Ammonia Energy Conference 2022

LSB Industries

Clean Energy

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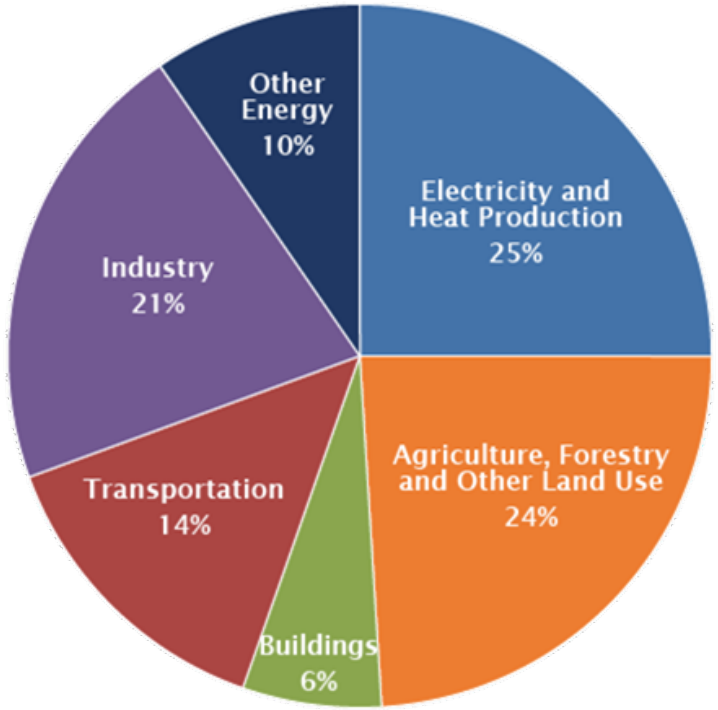
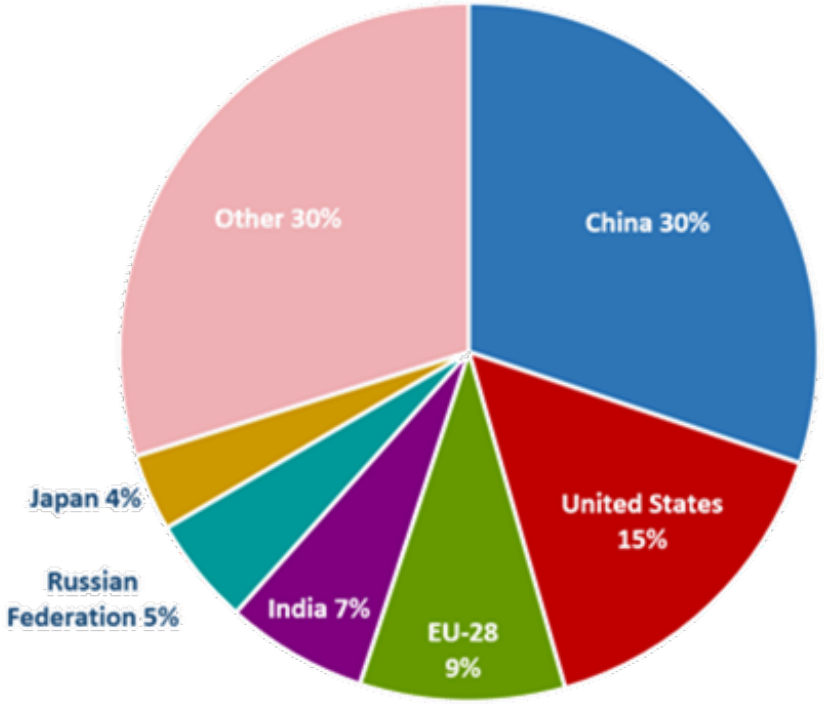
November 16, 2022

Globally a net of 40 Gt of CO_2e Greenhouse gas emissions are released into the atmosphere annually

