

wood.

Energy Transition





160+
year history

45,000
people

60+
countries

~\$10bn
2019 revenue

ENR #1
International Design Firm

Future Ready Now

Leading engineering and consultancy

One of the world's leading consulting and engineering companies operating across Energy and the Built Environment.

Consulting



Projects



Operations



Wood in Australia

40 years in Australia and over 3,000 people



Water



Life Sciences



Oil & Gas



Mining



Renewables



Hydrogen



Innovate Reconciliation Action Plan

May 2019 – 2021

The Wood business is united in its dedication to drive change, and help 'Close the Gap' between Aboriginal and Torres Strait Islander peoples and the wider community.

[Click here to access.](#)

wood.

Has hydrogen's time finally come?

For the last 30 years, hydrogen has been sold as 'just around the corner'...

but what is the difference *this time* for this clean and abundant energy vector?

- Energy demand is exponentially increasing as well as policy, industrial and societal pressures to reduce emissions, both of which requires a clean molecule in addition to electrification
- Technology and digitisation of industries continues to advance
- Significant cost reduction is happening across different hydrogen applications like renewables and carbon capture
- Government policy and dedicated investment
- Carbon pricing is shifting the burden
- Demand increasing across major sectors



“ After many false starts, hydrogen power is at last in sight of commercial viability.”

The Economist, 1999

Hydrogen is not a source of energy but a vector

It is the most common element in the universe but exists in combination with other elements, like oxygen in water or carbon in methane, so needs to be isolated to produce H₂

Now

greyH₂

Methane feedstock

Conventional, carbon intensive, Steam Methane Reforming, Autothermal Reforming

Wood track record: Designed 120+ hydrogen plants ranging from 4,000 Nm³/h to 160,000 Nm³/h single train.

Supplied over 220 Terrace Wall™ heaters worldwide

Near

bioH₂

Liquid bio feedstock

Carbon neutral Steam Reforming process

Biohydrogen is produced from liquid bio-feedstocks, such as biogas: this is a relatively new area of initiatives where Wood is developing new technology

