

# The role of green hydrogen in the energy transition: Prospects for trade

Trade and Environmental Sustainability Structured Discussions

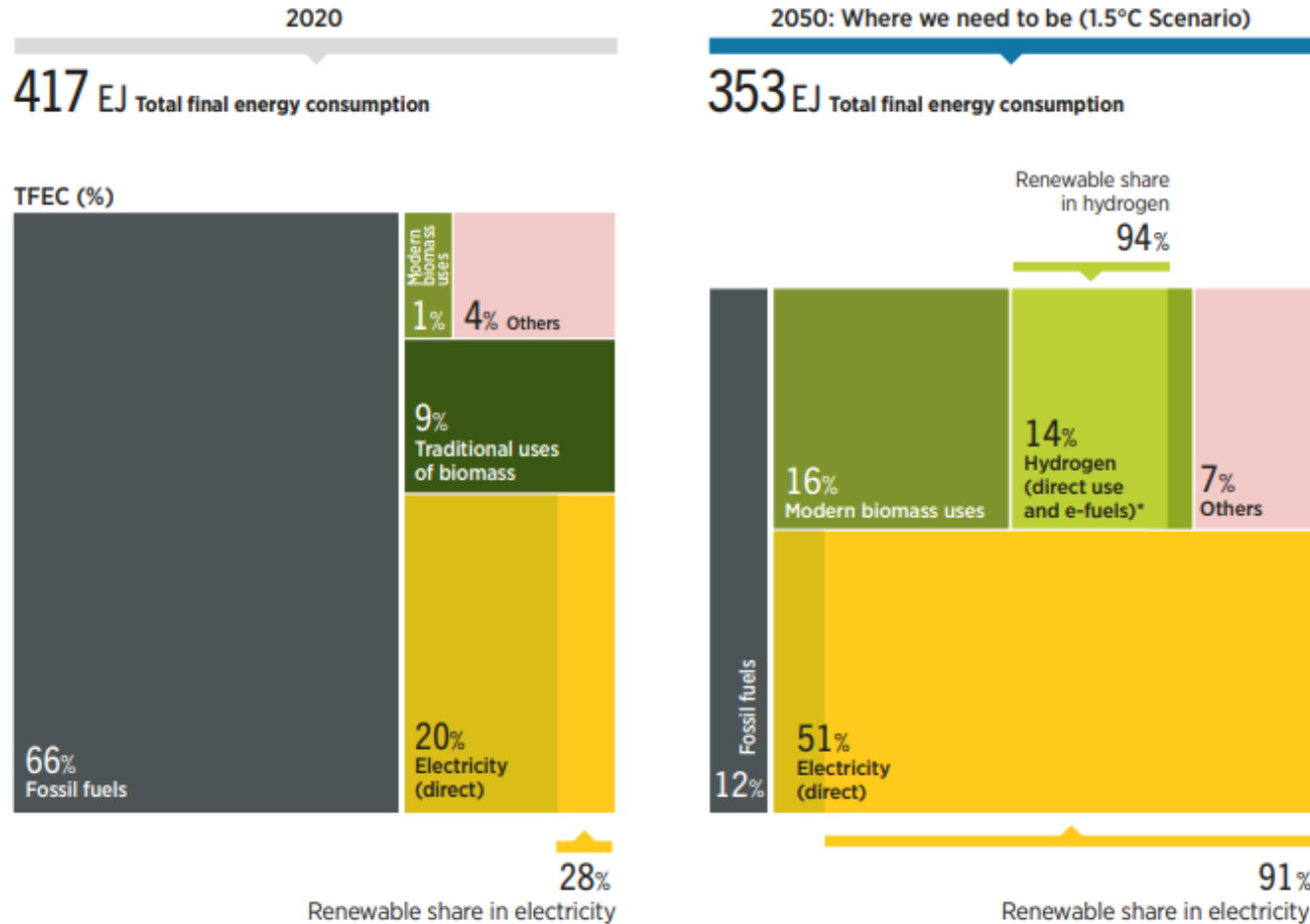
WTO Trade and Environment Week, 20 November 2023

