

*Platts 24th Annual Coal Properties and Investment Conference
Fort Lauderdale, Florida
March 21, 2016*

***21st Century Coal,
Policy Parity and Technology:***

The Path For Coal As The World's Future Fuel

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Coal: Energy for the Human Environment

Key Themes

- Energy poverty is the biggest environmental threat faced by the human community with millions dying each year
- Electricity is critical to improving the human and natural environment – the “human environment” – and to eradicating energy poverty
- 21st Century Coal drives economic growth and quality of life for billions allowing more people to live longer and better
- Clean coal offers the technology path forward to achieve our goals for human development and environmental improvement



National Environmental Policy Act: A Beacon for Future Coal Advocacy and an Answer to EPA's Coal Rules

NEPA EIS Process Focuses on Impact to the Human Environment

- The National Environmental Policy Act (NEPA) as a structure for going forward:
 - Establishes the “human environment” as the focus for all federal agencies in exercising regulatory authority for development of our natural resources
 - Requires the government to prepare environmental impact statements before taking major federal action that impacts the “human environment”
 - Signed into law by President Nixon in 1970
 - Is our “Environmental Magna Carta” and should be treated as such
- The U.S. entered into an international agreement in 1972 defining the “human environment”



UN Conference & Stockholm Declaration Defines the “Human Environment”

- The Declaration:
 - Identifies that the human environment includes the impact on people where they live and the natural environment
 - Identifies that protecting the human environment requires the human world to develop and that the daily needs of people everywhere need to be met to protect “the physical, mental and social health of man in the man-made environment, particularly in the living and working environment”
 - Recognizes that most environmental problems are caused by “underdevelopment” where millions of people live below minimum levels in poverty destroying the natural environment by living off the land
 - Recognizes the “fundamental human right to freedom, equality and adequate conditions of life, in an environment of equality that permit a life of dignity and well-being ”

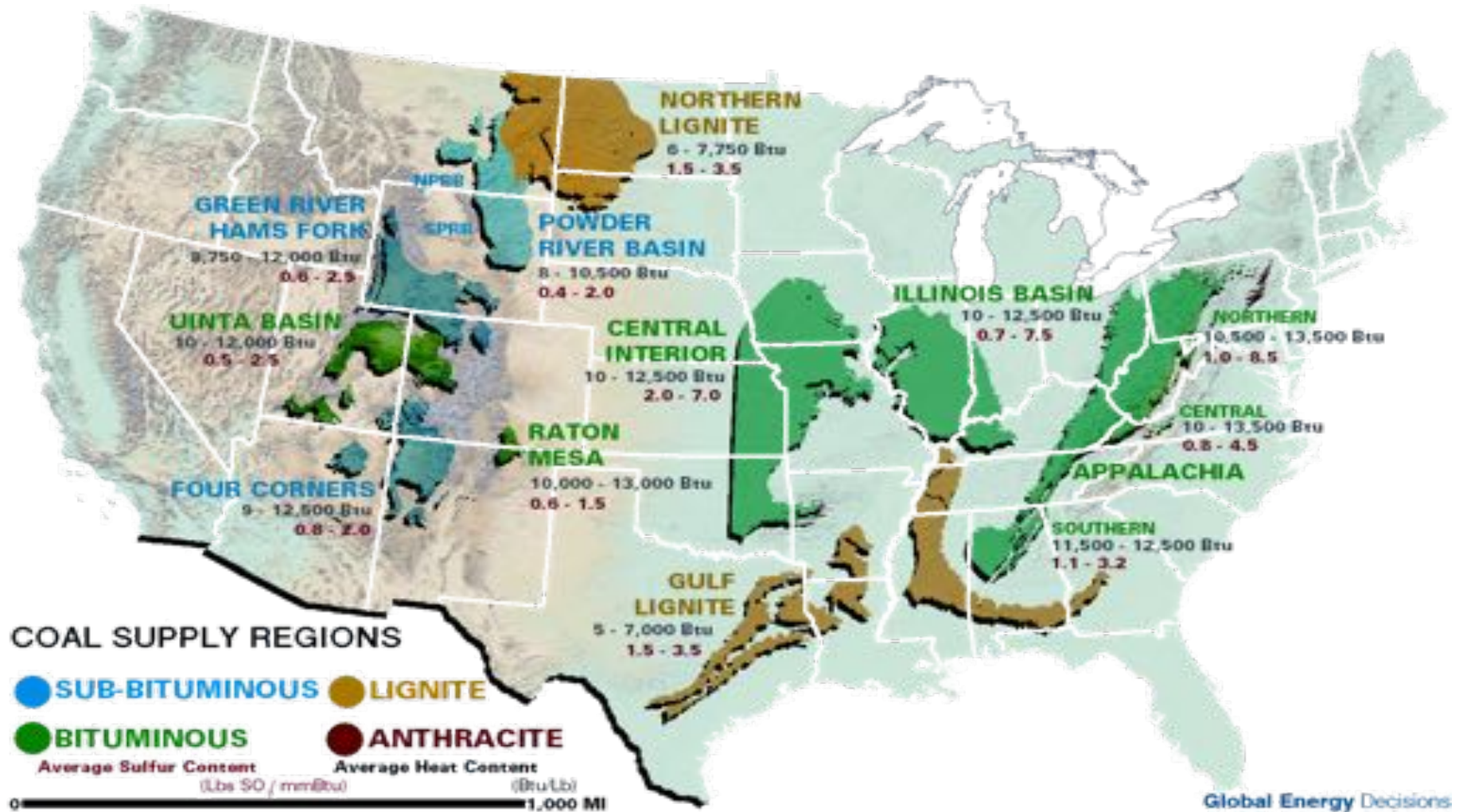
Subsistence Living Results in Short and Mean Lives While Destroying the Natural Environment



- The World Health Organization estimates that indoor air pollution led to 4.3 million deaths in 2012
- An estimated 2.9 billion people cook and keep warm burning twigs and dung, which give off deadly fumes
- Indoor air pollution disproportionately affects women and children

U.S. Coal: Preserves and Enhances the Human Environment for All Americans

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



Electrification Powers Human Civilization and Redefines the Human Environment



“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 stand point 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

The Primary Challenge of 21st Century: Eradicating Energy Poverty

“ 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
Executive Chairman

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.”

