

# Nuclear Energy's Essential Role in Meeting EPA's Clean Power Plan

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NUCLEAR ENERGY INSTITUTE

nuclear. clean air energy.

# Key Points

- Nuclear energy facilities have a unique set of attributes that are essential to a reliable grid
- As the electric industry undergoes transformation, maintaining large-scale, low-carbon generation is vital
- EPA's Clean Power Plan places a premium on nuclear energy to meet 2030 goals, but doesn't recognize the importance of license renewal



## 1 Efficient

Nuclear power plants are the most efficient source of electricity, operating 24/7 at a 92% average capacity factor.



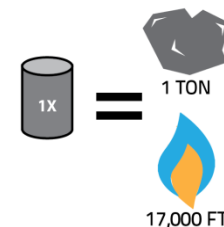
## 2 Available

A nuclear plant refuels once every 18 months, in spring or fall, replacing one-third of the fuel each time.



## 3 Reliable

During the 2014 Polar Vortex, the U.S. nuclear fleet operated at 95% capacity, far higher than any other source of electricity.



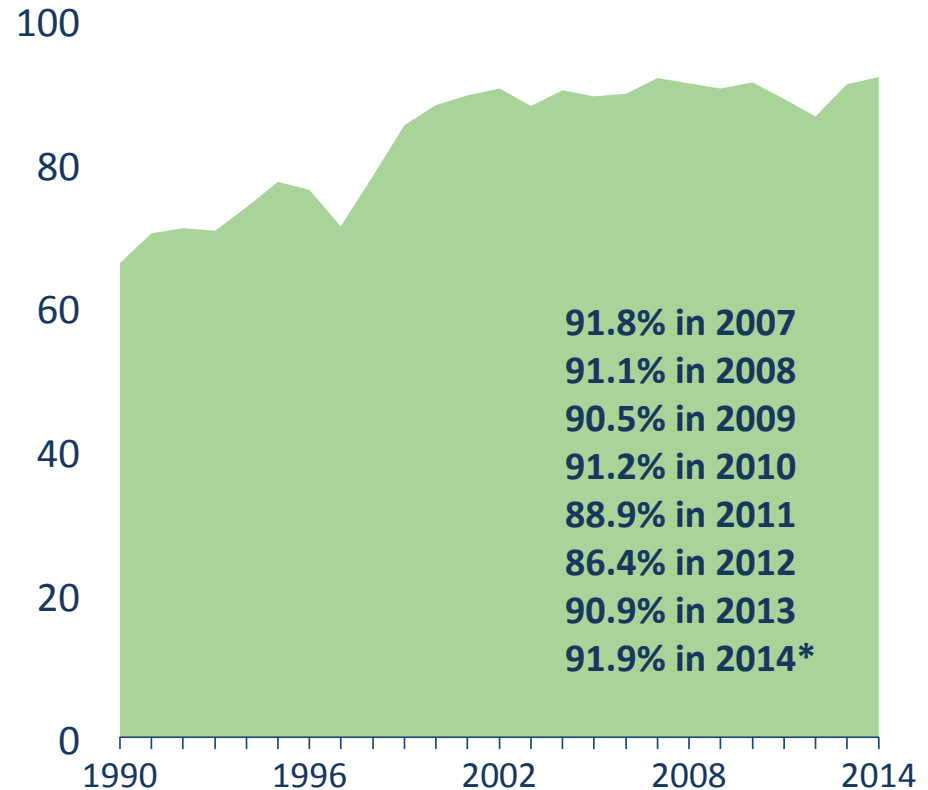
## 4 Clean

One uranium fuel pellet creates as much energy as one ton of coal or 17,000 cubic feet of natural gas.