Global Greenhouse Gas Emissions by Sector



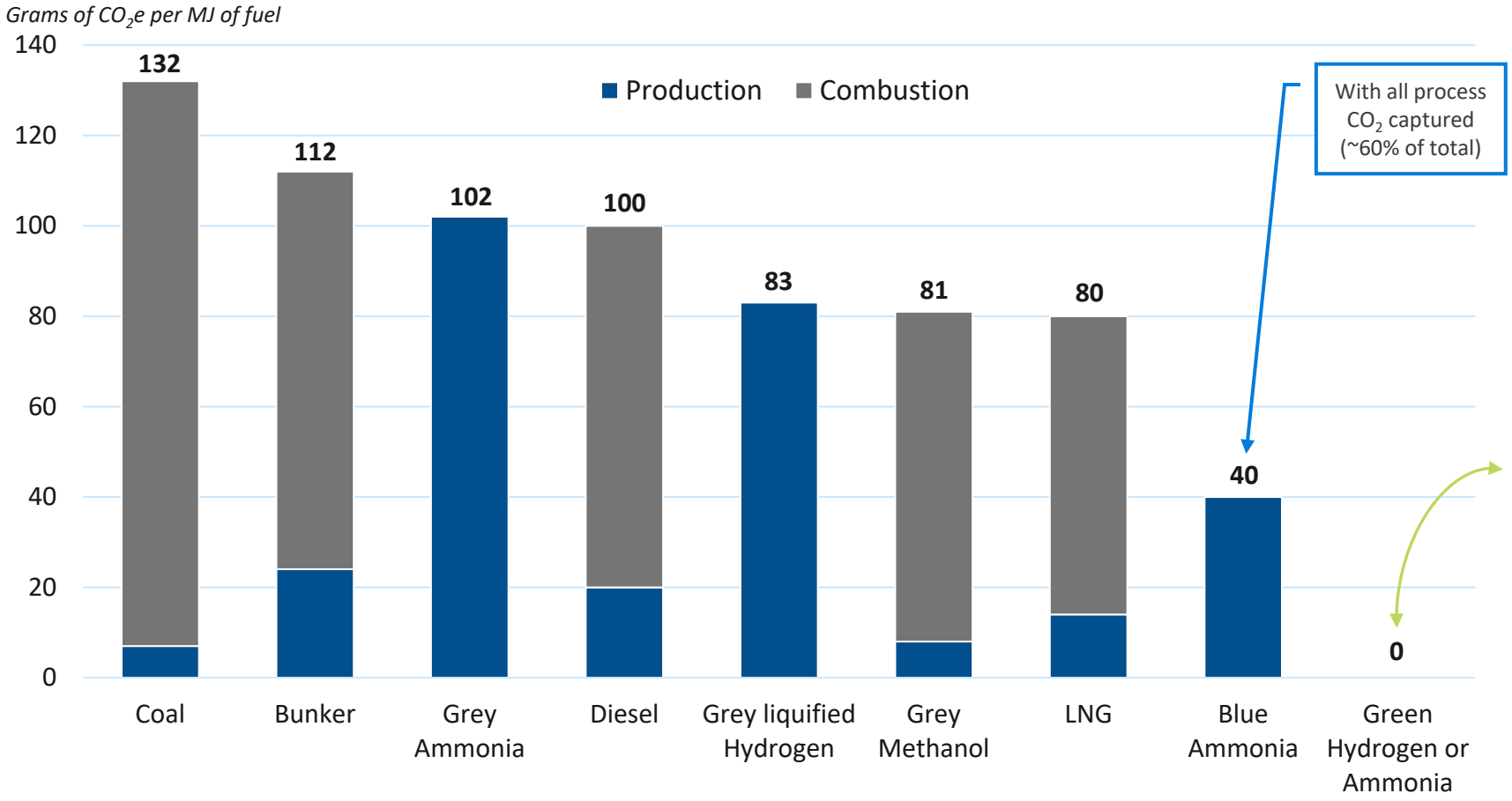
Global Greenhouse Gas Emissions by Country



Source: IPCC (Intergovernmental Panel on climate Change), EPA (Environmental Protection Agency)
Buildings - include onsite energy generation and burning fuels for heat in buildings or cooking in homes
Other Energy – include indirect emissions from the energy sector, such as fuel extraction, refining, processing, and transportation

Why is low carbon ammonia an essential fuel to decarbonize societies in the future?

