

# Missouri's Energy Future

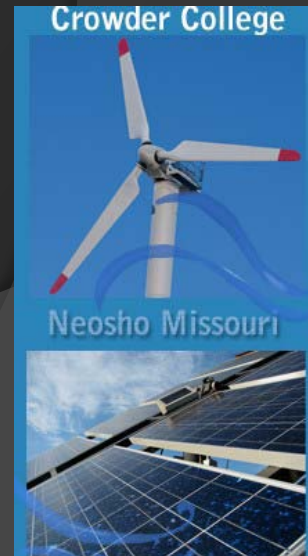
Some of the challenges WE (electricity producers and consumers) face in meeting OUR future energy needs

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## 5th Annual E3 Conference “Sustainability & You”



**Warren Wood**  
Engineer & Ex. Dir., Missouri Energy  
Development Association



# Energy Production & Planning for the Future...

## A Constant Balancing Act

Safe & Reliable  
Service with Fair  
Terms of Service  
to All Customers



Competitive  
Rates...  
Retention,  
Growth &  
Attraction of  
Industries /  
Jobs

Environmental Regulations & Being a  
Good Steward of Natural Resources

# Not an Easy Balancing Act...



# Topics

- Missouri's Electricity – Where It Comes From
- Future Challenges in Generating Electricity While Balancing the Needs of People, Prosperity and the Planet
- How Electric Service Providers Are Facing These Challenges

# Coal Fired Power Plants

78%



**Nuclear  
Power**

**11%**



# Natural Gas Fired Plants



4%



# Renewable & Other Sources of Electricity

7%



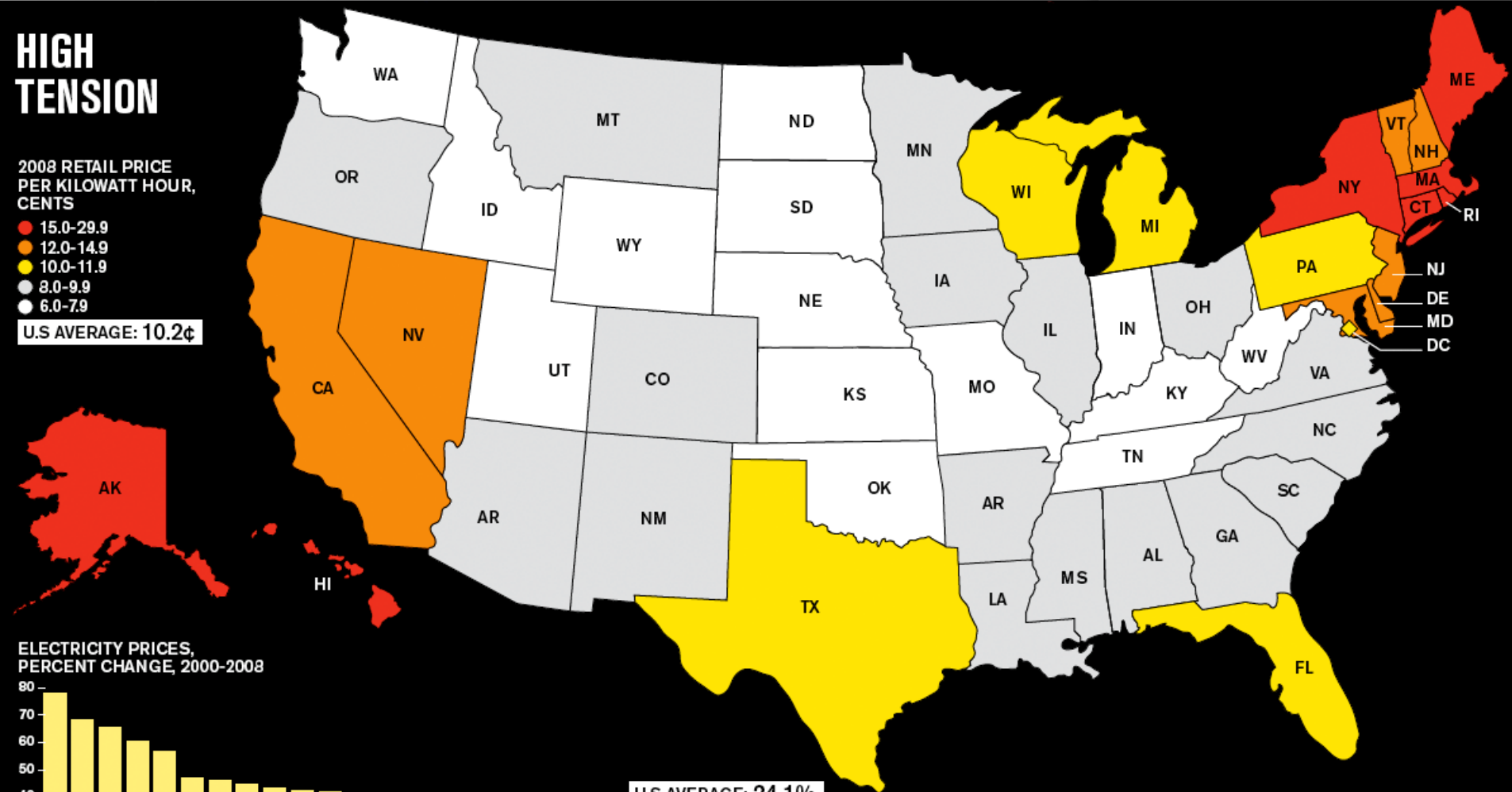
# Electric Rates in Missouri are Low & Stable

## HIGH TENSION

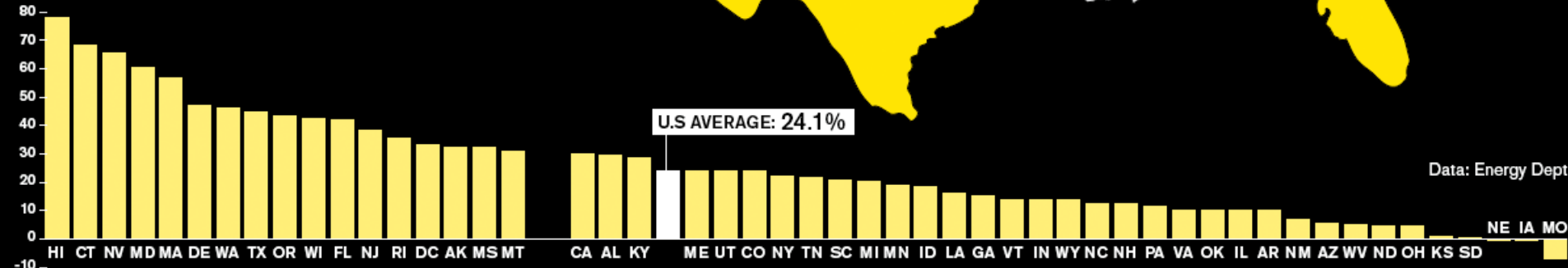
2008 RETAIL PRICE PER KILOWATT HOUR, CENTS