Luis Janeiro – Team lead, End-use Sector Applications



# Role of hydrogen in IRENA's 1.5°C Scenario

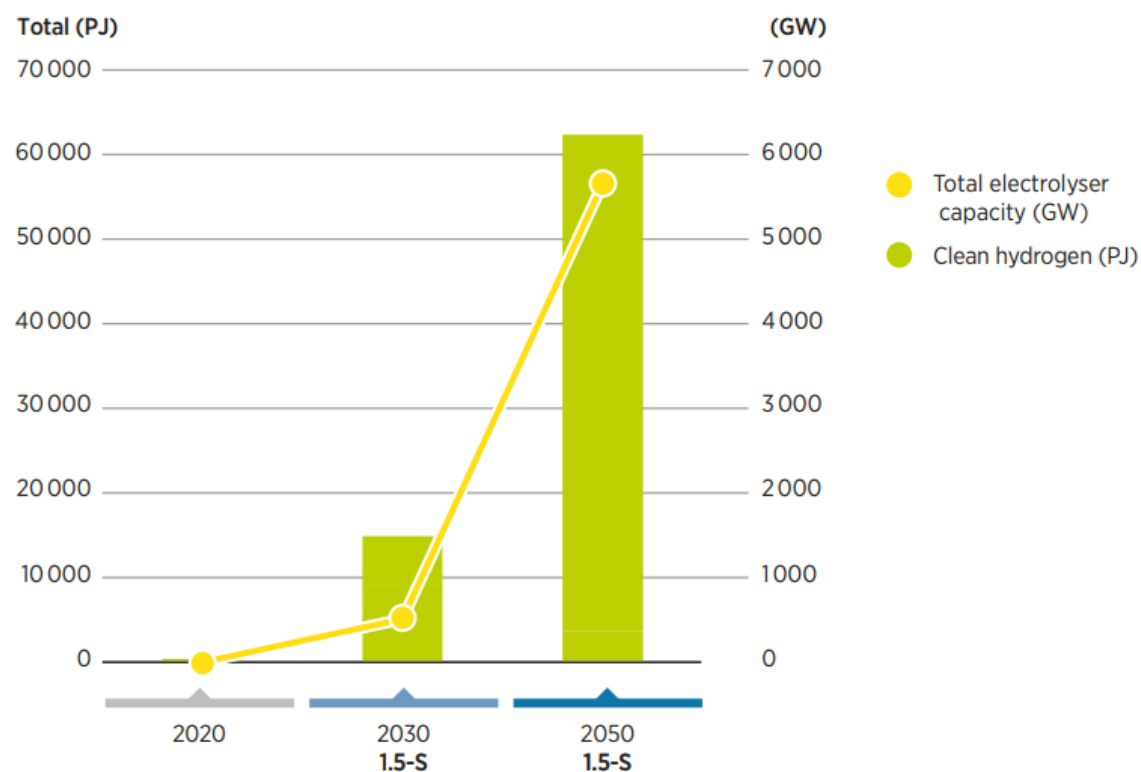
Breakdown of total final energy consumption by energy carrier in 2020 and 2050 under IRENA's 1.5°C Scenario:



- By 2050, **electricity becomes the main energy carrier**, accounting for more than half of the global final energy consumption.
- Hydrogen and hydrogen derivatives represent up **14% of total final energy consumption by 2050**.
- **94% of hydrogen production should come from renewables.**

