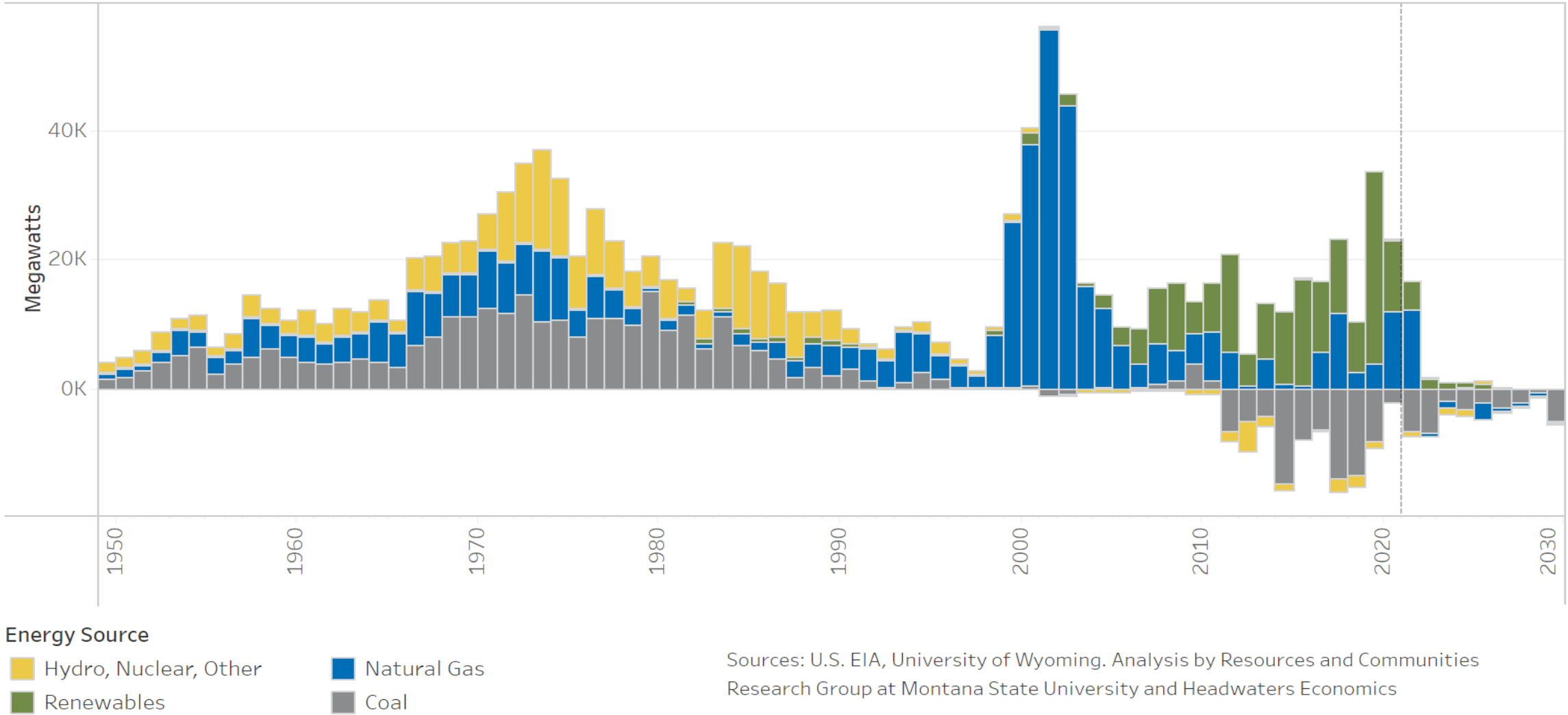
US on track to 100% clean electricity by 2035, starting with coal phase out

Bruce Nilles

Executive Director

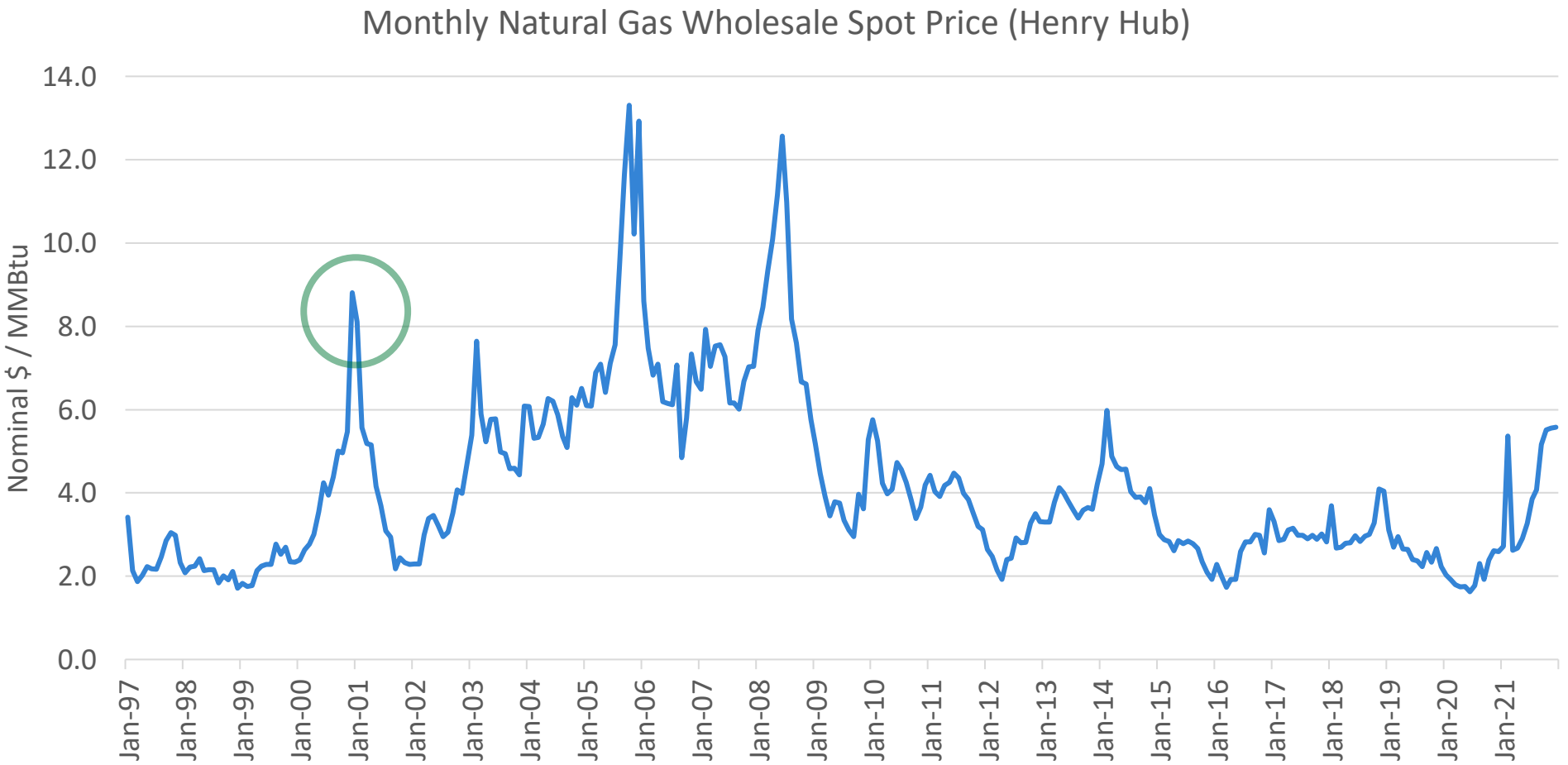
climate:imperative

Additions and closures of electricity generating power plants 1950-Present in the United States

