COMBINED
HEAT AND POWER
ALLIANCE

USA in Focus:
Combined Heat and Power & the Energy Transition

David Gardiner
Executive Director, CHP Alliance

Overview

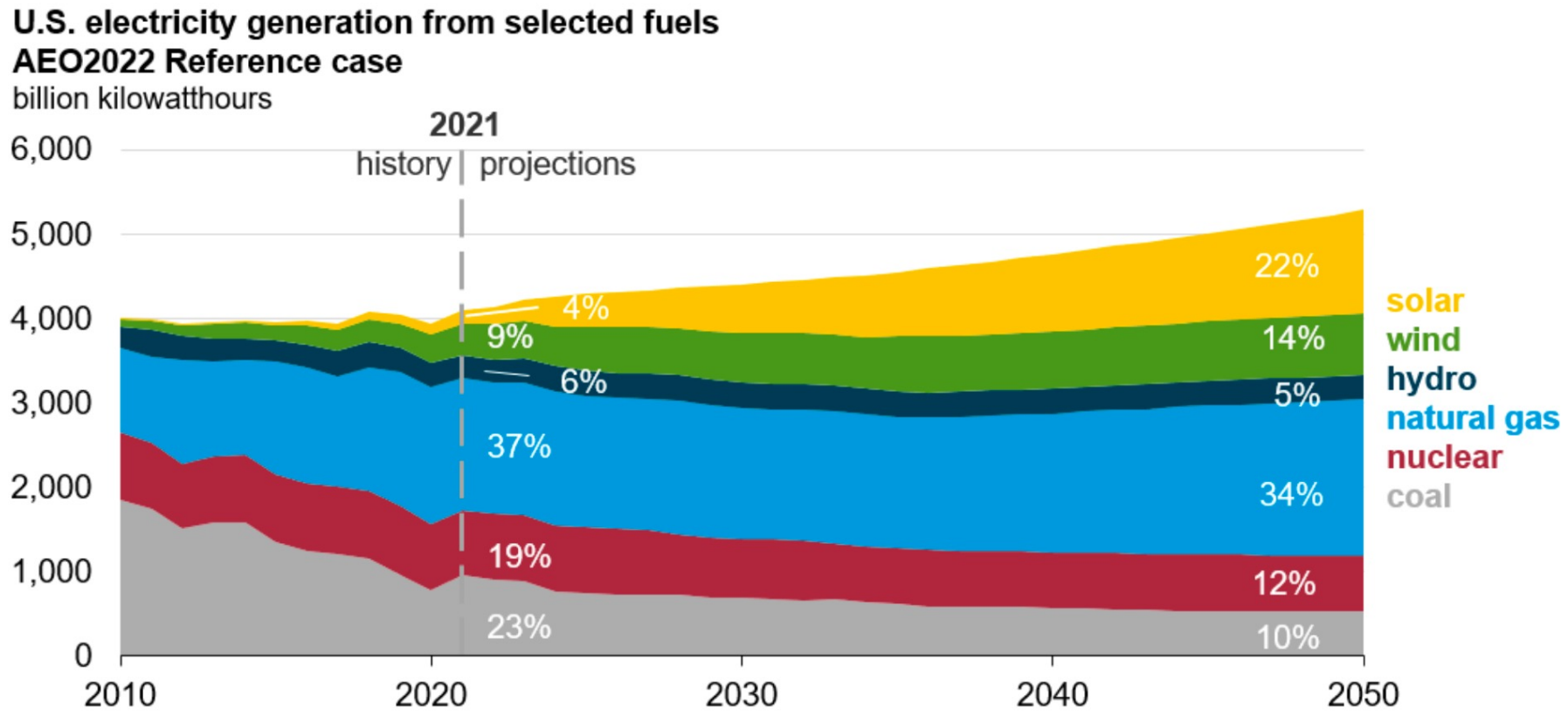
- An Introduction to the Combined Heat and Power Alliance
- The Current Energy and Climate Context in the U.S. and CHP's Role in It
- Today's U.S. CHP Market
- Hydrogen and CHP

