Economics of the Operating Nuclear Fleet

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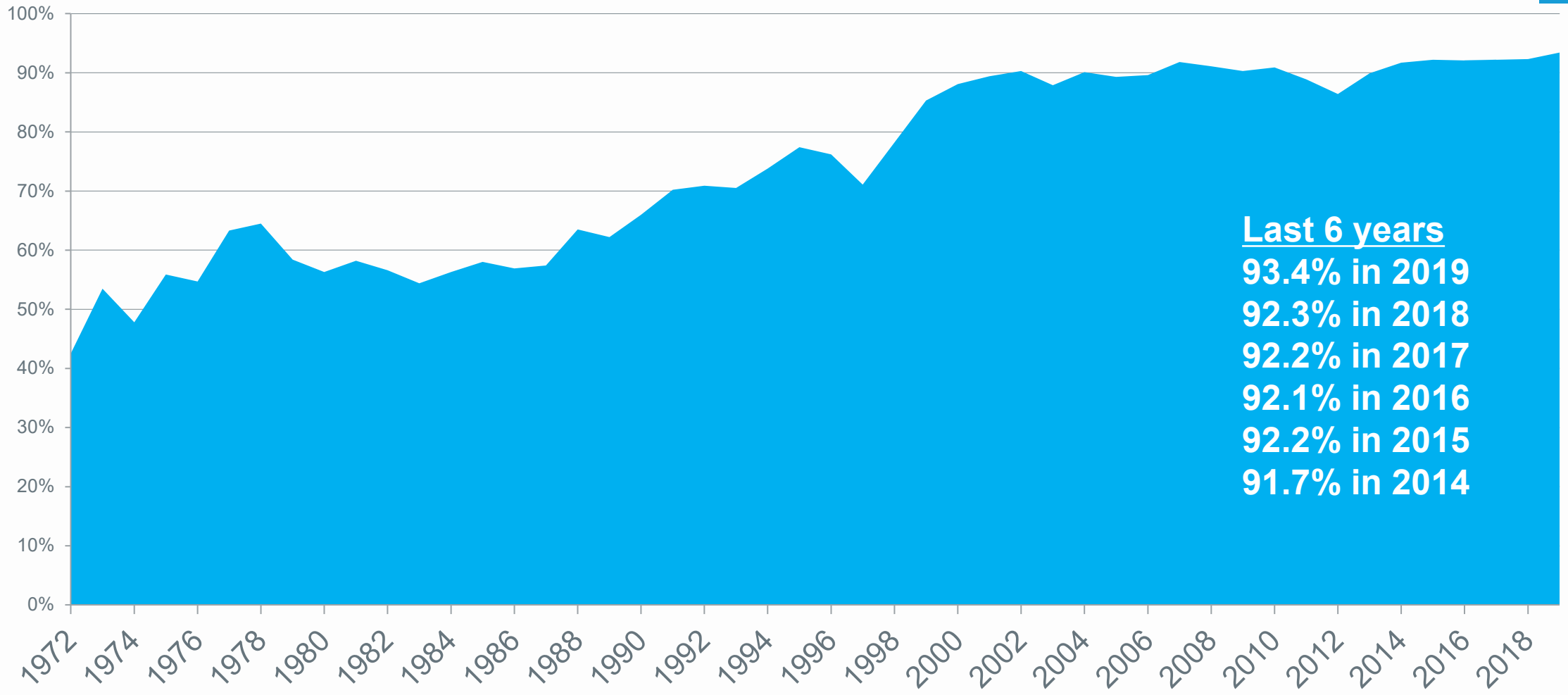
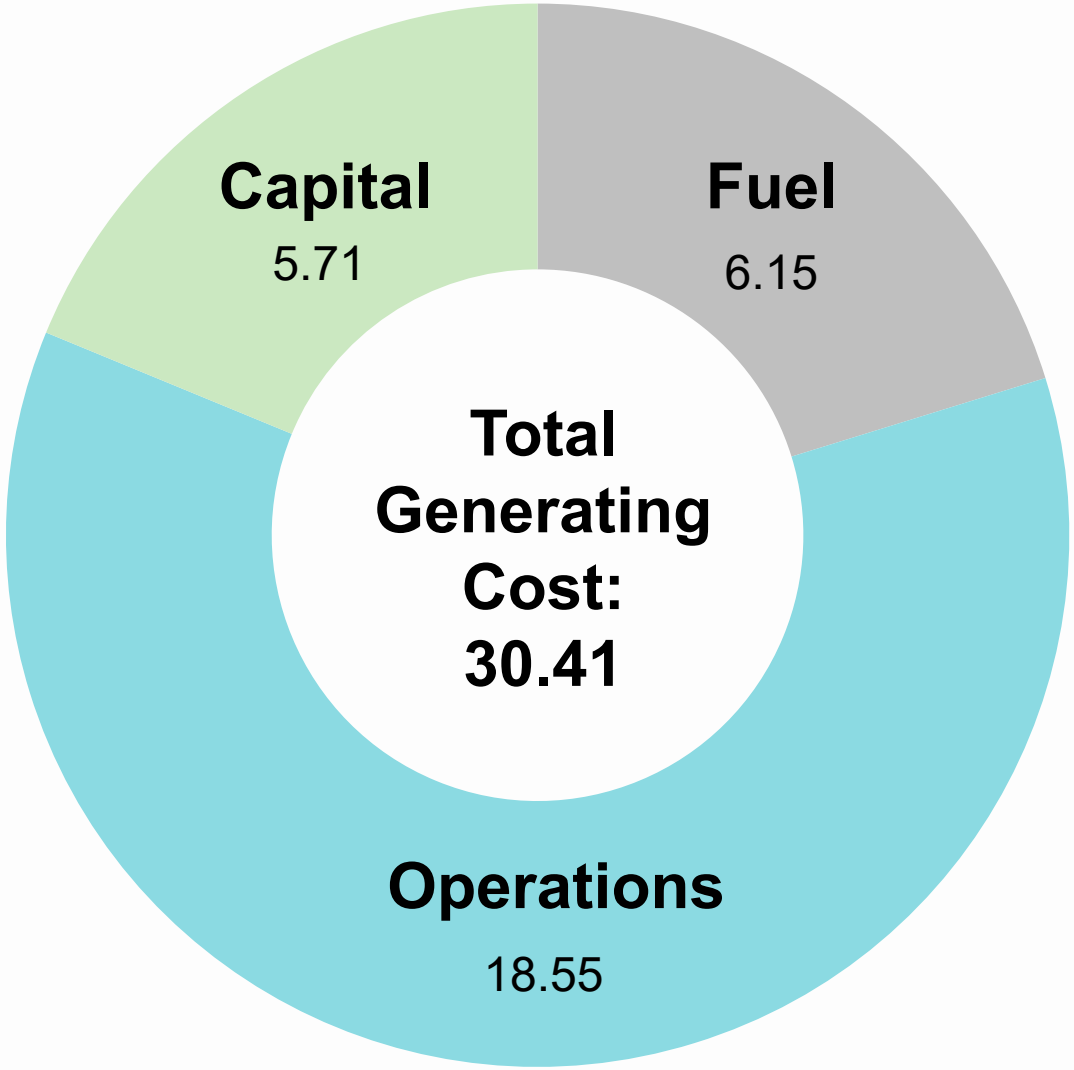
NUCLEAR ENERGY INSTITUTE