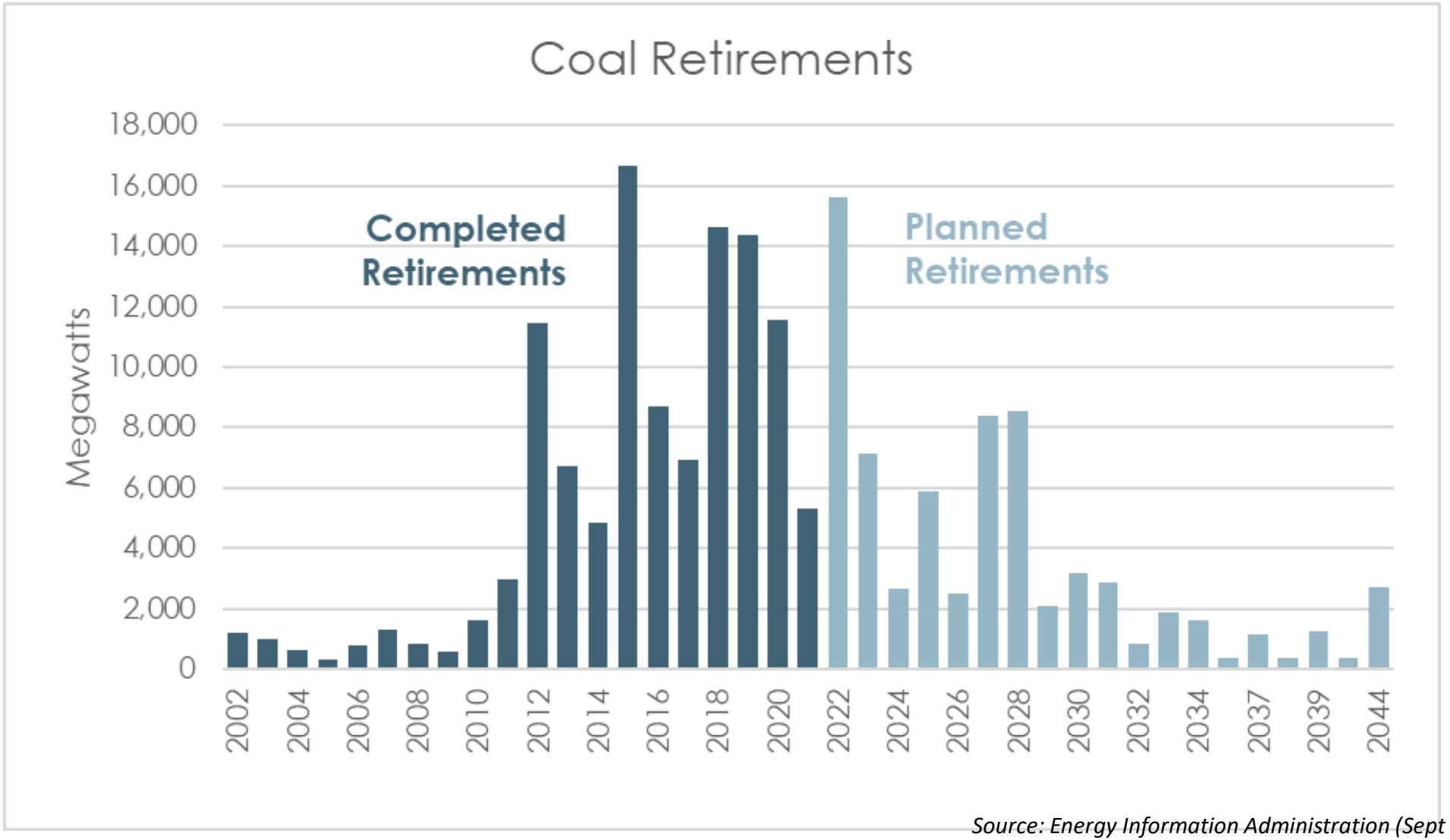


Sources: U.S. EIA, University of Wyoming. Analysis by Resources and Communities Research Group at Montana State University and Headwaters Economics

Wholesale natural gas prices 1997 – 2021. Natural gas plant construction slowed as price remained volatile



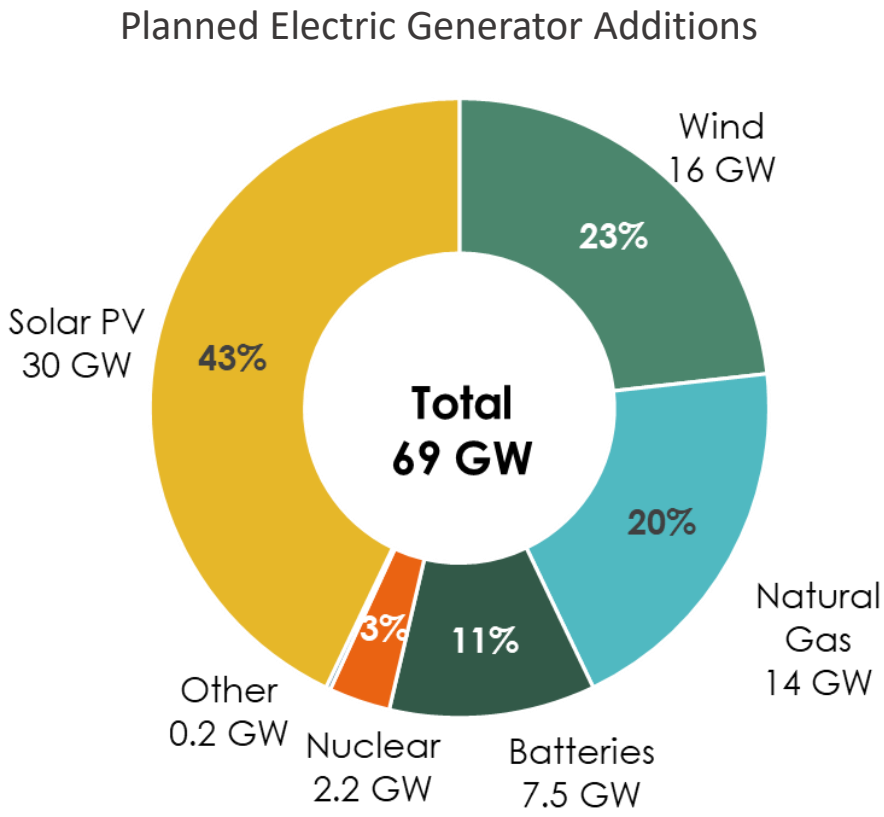
Coal retirements have accelerated and will continue