CHP Alliance: National Voice for CHP

Our Members

Reciprocal Affiliates

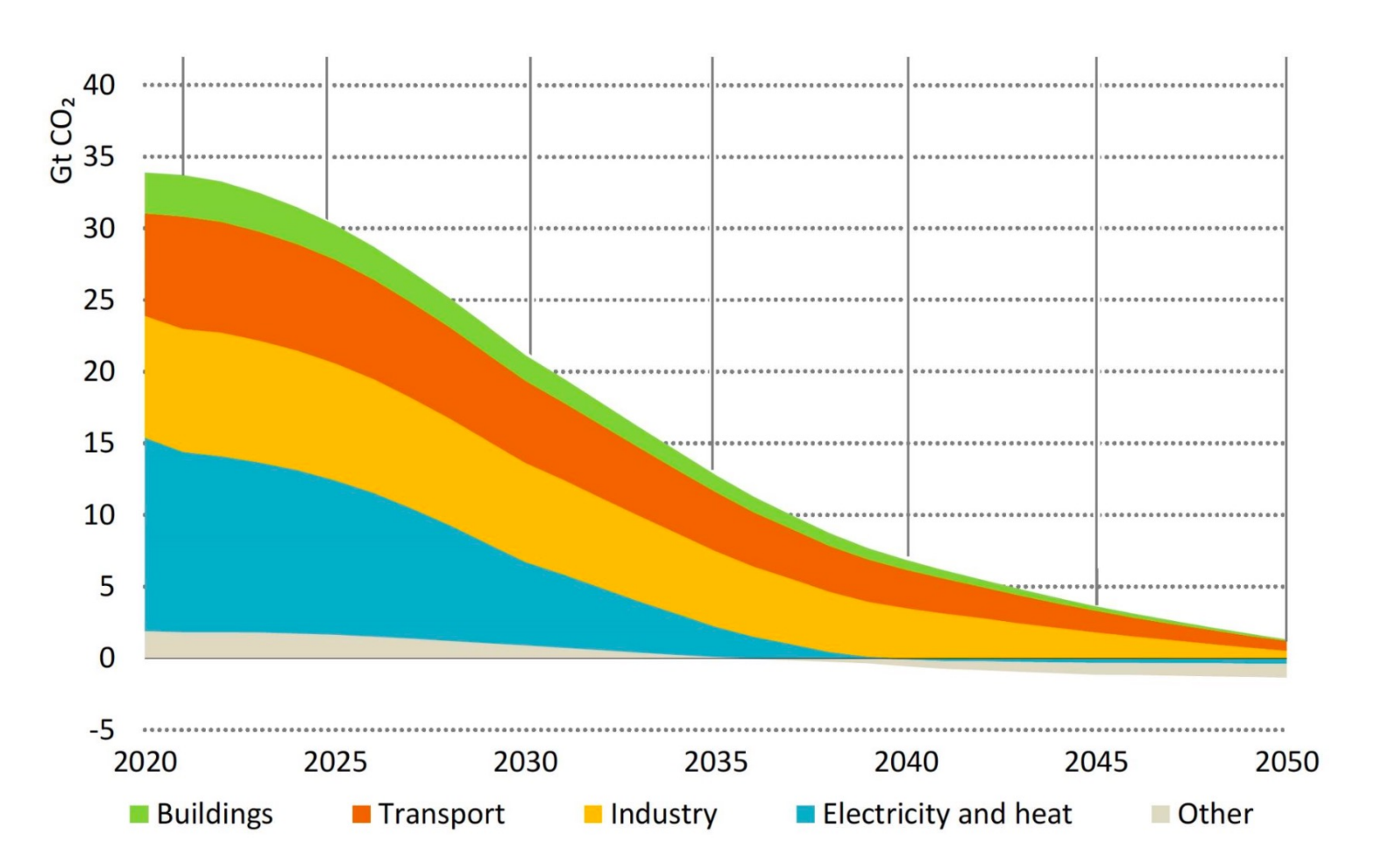
The U.S. Energy Transition



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022) Reference case

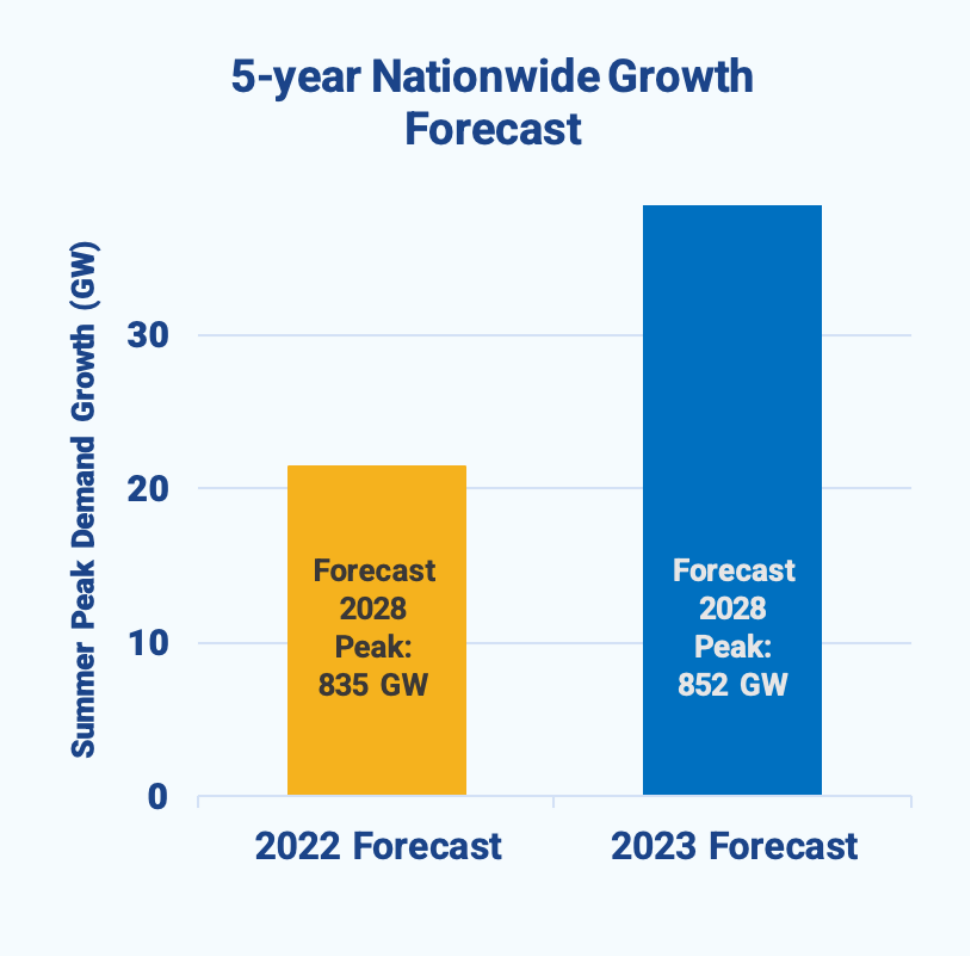
Note: Solar includes both utility-scale and end-use photovoltaic electricity generation.

