

Daniel Simmons  
Institute for Energy Research

[www.InstituteForEnergyResearch.org](http://www.InstituteForEnergyResearch.org)

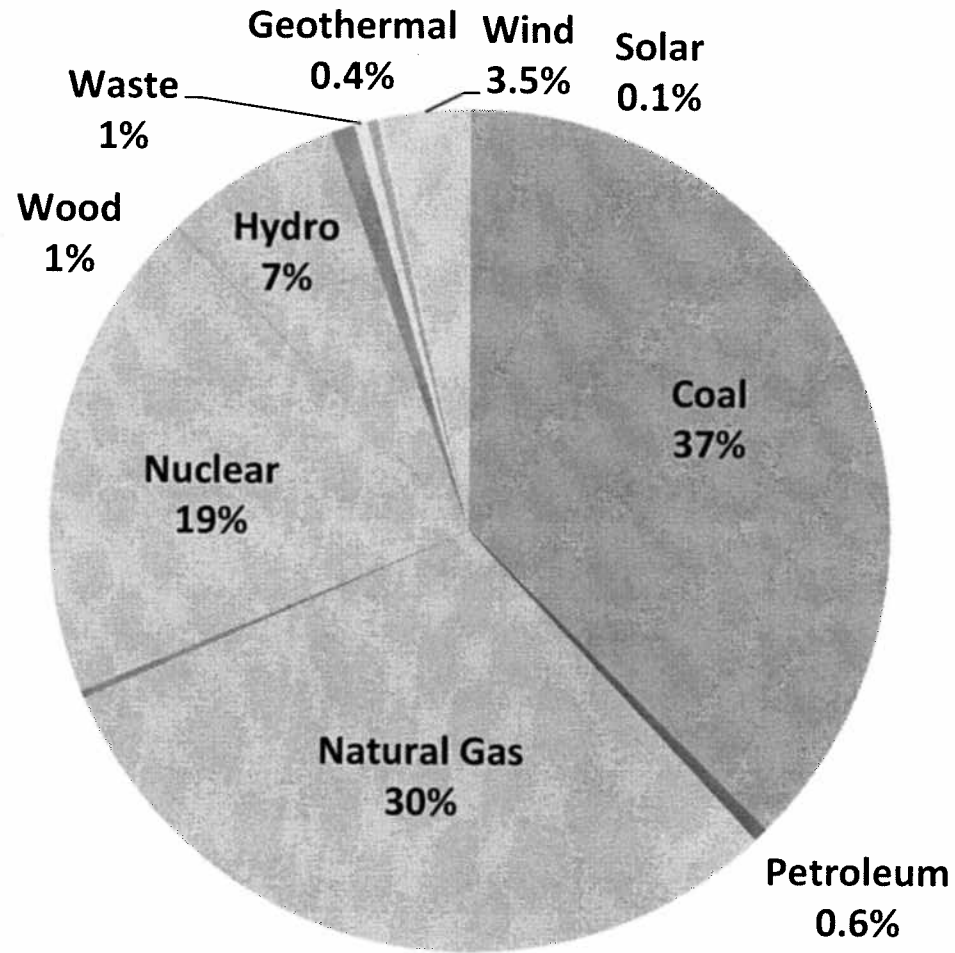


Does Michigan still  
need a renewable  
electricity standard?

# Is Michigan's RES Necessary?

- RESs are needed because America is running out of coal, oil, and natural gas
- RES are needed because coal is dirty
- RESs are needed because renewables are infant technologies and need help
- RESs will reduce the cost of electricity
- RESs will create jobs
- RES are an effective way to reduce carbon dioxide emissions

