



HyEfRe

Hydrogen integration for efficient
renewable energy systems

Hydrogen hub business models



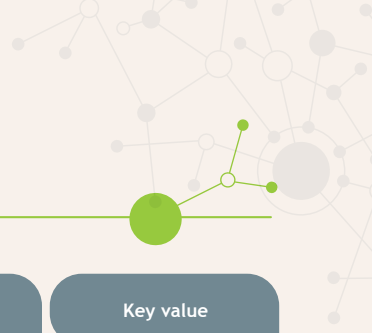
HyEfRe (Hydrogen Integration for Efficient Renewable Energy Systems) is an Interreg Central Europe project that supports the energy transition by developing green hydrogen ecosystems in eight regions and improving the integration of renewable energy sources. It promotes an investment-friendly environment for renewable energy and green hydrogen, while actively addressing legal and regulatory barriers that hinder hydrogen deployment and the efficient use of waste heat.

This leaflet presents jointly developed business models for hydrogen hubs, outlining the main archetypes, their defining characteristics, expected benefits, illustrative examples and potential fields of application. It is not intended to prescribe a single solution for all territories; rather, it offers an orientation framework to help stakeholders select the most suitable model according to territorial context, available resources, demand and supply profiles, investment structures, and the expected economic, environmental and social impacts.

The brochure is aimed at a wide range of actors involved in hydrogen ecosystem development, including public authorities, municipalities, regional and energy planners, industrial actors, infrastructure operators, investors, research organisations, SMEs and local communities.



Business model archetypes at a glance



Business model archetype	Main driver	Typical applications	Key value
Industrial decarbonisation anchor model	Demand-side	Refineries, steel, chemicals, fertilisers, industrial heat	Stable demand and deep decarbonisation of hard-to-abate sectors
Integrated port and logistics hub model	Territorial/ place-based	Ports, maritime transport, logistics, port equipment, nearby industry	Diversified demand and regeneration of strategic industrial areas
Transnational corridor and backbone model	Territorial/ infrastructure-led	Heavy road freight, rail logistics, cross-border transport and storage	Interoperable infrastructure and long-distance hydrogen transport
Captive mobility fleet hub model	Demand-side	Public buses, regional trains, municipal and service fleets	Predictable demand and fast market entry for local mobility
Decentralised supply and system service hub model	Supply-side	Grid services, power-to-X, district heating, local energy systems	System flexibility, renewable integration and local energy autonomy

1. Industrial decarbonisation anchor model

This demand-driven model secures stable and long-term demand from existing heavy industries, such as refineries, steel plants, chemical plants and fertiliser producers. Long-term offtake contracts reduce market risk and support investment in large-scale electrolysis and related infrastructure. Regulatory drivers such as the EU Emissions Trading System (ETS) and the Carbon Border Adjustment Mechanism (CBAM) strengthen the business case for low-carbon and renewable hydrogen.

Best suited for: industrial territories with large, continuous hydrogen demand or hard-to-abate production processes.

Key characteristics: demand-side initiative; industrial feedstock substitution and high-temperature heat; private or hybrid financing, often supported by IPCEI or national recovery funds.

Examples: MOL Green Hydrogen Refinery in Hungary and the Hydrogen Valley in Puglia, Italy.

Benefits: stable revenues through long-term contracts, lower exposure to carbon compliance costs, decarbonisation of hard-to-abate sectors, preservation of industrial employment and opportunities for workforce upskilling.

2. Integrated port and logistics hub model

This place-based model converts ports, logistics areas or brownfield industrial sites into multipurpose hydrogen hubs. It combines maritime fuel demand, port equipment, logistics fleets and nearby industrial users, while also acting as a possible gateway for the import, export and distribution of hydrogen and hydrogen derivatives.

Best suited for: port cities, logistics platforms and industrial areas where several demand sources can be connected within one territorial ecosystem.

Key characteristics: territorial coordination of multiple value-chain steps; applications in maritime transport, port equipment, short-haul logistics and adjacent industries; hybrid public-private financing supported by EU and national programmes.

Examples: Hamburg Green Hydrogen Hub in Germany, Civitavecchia Hydrogen Hub and Porto Marghera in Italy.

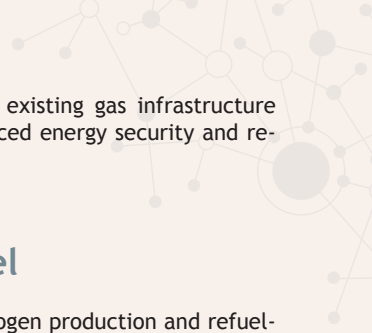
Benefits: diversified revenue streams, regeneration of underused industrial land, reduced emissions from port and logistics operations, improved air quality and creation of skilled jobs.