# Scaling hydrogen production will be a major challenge

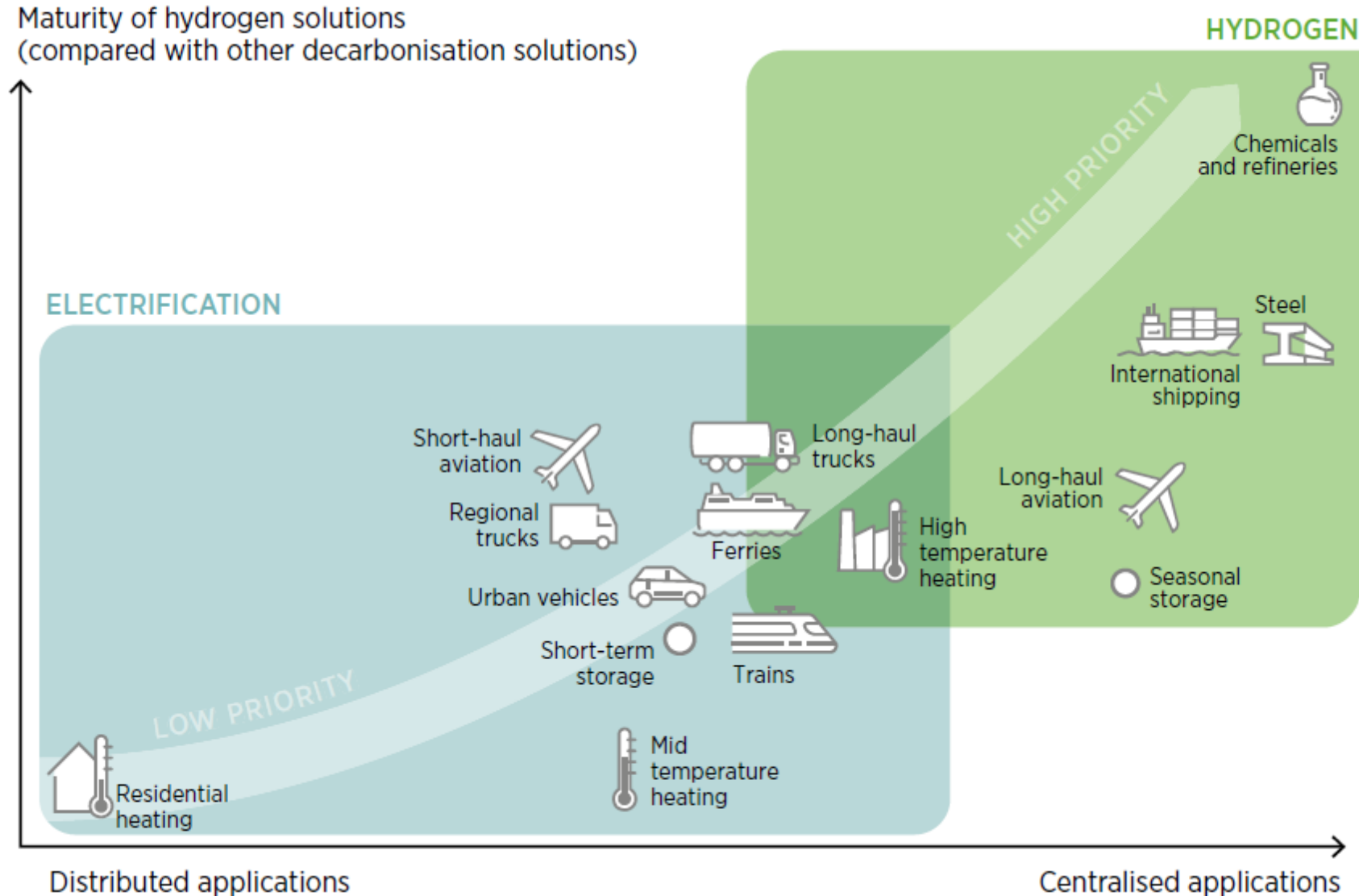
Global clean hydrogen supply in 2020, 2030 and 2050 in IRENA's 1.5°C Scenario.