Levelized CO_2e Emissions from the Life Cycle of Various Fuels

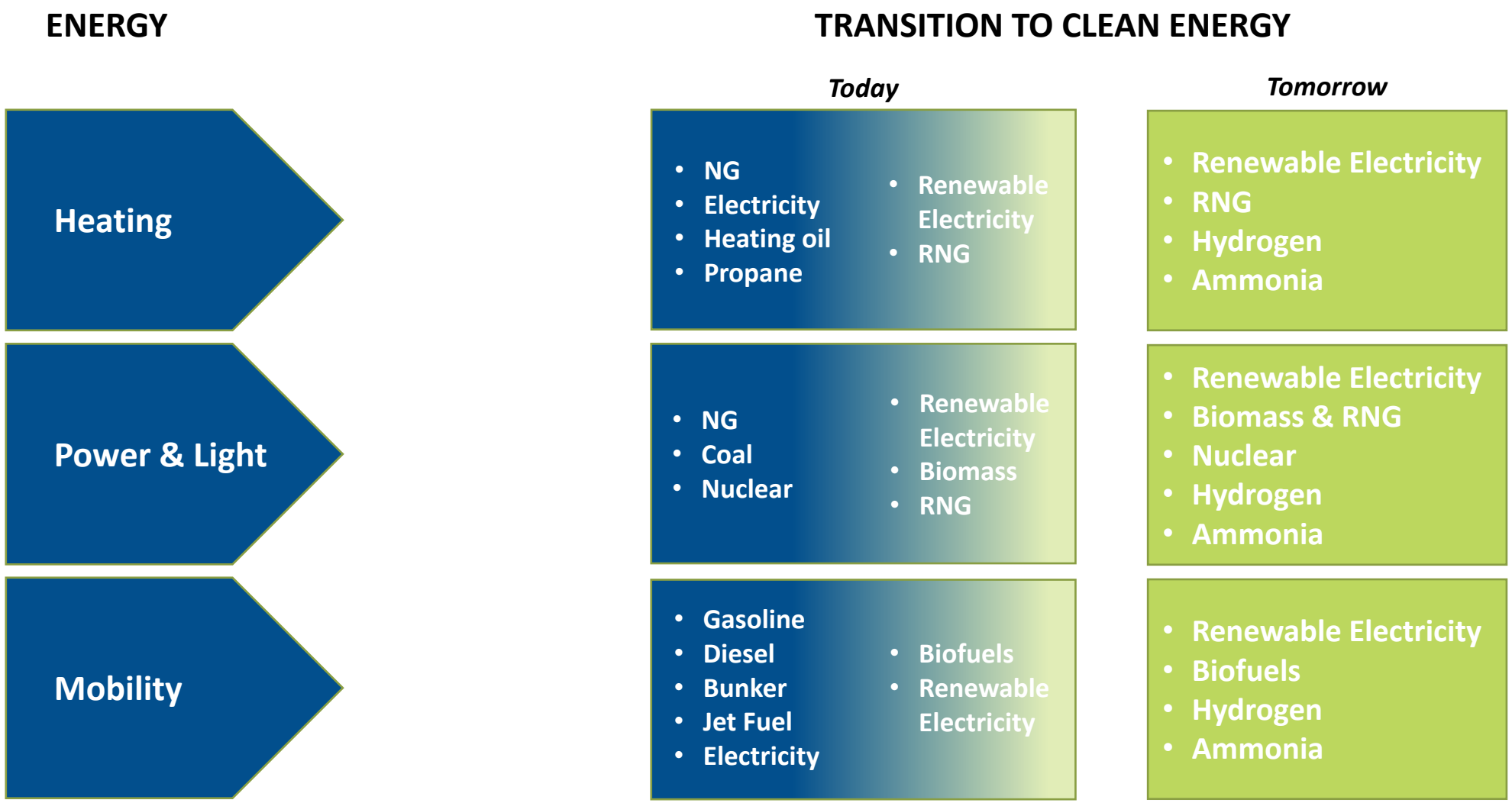


H_2	NH_3
Energy Density (MJ/Gal)	
11.0	26.9
Boiling point (F)	
-423	-27
Non-Toxic	Toxic
Highly flammable	Not highly flammable

Source: Energy Information Agency, Environmental Protection Agency, Progress in Energy and Combustion Science, Vol 69 Nov 2018

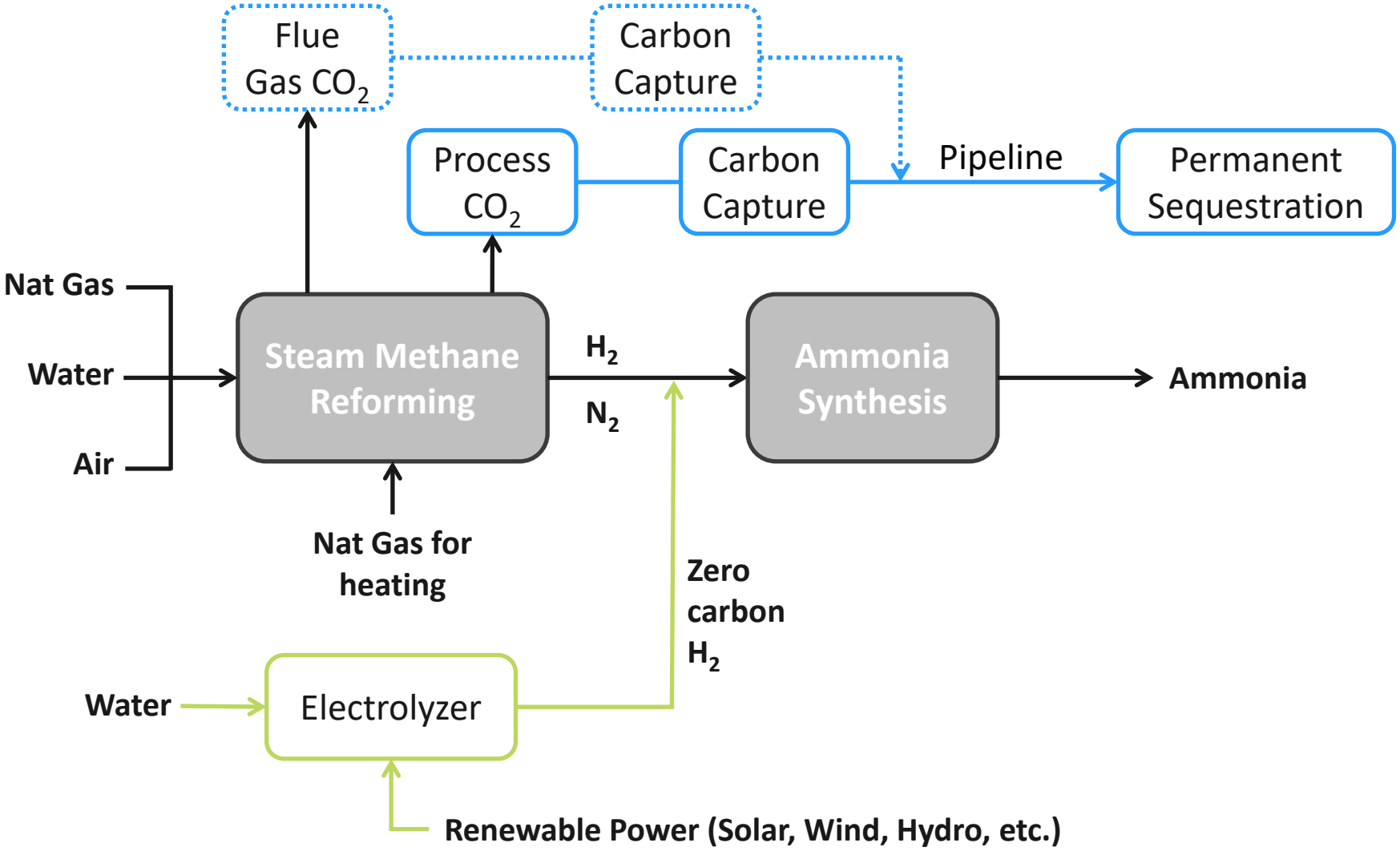
Cleaner fuels and products are needed to start reversing climate change

Hydrogen and ammonia are expected to be the main carbon-free energy sources in the future