Highest capacity factor ever achieved in 2019



NEI's capacity factor calculation (93.4%) accurately accounts for Three Mile Island I and Pilgrim generation in 2019. U.S. Energy Information Administration reports 93.5% as nuclear energy's capacity factor.
Source: U.S. Energy Information Administration
Updated: March 2020

2019 total generating costs decreased nearly $2.50/MWh

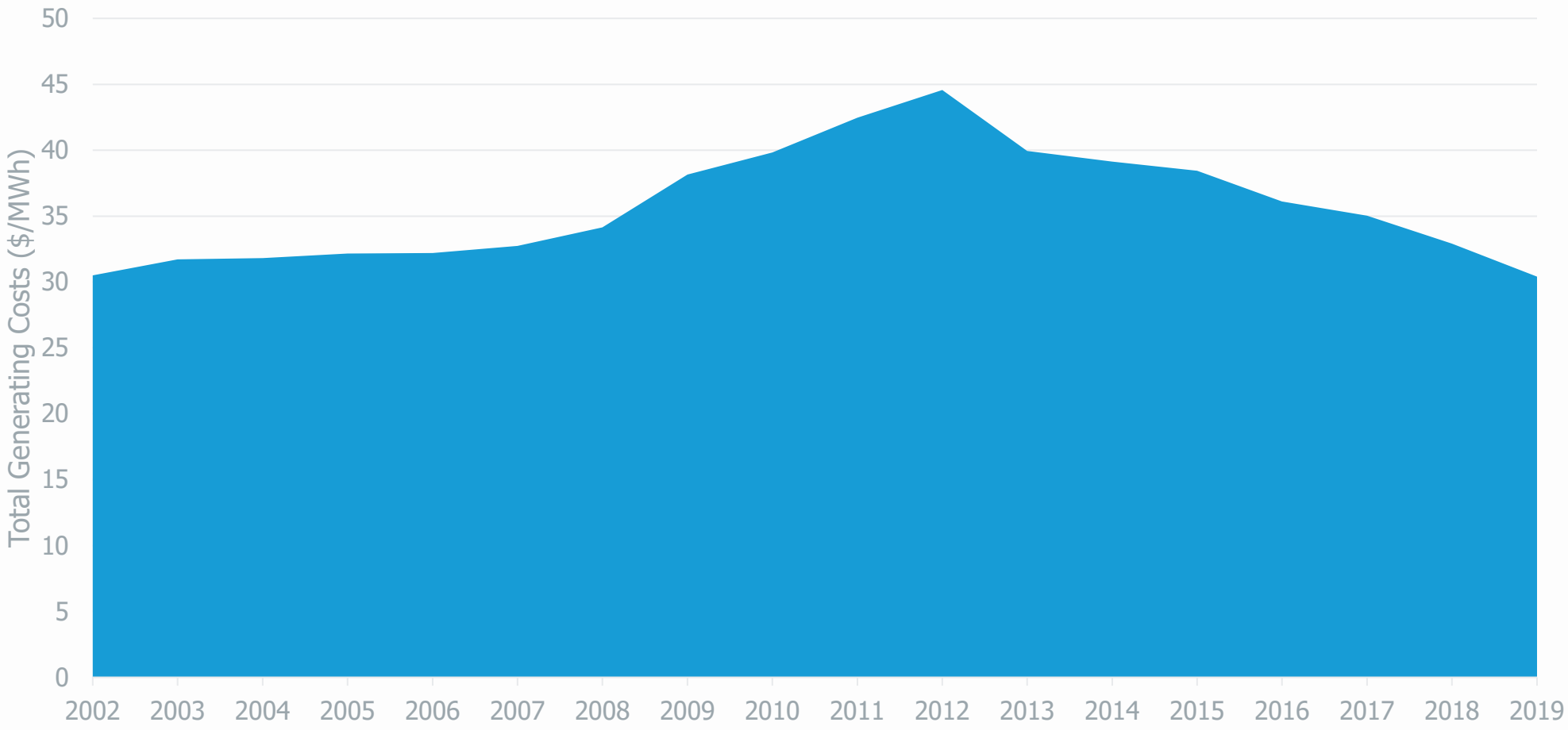


2019 costs compared to 2018:

- Total generating costs decreased by **$2.49/MWh (7.6% reduction)**
- Operations costs decreased by **$1.57/MWh (7.8% reduction)**
- Capital costs decreased by **$0.61/MWh (9.6% reduction)**
- Fuel costs decreased by **$0.32/MWh (4.9% reduction)**

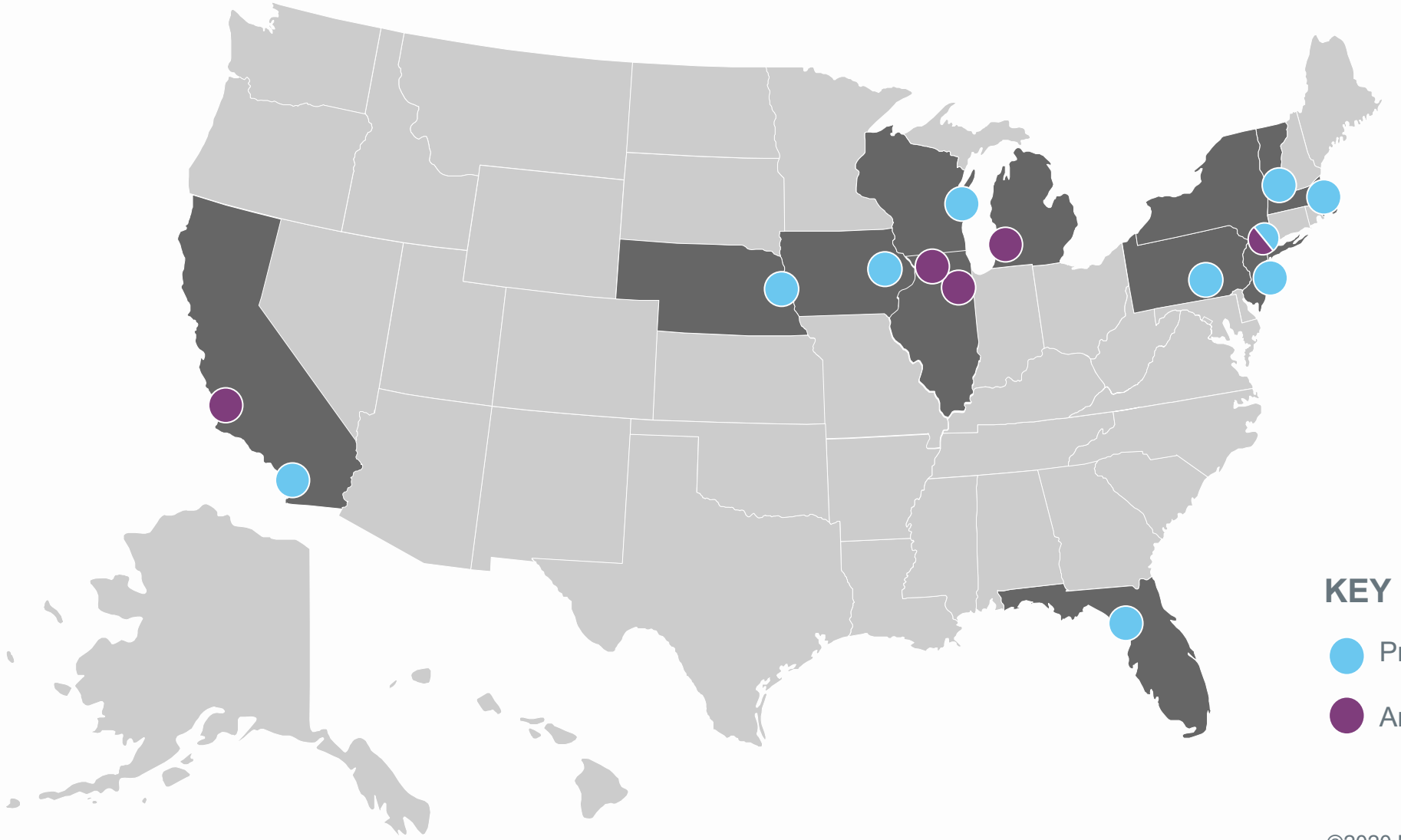
Source: Electric Utility Cost Group
Updated: July 2020

