



SCENARIO MAKING WITHIN THE FRAMEWORK OF GECF GLOBAL GAS OUTLOOK: HYDROGEN SCENARIO

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7th – 9th June 2021



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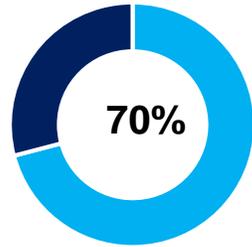
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Gas Exporting Countries Forum (GECF)



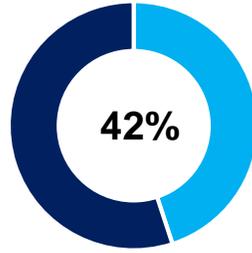
MEMBERS

Proven Natural Gas Reserves



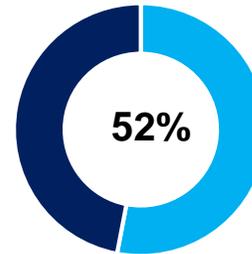
GECF: 144 tcm
World: 205 tcm

Marketed Gas Production



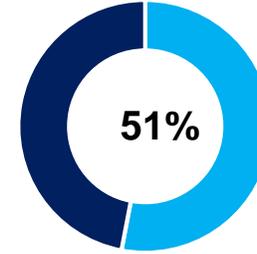
GECF: 1678 bcm
World: 3960 bcm

Pipeline Gas Exports

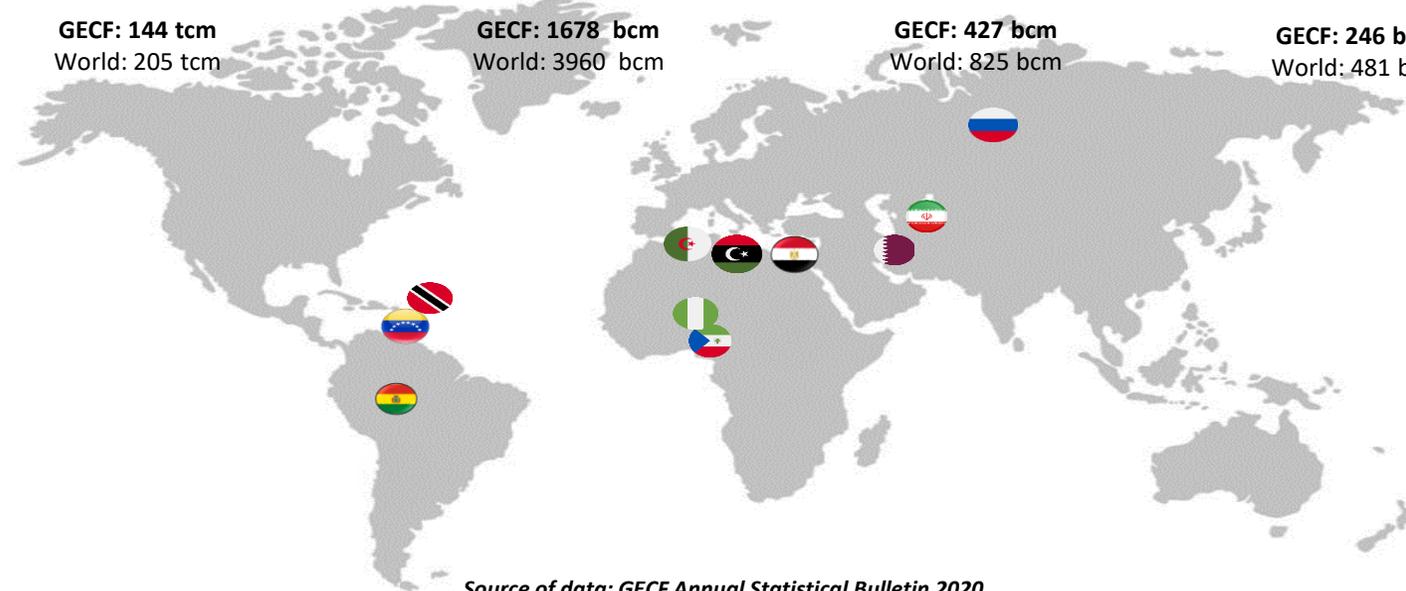


GECF: 427 bcm
World: 825 bcm

LNG Exports



GECF: 246 bcm
World: 481 bcm



Source of data: GECF Annual Statistical Bulletin 2020

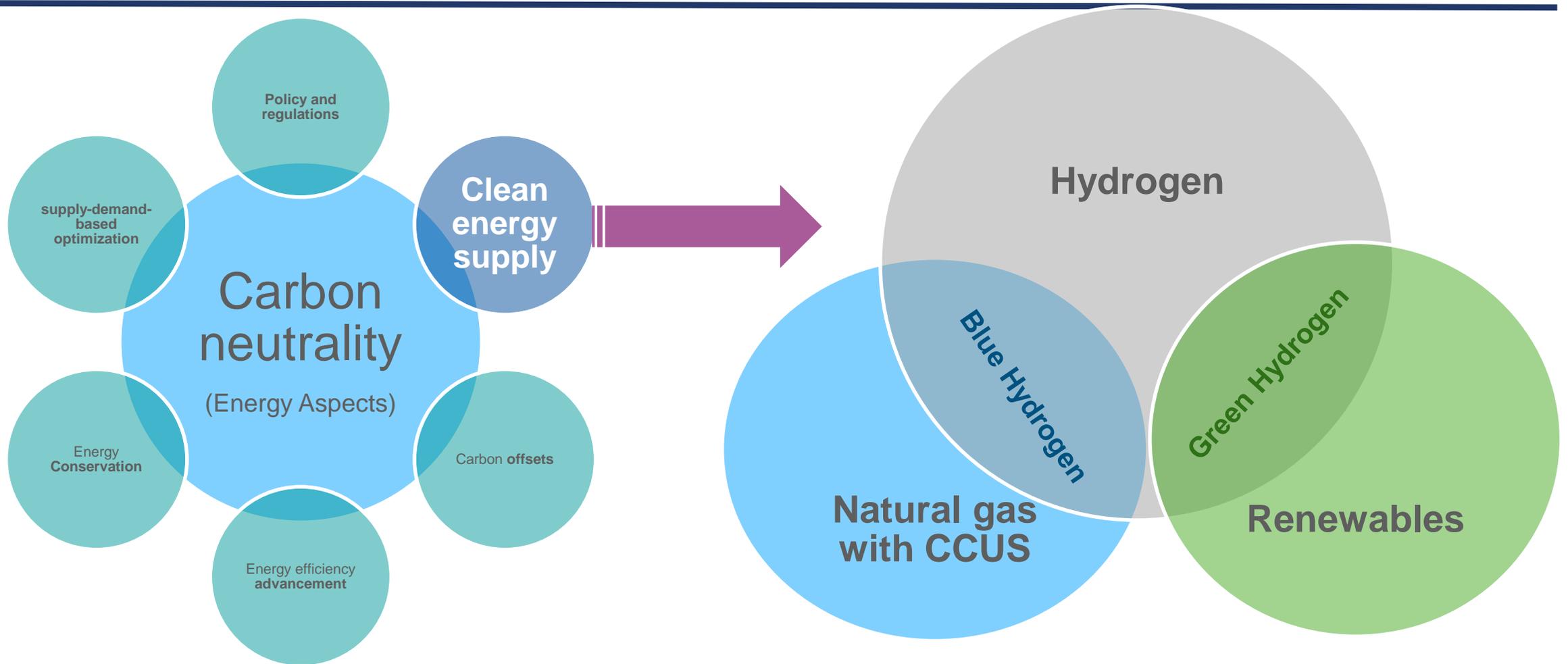
OBSERVERS

- Angola
- Azerbaijan
- Iraq
- Kazakhstan
- Malaysia
- Norway
- Peru
- United Arab Emirates

