

# Sheet N° 11- 1/2 - Integrated green hydrogen production unit

## Description



Green hydrogen production unit, with an average capacity of **200 MW**, from a water electrolysis process and renewable energies (~110 MW solar and ~245 MW wind) that can be used in the green chemistry, cement and steel industries.

**Main customers :** Chemical industry, upstream energy, mobility, refineries, thermal power plants, power-to-x-to-power

**Sector and sub-sector:** Green hydrogen and its derivatives /

Complexity of the product<sup>1</sup>



HS Code<sup>2</sup>: 280410

## Key facts

- Green hydrogen as a new Royal priority for Morocco (e.g. H2 roadmap being recalibrated)
- Morocco among the top 3 destinations for green H2 production in the world according to IRENA
- Rise of green hydrogen as a renewable energy source for several industries (refineries, fertilizers, methanol)
- Carbon tax imposed at EU borders to accelerate use of green hydrogen

## Prerequisites (2)

- Green hydrogen competitiveness requiring large-scale production
- Need for an in-depth study for the choice of the location with optimal capacity-factor conditions

## Market indicators

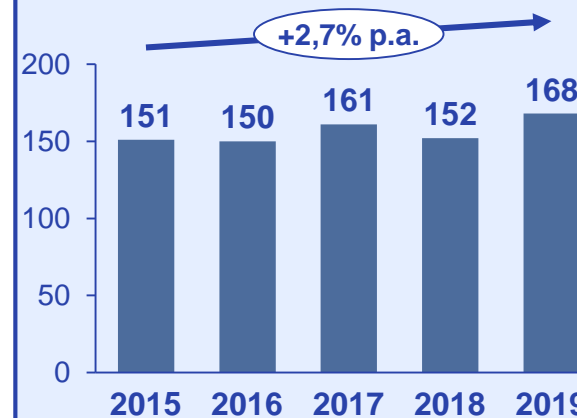
### Target market(s) :

#### Target market(s), (from highest to lowest priority) to be addressed :

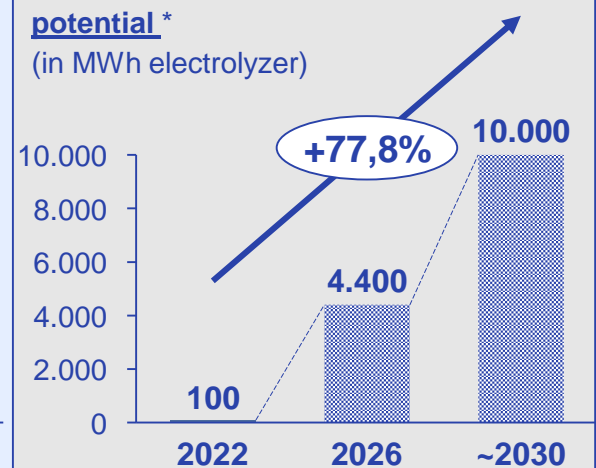
- +** Export: Mainly to Europe, USA and Canada to serve the decarbonisation needs of industry and mobility
- Local and national: Mainly to serve the decarbonisation needs of the domestic industry and the production of high value-added H2 derivatives

### Market size and development (3)

#### World hydrogen imports (USD million)



#### Estimated national installed capacity potential \*



(1) Product Complexity Index: Diversity and sophistication of the know-how required to produce a product. The PCI is calculated according to the number of countries that produce the product and the economic complexity of these countries. The most complex products, those that only a few countries can produce, have the highest PCI (e.g. electronics, chemicals) vs. the least complex products (e.g. raw materials, agricultural products) - Source: TradeMap, Harvard economic complexity

(2) Sources: Office des Changes, Press articles

\* See details on the following slides



# Sheet N° 11- 2/2 - Integrated green hydrogen production unit

## Financial indicators (indicative) :

<b>Potential investment</b>	6 - 7 billion MAD (of which ~54.4% energy, ~34% electrolyser and ~15% contingency)
<b>Turnover</b>	850 - 1170 Mn MAD
<b>Estimated selling price</b>	40 - 55 MAD / kg
<b>ROI</b>	7 - 15 years
<b>EBITDA (as % of sales)</b>	80 - 90 %
<b>Jobs</b>	70 - 100

## Investment elements

### Potential land

#### Priority provinces

✓ Laayoune 
 ✓ Es Smara 
 ✓ Boujdour 
 ✓ Tarfaya

#### Type of land

State private domain (e.g. the Akhfenir Tarfaya-Foum el Oued Lamssid-Jraifia coastline)

#### Area

950 - 1000 ha  
(+95% allocated to energy)

#### Average land price

Unified Regional Investment Commission (CRUI)

#### Mode of mobilisation

Unified Regional Investment Commission (CRUI)

### Main investment benefits

#### Grant

Investment Charter

#### Support for training

Solar Cluster, greenh2 Cluster, "Tatwir green growth", MorSEEF

#### Other

-

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### Human resources

#### HR skills needed

- Chemical and energy engineering, process engineering, specialising in renewable energy, electrolysis, energy efficiency

#### Training offers

- Multidisciplinary Faculty (Ouarzazate) : Control and exploitation of renewable energies
- EST (Laâyoune branch) : Professional degree in renewable energies and water desalination

### Raw materials and suppliers

#### Main inputs

- Water, electrolytes, renewable energy sources (photovoltaic panels, wind turbines, etc.)

#### Main suppliers

- Germany, China: Renewable energy sources
- Morocco : water