# 2012 Net Electricity Generation



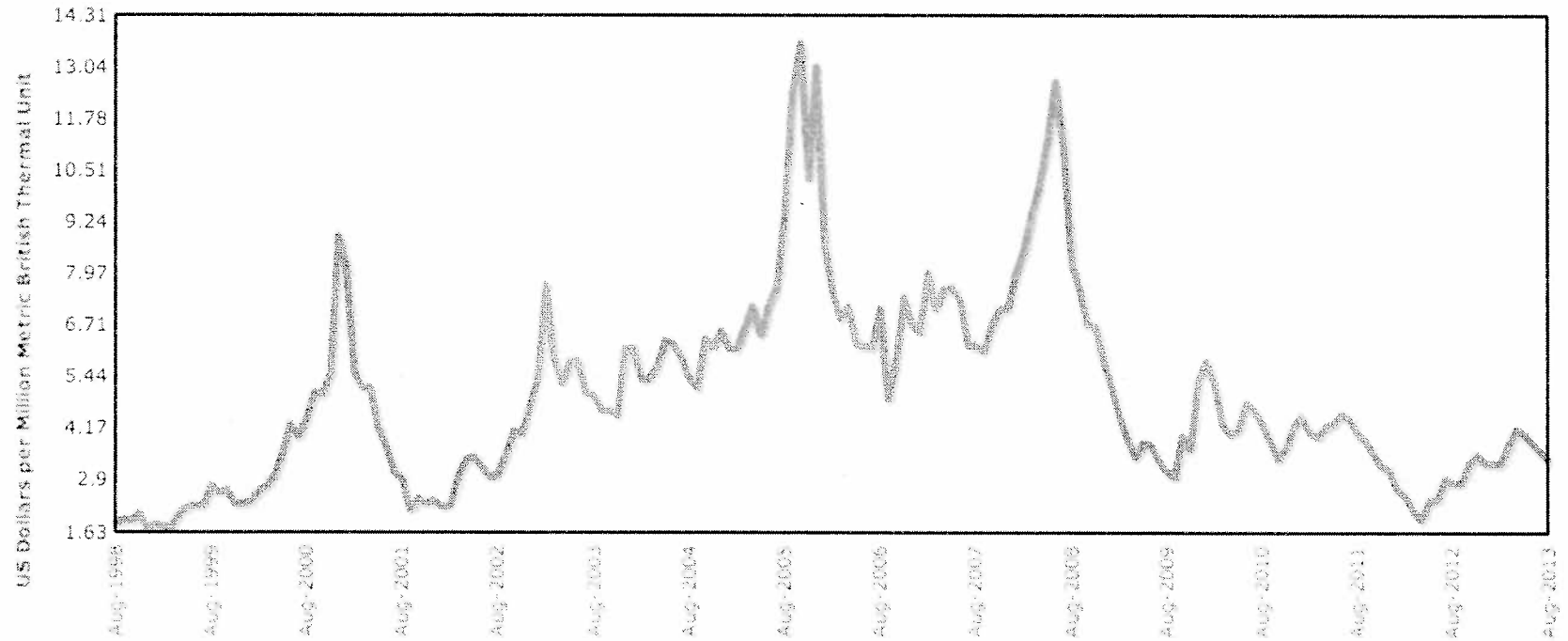
# Large Coal and Natural Gas Reserves

- 486.1 billion short tons of coal in its Demonstrated Reserve Base. The U.S. consumes 1 billion short tons of coal a year.
- 2.744 quadrillion cubic feet of natural gas and we use about 24 billion cubic feet a year.

### Natural Gas Monthly Price - US Dollars per Million Metric British Thermal Unit

Range 6m 1y 5y 10y 15y 20y 25y 30y

Aug 1998 - Aug 2013: 1.570 (84.41 %)