The Road to Net Zero



Source: Net Zero by 2050: A Roadmap for the Energy Sector by the Energy Information Administration

“The era of flat power demand is over”

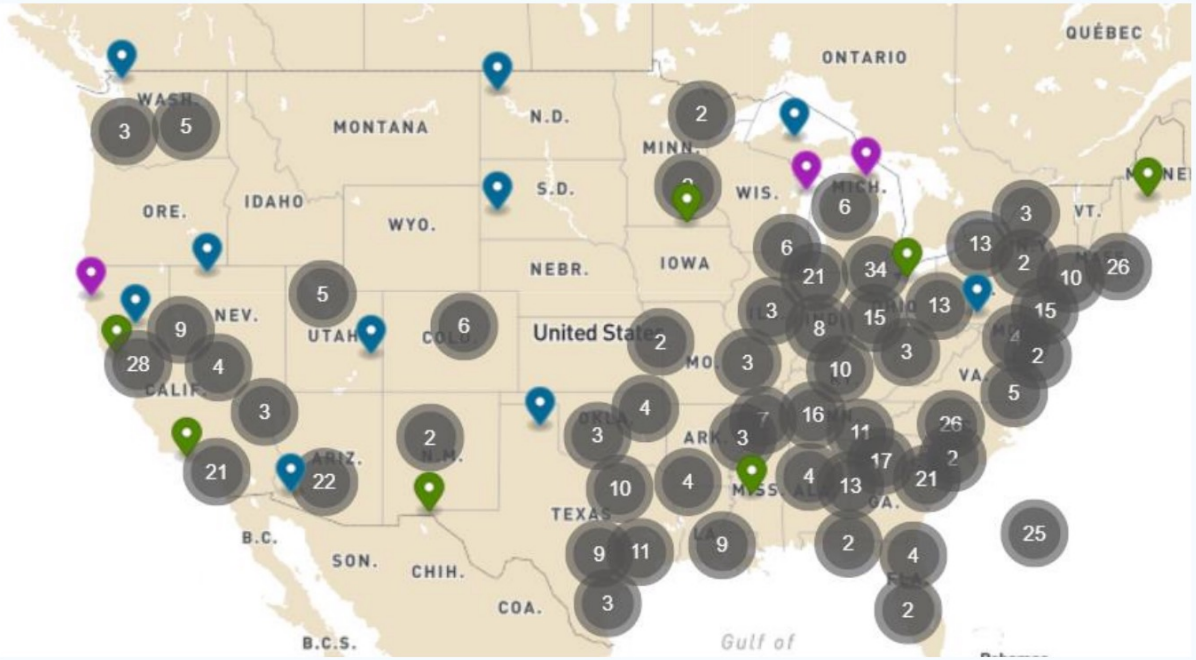


Source: Grid Strategies

- Over the past decade, grid planners have been forecasting a 0.5% annual growth rate, but in 2023 annual peak demand growth was at least 0.9%.
- Forecasts for 5-year electricity demand growth have changed significantly: in 2022, predicted demand growth was 2.6% over 5 years; now it’s 4.7%.

