration, AEO 1012, pg. 20: IEA, "Coal-Fired Power Generation: Replacement/Retrofitting Older Plants," 2008; Management Information Services and Peabody analysis.

Power to the People: PSEC Owners Serve 2.5 Million People in Eight States

Peabody ENERGY

Munis Studied Best Options for Ratepayers and Arrived at Coal

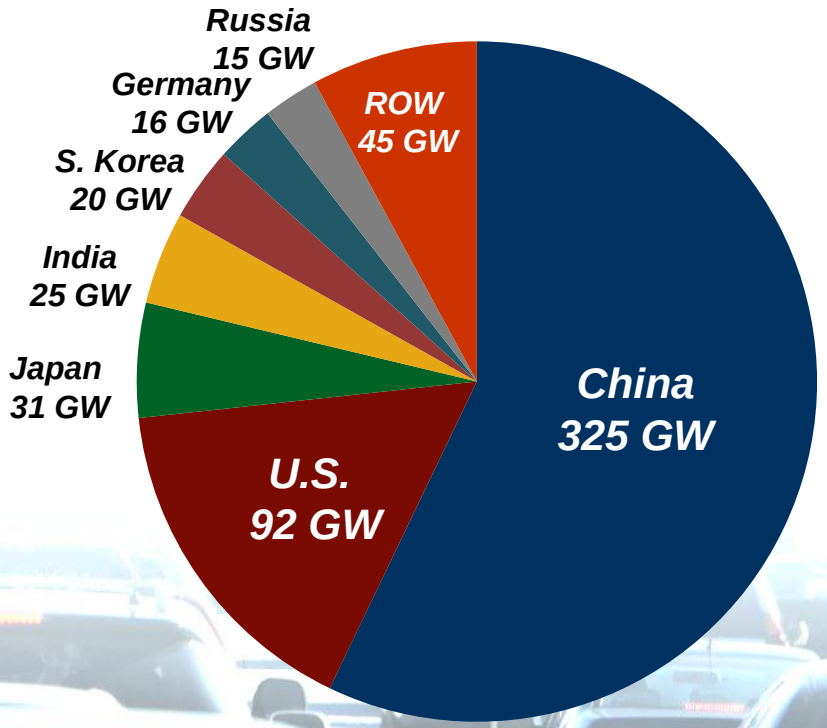


Every Advanced Coal Plant Equal to Taking 'A Million Cars Off the Road'

"A single, large coal plant, if built with the best-available technology, can reduce emissions by the annual equivalent of taking a million cars off the road…"

Maria van der Hoeven
Executive Director
International Energy Agency
December 2012

