INNOVATING GREEN ECONOMY: GREEN HYDROGEN

IEDE PROJECT 2023

Presented by Vernia Mahuni

MEET OUR TEAM

VERNIA MAHUNY

Team Leader

ISRAEL MUAKA MVITU

Core Member

JOSEPHINE BAFFOE

Core Member

MD LABU ISLAM

Core Member

OUTLINE

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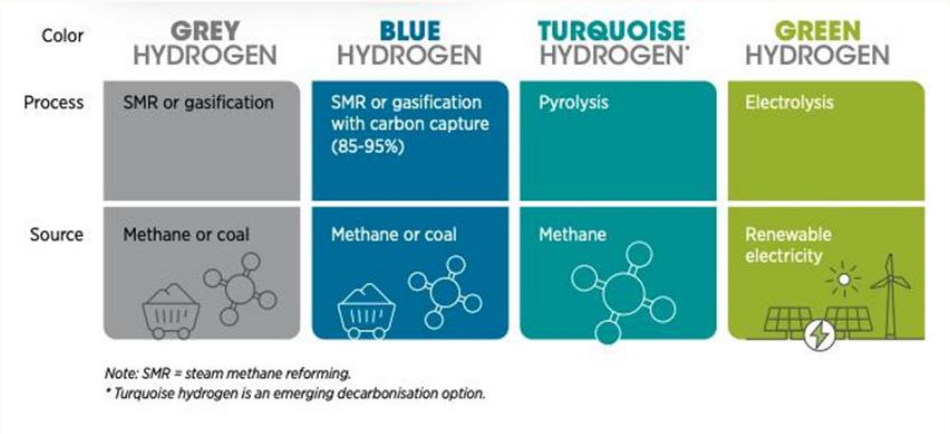
INTRODUCTION TO GREEN HYDROGEN

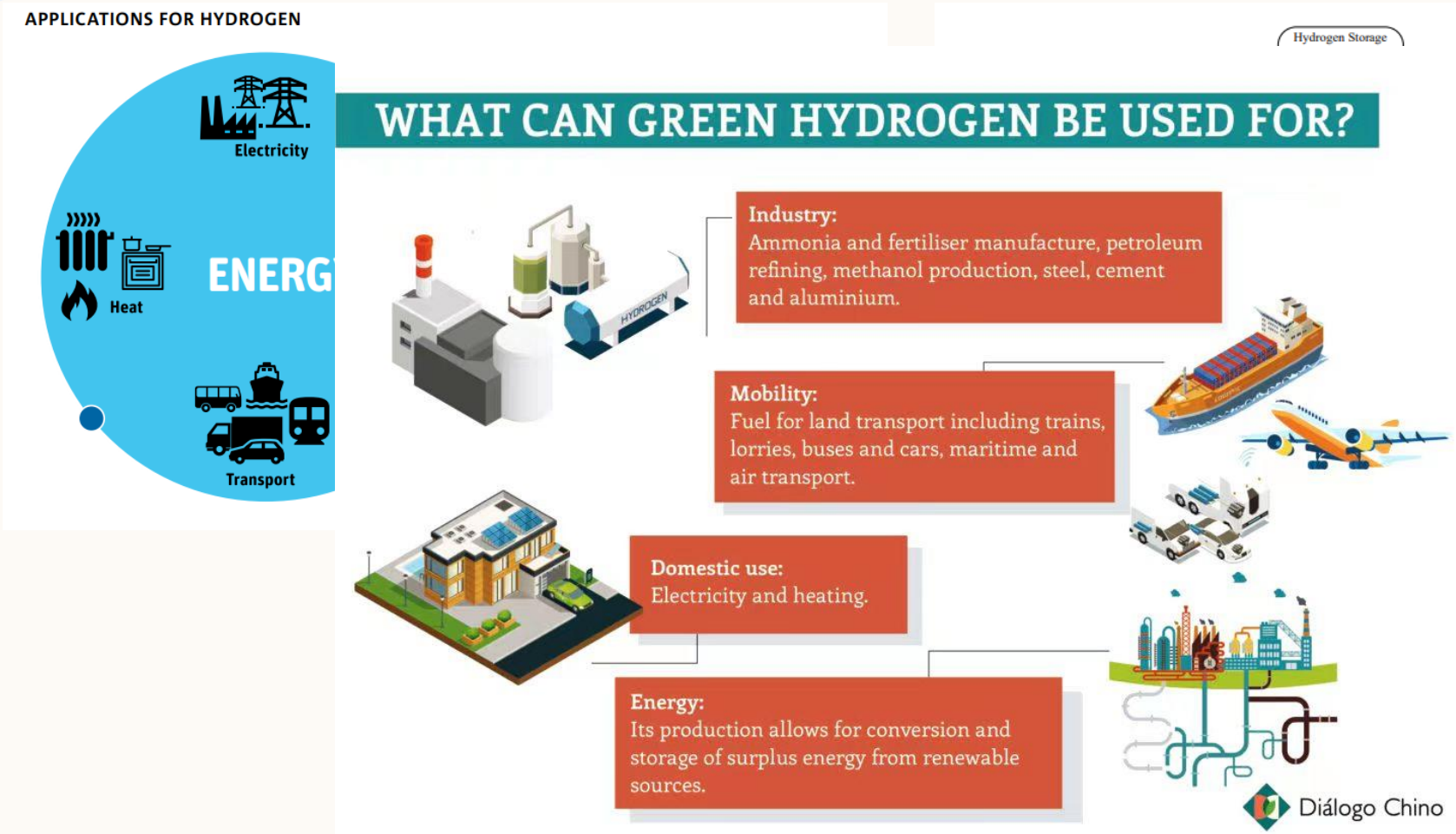
What is Green Hydrogen ?