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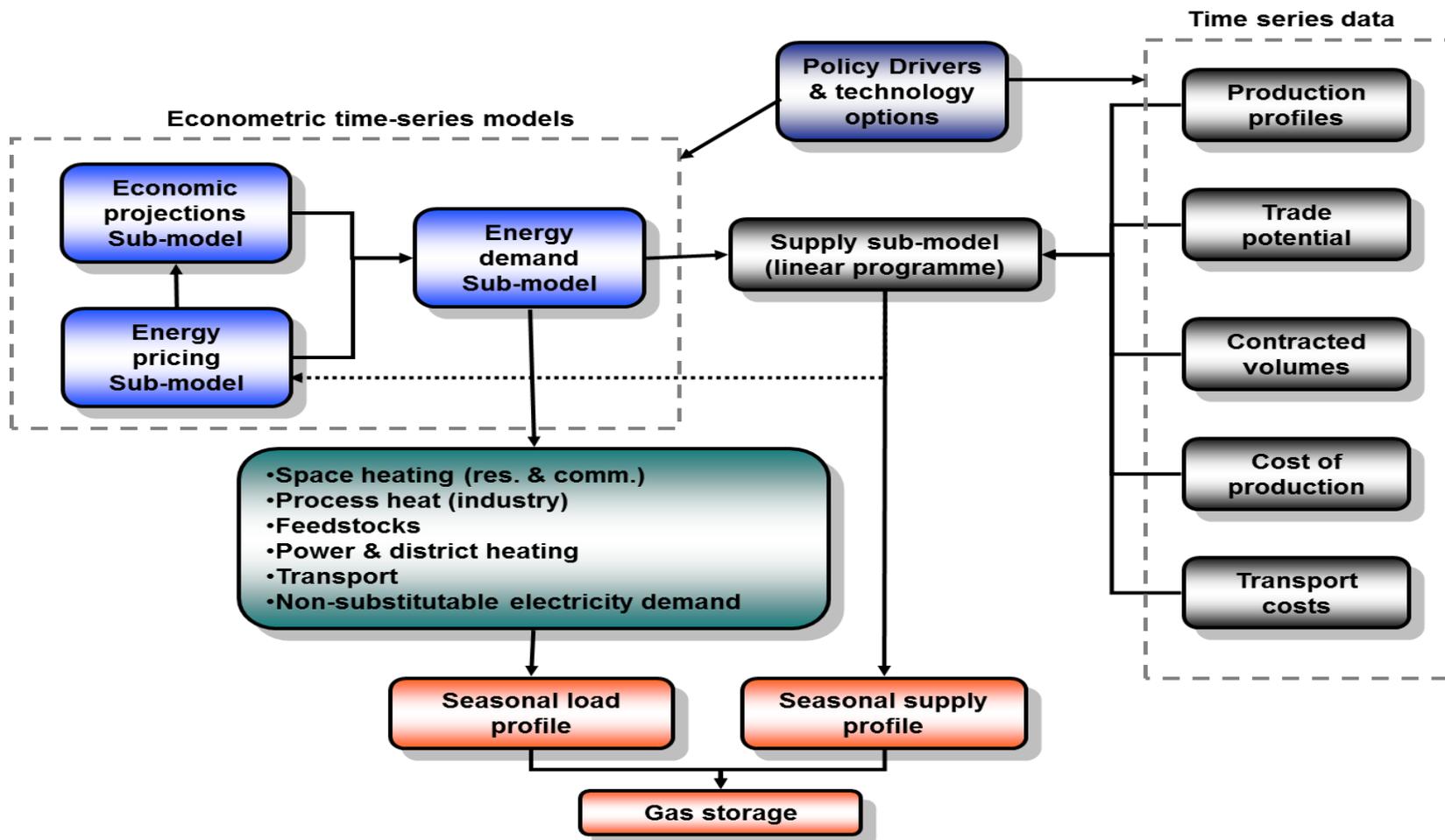
Carbon neutrality and the hydrogen role



Introduction and basics

GECF Reference Technology Map and the Hydrogen production spectrum

Model Architecture



Source: IHS Markit

The GGM provide energy projections on 34 energy sectors



- Final Sectors
 - Industry
 - Iron & Steel
 - Chemical
 - Construction
 - Mining & Quarrying
 - Non-Ferrous Metals
 - Non-Metallic Minerals
 - Other Manufacturing
 - Feedstocks
 - Domestic
 - Residential
 - Commercial
 - Agricultural, Forestry and Fishing
 - Transport
 - Motorbikes
 - Passenger Cars
 - Light Commercial Vehicles
 - Heavy Goods Vehicles
 - Rail
 - Aviation
 - International Aviation
 - Domestic Aviation



- Shipping
 - International Bunkers
 - Inland and Inshore Bunkers
- Other (incl. pipelines)
- Transformation Sectors
 - Power
 - Central Generation
 - CHP
 - District Heating/Cooling
 - Refineries
 - Conventional Refineries
 - Condensate Splitters
 - Gas-to-Liquids
 - Coal-to-Liquids
 - Biofuel Refining
 - Energy
 - Own-Use
 - Transmission & Distribution Losses
 - Gas Works Gas
 - Non-Energy
 - Other Uses

The GGM provide energy projections of 35 fuels



- Electricity
- Natural Gas



- Coal
 - Steam Coal
 - Lignite/Brown Coal
 - Coking Coal



- Crude
 - Crude Oil
 - Condensate
 - NGL



- Natural Gasoline



- Oil Products
 - Gasoline
 - Aviation Gasoline

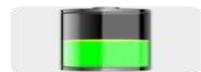


- Gasoil
 - Diesel
 - Heating Oil



- Fuel Oil

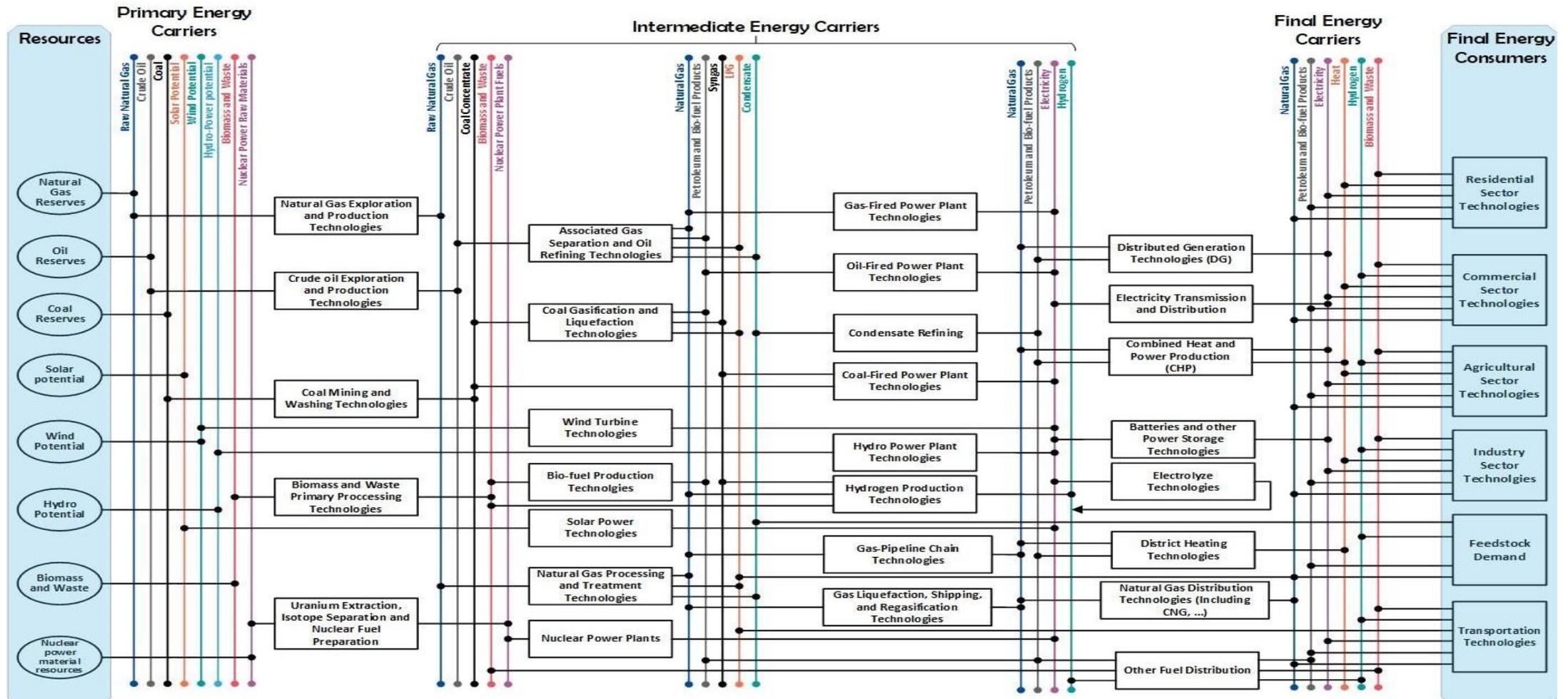
- LPG
- Naphtha
- Jet
- Kerosene
- Other Liquids