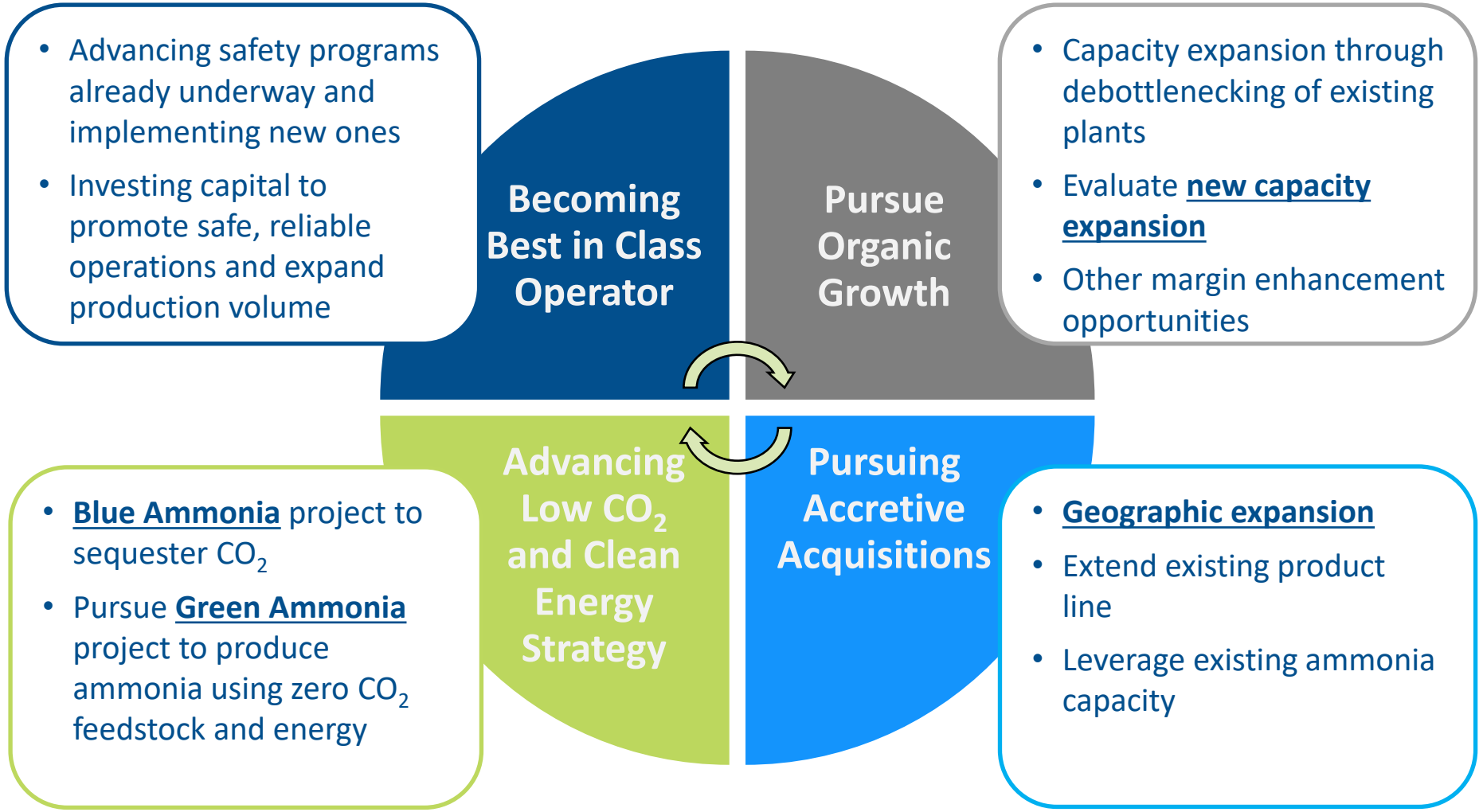


Source: U.S. Energy Information Agency

Making low carbon ammonia



LSB Industries Growth Initiatives



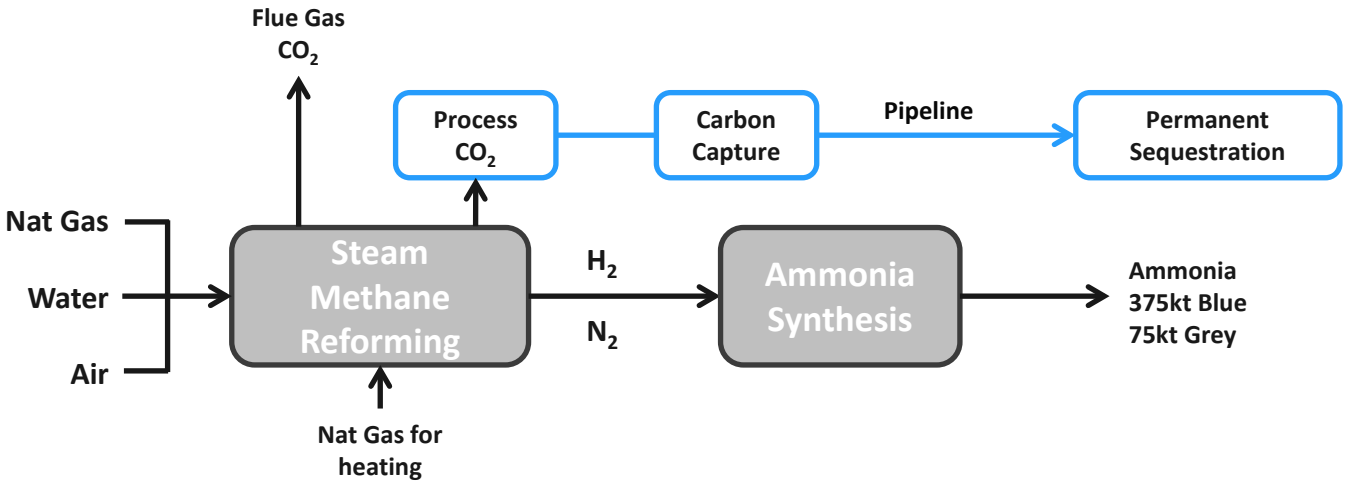
- Advancing safety programs already underway and implementing new ones
- Investing capital to promote safe, reliable operations and expand production volume

