



GOBIERNO
DE ESPAÑA

MINISTERIO
PARA LA TRANSICIÓN ECOLÓGICA
Y EL RETO DEMOGRÁFICO

Renewable Hydrogen Roadmap

Hydrogen Energy Network (HyENet)

26th May 2020



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I. Renewable hydrogen role in Spain's long-term targets:

- ✓ **2030: National Energy and Climate Plan**
 - 23% reduction in greenhouse gas (GHG) emissions in 2030 compared to 1990
 - 42% share of energy end-use from renewables (74% in electricity generation) in 2030
 - Specific measures to foster renewable H₂ (**Renewable Hydrogen Roadmap (RH2)**)
 - 39.5% energy efficiency improvement in 2030

- ✓ **2050: Long-term strategy for a modern, competitive and neutral economy in 2050**
 - Draft in progress
 - ≈ 90% reduction in greenhouse gas (GHG) emissions in 2050 compared to 1990
 - ≈100% share of energy end-use from renewables (100% in electricity generation)
 - Relevant RH₂ role (difficult sectors to decarbonize; surplus electricity storage)

- ✓ **Additional instruments for targets achievement**
 - Climate Change and Energy Transition Act → measures to boost RH₂
 - Just Transition Strategy → with a component of green reindustrialization including renewable H₂
 - Storage Strategy → H₂ storage
 - Renewable technologies Roadmaps (**RH2**; Offshore Wind & Marine Energies; Biogas).



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II. Renewable hydrogen Roadmap

- ✓ **Concept paper for public consultation (launched on 8th April)**
 - 10 specific questions to the public sector, stakeholders and civil society

- ✓ **Goals**
 - Identifying technical, regulatory and economic barriers
 - Proposing regulatory measures
 - Creating a favourable climate for investment
 - Linking H₂ policies to horizontal policies (e.g.: just transition)

- ✓ **Ongoing work during the COVID-19 crisis**
 - Meetings with relevant stakeholders
 - Current grey H₂ producers and consumers
 - Potential RH₂ consumers
 - RH₂ players
 - Technical assessment of RH₂ production projects
 - Momentum for RH₂

*Draft to be launched
shortly*



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III. Renewable hydrogen potential in Spain

✓ **Supply**

- Renewable energy deployment
 - Now: Competitive PV solar projects → lowest renewable electricity prices in the EU
 - Future: Robust objectives and surplus renewable energy (73% renewable electricity by 2030)
- Value chain
 - Electrolyzer manufacturers
 - Utility companies leaders in renewables

RH2 potentially a good energy carrier for isolated energy systems (islands) and just transition regions

✓ **Demand**

- Industry (10% of EU H₂ demand)
 - Hydrogen-intensive industry consumes 500,000 H₂ t/y → by 5 million CO₂ t/y
 - (71% refining; 25% fertilizers; 3% others)
- Transport
 - Importance of freight transport by road (>90%; 2nd EU member in tonnes-km).
 - Rail can not be completely electrified (secondary network).
 - Aviation (2nd EU member in passengers; 5 airports among EU top-30).
 - Maritime (2 ports among EU top-10).



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IV. Fostering a renewable hydrogen sector (1)

✓ **Stage 1. Ramp up RH2 sector**

- Shifting from grey to RH2 -> **scalable projects**
 - Reducing GHG emissions
 - Ensuring industry supply while strengthening competitiveness
- Introducing RH2 in transport
 - Captive vehicle fleets (trucks and buses) -> **scalable vehicles & refueling projects**
 - Development in ports and shipping
 - Demonstration projects in rail and aviation

→ **EU financial support to I+D and demonstration projects is a must**

- **Renewable H2 at low prices should be prioritised**

✓ **Stage 2. Maturity of H2 sector**

- Replacement of grey H2 as feedstock
 - Ensuring continuous, reliable and competitive RH2 supply
- Taking advantage of clean electricity surplus -> **Storage Strategy**
- Transport strategy for heavy-duty vehicles, hydrogen-based fuels in shipping and aviation