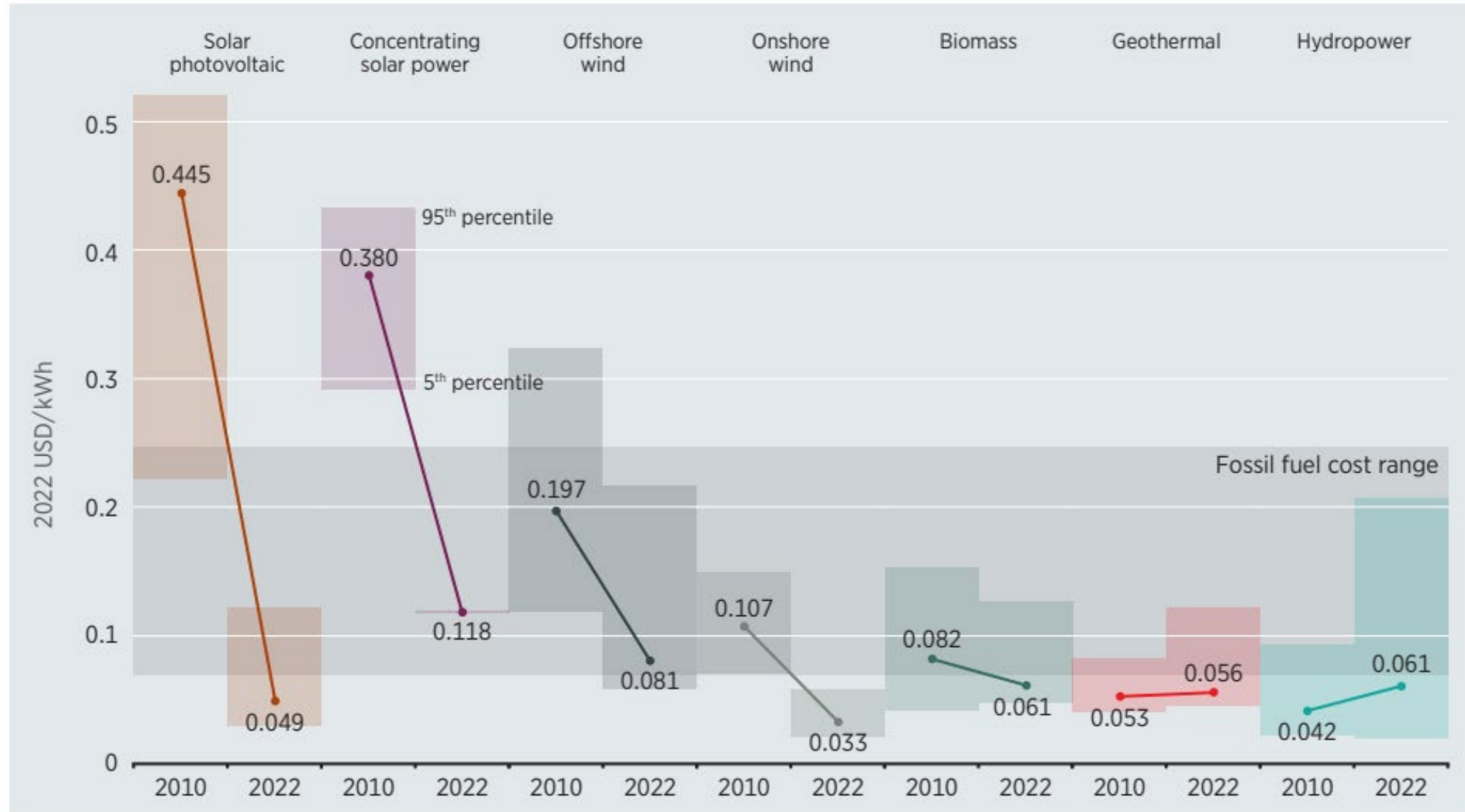
**Notes:** 1.5-S = 1.5°C Scenario; GW = gigawatt; PJ = petajoule.

- Bulk of **today's hydrogen production is fossil-based** (mostly natural gas, but also coal)
- Most of global hydrogen **production in 2050 should come from renewables**
- The electricity requirement for **green hydrogen in 2050 is comparable to today's global electricity consumption.**
- From **~ 1 GW to >5700 GW** electrolyser capacity by 2050.