# Nuclear Energy's Unqualified Value

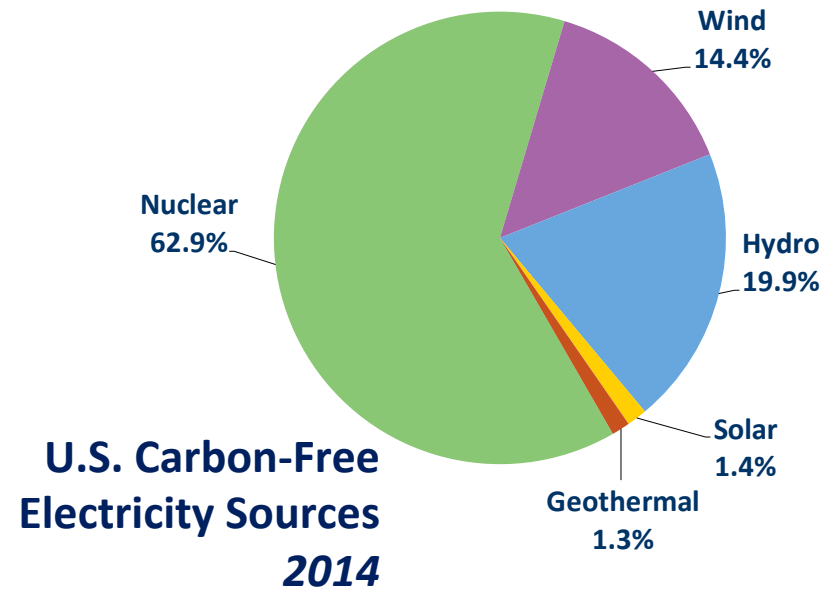
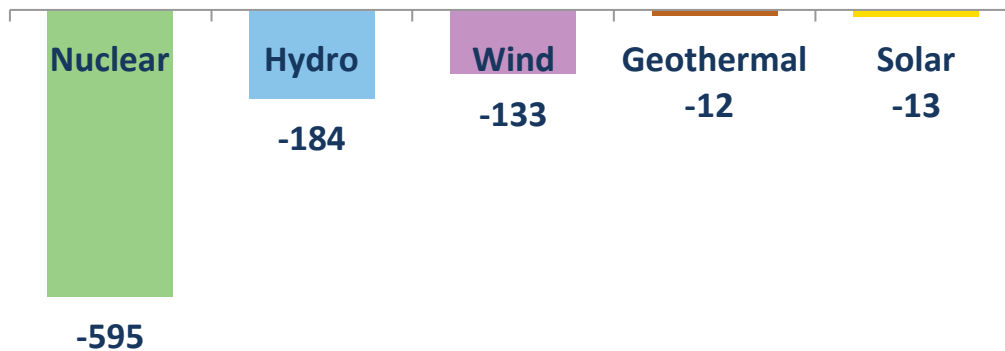
- Industry-leading reliability
- 63% of all U.S. clean-air electricity
- 24/7 production with assured fuel supply
- Maintains grid stability
- Economic drivers

U.S. Nuclear Plant Capacity Factor



# Carbon Prevention from Electricity Sources

## Electric Sector CO<sub>2</sub> Emissions Prevented Million Metric Tons 2014



Source: Emissions prevented are calculated using regional and national fossil fuel emissions rates from the Environmental Protection Agency and generation data from the Energy Information Administration.

# A Few Frames of Reference

“The threat of climate change calls for global responses, including expanded use of nuclear power to produce the electricity needed to sustain rising standards of living of the world’s growing population.” —*Energy Secretary Ernest Moniz, Sept. 14, 2015 at IAEA.*