- International Energy Agency, 2007

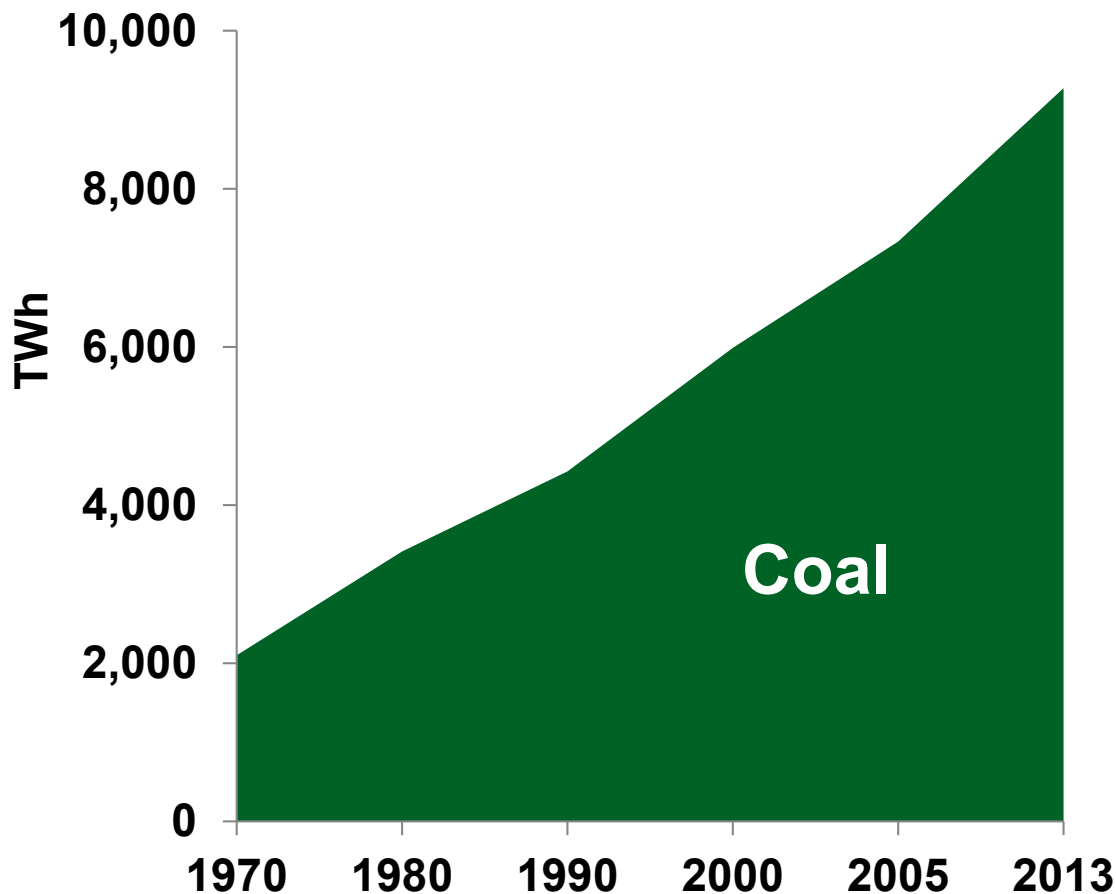
And Now India

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

- National Resources Forum, 2008

Electricity and Coal Are Critical to Fulfilling the Stockholm Declaration

Coal Provides 40% of Global Electricity

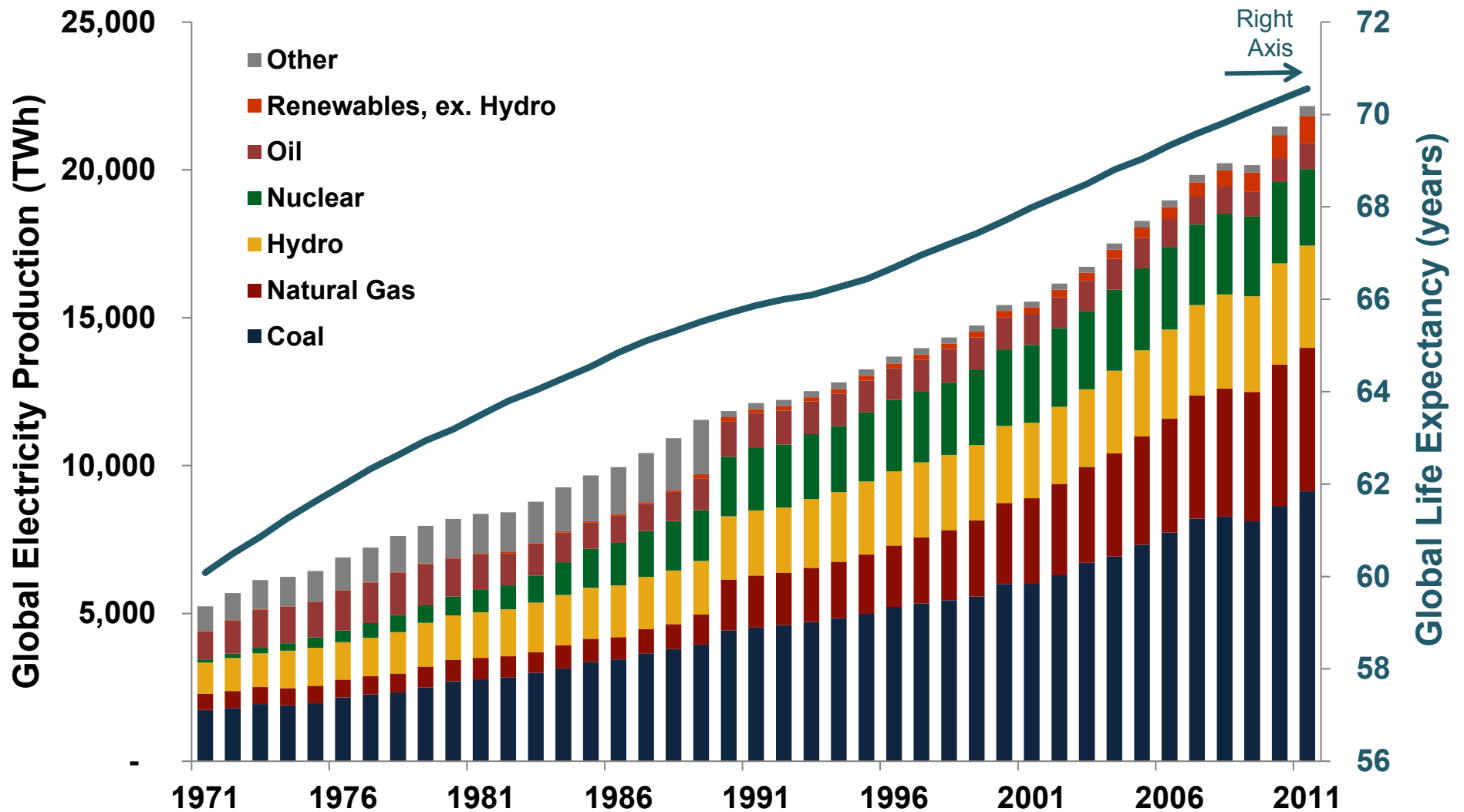


“The importance of coal in the global energy mix is now the highest since 1971 ... the fuel underpinning the rapid industrialization of emerging economies, helping to raise living standards and lift hundreds of millions of people out of poverty,”
– Chief Economist Fatih Birol
International Energy Agency, 2013

“We used to think roads were the most important thing. But it’s power, power, power.”
– Indian government minister*

Electricity Contributes to Longer Lives

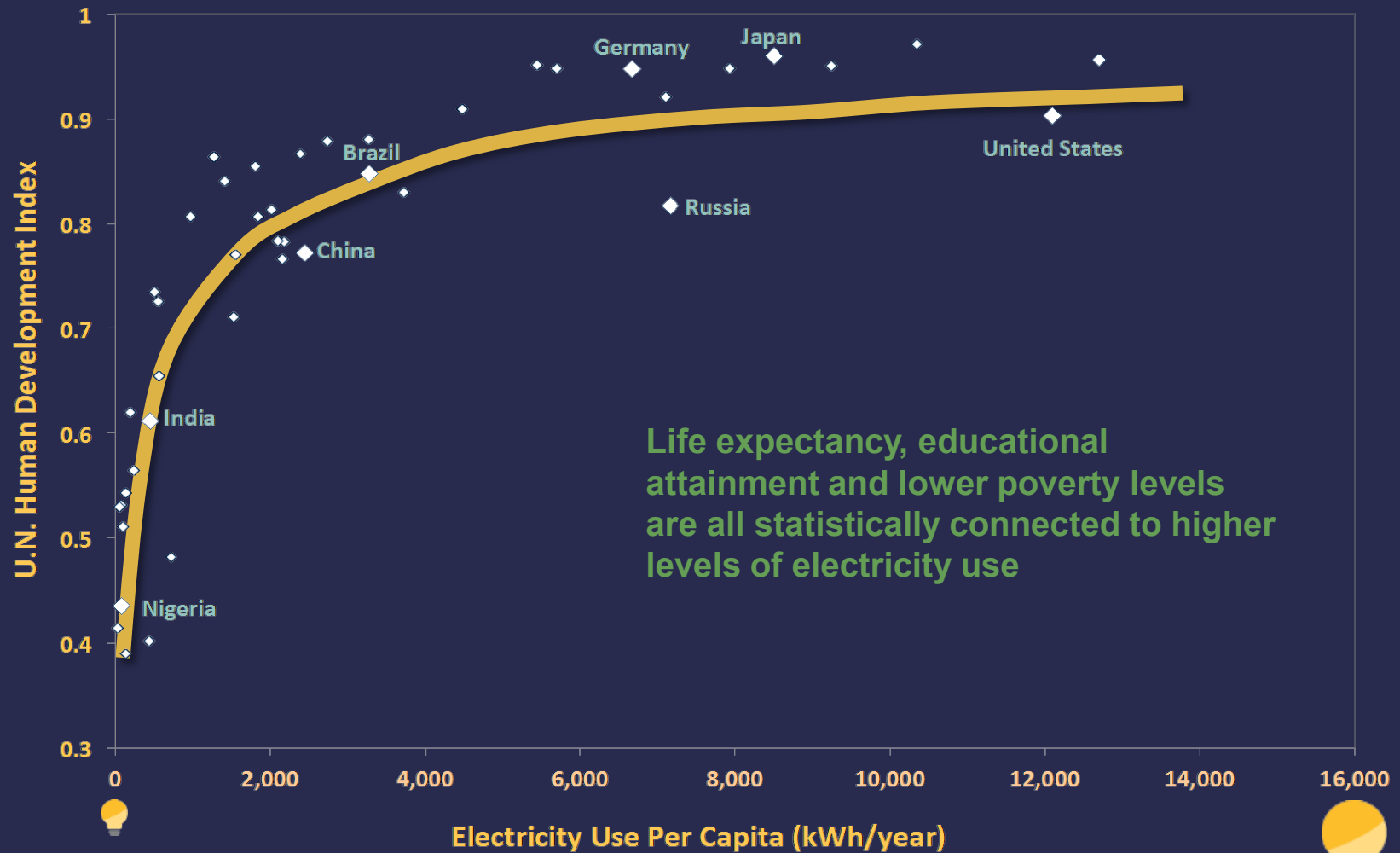
Adequate Access to Electricity Increases Longevity Nearly 10 Years



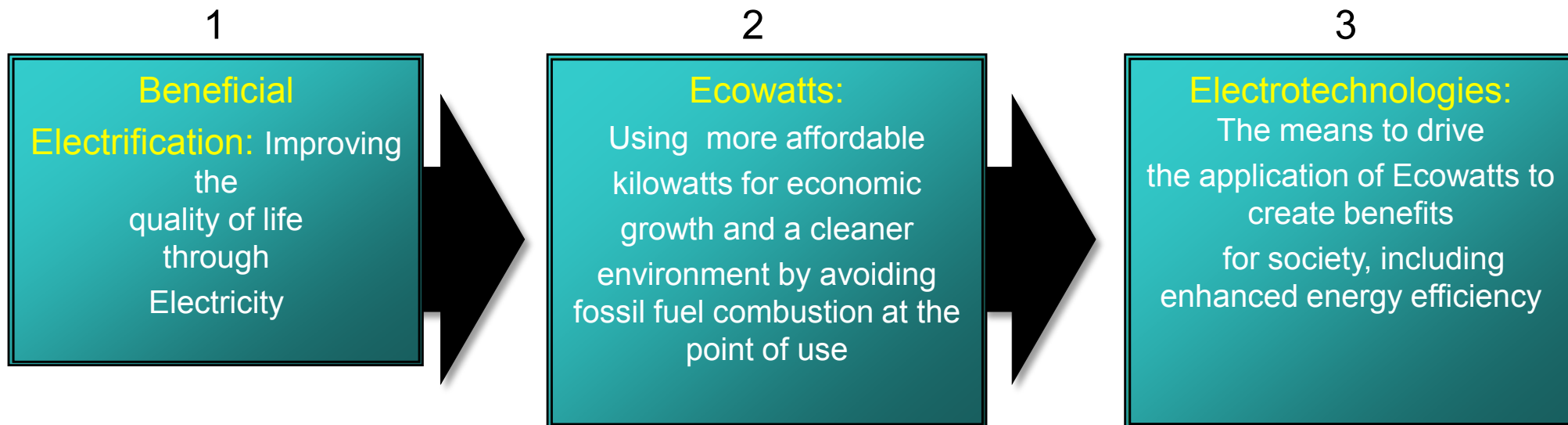
Source: World Bank, World Development Indicators, 2015. Weighted avg. life expectancy in countries with >2,500 KWh per capita electricity = 76.6 years, <2,500 KWh per capita electricity = 66.7 years

Greater Electricity Use Improves Human Development

United Nations Links Affordable Energy to Quality of Life



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



Economic Growth



Quality of Life



Workplace Improvement

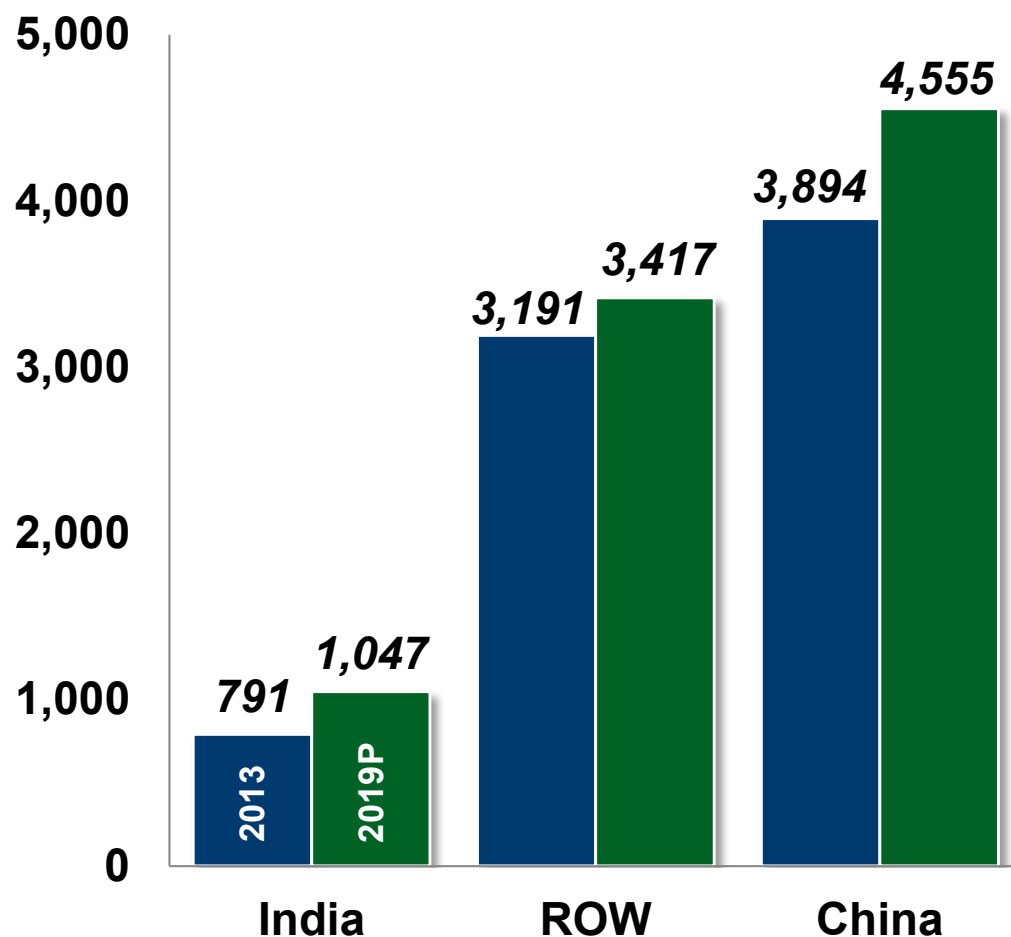


Environmental Progress

“Access to electricity is strongly correlated with every measurable indicator of human development”
- Berkeley Science Review, 2008