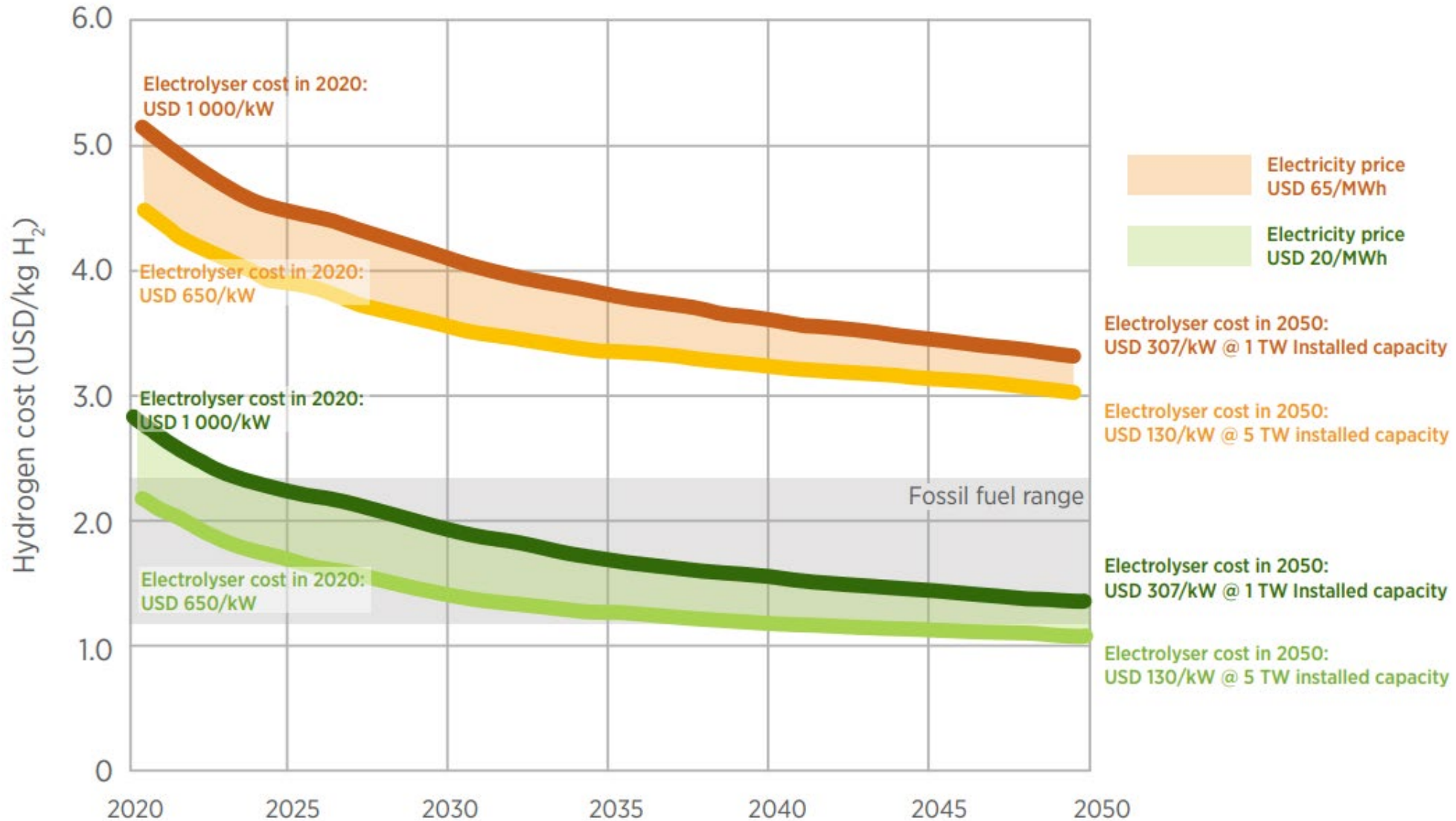
# Priority uses for hydrogen across the energy system