- Green hydrogen is hydrogen generated by renewable energy or from low-carbon power. Green hydrogen has significantly lower carbon emissions than grey hydrogen.

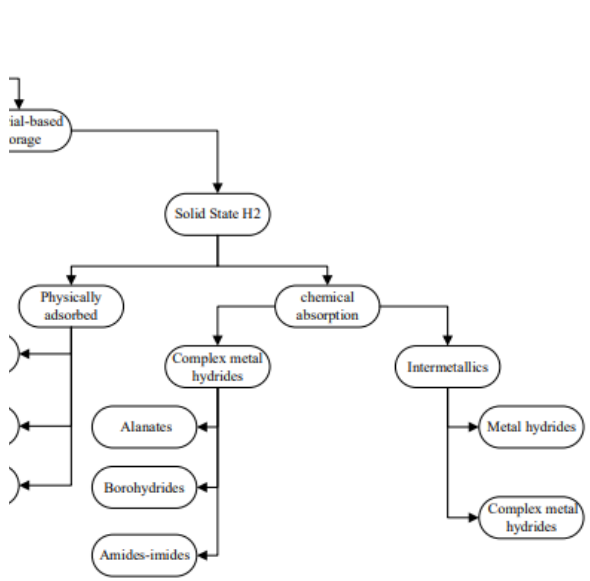


APPLICATIONS AND STORAGE

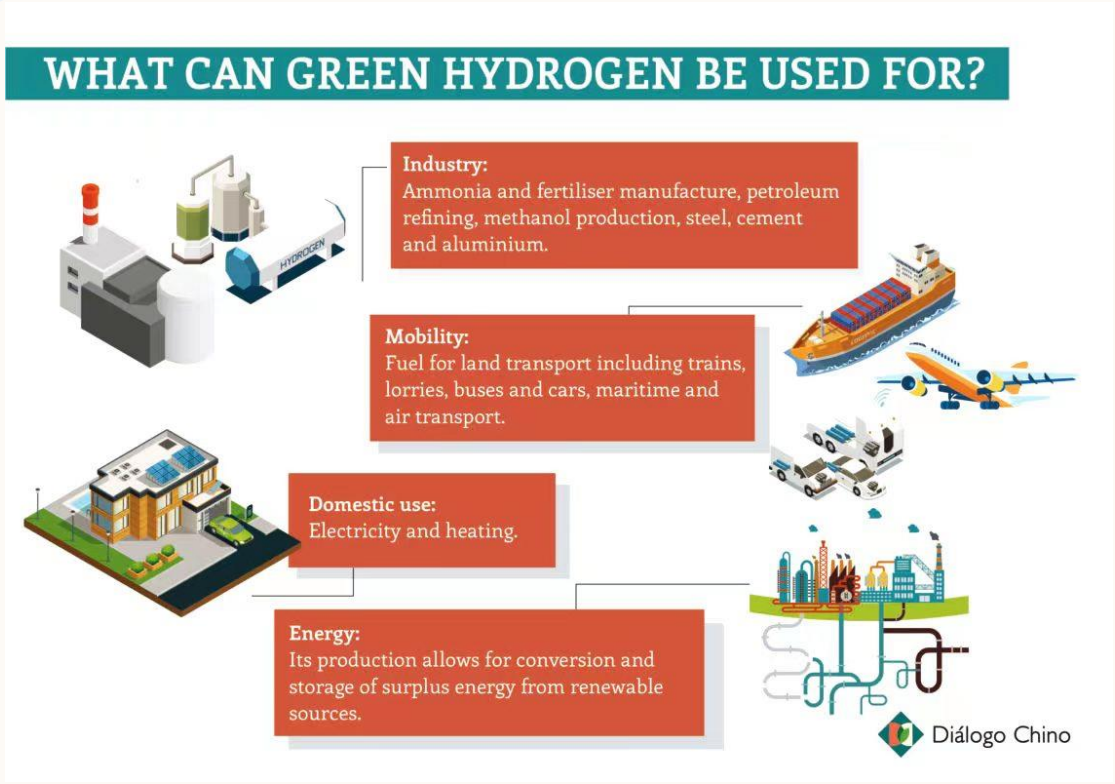
Applications



Storage



GREEN HYDROGEN FOR INDUSTRIAL USE



With the worldwide demand for steel expected to increase by around 6% by 2030, greening the steel industry is crucial for