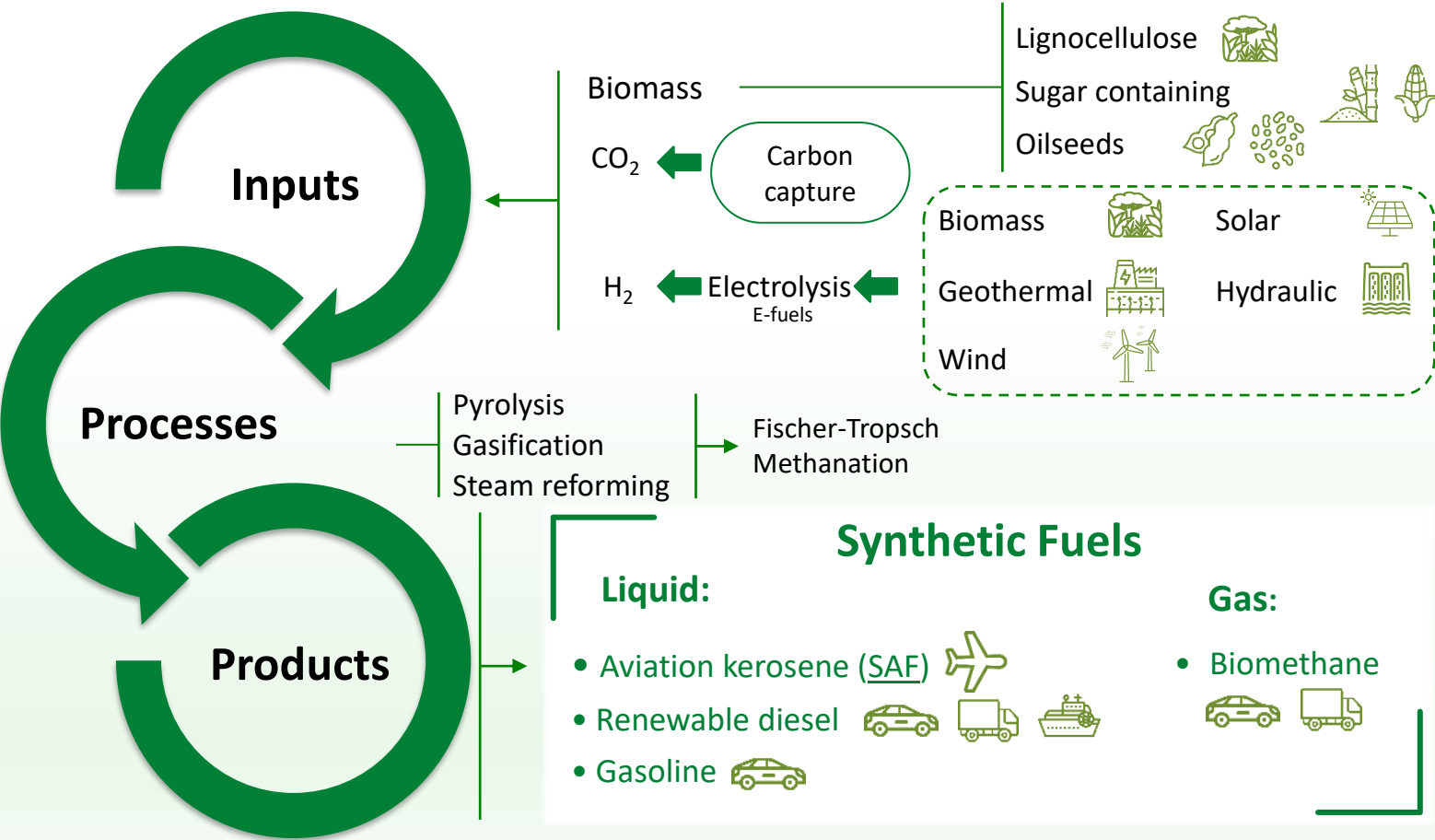




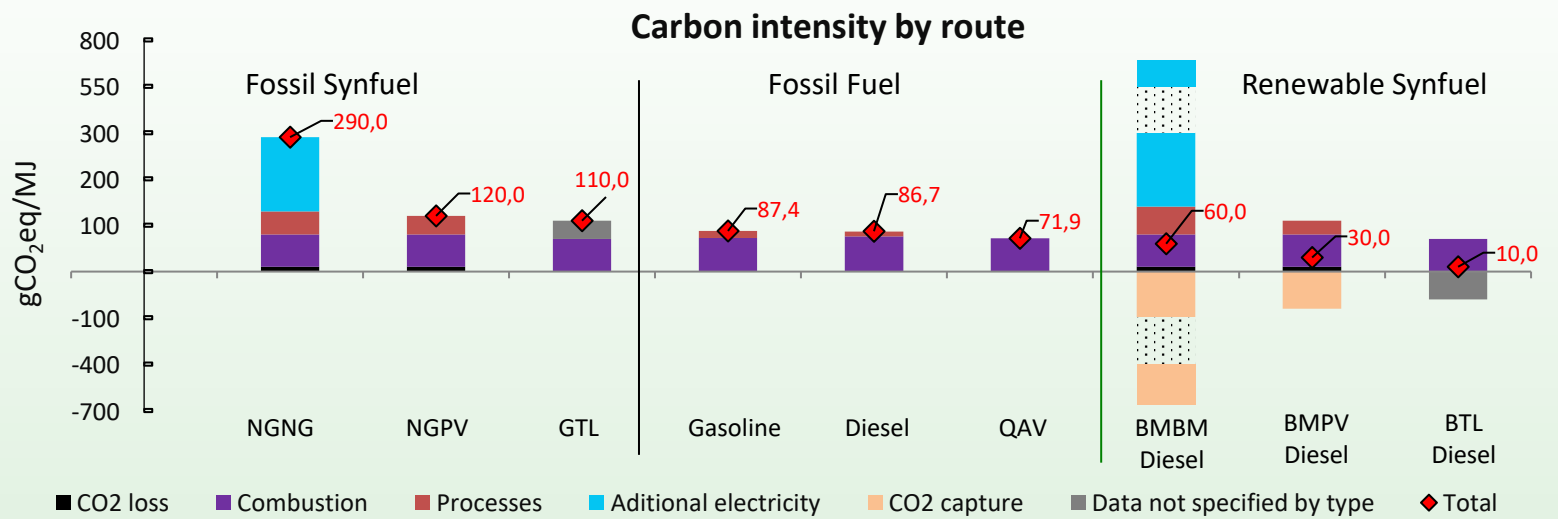
Synthetic Fuels, or SynFuels for short, are hydrocarbons artificially produced by catalytic and thermochemical processes. They have analogous properties to fossil fuels and can be used in existing systems without the need for adaptation (drop-in). This Fact Sheet covers only synthetics from renewable sources.



Note: In some cases, mixture limits between Synfuels and Fossil fuels have been established.

Brazil's expertise in energy crops and abundance in renewable resources accredit it as a potential producer of low-carbon synthetic fuels.

The input choice (energy and biomass) will be fundamental to produce a synthetic fuel with lower or higher CO₂ emissions, considering its life cycle assessment, thus helping the energy transition to a low-carbon economy.



Note – **GTL**: Gas to Liquid Technology; **NGNG**: Capture, use of CO₂ and electrolysis from natural gas; **NGPV**: Capture and use of CO₂ from natural gas and electrolysis by photovoltaic panel energy; **QAV**: Aviation kerosene; **BTL**: Biomass to liquid technology; **BMBM**: Capture and use of CO₂ and electrolysis from biomass; **BMPV**: Capture and utilization of CO₂ from biomass and electrolysis by photovoltaic panel energy.

