

Harmonizing Regulatory Requirements on Pipeline Security for Hydrogen Conference

Vision for Hydrogen and the Role of Gas Networks

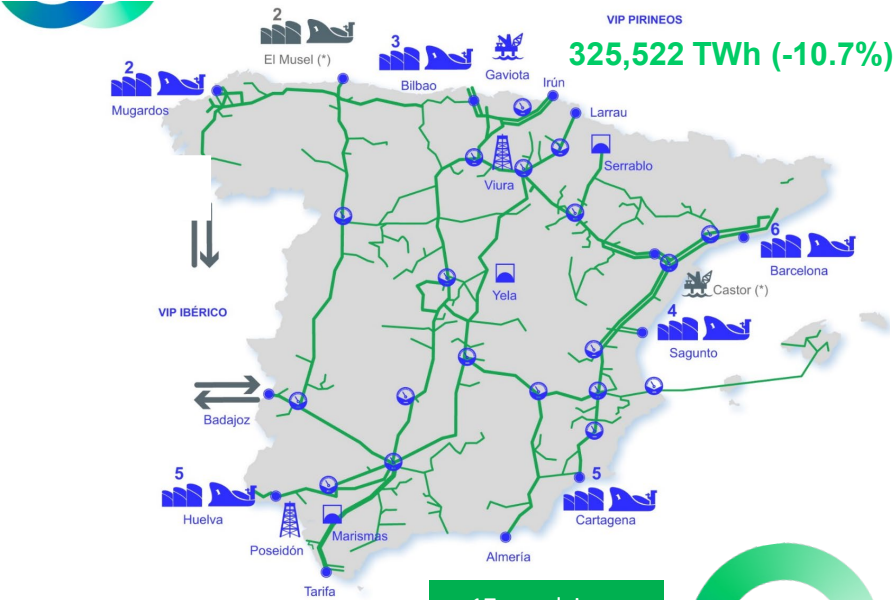
05/04/2024



Note from UNECE secretariat:

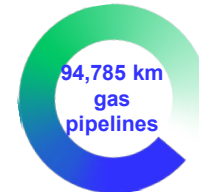
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Context of the Spanish gas system



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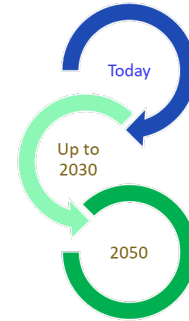
- 17 supplying countries
- 7 regasification plants
- 6 international connections
- 70% LNG imports



Efficient, accessible and inclusive roadmap for the gas sector

Gas infrastructures have demonstrated a high capacity for adaptation in their evolution and are ready to make an additional qualitative leap towards 2050.

- ✓ Ambitious biomethane and renewable hydrogen targets
- ✓ Need for stable regulatory framework
- ✓ Integrated GoO and PoS markets