- 15.0-29.9
- 12.0-14.9
- 10.0-11.9
- 8.0-9.9
- 6.0-7.9

U.S. AVERAGE: 10.2¢



ELECTRICITY PRICES, PERCENT CHANGE, 2000-2008



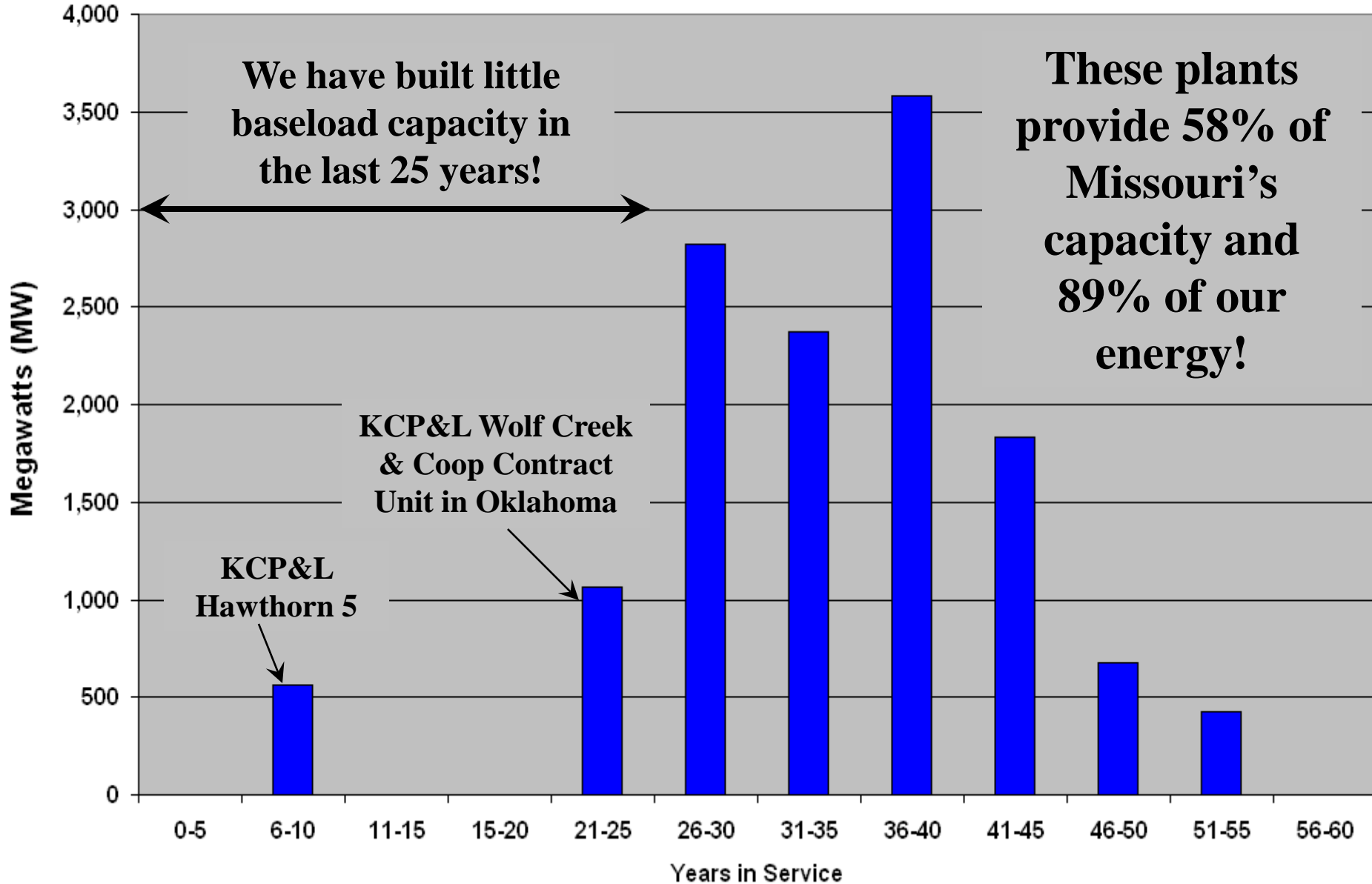
Data: Energy Dept.

Source: Business Week  
July 24, 2008

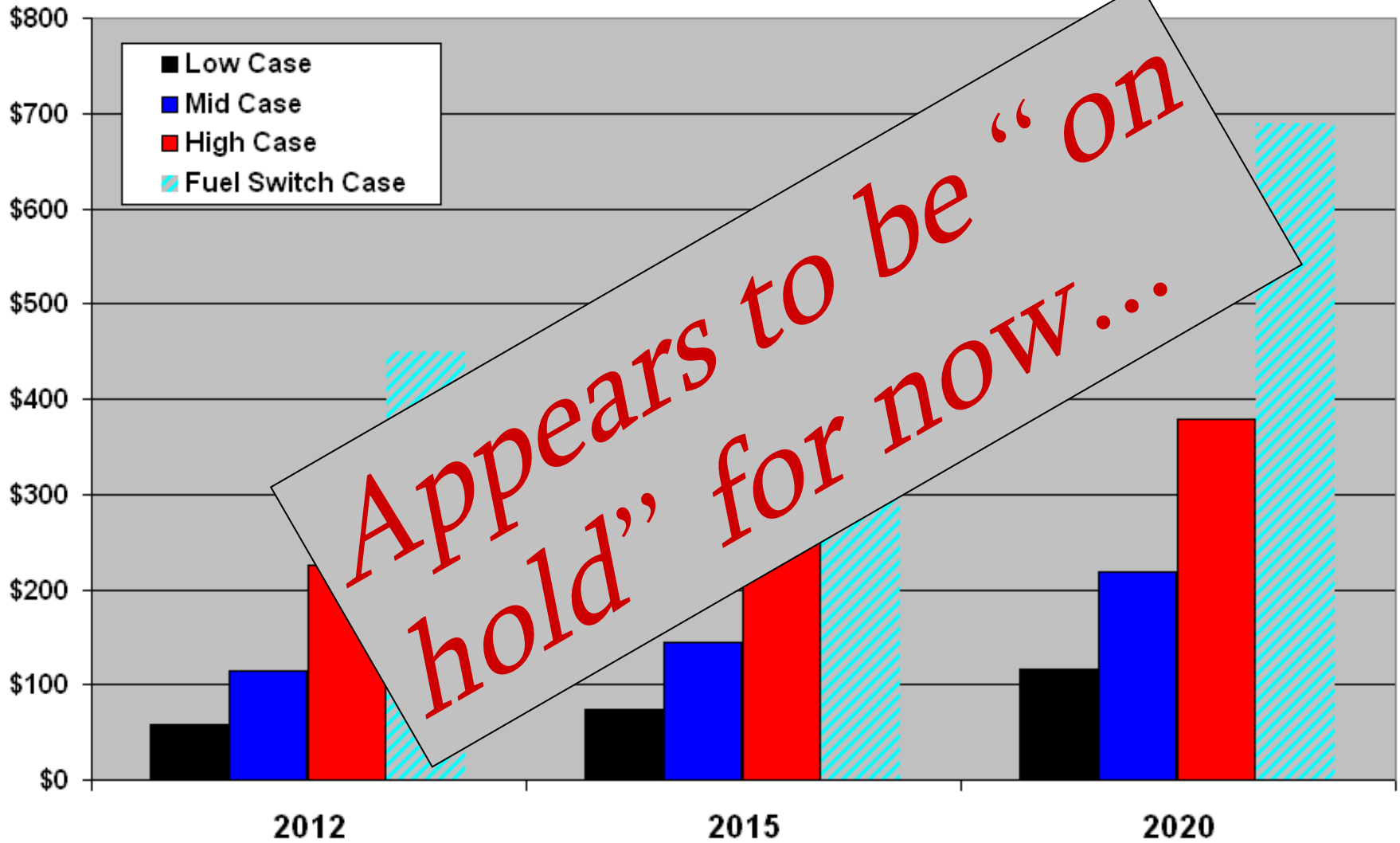
# Future Challenges to Generating Electricity in an Environmentally Responsible Way That is Reliable and Affordable