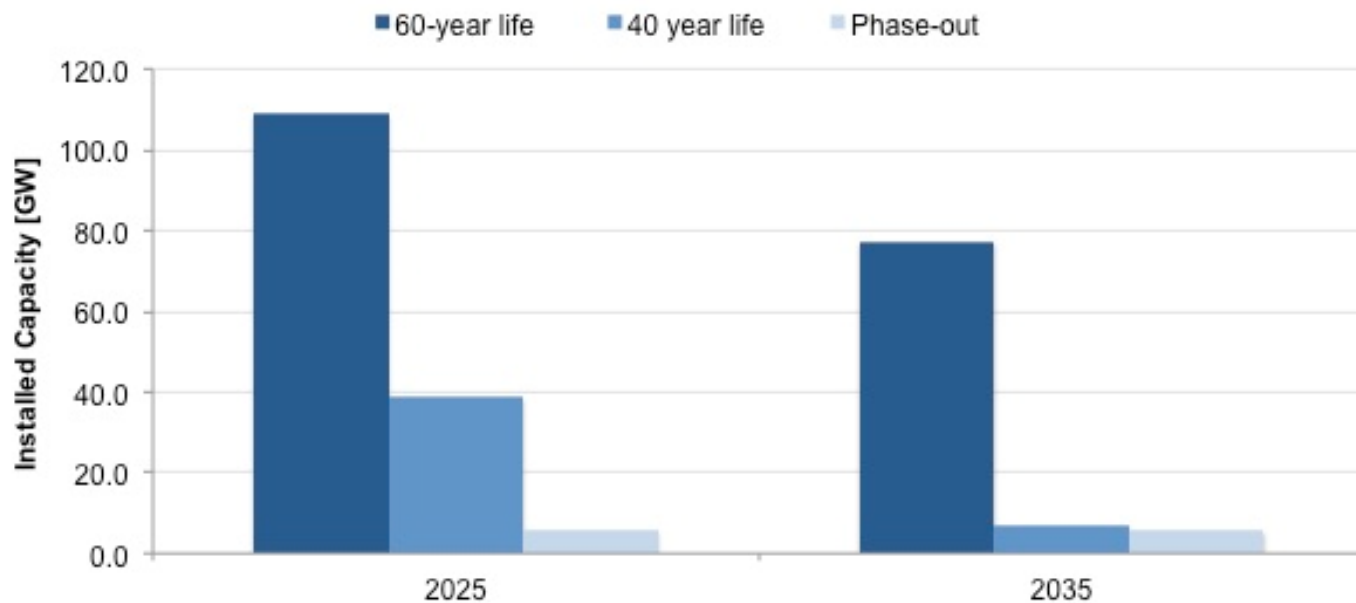
“If you care about climate change or air pollution, you cannot casually write off nuclear power, which produces virtually no carbon dioxide emissions while generating a tremendous amount of reliable power.” —*The Washington Post editorial, Aug. 19, 2015.*

# Nuclear Provisions in Clean Power Plan

- Credit for new reactors under-construction
- Credit for uprates at existing nuclear facilities
- Does not address factors contributing to “at-risk” plants
- Does not provide credit for license renewal at existing reactors
- Incentivizes mass-based system and carbon credit-trading

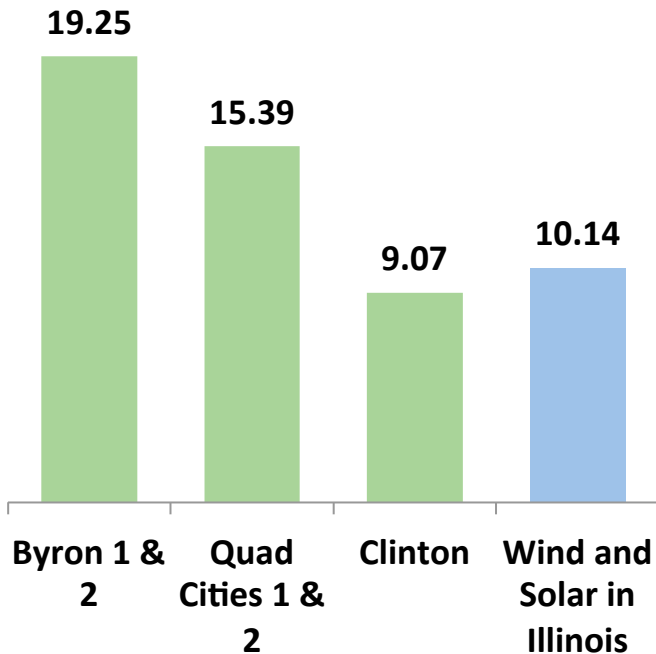
# Third Way Clean Power Plan Analysis Demonstrates Importance of License Renewal