Future

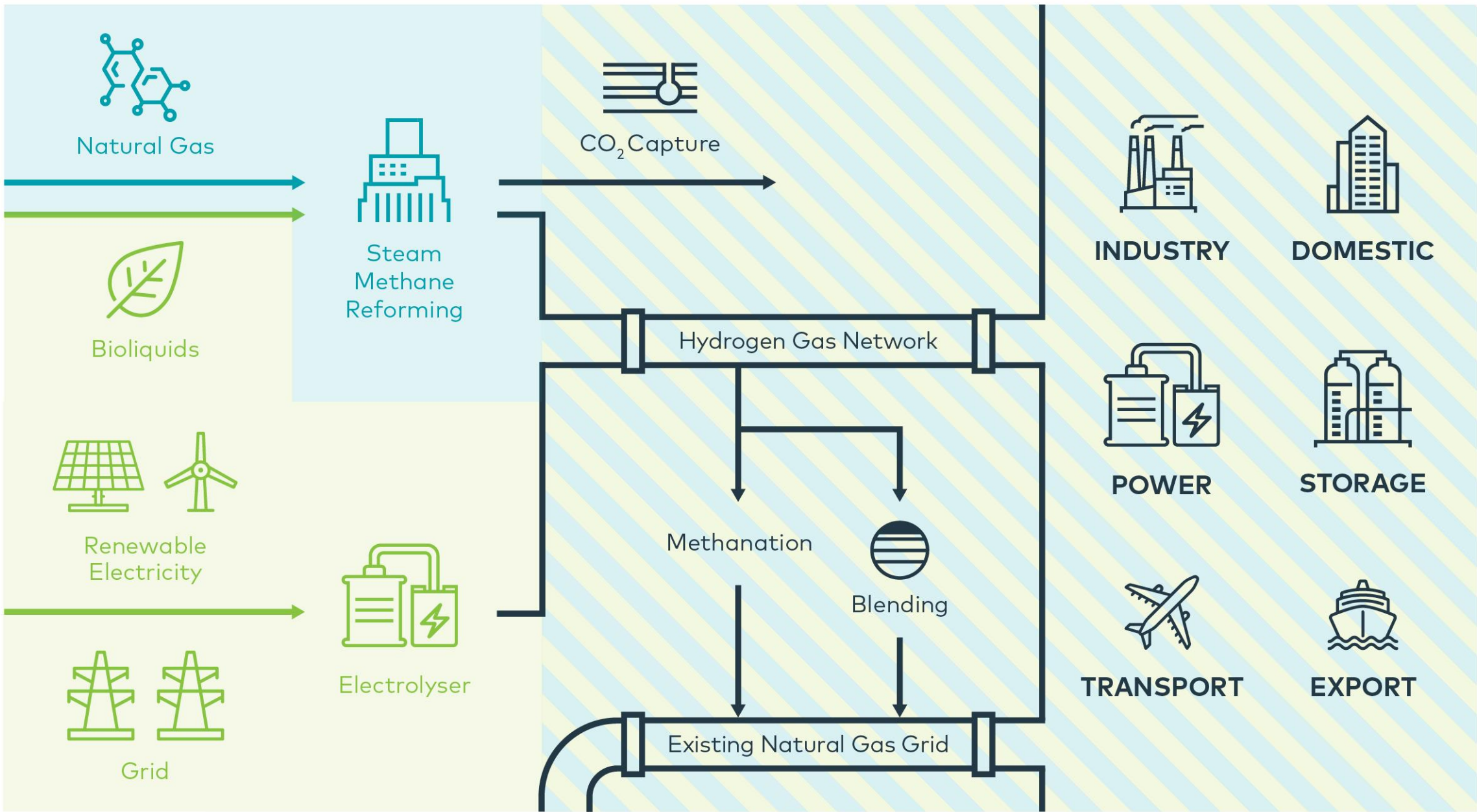
greenH₂

Water feedstock

Electrolysis powered by renewables

Currently mostly in study phase with some projects starting to move towards maturity.

Today, electrolysis technology is capped at 10MW generating c2,000 m³ / hr of H₂. Therefore, green hydrogen applications tend to focus on heavy transport application