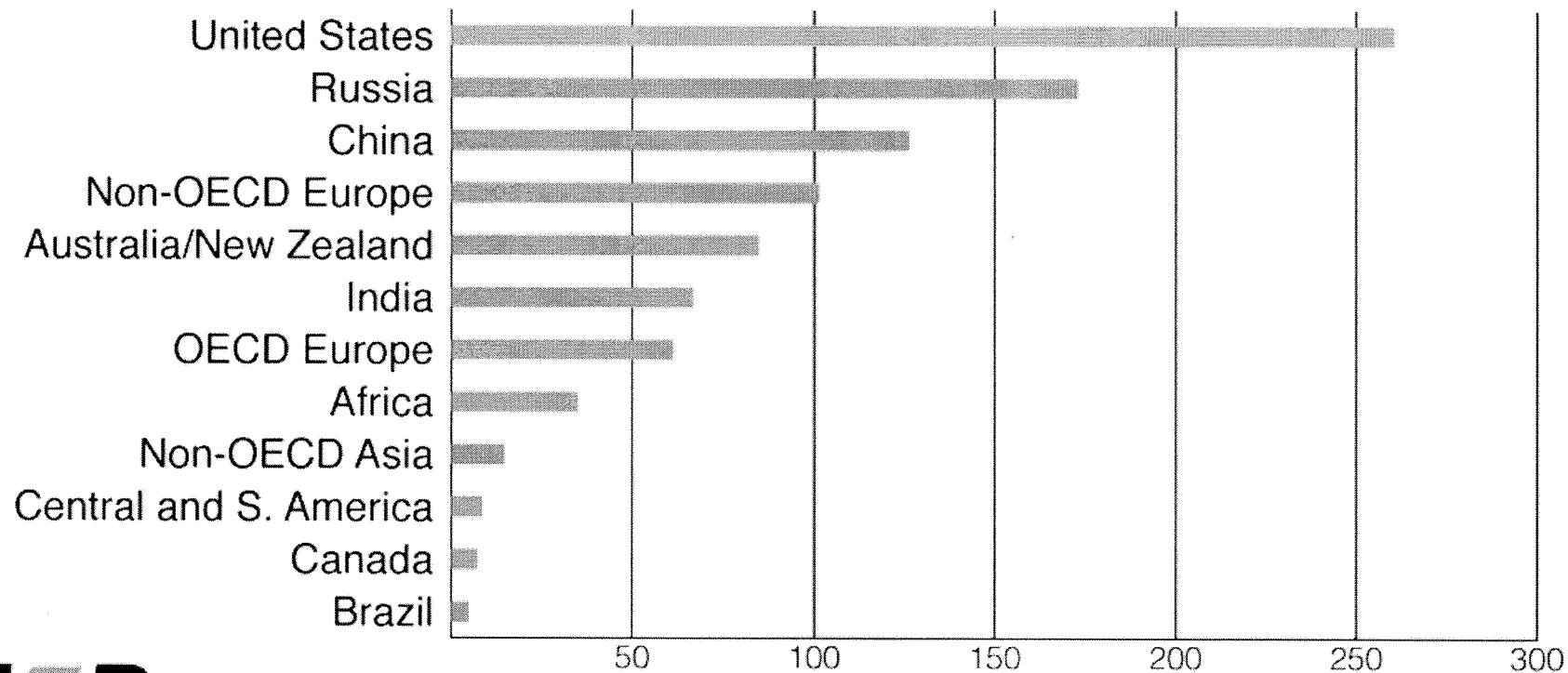


Description: Natural Gas, Natural Gas spot price at the Henry Hub terminal in Louisiana, US Dollars per Million Metric British Thermal Unit