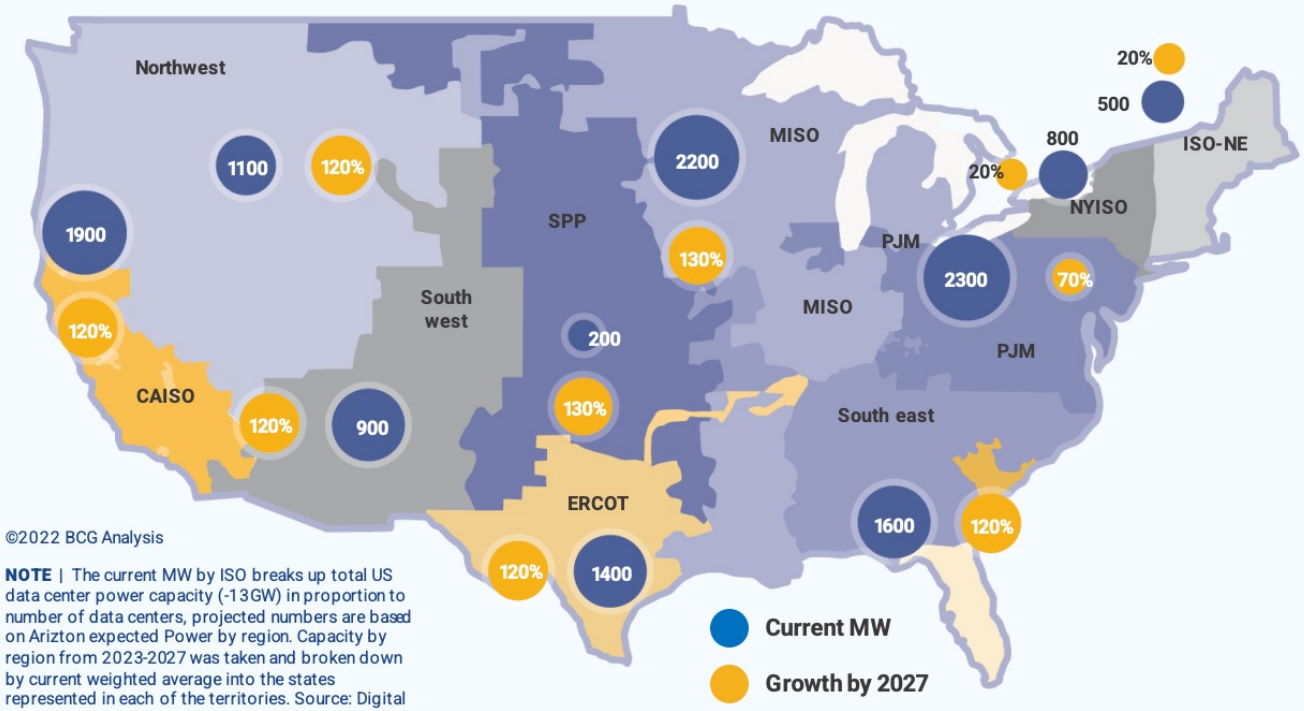
Drivers of New Demand

Announced Manufacturing Facilities since August 2022



More than 200 new manufacturing facilities for transportation and clean energy industries have been announced since the IRA passed.
Source: Grid Strategies

Data center demand is projected to grow from 17 GW to 45 GW by 2030, according to analysis from Boston Consulting Group.



