Comprehensive analysis of regulatory framework for the green hydrogen value chain in Tunisia

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ABSTRACT – Tunisia's pursuit of green hydrogen is driven by the need to diversify its energy mix, reduce dependence on electricity and natural gas imports, and meeting carbon emission targets. This paper examines the regulatory and procedural landscapes governing key sectors for green hydrogen production, including renewable electricity generation, seawater desalination, and electrolysis. It identifies the main obstacles and outlines pathways to address these challenges, with the aim to position Tunisia as a competitive player in the emerging global green hydrogen market.

Keywords: Green hydrogen, regulations and procedures, administrative and procedural obstacles.

1. INTRODUCTION

Under the Paris Agreement, Tunisia has pledged to reduce the carbon intensity of its economy by 45% by 2030 compared to 2010 levels. Since the energy sector accounts for roughly 60% of the country's total greenhouse gas emissions, it occupies a central place in Tunisia's climate strategy. Beyond its environmental commitments, Tunisia is also striving to diversify its energy mix with carbon-neutral alternatives in order to reduce its reliance on imported electricity and natural gas.

The development of a green hydrogen sector is seen as a key pathway to achieving these national climate objectives and meeting the targets outlined in Tunisia's Nationally Determined Contribution (NDC). This ambition is also fully aligned with the National Energy Strategy 2035 and with the national strategy for carbon neutrality and climate resilience. Green hydrogen and hydrogen-derived products can additionally support Tunisian industries in complying with the Carbon Border Adjustment Mechanism (CBAM), helping safeguard their access to European markets.

Hence, Tunisia has published its green hydrogen strategy, expressing its ambitious to produce 8300kt of GH2 in 2050 from which 6400kT are intended for export.
To fulfill these national needs and comply to international constraints, it is necessary to identify the obstacles and challenges that might hinder the development of green hydrogen projects. This paper covers the assessment of the regulations and procedures, as well as the legal and administrative aspects leading to the implementation of this sector in Tunisia.

2. METHODOLOGY

The study begins by mapping the key stages of the green hydrogen value chain.
It starts with electricity generation from renewable energy sources, followed by seawater desalination providing the purified water required to power electrolyzers for hydrogen production.
The scope of this work extends to the storage and distribution of green hydrogen, but does not cover downstream Hydrogen-to-X conversion processes.
The analysis draws on a deep review of relevant applicable laws, regulatory texts, official government publications, and publicly accessible information available on government platforms.
Figure 1 presents the laws, decrees, and standards most relevant to each component of the green hydrogen supply chain, highlighting the key regulatory instruments.