Source: Energy Information Administration (Sept 2021)

Today, renewable electricity is 77% of planned capacity additions and has been growing steadily for a decade

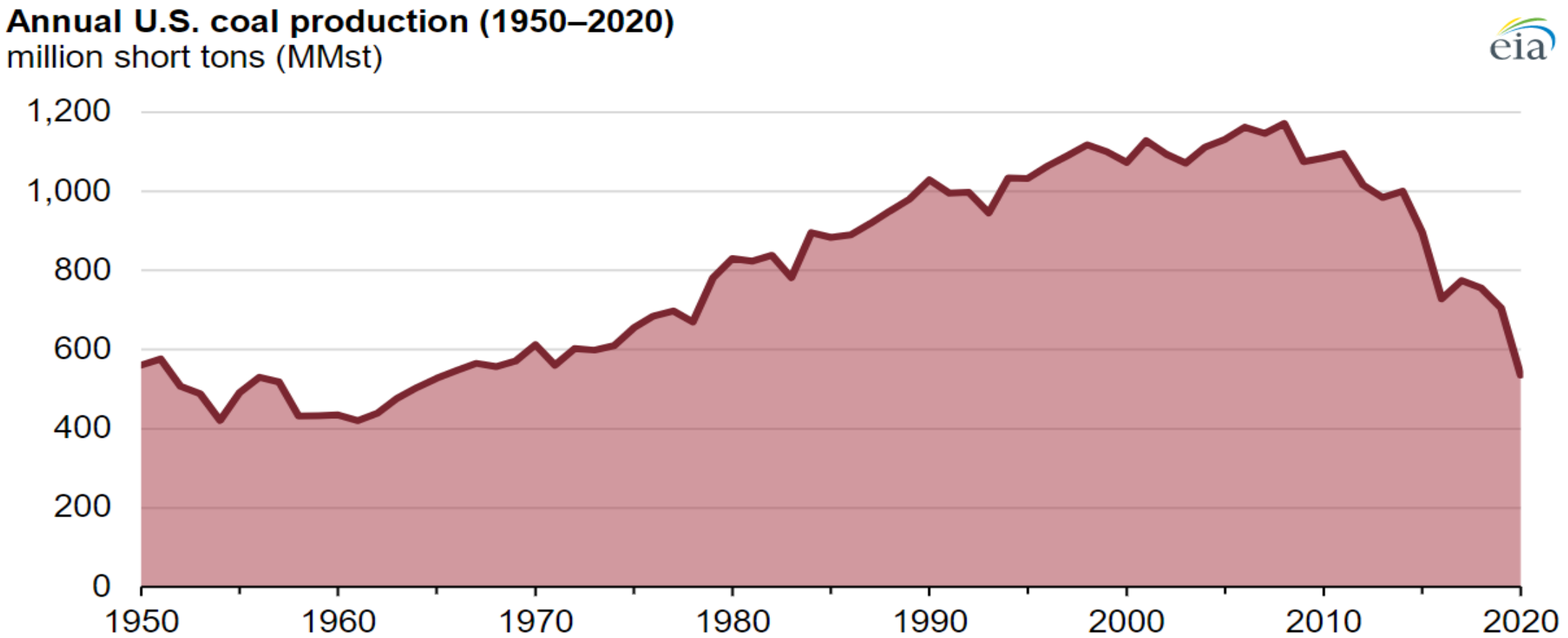
- Solar and wind installations dominate new planned capacity
- Utility-scale storage has steadily grown and represents 11% of planned capacity



Anticipated start in 2021 or 2022

Source: Energy Information Administration (Sept 2021)

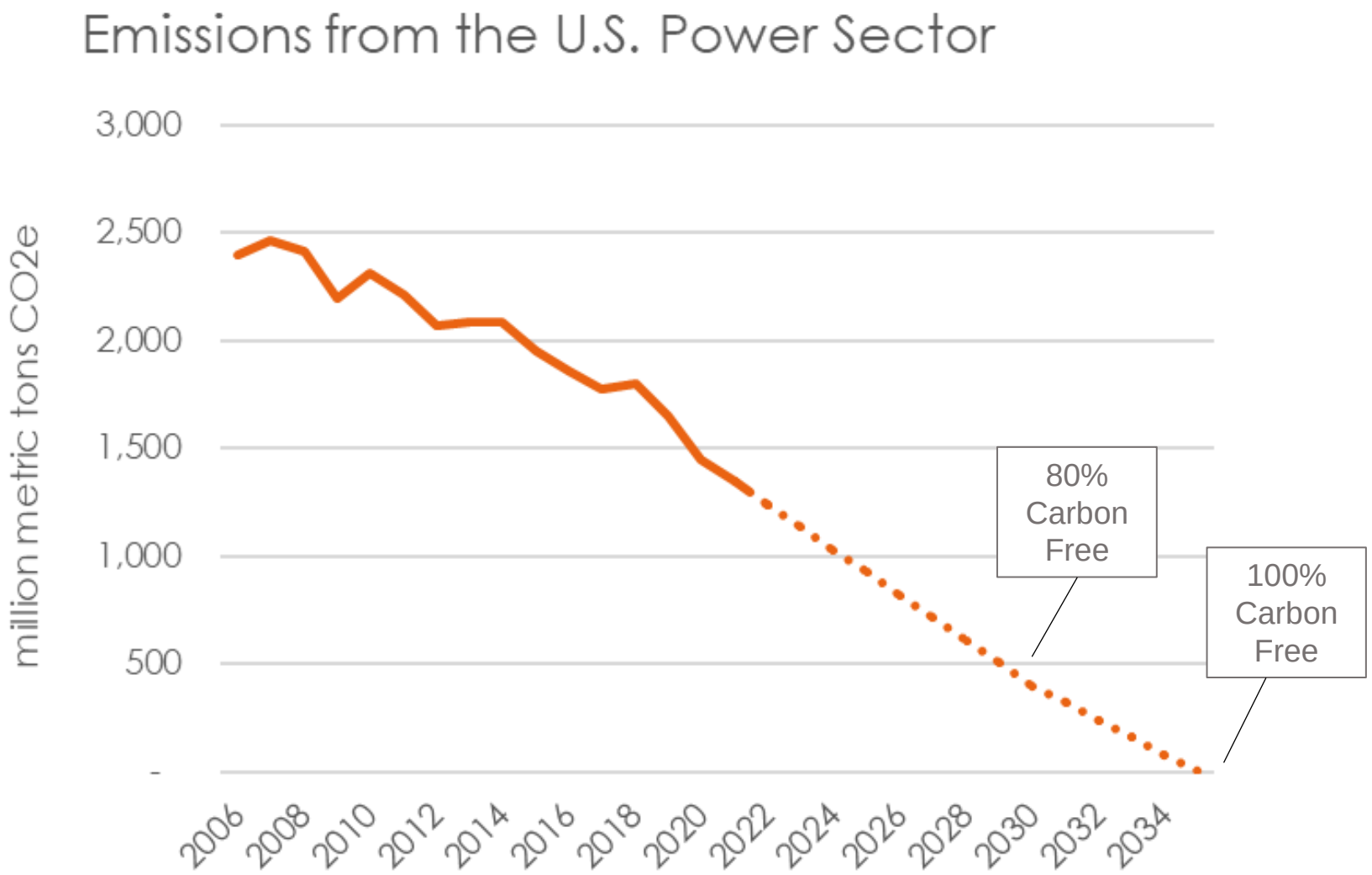
In 2020, U.S. coal production fell to its lowest level since 1965