■ Green Hydrogen
 ■ Blue Hydrogen

Our hydrogen journey

120+ hydrogen units
licensed and designed

Modular
solutions

Expertise in
production, storage
and distribution

60 years H₂
experience

200 MMSCFD (550MW)
Largest single train unit

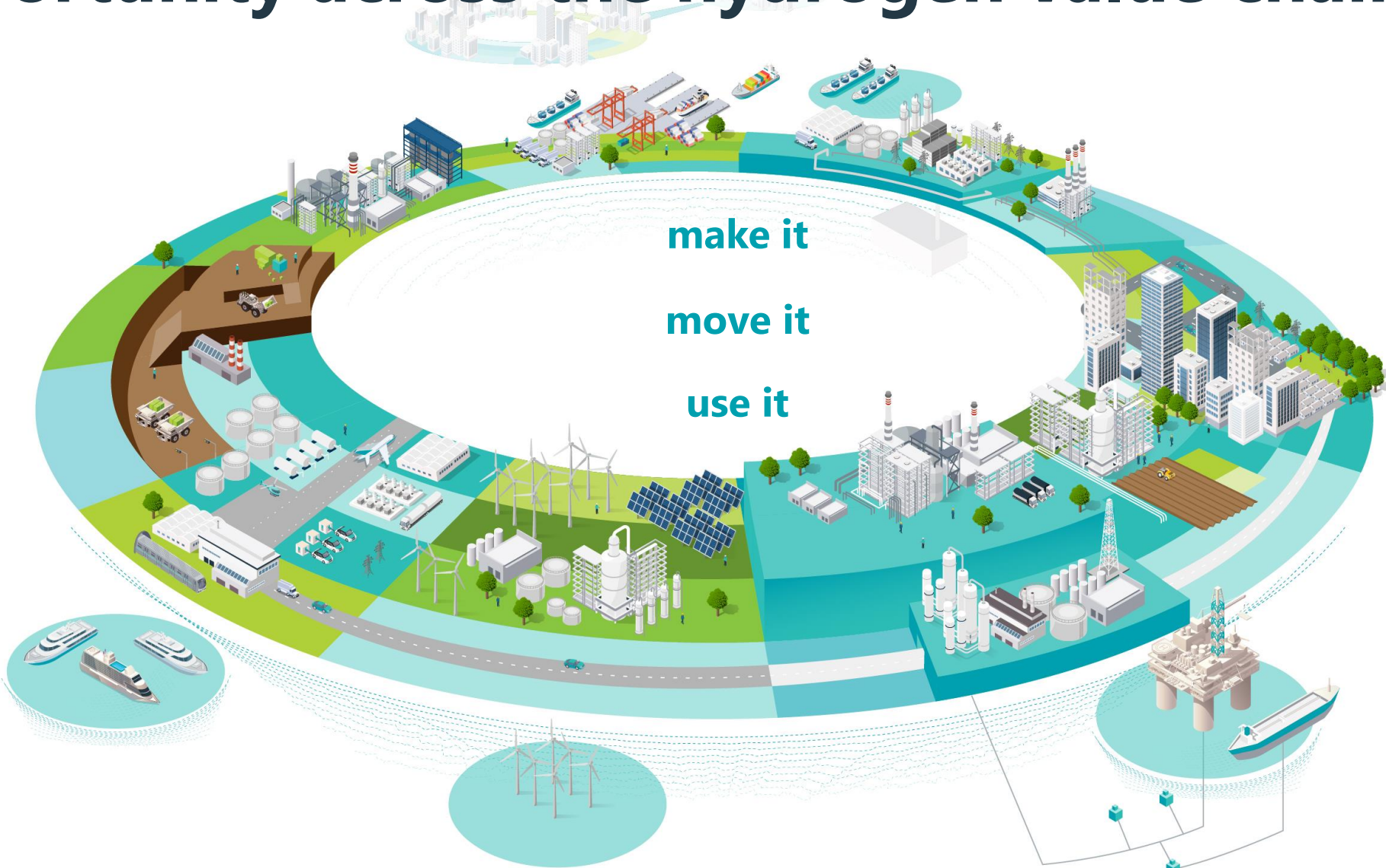
Experience in **integrated**
industrial developments

Biohydrogen
technology

Sustainable **clean SMR**
with 95% CO₂ reduction

Emerging blue hydrogen
technology with
integrated carbon capture.
Positioning for green

Opportunity across the hydrogen value chain



Make it: Near term production demand drivers

Accelerating industrial decarb



Need to bridge the gap to green hydrogen and reduce the CO₂ footprint of industrial Hydrogen generation from traditional sources.

Traditional market growth



Feeding the world's growing population is a major source of hydrogen demand today and will play a role in ongoing hydrogen demand and economics in the years ahead

Ramping up biofuel & Ecofining



Build on strong existing technology partnership with Honeywell UOP on "Ecofining" technology

Biofuels offers only near-term option to decarbonise aviation and heavy transport is already proven.

Make it: Over 120 Wood SMR units globally

ENI Gela, Italy



Wood scope: EPC LSTK for the complete HPU based on steam reforming technology and support the conversion of the existing refinery to a green refinery based on Ecofining™ technology.

Suncor, Canada



Wood scope: HPU PDP based on steam reforming technology and support the refinery modernisation and partial conversion to a green refinery.