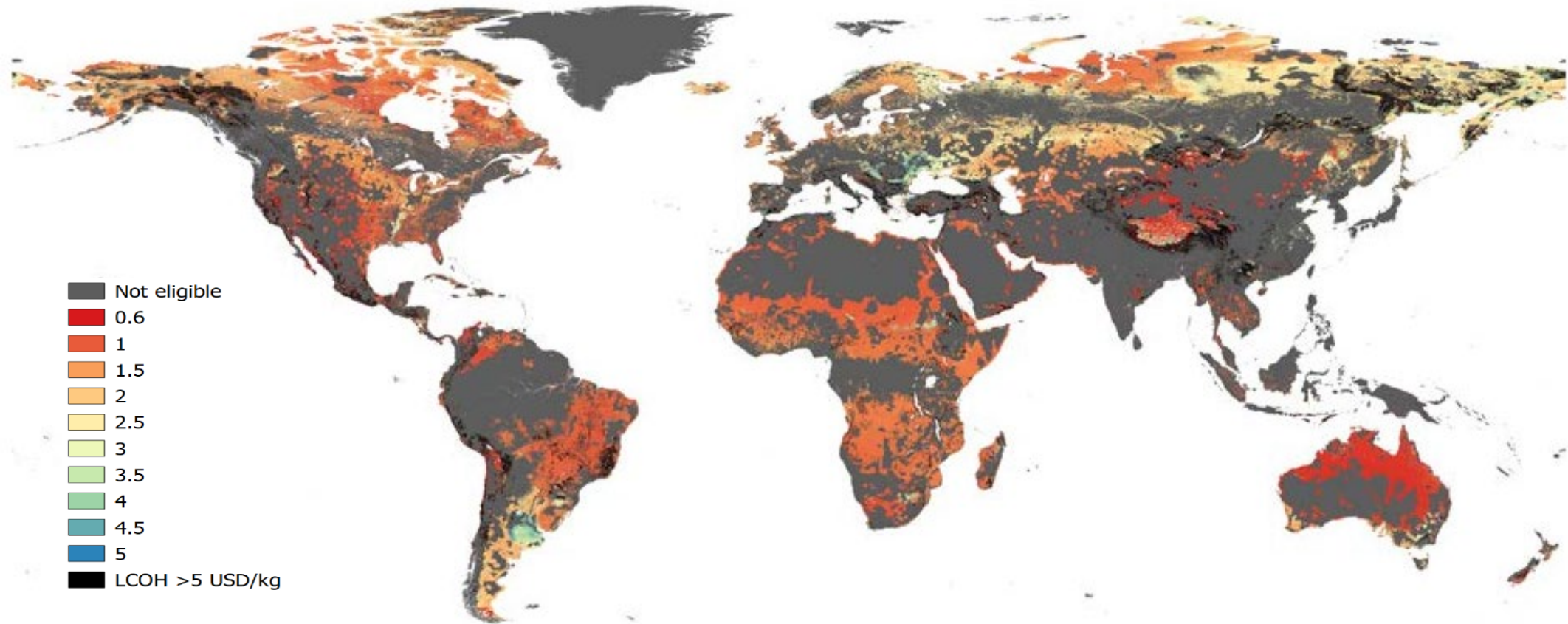
# We are transitioning to a world of abundant, cheap renewables