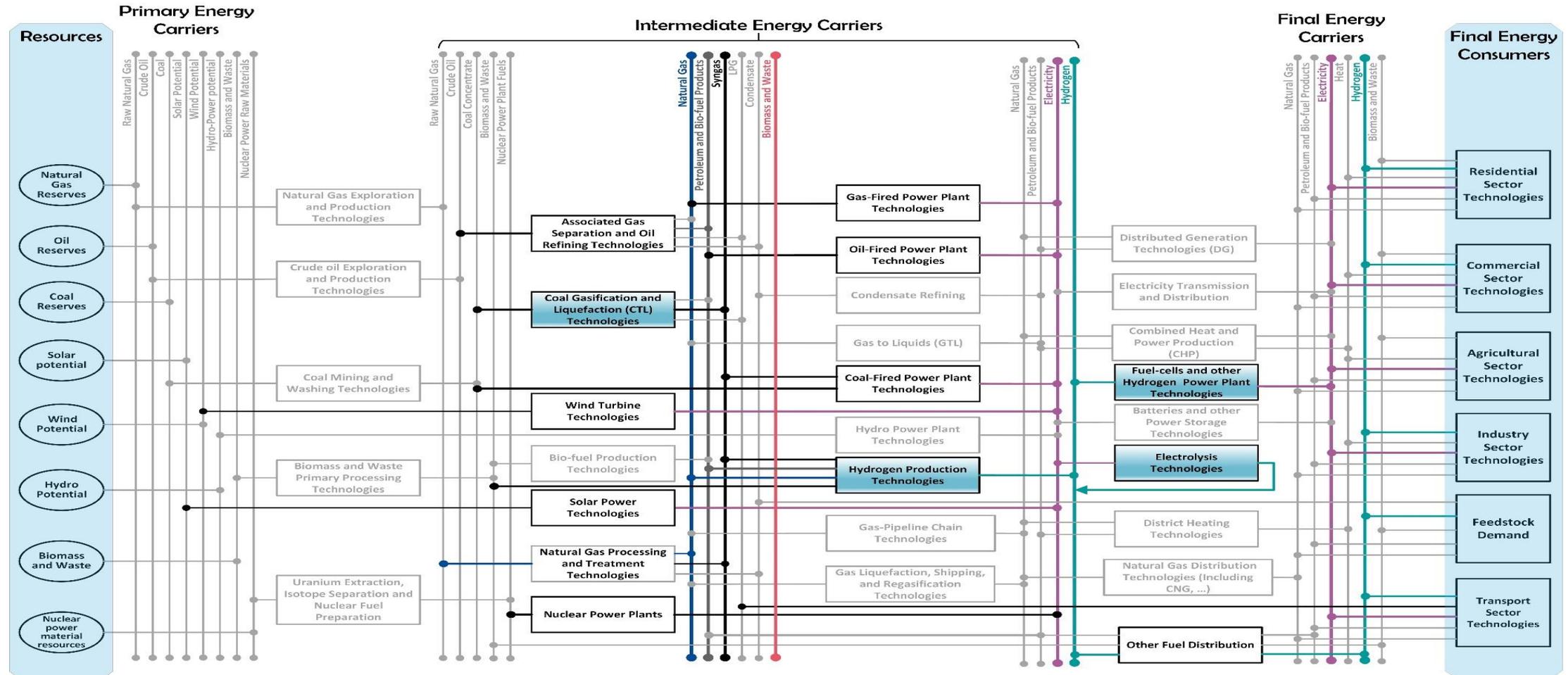
- Thermal Renewables
- Primary Electricity
 - Nuclear
 - Hydro
 - Geothermal
 - Tidal
 - Solar
 - Photovoltaic
 - Concentrated Solar Power
 - Wind
 - Onshore
 - Offshore
- Secondary Electricity
 - Pump Storage
 - Batteries
- Biomass & Waste
 - Ethanol/Biogasoline
 - Biodiesel
 - Biojet
 - Other Biomass