Annual World Coal Demand to Reach 9 Billion Tonnes in 2019

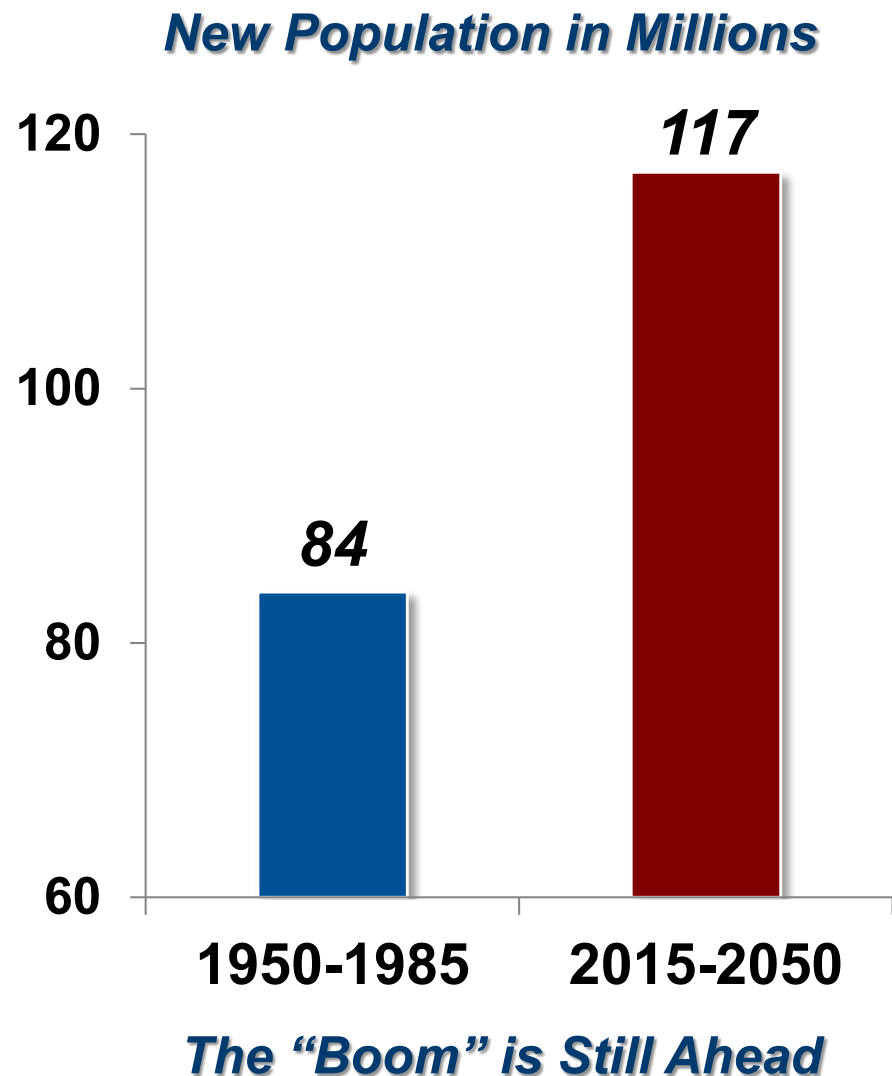
*Expected Global Coal Demand
(Tonnes in Millions)*



- New coal-fueled generation adds 1 billion tonnes annually by 2019
- Steel production growth requires additional 100 MTPY of metallurgical coal by 2019
- More than 80% of projected global demand growth from China/India

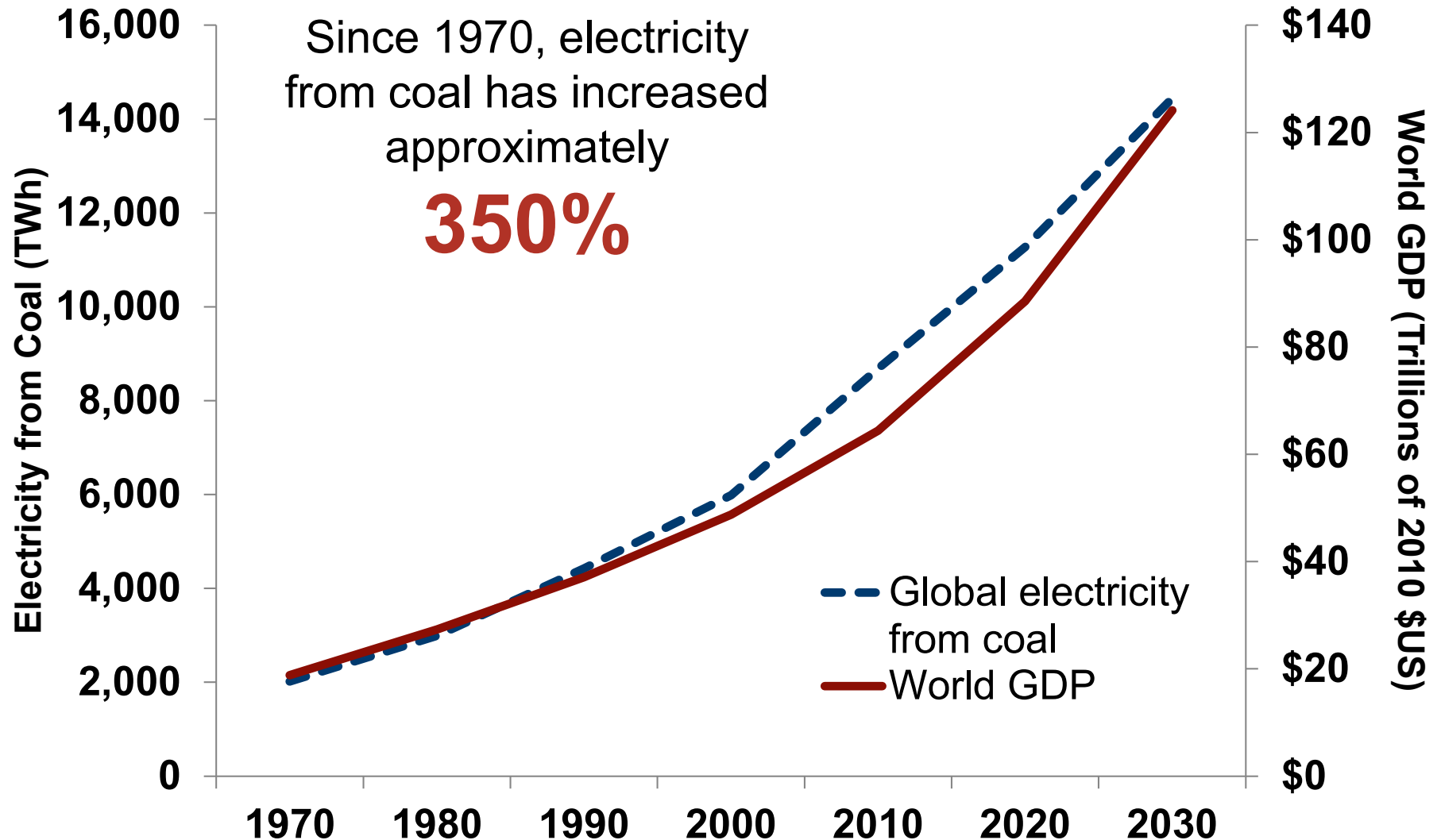
United States is a Developing Nation and Coal is Our Foundational Fuel

- U.S. adds 3.3 million people per year, population could 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