- Retirement / Replacement of Old Plants, Demand Growth, & Deployment of New Technology
- Existing Federal Environmental Regulations & Changes Being Considered
- Infrastructure Investment Challenge & Low Credit Ratings of Missouri's Utilities vs. Other States
- Enormous Uncertainty in Development of Long-Term Resource Plans

# Coal & Nuclear Power Plants Serving Missourians by Years in Service & Capacity

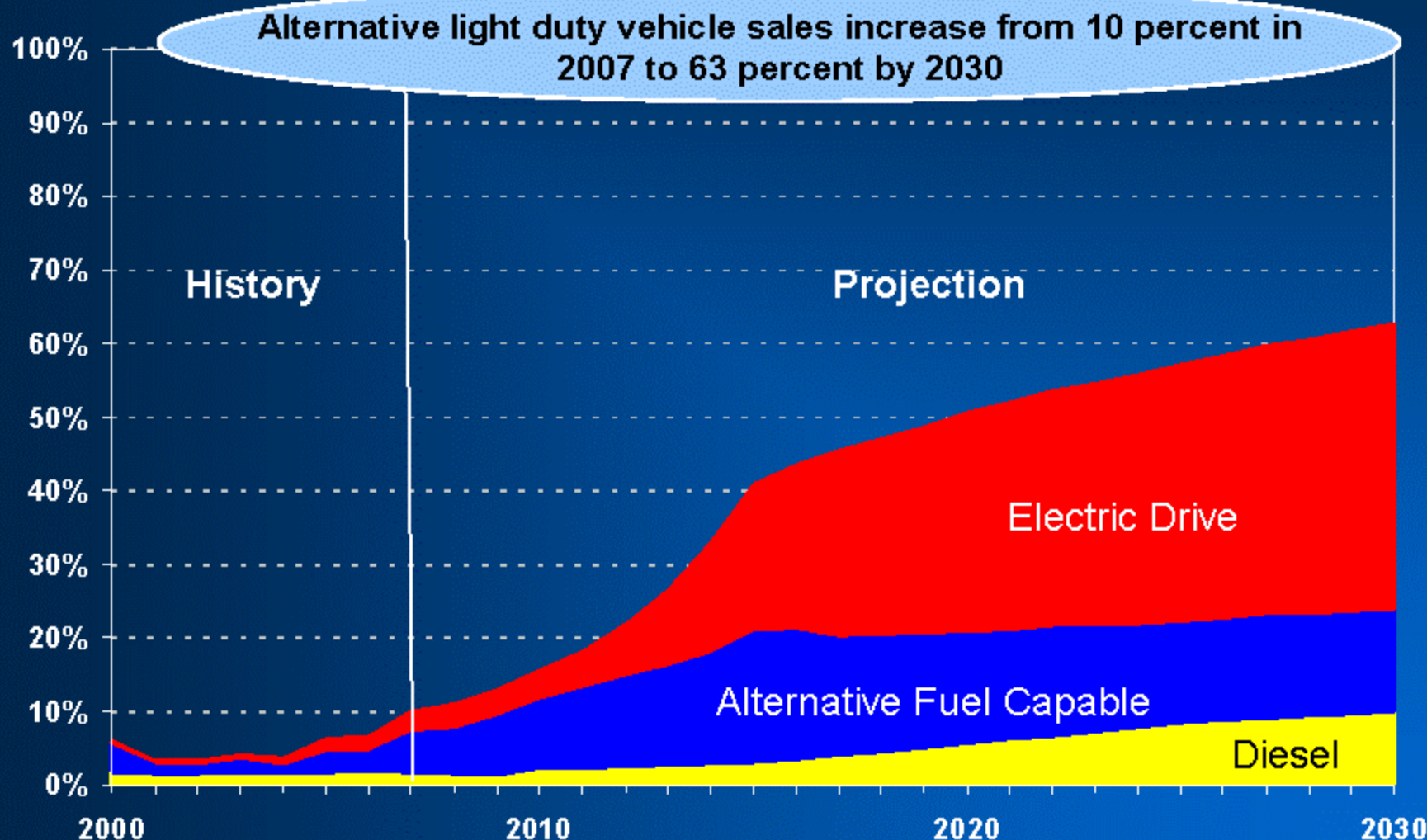


**Avg Increase in Annual Resid Electric Bill in MO Under Waxman-Markey**  
*(not including other fuel and infrastructure related rate increases)*