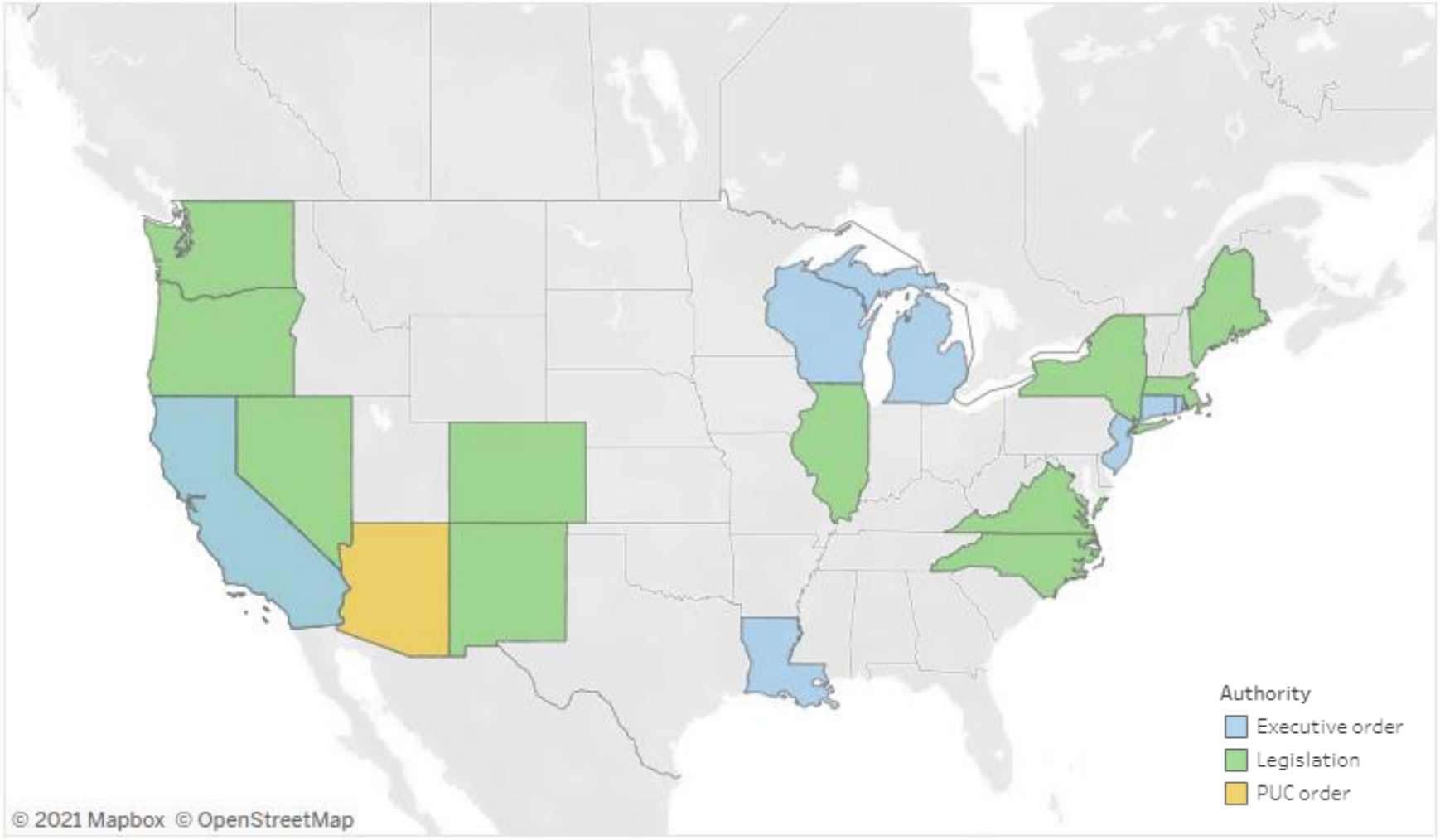
Source: U.S. Energy Information Administration, *Annual Coal Report*

U.S. coal production totaled 535 million short tons (MMst) in 2020, a 24% decrease from the 706 MMst mined in 2019 and the lowest level of coal production in the United States in any year since 1965.

U.S. electricity sector emissions have declined since 2005

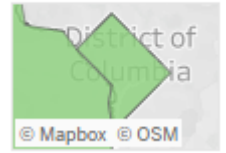


A growing number of states and territories have adopted 100% Clean Energy standards



