

FUTURE NORTHERN TERRITORY HYDROGEN SUPPLY CHAIN

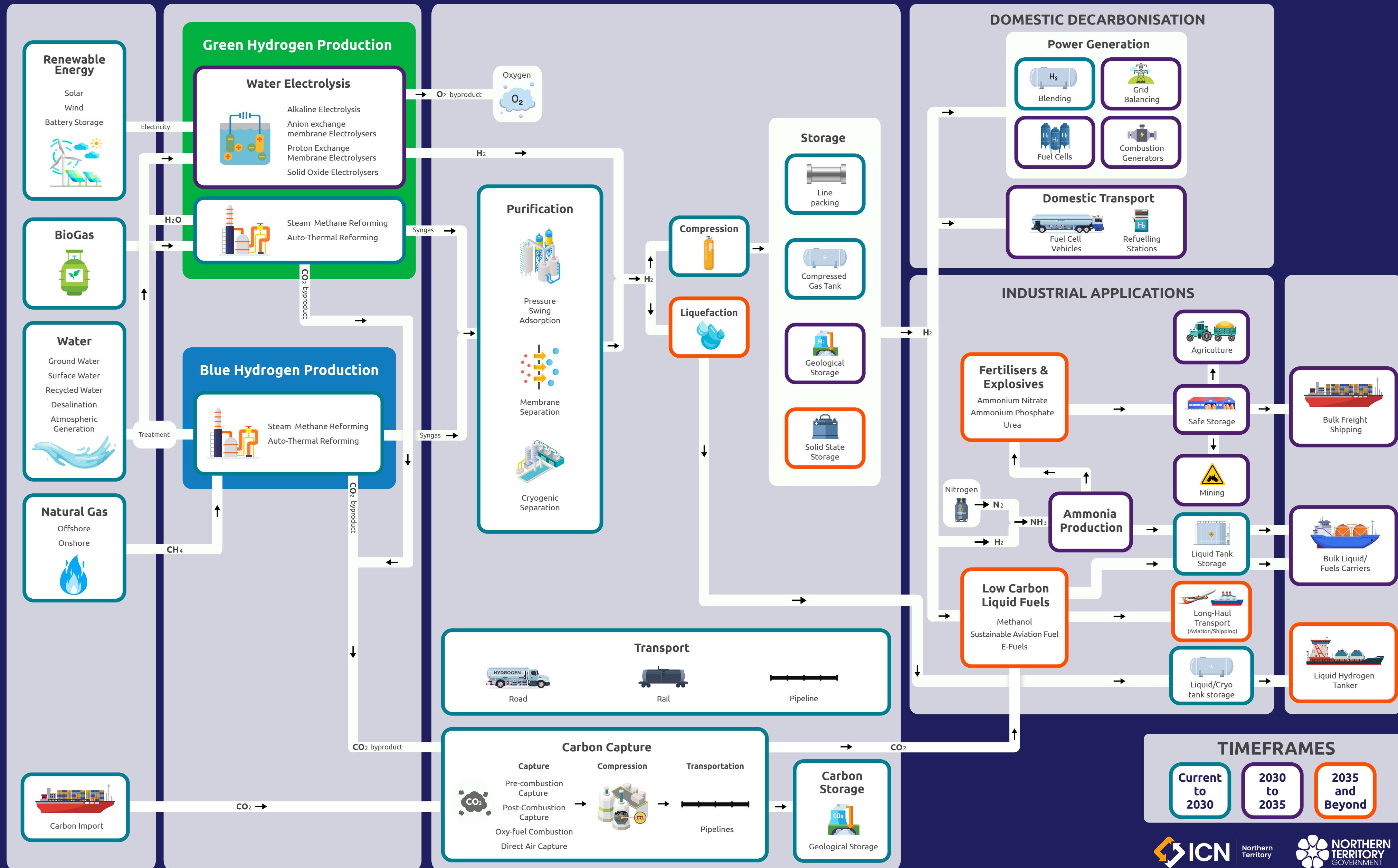
FEEDSTOCK

PRODUCING

PROCESSING

USING

EXPORT



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Explanatory Note

This graphic is intended to provide a comprehensive overview of the anticipated future hydrogen supply chain from the perspective of industry capability in the Northern Territory, Australia (NT). This work aims to better understand the relevant inputs, pathways, technologies, processes, applications, and end-uses of clean hydrogen specific to the NT. As such, many aspects have been prioritised or excluded to reflect the most likely potential future NT hydrogen industry as accurately as possible.

In developing this graphic, ICN NT conducted significant stakeholder consultations with hydrogen experts and relevant industry representatives. Their feedback was invaluable in refining the supply chain stages and time frames to be appropriate to the NT. This work reflects the best knowledge available at the specific point of time of the stakeholder consultations.

All future hydrogen and carbon capture projects will be subject to relevant approvals, assessments, and licensing under the NT's regulatory framework.

FEEDSTOCK

A combination of wind and solar, complemented with battery storage, was agreed to be the most optimal energy mix to ensure uptake for the longest periods possible during the day. Some forms of renewable energy, such as hydroelectric power, have been excluded as it is not a likely renewable energy source in the NT's geographical landscape.

While geothermal energy may become more feasible over the longer term, it is not identified as an immediate priority in the NT.

Biogas is a mixture of gases, predominately methane and carbon dioxide, naturally produced from the decomposition of organic waste.

When organic matter is broken down in an anaerobic environment, it releases a blend of gases that can be used as a feedstock for hydrogen energy. This form of green hydrogen, is a carbon-neutral process, and the carbon dioxide byproduct can be captured and used for other industrial purposes (not detailed in this graphic).

All water used in hydrogen production in the NT must be sustainably sourced and managed and will be subject to assessment under the *Water Act 1992*, including licensing and extraction.

In terms of efficiency, it is more likely that the NT will import the carbon dioxide required to synthesise low carbon liquid fuels, which is included under the feedstock section of this graphic.

PRODUCING

Electrolysis produces pure hydrogen and oxygen. The oxygen byproduct from producing green hydrogen represents an additional opportunity with value for use in industry, which has not been explored in this graphic.

Depending on the source of methane used as feedstock, both steam methane reforming and auto-thermal reforming can be classified as blue or green hydrogen production. Auto-thermal reforming has not yet been produced on a large scale.

PROCESSING

Transportation of hydrogen applies to the entire processing stage, as different forms may be used at most supply chain stages.

Purification is only required after processing methane into hydrogen to remove carbon monoxide from the resulting synthetic gas (or syngas). Water is also required in the liquefaction and compression of hydrogen for cooling, although not represented in this graphic.

While the technology currently exists, liquefaction is scheduled later on the timeline to align with the anticipated timing of hydrogen production in exportable quantities.

Short-term storage methods are expected to be used in the near future to facilitate immediate production and domestic decarbonisation.

Geological and solid-state storage may come into play once larger quantities of hydrogen are being produced.

USING

The NT hydrogen industry will likely focus initially on domestic decarbonisation uses before generating exportable volumes.

Power generation, as well as a number of industrial applications such as ammonia, fertilisers, explosives and low carbon liquid fuels all present significant opportunities for the NT to decarbonise domestic markets through the hydrogen industry. Hydrogen can assist with the decarbonisation of domestic transport, including freight trains and trucks, passenger trains and other passenger vehicles, as well as 'return to base' vehicles such as buses and waste collection.

A number of viable future industries were excluded from this graphic in the interests of prioritising those most immediately likely for development. For example, there are potential opportunities for other future green industries, including green metals.