# New Alternative Light Vehicle Sales (percent of total sales)

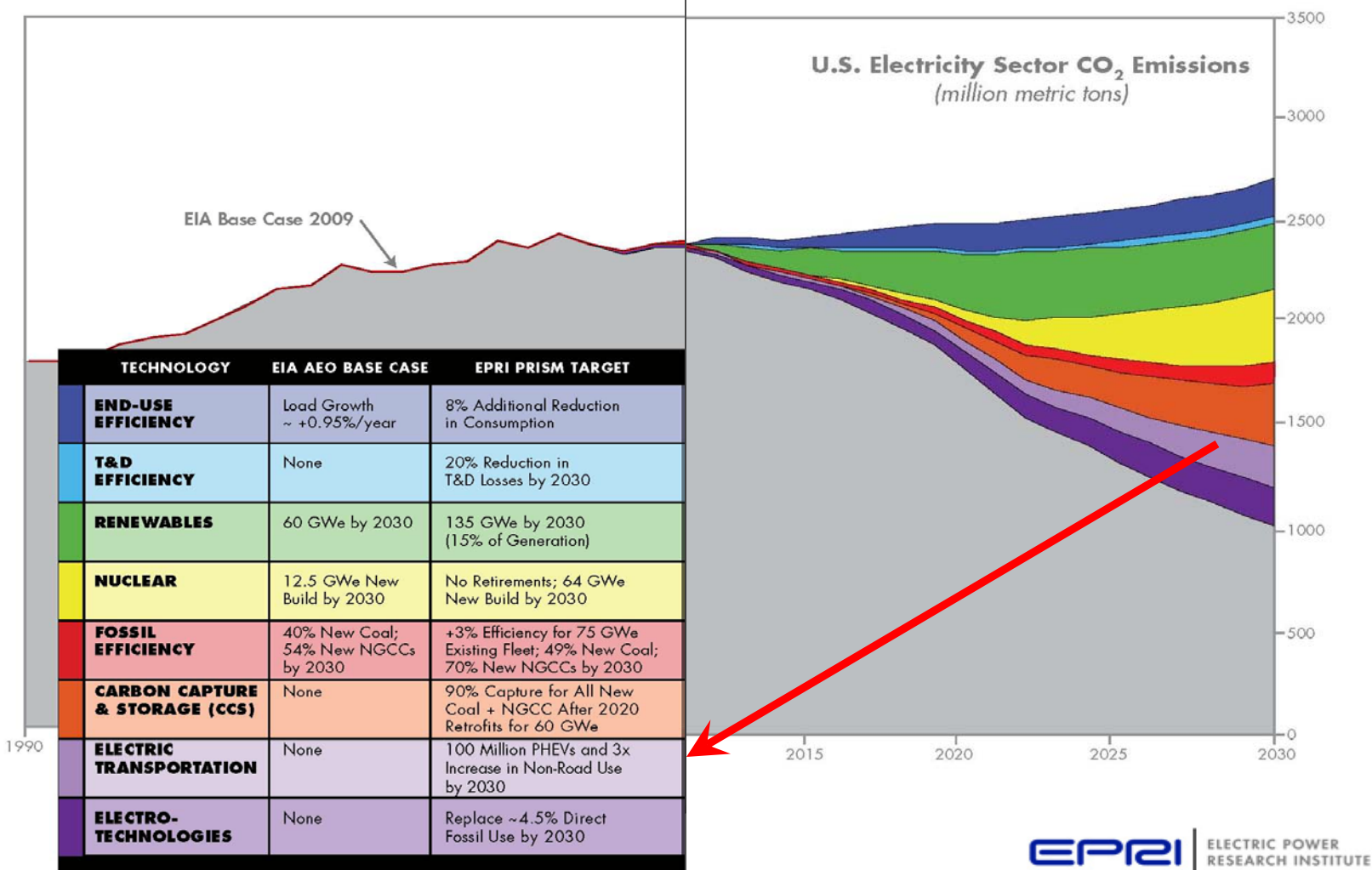




GAS

REGULAR  
ARM  
PREMIUM  
LEG

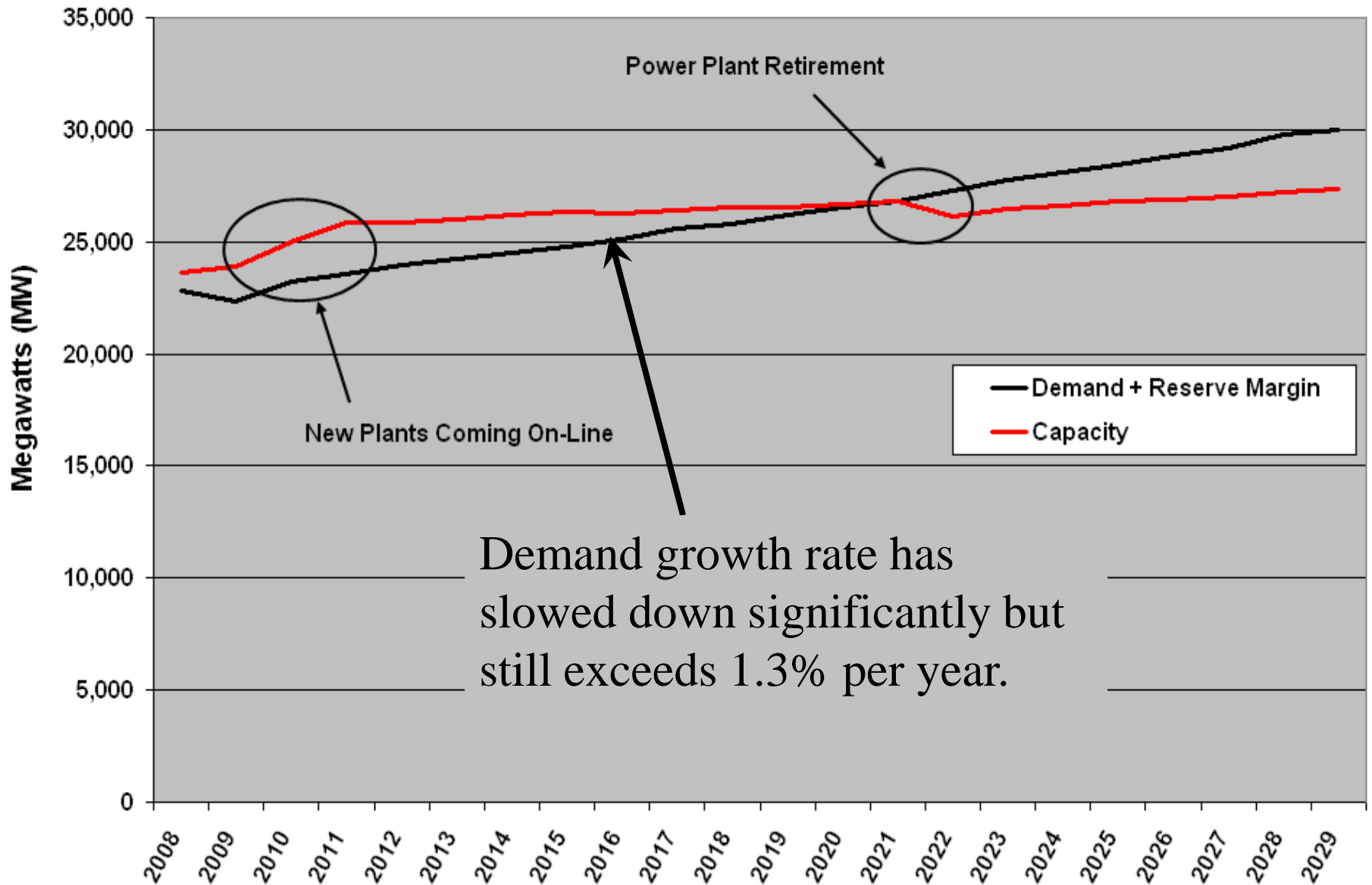
# Pathway to Reduce Carbon Emissions:



# ...SLOW Economic Recovery?



# Forecasted Demand vs Capacity in Missouri (All Electric Service Providers - 2008 to 2029)



# Voices from the Energy Industry

Bill Shiveley, the manager of Barry Electric Cooperative and the president of the Association of Missouri Electric Cooperatives (AMEC) board:

“Unless bold steps are taken quickly, electric consumers could face deteriorating service reliability and skyrocketing bills over the next 10 years. Some immediate actions Congress should take include helping all households become more energy efficient, improving transmission infrastructure to ‘grow’ renewable energy resources and cutting through the red tape that prevents construction of new nuclear power plants.”