Hawaii

DC



Puerto Rico

Source: CESA

2035 Report Key Findings

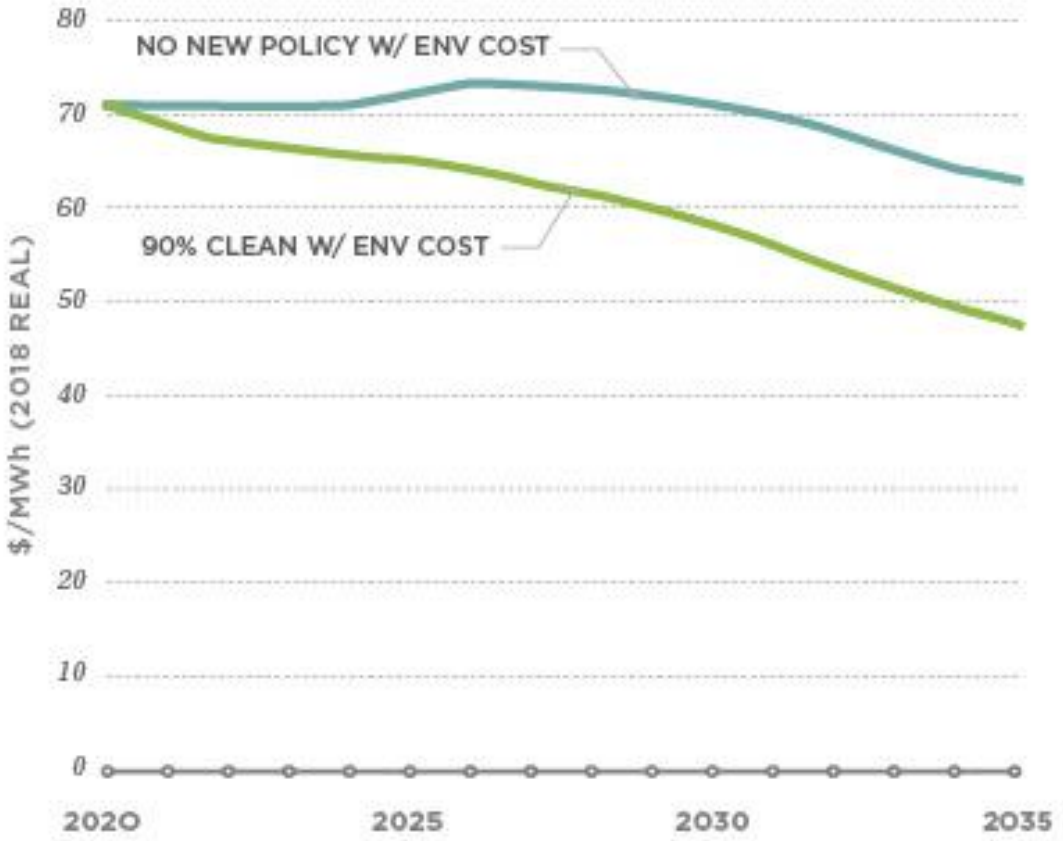
A recent report by researchers at University of California found that:

- 90% clean electricity by 2035 is already possible with existing technologies

- A 90% clean grid is dependable without new coal or natural gas fossil fuel plants

2035 Report Key Findings

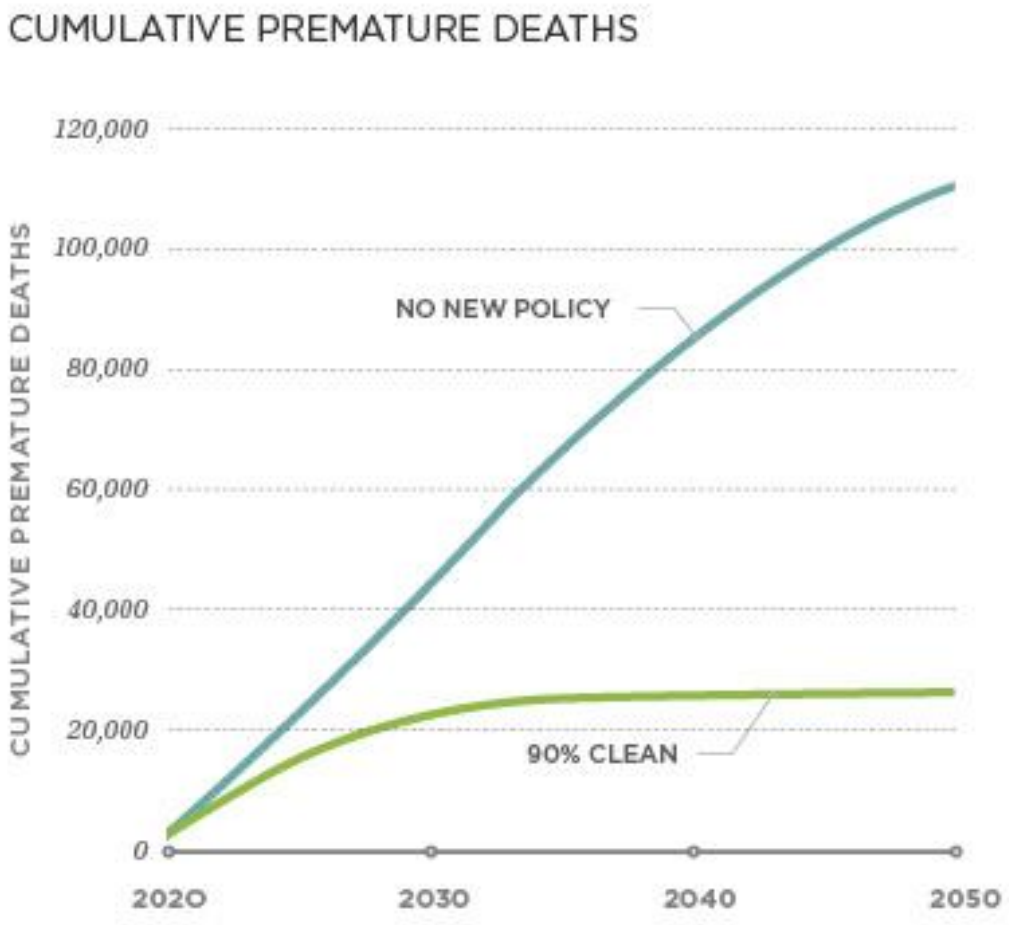
- Plummeting renewable energy costs make the 90% clean grid affordable