# Green hydrogen costs depend on electrolyser cost electricity cost

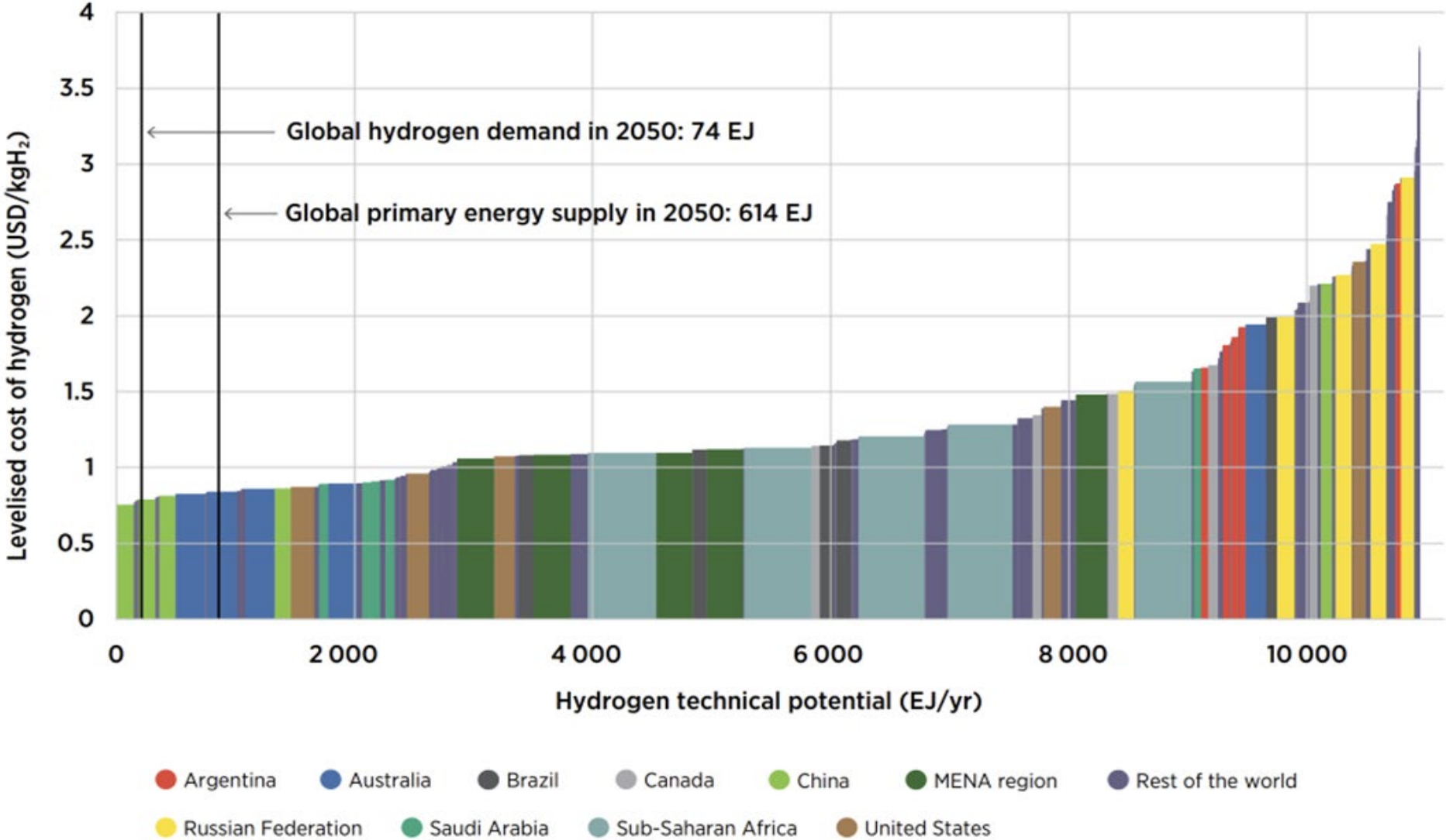


# Global levelised cost of hydrogen in 2050



Note: Assumptions for capital expenditure are as follows: solar photovoltaic (PV): USD 270-690/kW in 2030 and USD 225-455/kW in 2050; onshore wind: USD 790-1435/kW in 2030 and USD 700-1 070/kW in 2050; offshore wind: USD 1 730-2 700/kW in 2030 and USD 1 275-1 745/kW in 2050; electrolyser: USD 380/kW in 2030 and USD 130/kW in 2050. Weighted average cost of capital: Per 2020 values without technology risks across regions. Land availability considers several exclusion zones (protected areas, forests, permanent wetlands, croplands, urban areas, slope of 5% [PV] and 20% [onshore wind], population density, and water availability). Source: IRENA, 2022. Global hydrogen trade to meet the 1.5C goal. Part I: Trade outlook for 2050 and way forward