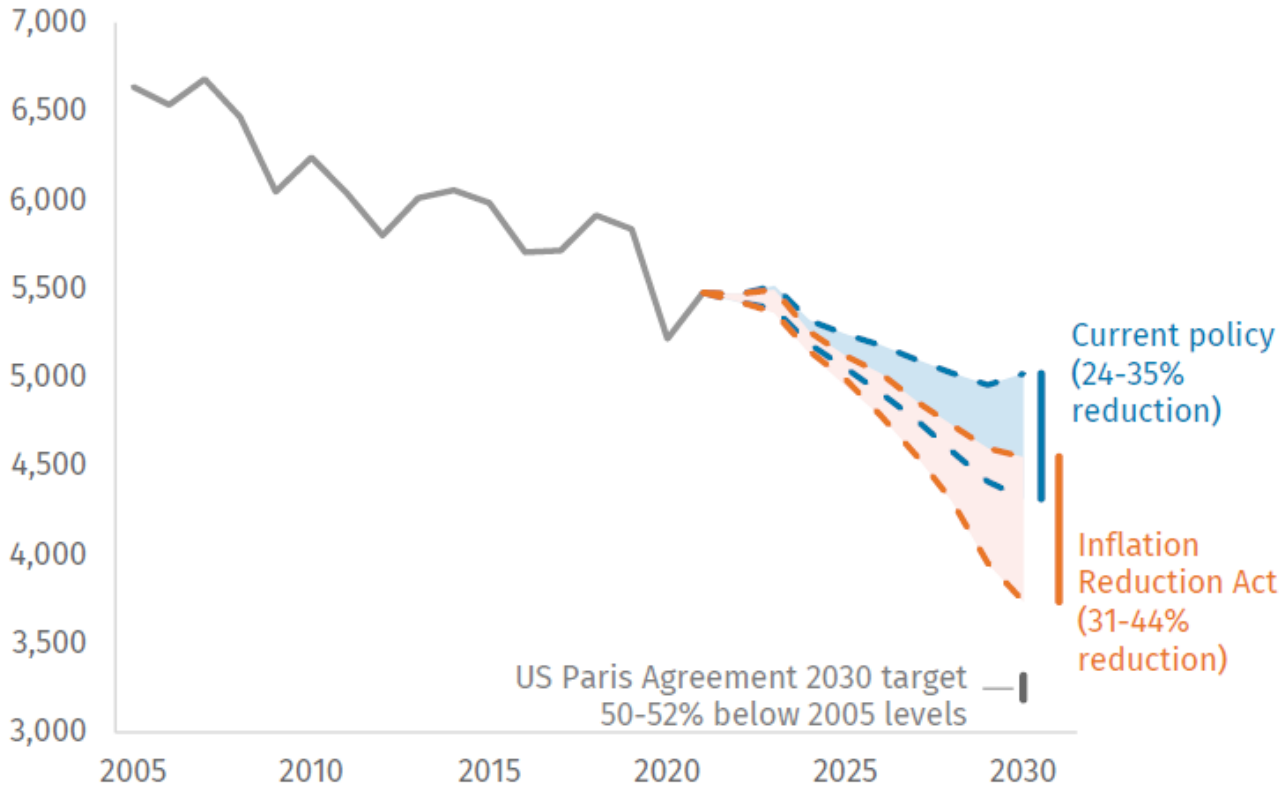
U.S. Climate Strategy

- The Inflation Reduction Act (2021) was a game-changer for U.S. climate action.
- The IRA commits more than $400 billion to combat climate change.

FIGURE 1

US greenhouse gas emissions

Net million metric tons (mmt) of CO_2-e



Source: Rhodium Group. The range reflects uncertainty around future fossil fuel prices, economic growth, and clean technology costs. It corresponds with high, central, and low emissions scenarios detailed in Taking Stock 2022. Under the central scenario (not shown), the IRA accelerates emissions reductions to a 40% cut from 2005 levels.

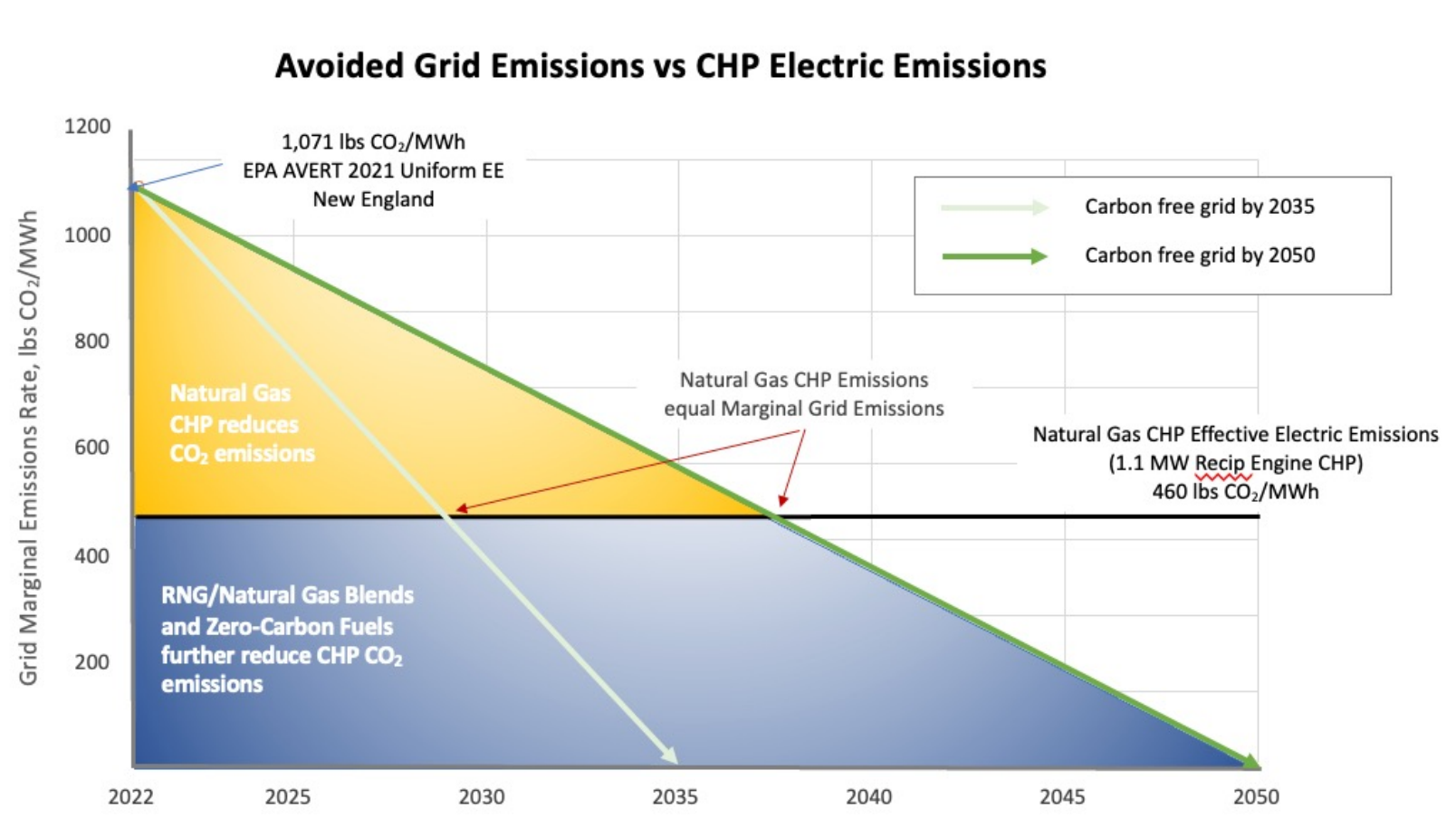
What does the IRA mean for CHP?