Advanced Coal Generation 569 GW On Line and Under Construction

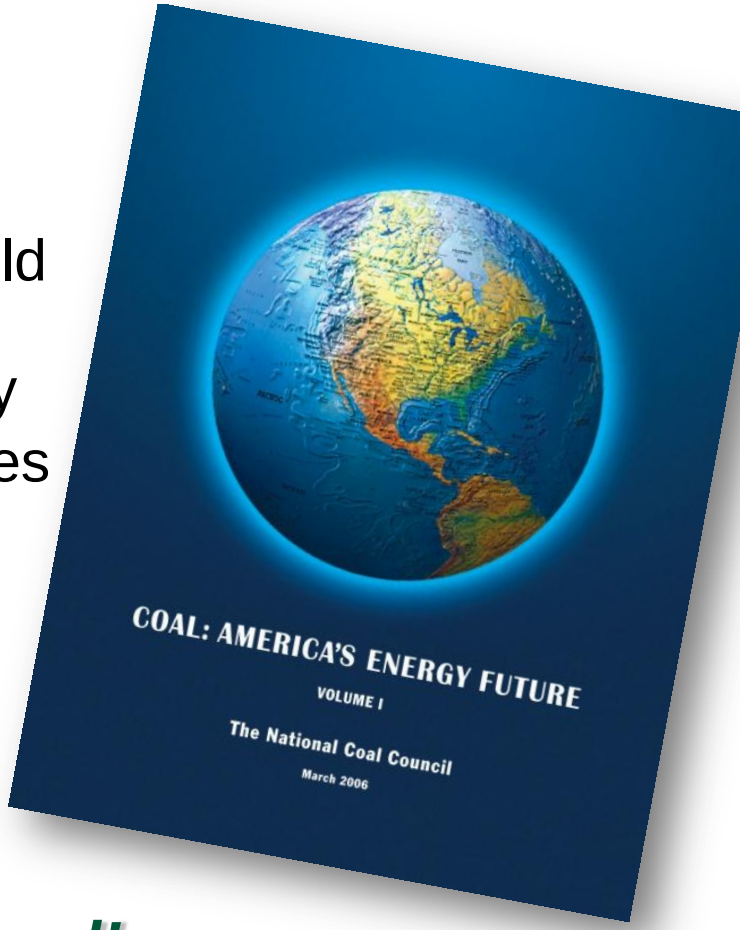


Supercritical and ultrasupercritical operating plants and plants under construction.
Source: Platts World Electric Power Plant Database. December 2013. Huffington Post, "How to Fix the 21st Century's Dirty Engine of Growth," Dec. 2012.

2006 National Coal Council Study for U.S. DOE Still the Roadmap

Chaired By Peabody Energy CEO Greg Boyce, Study Calls on U.S. to Control Energy Future

- Technologies can turn U.S. coal into multiple energy forms
- By 2025, new capital investments would create:
  - 100 GW in new generation capacity
  - 4 TCF of coal-to-natural-gas facilities
  - 2.6 million barrels per day of coal-to-liquids
- U.S. coal production would more than double to 2.4 billion tons of coal per year



Oil: $62/BBL When Report Issued!

Next Generation Technologies: Continuous Path Forward

Peabody ENERGY

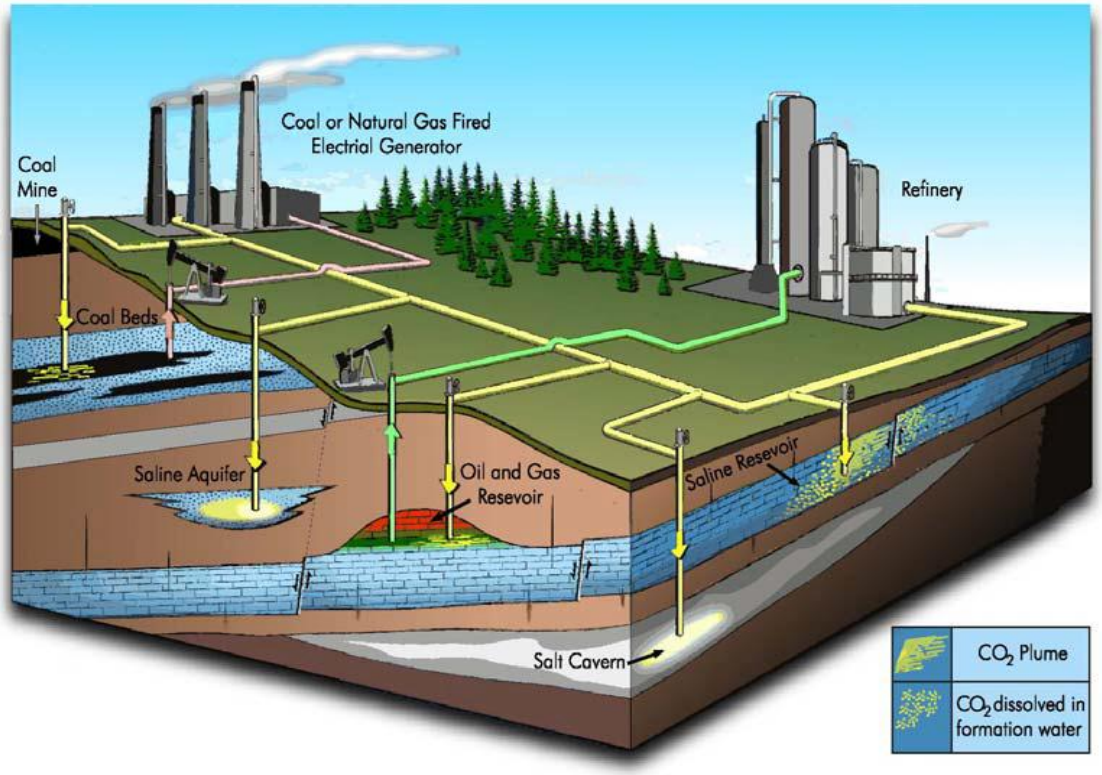
- *Efficiency Improvements at Existing Plants*
- *Building New Supercritical and Ultra-Supercritical Plants*
- *Demonstrating and Deploying IGCC and Carbon Capture, Utilization and Storage*
- *Advance Carbon Capture, Use and Storage and Btu Conversion Applications*
- *Retrofitting Existing Coal-Based Generation with Carbon Capture/Storage Up to 90% Lower CO_2*
- *CO_2-Enhanced Oil Recovery, Producing 4 Million b/d*