Total generating costs decreased nearly 32% since 2012



Source: Electric Cost Utility Group
Updated: July 2020

Premature Closures and Announced Shutdowns

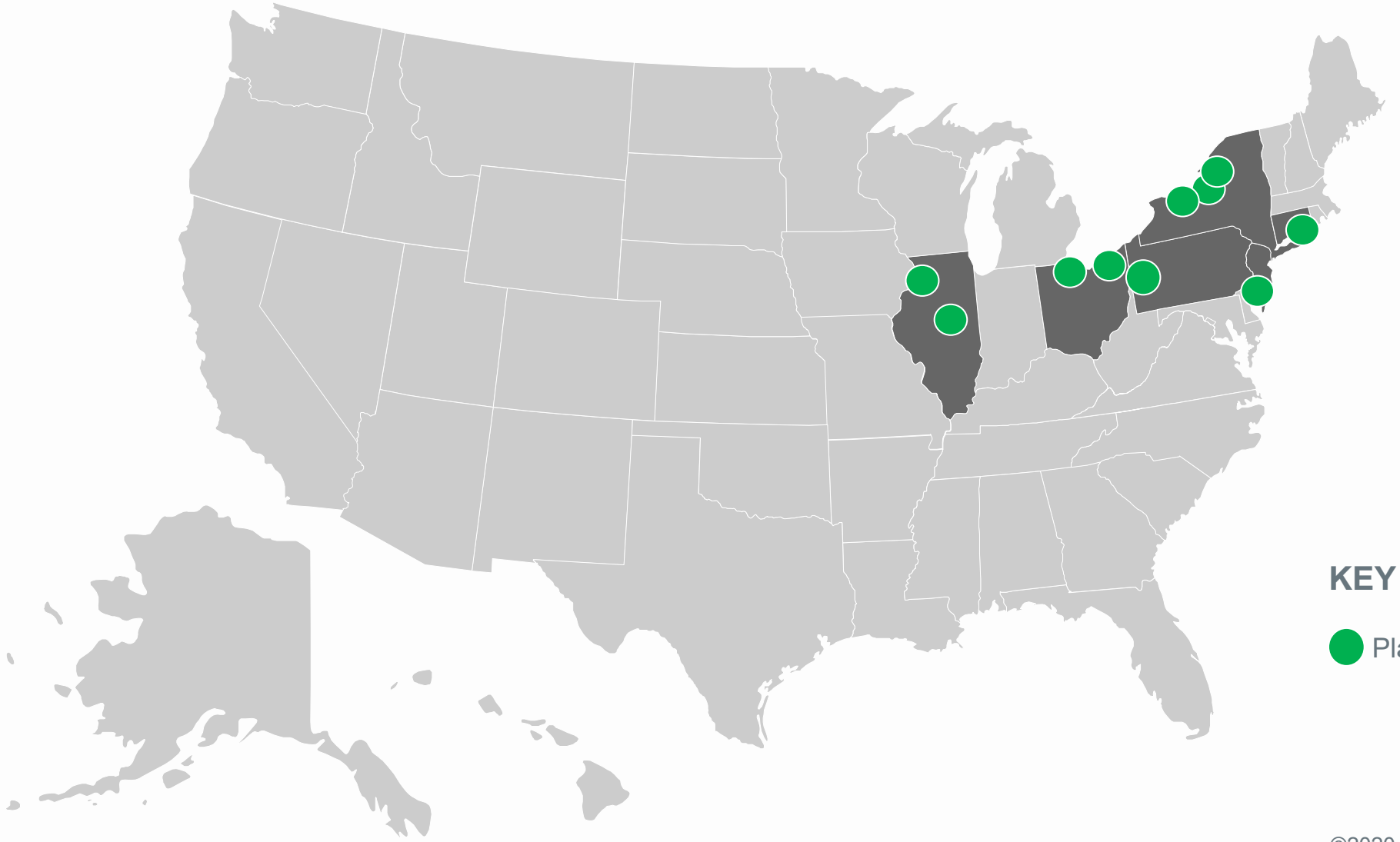


KEY

- Premature Closures
- Announced Shutdowns