• **Hydrogen**

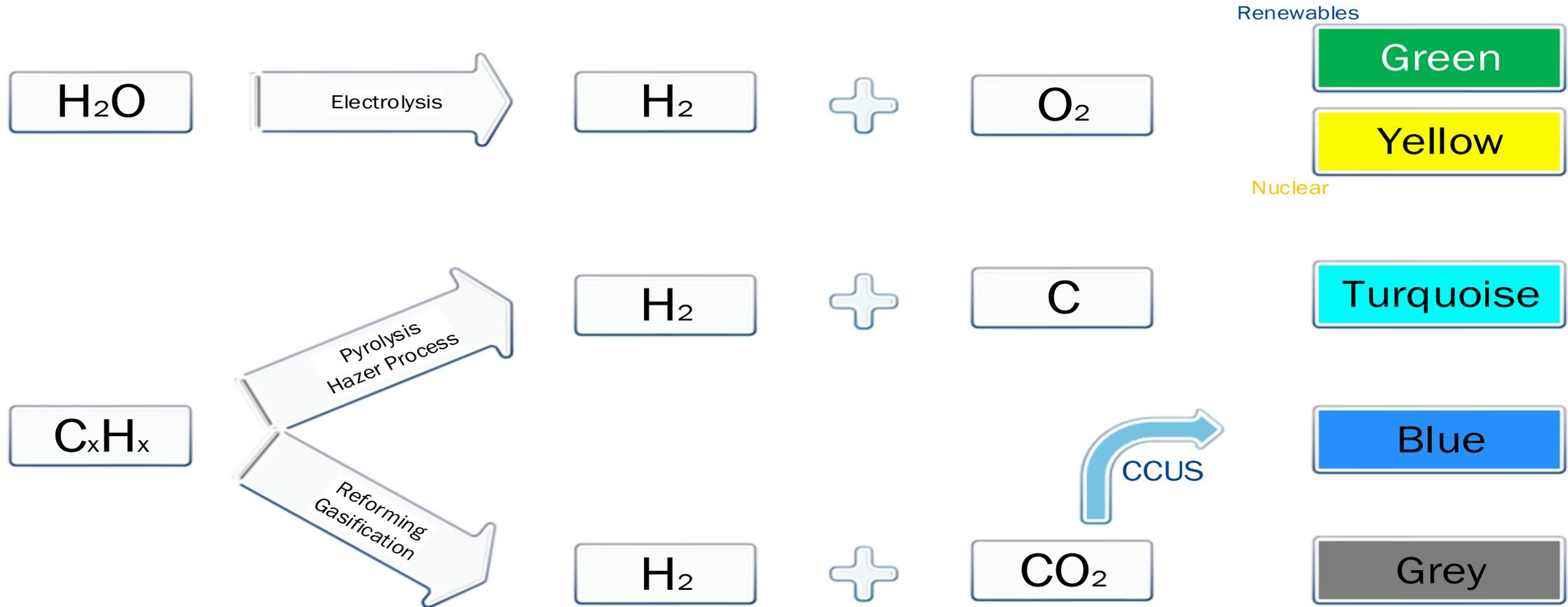
GECF Reference Technology Map



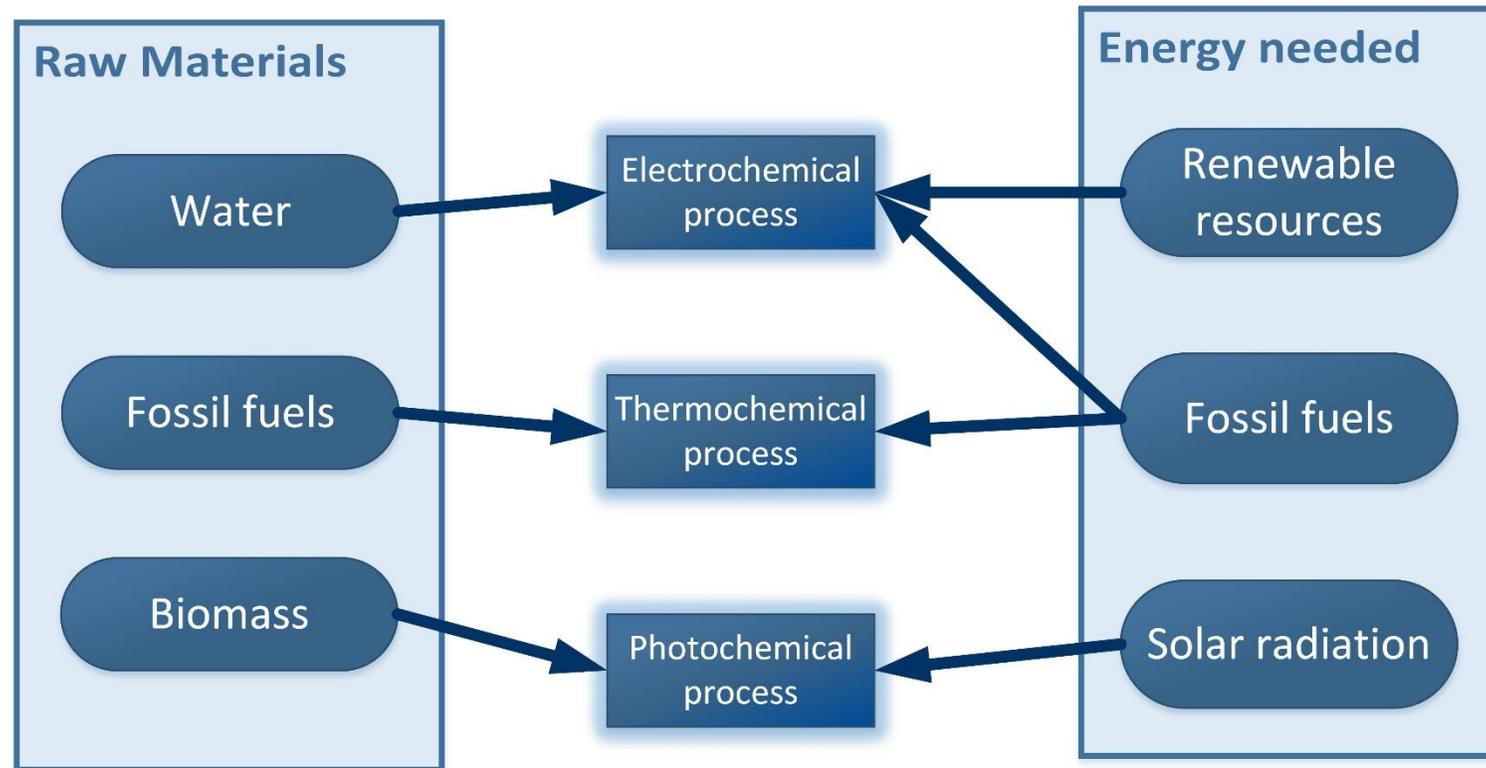
GECF Reference Technology Map



Hydrogen production spectrum

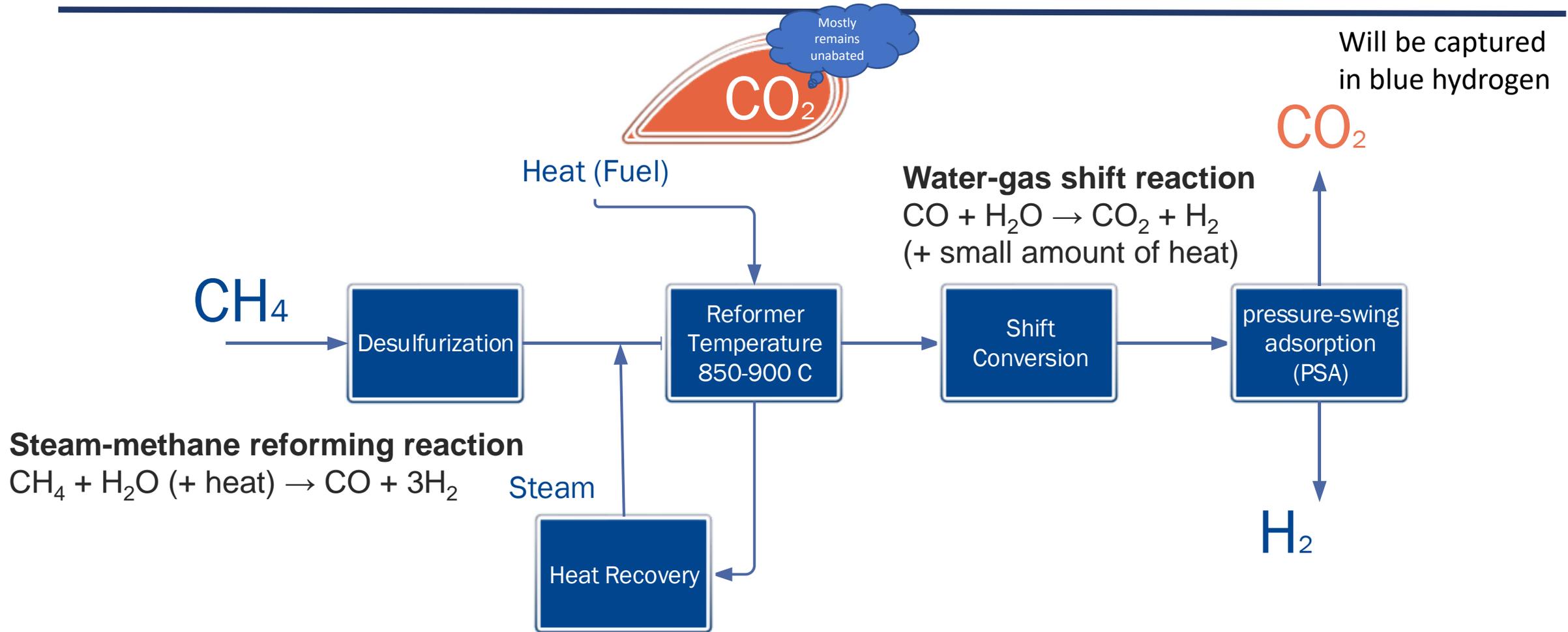


Hydrogen source map