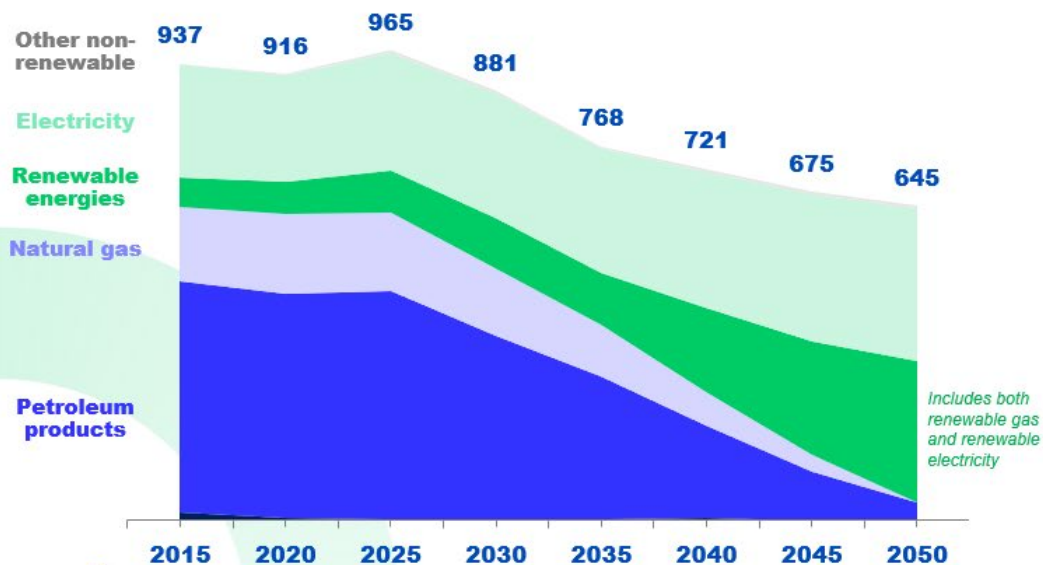


- ✓ Decarbonization: Substitution with renewable gases
- ✓ Circular Economy: Efficient waste management
- ✓ Coupling Sector: Supporting electric RES-E
- ✓ Security of Supply Demographic Challenge
- ✓ Decarbonized economy
- ✓ Spain, a renewable energy exporter: Hub
- ✓ Security of supply

Introduction and energy context

Achieving the decarbonisation targets by 2050 will require a complete mutation of the current Spanish energy system, with technology neutrality being a critical factor for the success of this energy transition process.

Expected evolution of final energy consumption in Spain (TWh, PNIEC+ELP)



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Note: Other non-renewable includes fuels such as coal or non-renewable waste.

Source: PNIEC, EDP, own elaboration

Comments

Spain, like its European peers, has developed and implemented a series of policies aimed at accelerating the decarbonisation of the economy:

- **Integrated National Energy and Climate Plan (PNIEC):** the draft includes a production target of 20 TWh/year of biogas and a target of 11 GW of electrolyzers for renewable hydrogen production.
- **Long-term Decarbonisation Strategy (LTS):** climate neutrality no later than 2050

A critical factor in achieving the decarbonisation target will be technology neutrality.

The Role of Hydrogen in the Spanish Gas System

Renewable gases can and must play a relevant role in the energy transition: Spain is one of the main producers of renewable hydrogen (210TWh) worldwide and has one of the largest biomethane production potentials (163TWh) at European level.

Renewable gases would today be a competitive solution for the industry under current market conditions, thus being the most suitable substitute in a decarbonization scenario.

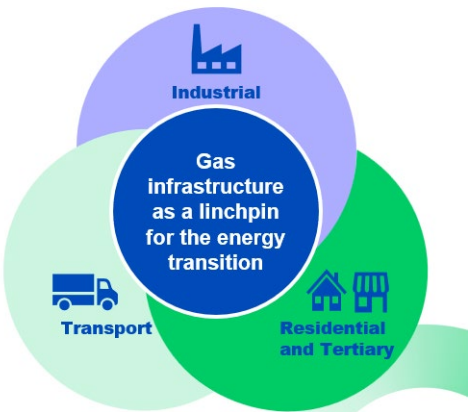
26%

Both biomethane and renewable hydrogen could be a competitive solution, both in residential (especially in existing housing) and tertiary applications.

32%

Renewable gases will be decisive for the decarbonization of mobility, (heavy road transport, aviation and maritime sectors) as there is no efficient technological alternative..

42%



% Percentage of national end-user demand

Spanish Hydrogen Think tank

THE HYDROGEN THINK TANK POSITIONS ITSELF AS A VOICE OF REFERENCE ON HYDROGEN REGULATION AND AS AN ORGANIZATION FOR COOPERATION AND CONTRIBUTION TO THE CHALLENGES OF THE TRANSITION. TRANSITION.

5. Ficha técnica

Nombre completo

Think Tank del Hidrógeno para su inyección y almacenamiento en las infraestructuras de gas natural

Fundación

24 de julio de 2020

Composición

20 entidades (principales operadores del sistema gasista, asociaciones españolas de Hidrógeno y Administración)*

* El Think Tank también cuenta con la colaboración de algunas asociaciones del Colegio de Ingenieros de Barcelona con gran experiencia en infraestructuras gasistas.