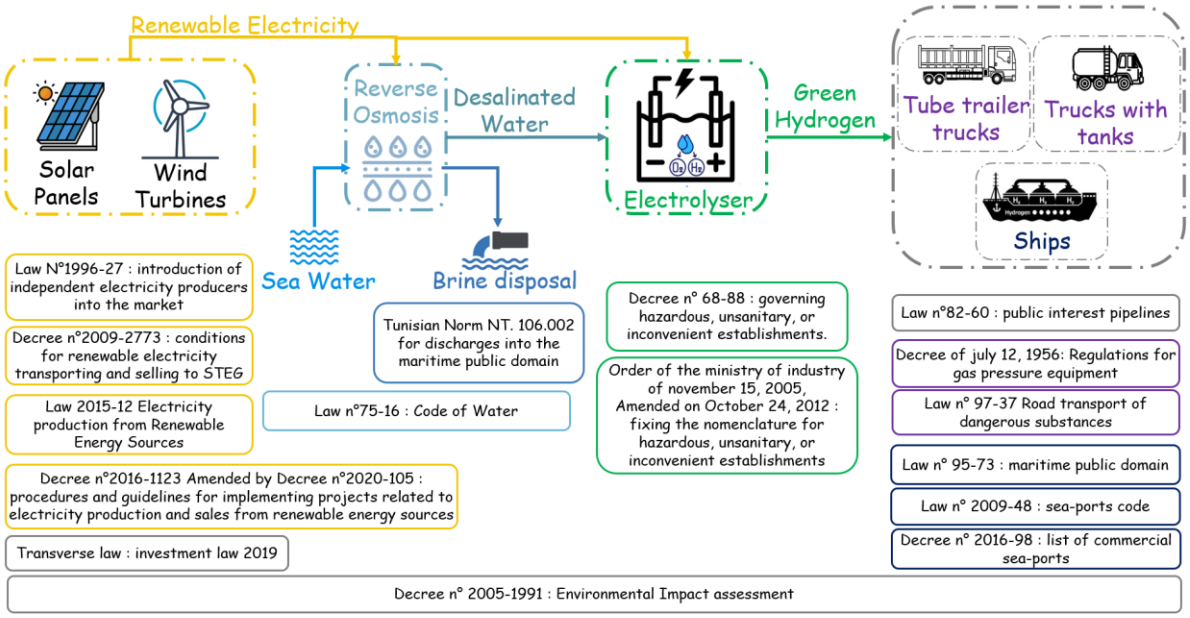

Figure 1: legal framework for green hydrogen production

This approach provides a comprehensive understanding of the regulatory landscape influencing the development of green hydrogen.

3. RESULTS

The study outputs are as follows:

a. Electricity from renewable energy sources:

In Tunisia, the renewable energy sector is currently structured around three objectives: self-consumption, meeting national electricity demand, and export, none of which yet include hydrogen production.

Law 2015-12 establishes three corresponding regimes. The self-consumption regime enables users to generate electricity for their own needs and sell up to 30% of their annual surplus to STEG. The authorization regime supports national demand through independent producers who exclusively sell electricity to STEG, with project capacities capped at 10 MW for solar and 30 MW for wind. Finally, the concession regime, awarded through ministerial tenders, targets large-scale projects exceeding authorization thresholds and includes both electricity production for the domestic market and projects dedicated to export.

This framework, designed primarily for electricity generation, is not suitable for hydrogen production. Depending on the regime, key limitations include mandatory connection to the national grid, exclusive electricity sales to STEG, competitive tendering requirements, and capacity caps for solar and wind projects. These constraints restrict the flexibility and scale needed for green hydrogen production.

The development of renewable energy in Tunisia involves a multi-step process that can partially overlap, with some varying requirements depending on the regime. The procedure begins with site selection, a complex and lengthy phase that requires assessing land suitability, ownership, grid proximity, resource potential, accessibility, and environmental or administrative constraints, often supported by topographic, cadastral, and state-domain checks, as well as 12-month wind measurements where relevant. During this stage, developers must obtain ministerial authorization and a temporary land occupancy permit to conduct

technical and economic studies. Next, developers undertake project-related studies, including pre-feasibility and feasibility analyses covering technical design, sizing, supplier selection, environmental considerations, and grid-connection assessments. This also includes a preliminary Category B Environmental Impact Assessment for large projects (≥300 MW) which receives an opinion of approval or rejection or requests for additional studies within a maximum period of 3 working months. Once the project is validated, developers move to securing authorizations and permits, such as temporary occupancy on state land, agricultural land approvals, building permits, circulation permits for oversized transport, and final ministerial approval, which is valid for two years. Afterward, investors can establish the project entity, obtain the investment declaration certificate, and access fiscal or financial incentives. Finally, grid-connection studies are completed to define integration requirements, allowing the project to be physically connected to the national grid.

b. *Water desalination for green hydrogen production*

Green hydrogen projects in Tunisia will depend heavily on seawater desalination, which generally operates under concession contracts and requires coordination among multiple stakeholders. Desalination plants are classified as Category A installations and must undergo an Environmental Impact Assessment (EIA) with a maximum review period of 21 working days, while water transport or transfer canals require specific terms of reference and, in some cases, more detailed documentation. The maritime ports code permits private use of the maritime domain through temporary occupation or concessions for infrastructure built in or near the sea. Although the legal framework does not impose direct restrictions on desalination, the overall process, characterized by multiple authorizations, EIA requirements, and complex procedures, can be time-consuming and costly, creating additional challenges for project developers.