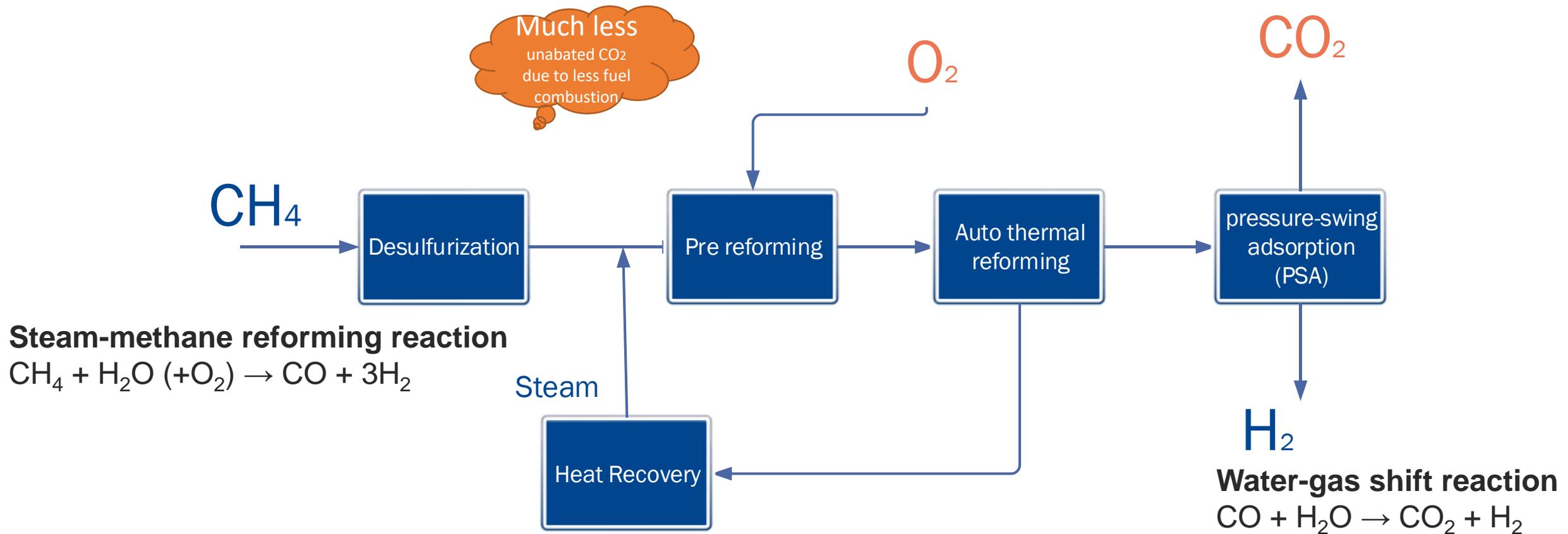


Technology Status

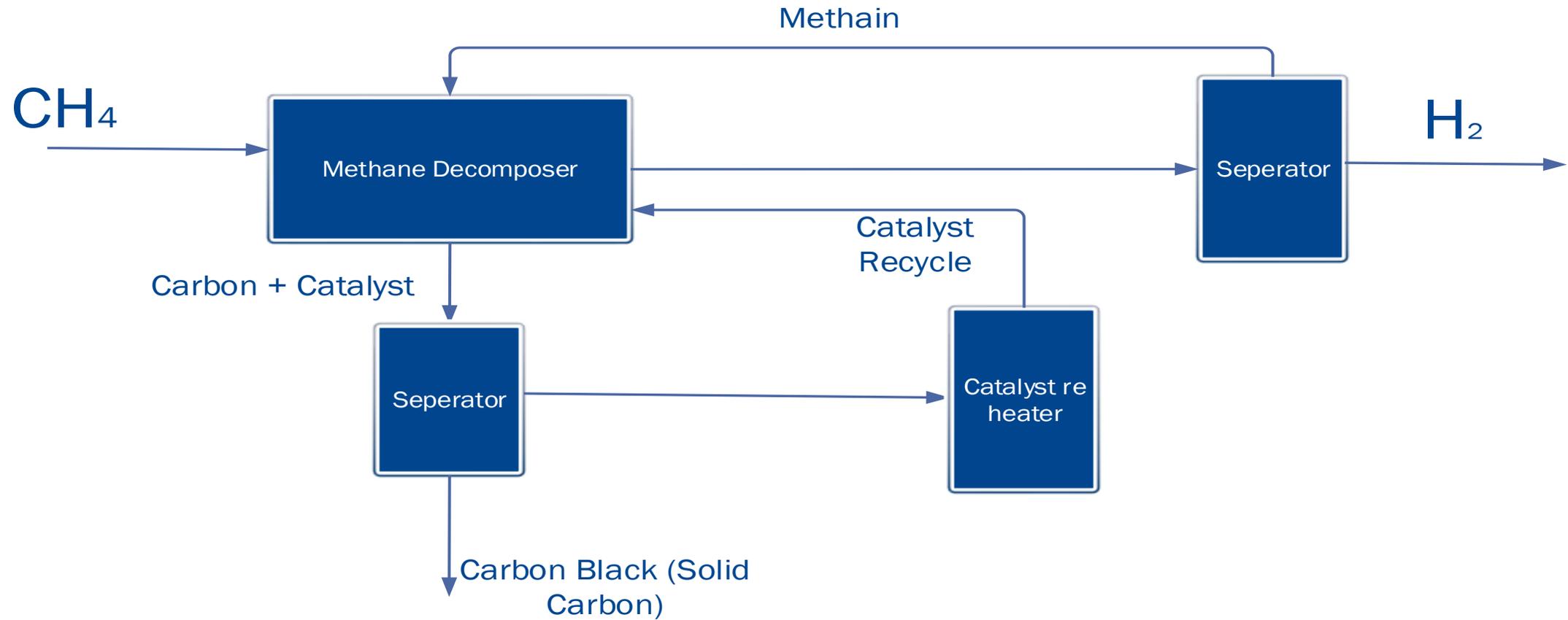
Steam Methane Reforming



Autothermal reforming

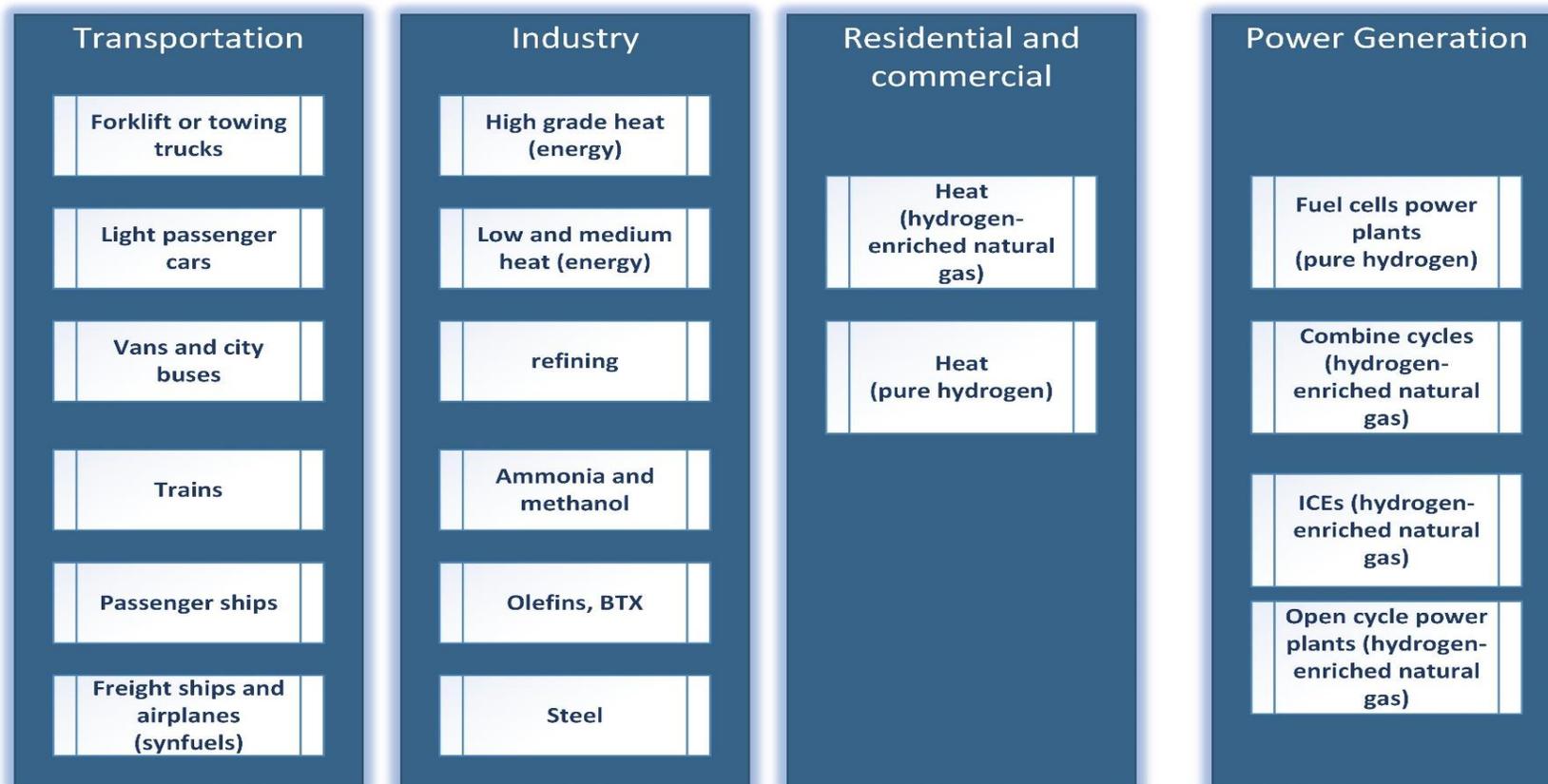


Pyrolysis



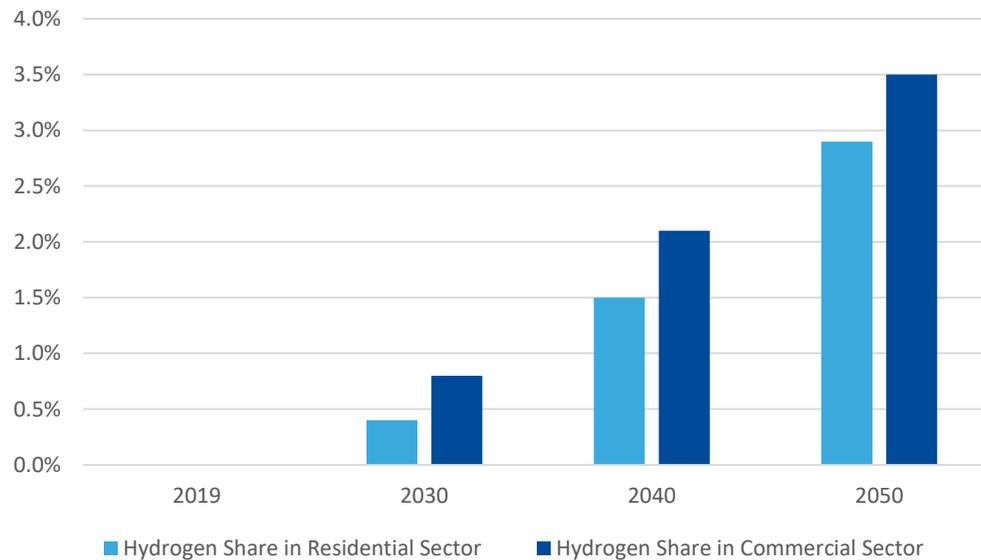
Hydrogen Scenario (2020)

