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Smart. Focused. Done Right.®

Implications of Shuttering a Nuclear Plant

NAYGN Southeast Chapter

September 19, 2019

Introduction to ScottMadden

Ed Baker
Generation Co-Leader

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Generation Co-Leader

We have helped the best be more successful and have assisted performance-challenged plants make meaningful improvements.

EXPERIENCE

- We have conducted engagements with five of the top-five fleet operators and eight of the top-10 U.S. nuclear operators, as well as all Canadian operators
- Our consultants have delivered projects to more than 80% of the operating and decommissioned commercial nuclear generation stations in the United States and Canada, from the largest fleet operators to single-station, stand-alone plants
- We share the same values as nuclear operators, with a strong commitment to safety demonstrated by many of our consultants having been previously badged at nuclear power plants
- Because we routinely deal with the integration of business strategy and detailed operating plans, we understand how to develop actionable strategies which drive operating improvements

SERVICES

- Business and cost management
- Peer-to-peer benchmarking
- Organization structure and staffing
- Targeted operational and process improvement
- Nuclear fleet operating models
- Plant turnaround/improvement efforts
- Merger and acquisition integration
- New build/refurbishment support
- Plant digitization strategy
- Operational Technology and Cyber Security

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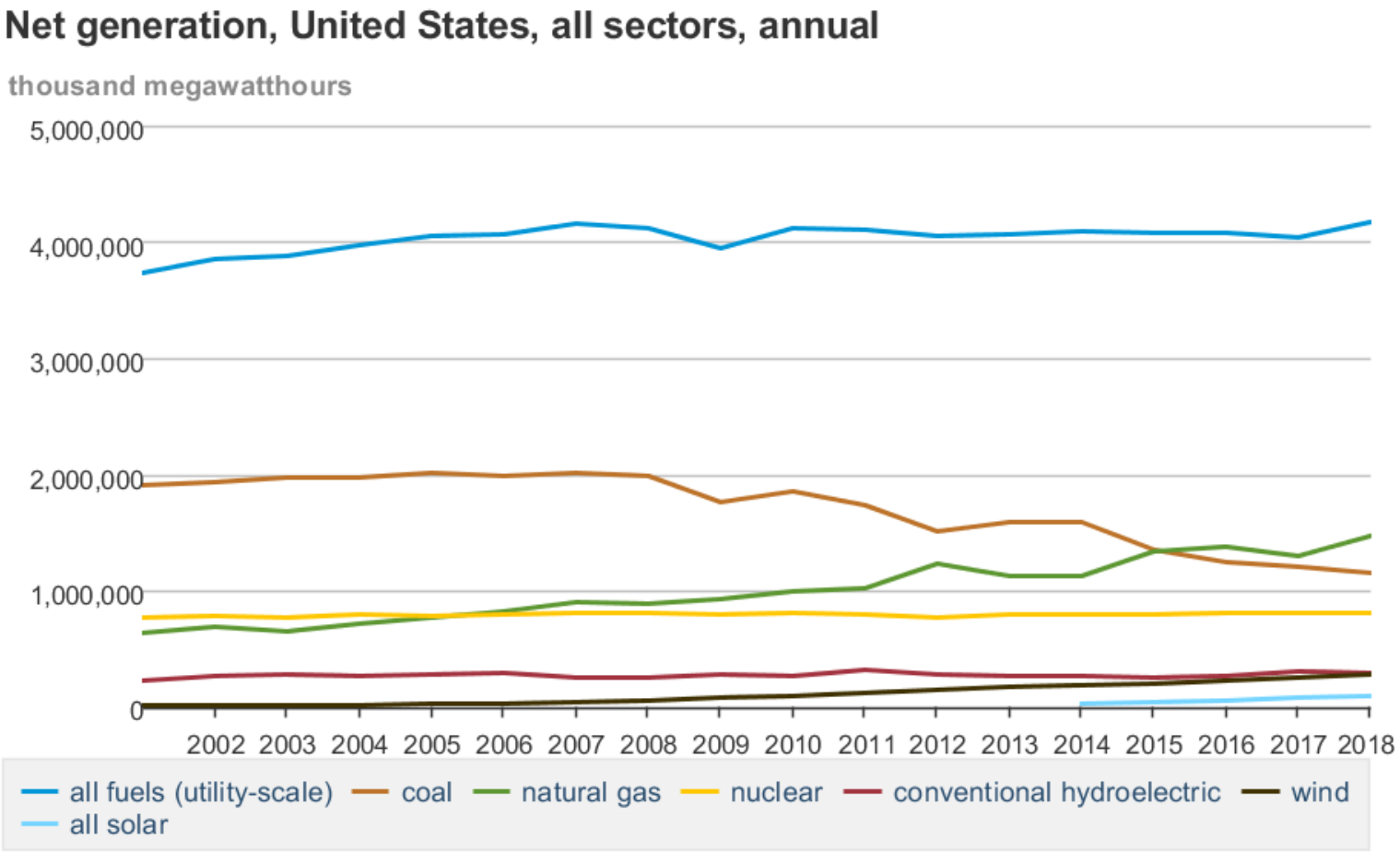
Generation in the U.S., historical



- **While total generation has remained relatively flat, natural gas has replaced coal as the primary fuel for generation**
- **Nuclear generation has remained steady**