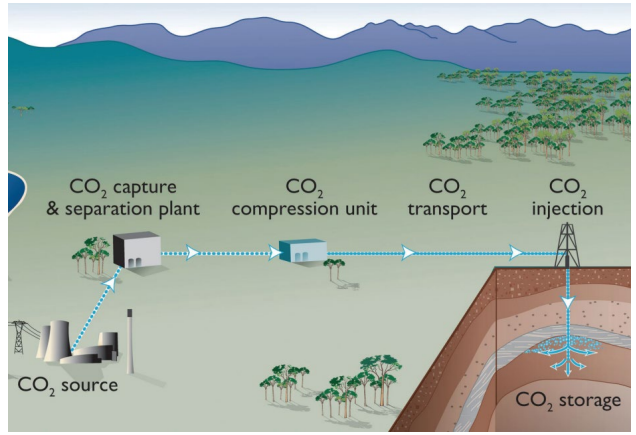
- Capacity expansion through debottlenecking of existing plants
- Evaluate **new capacity expansion**
- Other margin enhancement opportunities

- **Blue Ammonia** project to sequester CO_2
- Pursue **Green Ammonia** project to produce ammonia using zero CO_2 feedstock and energy

- **Geographic expansion**
- Extend existing product line
- Leverage existing ammonia capacity

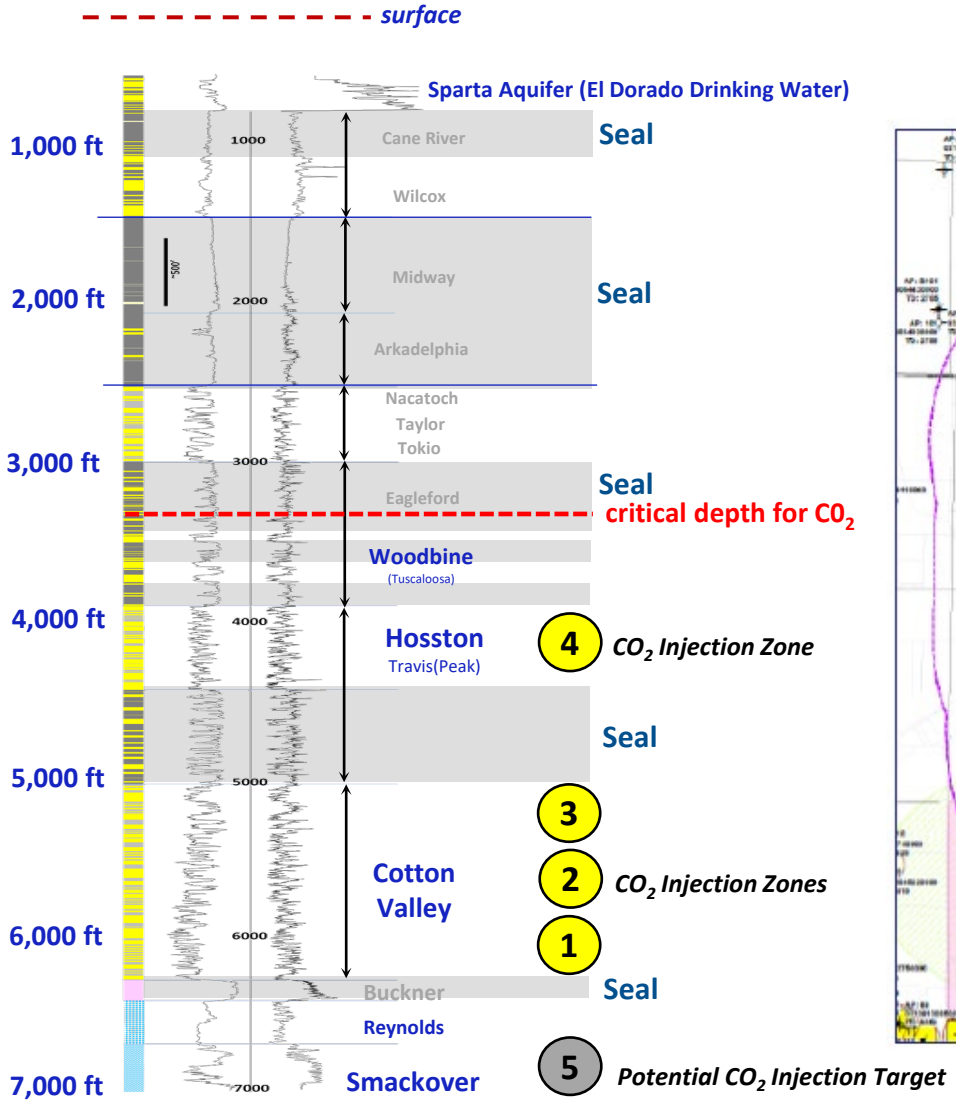
Producing low carbon ammonia at El Dorado, AR



