



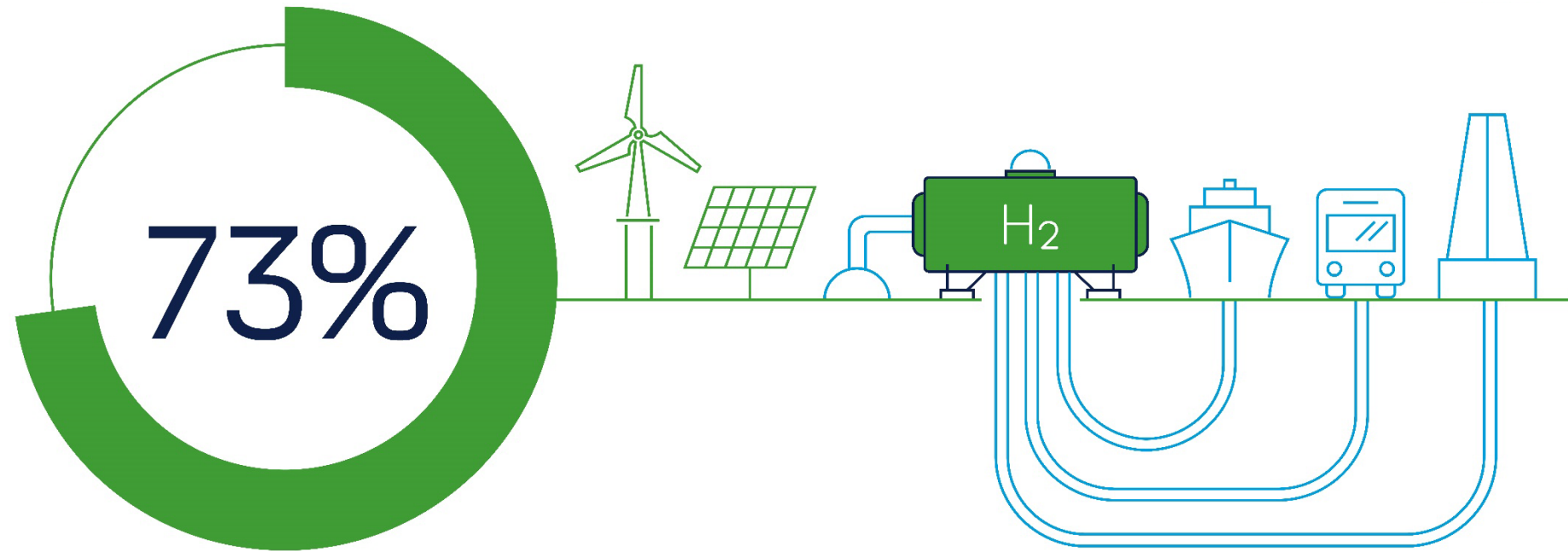
WHEN TRUST MATTERS

# Rising to the challenge of a hydrogen economy

Hydrogen and Energy Transition: Energy and Socio-Economic Opportunities for Brazil