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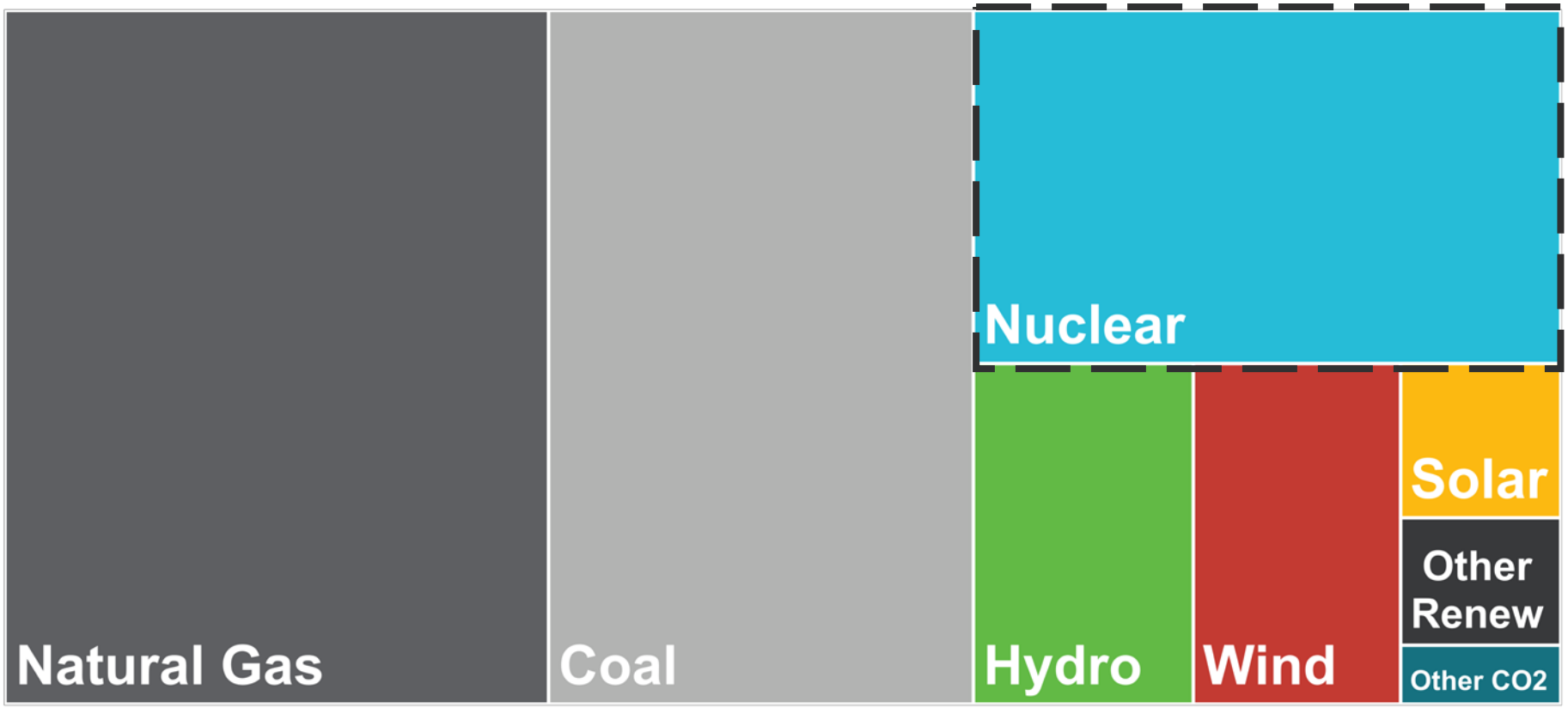
Generation in the U.S., 2018



Nuclear retirement is a major threat to our industry, the economy, and the environment

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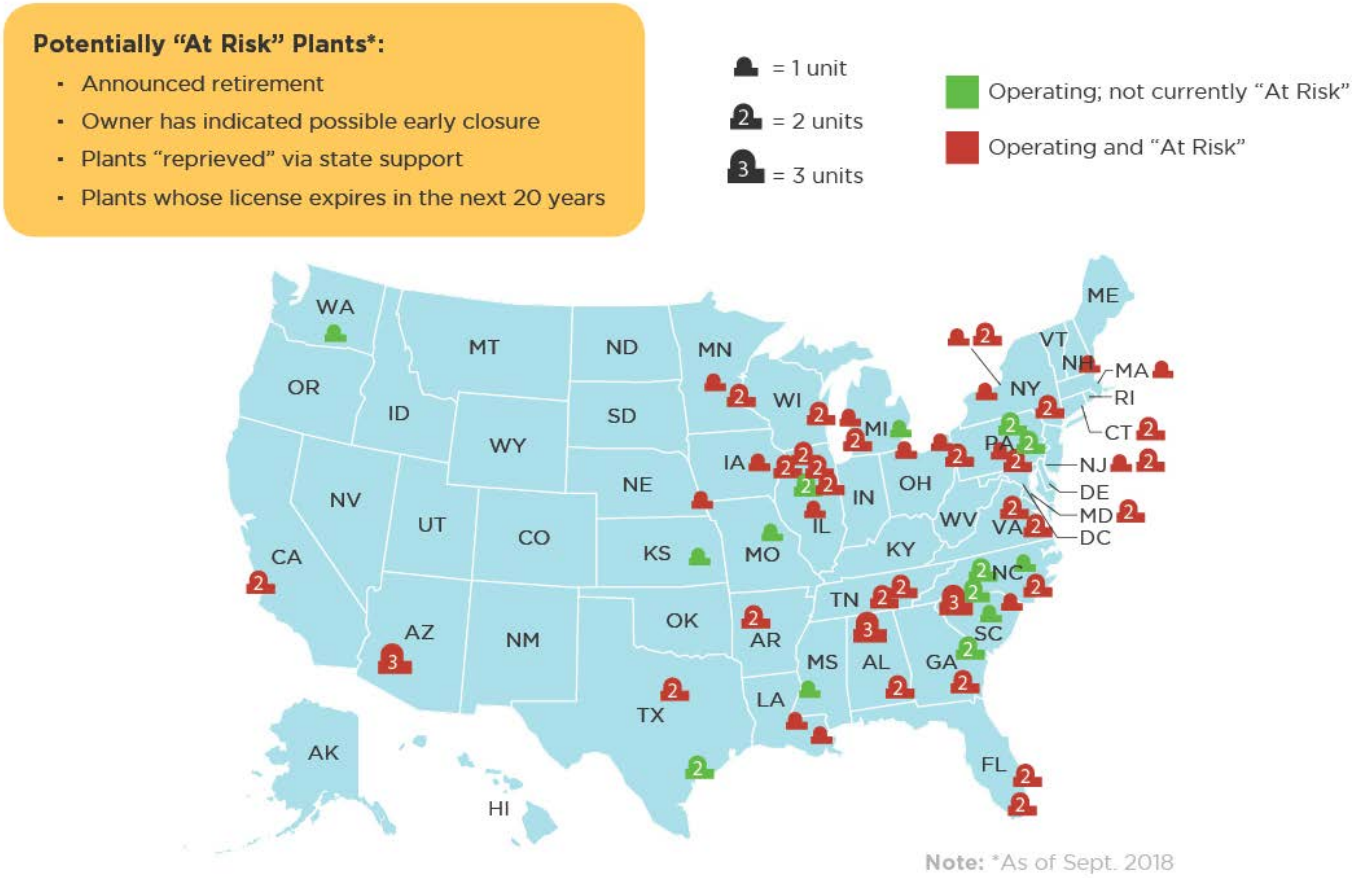
Nuclear is Facing a Tough Economic Environment