Figure 1: The Nuclear Power Capacity Under Three Scenarios



# Carbon-Free Sources of Electricity: The Illinois Example

**Electricity Produced**  
*billions of kilowatt-hours*



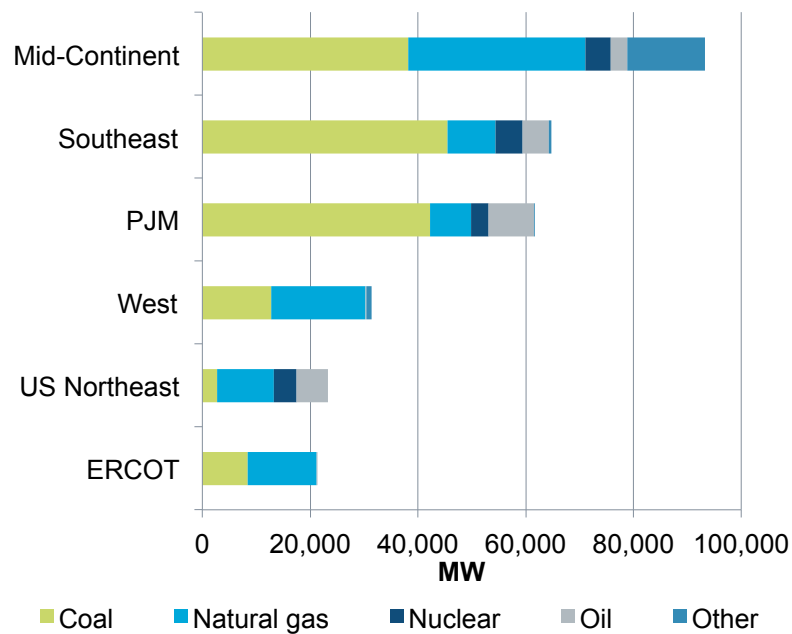
- Losing even one nuclear power station plant would be a major blow to carbon reduction efforts
- Replacing the carbon-free generation from Quad Cities (15.39 billion kWh) would require almost all of the wind generated in Iowa (16.29 billion kWh).

Annual Emissions Avoided			
Plant	CO <sub>2</sub> (metric tons)	SO <sub>2</sub> (short tons)	NO <sub>x</sub> (short tons)
Byron 1 & 2	15.5 million	36,075	15,250
Quad Cities 1 & 2	12.4 million	28,832	12,188
Clinton	8.6 million	13,757	4,852



# Close to 300 GW of Plant Retirements Projected 2015-40: 30% of Capacity

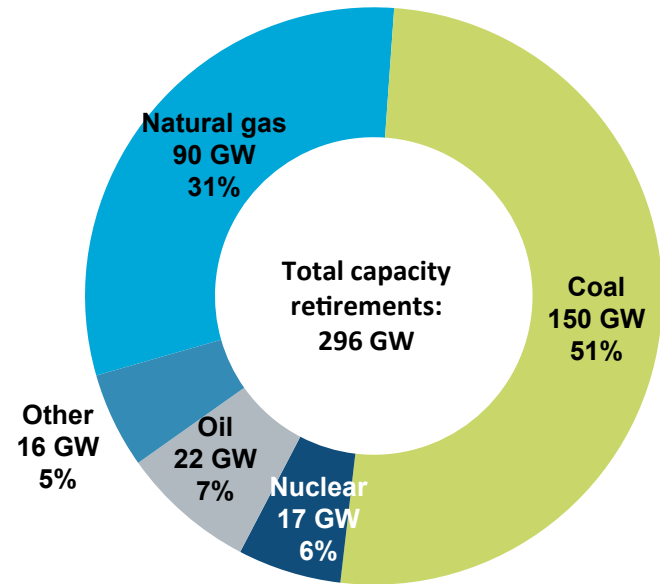
US cumulative retirements by region, 2015–40



Source: IHS

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US cumulative generating retirements, 2015–40



Source: IHS

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# Innovation and Transformation: Changing the Conversation

- Electric power business today is dominated by transformation, innovation
- Many consider nuclear energy a legacy baseload technology, but there is innovation in the sector as well
- Remarkable gains in cost and performance in natural gas, solar, wind, but part of the story is getting lost
  - In terms of cost/kWh, the “gee whiz” technologies are only now (after 20+ years of subsidy) approaching nuclear
  - In terms of production, by 2040 solar and wind will equal nuclear energy generation today

# Questions?



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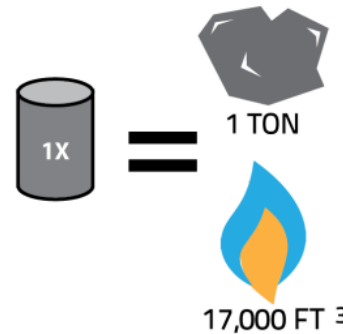
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