

9th session of the Group of Expert on Gas

Item 6: Hydrogen production and consumption

UNECE Task Force on Hydrogen

24 March 2022



ENERGY



- Effort by 3 Expert Groups → Group of Experts on Renewable Energy, Gas and Cleaner Electricity Systems
- Carbon neutrality project
 - Role of Hydrogen to Attain Carbon Neutrality
 - Technology Brief on Hydrogen
 - Technology interplay & scenario building
- Subregional project on Sustainable hydrogen production pathways in Eastern Europe and Central Asia
- Guarantees of Origin for Sustainable Hydrogen





TECHNOLOGY BRIEF
CARBON CAPTURE, USE AND STORAGE (CCUS)



TECHNOLOGY BRIEF DECARBONISING ENERGY INTENSIVE INDUSTRIES IN UNECE REGION



TECHNOLOGY BRIEF
HYDROGEN



TECHNOLOGY BRIEF
NUCLEAR POWER

HYDROGEN VALUE CHAIN

Hydrogen, an innovative solution for achieving carbon neutrality

PRODUCTION

FUEL-BASED PRODUCTION



Natural gas

Steam methane reforming/ autothermal Reforming with or without CCS

Coal

Gasification of coal with or without CCS

Biomass

Gasification of biomass with or without CCS



Steam reforming and gasification with CCS

ELECTRICITY SYSTEM



Renewable energy

Electricity from wind, solar, hydro or geothermal power



Nuclear

Electricity and heat from nuclear power



Water electrolysis

H₂

CONVERSION, PROCESSING & TRANSPORTATION

PURE H₂



PROCESSING

- Liquefaction and regasification of H₂
- H₂ gas compressed



CONVERSION

- **Haber-Bosch process**
H₂ & N₂ → ammonia;
standard shipping modes
- **Methanization**
H₂ + CO₂ → CH₄ + H₂O
or H₂ + CO → CH₃OH (methanol)
(synthetic or substitute natural gas)



STORAGE



Liquified H₂ in storage tanks



Geological storage in underground salt caverns

USE

TRANSPORT



- Hydrogen into **fuel cells** for trucks, passenger vehicles
- **Synthetic fuels** for shipping and aviation

INDUSTRY



- Hydrogen as **feedstock** in refining, steel production, chemicals production
- Hydrogen for **heat generation** for industrial processes

BUILDINGS



- Hydrogen for **heating**
- Hydrogen for onsite **power** through fuel cells

POWER



- Fuel cell **electricity**, H₂ turbines and H₂ CHP
- **Energy storage** and system buffer



Awareness

Recognise hydrogen as a viable climate mitigation option



Acceptance

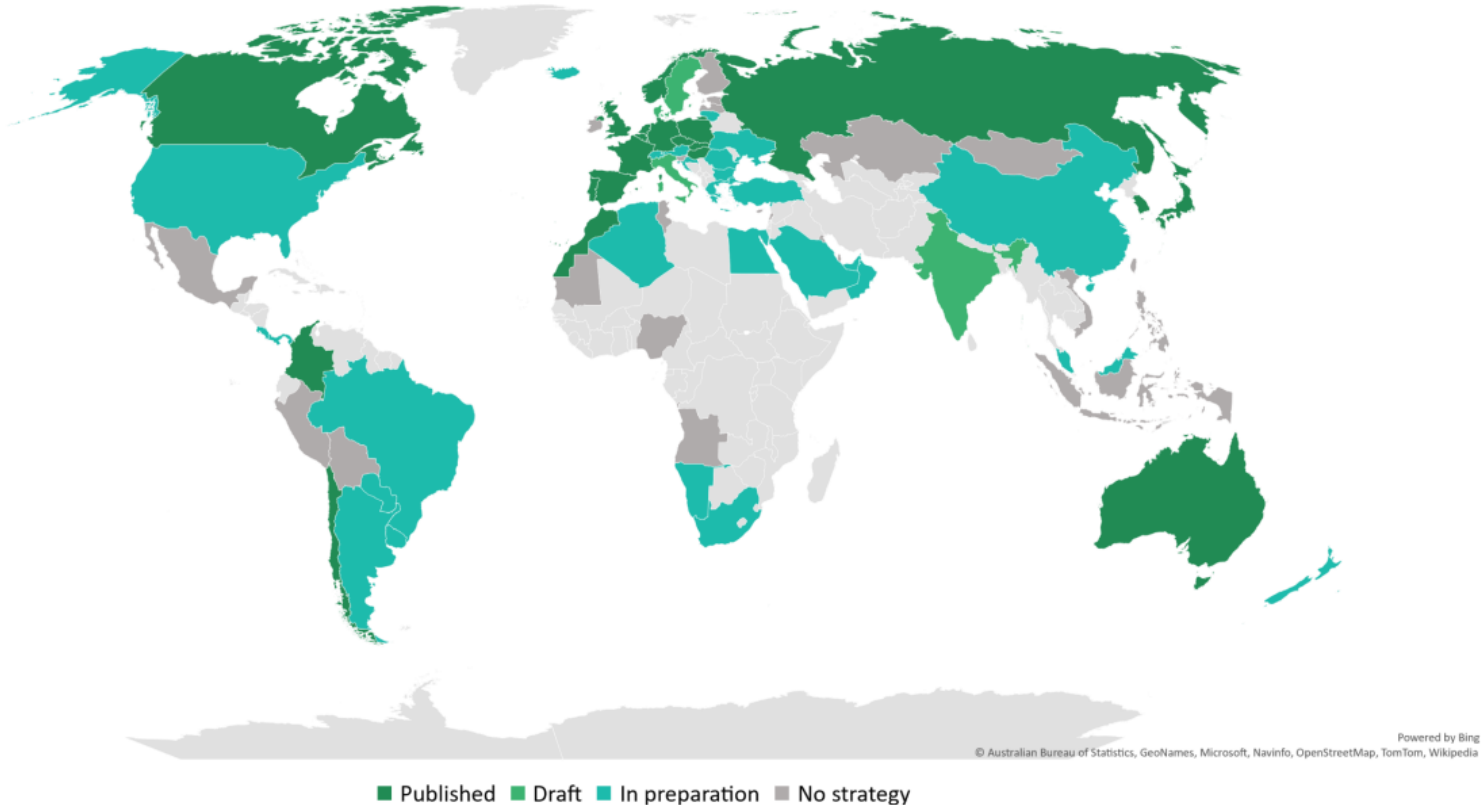
Develop and integrate policies to jumpstart hydrogen economy