The nuclear industry is challenged by low natural gas prices and lack of support for its carbon-free generation



To even come close to meeting the Paris agreement goal, we need every source of carbon-free generation

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Three Primary Implications of Nuclear Plant Closure

The *risks of losing nuclear power*

Environment

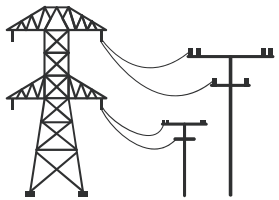
Global

- Progress toward clean energy goals
- Carbon Emissions

Economy

Local

- Jobs
- Home prices
- Property values
- Taxes



Grid Reliability

Regional

- Energy diversity
- Outage risk during natural disasters

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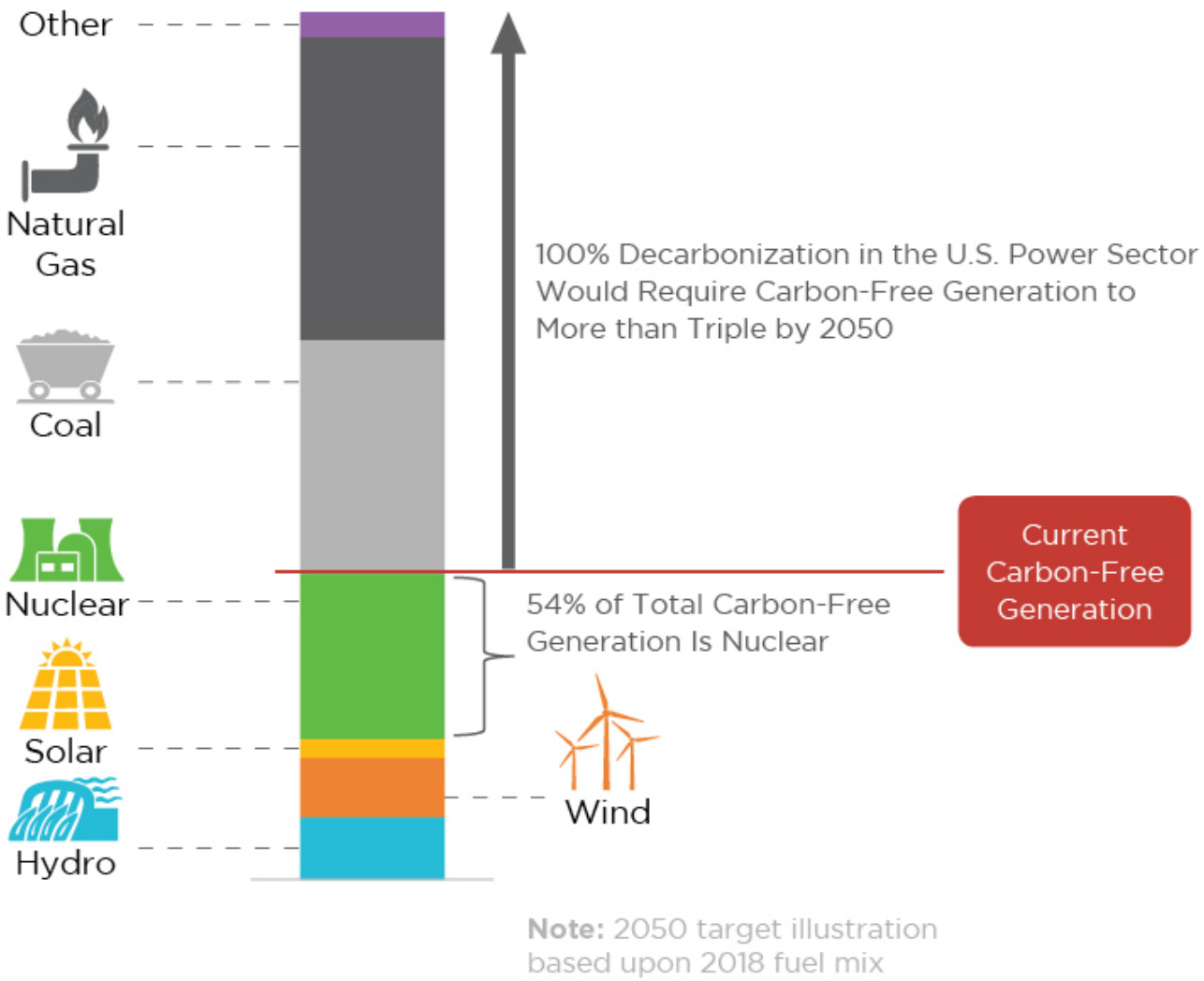
To Meaningfully Reduce Carbon Emissions…