- **Through the end of 2024:** the IRA extended the 30% investment tax credit (ITC) for combined heat and power through the end of 2024.

- **Beginning in 2025:** the IRA establishes technology-neutral tax credits. It's not yet clear whether CHP units could qualify.

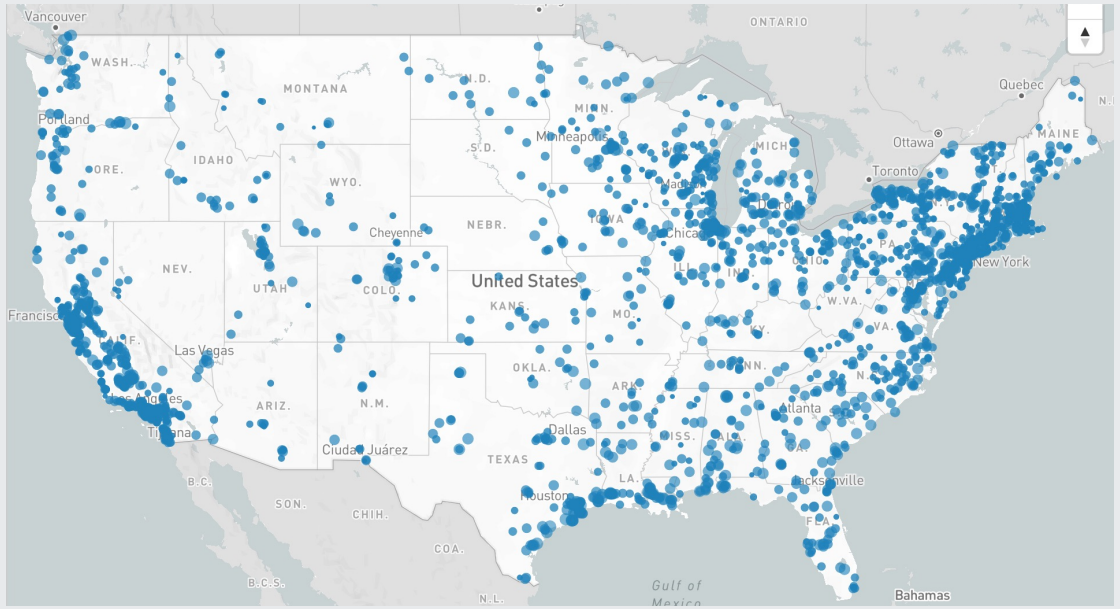
- **What is the CHP Alliance doing?**
  - *Advocating for an extension of the existing ITC*
  - *Advocating for CHP's inclusion in tech-neutral credit*

Our Argument: CHP Plays a Key Role in the Energy Transition

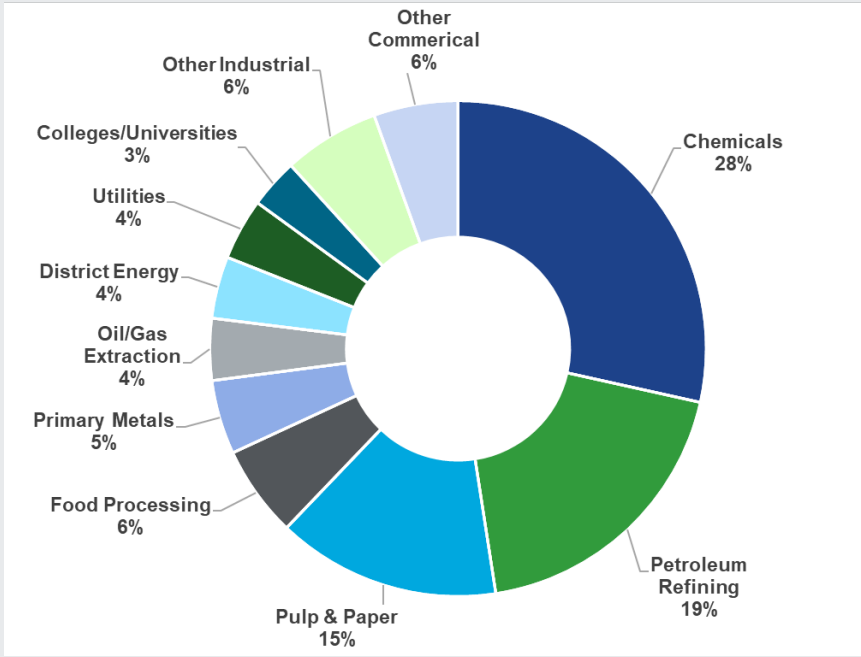


- New CHP systems reduce emissions *immediately* in all regions on the U.S.
- In almost all regions, CHP systems installed through 2035 will reduce CO2 emissions through 2050.
- Efficient CHP units powered by zero carbon fuels will lower costs & maximize carbon reductions.