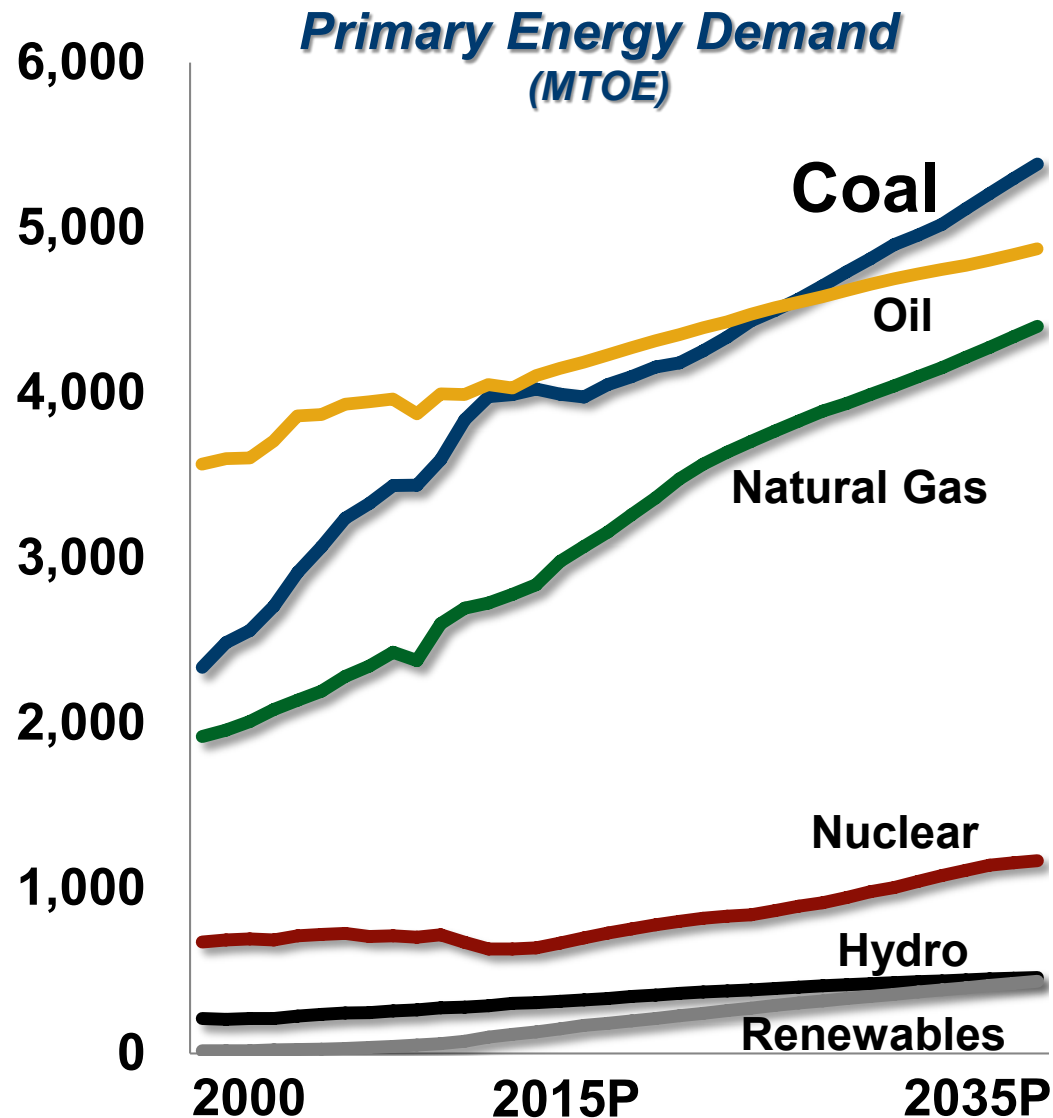


Coal-Fueled Electricity Increases Correspond to Rise in Economic Growth

Near-Perfect Correlation Between Coal Generation and Global GDP



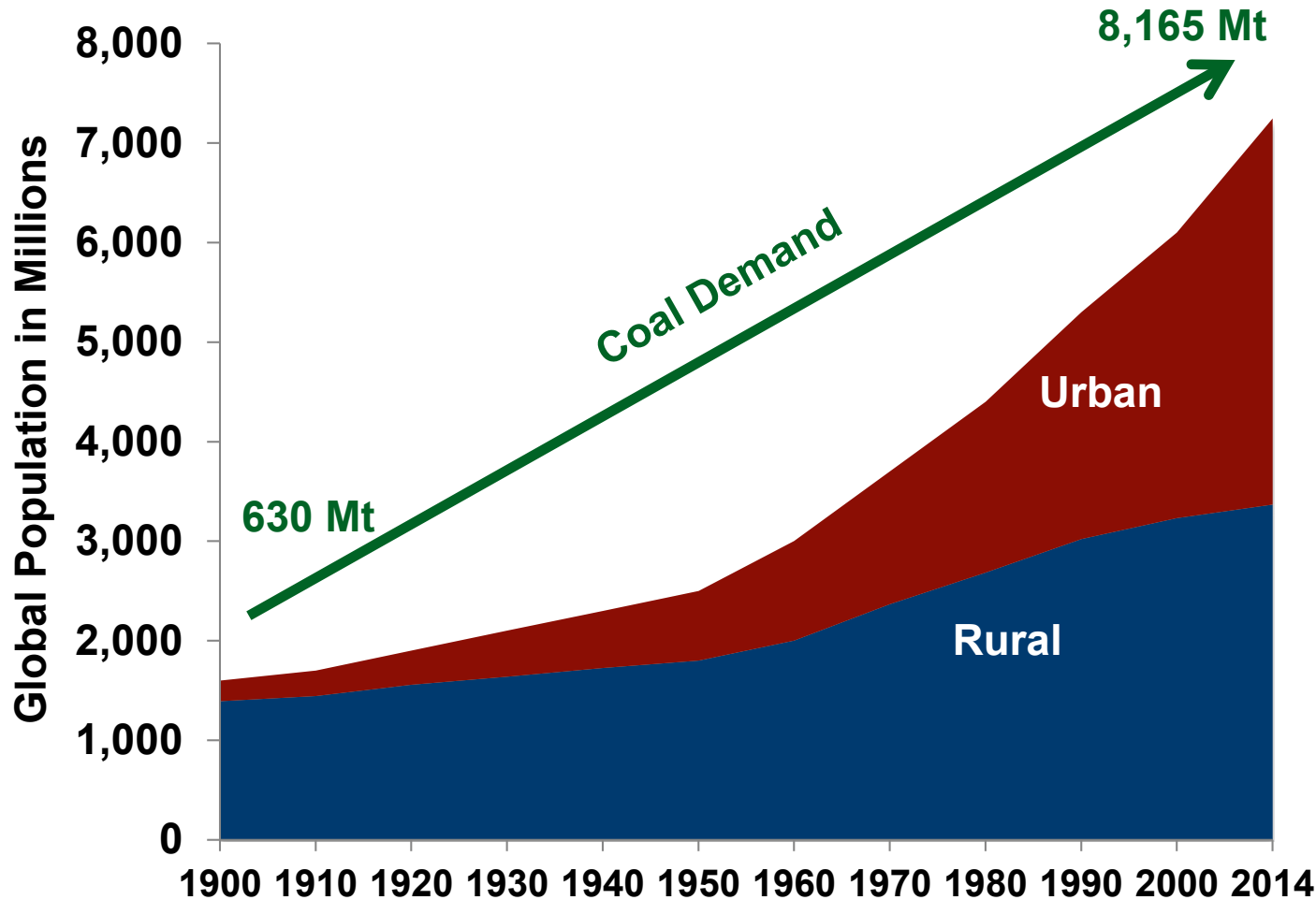
Coal Expected to Overtake Oil as Largest Energy Source by 2025



- Coal is the world's fastest growing major fuel this century
- More than 75 million people to be added to cities each year through 2020 driving greater energy and infrastructure needs
- Coal least expensive and most reliable form of electricity generation to meet rising demand

The World is Urbanizing as a Means to a Better Life

United Nations Expects Increase of 1.4 Billion People in Cities by 2035



“Cities are expanding enormously because urban density provides the clearest path from poverty to prosperity”

***— Edward Glaeser
Triumph of the City, 2011***

Lessons Learned from Other Nations Regarding Energy Policy: U.S. Should Take Note

Response to Misguided Global Policies

“With this new rule, the Environmental Protection Agency is continuing its push to make U.S. electricity less diverse, less reliable and more expensive. The resulting impacts on American jobs and the economy could be devastating.

– **Chad Kolton**

Partnership for a Better Energy Future

“Those who call for an end of coal power generation don't have much interest in a reliable energy policy.

– **Jochen Hohmann**

President of German Federal Network Agency Board

“Our government has reduced greenhouse gas emissions while protecting and creating Canadian jobs... Greenhouse gas emissions are down since 2006, and we've created 1 million net new jobs since the recession — and we have done this without penalising Canadian families with a carbon tax.

– **Paul Calandra**

Manager Parliamentary Secretary to the Canadian Prime Minister

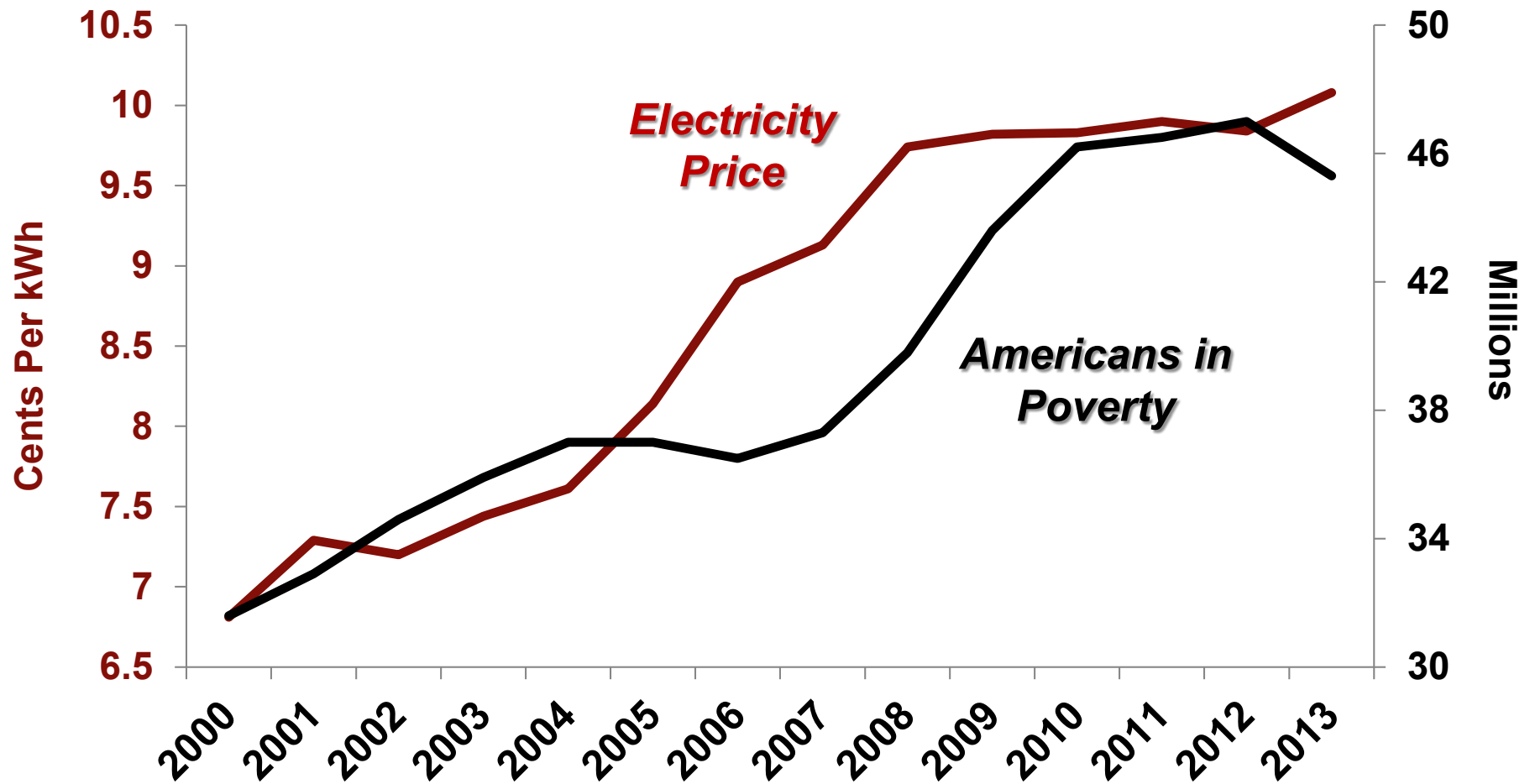
“The tax you voted to get rid of is finally gone. A useless, destructive tax which damaged jobs, hurt families' cost of living and which didn't actually help the environment is finally gone.