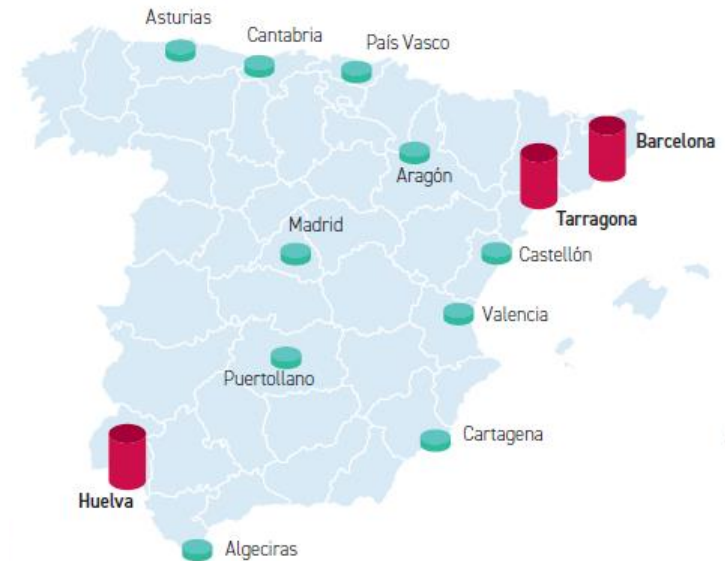


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IV. Fostering a renewable hydrogen sector (2)

Potential H2 hubs	Petro chemical	Just transition	Islands
Tarragona	X		
Huelva	X		
Puertollano	X	X	
Cartagena	X		
León- Asturias		X	
Canary Islands			X
Balearic Islands			X

“Distributed RH2 production” through scalable projects is the first step

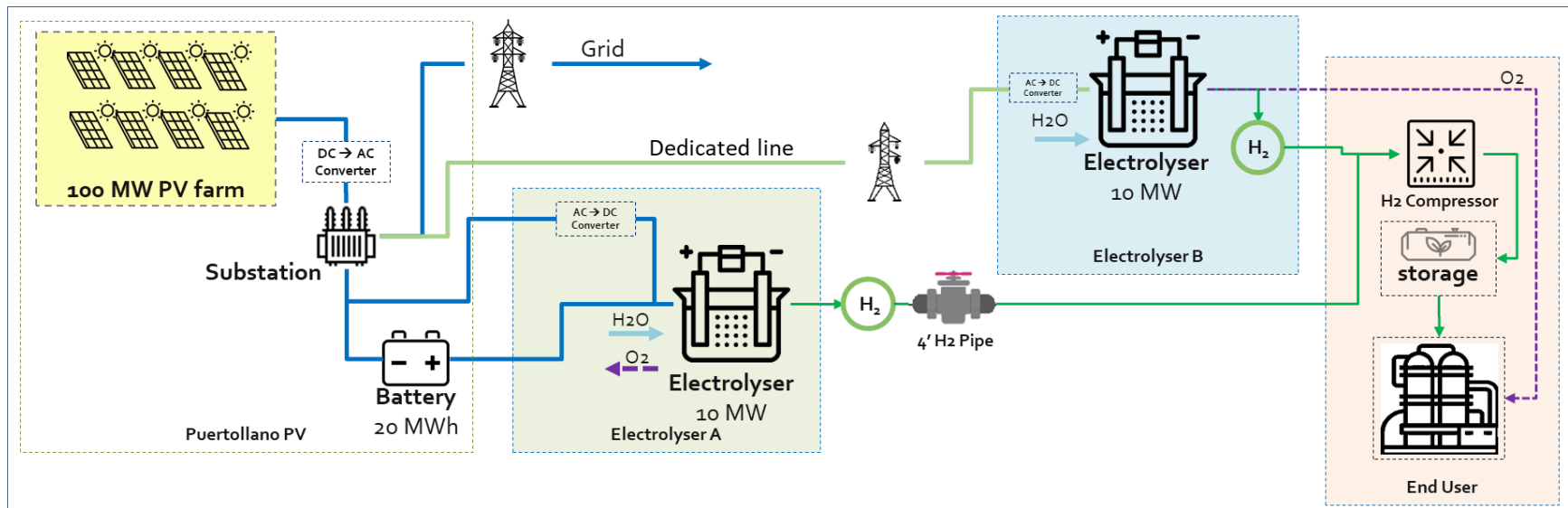




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V. Projects in progress. Replacing grey H₂ (1)