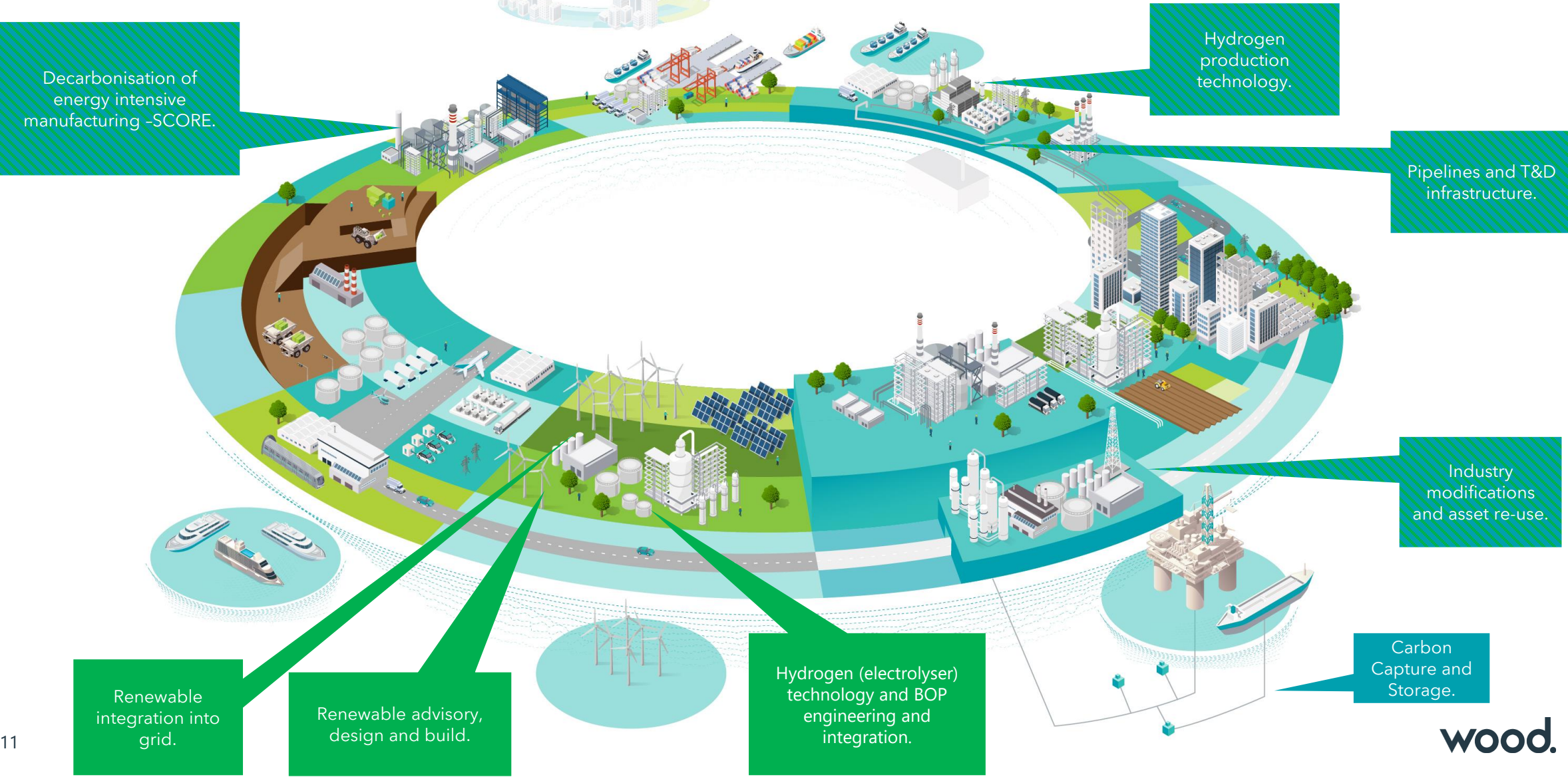
SCAPSA, Argentina



Wood scope: EPF modular supply for the complete HPU based on steam reforming technology and support the refinery modernisation to be delivered on EPF basis.

Proprietary reformer design

Make it: Integrating green & blue H₂



Make it: Combine SMR & CO₂ capture for blue H₂

Wood has a unique proposition when combining hydrogen with carbon capture and storage expertise.

