

Nuclear Energy in the United States: Status and Outlook

NCSL Task Force on Energy Supply

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NEI

NUCLEAR ENERGY INSTITUTE

nuclear. clean air energy.



STORIED HISTORY
BRIGHT FUTURE

Nuclear Energy in the United States ... At a Glance

- U.S. nuclear plant performance continues strong
 - ~ 90% capacity factor first half of 2013
- Political willingness, interest in addressing used fuel
- Effective industry response to lessons learned from Fukushima
- \$30-billion new build program
 - Vogtle 3 and 4, Summer 2 and 3, Watts Bar 2

Trends in the Electricity Markets

- Electricity demand has not returned to 2007 level
- Fuel/technology diversity at risk
- Price signals in merchant power markets do not support investment in new capacity, or continued operation of existing capacity

Generating Capacity Built in the United States in the Last 15 Years

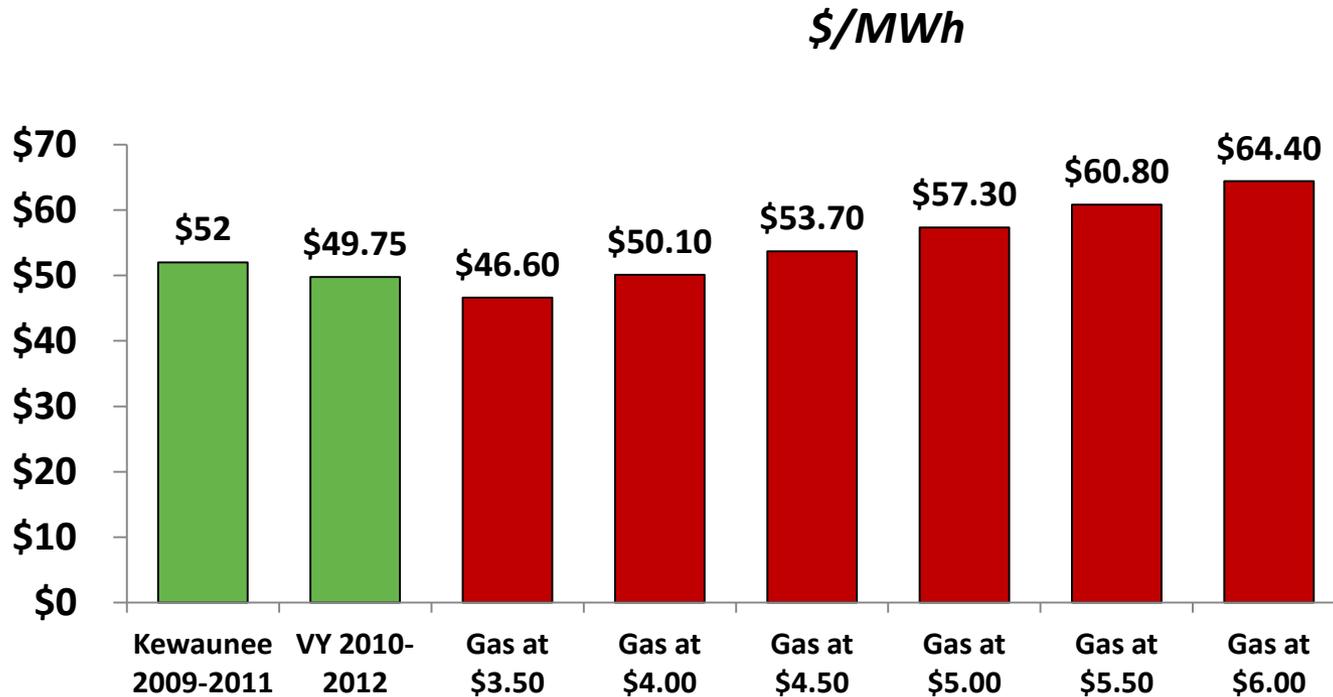
Fuel	Total
Coal	25,922
Gas	341,771
Nuclear	1,413
Oil	7,458
Renewables	66,599
Other	4,270
Total	448,806

Source: Ventyx

Nuclear Plant Shutdowns: The Situation

- Five reactors shut down
 - Four in 2013
 - One at the end of 2014
- Crystal River 3, San Onofre 2 and 3 were unique events
 - Over 110 PWRs (57 in the U.S.) have replaced steam generators; three ended badly
- Kewaunee, Vermont Yankee shutdown because of adverse economics

Efficient Markets Do Not Make Inefficient Economic Decisions



- Kewaunee 2009-2011 capacity factor = ~ 95%
- Vermont Yankee 2010-2012 capacity factor = ~ 90%
- Nothing wrong with the plants; something wrong with the markets

Sources: Kewaunee, VY 3-year average total generating cost: Electric Utility Cost Group. Gas-fired combined cycle plant costs from NEI financial model: Debt at 5.0%, 15% return on equity, debt/equity structure of 50/50. Capital, O&M and fuel cost assumptions for natural gas are from the Energy Information Administration's *Annual Energy Outlook 2013*.

Long-Term Fundamentals Still Strong

- Electricity demand will grow as the economy recovers
 - EIA forecast: 0.7% per year = 339,000 MW by 2040
- ~110 GW of fossil capacity retired 2011-2020, most by 2016
 - ~ 20% of coal-fired fleet shut down by 2020 (without carbon limits)
- Natural gas price volatility will continue
- Value of diverse fuel and technology portfolio will become clear

“We should be having policy discussions now about how we intend to replace 100 gigawatts of nuclear capacity that will be retired by about 2040. One hundred gigawatts can power 25 million typical households. Can we realistically expect natural gas and renewables to fill that void? As a practical matter, the answer is no. And the generation of electricity is about as practical as it gets.”

*– Thomas Farrell
President and CEO
Dominion Resources*

Nuclear Energy: A Solid Value Proposition

Safe, Reliable Electricity 24-by-7-by-365 Plus ...



Pricing the Attributes of Electricity

“Markets only efficiently allocate that which is given a price. Attributes that are not priced by markets are not (necessarily) allocated efficiently by them

“Paying more for diversity is not unprecedented. We call it insurance – consumers willingly pay a premium in return for being able to diversify their risks As deregulated power markets continue to evolve, **one challenge faced by such markets is the pricing of the numerous attributes of electricity that accompany the energy itself.** We have ‘green tags,’ could we not have ‘low price volatility tags’ as well?”

– *DAI Management Consultants*