# COAL

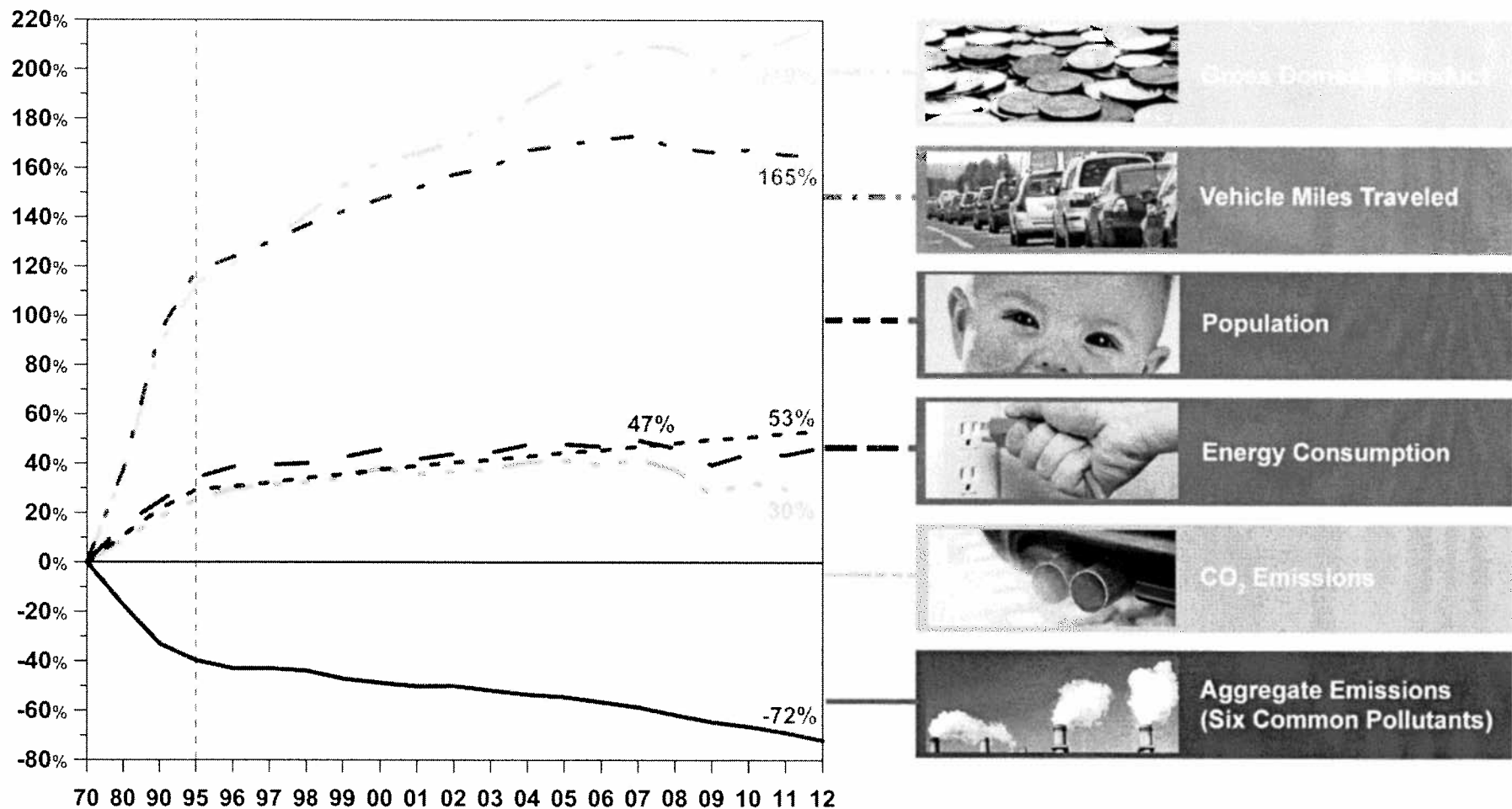
## World Recoverable Reserves



Source: Energy Information Administration, International Energy Outlook, 2011 (6/25/13)



# But what about air pollution?





Today's coal-fired power plants are cleaner than ever, but you can't build them in the United States

But aren't wind and solar  
"infant" technologies that  
just need "a little" help?

# Renewables are Old

- 1882—First coal-fired power plant built by Thomas Edison
- 1883—First solar cells made by Charles Fritts
- 1887—First electricity generated from wind turbine
- 1954—first photovoltaic cells powerful enough to run everyday electrical equipment

# Solar Power Seen Meeting 20% of Needs By 2000; Carter May Seek Outlay Boost

By WALTER S. MOSSBERG

Staff Reporter of THE WALL STREET JOURNAL

WASHINGTON—Federal planners have concluded that solar energy can contribute as much as 20% of U.S. energy needs by the

that a second, smaller review group be named to tailor policy options to a specific goal, preferably the environmental council's projection of a 25% solar share of U.S. energy by 2000.

**A10** MONDAY, NOVEMBER 13, 2006

THE WALL STREET JOURNAL.

# Renewable Fuels May Provide 25% of U.S. Energy by 2025

By JOHN J. FIALKA

WASHINGTON—A new Rand Corp. study showing the falling costs of ethanol, wind power and other forms of renewable energy predicts such sources

of the nation's energy, and about half of that comes from hydroelectric dams. The study assumes renewable-energy costs will keep dropping at the rate of recent years. It says raising the use of renewables to 25% of all U.S. energy consumed



[← Back to table of contents](#)

### 3. RENEWABLE ENERGY:

#### Western wind, solar could compete with gas in 2025 -- DOE study

Phil Taylor, E&E reporter

Published: Monday, August 26, 2013

Renewable wind and solar power could be cost-competitive with natural gas in Western states without subsidies in 2025, when current state renewable energy standards are set to expire, according to a new federal study.

The study by the National Renewable Energy Laboratory found that wind and solar power from remote lands in Nevada, Arizona, New Mexico, Wyoming and Montana could be transmitted to urban customers for almost the same cost as power from a nearby natural gas plant.

Most of the renewable energy generation in the West has been built to satisfy state renewable energy standards, which range from Arizona's 15 percent by 2025 to California's 33 percent by 2020.

The 161-page NREL study looked at what renewable resources would be left when those standards expire in 2025 and what it would cost to connect them to the best-matched population centers.


The lab's goal was to reduce some of the uncertainty that clouds long-term energy planning.