Sources: [\(Giesen; Kleijn; Kramer, 2014\)](#); [EPE \(2022\)](#); [IPCC \(2006\)](#).



Synthetic Fuel Sources	Route
Plant biomass	Gasification of lignocellulose
Agro-industry - Forest residues, animal and agricultural wastes - Bioethanol - Biodiesel - Biogas	- Biomass Gasification - Bagasse Gasification - Reforming or gasification of glycerol - Methane Reforming
Urban waste - Urban solid wastes - Wastewater treatment	- Gasification - Methane Reforming
Pulp and paper industry	Gasification of bark and black liquor
Electrolysis from renewable energy and carbon capture and use from industry	E-fuels

Sources: [ProQR \(2021\)](#) e [Royal Society \(2019\)](#)

Initiatives in Brazil:



[Fuel of the future program](#) (2021): Expanding the use of sustainable and low-carbon fuels



[H2Brasil](#) (2021): Expansion of Green Hydrogen in Brazil



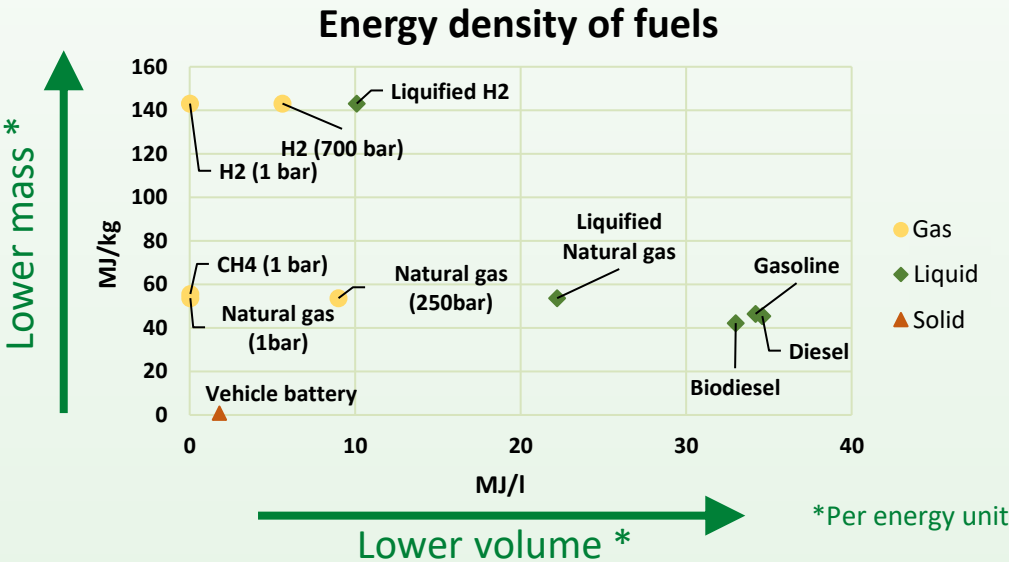
[ProQR](#) (2017-2023): Incentive to produce [SAF](#)



[PNH₂](#) (2022): Public policies, technology and the Hydrogen market.

High energy density is key to traveling long distances.

Therefore, to reduce the environmental impacts in the transport sector – air, sea and heavy vehicles – the **Synthetic fuels** are shown as an alternative to their fossil analogues.



Opportunities

- *Technological routes with technological maturity (e.g., Fischer-Tropsch)
- * Possibility of use in mixtures without the need for adaptation (drop-in)
- * High energy density favors storage, transportation and use
- * Reduction of GHG emissions and pollutants (particulate matter, aromatics, SOx and NOx) when compared to fossils

Challenges

- * Technology cost reduction
- * Increase maturity of some technologies
- * Replacement of fossil fuel depends on its final price
- * Renewable energy generation and H₂ at scale and competitive costs
- * Energy losses in the production process