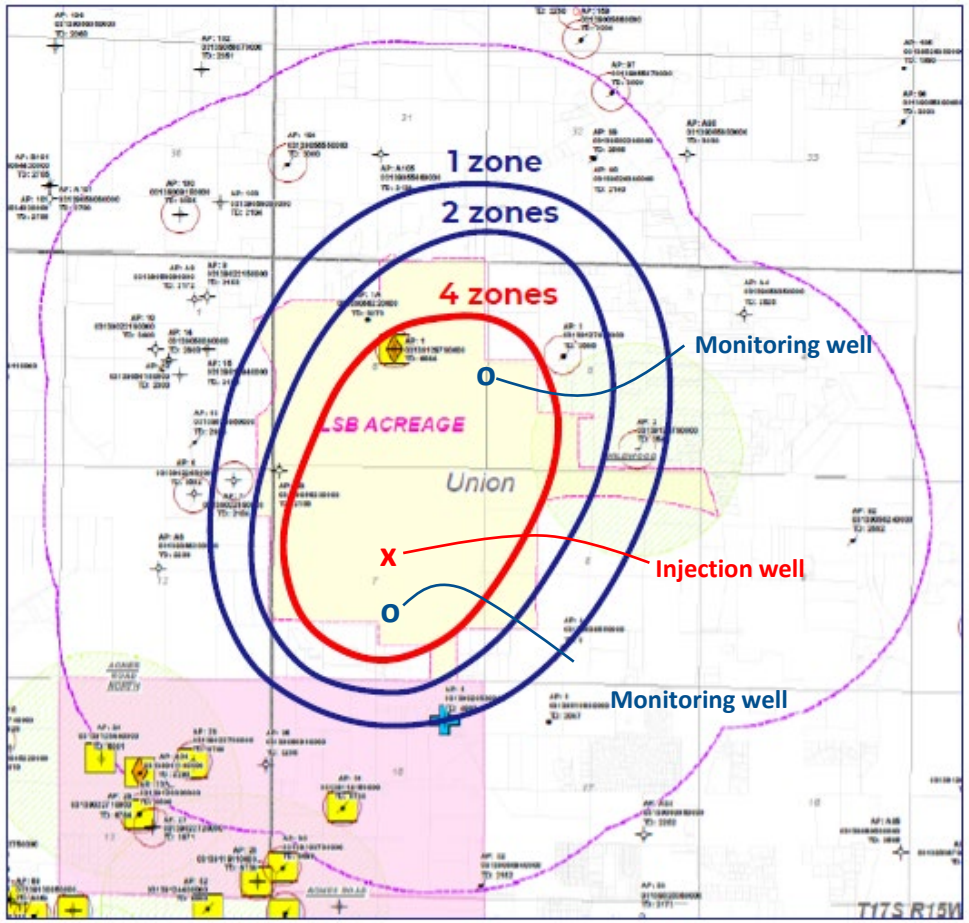


- Agreement with Lapis Energy to develop the CO_2 capture and sequestration (CCS) project
- Project operations expected to begin by early 2025, subject to Class VI EPA permitting
- >375k metric tons of low carbon ammonia per year (assuming 100% of process CO_2 captured and sequestered)
- Permanently sequestering >450k metric tons of CO_2 in saline formations directly under the facility. The sequestered CO_2 will reduce the company's scope 1 GHG emissions by ~25% from current levels

The subsurface under El Dorado facility has four suitable saline formations with ample storage capacity