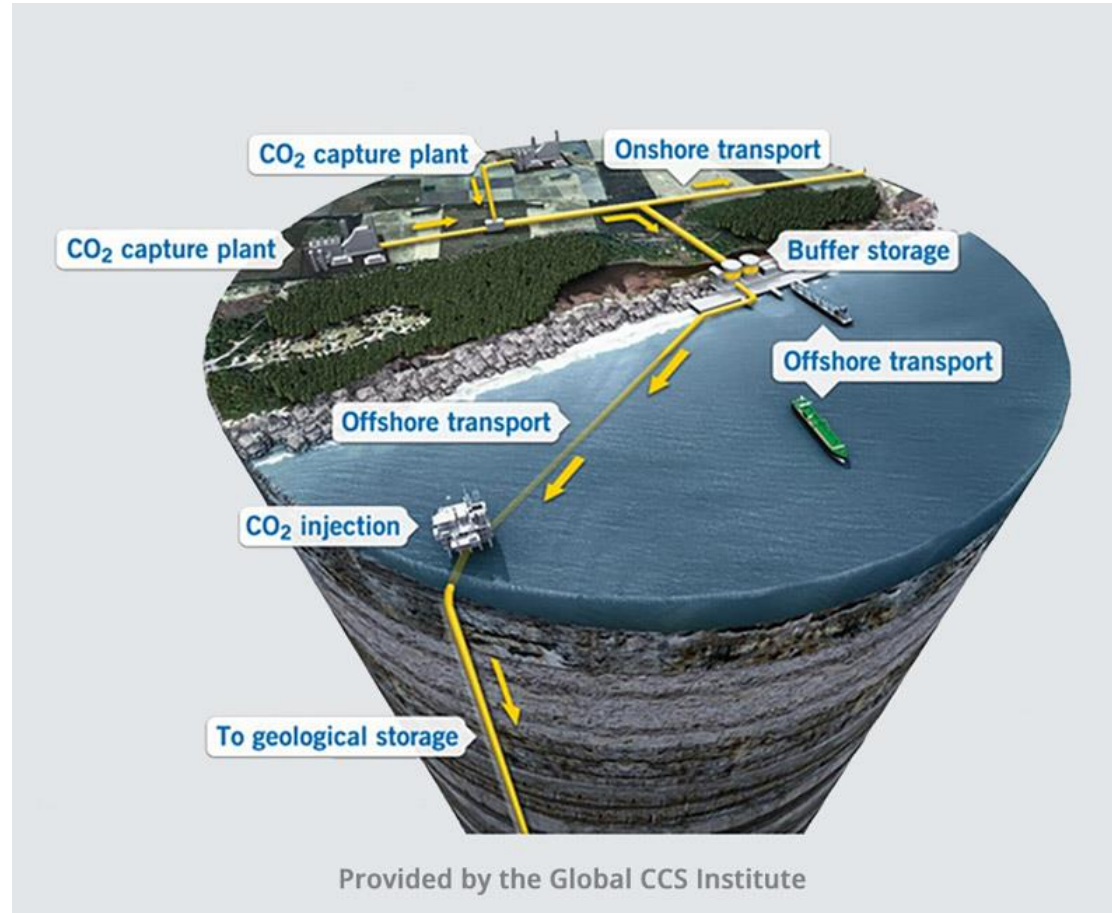
Carbon Capture design

Blue Hydrogen Technology

Subsea Pipeline design

Topsides Modifications

Onshore / Offshore Permitting & Consents



Carbon Pricing & economics

Flow Assurance Experts

Integration with existing facilities

Marine Transport

CO₂ Injection Expertise

Wood plays a pivotal role in industrial clusters

BP Net Zero Teesside



Designing optimised, state-of-the-art carbon capture facilities for gas-fired power & six industrial processes, key UK emitters with high impact on climate change.

SGN North East Scotland



Roadmapping the decarbonisation of the east coast of Scotland
Future forecast of hydrogen production and demand capacity.
CO₂/H₂ storage considerations.

Humber Zero



Decarbonisation masterplan for two oil refineries, combined heat & power plant, and gas-fired power station. Green and Blue Hydrogen refueling and post-combustion carbon capture avoiding 8 MTPA CO₂.