the energy transition. This article will examine the potential use of green hydrogen (H2) in steel production processes, leading to the decarbonization of the entire steel industry.

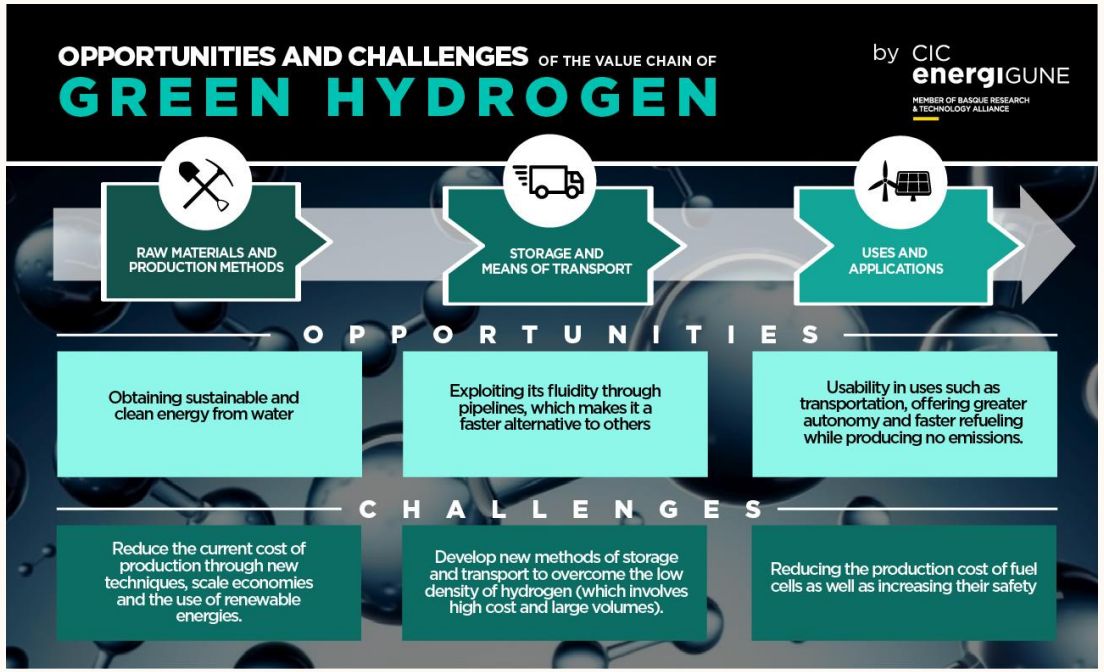
Image Credit: David Tadevosian/Shutterstock.com

High Carbon Footprint of Steel Production

Steel production accounts for up to 8% of global greenhouse gas emissions, and current technologies necessitate a considerable amount of coal.