Hydrogen consumer sectors (potential and existing)

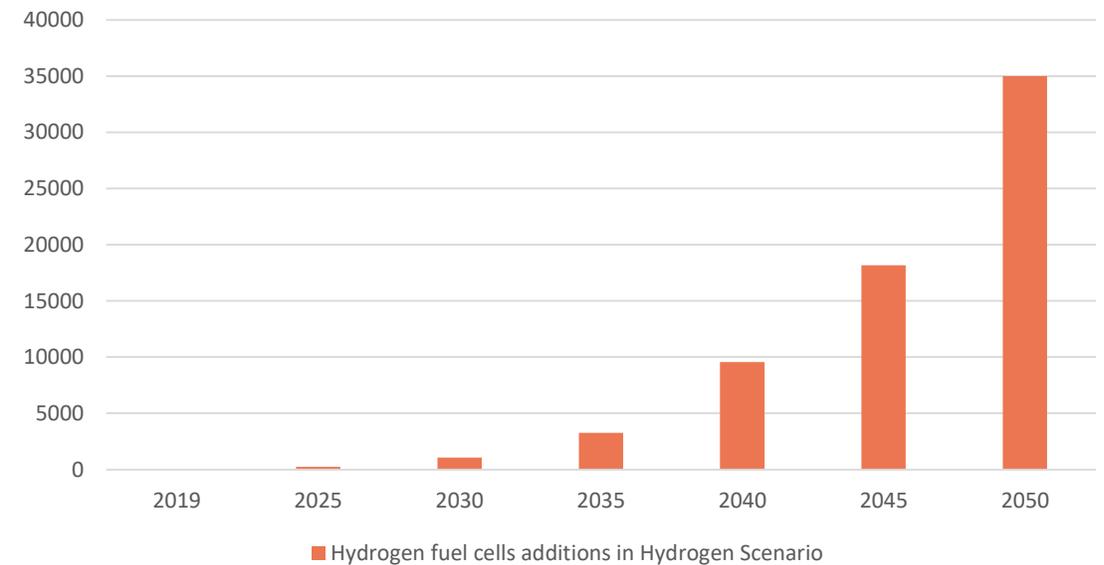


Building and Power sectors

Hydrogen share in building sector

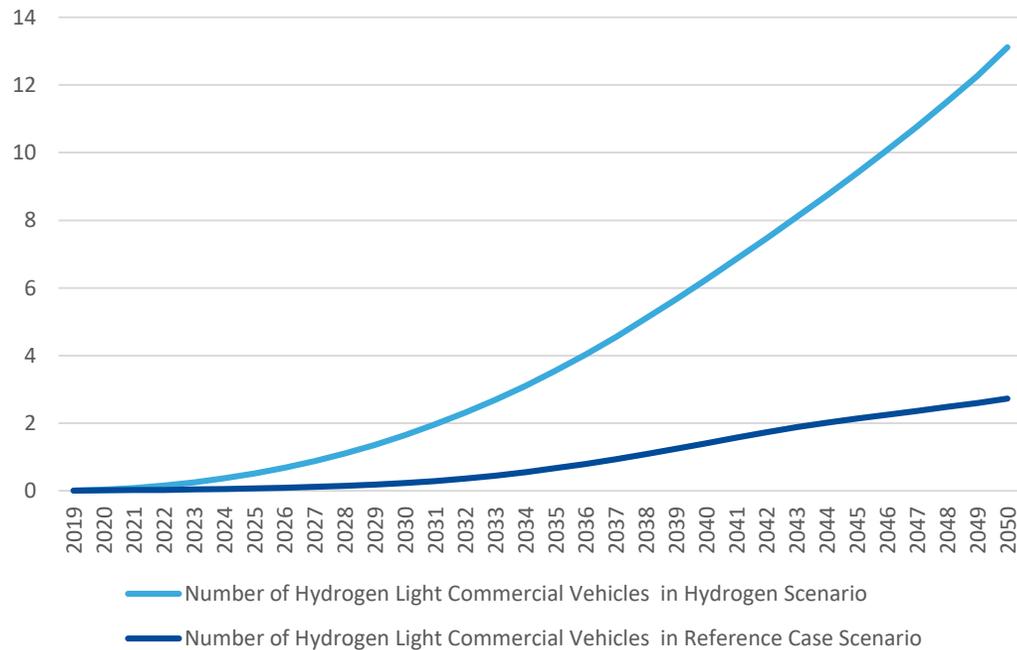


Hydrogen fuel cells power in Hydrogen Scenario (MW)

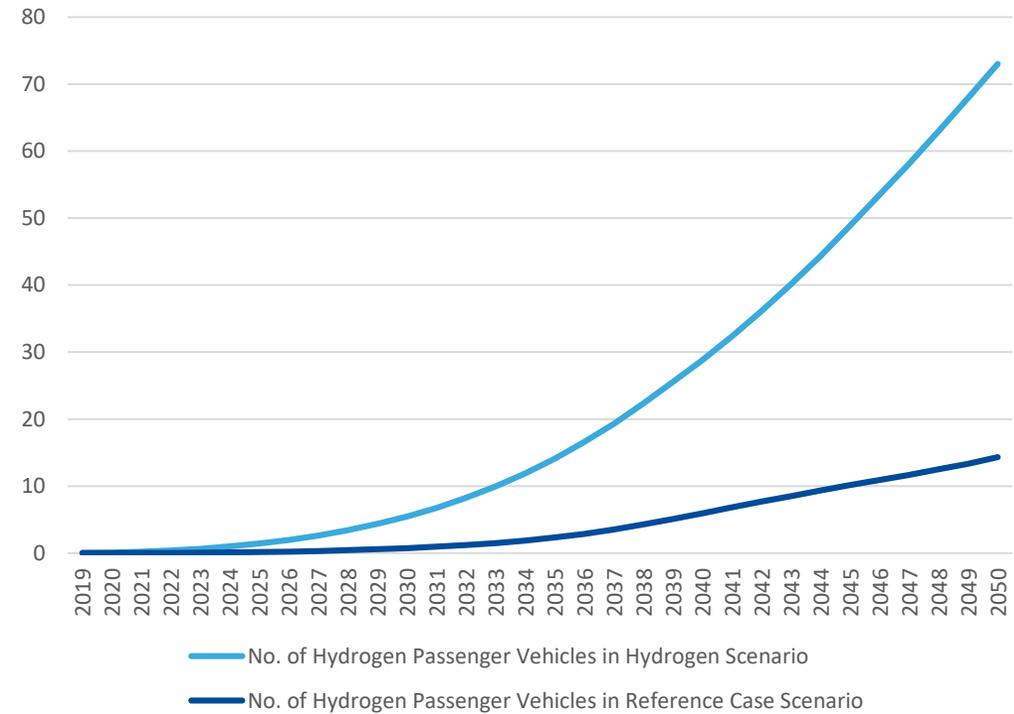


Transport Sector

Number of Hydrogen Light Commercial Vehicles (Million)

