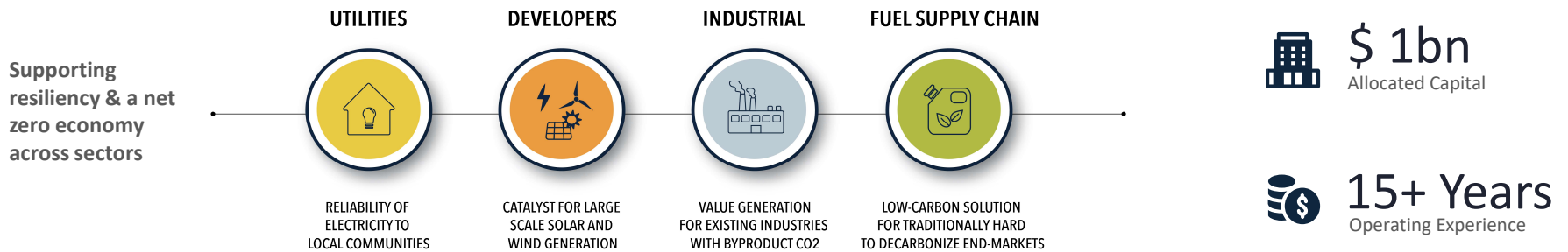




Decarb Canada

October 2023

# Producing Low Carbon Fuels Through Electrolysis

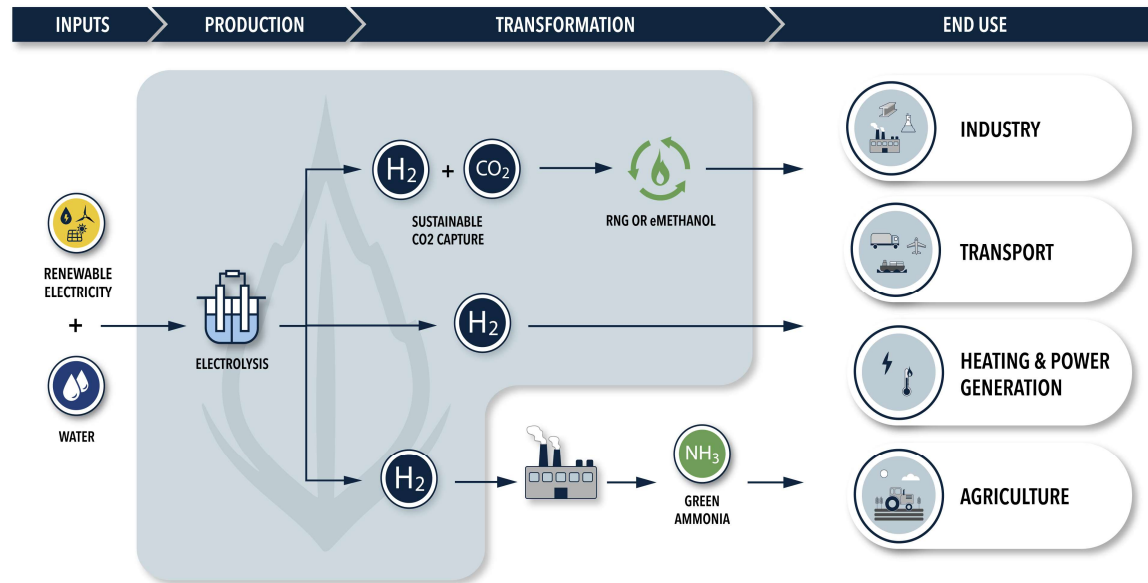


## We develop, own, and operate renewable hydrogen-based clean fuel production facilities

- Leveraging our decades of experience in renewable energy, we help corporations, utilities, and governments achieve net zero emissions through the production of low carbon fuels for hard to decarbonize sectors.
  - Electrolysis represents a replicable approach to producing low carbon fuels at scale
- We support a low-carbon future through the production of economical clean hydrogen underpinned by renewable electricity and an offtake strategy that spans a variety of end markets including marine, transport, industrial, and utility.
  - These sectors provide a stable existing market without the need for the build out of a supply chain infrastructure.