On average, 1 ton of steel production emits around 1.85 tons of carbon dioxide into the atmosphere.

CHALLENGES AND OPPORTUNITIES



- High cost
- Energy intensive
- Storage and transportation
- Limited infrastructure
- Safety concerns

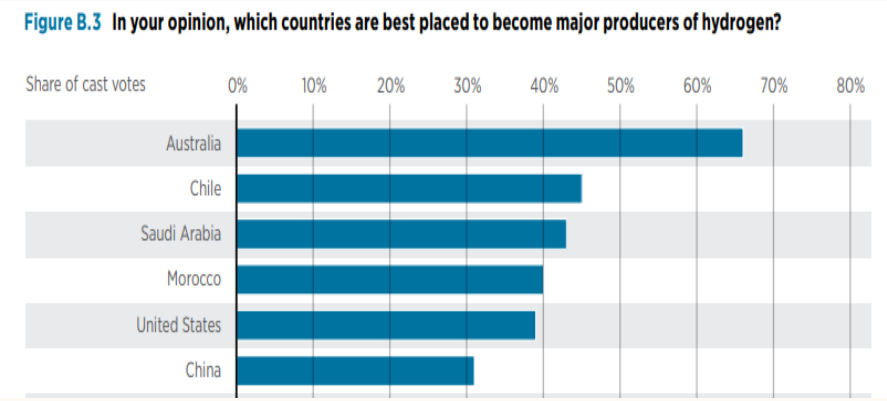
Solutions

- Reduce production cost
- Develop infrastructure
- Address scalability issues
- Promote policy and regulatory support
- Foster stakeholder collaboration

SDG 7

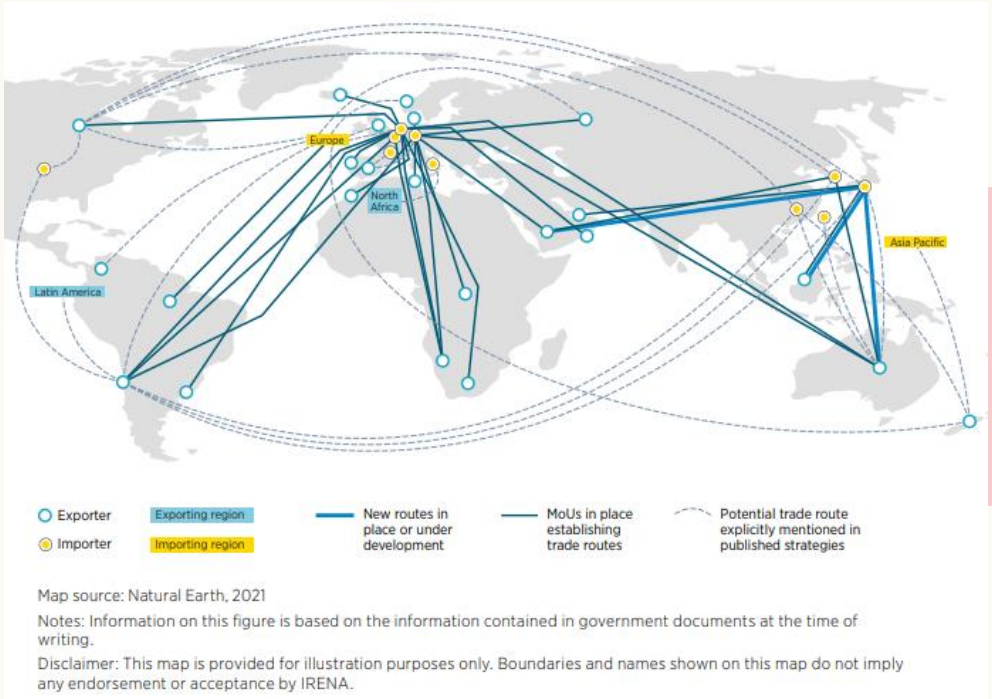
- SDG 7 includes targets on ensuring universal access to affordable, reliable and modern energy services, significantly increasing the share of renewable energy in the global energy mix, and doubling the global rate of improvement in energy efficiency.
- Achieving SDG 7 will catalyze action to combat climate change and attain many other SDGs, including on poverty eradication, gender equality, climate change, food security, health, education, sustainable cities and communities, clean water and sanitation, decent jobs, innovation, transport, and refugees and other situations of displacement.
- Without urgent action, however, the world will fall short of achieving SDG 7. We must dramatically accelerate our efforts.