✓ PUERTOLLANO. Green hydrogen for chemical industry (*Innovation Fund*)



Project figures

- 20 MW RH₂ production (scalable)
- 100 MW PV solar plant

End-uses

- RH₂ as feedstock for chemical industry (replacing 5-8% of grey H₂ needs of client)

Puertollano (Ciudad Real)

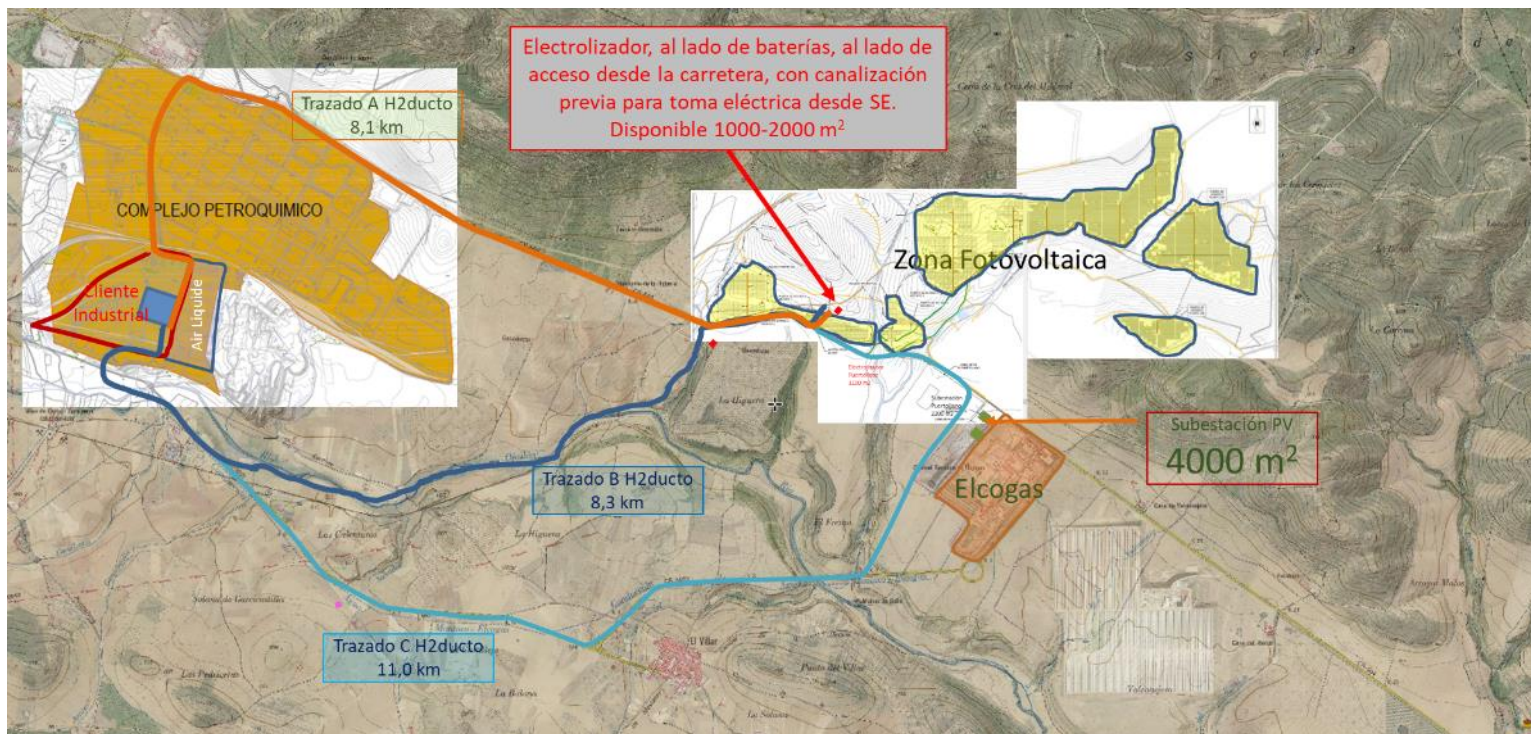
- Only inland refinery in Spain
- Petrochemical area
- Just transition region (former coal production)