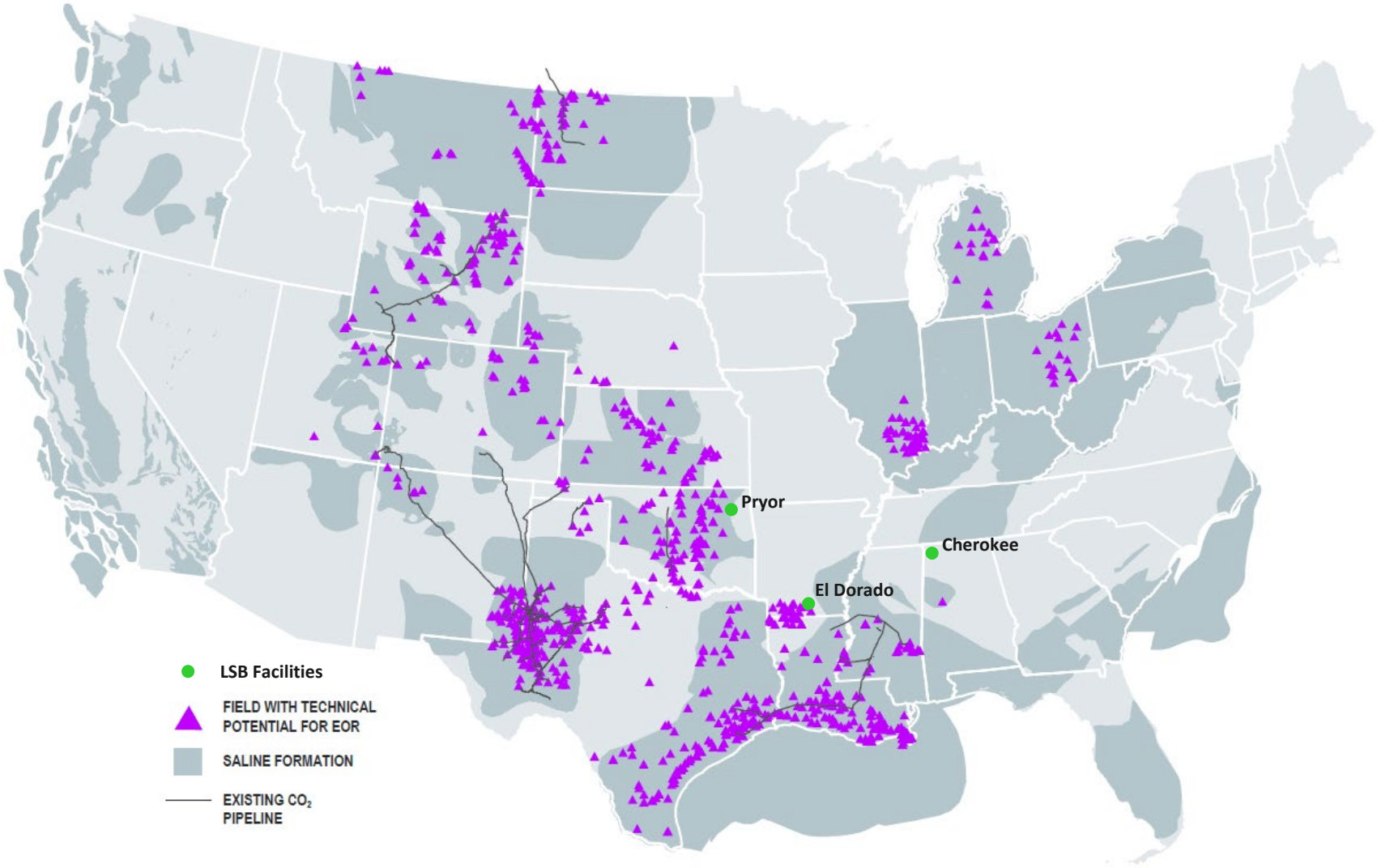


Plume size after 70 years, based on injection zones used over 20 years in Hosston/Cotton Valley



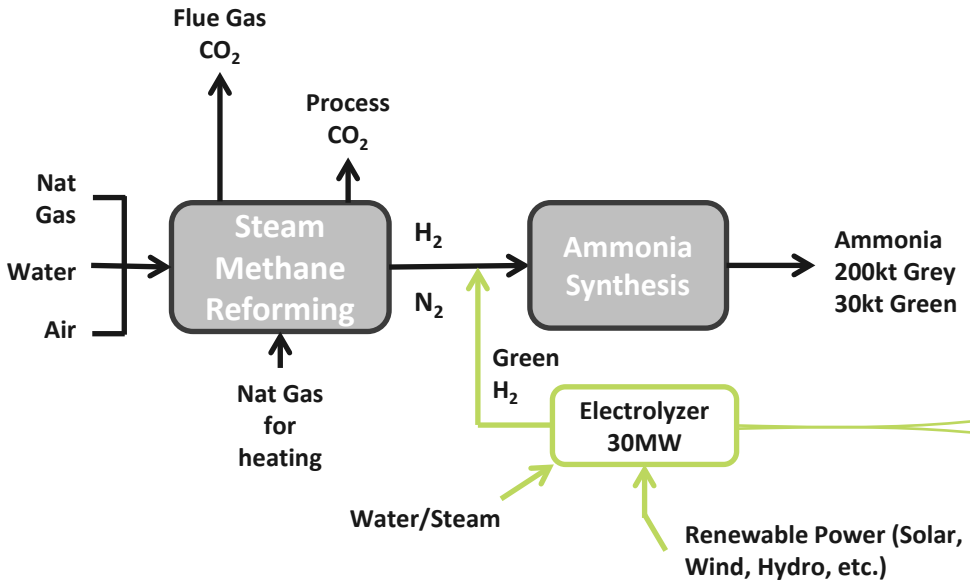
- Three saline formations for CO_2 injections identified at depths of 4,000-7,000 ft
  - Cotton valley
  - Hosston
  - Smackover
- Ability to store more than 50 million metric tons of CO_2
- Several seal formations above will prevent any CO_2 from returning to the surface
- Saline formations are significantly below underground drinking water, >4,000 ft lower
- The Smackover is a former oil and a current bromine and lithium producing region
  - One third of the world's bromine is produced 50 miles south-west of El Dorado facility

Deep geologic saline formations and depleted oil fields with carbon capture and sequestration potential in the US



Source: Great Plains Institute, University of Wyoming

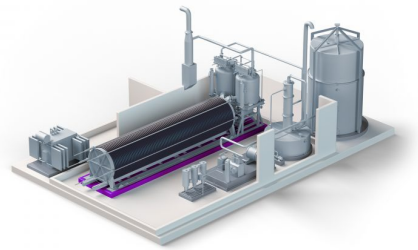
Zero carbon ammonia project at Pryor, OK