CASE STUDIES



- 2 of the top 6 countries will be discussed in this presentation
- These countries have in common the abundance of renewable resources due to their position

- These countries published their roadmaps to decarbonization, with hydrogen at the center of it.



China
Australia
Morocco
Chile

CASE STUDIES

CHINA

- World's leader in hydrogen production (33.4Mt/yr) set to build the biggest green hydrogen Plant in Inner Mongolia

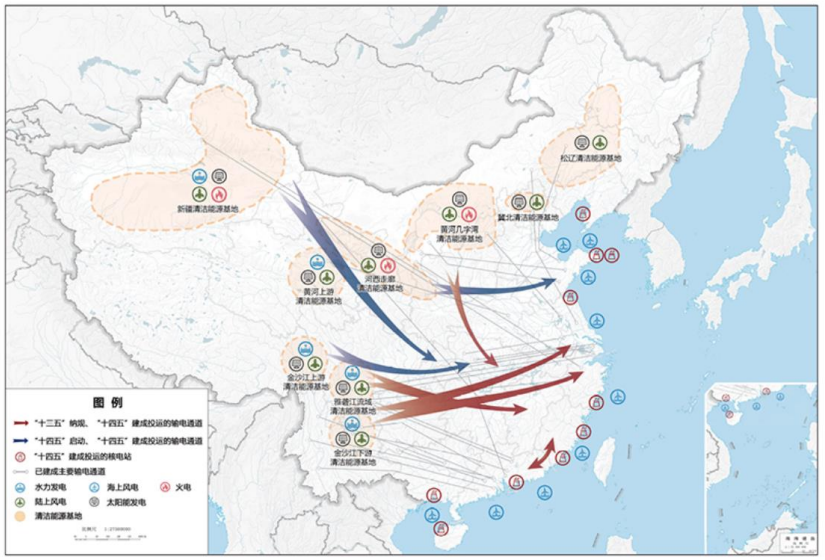
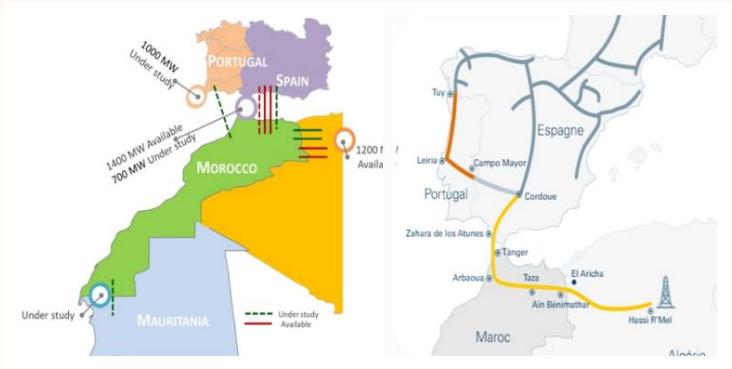
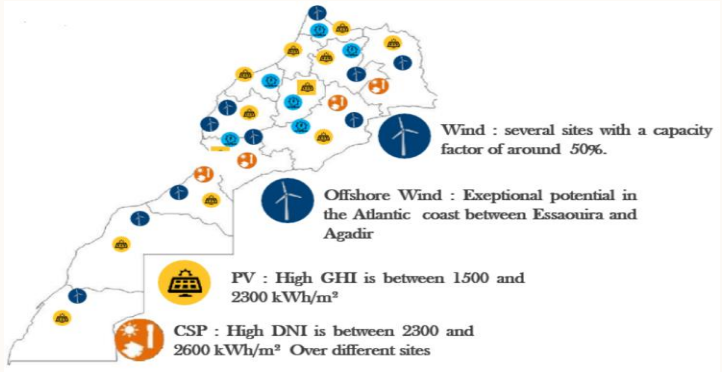