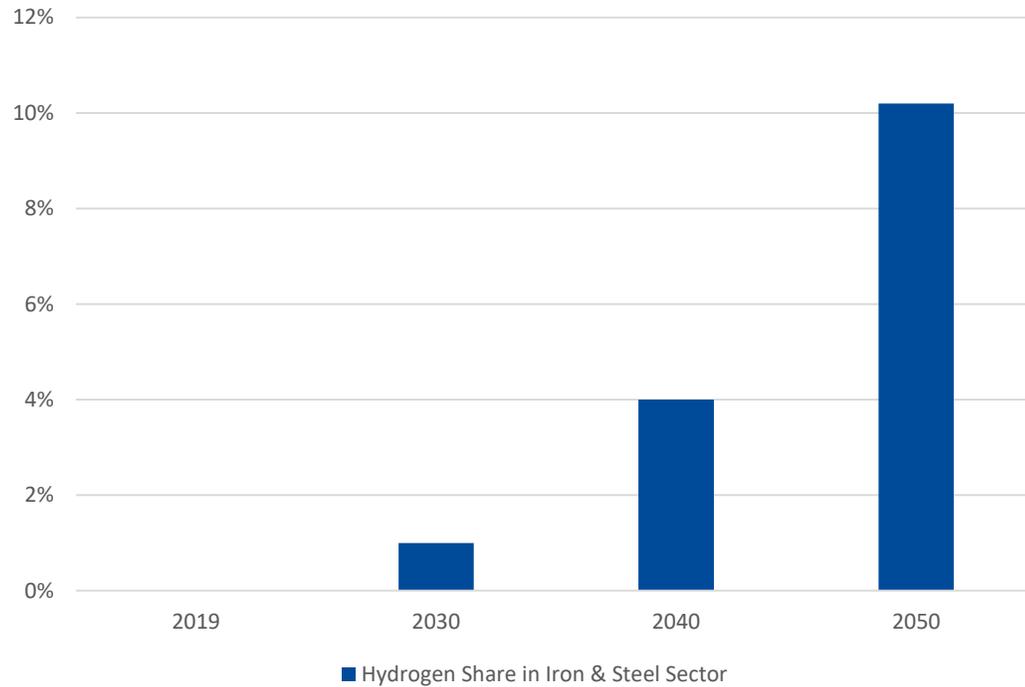


Number of Hydrogen Passenger Vehicles (Million)