# eFuels – H2 Derived End Products

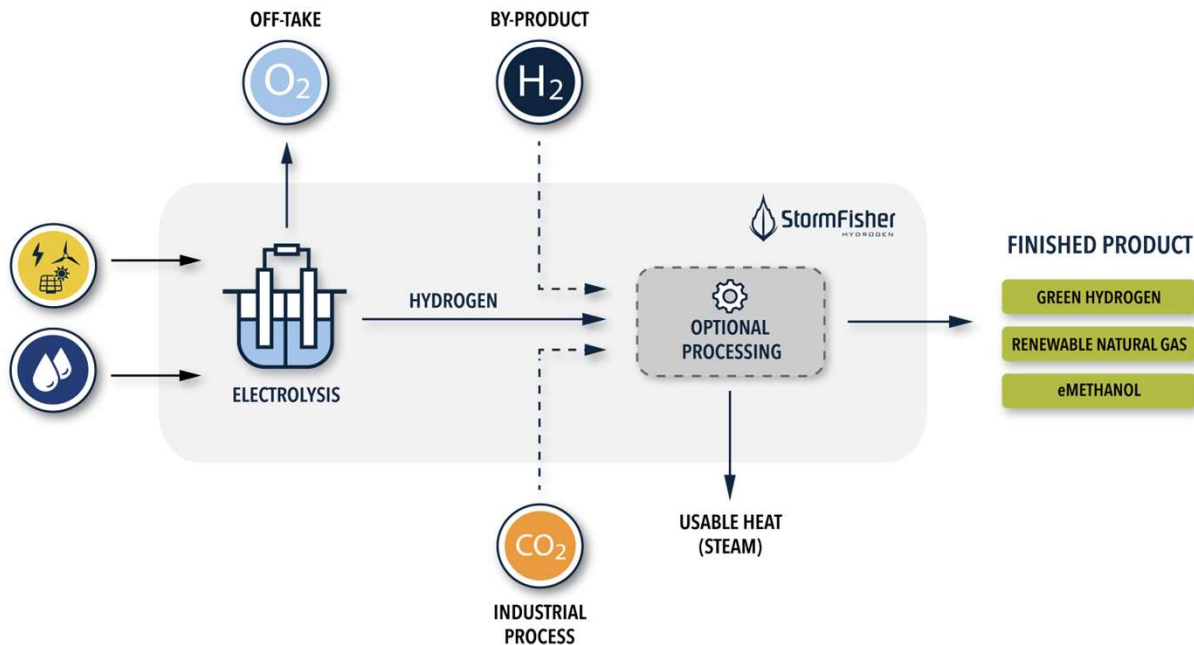
Electrolysis represents a replicable approach to producing low carbon fuels at scale



StormFisher has evaluated various decarbonization pathways for hydrogen, matching low carbon hydrogen-based fuels with hard-to-abate applications

- Traditional biofuel approaches result in feedstock constraints limiting scale and replicability
- Completed a FEED and commercial feasibility study for a 25 MW P2G facility in Aylmer, Ontario
- Developing electrolysis-based projects across North America including Canada; Texas, Mid-West US, California, and Mexico
- Engaging with electrolysis, methanation, and methanol synthesis technology vendors to understand the capability and cost of rapidly developing technologies
- Working with companies with low carbon ambitions on the best use cases for hydrogen-based fuels

# Project Development Model



## Benefits of Clean Hydrogen-Based P2G



**Utility scale grid resiliency:** Operational flexibility to draw or curb power consumption



**Energy transition:** Pairs with solar and wind generation as an outlet for stranded or low-priced electricity coupled with energy storage applications



**Net zero economy:** Low-carbon fuel that can supply traditionally hard to decarbonize end markets



**Carbon Dioxide:** Maximize value of existing sources of carbon dioxide through utilization to make marketable clean end-products

# Project Development Framework

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## Infrastructure



- StormFisher identifies and secures optimal siting with grid connection and EcDev incentives in consideration.
- Select technology, design, and build partners.
- Draft, negotiate, and execute commercial agreements.

## Construction



- StormFisher oversees construction through to successful commissioning.
- StormFisher commits to a long-term energy price and takes construction and operating risk.