图 1 "十四五"大型清洁能源基地布局示意图

MOROCCO



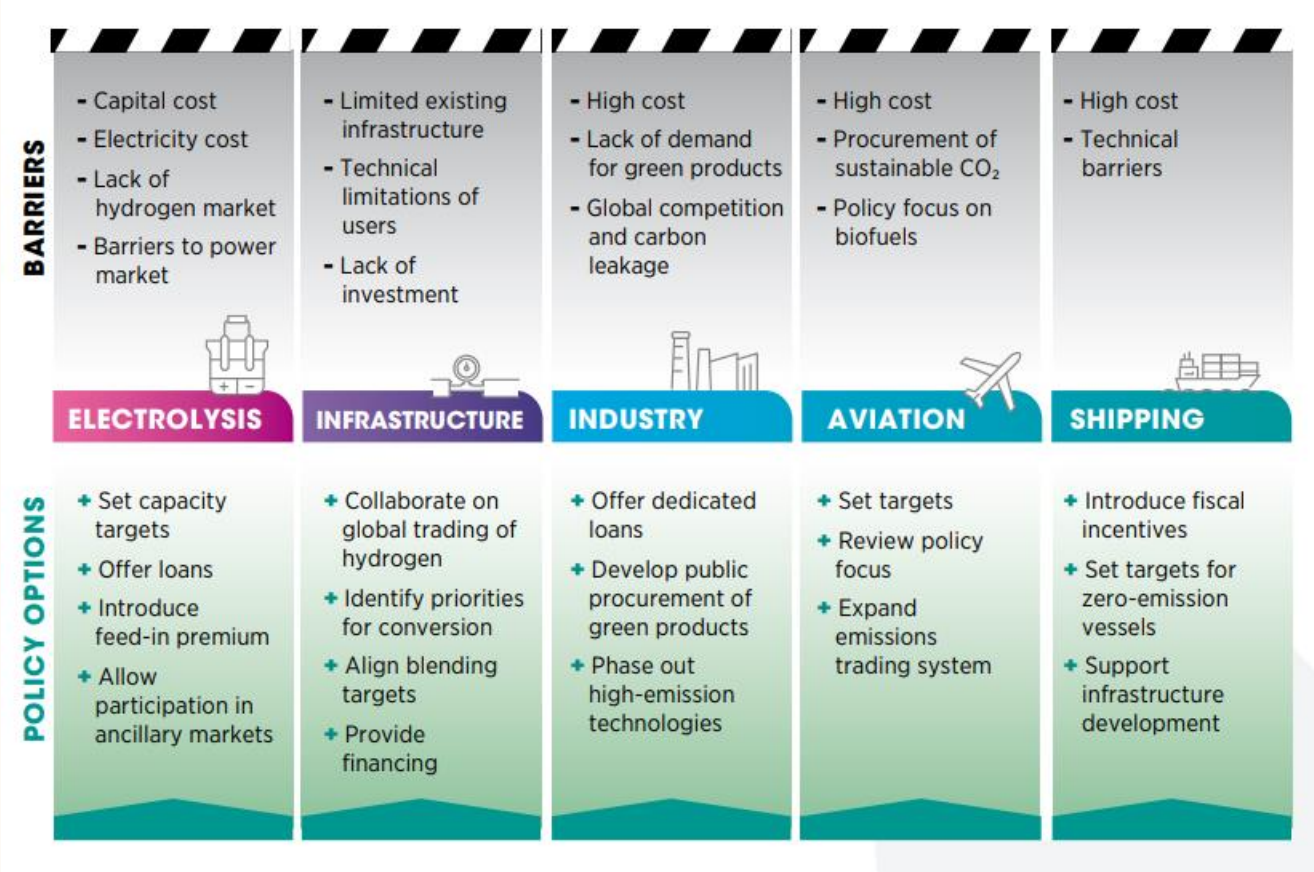
- Strengths due to its strategic position
- Plans to complete more than 52% of green H2 projects by 2040
- Export greenH2 products
- Local use in industry, housing, heat, air transportation