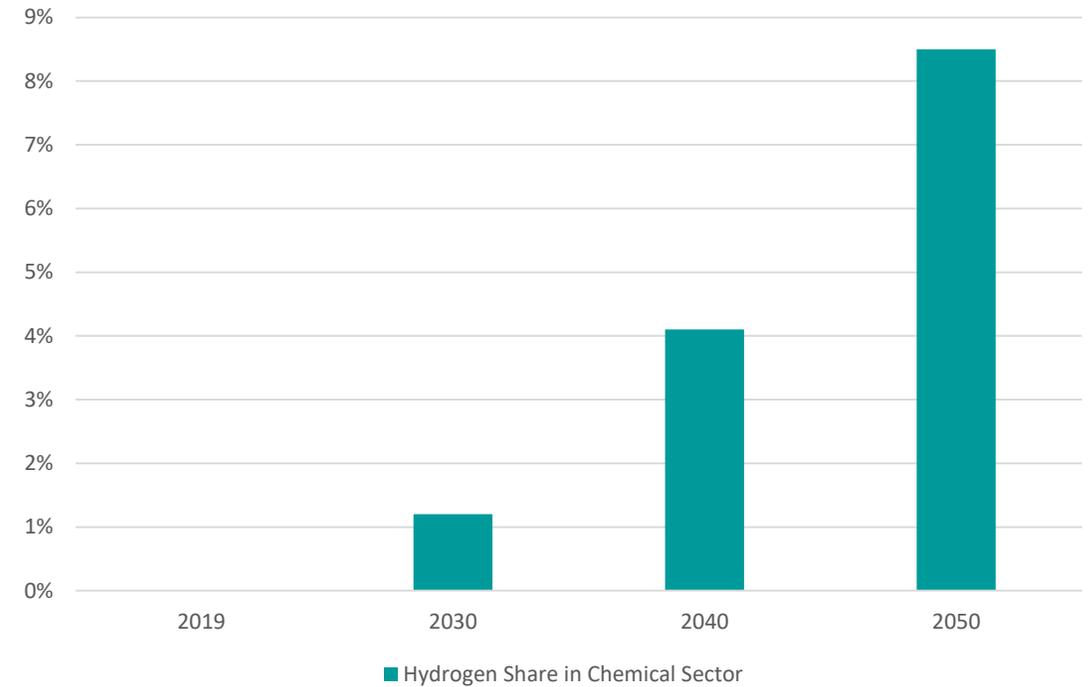


Industry Sector

Hydrogen Share in Iron & Steel Sector

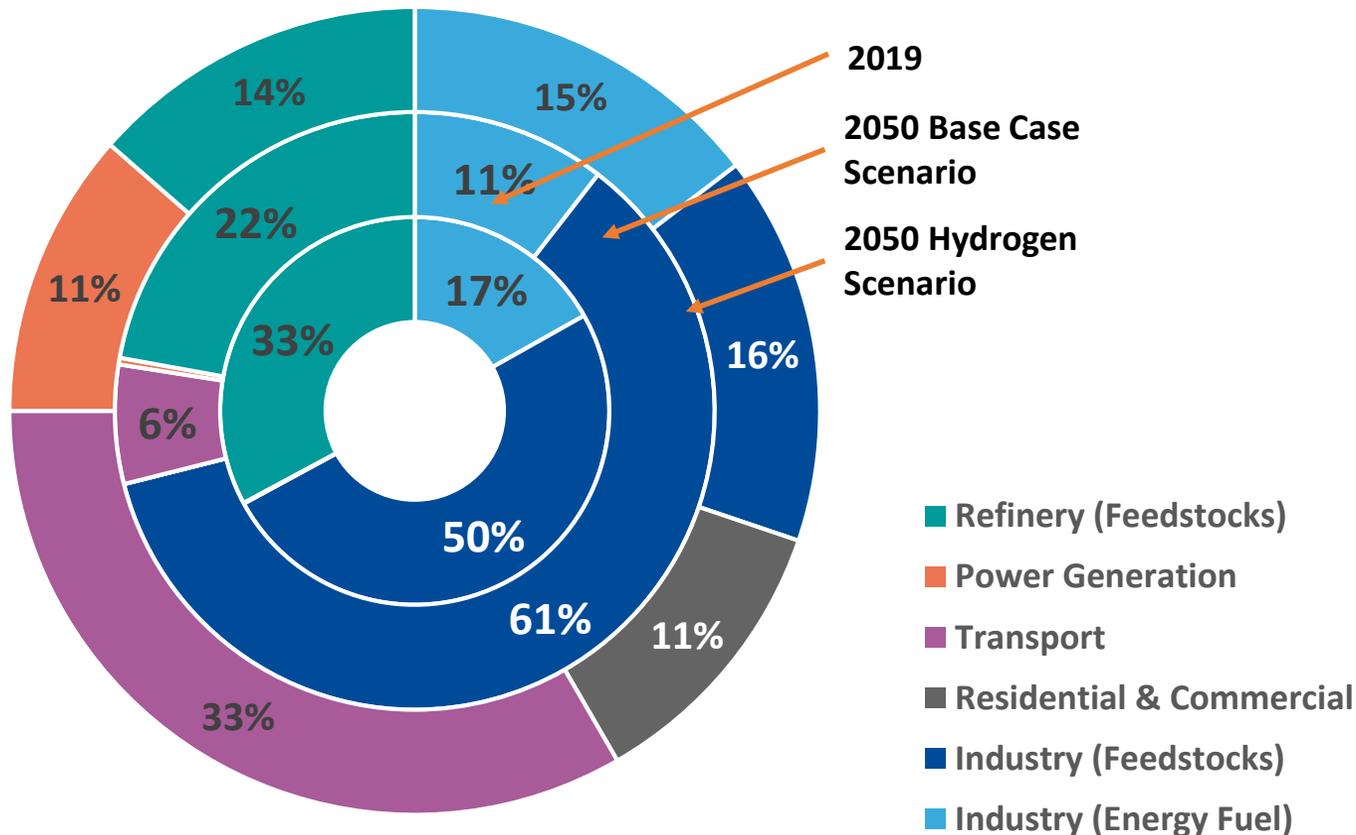


Hydrogen Share in Chemical Sector

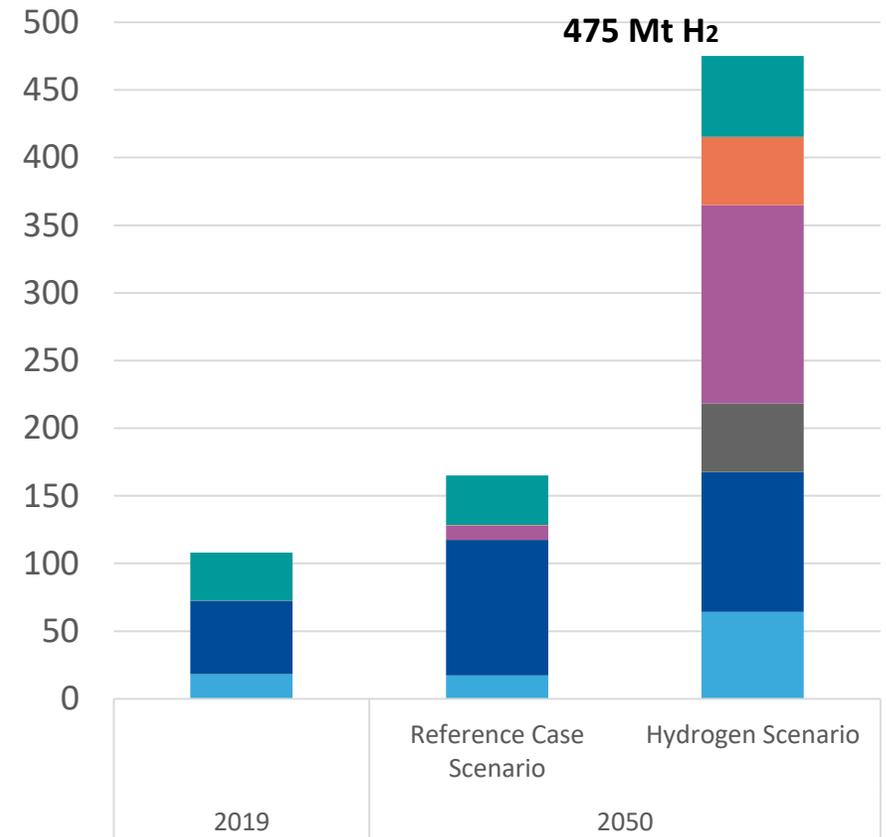


Results (1)

Sectorial share for hydrogen demand

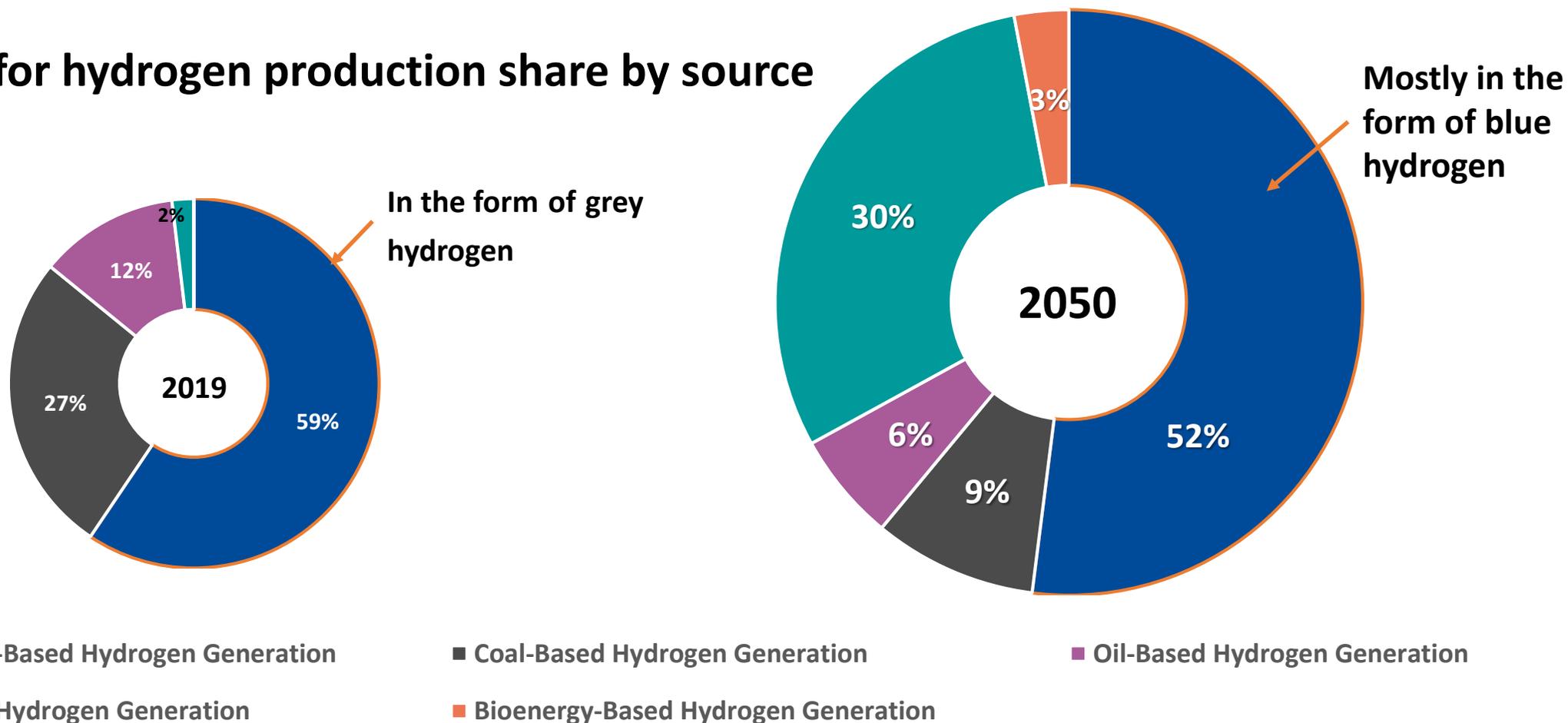


Hydrogen demand outlook by sector (Mt of H₂)



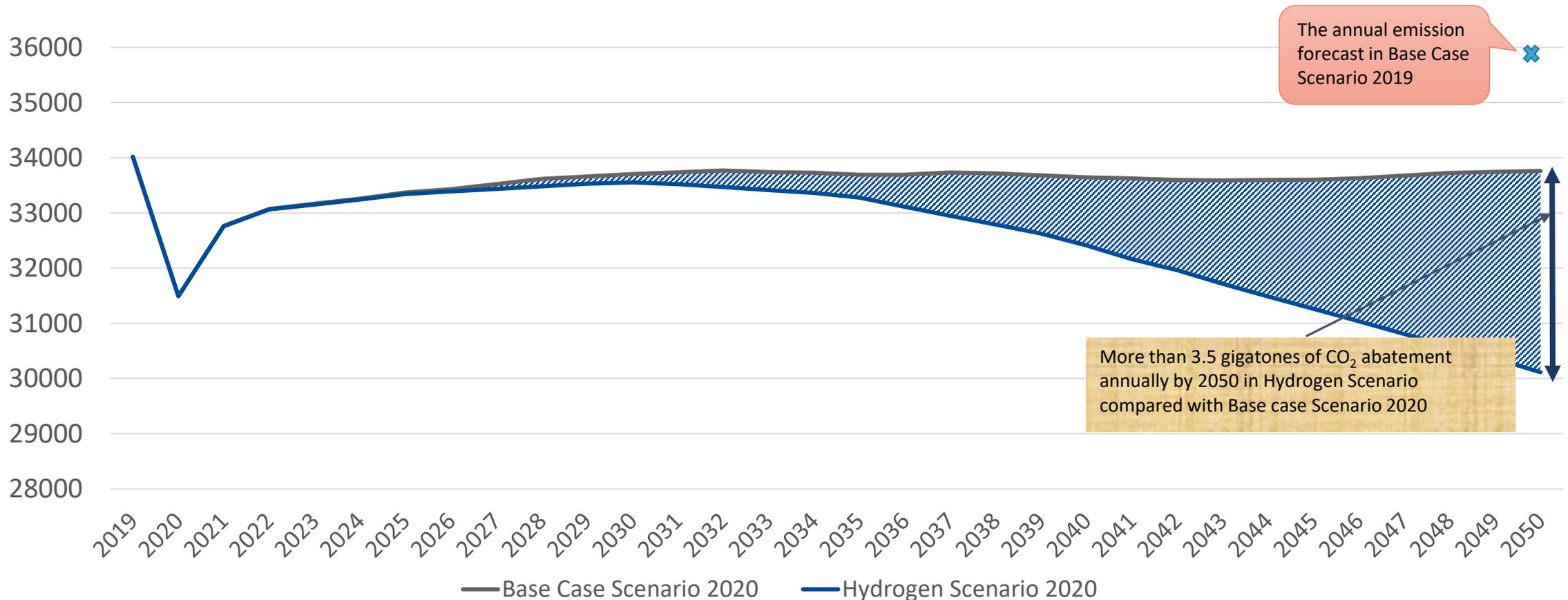
Results (2)

Outlook for hydrogen production share by source



Results (3)

Outlook for CO2 emission (Mt CO2)





GECF