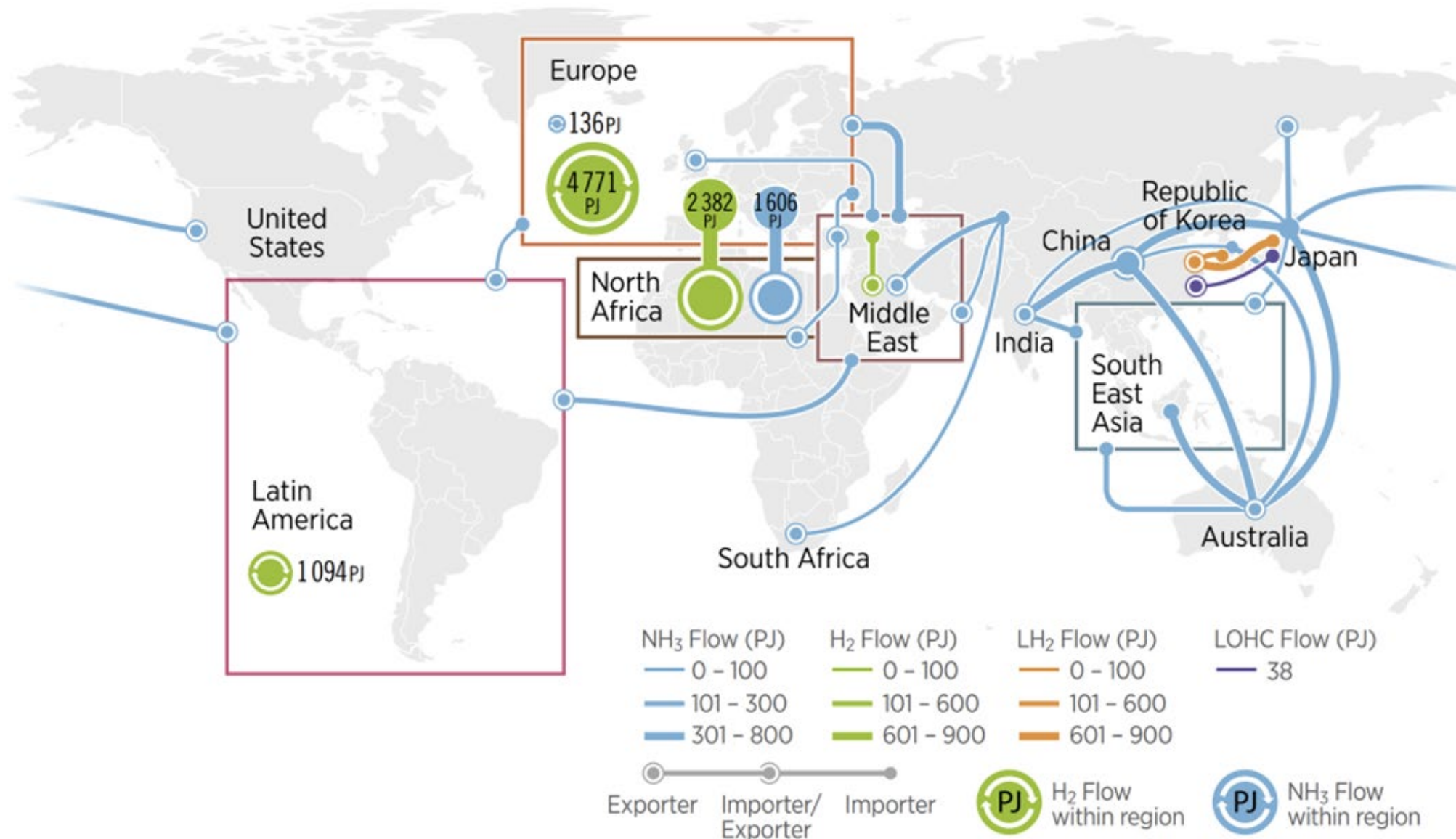
# Green hydrogen technical potential, almost 20 times the global primary energy supply in 2050



Source: IRENA, 2022. Global hydrogen trade to meet the 1.5C goal. Part I: Trade outlook for 2050 and way forward.



# About a quarter of the global hydrogen demand could be internationally traded





IRENA

International Renewable Energy Agency