

A Quality Infrastructure Roadmap for Green Hydrogen

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SPEAKERS



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Energy Transition is off-track to meet 1.5 Scenario



Key trends

- 473 GW on new capacity added in 2023 which bring cumulative capacity to 3.8 TW
- If development pace is *unchanged* RE capacity will reach 9.7 TW by 2030 which misses 11.2 TW target.
- 1.5 TW gap between projected and target capacity
 by 2030 is equivalent to cumulative capacity in
 following regions: Africa, Central America and
 Caribbean, Europe, North America, Oceania



Rapid Electrification via renewables is necessary for rapid decarbonization

2022



Source: (IRENA, 2024)

Quality infrastructure services cut across the full value chain



#3xRenewables



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This quality infrastructure roadmap is the product of a long term collaborative project

Outcome: The major stakeholder groups have sustainably increased the coordination amongst each other, are informed about the role of Quality Infrastructure (QI) and support the development of QI in line with identified priority areas for the sustainable production and trade of global green-hydrogen as well as selected derivatives.







Project Duration



Apr 2022

The roadmap is a step-by-step guide to implementing QI





Note: QI = quality infrastructure.



Step 1: Analysing the potential for green hydrogen & derivatives





RE Potential

Countries should leverage national energy data, international reports and energy models to determine the potential of RE resources available in country



Undertake assessment on how GH2 can be used in the country in industries (steel, MeOH, NH3); transport (road, shipping); and electricity (grids and heating)



Downstream

Assessing existing regulation, mechanisms to support early movers (finance), demand creation tools (certifications, green procurement); value chain integration (clusters and hubs)



Midstream

Look into assessing the readiness of existing transport and distribution infrastructure availability as well as associated financing for new infrastructure requirements



Upstream

Attracting investors to support GH2 production; procurement of electricity for electrolyzers; and manufacturing options should be investigated



Market Assessment

Undertake an assessment on how national GH2 market potential fits with international markets requirements as well as determine potential trade opportunities

> 3X #3xRenewables

Source: IRENA, UNIDO and IDOS 2024

Step 2: Developing a green hydrogen strategy



Decide on which opportunities to develop and prioritize them in a coherent hydrogen strategy that can guide the implementation of the most important facets within the GH2 economy. Some of the key tenets necessary in these strategies are as follows:



Key points from the Tunisia Green Hydrogen Strategy



Source: Tunisia National Green Hydrogen Strategy launched in May 2024



Step 3: Assessing the status of the national Quality Infrastructure system



- In step 3 the general status of the national Quality Infrastructure system is analysed to identify strengths and areas to be further developed by the system. This general analysis is not sector specific, but relevant for all areas of public interest.
- The analysis can be based on the "<u>Rapid Diagnostic Tool</u>", developed by PTB and World Bank.







Strengths

- INNORPI is a well-established standardisation body with financial autonomy.
- INNORPI is full/participating member of ISO, IEC and regional standardisation organisations. It is represented in several relevant international TCs and has related mirror committees.
- A standardisation strategy and standardisation programme exists.
- The department for information on standards is working effectively.
- A relatively large number of national standards in relevant areas exist.

Potential for further development

- Expansion of **representation on international TCs** and the discussion of international standards in **national mirror committees**.
- Implementation of training programmes for INNORPI management staff and key stakeholders.



Step 4: Quality Infrastructure service offering and demand assessment



Use the Quality Infrastructure service checklists to identify the services required nationally on the three Level development and specification for been with

Level 3 Quality infrastructure services specifically required for green hydrogen.

Level 2

Medium advanced quality infrastructure services required for safety in **renewable energy**, electric energy and natural gas, as well as hydrogen

Level 1

Quality infrastructure system according to international standards and good practices. Basic guality infrastructure services required for renewable energy, electric energy and natural gas

Objective Level 3

• Assure safety, quality and sustainability of green hydrogen throughout the value chain

Objectives Level 2

- Provide all required quality infrastructure services to assure safe production, distribution/transport and use of gas mixtures with more than 20% hydrogen content as well as pure hydrogen
- Provide the medium advanced quality infrastructure services for assuring quality and sustainability in renewable energy generation as well as the distribution and use of electric energy and gas (especially natural gas)

Objectives Level 1

- Establish a quality infrastructure system in accordance with international standards and good practices
- Provide all required quality infrastructure services to assure safety in renewable energy generation as well as the distribution and use of electric energy and gas (especially natural gas)
- Provide the basic guality infrastructure services required to assure quality and sustainability in the previously mentioned sectors