Bloom Energy – 10MW Solid Oxide Electrolyzer

Thyssenkrupp – 20MW Alkaline Electrolyzer

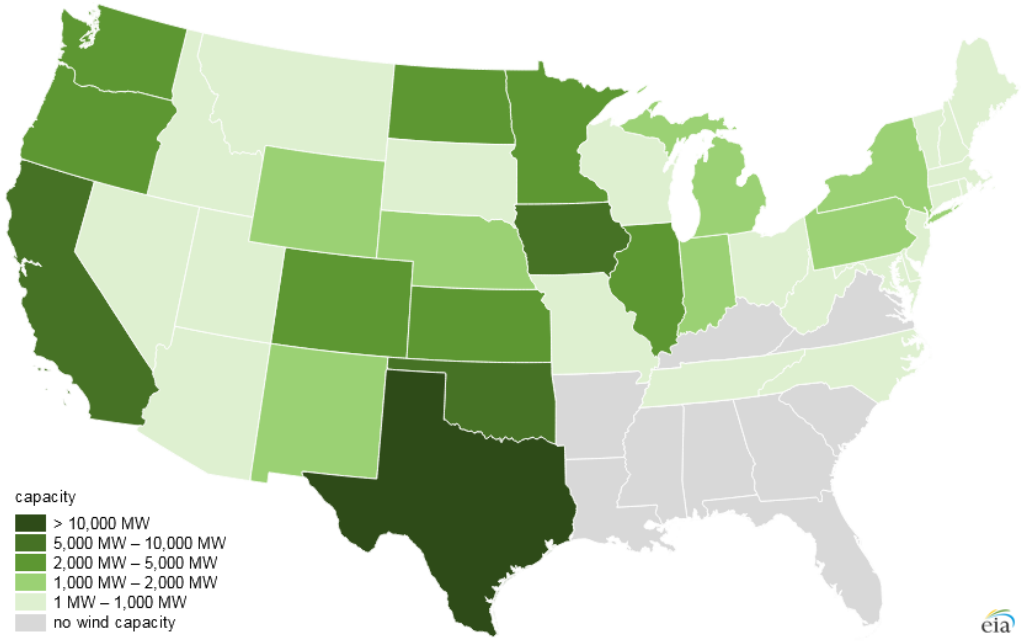
Nel Hydrogen – 20MW Alkaline Electrolyzer



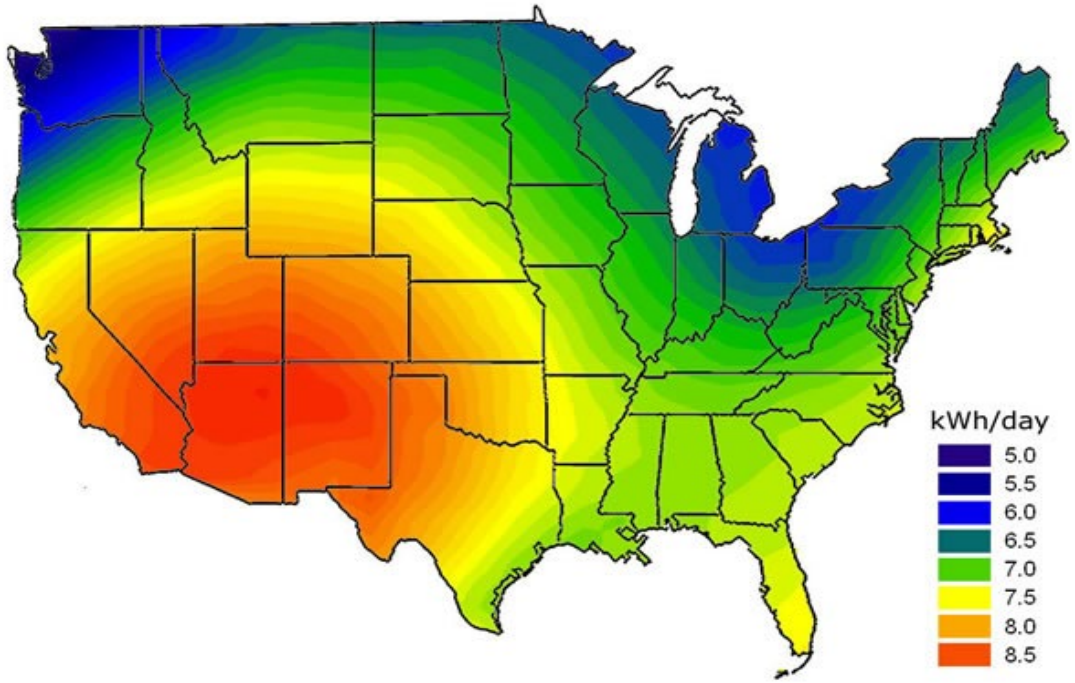
- Working on feasibility study
- Unique facility with two different electrolyzer technologies
  - Will host the largest Solid Oxide Electrolyzer in the world
- Potential for 30k metric tons of zero carbon ammonia per year, starting up in 2024
- Expecting to offset hydrogen production costs using clean hydrogen tax credits of up to $3 per kg
- Will utilize renewable power from solar and wind facilities in Oklahoma and Kansas
- Reducing process CO_2 emissions from existing facility by ~50k metric tons per year

US renewable power generation potential

Wind generating capacity



Solar generating capacity



- Oklahoma has great opportunities for new wind and solar power generation facilities
- The state higher renewable power generation efficiencies drive lower production costs per MWh

Source: Energy Information Administration, National Renewable Energy Laboratory

LSB clean energy developments

- Current projects
  - El Dorado low carbon ammonia project will reduce LSB scope 1 emission by 25%
  - Pryor zero carbon ammonia project will reduce LSB scope 1 emission by 3%
  - N_2O abatement in nitric acid production will further reduce our scope 1 emissions
- Potential developments
  - Increase renewable energy power consumption to reduce our scope 2 emissions
  - Potential to use renewable natural gas (carbon neutral) as feedstock to further lower our scope 1 emissions
- Pursue growth opportunities in the low carbon ammonia front with carbon capture and sequestration, including new facilities or expansion of existing facilities