Updated: August 2020

State Policies Preserving Nuclear Plants

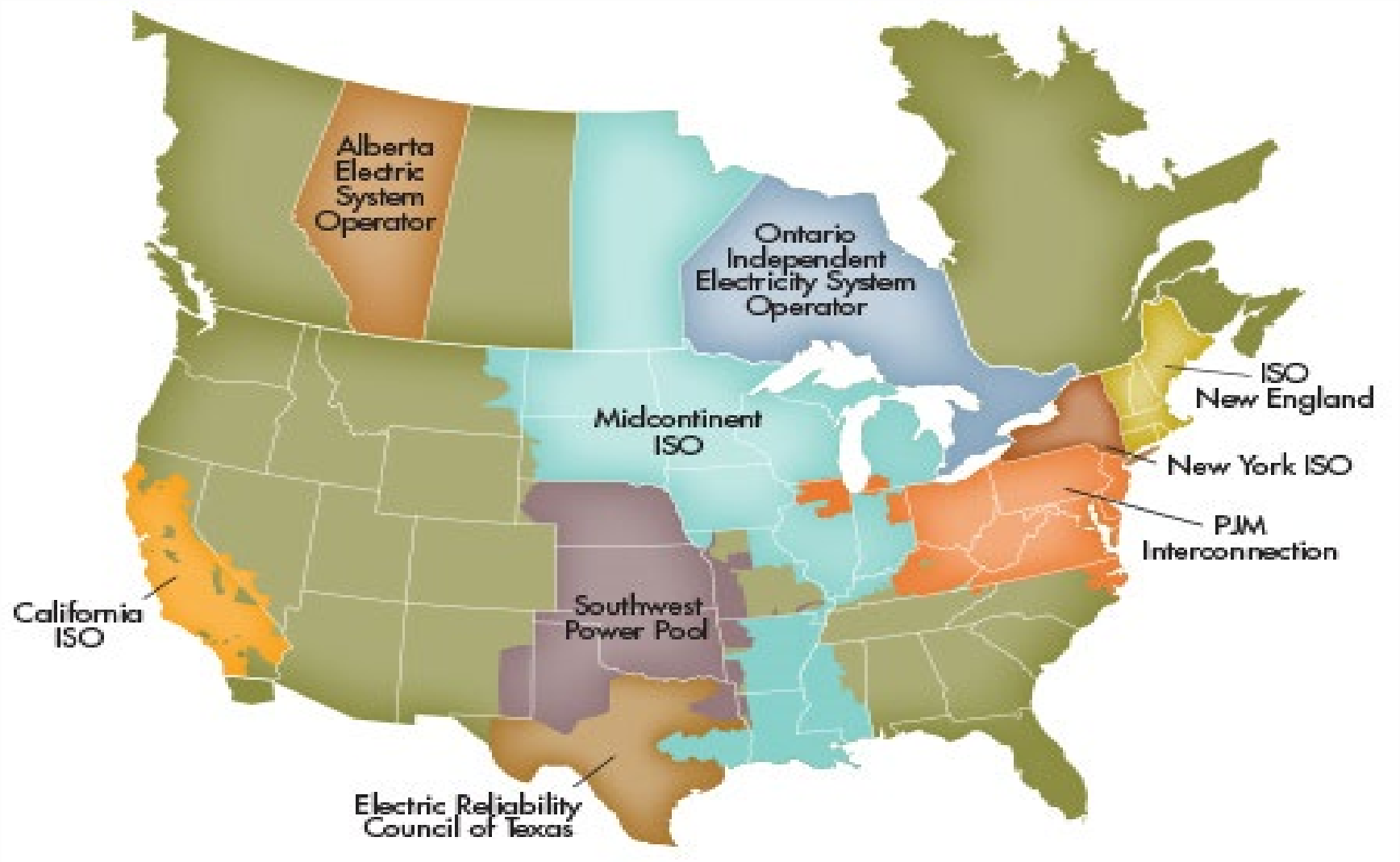


KEY

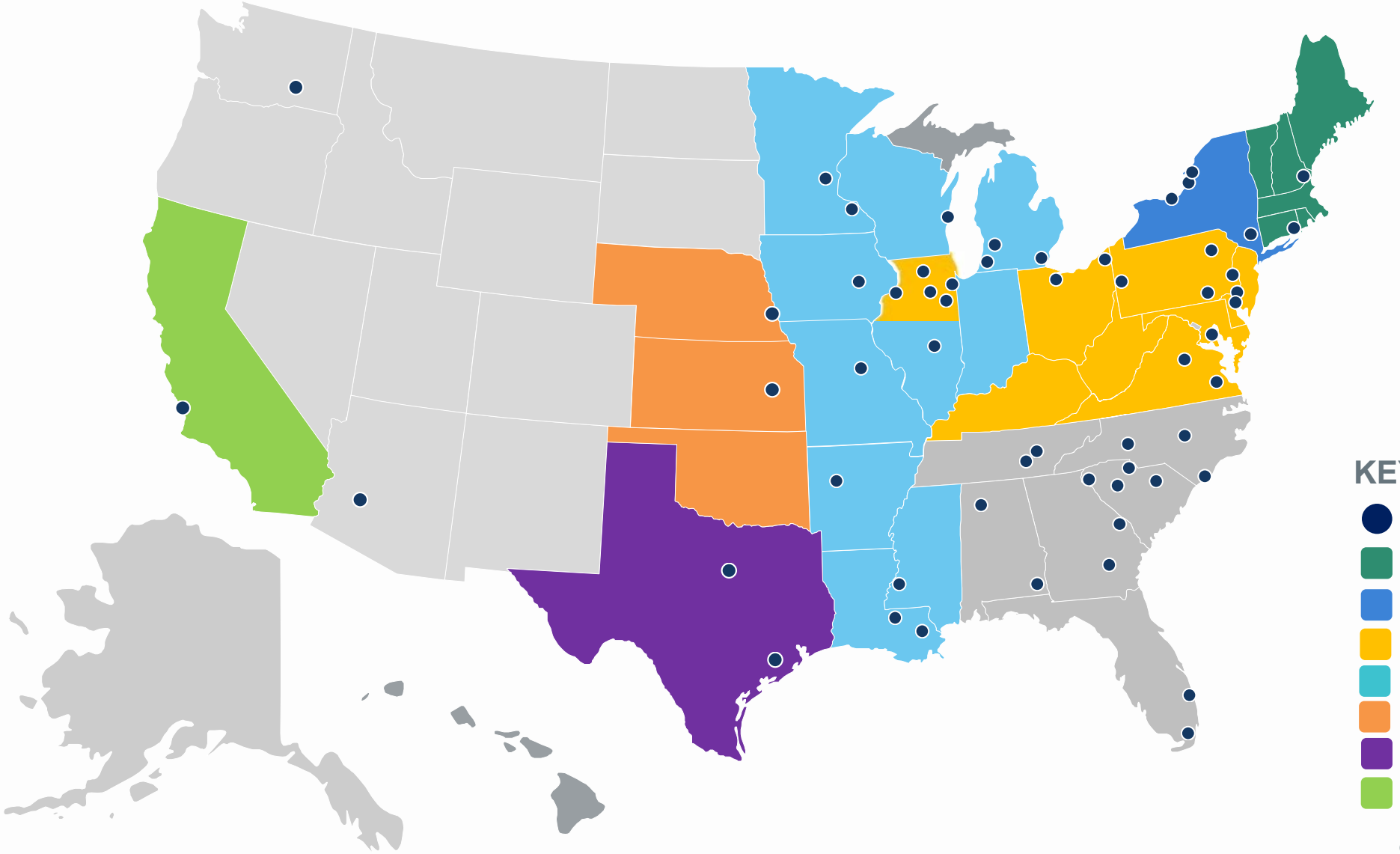
Plants Saved by State Action

Updated: August 2020

Regional Electricity Markets