…the U.S. cannot afford to lose any existing nuclear plant

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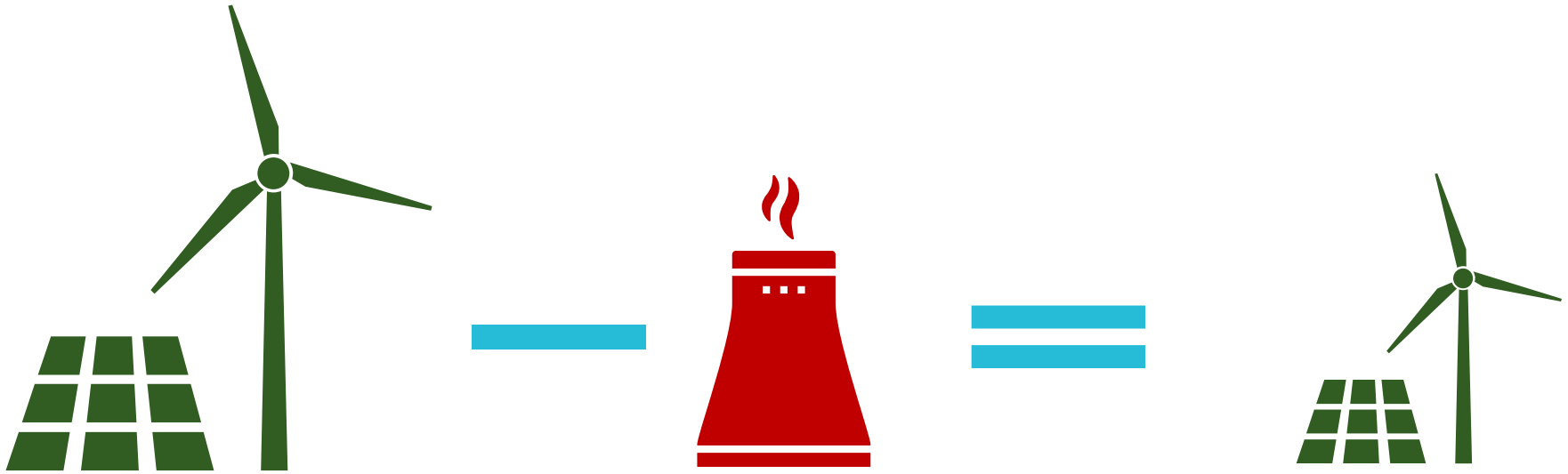
Wind and Solar Are Not the Entire Solution

In 2018:

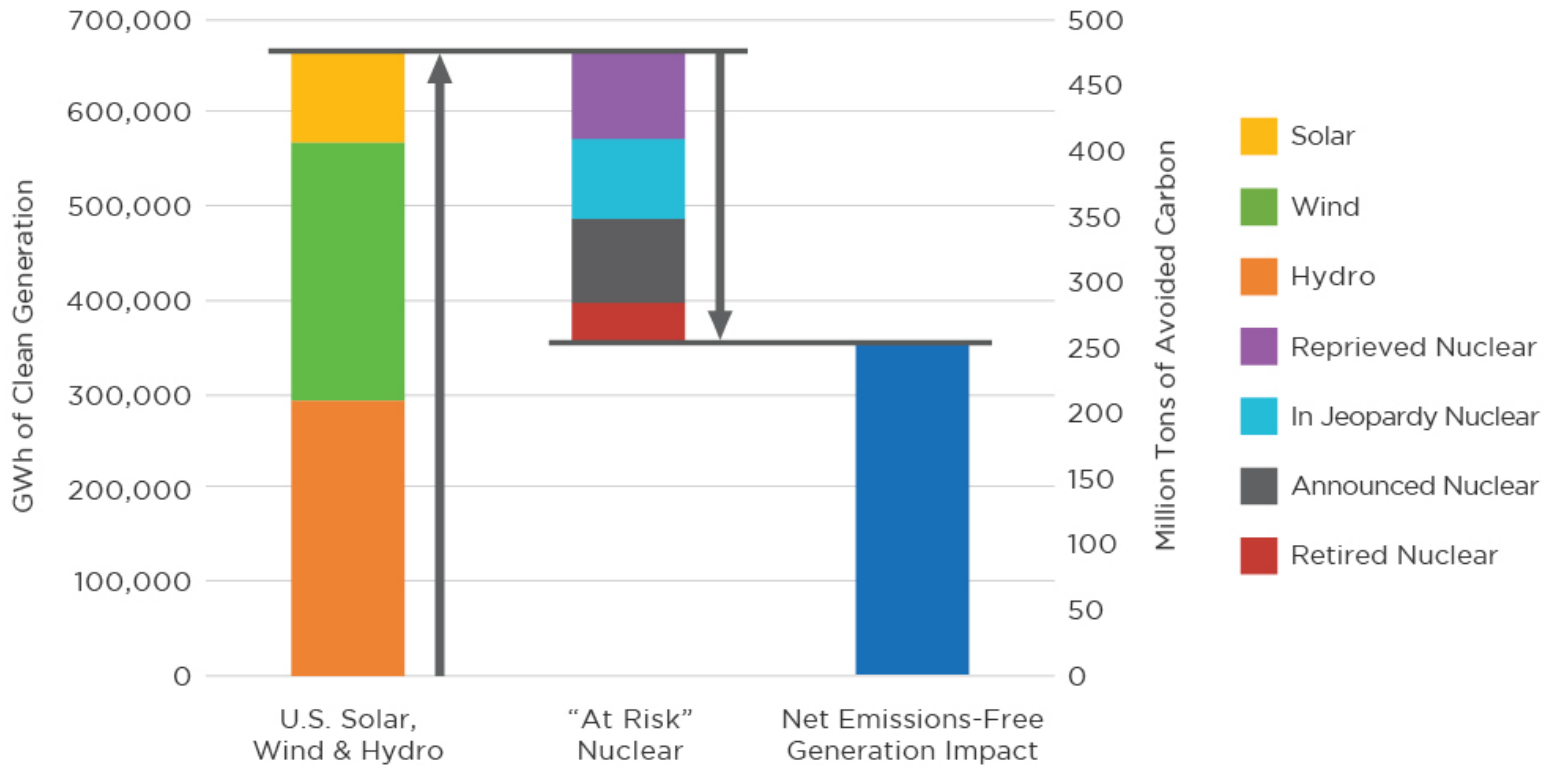


660,000 GWh — **310,000 GWh** = **350,000 GWh**

“Spinning Our Wheels”

Wind and Solar Are Not the Entire Solution

In 2018:



"Spinning Our Wheels"

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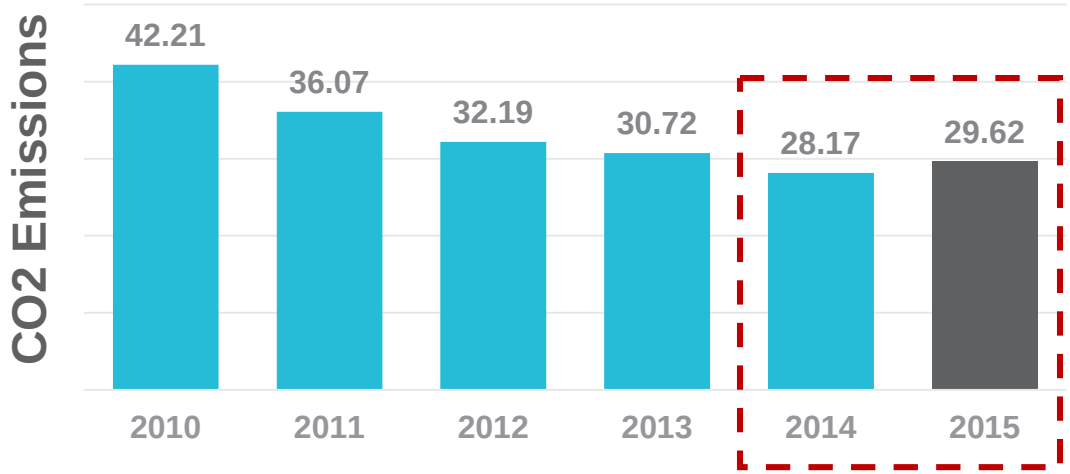
Two Case Studies

New England

- **December 2014**:
  - Vermont Yankee retired
- **December 2015**:
  - CO2 emissions increased 5%
- **May 2019**:
  - Pilgrim retired



Ohio/Pennsylvania

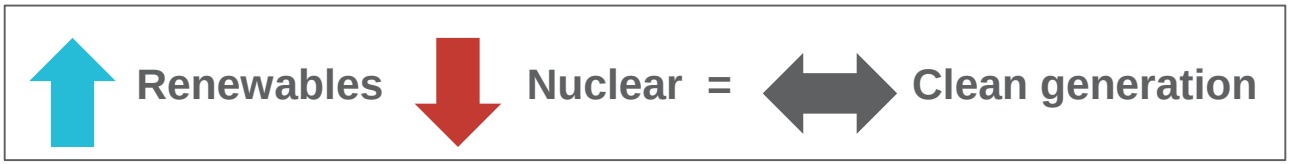
If these plants close:

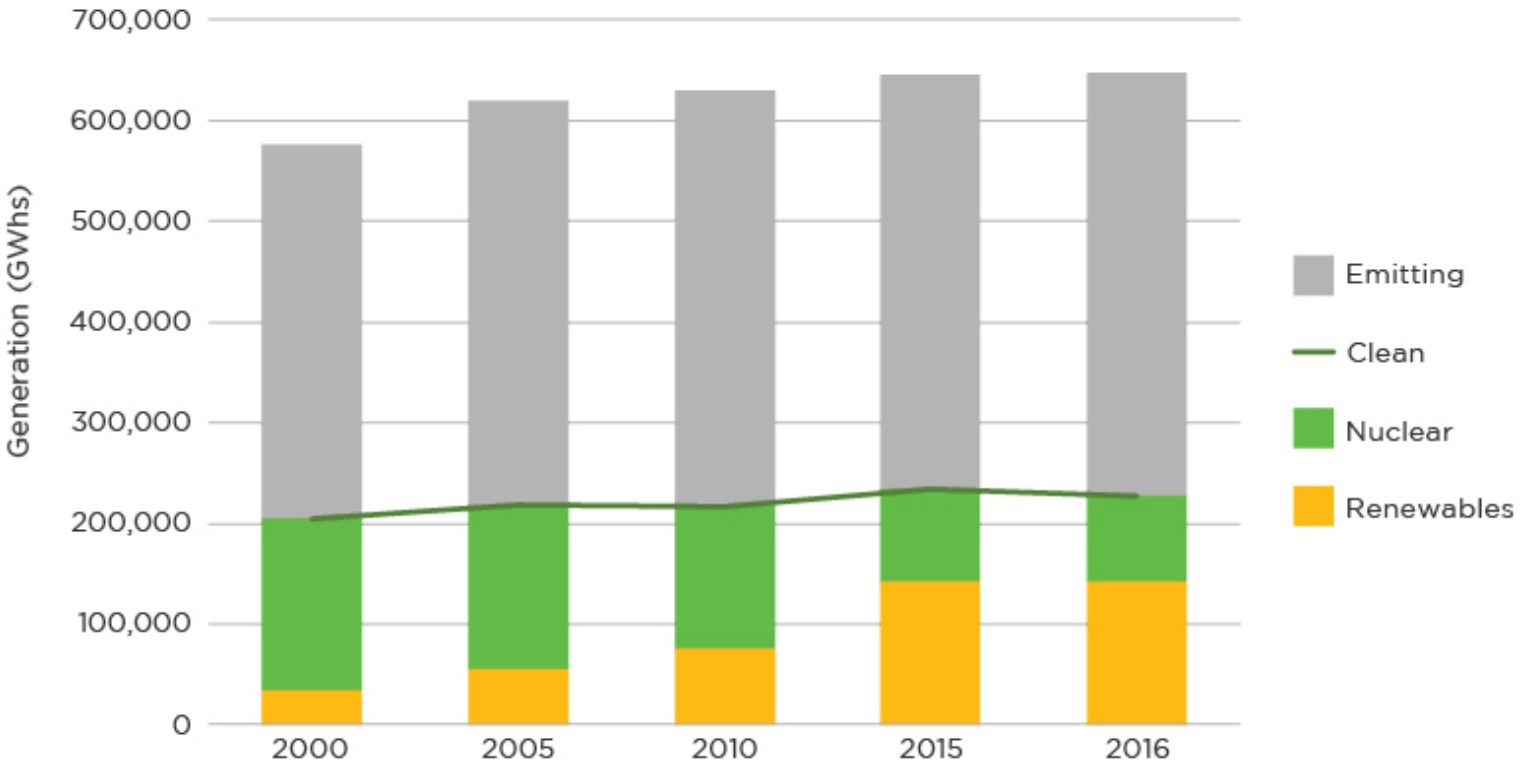
- **Perry**
- **Davis-Besse**
- **Three Mile Island**

Human health:

- **126 deaths per year**

In Germany





Germany may indicate where the U.S. is headed

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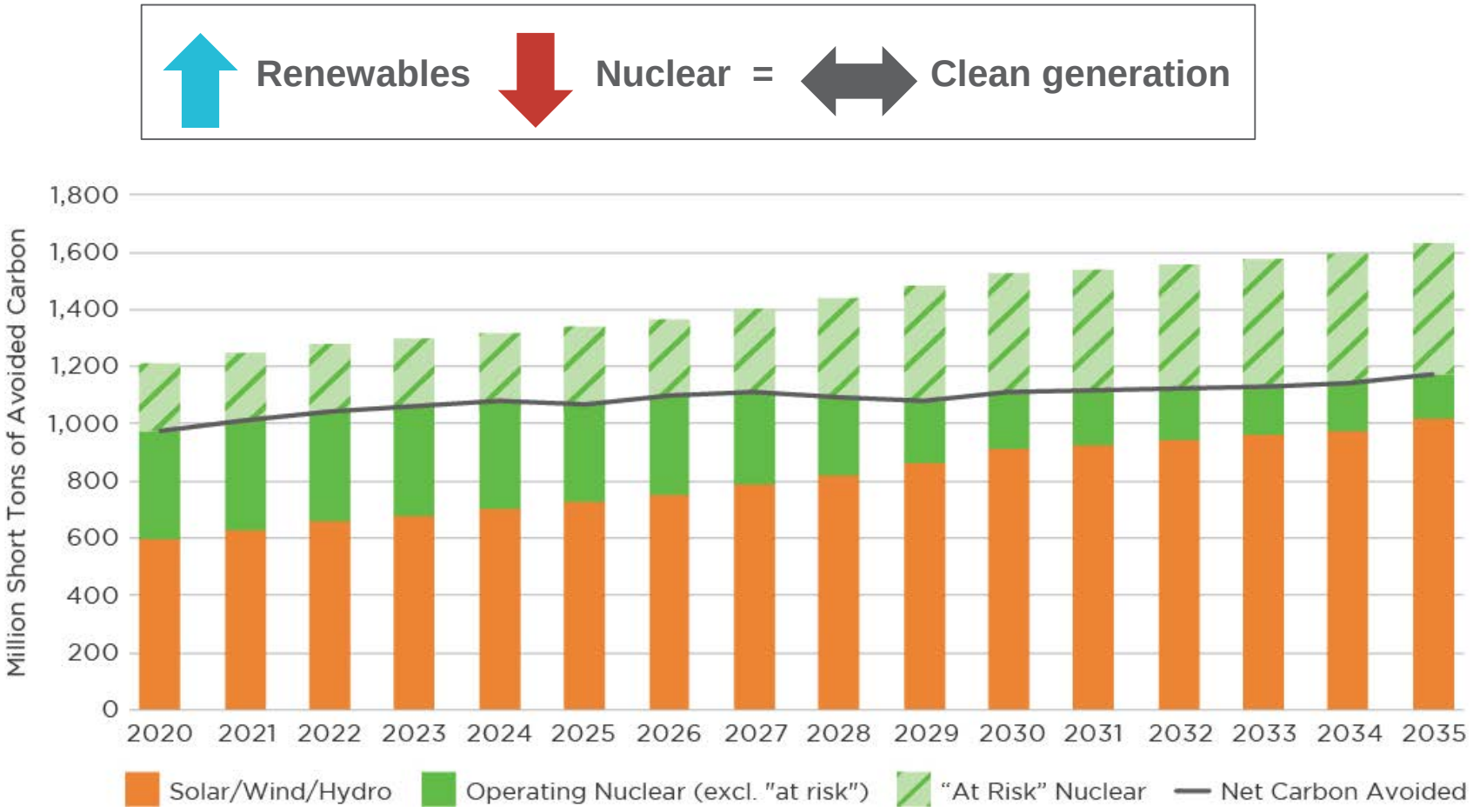
15 years from now…