c. *Water electrolysis for green hydrogen production*

Water electrolysis projects for green hydrogen production in Tunisia face strict regulatory procedures because hydrogen is classified as a hazardous product (categories 1 and 2). Establishing an electrolysis facility requires a public inquiry, lasting from three months to three years, during which developers must respond to public objections, consult multiple ministries, and ultimately receive approval through a ministerial decree. Although intended to ensure safety, this process can significantly delay project timelines, especially when public resistance arises. Additionally, gas storage units fall under Annex II of the EIA framework, requiring detailed terms of reference, impact analyses, and an Environmental Management Plan, steps that are both time-consuming and costly.

d. *Identified obstacles and recommendations*

Through a comprehensive assessment, it became clear that present regulatory challenges fall mainly under 3 categories or stages as presented in Table 1 below:

Table 1 : Main obstacles and recommendations for Tunisia's green hydrogen (GH2) projects

Project Stage	Obstacles and Challenges	Relevant Recommendations
Project location	- Complex and long process for site selection and land acquisition for RE projects mainly -Multiple authorizations involved with administrative coordination gaps	-Map suitable land and streamline land allocation via dedicated authorities - create a "Green Hydrogen Valley" with strategic areas and port access
Project-related Studies	- Feasibility, pre-feasibility and grid connection studies for RE Projects: time-consuming, complex, require authorizations - Environmental Impact Assessment: long	- Revise renewable energy regimes to include GH2-specific rules -Implement integrated technical and environmental studies under a single dedicated

	and costly process, different categories of EIA demanded for each phase of the project. - public inquiries for electrolysis projects.	regulatory framework -Consolidate Environmental Impact Assessments into a single integrated EIA across project lifecycle. - Streamline public inquiry procedures
Authorizations & Permits	-Multiple permits needed for each phase (building, circulation, ministerial approval for RE projects, water transport or transfer canals, temporary occupation/concession of maritime domain) -involvement of numerous administrative entities -some unclear timelines and risk of delays	-Introduce a Single Window system to centralize approvals and treat GH2 projects as a distinct industry with dedicated rules for permits, land, EIAs, and public inquiries -Standardize and streamline desalination approval procedures as part of a dedicated GH2 regulatory framework -define clear response timelines, ensure timely approvals and alignment with project timelines

It is also important to mention that launching pilot projects is a huge step to demonstrate feasibility and progress. While the country has already promoted strategic partnerships with big energy companies and investors through MoUs, starting these pilot initiatives provide tangible results that can build investor confidence, refine regulatory and technical processes, and pave the way for large-scale green hydrogen deployment.

4. CONCLUSION

Tunisia possesses strong potential to emerge as a leader in green hydrogen production, thanks to its abundant renewable energy resources and strategic location. Yet, regulatory constraints, complex approval procedures, and limited frameworks currently hinder progress. Streamlining legal processes, improving land access, and establishing a specific green hydrogen policy are essential to unlock this potential.

REFERENCES

[1] Republic of Tunisia, UPDATED CDN OCTOBER 2021, Available online at: https://unfccc.int/sites/default/files/NDC/2022-08/CDN%20-%20Updated%20-english%20version.pdf

[2] Ministry of industry, mines and energy (2023), "Stratégie Energetique de la Tunisie à l'horizon 2035", Available online at : https://www.energiemines.gov.tn/fileadmin/docsu1/synth%C3%A8se_strat%C3%A9gie_2035.pdf

[3] Ministry of industry, mines and energy, Stratégie nationale pour le développement de l'hydrogène vert et ses dérivés en tunisie (May 2024). Available online at : https://www.energiemines.gov.tn/fileadmin/docs-u1/Re%CC%81sume%CC%81_stratei%CC%80gie_nationale_MIME-WEB.pdf

[4] GIZ (2019), Projets d'énergies renouvelables _ Guide détaillé _ mai 2019. Available online at: http://www.tunisieindustrie.gov.tn/upload/ENR/Guide_detaille_ENR_tunisie_mai2019.pdf

[5] GIZ (2020), GUIDE D'ACCES AU FONCIER. Available online at : https://www.energiemines.gov.tn/fileadmin/docs-u1/Guide_d_Acc%C3%A8s_au_Foncier_Projets_ER_en_Tunisie_.pdf .

[6] Legislative texts available on : http://www.iort.gov.tn/WD120AWP/WD120Awp.exe/CONNECT/SITEIORT

[7] Legislative texts available on : https://www.pist.tn/collection/JORT?ln=fr