– **Tony Abbott**

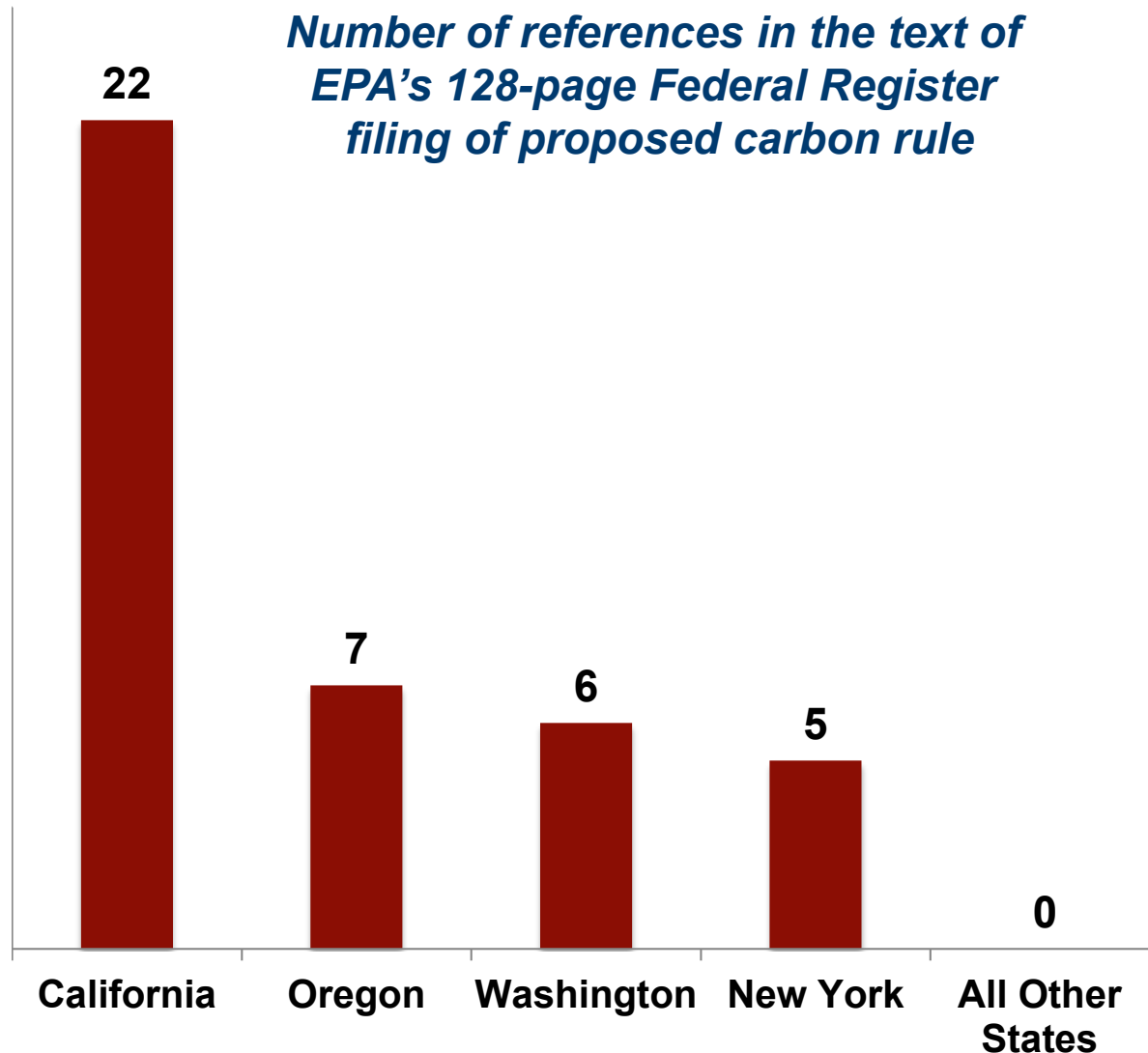
Australian Prime Minister

Rising Power Prices Correlates With Growing U.S. Poverty

Since 2008 U.S. Population in Poverty Grew By Nearly 15%



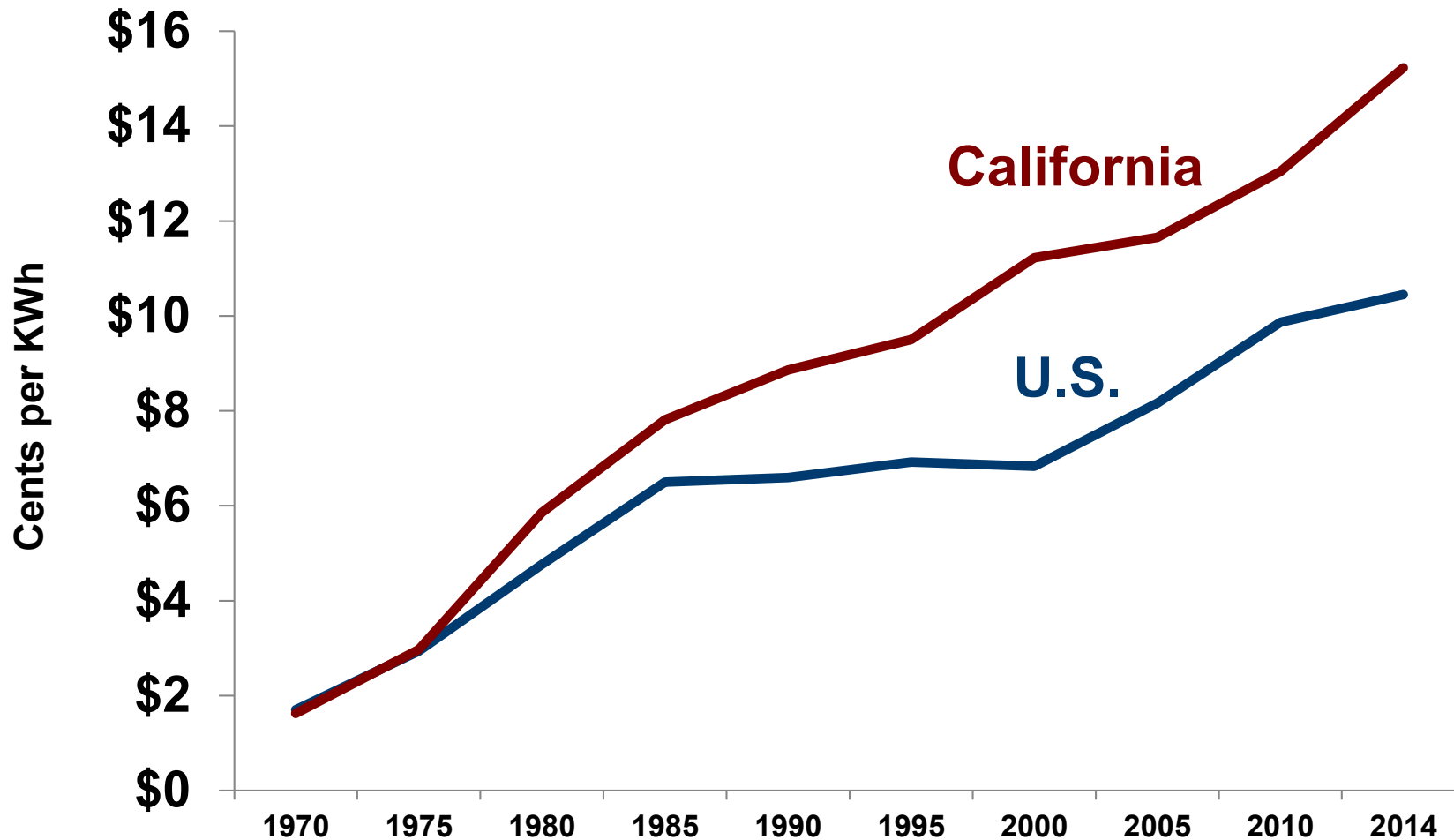
Which States are a Model for EPA's Proposed Existing Fleet Rule?



- California has the highest electricity rates west of the Mississippi
- New York's residential rates are 60% above U.S. average
- Washington and Oregon are hydro-based, thus not relevant to the rest of the country

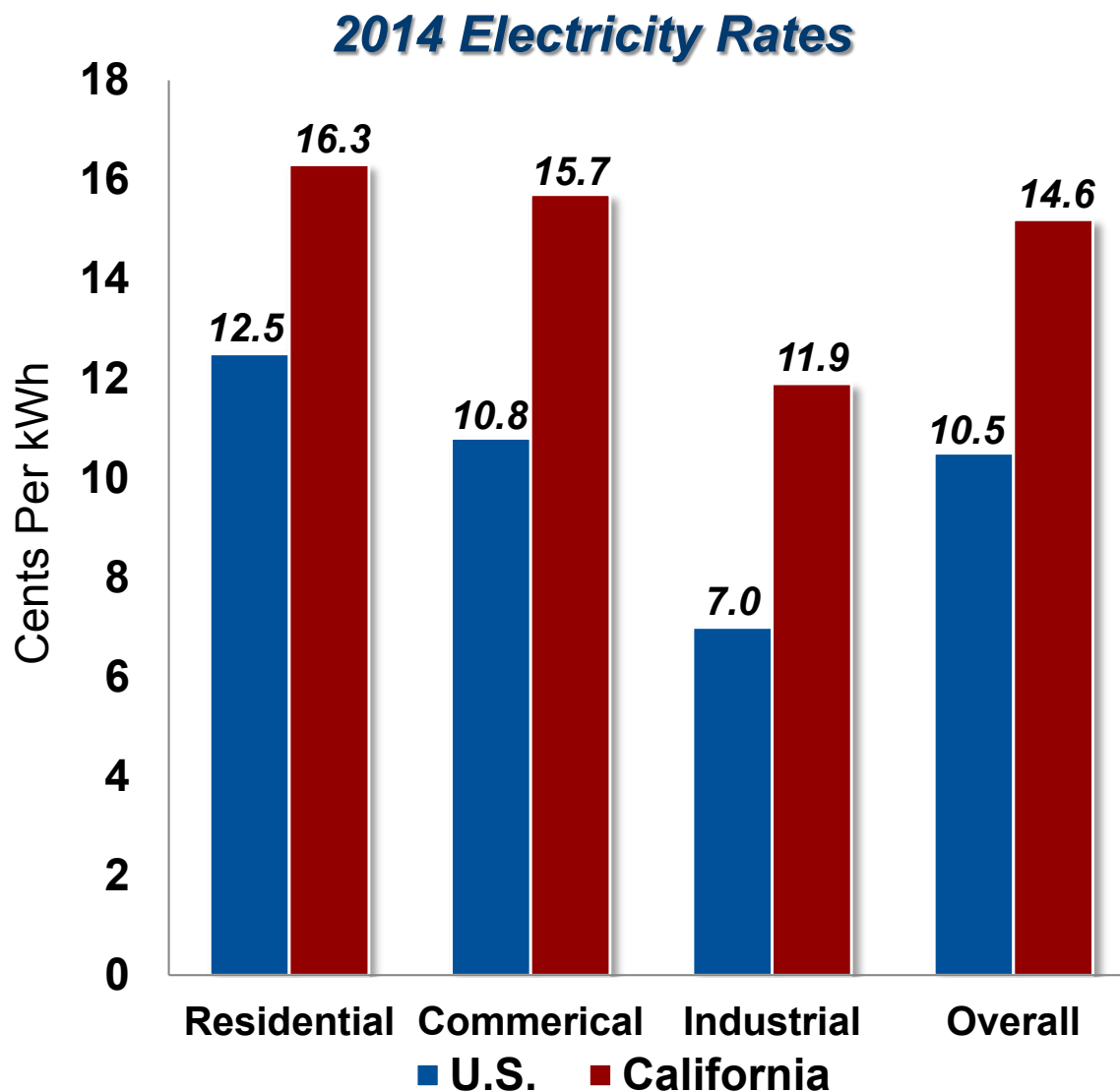
California's Anti-Coal Policies Massively Increase Prices for Ordinary Consumers

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



The California Model: A Cautionary Tale of Forcing Out Coal

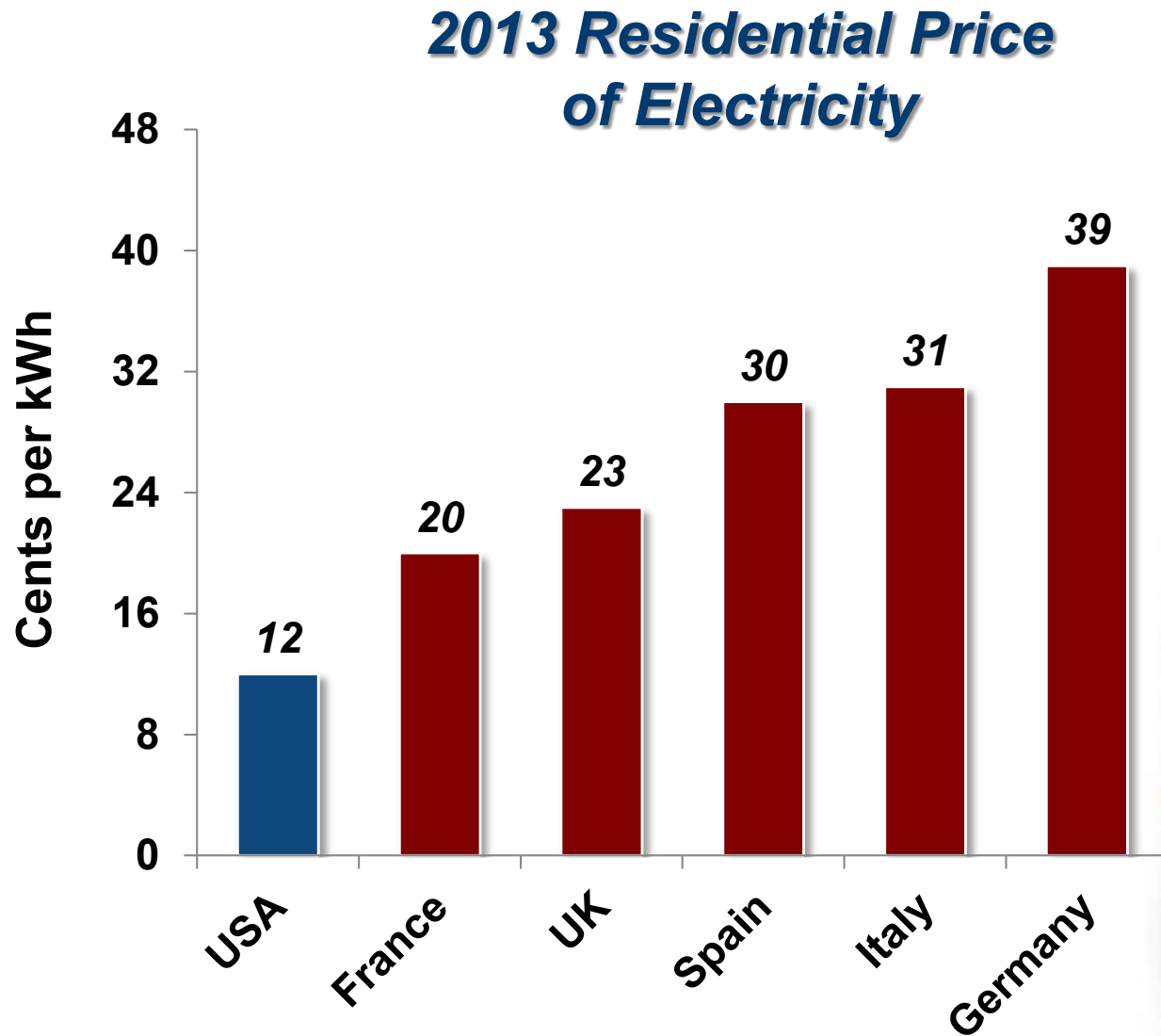
California = 12% of U.S. Population, 34% of U.S. Welfare Recipients



California

- Electric rates 45% more than national average
- 12 million people eligible for low income energy assistance
- More than 2 million children in poverty including 868,000 in extreme poverty
- 600,000 manufacturing jobs lost since 2000

Europe Moves Away from Coal Electricity Prices Much Higher Than U.S.