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V. Projects in progress. Replacing grey H₂ (2)

✓ PUERTOLLANO. RH2 for chemical industry (*Innovation Fund*)



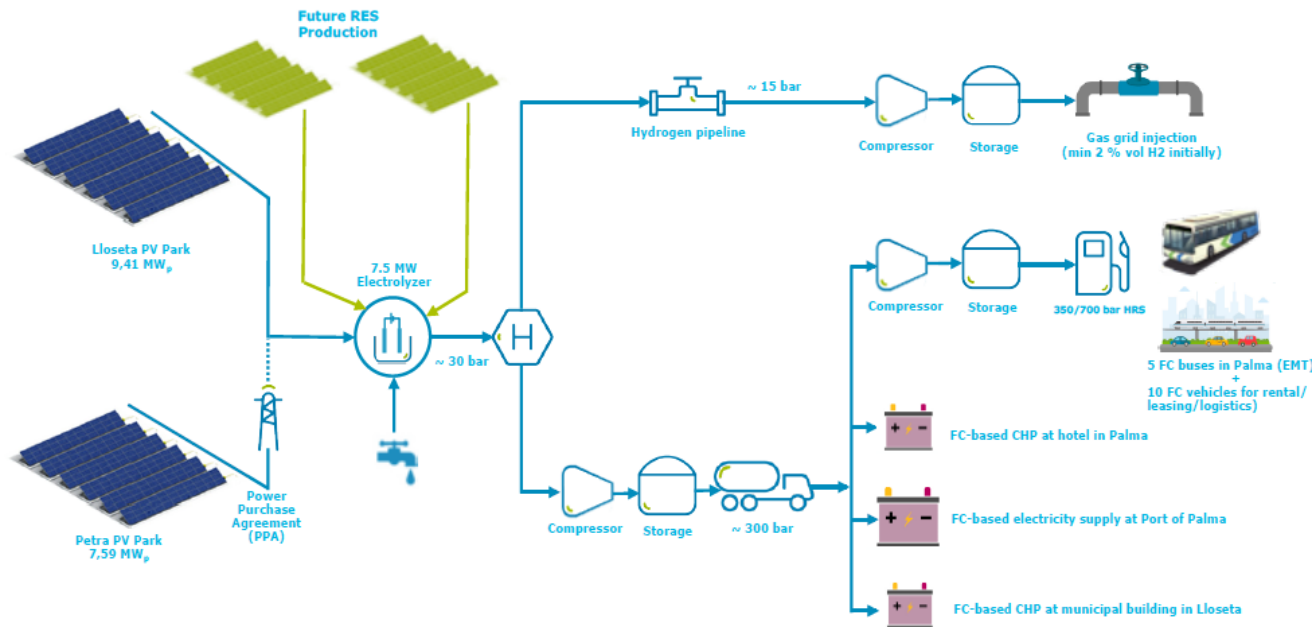
Double solution:

- 1 electrolyser within the PV plant (H₂ supplied via pipeline)
- 1 electrolyser within client facilities (electricity supplied via direct grid from the PV plant)



V. Projects in progress. Islands

✓ GREEN HYSLAND. Mallorca: Sustainable tourism in islands (FCH JU. Islands topic)



Project figures

- 10 MW H2 production
- 16MW PV solar plant

End-uses

- Mobility (buses; rent-a-car)
- Heat (hotels; industry)



Lloseta (Mallorca)

- Cement plant closure
- Win-win project: takes advantage of existing energy infrastructure, boosts clean reindustrialization and decarbonizes transport



Thank you very much for your attention

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