…carbon-free generation is projected to grow *only 20%*

The choice is not nuclear OR renewables - it must be BOTH

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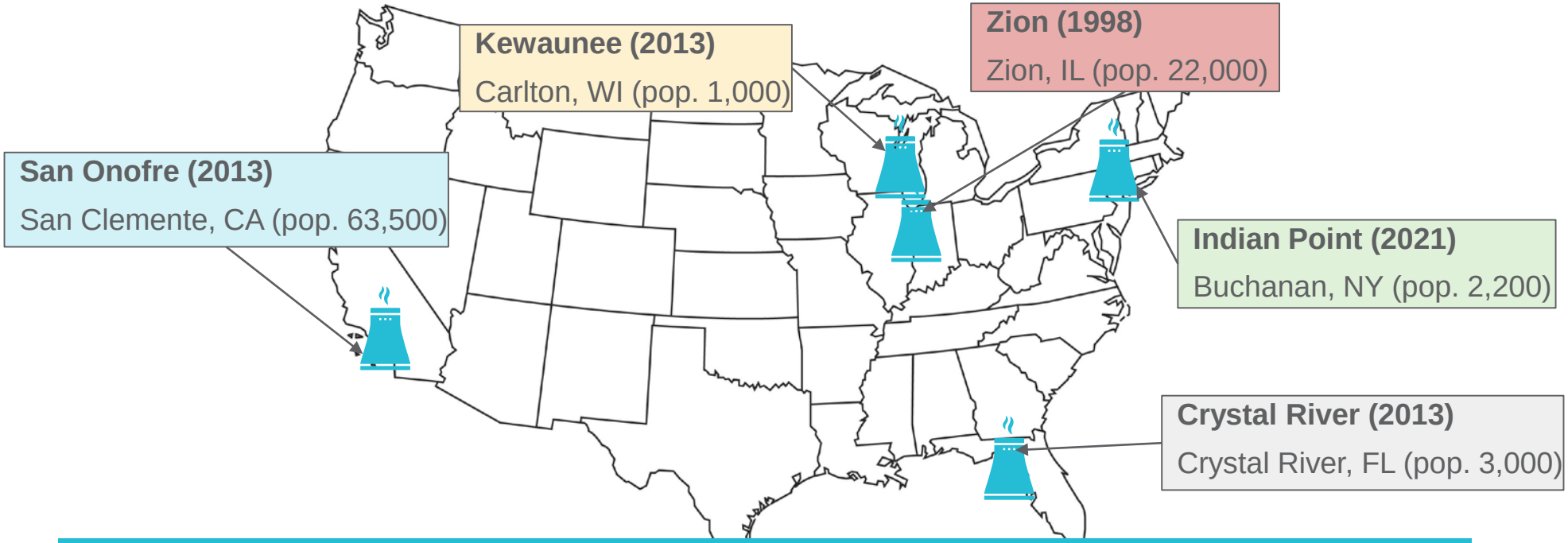
Nuclear Retirement = Loss of vital economic engine

100's of jobs	Income tax
Home values	Property tax
Budgets for schools & services	Sales tax
Community leaders	Unemployment



Examples shown are indicate a troublesome pattern…

Nuclear retirement is devastating for host communities

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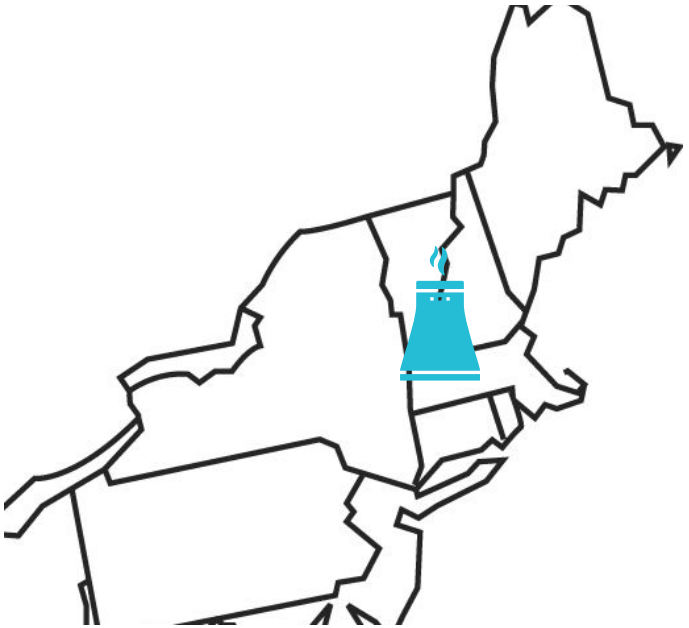
Case Study: Vermont Yankee