Source: 2035 The Report

2035 Report Key Findings

- Building a 90% clean grid improves health outcomes

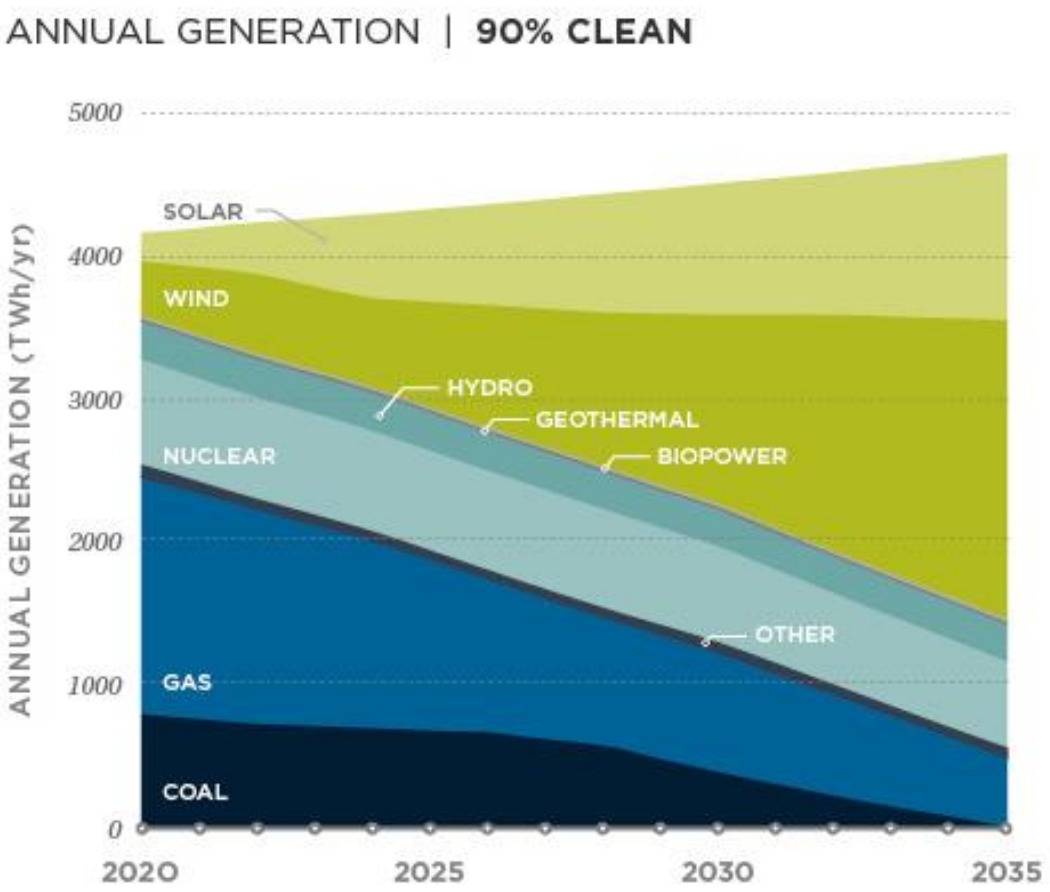


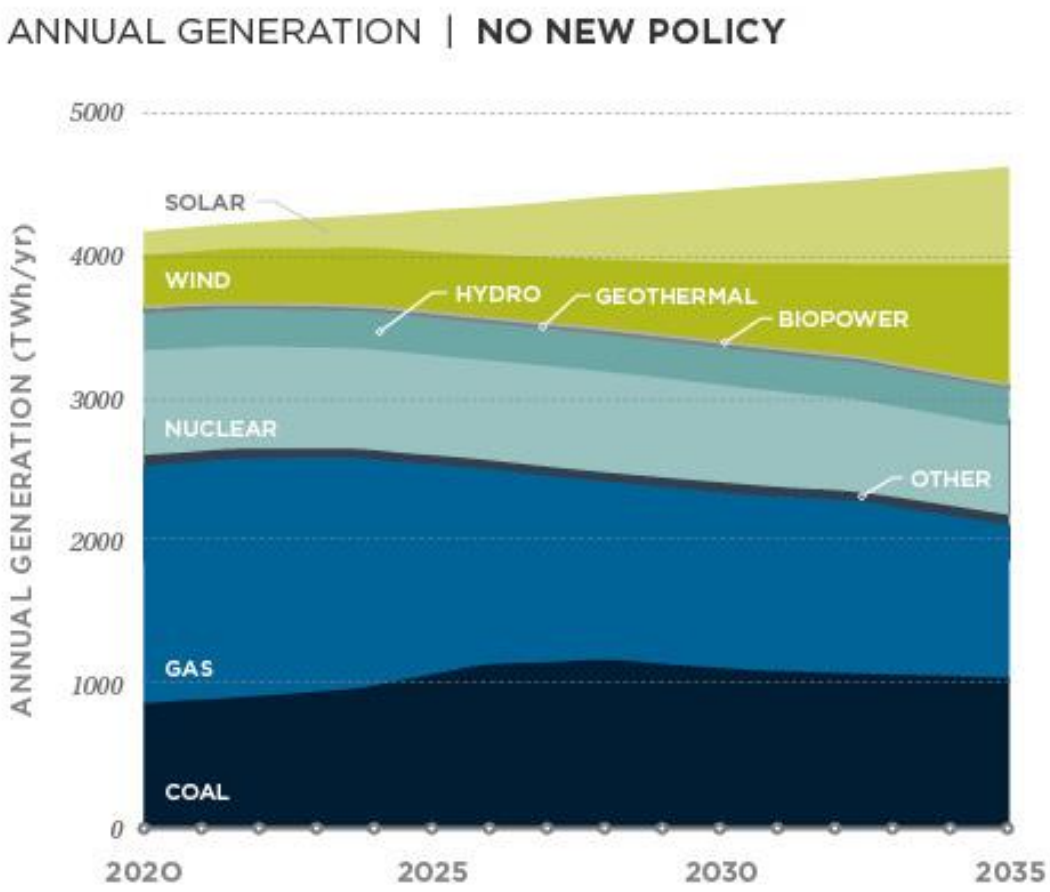
Source: 2035 The Report

What's Necessary for 100% by 2035 in the US

- Retire coal: All remaining coal plants should retire by about 2030.
- No new gas: We would need no new gas plants. Some of the existing gas fleet may be maintained but run infrequently as storage continues to replace it.
- Accelerated renewables deployment: Double solar and wind annual deployments through the 2020s, and double again in the 2030s.
- Increase storage capacity: Storage deployment would need to grow 25 percent each year, from 523 megawatts (MW) in 2019 to 20,000 MW in 2035.
- Build transmission: We need some new transmission lines to interconnect new generation, but relatively few interregional lines.

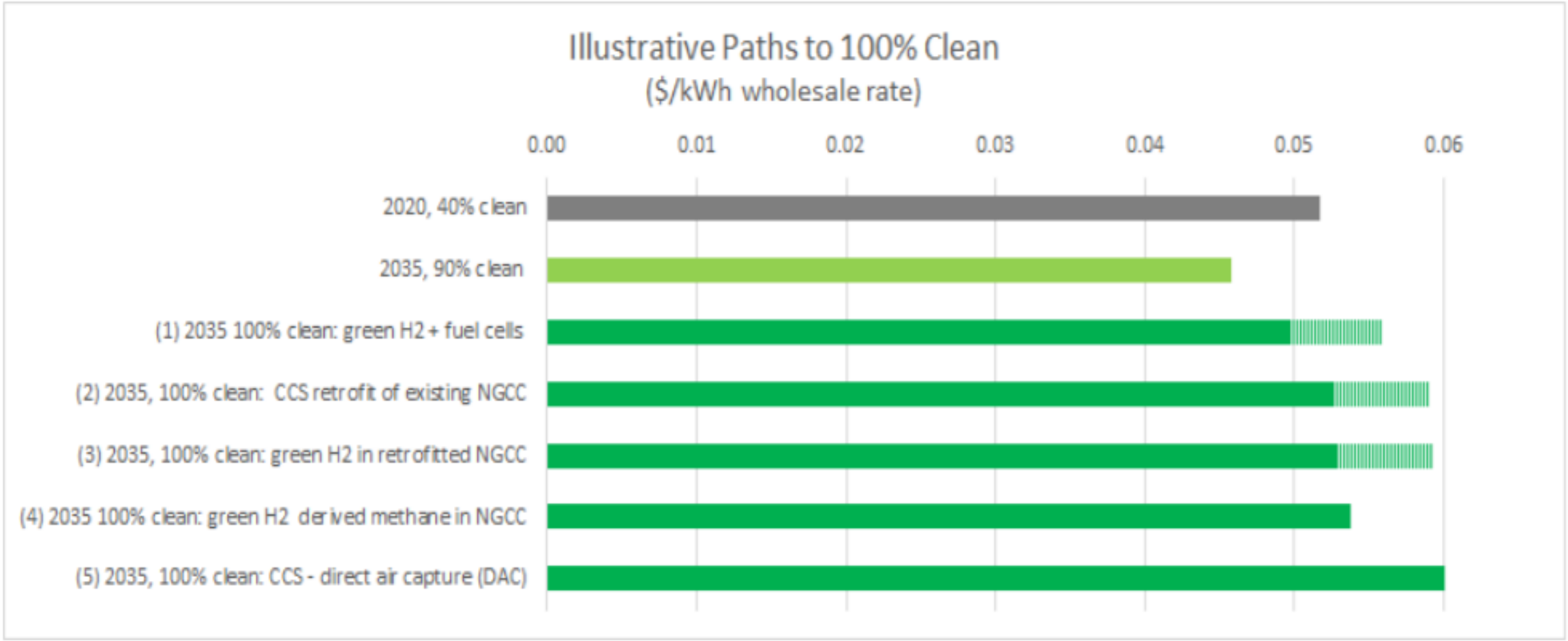
90% clean: 10% of generation remains from gas in 2035