CHP in the U.S.



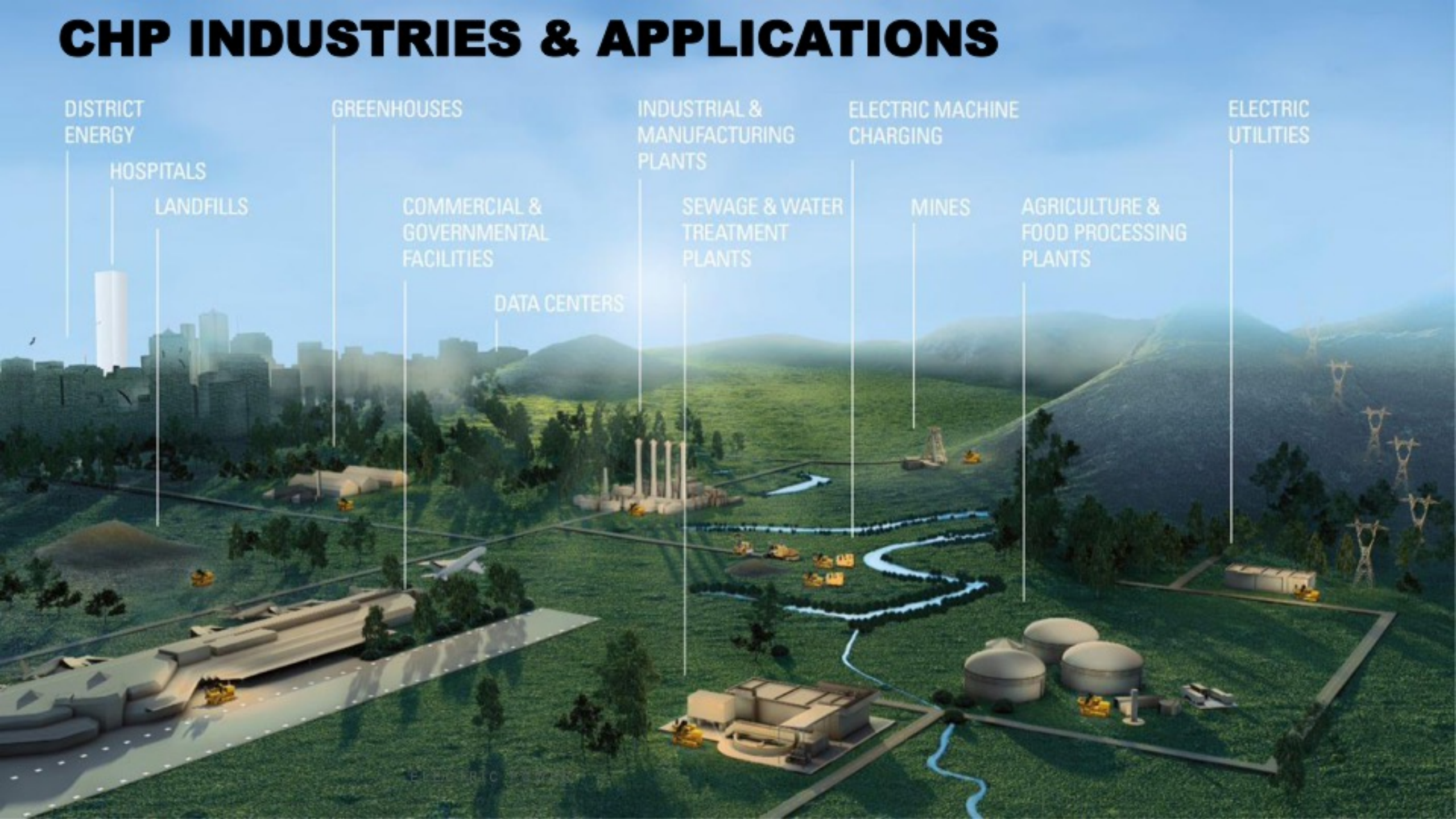
Source: U.S. Department of Energy



Source: U.S. Department of Energy

- 80 GW of installed CHP at 4,600+ industrial and commercial facilities in the U.S.
- 72% natural gas fueled; 15% biomass/biogas/municipal and process waste fueled

CHP INDUSTRIES & APPLICATIONS



CHP: A Tool for Electrification-Resistant Industry

- Support for CHP from U.S. Dept. of Energy
  - "Industrial CHP can provide significant greenhouse gas emissions reductions in the near- to mid-term as marginal grid emissions continue to be based on a mix of fossil fuels in most areas of the country."
  - "RNG and hydrogen-fueled CHP systems can be a long-term path to decarbonizing industrial thermal processes resistant to electrification because of technology or cost barriers, and for critical operations where dispatchable onsite power is needed for resilience and reliability."