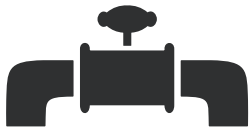
- Vernon, VT (pop. 2,200)
- Retired in 2014



- 620 jobs
- 50% of town budget
- Real estate market

- Negative effect on public institutions

The Grid Cannot Depend on Natural Gas Alone

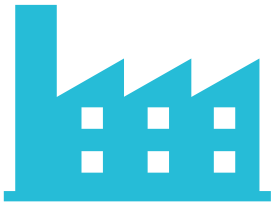


3 considerations unique to natural gas

Natural gas generation relies on real-time delivery

Demand from other sectors affects supply of gas available to the power sector

- **E.g., residential heating**



Demand for natural gas is expected to grow in other sectors

- **E.g., manufacturing**

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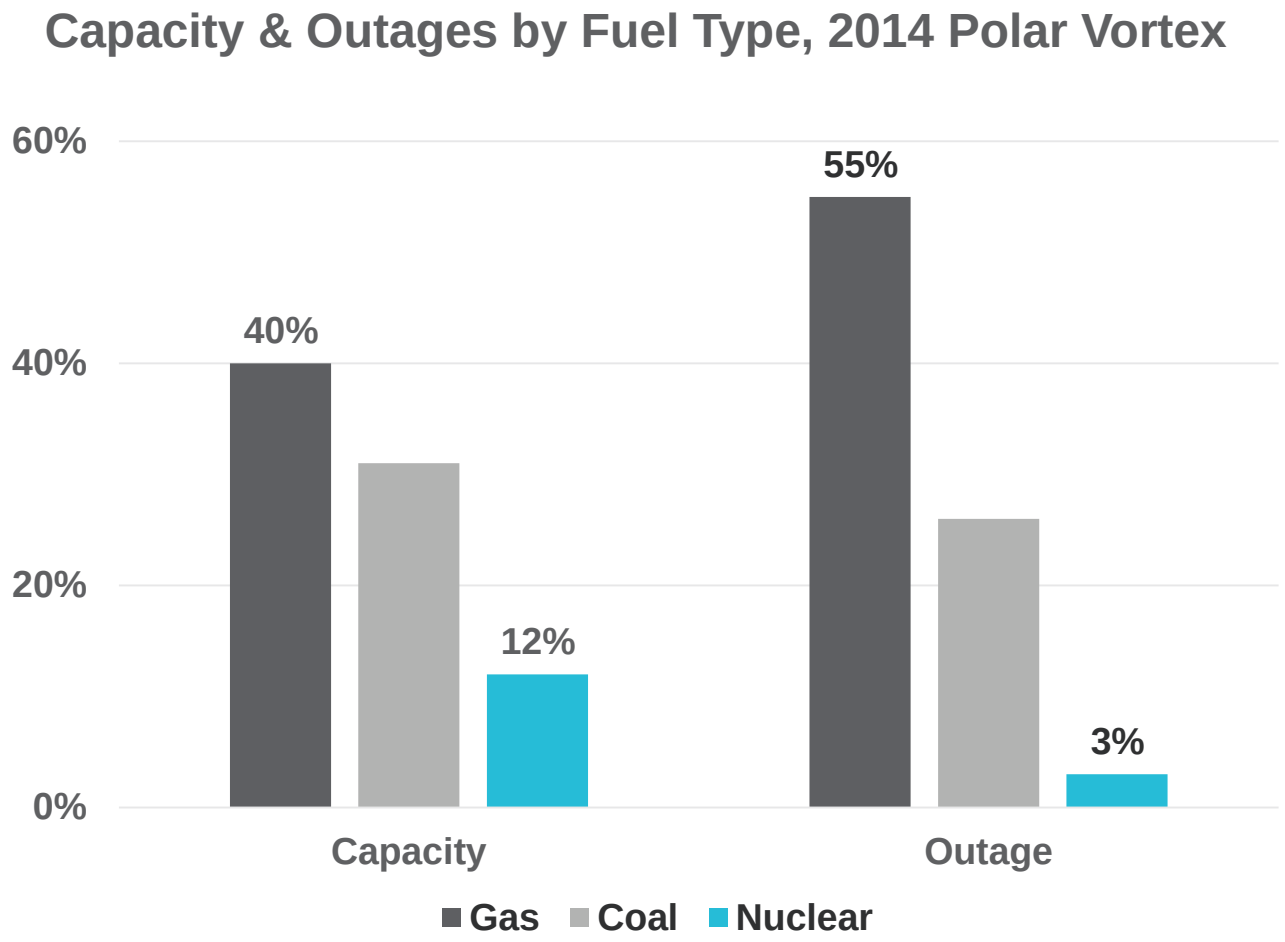
Less Diverse Generation Mix Harms the Grid



The US needs nuclear for grid reliability and baseload generation

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Natural Gas vs Nuclear

Elements to Consider	Natural Gas	Nuclear
Flexibility	✓	
Capacity Factor		✓
Carbon Emissions		✓
Resiliency		✓
Production Costs	✓	

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What can NAYGN do?

1. **External**
   - Partner and network
   - Educate
2. **Internal**
   - Challenge the status quo
   - Innovate

Implications for:

- **Environment**
- **Economy**
- **Grid**

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