Source: 2035 The Report

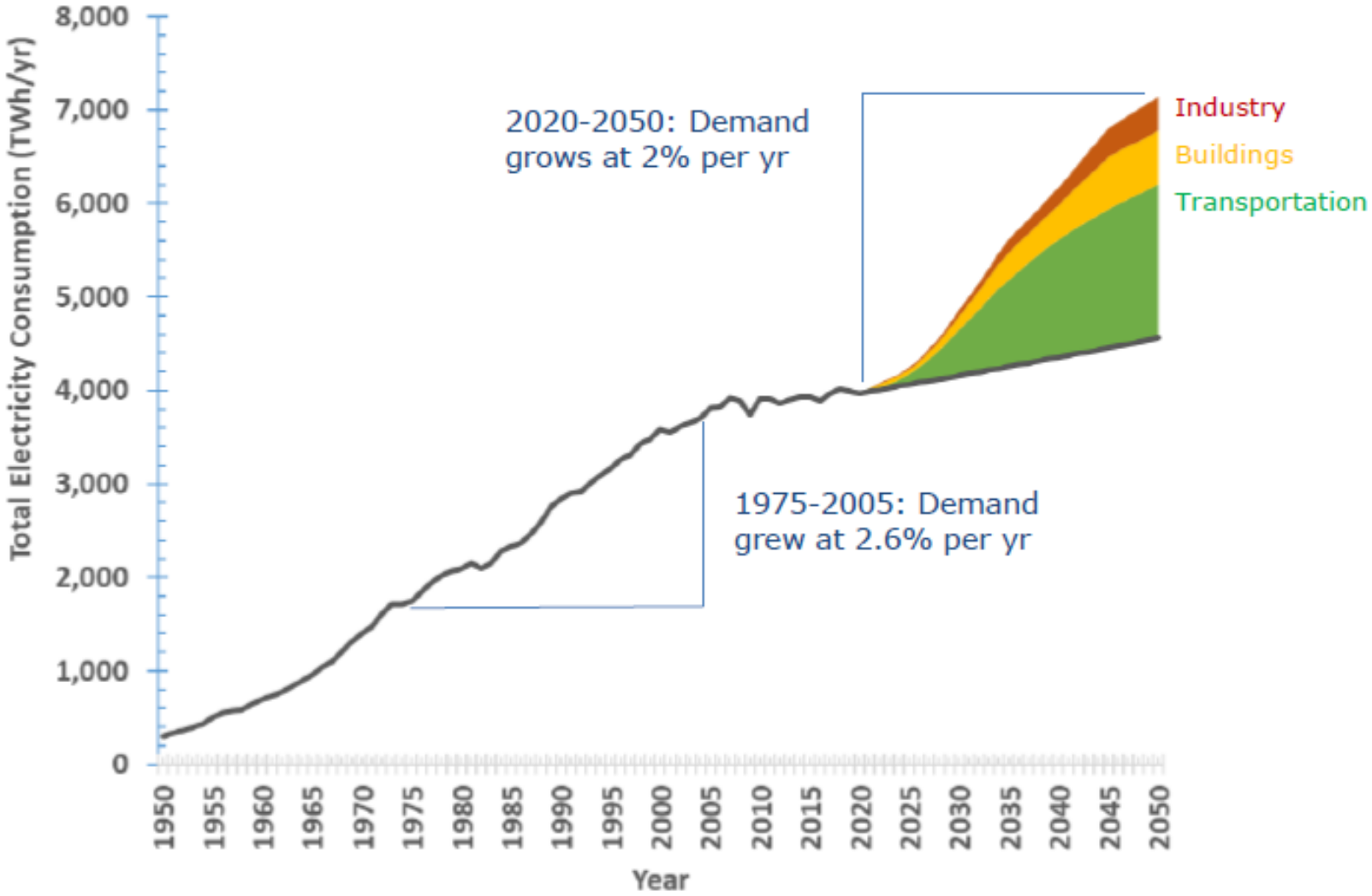
We are confident that we can get to 100% clean by 2035 - without carbon capture and storage