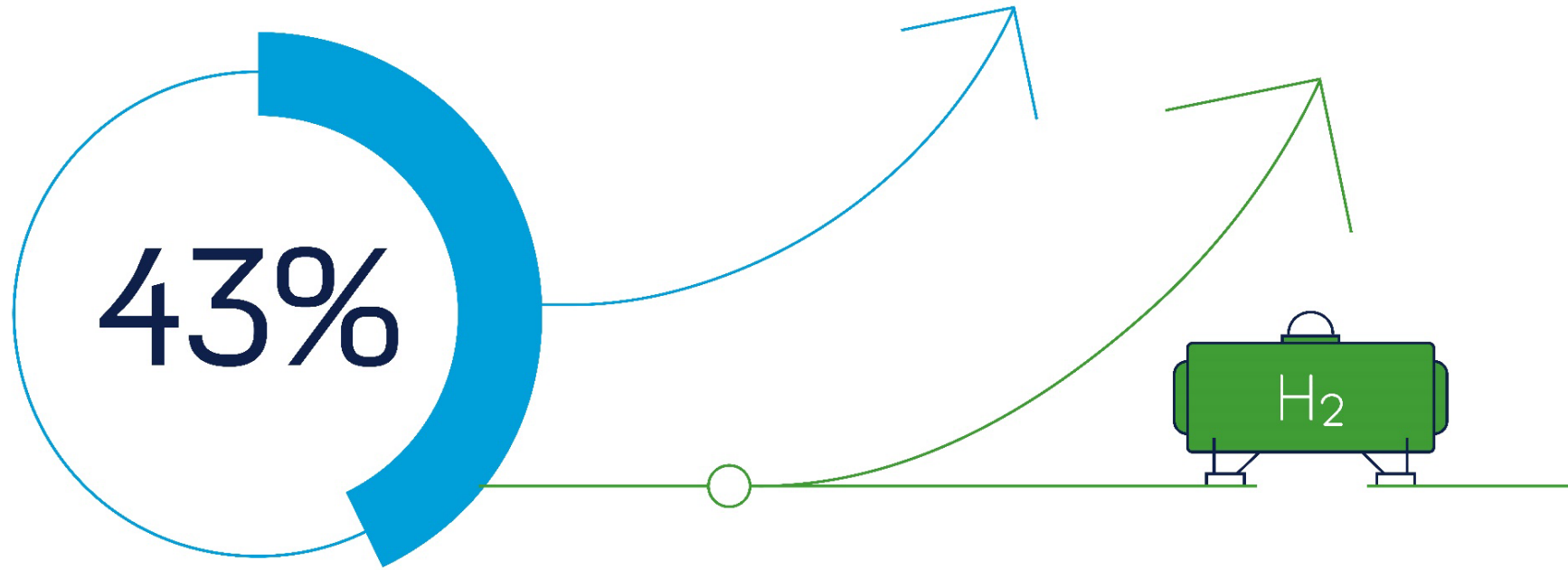
For many, hydrogen is essential to a clean energy future