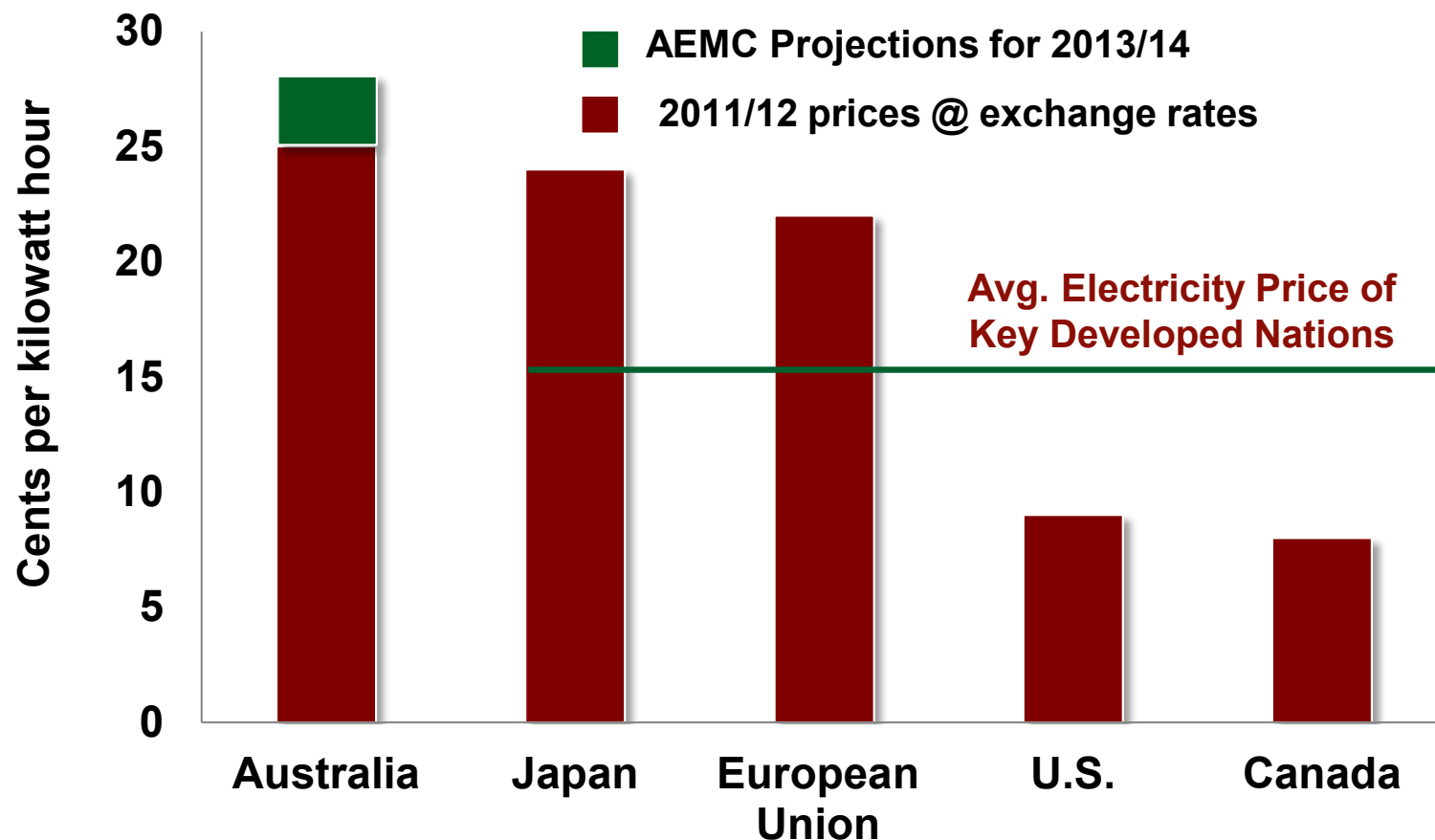


Source: Robert Bryce, "Maintaining the Advantage: Why the U.S. Should Not Follow the EU's Energy Policies", February 2014; U.S. Energy Information Administration, "European residential electricity prices increasing faster than prices in United States," November 2014.

Australia's Carbon Tax Leads to Highest Electricity Prices in Developed World

Nearly Double the Average of Other Developed Nations

Average Household Electricity Prices



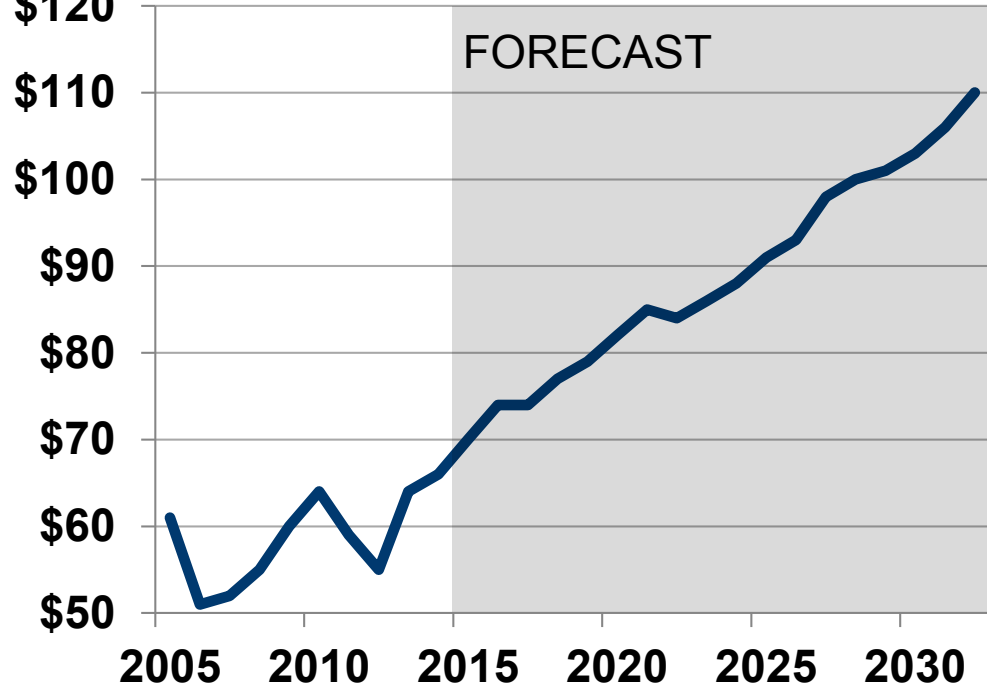
Ontario: Anti-Coal Policies Increased Rates, Reduced Competitiveness

Ontario Now Has Highest Delivered Industrial Prices in North America



Average Estimated Ontario Industrial Energy Costs

Dollars Per
Megawatt Hour
\$120



Industrial and commercial users with an average hourly peak demand of three megawatt or higher.

American Public Power Association: U.S. Natural Gas Cannot Replace Coal

- **There is not enough gas**
 - Just to replace coal power, the United States would need any additional 14 trillion cubic feet of gas – equivalent to the combined production of Texas, Louisiana, Oklahoma and the Gulf of Mexico.
- **It would cost too much**
 - Merely to build the power plants, pipeline system and storage infrastructure necessary to provide reliable gas would require an outlay of almost \$750 billion.
- **It would be physically impossible**
 - Given the high depletion of natural gas wells, there are not enough rigs, it would take decades to build enough pipelines and many states do not have adequate geology for storage.
- **It would escalate the price of gas dramatically**
 - EIA projects that natural gas will cost \$4.77 per million Btu in 2020.
 - The American Public Power Association indicates it would cost \$10 per million Btu simply to replace depleting reserves