The government action plan contains 8 major and important steps:

- Costs reduction
- Innovation and research
- Local content
- Industrial cluster
- Finance
- Exportations
- Storage
- Domestic markets

POLICIES AND REGULATIONS

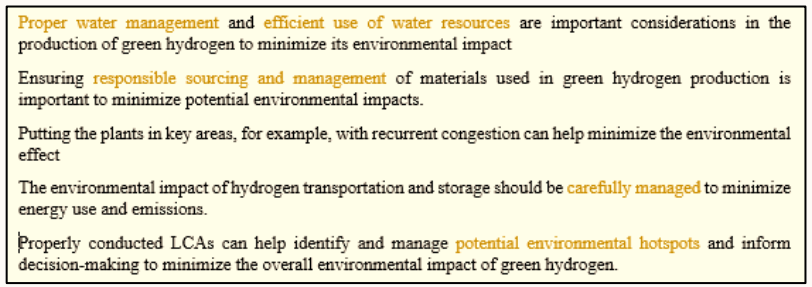


Green hydrogen policy can vary from country to country and region to region, depending on local energy resources, economic conditions, and environmental priorities. However, the overarching goal is to create a supportive policy environment that accelerates the development and deployment of green hydrogen as a sustainable energy source to mitigate climate change and reduce greenhouse gas emissions.

FUTURE OF GREEN HYDROGEN

ENVIRONMENTAL IMPACTS

- **Greenhouse gas emissions** from manufacturing and transporting renewable energy
- **Water usage**: large-scale use of electrolysis could put pressure on water resources
- **Material usage**: some catalysts contain rare earth metal whose extraction poses social and environmental issues
- **Raw material extraction** (land degradation, deforestation…)
- **Transportation and storage** (compression or liquefaction, both energy-intensive)
- **Chemical waste** (disposals)
- **Life cycle assessment**: needed to fully understand H2's impact



Proper water management and efficient use of water resources are important considerations in the production of green hydrogen to minimize its environmental impact

Ensuring responsible sourcing and management of materials used in green hydrogen production is important to minimize potential environmental impacts.

Putting the plants in key areas, for example, with recurrent congestion can help minimize the environmental effect

The environmental impact of hydrogen transportation and storage should be carefully managed to minimize energy use and emissions.

Properly conducted LCAs can help identify and manage potential environmental hotspots and inform decision-making to minimize the overall environmental impact of green hydrogen.

INTERNATIONAL COLLABORATION

- **Research and Development**: collaborate on research and development efforts to advance the science, technology, and innovation related to green hydrogen
- **Policy and regulatory cooperation**: establish common policy frameworks, standards, and regulations for green hydrogen production, transport, and utilization
- **Demonstration projects**: collaborative demonstration projects can showcase the feasibility and benefits of green hydrogen technologies in real-world settings
- **Knowledge sharing and capacity building**: training programs, workshops, and exchanges of experts for promotion
- **Business and investment cooperation**: facilitate business partnerships and investment opportunities in the green hydrogen sector.

FEW SUGGESTIONS

SUMMARY

Green Hydrogen: Driving a Sustainable Future"

- Renewable energy sources are transforming our planet, and Green Hydrogen is emerging as a key driver towards achieving net zero and carbon-free emissions.
- Challenges and opportunities associated with Green Hydrogen exist, but it is an essential piece of the puzzle in the energy transition.
- Prioritizing renewable electricity and electrification is crucial, but decarbonizing difficult-to-electrify sectors with Green Hydrogen is equally important.
- Global progress is evident, with countries like China, Australia, the Netherlands, Morocco, and Oman leading the way.
- Green Hydrogen aligns with the Sustainable Development Goals (SDGs), particularly SDG 7, for affordable and clean energy, with positive impacts on poverty eradication, gender equality, and more.
- The progress made in recent years is undeniable, and the future of Green Hydrogen is bright and promising in shaping a sustainable tomorrow. Let's join the tune of Green Hydrogen in driving this positive transformation.

THANK YOU