The Goal: Near-Zero Emissions

20 years

CCUS-The EOR Option: Proven and Profitable at $100/bbl Oil

Carbon is a Product and EOR Commercial Since Early 1970's



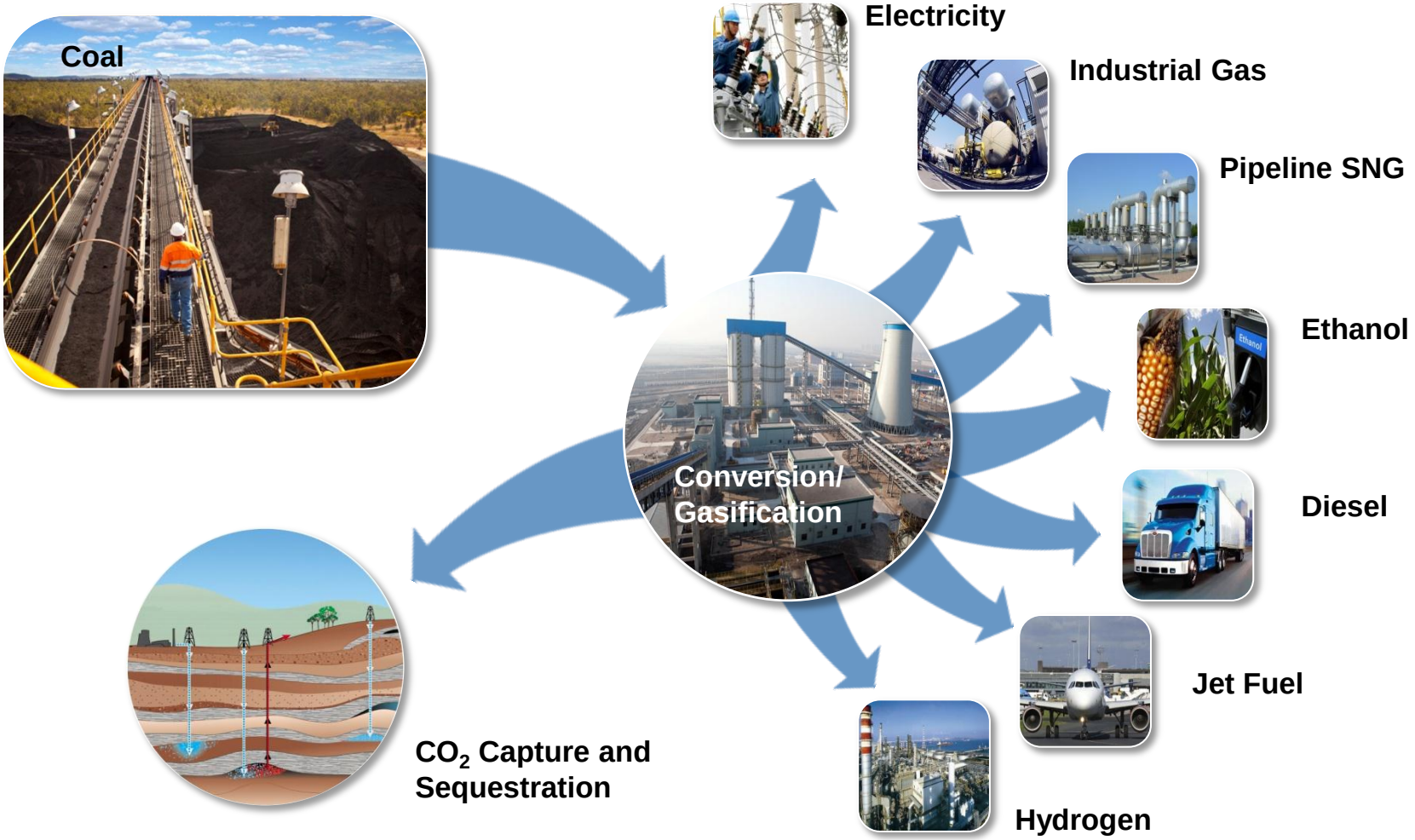
Over the next 30 years:

- 87 billion barrels in stranded oil could be recovered in the U.S. alone
- CO_2 is a necessary feedstock for EOR
- Maximum needed:
  14 billion tons of CO_2
  7 billion tons of coal
- Carbon is a product… not a problem.