# No Silver Bullet



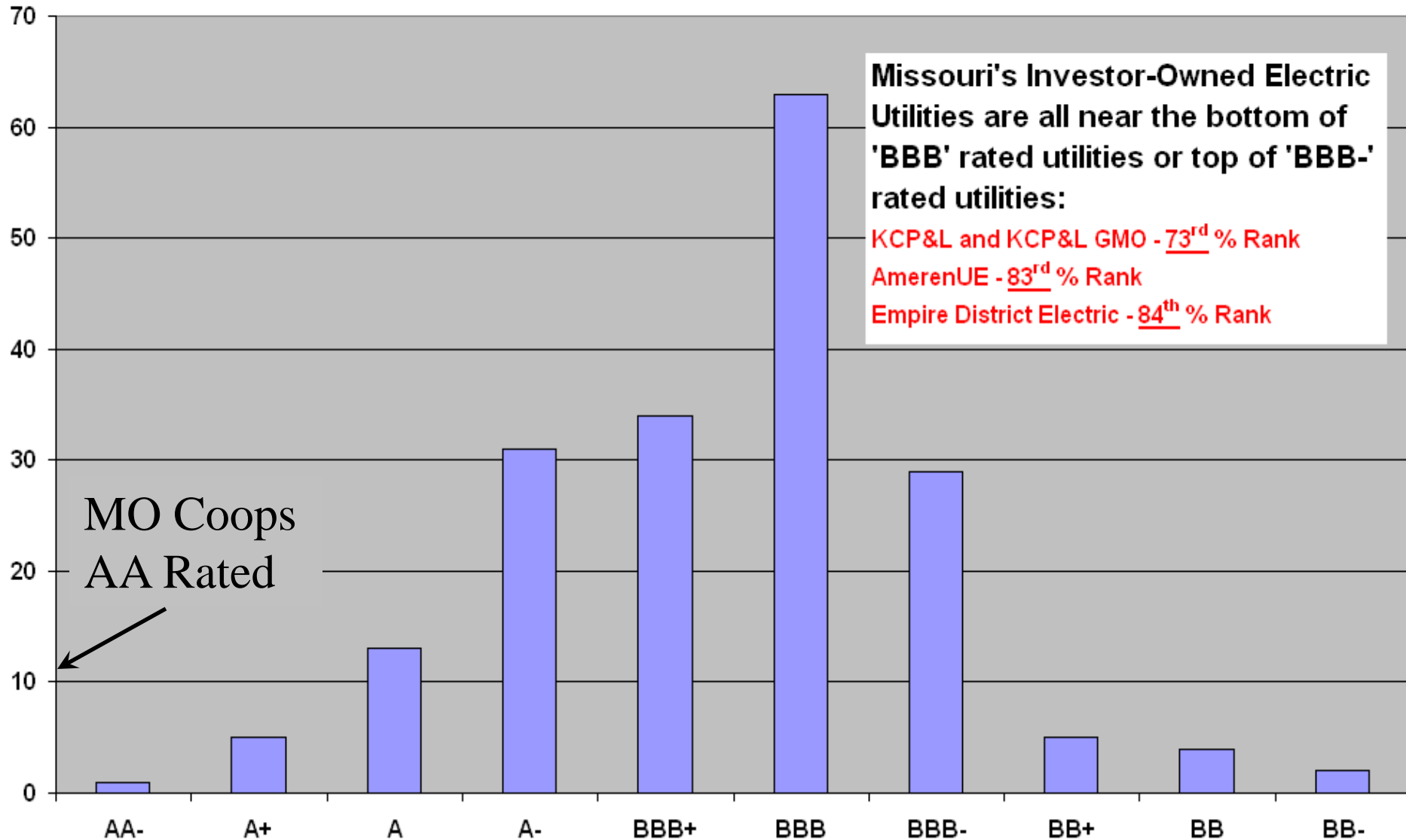
**Roger Kranenburg, a  
director at Edison Electric  
Institute (EEI):**

“Renewables, along with a full range of other climate-friendly technologies – including nuclear, energy efficiency, clean coal, carbon capture and storage, and plug-in hybrids – must be part of the industry’s long-term approach to meeting our country’s steadily growing demand for electricity.”

# U.S. Regulated Electric Utilities

## Number of Utilities by Corporate Credit Rating

(Standard & Poor's 7/14/09)



# How Electric Service Providers Are Facing These Challenges

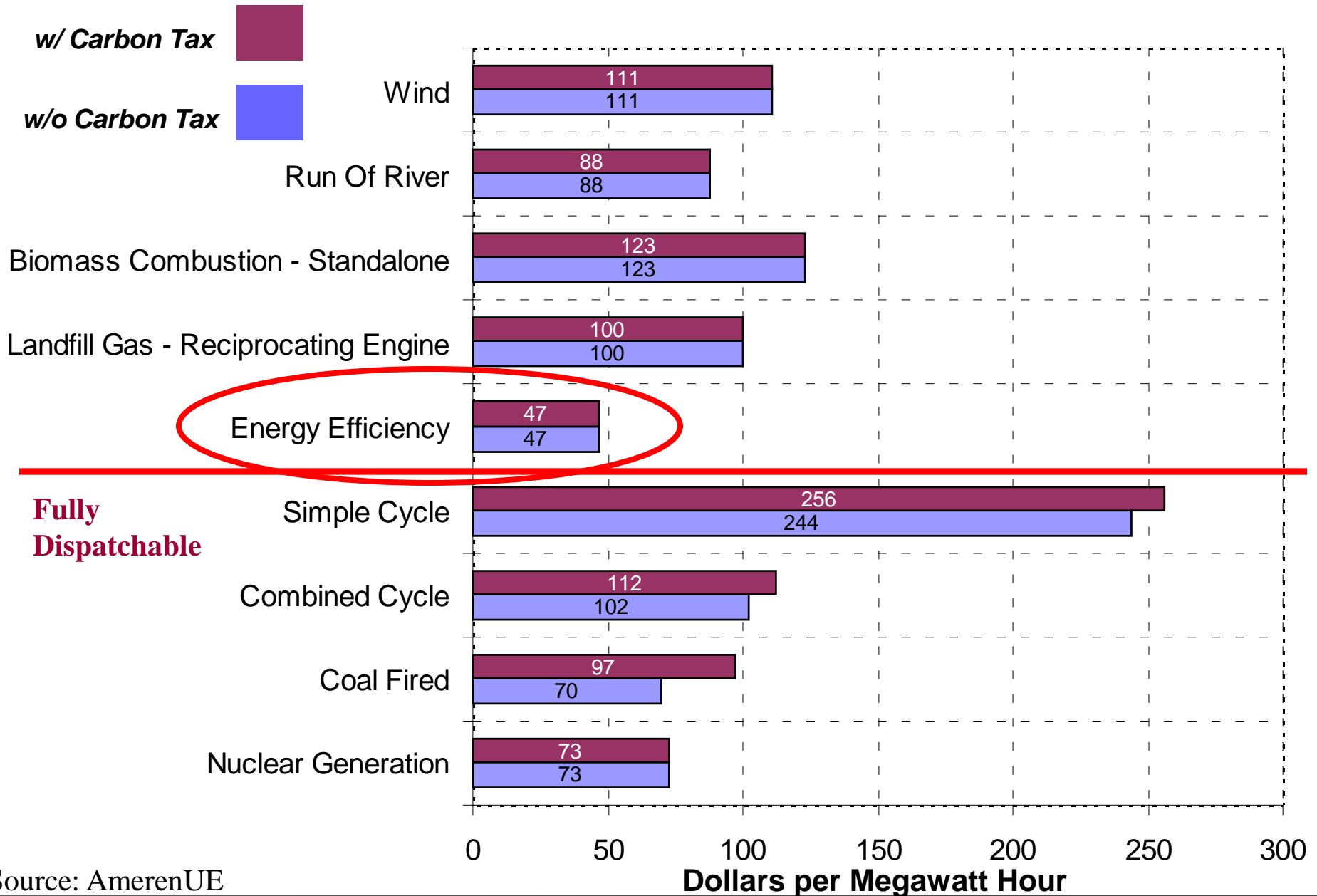
- Carefully Analyzing Options to Assure Continued Compliance with Environmental Regulations, Reliability of Service & Reasonable Rates
  - Attempting to quantify degrees of risk associated with future uncertainties – very challenging with significant risk of moving ahead with major projects
- Acting on Least Cost Plans...Building Infrastructure & Implementing Programs, Especially w/Support Under Wide Range of Scenarios

# BIG questions...no easy answers

- ⦿ How widespread and how quickly will electric vehicles be deployed?
- ⦿ What sort of climate change and/or national RPS legislation will be passed?
- ⦿ Will coal plant carbon capture and storage become economically feasible and if so, when?
- ⦿ How quickly will cost of wind, biomass and solar energy technologies decline relative to traditional sources?
- ⦿ How quickly will cost of energy storage technologies decline?