**Say Paris Agreement targets will not be possible without a large-scale hydrogen economy**



# Are hydrogen targets achievable?



**Believe that the majority of national and organizational hydrogen goals are realistic**

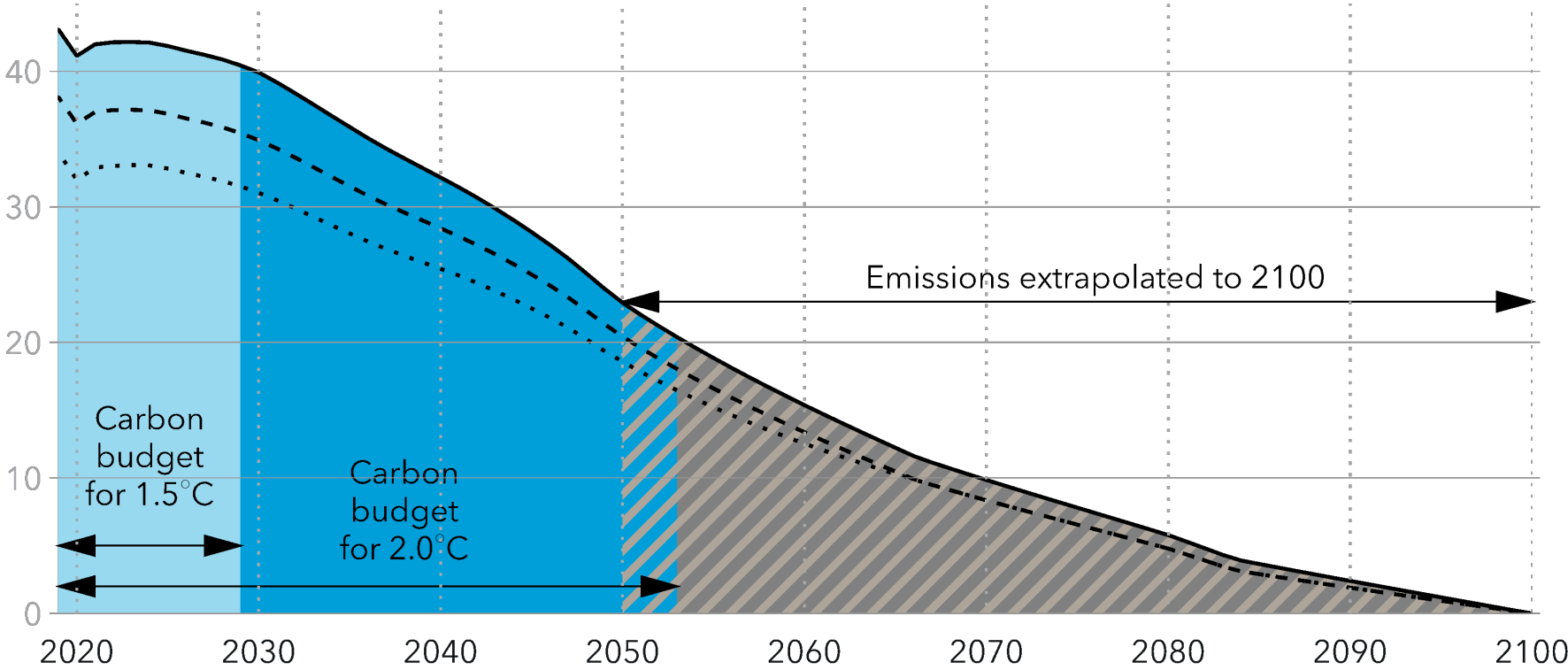


# Energy Transition Outlook 2021

## Cumulative emissions exhaust 1.5°C budget in 2029, 2°C budget in 2053

### Carbon emissions and carbon budget

Units: GtCO<sub>2</sub>/yr



#### Sources of emission:

- Total including AFOLU
- - - Energy-related and industrial processes
- ..... Energy-related only