Clean Coal and Next Gen Technologies: The Path Forward

GreenGen Power Plant and
Carbon Research Center; Tianjin, China

Clean Coal Technologies In Broad Use Around the World

Today's Technologies Deliver Major Environmental Improvement

Supercritical Power with Advanced Emission Controls

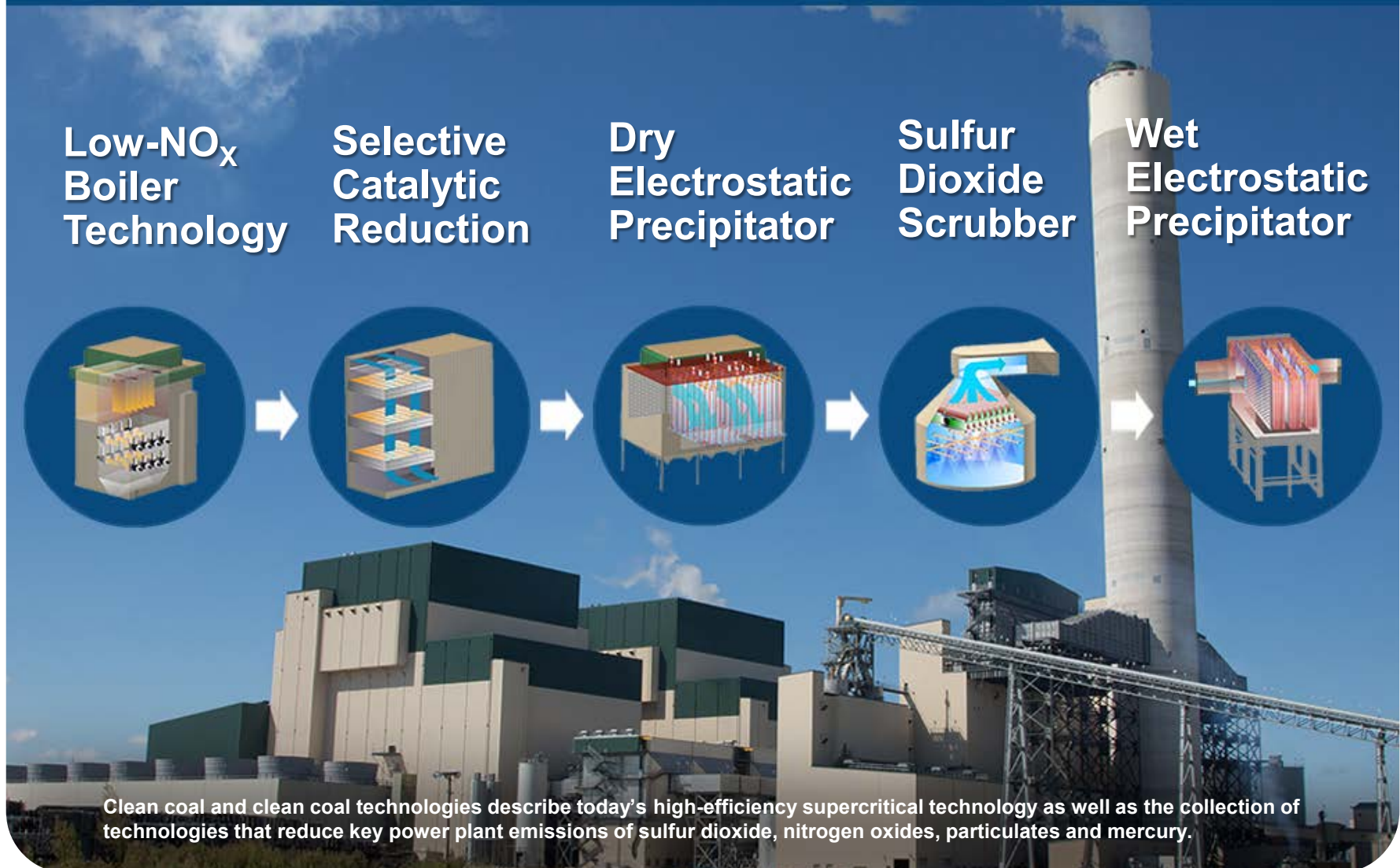
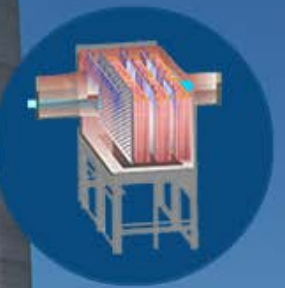
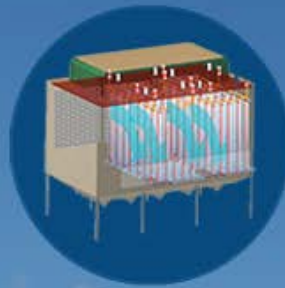
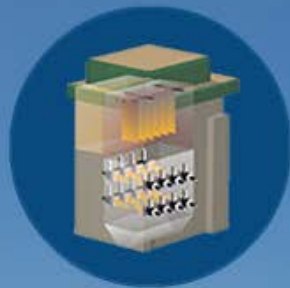
Low-NO_x
Boiler
Technology

Selective
Catalytic
Reduction

Dry
Electrostatic
Precipitator

Sulfur
Dioxide
Scrubber

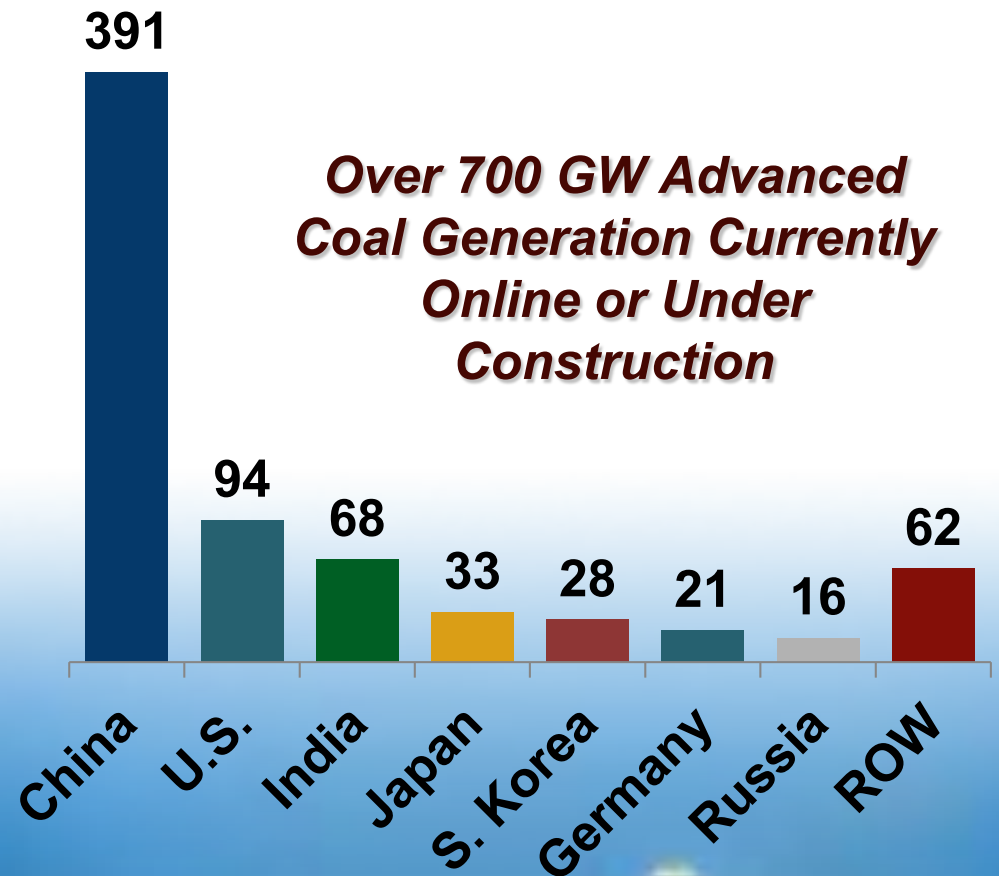
Wet
Electrostatic
Precipitator



Clean coal and clean coal technologies describe today's high-efficiency supercritical technology as well as the collection of technologies that reduce key power plant emissions of sulfur dioxide, nitrogen oxides, particulates and mercury.

Large Build Out of High-Efficiency Coal Plants Underway Globally

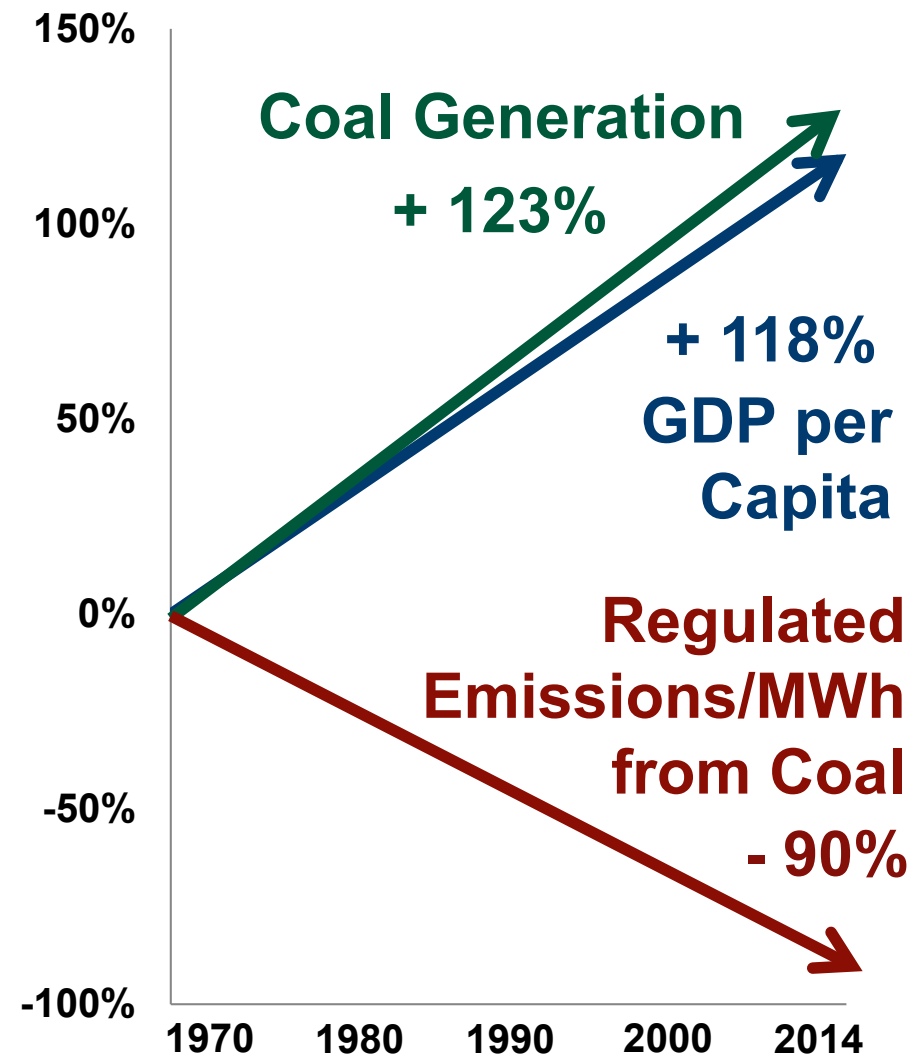
High-efficiency plants achieve a 25% lower CO₂ profile than the oldest U.S. plants



Supercritical and ultrasupercritical plants in operation and under construction through 2016.
Source: Platts World Electric Power Plant Database, March 2015.

Advanced Coal Technologies: A U.S. Environmental Success Story

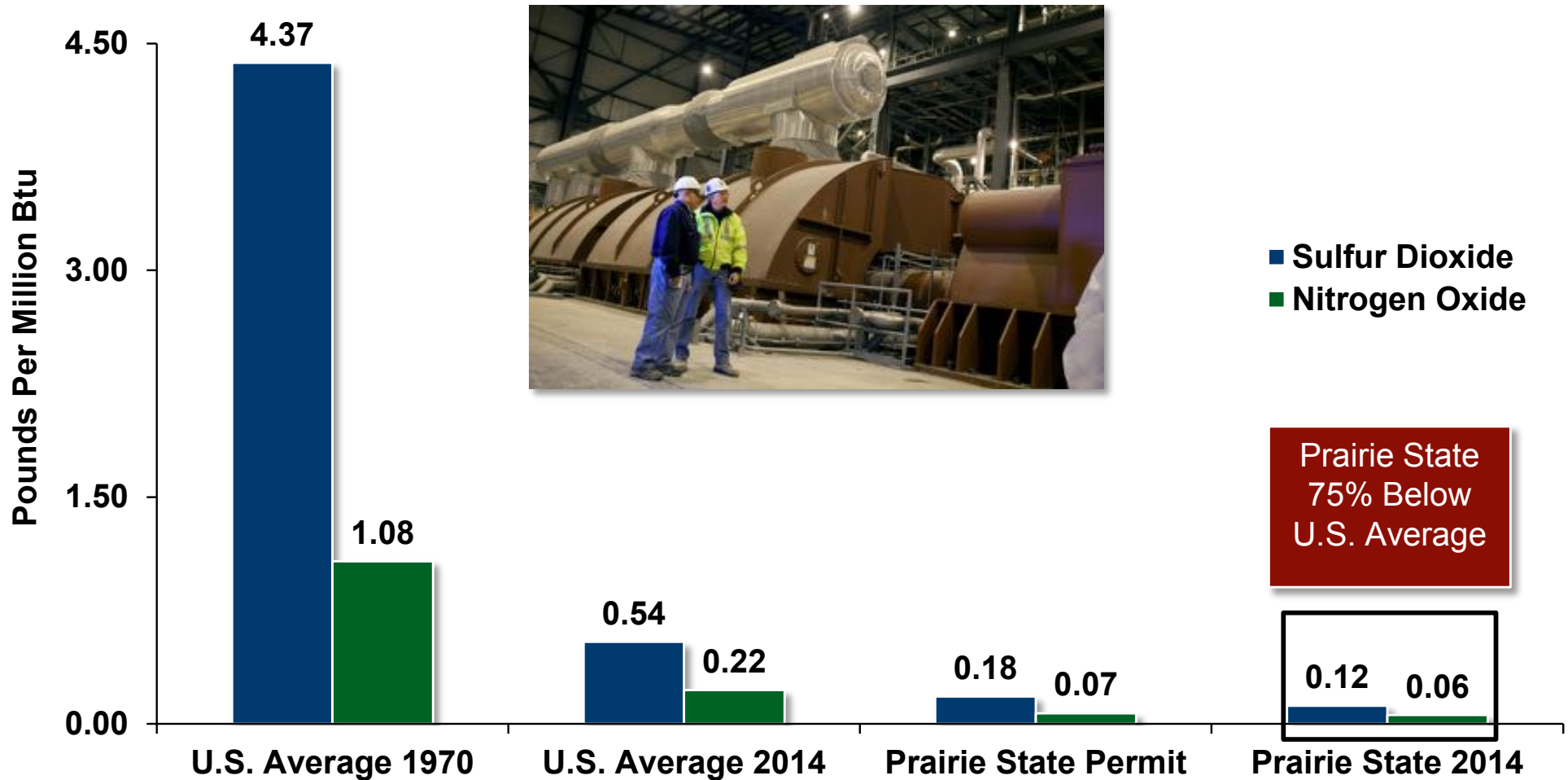
Since 1970, Coal Generation Up 123%; Emissions Rate Down 90%