# Levelized Cost of Ownership

total cost of electricity as it leaves the plant



Source: AmerenUE

# Renewable Projects Recently Built or Under Construction/Contracted

Wind Farms – Bluegrass Ridge, Cow Branch, Conception, Lost Creek, Elk River, Meridian Way, Rock Port, Smoky Hills, Pioneer Prairie, & Spearville

Biomass – Lamar Landfill, Fred Weber Landfill (largest in several state radius), Ameresco Biogas, Columbia Biogas, Wood Fuel in Columbia, & Laddonia



# Baseload Projects Under Construction

- Iatan II
- Southwest II
- Nebraska City II
- Prairie State
- Plum Point
- Combined Cycle Natural Gas





# Natural Gas Fired Generation

# How Can You Help?

- Look at how you use energy...
  - What low and no cost things can you do to reduce your energy consumption?
  - Check with your local electric service provider – many of them have several energy efficiency programs, some with audits and rebates for taking steps to reduce energy consumption without reducing your quality of life.
  - When are you using most of your energy?
  - Can you do things to shift your usage of energy to periods when less energy is being used?
- As public policy debates continue on energy issues – ask yourself if these policies balance the needs of people, planet and prosperity. If we don't carefully balance these issues we will be taking steps toward an energy policy that is less than optimal.



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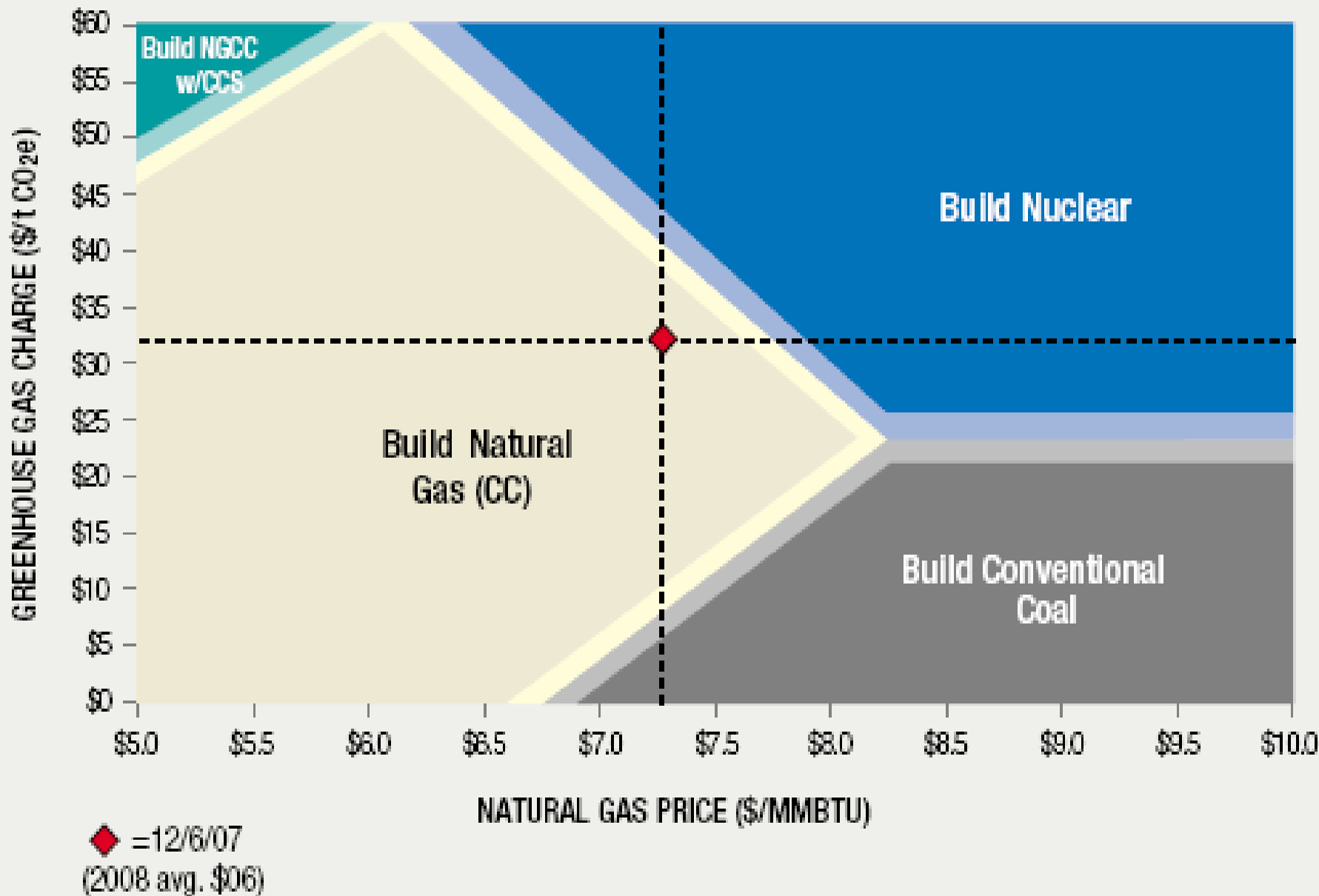
E-Mail: [Warren@missourienergy.org](mailto:Warren@missourienergy.org)

Questions ?