# The euphoria – Uses of low carbon hydrogen as an energy carrier

## Heating



## Mobility (FC + ICE)



## Storage and use of excess electricity



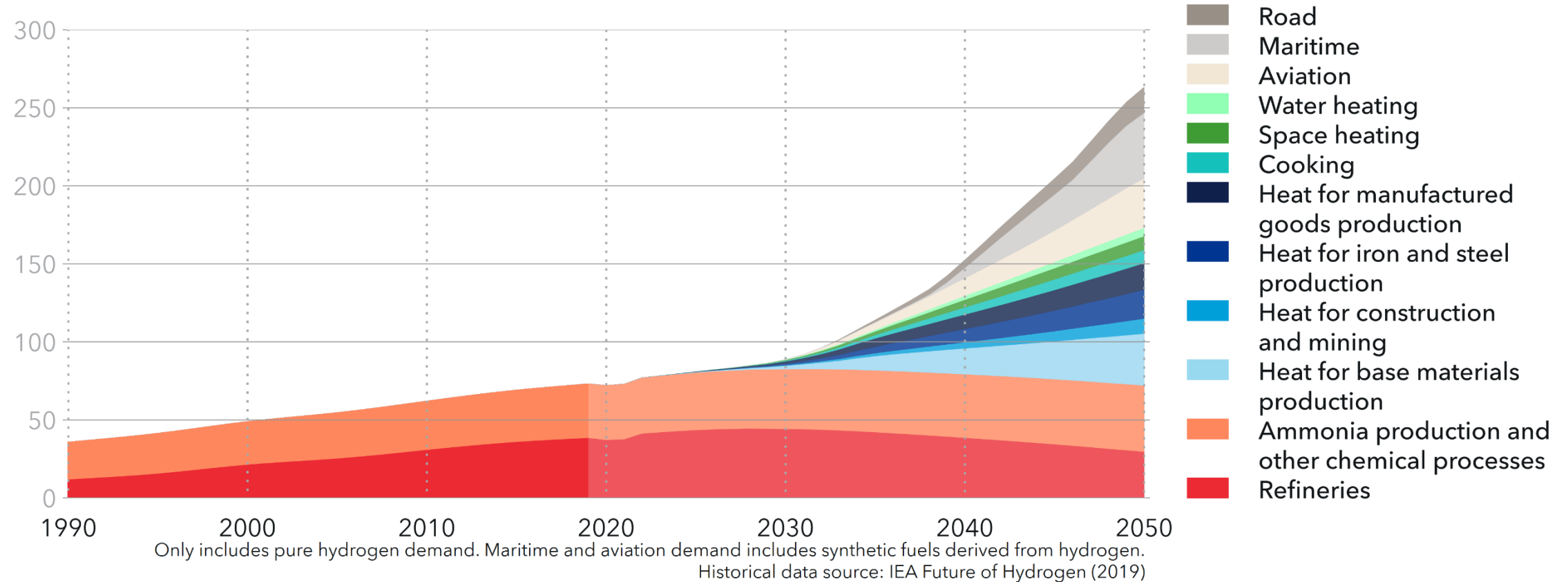
## Industry – Energy intensive heating



# Hydrogen - late but strong growth: 5% of global energy demand in 2050

## World hydrogen demand by sector

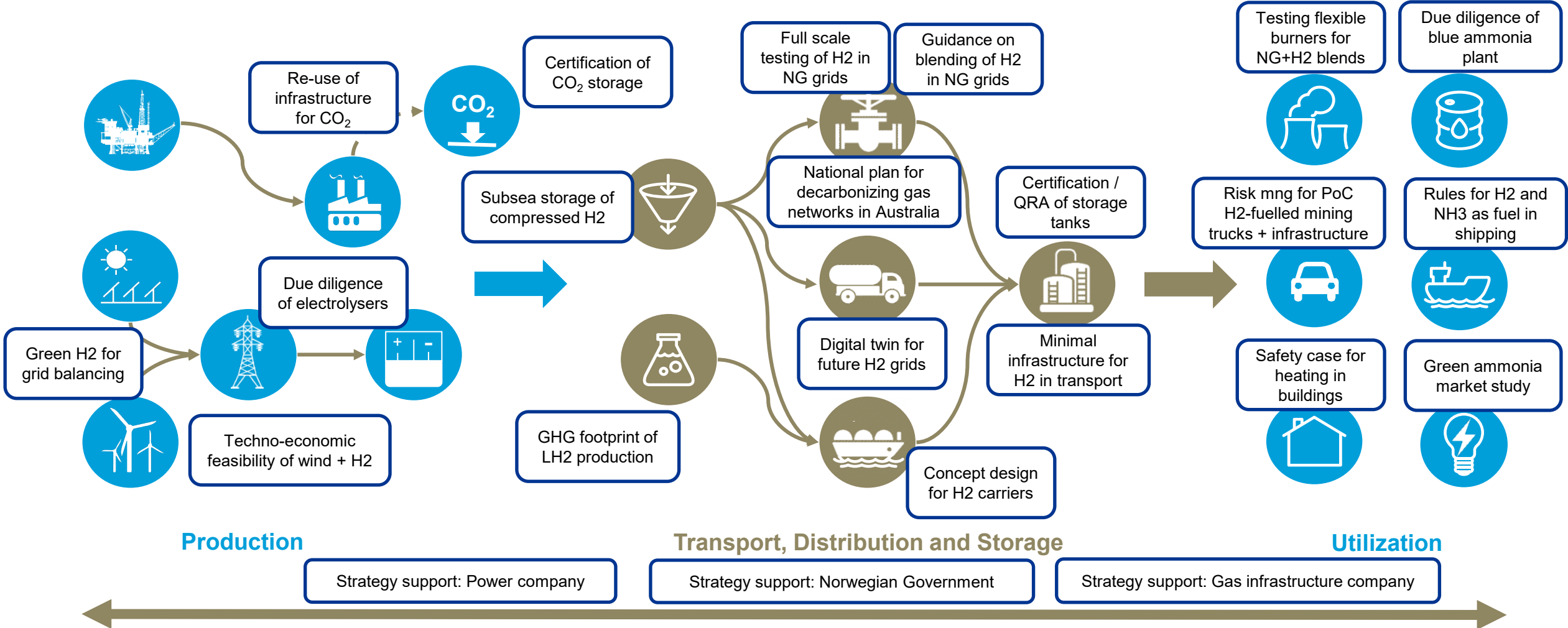
Units: Mt/yr



# How can Norway contribute to develop a new hydrogen industry in Brazil?

- 1 Norway and Brazil share large hydropower resources – can be leveraged to position countries as leaders in green H<sub>2</sub>/NH<sub>3</sub>
- 2 Norway is a front-runner in development of low-carbon shipping: Battery, hydrogen and ammonia.
- 3 Norway has been a leader in early deployment of CCS – Can help Brazil become a leader in blue hydrogen and blue ammonia.

# DNV: Deep knowledge about all parts of hydrogen value chains



DNV offers a wide range of both **technical and business advisory** services and, with broad expertise across the energy and maritime industries, we are in a **unique position** to cover the **whole hydrogen value chain**.



# Rising to the challenge of a hydrogen economy

[dnv.com/focus-areas/hydrogen](https://dnv.com/focus-areas/hydrogen)

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