The **Regulatory Working Group** follows the progress of the debate at European level on the gas and hydrogen package which should define the future development of a hydrogen-based gas system to work on a proposal that will adapt the new framework to come to the challenges and opportunities in Spain.+ The **Infrastructure Working Group**, will develop together with the Polytechnic University of Catalonia (UPC) a study of the possible effect of hydrogen on the polymeric joints of ductile cast iron

For the **Utilization and Consumption Working Group and Consumption**, it is essential to promote, together with equipment manufacturers, the commercialization and installation of hydrogen-ready boilers.

The first set of projects by the Think Tank brings the need to develop the Cavendish2 project

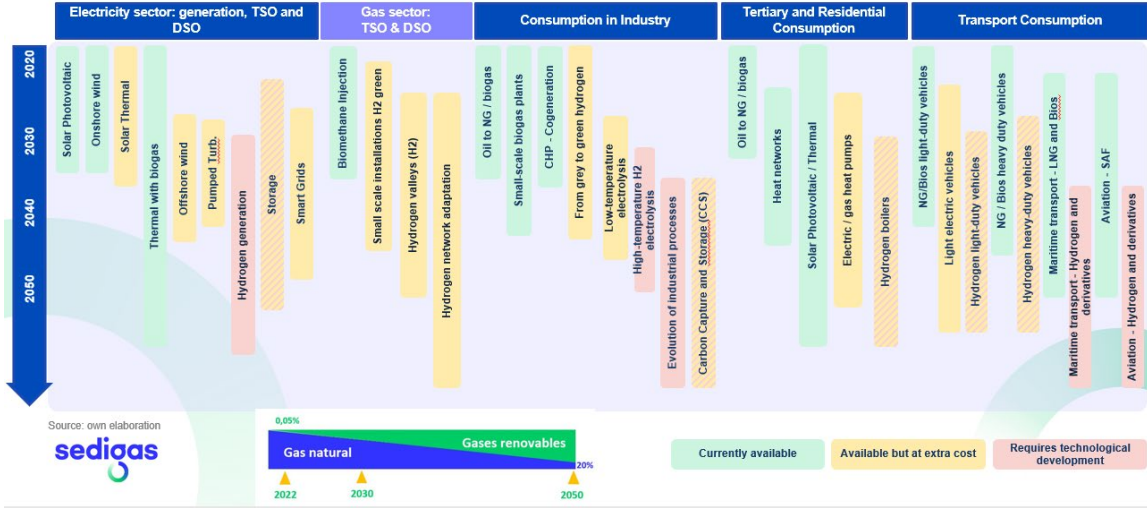
Proyecto CavendishH2

Análisis sobre el valor de la infraestructura gasista como eje para la transición energética

Regulatory Advances and Infrastructure Adaptations

In the current energy situation, and in order to meet these decarbonization objectives, it will be necessary to adopt technological solutions that allow us to move towards a more efficient, secure, diversified and sustainable energy system.

Overview of decarbonisation technologies by segment



Recent Regulatory Changes and Their Impact

- National and European Frameworks
- Incentives and Support Mechanisms
- **Safety and Standards**

Infrastructure Adaptations Necessary for Hydrogen Injection:

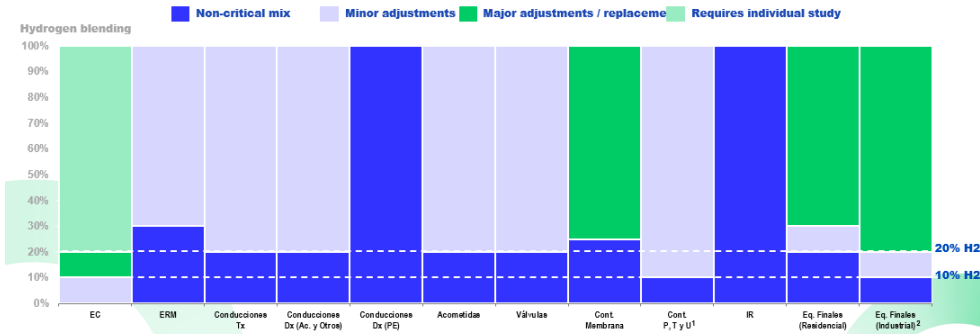
- Technological Upgrades
- Blending and Pure Hydrogen Networks.
- Pilot Projects and Demonstrations