Finance

Direct public and private investment into clean hydrogen projects

21 countries have published a hydrogen national strategy



Project on Sustainable Hydrogen Production Pathways



ENERGY

Project Activities as per EXCOM approved document, 15 October 2021

A 1.1.	Conduct an <u>analysis of national potentials to contribute to development of a hydrogen ecosystem</u> and global energy transitions, including the supply of energy to energy-deficient regions of the world	Phase I
A 1.2.	Conduct an <u>analysis of priority areas</u> for the development of national hydrogen potential	
A 1.3.	Conduct an <u>analysis of hydrogen production potential</u> across CIS countries.	
A 1.4.	Conduct an <u>analysis of the opportunities for hydrogen export</u> and possible applications in the domestic market	
A 1.5.	Organize a <u>peer-to-peer dialogue on best practices and lessons learned in developing national hydrogen strategies</u> in the context of the Paris agreement and Agenda 2030 implementation.	
A 2.1.	Conduct a <u>subregional assessment of cost and technical performance of hydrogen production</u> from fossil fuels, low-carbon energy, and renewable energy across beneficiary countries	Phase II
A 2.2.	Refine existing data and assumptions related to sustainable hydrogen production for the energy model.	
A 2.3.	<u>Propose the directions for the implementation of pilot projects</u> for the supply of sustainable hydrogen for export	
A 2.4.	Organize a <u>policy dialogue to identify and overcome existing barriers</u> to development of a hydrogen ecosystem	
A 2.5.	Develop <u>recommendations for a coherent international system of standardization</u> and certification of hydrogen in the context of the Paris agreement and Agenda 2030 implementation.	Phase III
A 2.6.	Develop <u>recommendations for pilot projects</u> in international cooperation in sustainable hydrogen technologies	
A 3.1.	Final seminar for representatives of governments, industry, and academia to present and discuss recommendations and discuss how they can be incorporated into draft National Action Plans to meet SDG 7.	



- **Timeline: January – June 2022**
- **Analysis on hydrogen potential in Eastern Europe & Central Asia**
 - National potentials to contribute to development of a hydrogen ecosystem
 - Priority areas for the development of national hydrogen potential
 - Hydrogen production potential in Eastern Europe and Central Asia
 - Subregional assessment of cost & technical performance of various hydrogen production pathways
 - Opportunities for hydrogen export potential & domestic applications
- **Workshops:**
 - **Technical workshop on priority areas and hydrogen production potential**, March 2022 at Annual Meeting of the Group of Experts on Gas
 - **Policy dialogue**, April 2022 at Annual Resource Management Week



- Capacity building workshop for beneficiary countries to start preparing and drafting national hydrogen strategies
- All technologies will play a role → no prejudices
- Facilitating market creation in specific sectors → hard-to-abate sectors
- Enabling resilience of the overall energy system
- Supply chain development on the back of local demand and creation of hydrogen hubs



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Iva Brkic, Project Lead, Iva.Brkic@un.org