Nuclear Reactors Map



Two-thirds of reactors in some form of market

KEY

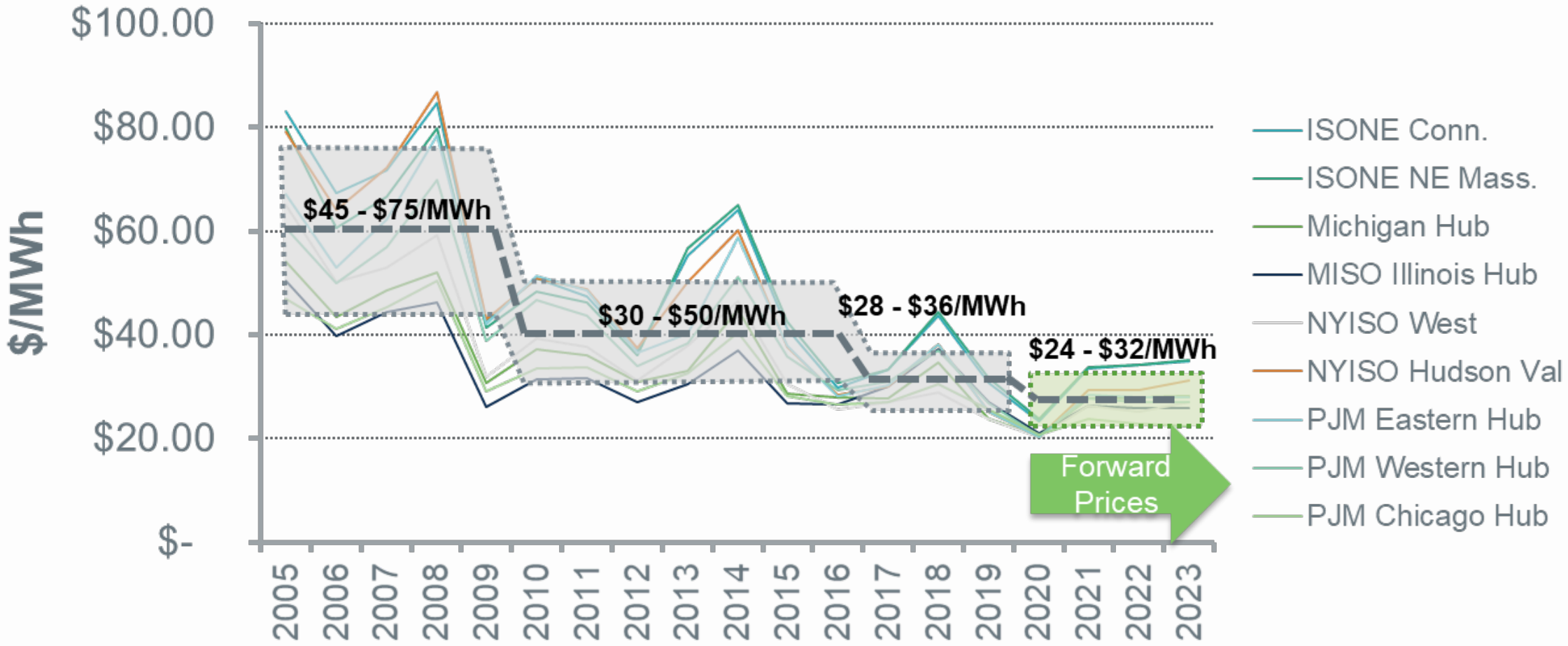
- Nuclear Reactor Locations
- ISO New England
- NYISO
- PJM
- MISO
- Southwest Power Pool
- ERCOT
- California ISO