"The electric generation portfolio of the future could be both cost effective and diverse," said NREL Senior Analyst David Hurlbut, the report's lead author, in a statement. "If renewables and natural gas cost about the same per kilowatt-hour delivered, then value to customers becomes a matter of finding the right mix."

Story Tools sponsored by  
America's Natural Gas

AA RESIZE TEXT  EMAIL  PRINT

Advertisement



AMERICA'S  
NATURAL GAS

thinkaboutit.org

# Electricity Generation and Supply

## Supply and Demand

Graph displays current system demand plotted against forecast demand and available resources. See [tutorial](#) for more information on this graph.

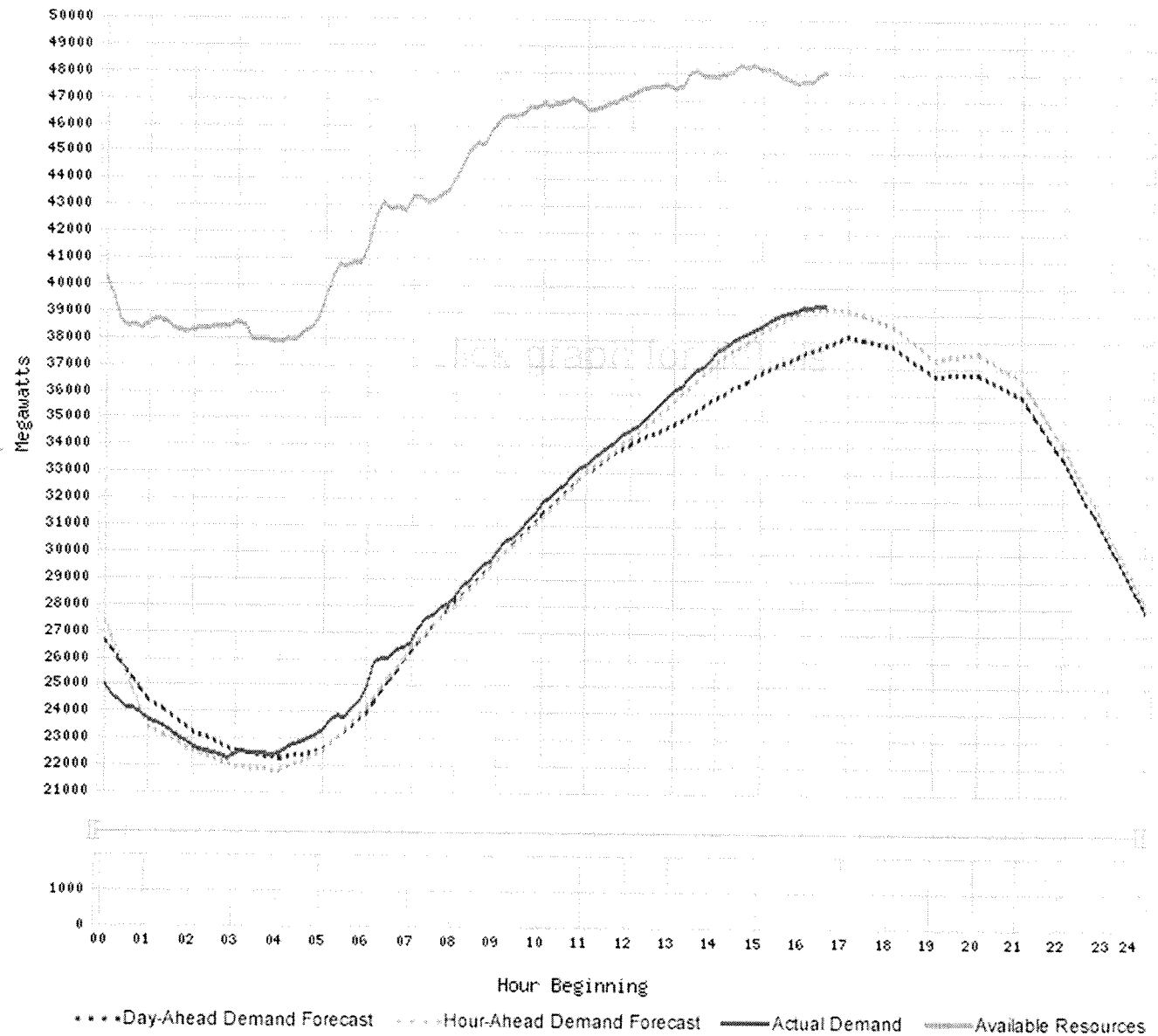
Current System Demand:  
(Actual Demand at this point in time)  
39290 MW