Source: National Energy Technology Laboratory, U.S. Department of Energy, "Storing CO_2 and Producing Domestic Crude Oil with Next Generation CO_2-EOR Technology," Jan. 9, 2009; International Energy Agency: "Coal-Fired Power Generation: Replacement/Retrofitting Older Plants," 2008; Management Information Services and Peabody analysis. Source: DOE/NETL_2012/1540-Figure 1.5.

China Uses Coal Like the World Uses Oil – And So Should the United States

Low-Cost Coal Fuels 80% of China's Economic Engine



Research and Development Underway to Advance Next-Generation Technologies

GreenGen To Capture CO_2 for Enhanced Oil Recovery in Later Stages

Control Room at the GreenGen Plant Tianjin, China

- Peabody is the only non-Chinese partner
- Designed to be the world's largest near-zero emissions power plants and global model
- Multi-phase power project with carbon capture and carbon research center
- First 250 MW unit commissioned in 2012

Source: China Huaneng Group news release, Dec. 12, 2012.

Peabody Continues to Support Clean Coal Initiatives

Low Carbon Projects and Partnerships in U.S., China and Australia

FutureGen – Founding member of a consortium of energy and coal companies working with U.S. DOE to develop first-of-its-kind near-zero emissions coal-fueled power plant

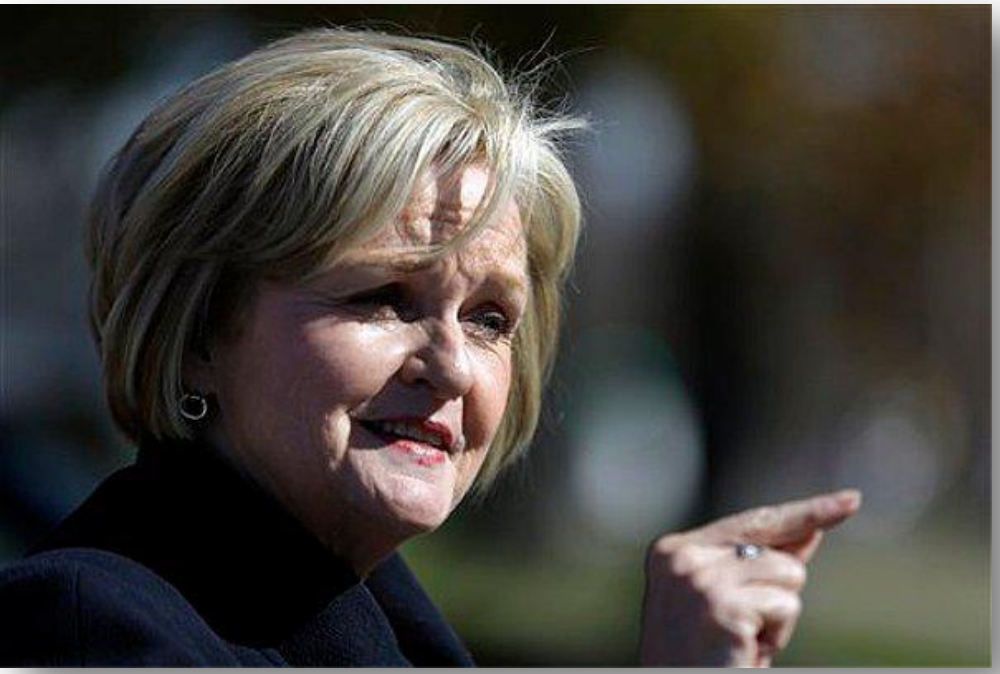
Coal 21 Fund – Founding member of industry effort to pursue collection of low-carbon technologies in Australia

Peabody owns 5% equity stake in the Prairie State Energy Campus in Southern Illinois, the second largest new coal-fueled generating plant to be built in America in the last quarter century

There is a Better Path Forward in U.S.