Electricity Market Design Questions

- Energy Market
  - Which power plants should be used to meet demand?
  - How much should they be paid for their electricity?
- Capacity Market
  - Which plants should be kept in service in case we need them?
  - How much should they be paid to stay in service?

Answer: Use the less expensive ones most often.

Declining Wholesale Electricity Prices



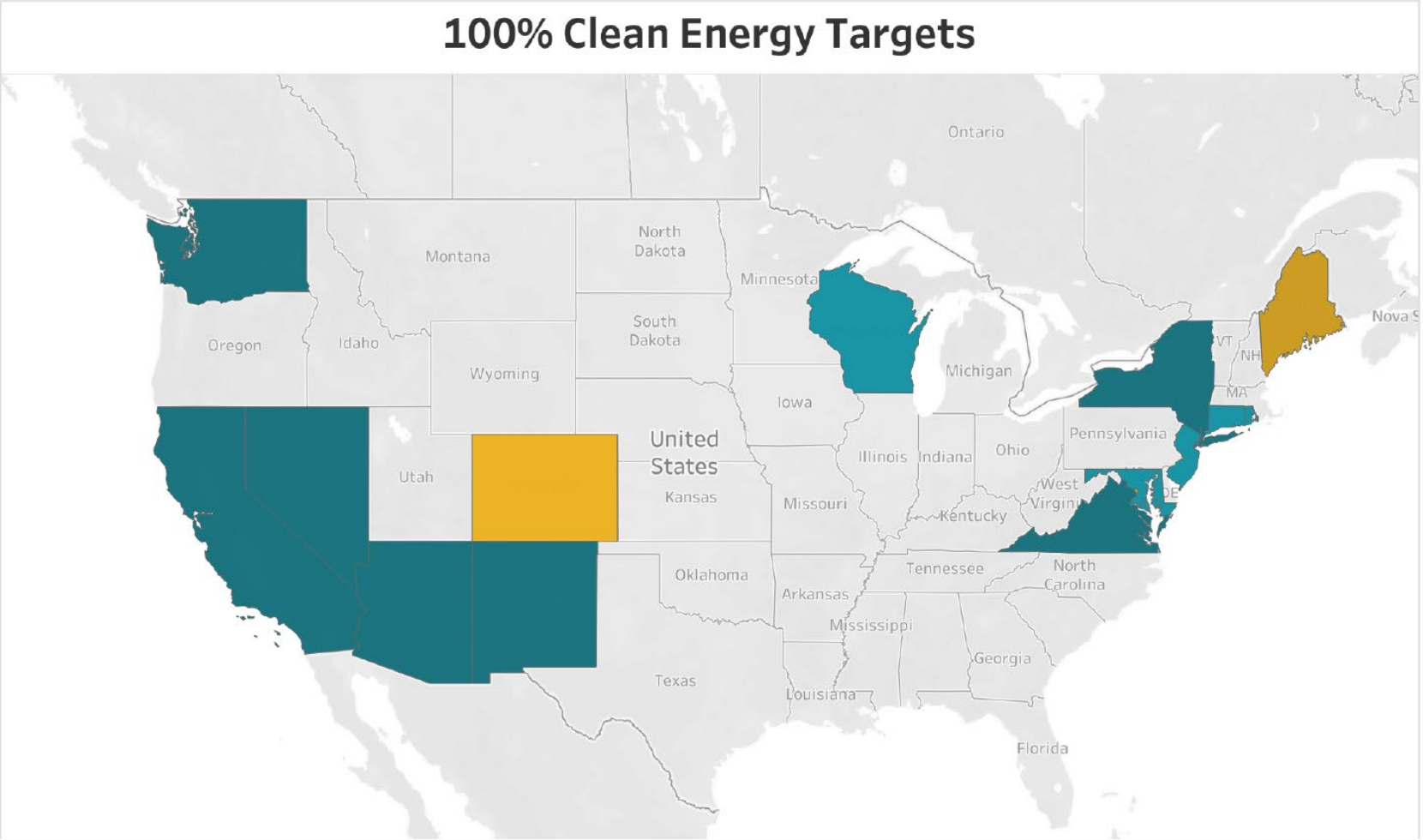
Nuclear Plants Preserved via State Action