**FIG. 2****ECONOMIC CHOICE FOR NEW GENERATING CAPACITY (\$2006)**

Source: Bruce Alan Hurlbut

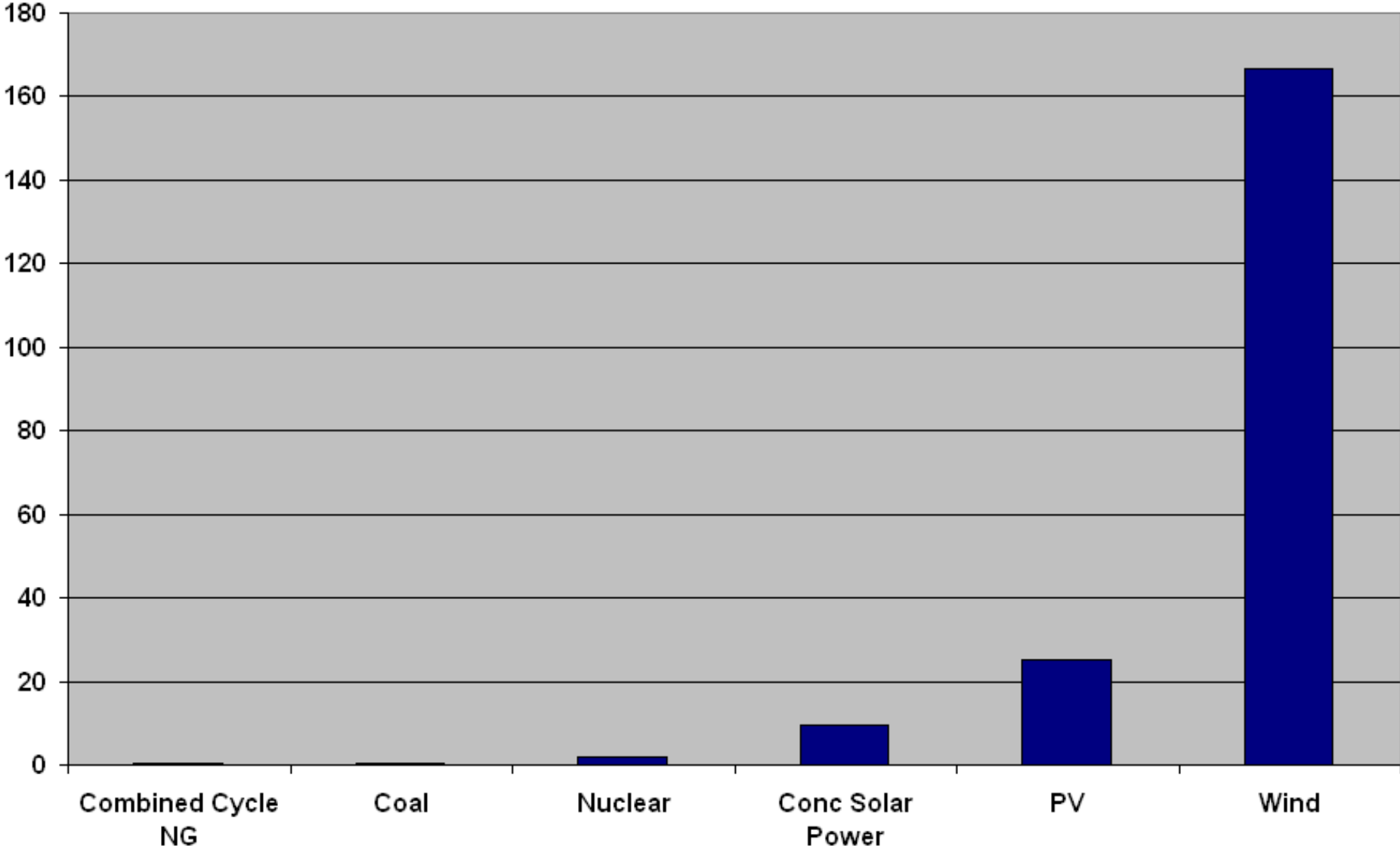


Cost of Electricity in the US vs European Countries (Cents per kWh)