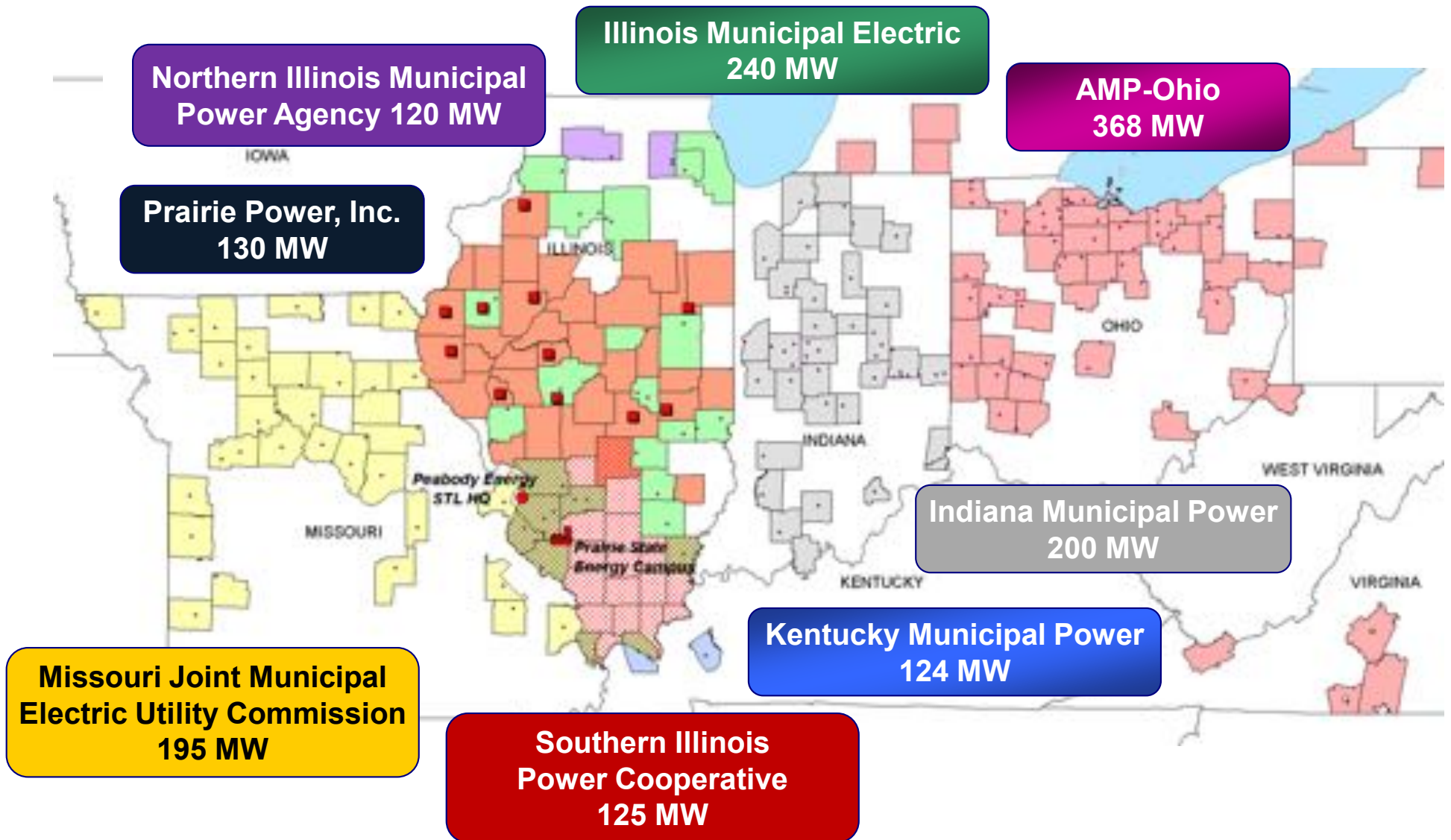
Sources: U.S. Energy Information Administration, Monthly Energy Review, March 2015; U.S. Department of Agriculture, Economic Research Service, December 2014; U.S. Environmental Protection Agency (EPA), National Air Pollutant Emission Trends & Air Market Program Database.

Technological and Environmental Success Story

Prairie State Operates in Top 12% of U.S. Coal Plants



Partners Serve More Than 2.5 Million People in Nine States



China's GreenGen, a Global Model

GreenGen: Among World's Largest Near-Zero Emissions Coal Plants



**Control Room at the GreenGen Plant
Tianjin, China**

- Peabody only non-Chinese partner in GreenGen
- Multi-phase power project with carbon capture and carbon research center
- First 250 MW unit commissioned in 2012

Research to Commercialize Next-Generation Technologies Advancing

GreenGen will Capture CO₂ for Enhanced Oil Recovery

- China's GreenGen power plant ultimately could be among world's largest near-zero emissions coal plants
- Peabody is the only non-Chinese equity partner
- Multi-phase power project with carbon research center
- First 250 MW unit commissioned in 2012

GreenGen Power Plant Tianjin, China

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



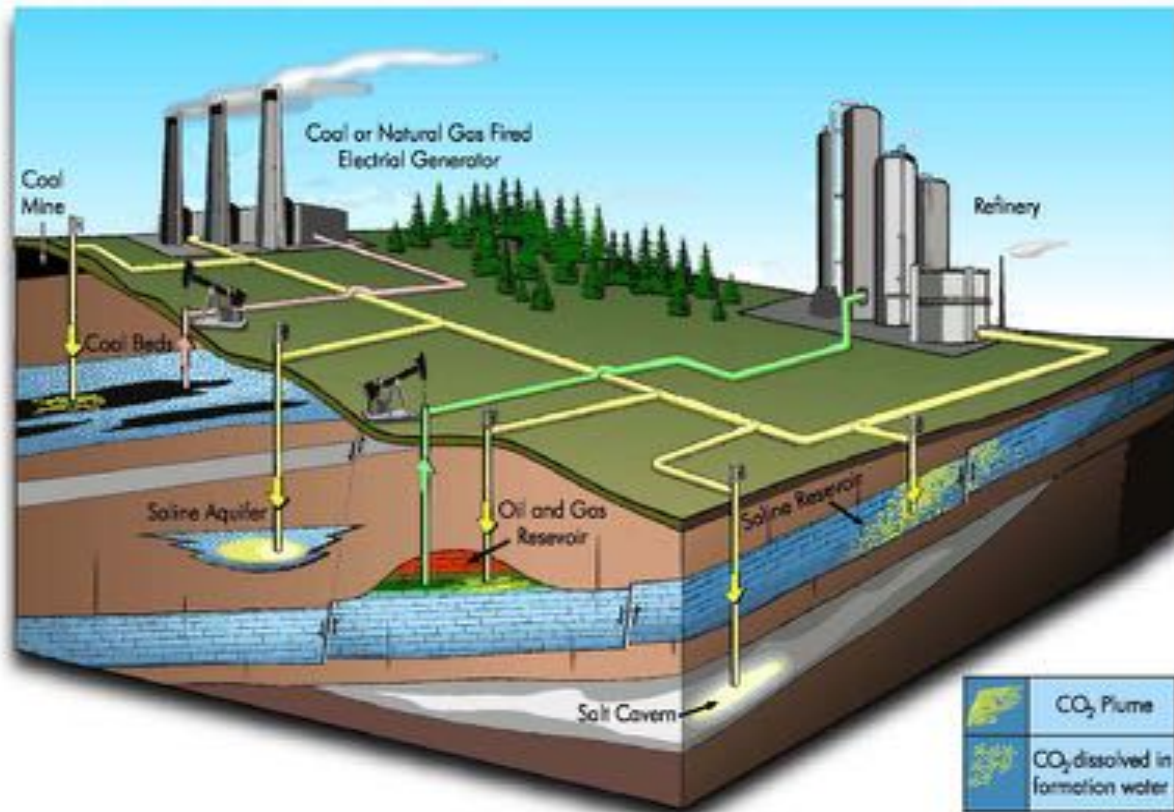
21st Century Coal Embraced By U.S. and China Leadership

People's Republic of China President Hu Jintao and U.S. President Barack Obama Pledge to Advance Clean Coal



CCUS-The EOR Option: A Proven and Important Source of Oil Supply in the Right Market Environment

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
- CO₂ is a necessary feedstock for EOR
- Maximum needed:
 - 14 billion tons of CO₂
 - 7 billion tons of coal
- Carbon is a product not a problem.

Source: National Energy Technology Laboratory, U.S. Department of Energy, "Storing CO₂ and Producing Domestic Crude Oil with Next Generation CO₂-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.

A Better Way: Clean Coal Path to Achieve Our Economic, Environmental Goals

Efficiency improvements at Existing Plants

Building New Supercritical Plants

Demonstrating and Deploying IGCC and Carbon Capture, Utilization and Storage

Advancing Carbon Capture, Utilization and Storage and Btu Conversion

Retrofitting Existing Coal-Based Generation with Carbon Capture/Storage Up to 90% Lower CO₂

CO₂-Enhanced Oil Recovery, Producing 4 Million b/d

*The Goal:
Near-Zero
Emissions*

-----> 20 years

John F. Kennedy on the Future of Coal

“It would be the height of folly for this nation to permit its coal mines to be abandoned– to permit the skills of our miners to be scattered throughout the country, in other industries– and to neglect further research and development in this major American industry

Our coal mines and coal miners represent one of this nation’s greatest assets– a storehouse of wealth that can and should serve us for centuries bear in mind a world populated by more than 6 billion people by the end of this century– 6 billion who will need heat and power and transportation

Moreover, as the standard of living rises around the world, as the underdeveloped nations raise the level of their needs and expectations the demand for energy rises also Virtually the entire world is on the threshold of a second industrial revolution... As our population increases at home and abroad – as the demand for electricity doubles every decade -- the American coal industry will be called upon to play an increasingly major role in the progress of our economy coal possesses hidden properties which have not yet been fully explored or exploited. There are products to be discovered, new uses of coal, new utilizations of its byproducts.

We need intensive research on the development and use of our coal resources the coal industry of America will reach that future better and stronger than ever before.”

– John F. Kennedy, 1959