Standardisation: status of existing services in Tunisia



	Renewable Energy Generation	Production		Distribution and transport	Utilization
		Electro- Conversion lysis into derivates	Storage		
Level 1	 Adopt international standards in the national standard system as defined in the database for Level 1. At least "observer" status in international TCs and establishment of the related national mirror committees in the following areas: IEC <u>TC 31</u> – Explosive atmospheres and related subcommittees (i.e. SC 31J, SC 31M), IECEx (acceptance of international certificates of conformity), ISO/TC 180 – Solar energy, IEC TC 82 – Solar photovoltaic energy systems, IEC TC 88 – Wind energy generation systems, ISO/TC 161 – Controls and protective devices for gaseous and liquid fuels, ISO/TC 22/SC 32 – Electrical and electronic components and general system aspects, ISO/TC 301 – Energy management and energy savings, ISO/TC 58 – Gas cylinders. Adopt relevant ISO CASCO – Standards related to the national quality infrastructure system. 				
Level 2	 Adopt international standards into the national standard system as defined in the database for Level 2. Full participating member in international TCs and establishment of national mirror committees in the following areas: TCs mentioned for Level 1 with "observer status" previously, IECEx and IECEE (Member Body), <u>ISO/TC 197 – Hydrogen technologies</u>. At least "observer" status in international TCs and national mirror committees in the following areas: ISO/TC 207 – Environmental management (i.e. SC 7 Greenhouse gas and climate change management and related activities), <u>ISO/TC 158 – Analysis of gases</u>, <u>ISO/TC 161/WG 5 – High-pressure controls</u>, <u>ISO/TC 193 – Natural gas</u>. 				
Level 3	 Adopt international standards in Full participating member in inte "observer status" previously, IEC 	to the national standard syst rnational TCs and national n C/TC 105 – Fuel cells, IECRI	em as defir nirror comm <mark>E (Member</mark>	ned in the database for Level 3. hittees in the following areas: TC <mark>Body)</mark> .	s mentioned for Level 2 with

Existing services marked in green, Not existing services marked in orange, Missing information marked in grey



Step 5: Develop a national Action Plan to implement & embed QI services



General development of Quality Infrastructure, improving the gaps identified in the QI analysis (see step 3).

Activity	Budget	Responsible	Date	
Legal and institutional framework				
Administration and infrastructure				
Service delivery and technical competency				
External relations and recognition				

Development of Quality Infrastructure services according to national priorities

Activity	Budget	Responsible	Date	
Metrology				
Testing				
Standardization				
Certification and Inspection				
Accreditation				
Technical Regulation				



Activities recommended: Short term (till 2026)



Activity	Leading organisation	Organisations to be involved	Material resources required
Standardisation			
Expansion of representation on international TCs and the discussion of international standards in national mirror committees , based on an updated strategic plan for INNORPI. Participating member in international TCs and national mirror committees in the following areas: International: <u>ISO/TC 161</u> Controls and protective devices for gaseous and liquid fuels (to be upgraded to participating member). National: Mirror committee to be created for: <u>ISO/TC 301</u> Energy management and energy savings, <u>ISO/TC 22/SC 32</u> Electrical and electronic components and general system aspects, <u>ISO/TC 301</u> Energy management and energy. International and national: <u>IEC/TC 31 – Explosive atmospheres</u> , <u>IECEx</u>	• INNORPI	• MIME	↑ \$
(Member Country), IEC TC 88 Wind energy generation systems, <u>IEC TC 82</u> Solar photovoltaic energy systems, <u>ISO/TC 28</u> Petroleum and related products, fuels and lubricants (to be upgraded to ISO participating member and creation			
of national mirror committee).			
 Updated training programme for INNORPI management staff and key stakeholders for the standardisation areas as defined in this action plan. 	 INNORPI 	MIME (DGIIT)International cooperation	Ş \$
 Adoption of international standards to the national standard system as defined in the checklist for Level 1. 	• INNORPI	 Relevant stakeholders in TCs International cooperation 	1



10 Priorities to Develop a Quality Infrastructure for Green Hydrogen

1.



10. Foster international collaboration

It is a well-established fact that international collaboration will be instrumental to harmonize, ensure environmental integrity, create value opportunities in global South and developed robust GH2 markets based on Ql.

9. Strengthening the link between policy and QI ____

International and regional bodies should engage in continuous efforts to create awareness about the benefits of QI for safe and sustainable production and trade of products like hydrogen.

8. Provide a voice for developing countries

Engagement of developing countries in international standardization TCs must be promoted and supported.

7. Promote harmonisation of QI elements

To create a level playing field and ensure fair access to global markets for H2 and its derivatives, international harmonization of quality and safety standards is crucial.

6. Promote digital solutions

Leveraging existing digitalization tools and standards can support streamlining the requirements in standards across the whole H2 value chain. The adoption of digital avenues can also promote enhanced traceability and compliance with QI requirements.

Strike the correct balance for QI conformity

There are strong efforts need to develop QI while balancing the following key objectives: a) environmental and social integrity and b) not overburden stakeholders with requirements that delay the deployment of green hydrogen.

2. Align standards with market trends

Supporting standardisation bodies is crucial for staying updated on market trends to develop the standards that are more urgent to foster the market.

3. Invest in training skilled personnel

Countries' quality and safety initiatives must also focus on building the skills of personnel responsible for managing various elements in the H2 value chain.

4. Accounting standards must be all encompassing

Carbon accounting standards, like ISO's forthcoming 19870, covering emissions across the entire life cycle. It's essential for all stakeholders contribute to improve these standards.

5. Sustainability aspects must not be overlooked

It is important to look beyond emissions accounting and ensure that sustainability standards must better cover aspects related to impact on water & land demand and the associated social impacts.







The roadmap publication provides an overview on the QI considerations for green hydrogen as well as presents five steps to start the establishment of such an ecosystem as well as introduced a three-level assessment model + QI checklists for each pillar.





The application of these roadmap steps was piloted in a **Tunisia case study** developed together with the Ministry of Industry, Mines and Energy. It is available as a PPT slide deck on the report landing page.

A standards database created combining inputs based on IRENA desk research as well as database from DIN project "<u>Standardization Roadmap for</u> <u>Hydrogen Technologies</u>" provides a detailed overview on standards available and applicable to hydrogen sector. QI level as presented in roadmap and sectoral/QI aspect classification have been ascribed to each entry.





Thank you for your quality attention!



Federal Ministry for Economic Cooperation and Development









Q & A 5 min





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