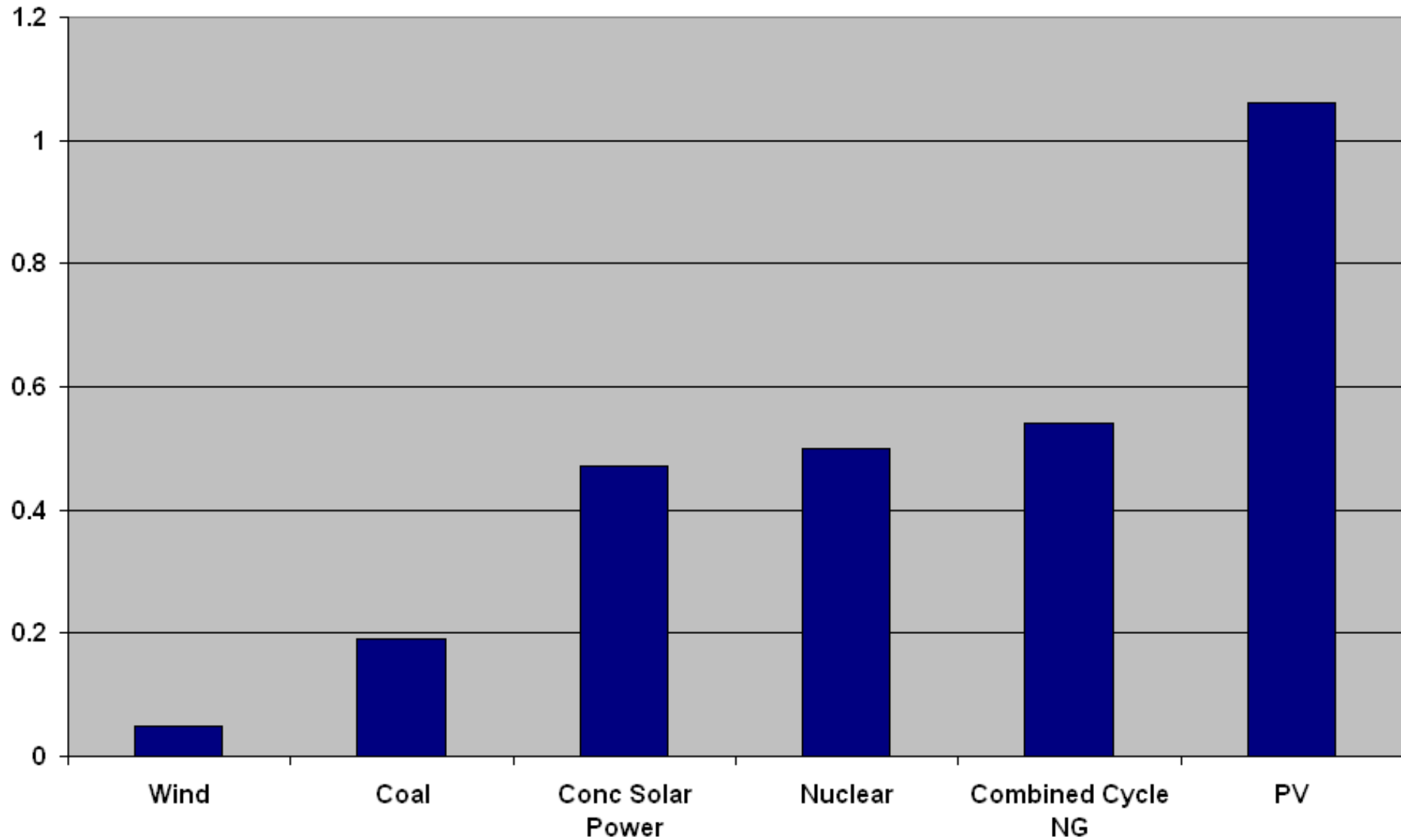
**It could be a lot worse!**

# Land Area for Energy Resources (Acres / MW)

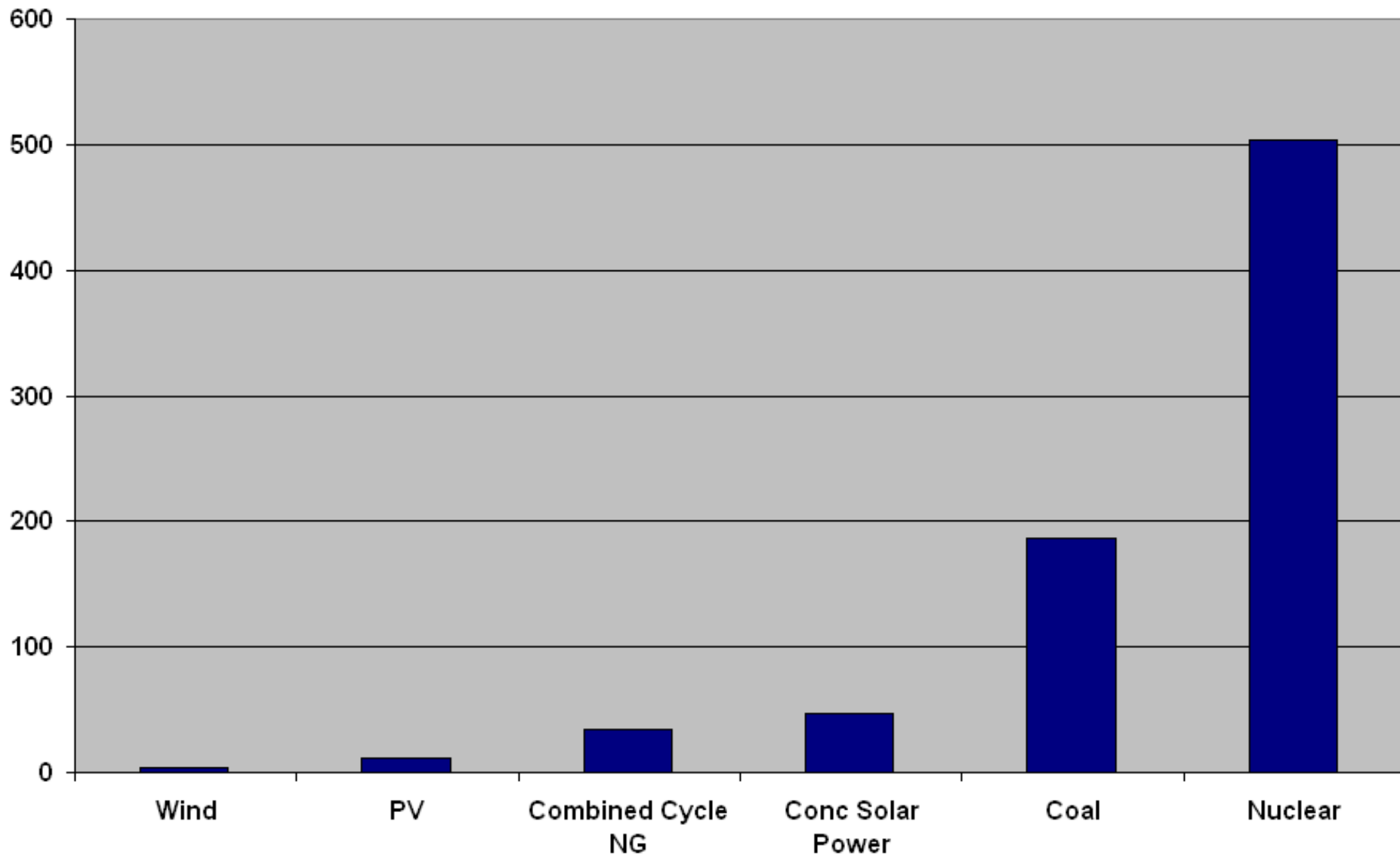


Source: May 2010 Public Utilities Fortnightly – “Green Job Realities”

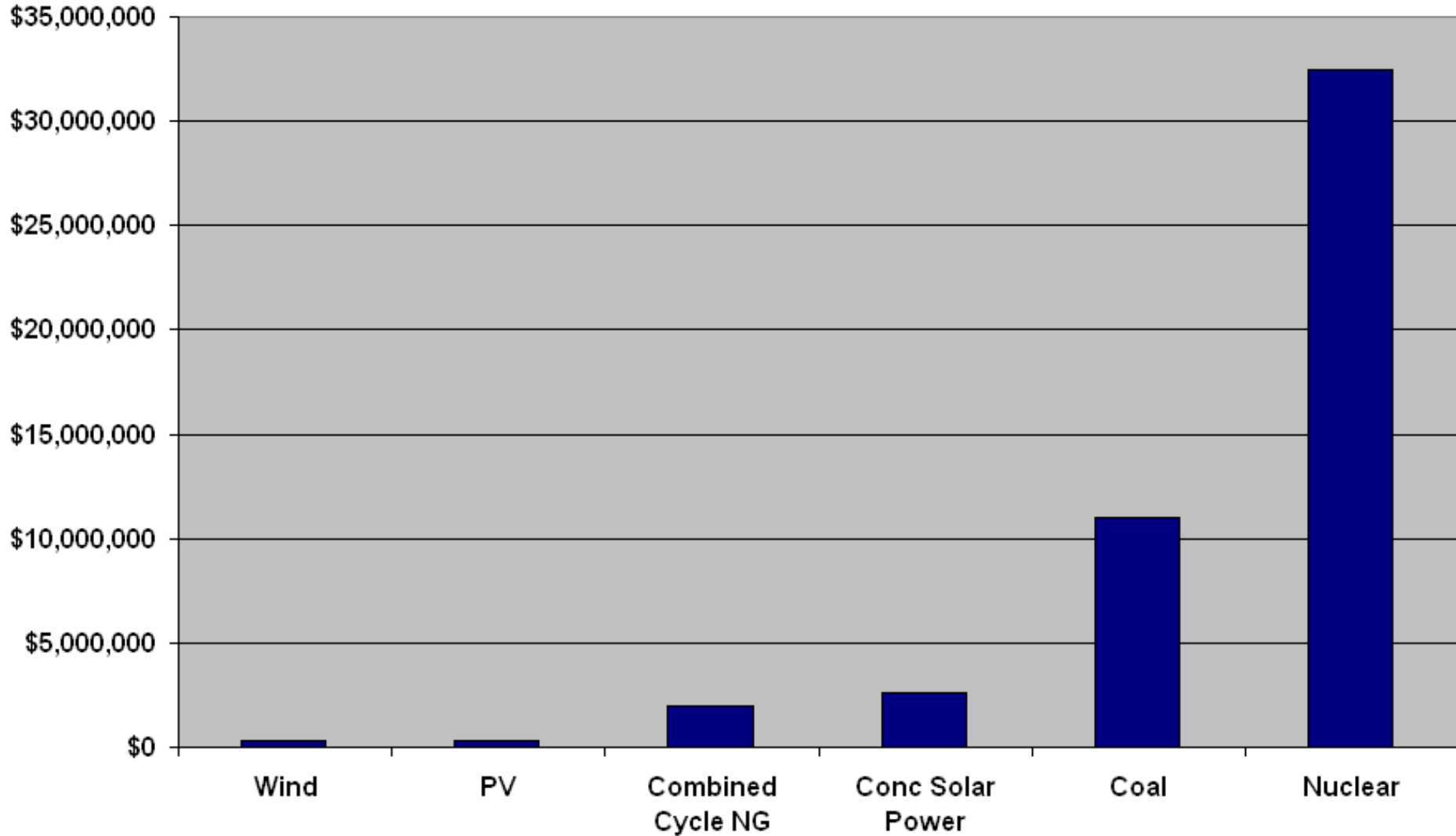
## Jobs per Unit of Energy for Different Technologies (Jobs / MW)



## Direct Jobs for Different Technologies (for average size facility)



## Local Workforce Income (\$/yr) for Different Technologies (for average size facility)



## U.S. Government Subsidies in 2007 (\$/MWh)