Plant / Site	State	Summer Capacity (MWe)	Initially Announced Closure Year	Electricity Generated (billion kWh in 2019)	CO_2 Emissions Avoided (Million metric tons per in 2019)
Beaver Valley 1 & 2	Pennsylvania	1,808	2021	15.5	9.9
Clinton	Illinois	1,065	2017	8.4	8.4
Davis-Besse	Ohio	894	2020	7.8	5.0
Fitzpatrick	New York	848	2017	7.4	3.5
Ginna	New York	582	2017	5.0	2.4
Hope Creek & Salem 1 & 2	New Jersey	3,500	~2020-2021	26.6	17.0
Millstone 2 & 3	Connecticut	2,073	~2020	16.7	7.6
Nine Mile Point 1 & 2	New York	1,917	2017-2018	15.8	7.5
Perry	Ohio	1,240	2020	9.2	5.9
Quad Cities 1 & 2	Illinois	1,819	2018	15.5	9.9
TOTAL		**15,746**		**127.9**	**76.9**

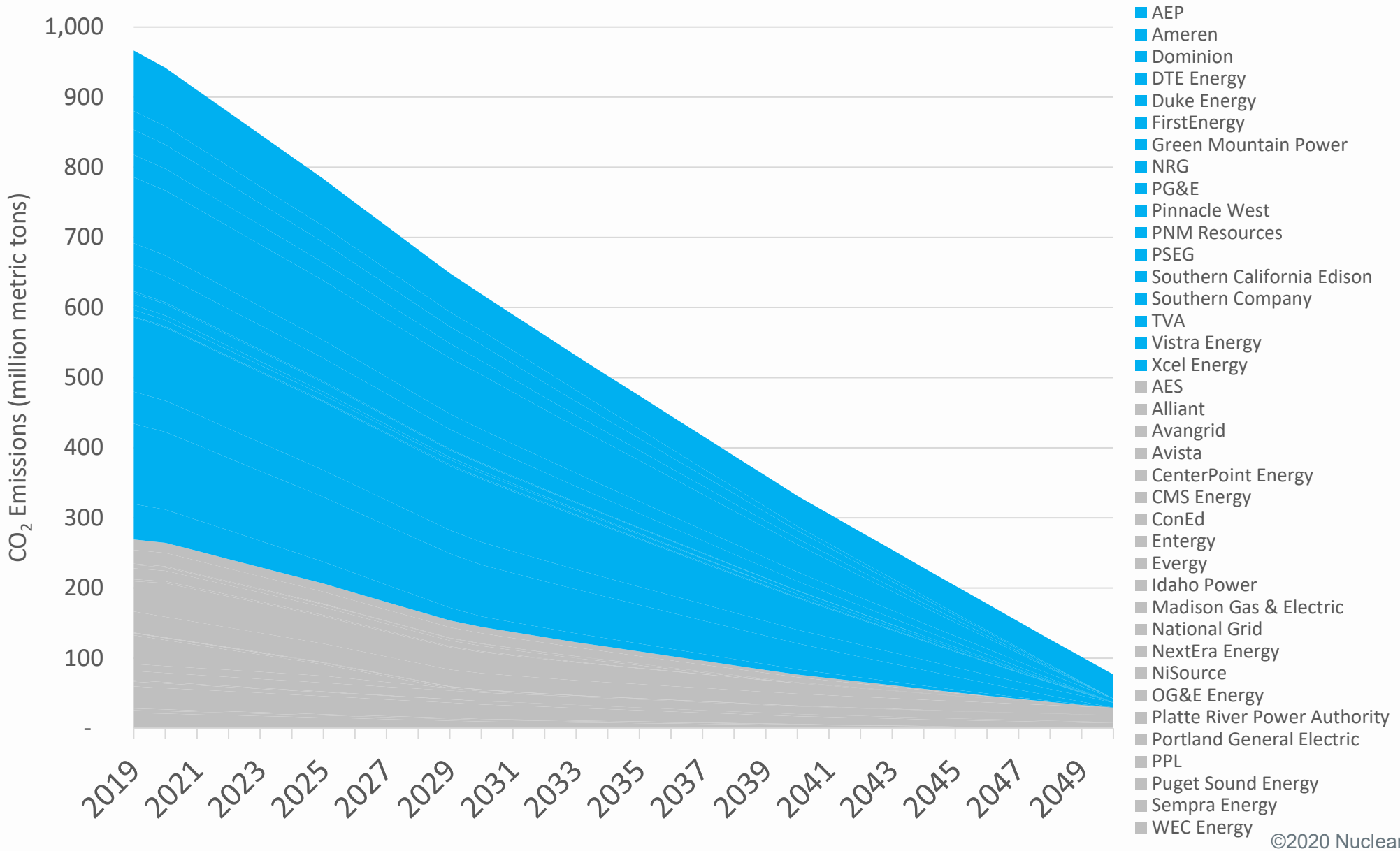
Source: Emissions avoided are calculated using regional and national fossil fuel emissions rates from the **U.S. Environmental Protection Agency** and latest plant generation data from the **U.S. Energy Information Administration**.
Updated: August 2020

State Clean Energy Policies

THIRD WAY



Utility carbon emission projections based on pledges



Source: ABB Velocity Suite, U.S. Environmental Protection Agency, utility news releases.

Key Takeaways

- U.S. nuclear fleet operating at high level and reducing costs
- Depressed market revenues challenging the continuing operation of many plants
- Policies to value carbon-free generation can change prospects for nuclear plants