1. Insistence on low-cost electricity
2. Investment in efficiency improvements at existing plants
3. Deployment of advanced supercritical coal plants
4. Greater research and development toward next-gen coal technologies, including CCS

Words of Wisdom on Environmental Policy



"We've got to be very careful with what we do …We need to be a leader in the world, but we don't want to be a sucker… And if we go too far with this, all we're going to do is chase more jobs to China and India, where they've been putting up coal-fired plants every 10 minutes."

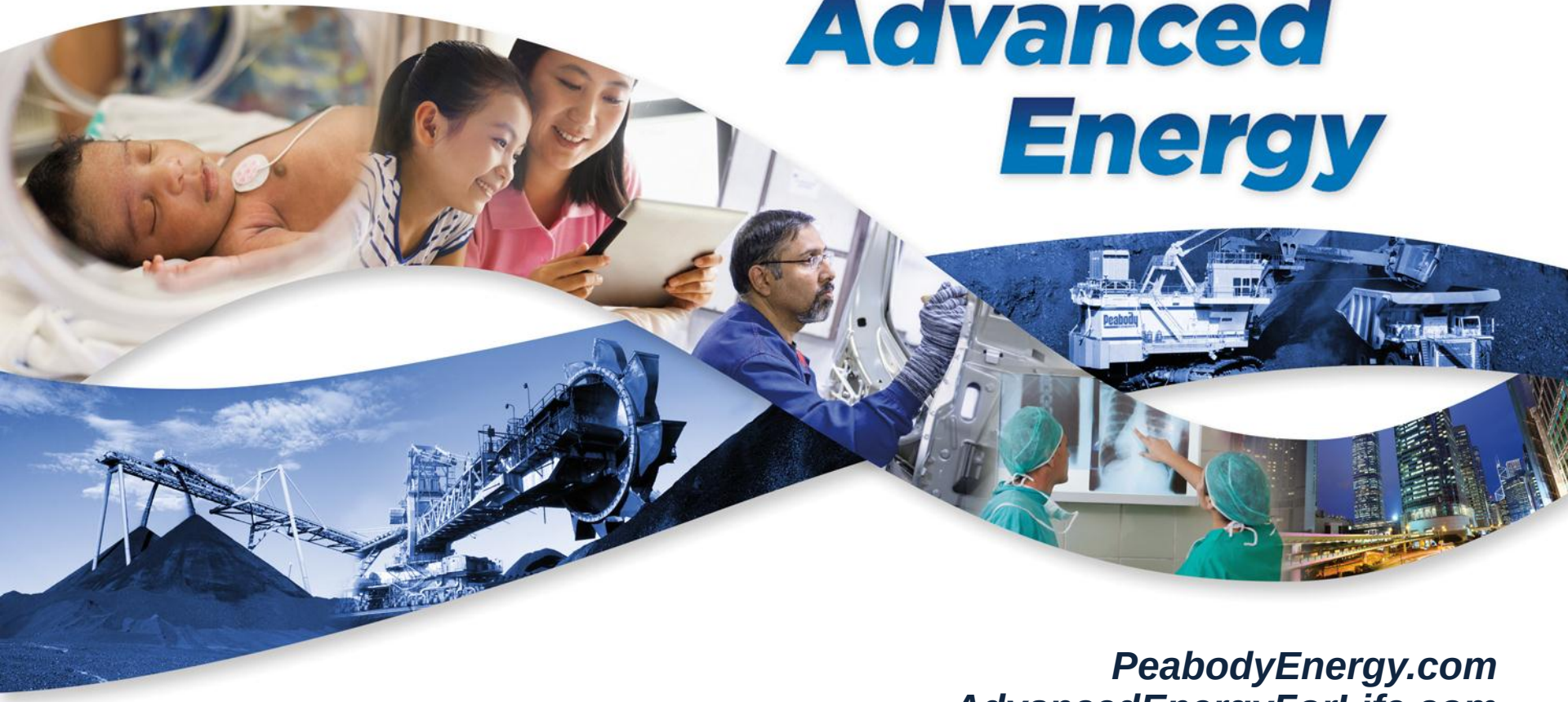
Claire McCaskill (D-Mo.) on Waxman-Markey Bill

Reddy, Willie and FDR Had It Right

Beneficial Electrification is the Best Path for People:
At Home and Abroad, that Means Coal

Peabody ENERGY

Advanced Energy



PeabodyEnergy.com
AdvancedEnergyForLife.com