A Clean Hydrogen Roadmap for CHP

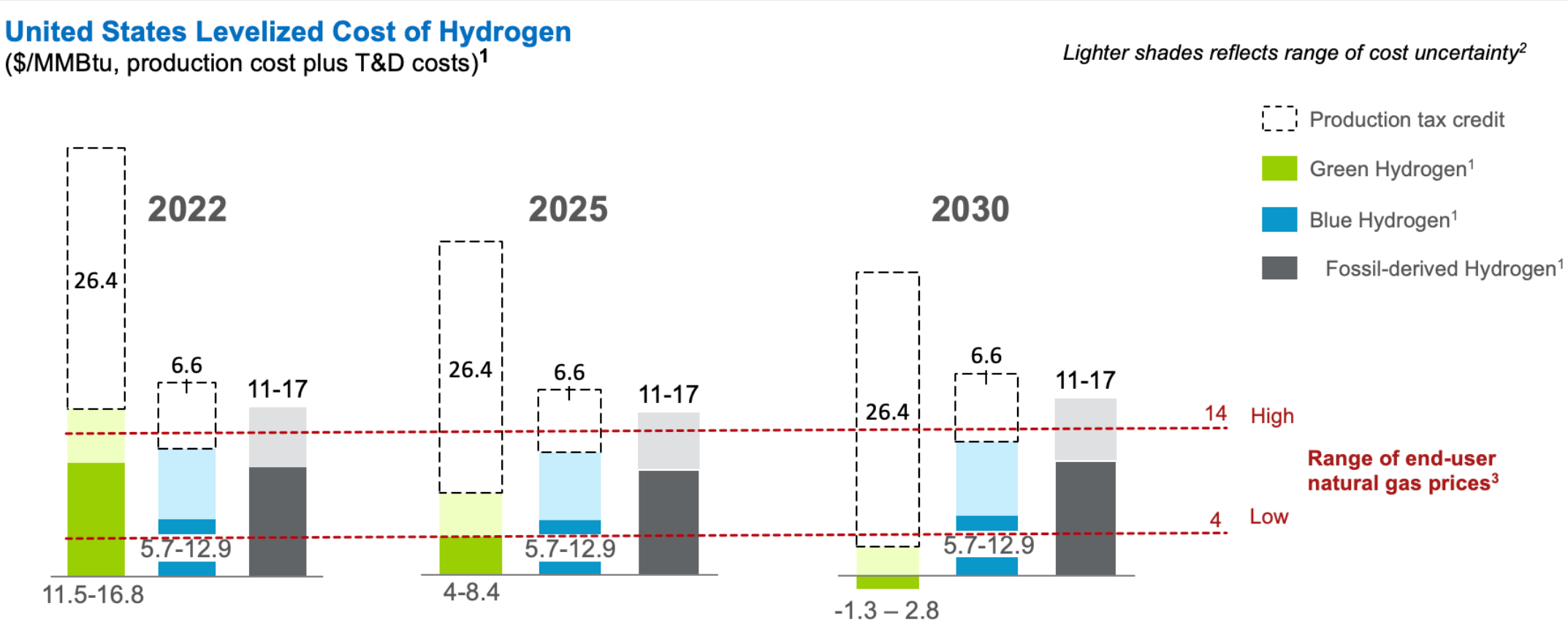
Today's CHP systems use blends of 20-100% clean hydrogen.

By 2030, new CHP systems can burn 100% clean hydrogen.

Existing CHP systems can convert to 100% clean hydrogen with minimal downtime.

Paired with clean hydrogen, CHP achieves bold emissions reductions over time.

IRA: Hydrogen Cost Competitive with Natural Gas



1. Lighter shade reflects pricing uncertainty regarding natural gas (lower limit $2/MMBTU, upper limit $5/MMBTU) and electricity; 2. Starts at $0.4/kg H2 for 60-75% greenhouse gas reduction vs fossil-derived hydrogen, goes up to $0.75/kg H2 for 75-85% greenhouse gas reduction; 3. US EIA May 2022
Source: BCG North America H2 Supply Model

The CHP 2.0 Opportunity

- Install new hydrogen-ready CHP units wherever possible
- Retrofit 1,145 existing CHP units in the industrial sector to use clean hydrogen.
  - 24% of all CHP units in the US but produce 78% of the electrical power from all CHP units.
  - Best opportunity – chemicals, food processing, and pulp and paper sectors – more than 60% of all industrial CHP units.

Summary

- CHP has significant role to deliver clean, reliable power and thermal energy to meet rising U.S. power demand.
- U.S. post-2025 tax policy are critical.
- Many industrial and commercial market opportunities.
- CHP is ready for clean hydrogen but unclear how much and how quickly it will be available at cost-effective prices.

Questions?

Get in touch: david@dgardiner.com