Overcoming Challenges and Leveraging Opportunities:

- **Addressing Technical Challenges**
- Economic Considerations
- Collaborative Efforts for a Cohesive Transition

Case Studies and Practical Applications

High level vision of the hydrogen tolerance of gas network components



(1) Except at border points between countries, where debledging plants may be required to adjust the percentage to the future regulation of natural gas, renewable gases and hydrogen.

(2) In general terms, combined cycle turbines have hydrogen admission limits of less than 5%.

Note: No account is taken of reinforcement or replacement of assets due to capacity problems, as the chemical composition and energy properties of biomethane are very similar to those of natural gas, it is possible to inject it into the grid without grid adaptations.

Source: own elaboration



It is expected that most of the infrastructure will be able to operate with up to 20% hydrogen without requiring major adaptation efforts¹. In the long term, and in a 100% hydrogen scenario, additional actions would be required.

The total cost of infrastructure transformation for a blending scenario of 20% hydrogen by volume would be ~700 million euros, which is equivalent to only 2% of the last 20 years' remuneration to natural gas transmission and distribution companies.

Specifically, due to these network conditions in Spain, it is expected that more than 97% of the transmission and distribution pipelines will be ready for use in a potential 100% hydrogen scenario.

Categories	Transmission and Distribution Networks: 88,745 km	Transport Network: 14,178 km	Distribution Network: 74,567 km
1 - High probability suitable H₂ <ul style="list-style-type: none"> Pipelines with high certainty of safety in the delivery of H₂ 	75,598 (85%)	10,803 (76%)	64,795 (87%)
2 - Probable fit H₂ <ul style="list-style-type: none"> Pipelines for which no problems are to be expected Requires inspections to ensure its condition 	11,240 (13%)	3,340 (24%)	7,900 (11%)
3 - Uncertainty <ul style="list-style-type: none"> Pipelines which present particularities that imply uncertainty about their behaviour with H₂ Requires inspections and, where an incident is detected, thorough testing/replacement 	1,277 (1%)	35 (0%)	1,242 (2%)
4 - High uncertainty <ul style="list-style-type: none"> Requires inspections and, where an incident is detected, thorough testing/replacement 	630 (1%)	0%	630 (1%)
5 - Likely replacement <ul style="list-style-type: none"> Replace if close to service life / mto. plan or test to assess need for replacement. 	0%	0%	0%
6 - Replacement required <ul style="list-style-type: none"> Pipelines not suitable for blending Replacement and prioritisation of these sections 	0%	0%	0%

Conclusion

unique position of Spain in leveraging its extensive renewable energy resources, advanced gas infrastructure, to champion the integration of hydrogen as a cornerstone of its energy transition.

collective journey of policymakers, industry leaders, researchers, and the community towards realizing the vision of a hydrogen-powered future.

- Acknowledge the ongoing projects, technological innovations, and regulatory advancements that have laid the groundwork for this transition.

Promote Policy Support and International Collaboration to solve

- **Safety and Standards**
- Technological Upgrades
- **Addressing Technical Challenges**
- Economic Considerations

Vision for the Future: Paint a picture of a future where hydrogen plays a central role in Spain's energy landscape, powering industries, transportation, and homes with clean, sustainable energy.

Commitment to Action: Conclude with a reaffirmation of the Spanish gas industry's commitment to leading the charge towards a hydrogen economy, inviting all stakeholders to join in this transformative journey.

¡Thanks!