Today's Peak Demand:  
(Highest point thus far today)  
39290 MW

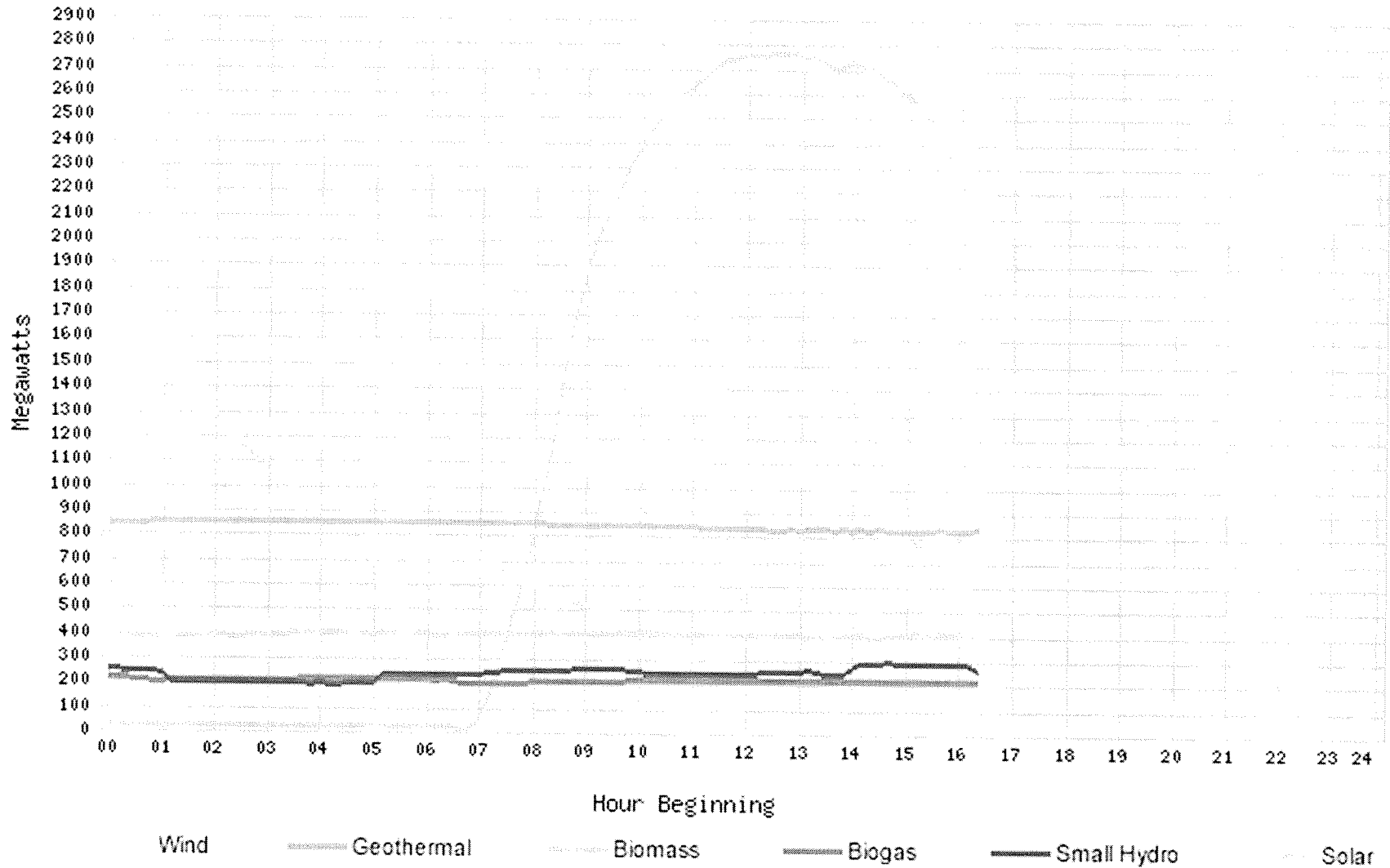
Today's Forecast Peak Demand:  
(Highest point expected today. Does not appear post-peak.)  
39096 MW

Tomorrow's Forecast Peak Demand:  
(Not included on graph)  
34730 MW

Information is current as of 16-Sep-2013 16:30 . If browser does not support auto refresh, select reload.