## Operations

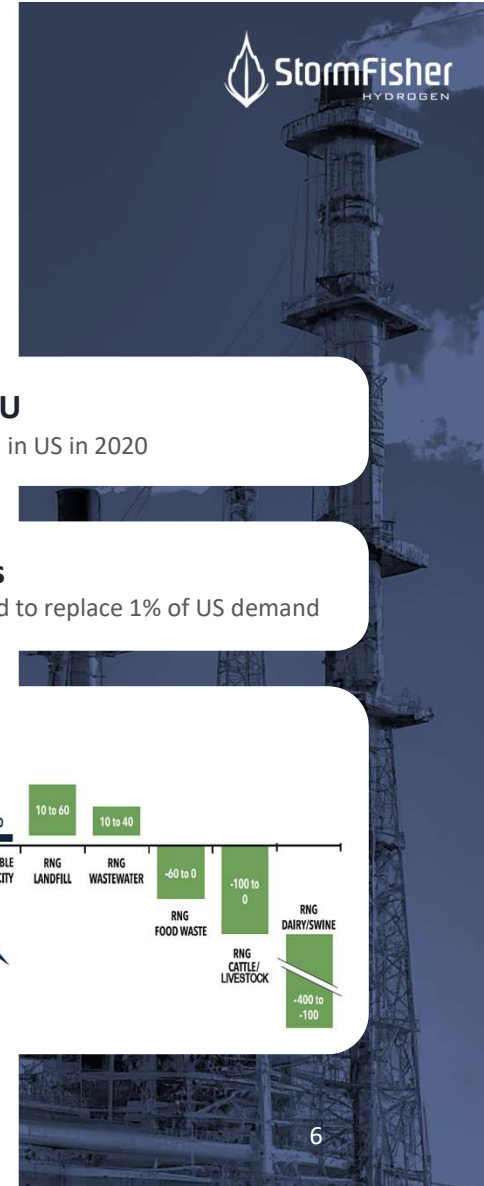


- StormFisher commits to performance-based operations to the Project.
- StormFisher will be responsible for day-to-day operations and maintenance.
- Track record of identifying and implementing process efficiencies.

# Renewable Natural Gas

RNG is molecularly identical to fossil natural gas and can be used in today's infrastructure. Clean hydrogen can be combined with carbon to produce RNG

- RNG is typically produced at small scale from surrounding waste streams. RNG from hydrogen can be produced at scale and serve to transport hydrogen.
- North American market is established with State and Provincial low carbon fuel standards creating carbon-based pricing supportive of low carbon RNG.
- Natural gas utilities are under pressure to green their systems with Canadian utilities, (FortisBC, Energir) and Northwest utilities such as PSE purchasing RNG under 20-year fixed price contracts.
- Voluntary markets are expanding with Large Multinationals and Institutions purchasing RNG under 5-10 year contracts to meet ESG requirements.
- Zero carbon RNG is sought after in the market and (prices from \$25-40/MMBTU)