Source: Energy Innovation

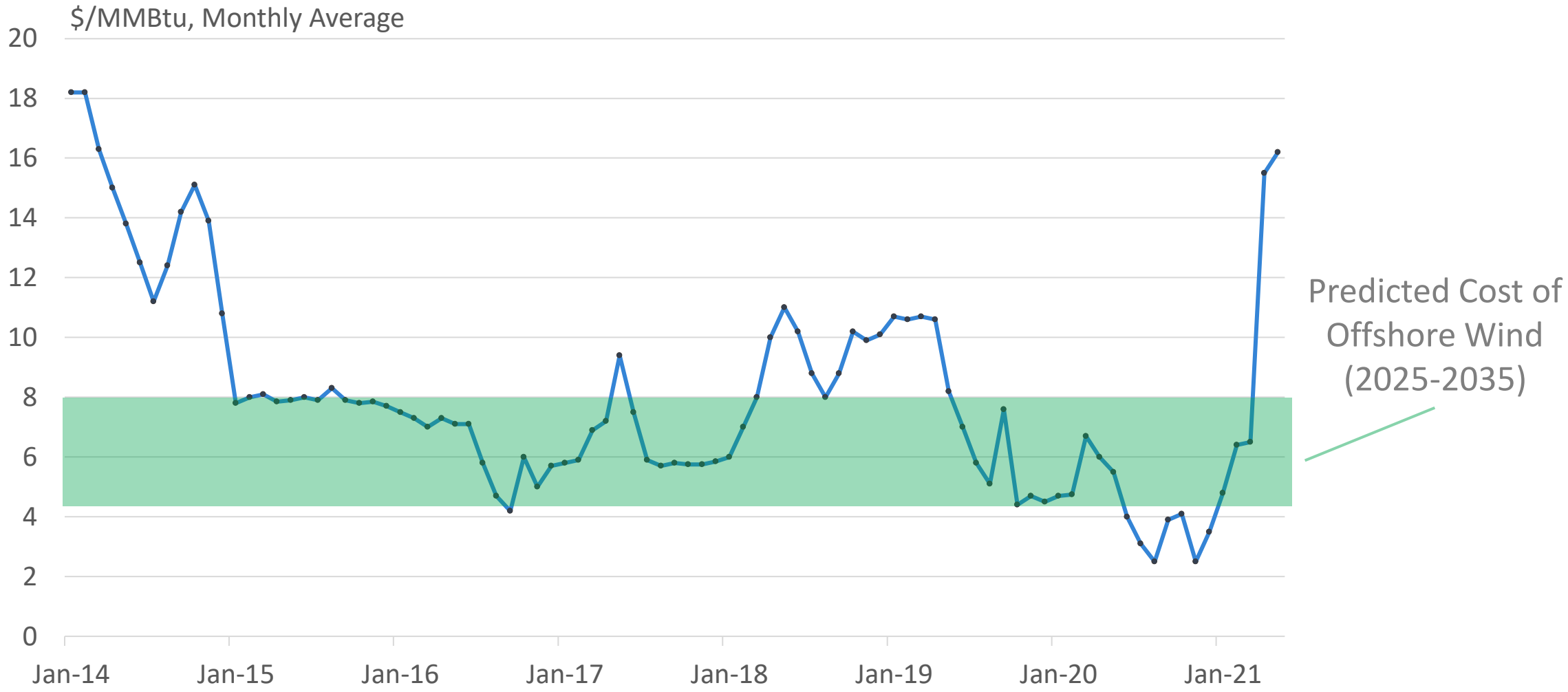
Figure 1: Wholesale electricity rates for 100% zero carbon electricity in 2035 could be similar to today's rates

Important to plan for an electric future, with electric vehicles, electric buildings, and mostly electric industrial sector



Source: 2035 The Report

New Research from Lawrence Berkeley National Lab – Comparing Price of LNG Arriving in Japan With Offshore Wind



Source: METI (Graphic adapted from wolfstreet.com)

Conclusions

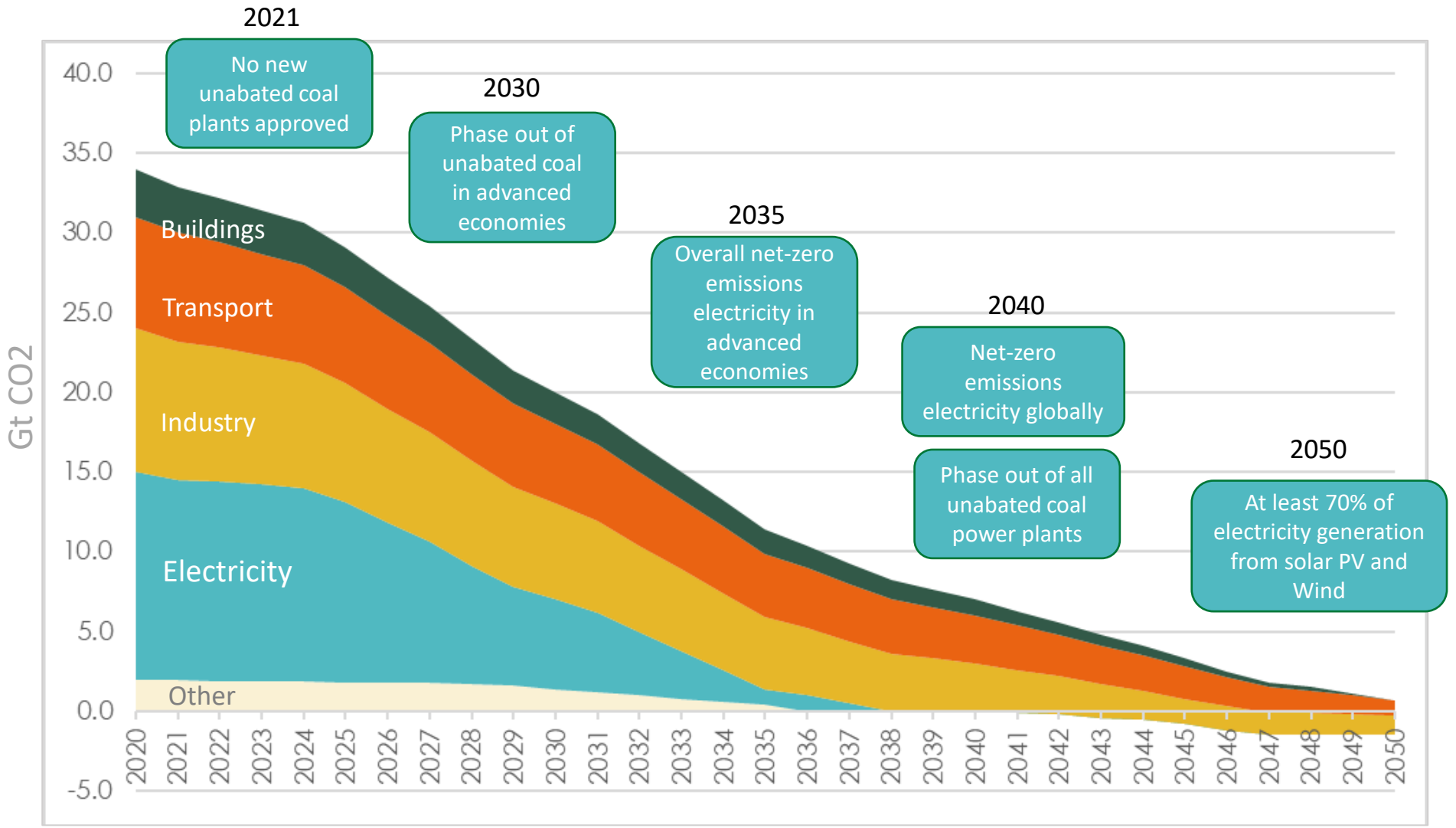
1. Fossil fuel prices are volatile and huge risk to our economies, especially low-income residents and manufacturers.

2. We can’t afford new coal or gas plants.

3. To meet our climate goals we need to phase out existing coal plants in developed countries by 2030, rest of world by 2040

4. Clean electricity is the engine to decarbonize our vehicles, buildings and industry.

Key Electricity Milestones to Net Zero



Source: International Energy Agency (2021)