# Electricity Generation and Supply



### Estimated Levelized Cost of New Dispatchable Generation Resources, 2018

Plant type <b>Dispatchable Technologies</b>	U.S. average levelized costs (2011 \$/megawatthour) for plants entering service in 2018					
	Capacity factor (%)	Levelized capital cost	Fixed O&M	Variable O&M (including fuel)	Transmission investment	Total system levelized cost
Conventional Coal	85	65.7	4.1	29.2	1.2	100.1
Advanced Coal	85	84.4	6.8	30.7	1.2	123
Advanced Coal with CCS	85	88.4	8.8	37.2	1.2	135.5
<b>Natural Gas-fired</b>						
Conventional Combined Cycle	87	15.8	1.7	48.4	1.2	67.1
Advanced Combined Cycle	87	17.4	2	45	1.2	65.6
Advanced CC with CCS	87	34	4.1	54.1	1.2	93.4
Conventional Combustion Turbine	30	44.2	2.7	80	3.4	130.3
Advanced Combustion Turbine	30	30.4	2.6	68.2	3.4	104.6
Advanced Nuclear	90	83.4	11.6	12.3	1.1	108.4
Geothermal	92	76.2	12	0	1.4	89.6
Biomass	83	53.2	14.3	42.3	1.2	111



### Estimated Levelized Cost of New Non-Dispatchable Generation Resources, 2018

Plant type <b>Non-Dispatchable Technologies</b>	U.S. average levelized costs (2011 \$/megawatthour) for plants entering service in 2018					
	Capacity factor (%)	Levelized capital cost	Fixed O&M	Variable O&M (including fuel)	Transmission investment	Total system levelized cost
Wind	34	70.3	13.1	0	3.2	86.6
Wind-Offshore	37	193.4	22.4	0	5.7	221.5
Solar PV <sup>1</sup>	25	130.4	9.9	0	4	144.3
Solar Thermal	20	214.2	41.4	0	5.9	261.5
Hydro <sup>2</sup>	52	78.1	4.1	6.1	2	90.3







Front Page World Europe Germany Business Zeitgeist Newsletter

English Site > Germany > German Energy Revolution > High Costs and Errors of German Transition to Renewable Energy

## Germany's Energy Poverty: How Electricity Became a Luxury Good

By SPIEGEL Staff



DPA

Germany's aggressive and reckless expansion of wind and solar power has come with a hefty pricetag for consumers, and the costs often fall disproportionately on the poor. Government advisors are calling for a completely new start.

# Renewable Mandates **Cost** Jobs

- In Spain, an estimated that 2.2 jobs were lost as an opportunity cost of creating one expensive, subsidy- and set-aside-dependent job in the renewable sector.
- In Germany, per worker subsidies in the solar industry are as high as \$240,000 per worker.
- Denmark pays 39 US cents per kWh, and they pay subsidies of nearly \$400 million a year to wind producers (in a country with less than 2 percent of the population of the United States)

# Renewable Jobs are Expensive Jobs

- According to the Joint Tax Committee, extending the wind production tax credit (PTC) would cost \$12.1 billion.
- The American Wind Industry Association, claims that 37,000 jobs would have been lost if the PTC was not extended.
- This means that each job “saved” cost the U.S. Treasury \$327,000.

States that have renewable mandates have residential electricity prices 27 percent higher than states without these mandates.

# Existing Coal and Hydro Produce Low-Cost Power

State	Price	Largest Source of Electricity
Idaho	6.90	Hydro
Utah	7.41	Coal
Oklahoma	6.93	Coal
Missouri	7.63	Coal
Iowa	7.49	Coal
Arkansas	7.42	Coal
South Dakota	8.21	Hydro
Nebraska	7.74	Coal
Washington	7.07	Hydro
Minnesota	8.77	Coal

# Expensive CO2 Emission Reductions

- California Air Resources Board—**\$133 per ton** to reduce carbon emissions through a renewable electricity mandate.
- Obama administration memorandum on subsidies—“would have to be valued at nearly **\$130 per ton for CO<sub>2</sub>** for the climate benefits to equal the subsidies.”
- **\$7.70 a ton** to purchase a certified carbon dioxide allowance traded on the European Climate Exchange.

# Summary

- U.S. is energy rich
- U.S. air quality has dramatically improved
- Renewables are not new and they won't necessarily be truly cost-competitive anytime soon
- Renewables are expensive
- Lavish renewable subsidies increase prices and cost jobs
- Flexibility and freedom of choice