Actively pursuing further phases in the majority of UK industrial clusters (technology, FEED, EPC and PMC)

Hydrogen distribution Challenges

- **Energy integration** - delivering hydrogen into mature and complex integrated energy systems
- **Transporting hydrogen** across large distances (across land and oceans), linking low cost supply with large volume demand. Different carriers (liquified H₂, ammonia, or other carriers)
- **Safe storage** - hydrogen handling challenges in particular low density, leakage risk and explosion risk
- **Network distribution** – minimising new network capex through existing infrastructure repurposing and modification

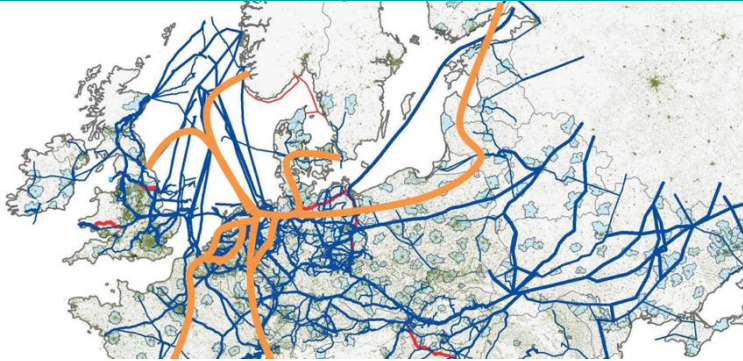


Developing
distribution
systems that
deliver on
promises.

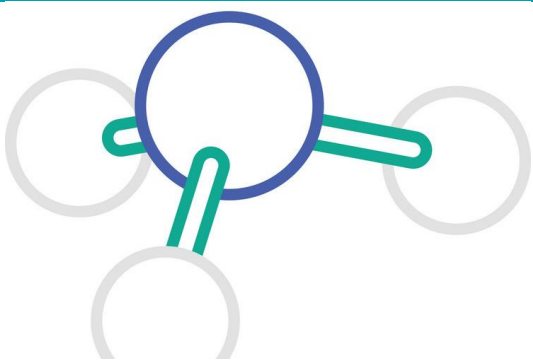
Move it: export & distribution expertise



Pressurized networks



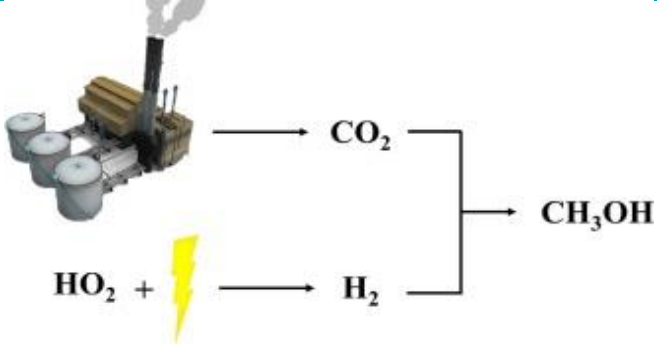
Ammonia Cracking



LNG conversion



Green Methanol



Liquefied



Overview of Wood value propositions

	Opportunity	Wood Value Prop	Maturation
1	Step change current technology to capture Blue Hydrogen bridge to renewable future.	Accelerate Wood Industrial Hydrogen Technology (Inc Sector expansion) CCS+EPCm.	Near term
2	Hydrogen demand associated with adoption of biofuels (specifically aviation).	Technology Partnership w Bio-Diesel/Kerosene leaders – Product Revenue stream.	Near term
3	Development and integration of Green Hydrogen into industry and infrastructure.	System integration and development, implementation and operation of supporting infrastructure.	Near to Mid term
4	Differentiated access to Green Hydrogen.	Technology partnership with Electrolyser supplier EPC of Renewable source.	Mid to Long term
5	Bulk transportation (ammonia).	Technology partnership and product offering for Ammonia production and cracking EPC implementation.	Mid to Long term