3. Transnational corridor and backbone model

This model connects dispersed production and demand centres through long-distance transport infrastructure along major transport corridors and hydrogen backbones. It focuses on pipeline conversion, new hydrogen infrastructure and refuelling stations, often linking different countries and regions to create interoperable hydrogen networks. Best suited for: territories located along strategic transport and energy corridors, especially where industrial demand, logistics flows and infrastructure operators can be aligned.

Key characteristics: systemic territorial approach involving TSOs, DSOs, motorway operators, logistics actors and public authorities; applications in heavy road freight, rail logistics, grid balancing and storage; large-scale public-private partnerships supported by instruments such as CEF, IPCEI or national recovery funds.

Examples: North Adriatic Hydrogen Valley, H2 Valle Padana and GET H2 Nukleus in Germany.



Benefits: cost-efficient long-distance transport, reuse of existing gas infrastructure where possible, access to diverse demand clusters, enhanced energy security and reduced emissions from freight and logistics.

4. Captive mobility fleet hub model

This model targets quick market entry by co-locating hydrogen production and refueling infrastructure with captive fleets such as public buses, regional trains, municipal vehicles or service fleets. Predictable and scheduled demand reduces distribution risks and enables a more controlled deployment pathway.

Best suited for: municipalities, regional transport authorities and public transport operators with predictable fleet demand and clear decarbonisation targets.

Key characteristics: demand-side initiative backed by transport operators or public authorities; applications in public bus fleets, regional rail and municipal services; hybrid financing with grants and subsidies to cover high early-stage vehicle and infrastructure costs.

Examples: H2iseO rail pilot in Italy, Brno Hydrogen Public Transport in the Czech Republic, Bolzano Hydrogen Valley in Italy and the Rybnik bus fleet in Poland.

Benefits: stable fuel supply contracts, simplified logistics through depot-based refueling, zero tailpipe emissions, reduced urban pollutants and noise, and improved social acceptance of hydrogen through visible local applications.

5. Decentralised supply and system service hub model

This supply-driven model locates electrolysers near low-cost renewable energy sources and integrates hydrogen production with local power and heat systems. It optimises the Levelised Cost of Hydrogen by combining hydrogen sales with additional revenues from flexibility services, grid balancing, waste heat recovery and, where relevant, oxygen valorisation.

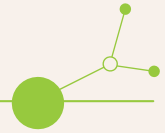
Best suited for: territories with strong renewable energy potential, municipal utilities, local energy communities or industrial sites able to use heat, oxygen or system flexibility services.

Key characteristics: supply-side initiative focused on high utilisation of renewable electricity and waste heat; applications in power-to-X, district heating and grid services; hybrid financing involving utilities, local energy cooperatives and public support mechanisms.

Examples: Wunsiedel WUN H2 plant in Germany, ECUBES in Slovenia and Hy2B Hydrogen Cluster in Bavaria, Germany.

Benefits: competitive hydrogen production, reduced renewable curtailment, diversified revenues, higher overall system efficiency and increased local energy autonomy.

From business model to implementation: a roadmap

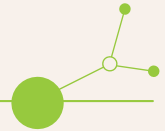


The roadmap below can help you move from the initial concept of a hydrogen hub to a detailed business plan, pilot implementation and future scaling.

- 1. Context and baseline assessment:** Map existing and planned energy, gas, heat, transport and industrial infrastructure; review relevant policy and regulatory frameworks; assess current energy demand, emissions profiles and key industrial and mobility clusters.
- 2. Systemic mapping and stakeholder engagement:** Identify the key actors of the hydrogen ecosystem, including producers, grid operators, infrastructure providers, off-takers, public authorities and communities. Use mapping tools, RACI matrices and engagement agreements to clarify roles, responsibilities and influence.
- 3. Demand, supply and infrastructure concept:** Define the expected demand, available supply, production routes and infrastructure needs, matching the most suitable business model to the territorial context.
- 4. Business model design and financial structuring:** Translate the selected archetype into a structured business model, defining value proposition, customers, partners, costs, revenues, governance and financing sources.
- 5. Techno-economic modelling and financial evaluation:** Assess project feasibility, including LCOH, CAPEX, OPEX, sensitivity to electricity prices, revenue scenarios and financial sustainability.
- 6. Detailed business plan and implementation roadmap:** Prepare the operational plan, governance structure, risk management approach, investment plan and implementation schedule.
- 7. Pilot implementation and performance validation:** Deploy pilot or early-stage assets and services to validate the model, collect performance evidence and adjust assumptions before scaling.
- 8. Communication, market development and scaling:** Communicate results, build market acceptance, attract additional users and investors, and plan replication or expansion in other territories.







Key message



There is no single optimal hydrogen hub business model. The most appropriate model depends on the territorial context, the maturity of demand and supply, the available infrastructure, the financing structure and the stakeholder ecosystem. Successful hydrogen hubs are those that combine economic viability, environmental performance and social legitimacy, while building governance structures capable of managing complexity and supporting long-term scalability. For more information you can read the complete HyEfRe document “Business model list” on HyEfRe website.

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