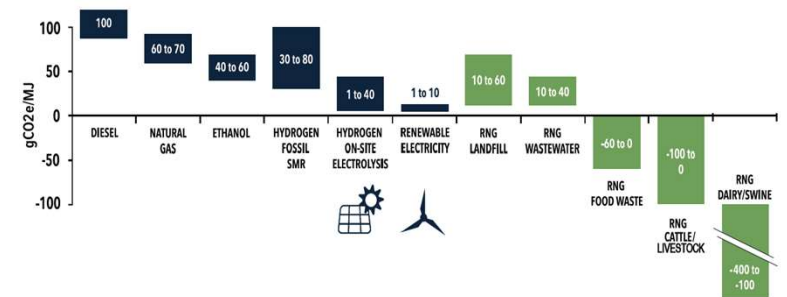
**33bn MMBTU**

Natural Gas used in US in 2020



**3.3M Tonnes**

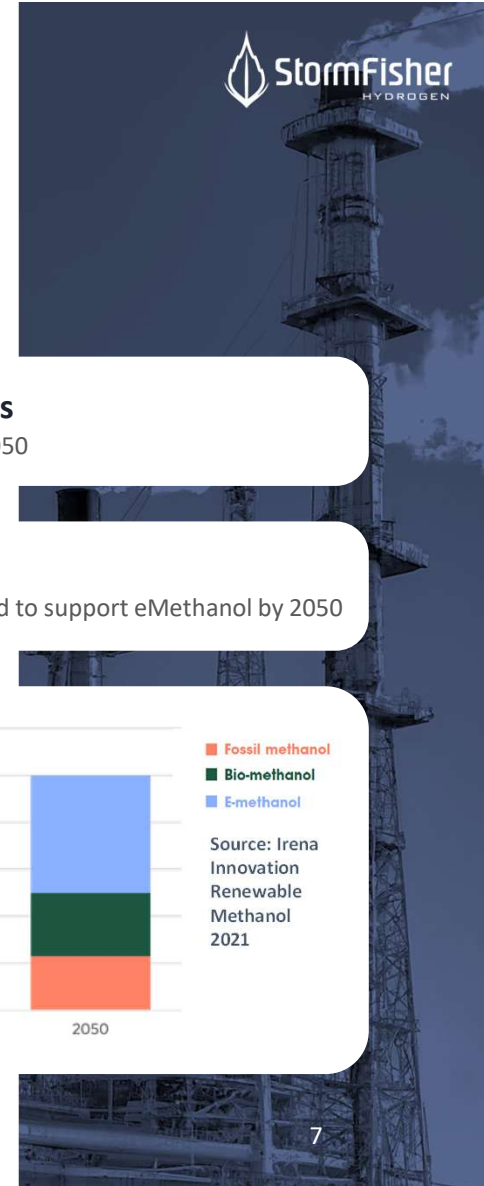
Hydrogen needed to replace 1% of US demand



# eMethanol

**Renewable methanol demand is outpacing supply – over 80 renewable methanol facilities have been announced to be online by 2027 to meet the demand.**

- European Union’s Energy Roadmap calls for GHG emission reductions of 80-95% by 2050 (32% reduction by 2030)
  - Maersk has committed to purchase 750,000 tonnes of eMethanol by 2025.
- The global methanol market size was \$28bn in 2020 and is projected to grow 5% annually to \$55bn by 2030.
- Hydrogen is a key raw material for methanol production, accounting for about 75% of the total production cost.
- Renewable methanol can be used as a fuel for transportation, especially for hard-to-abate sectors such as aviation and shipping, where electrification is not feasible, and chemicals such as ethylene, propylene, acetic acid, and formaldehyde.
- eMethanol market is nascent with pricing ranging from \$500-1,200/tonne
- Renewable bio-methanol is transacting at \$1,600/tonne, creating pricing power for eMethanol



# Renewable Ammonia

Clean hydrogen is a reliable and sustainable energy feedstock with stable pricing giving operational certainty to ammonia and fertilizer producers.

- The combined capacity of all currently announced renewable ammonia projects represents around 8% of the current global ammonia production.
- Renewable ammonia is expected to be competitive with fossil-based ammonia by 2030, achieving cost parity with CCS beyond 2030.
  - IRA puts clean hydrogen in a competitive position particularly as fossil gas prices continue to increase.
- Renewable ammonia and fertilizer through clean hydrogen can significantly reduce scope 1 greenhouse gas emissions and help meet sustainability goals.
- Green ammonia to fertilizer can help meet the increasing demand for sustainably produced products, and the global need for fertilizer.



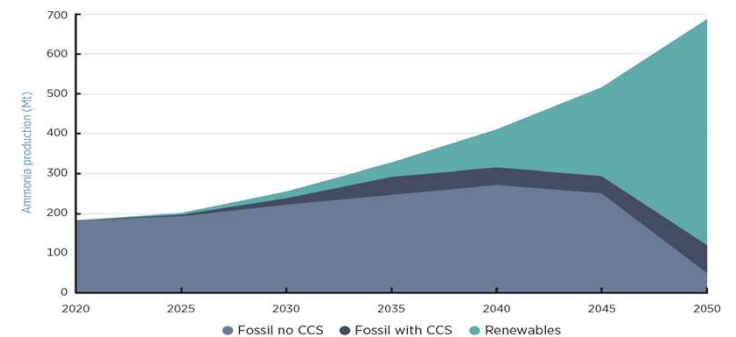
**20M Tonnes**

Renewable Ammonia by 2030



**60 Facilities**

R-Ammonia Facilities in development globally



Source: Irena Innovation Outlook – Ammonia 2022



# Energy. Water. Power

We repurpose the world's scarcest commodities

Thank you. For more information, please contact:



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