RECIPROCITY

Policy Paper on Hydrogen Mobility

The RECIPROCITY project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101006576

Introduction

The RECIPROCITY project aims to address the challenges posed by urbanisation, climate change and digitalisation in the field of mobility. To this end, the project employs an innovative four-stage replication approach aimed at showcasing and disseminating best practices in urban development and mobility. As RECIPROCITY progresses, it becomes increasingly evident that facilitating a continuous flow of knowledge and information among cities, municipalities and policymakers is important to ensuring the widespread replication of successful mobility solutions in the future.

One of the core objectives of RECIPROCITY is to stimulate conversations and foster learning between various stakeholders, including cities, municipalities and policymakers. To achieve this, the project has implemented a range of strategies, including the organisation of webinars and workshops between cities, regions and policymakers. Additionally, the project recognises the importance of position papers as a powerful tool for facilitating exchange with policy and regulation entities. These position papers will effectively put together some of the key learnings accumulated throughout the RECIPROCITY project.

Through this position paper, RECIPROCITY compiles a comprehensive set of recommendations for local and regional public authorities and European institutions to effectively deploy **hydrogen mobility solutions at local and regional level.** RECIPROCITY highlights the role of local and regional authorities in coordinating local stakeholders, activities, resources and funding to effectively create a shared vision on hydrogen mobility at local level. Additionally, their key role in raising public awareness and acceptance, as well as investing in education programmes and stakeholders' engagement activities has been recognised. On the other hand, European institutions are called to take into account local and regional needs in shaping EU hydrogen-related policies, as well as develop common safety standards to ensure the safety of infrastructures and vehicles and enhance public acceptance. RECIPROCITY also recommends fostering citizen acceptance and ownership at European level, and clearly defining funding synergies to scale up hydrogen mobility solutions from research and development to market deployment.

RECIPROCITY acknowledges the crucial role of decision-makers with the political mandates to shape the future of mobility. In summary, RECIPROCITY's position papers serve as an instrument to disseminate the project's learnings and recommendations for policy and regulation. By capturing the valuable insights gained from the replication projects and engaging with decision-makers, RECIPROCITY aims to have an impact on the future of smart and clean mobility in European cities.

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The role of hydrogen in mobility

In the context of widespread electrification and the transition to greener energy, the production, storage and distribution of energy has become a strategic challenge for the transition to a greener energy future. As a key driver for economic growth, the hydrogen sector is likely to play a crucial role in decarbonising the mobility sector.

The European Commission (EC), as well as several countries and regions, have recognised the importance of hydrogen in its EU strategies. In 2020, the EC adopted a dedicated strategy on hydrogen as part of the European Green Deal. Additionally, the EC's REPowerEU plan, published in 2022, aims to implement the EU Hydrogen Strategy to reduce the dependence on Russian fossil fuel imports.

In parallel, a growing number of Member States have adopted national strategies, roadmaps and regulations focused on hydrogen. Austria, for example, published its Hydrogen Strategy in 2022, prioritising hydrogen in aviation, shipping, long-haul trucks and buses. It is worth noting that most of these strategies consistently emphasise the use of renewable hydrogen, also known as green hydrogen, aligning with the goal of achieving sustainable transportation solutions.

Hydrogen can play a crucial role in both urban and rural mobility of the future for several reasons. Firstly, it offers a significant **reduction in emissions**. When used as a fuel in fuel cell vehicles, hydrogen produces only water as a byproduct, resulting in zero greenhouse gas emissions. This contributes to mitigating air pollution and combating climate change.

Secondly, hydrogen provides an **extended driving range**. Hydrogen-powered vehicles typically have longer ranges compared to many battery-electric vehicles, making them well-suited for long-distance journeys or areas with limited access to electric charging infrastructure, such as rural areas.

Another advantage is the **rapid refuelling time**. Hydrogen refuelling times are comparable to conventional fuelling, unlike battery charging, which often takes longer. This ensures quick refuelling, enhancing operational efficiency and reducing wait times compared to battery charging.

Moreover, hydrogen offers **versatility**. It can be produced from various renewable energy sources, such as solar or wind power. This enables the utilisation of **local renewable energy resources** and **reduces dependence** on fossil fuels. Additionally, hydrogen can be utilised in other sectors beyond transportation, such as stationary power generation for buildings and industrial applications, increasing its versatility and potential applications. Utilising renewable energy sources for hydrogen production can reduce reliance on oil and gas imports, contributing to energy security and diversification.

Lastly, there are **economic benefits** associated with hydrogen mobility. The adoption of hydrogen mobility creates economic opportunities, including job creation in hydrogen production, infrastructure development and hydrogen vehicle manufacturing.

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Challenges in implementing hydrogen mobility

Despite the paramount importance that hydrogen may have in urban and rural mobility, driven by its emission reduction capabilities, extended driving range, rapid refuelling, versatility, and economic advantages, there are still barriers that impede the development of hydrogen mobility at the local level:

- **Infrastructure:** The hydrogen refuelling infrastructure is still lacking in many European cities and regions. It is necessary to build conveniently accessible and well-distributed hydrogen refuelling stations to enable a widespread use of hydrogen vehicles. Without a sufficient number of refuelling stations, potential customers are reluctant to purchase hydrogen vehicles. Conversely, without a substantial customer base, companies are hesitant to invest in building refuelling stations. In Austria, for instance, there are only seven HRS due to the lack of demand. The installation of these infrastructures requires significant investments and cooperation between governments, energy companies, and refuelling station operators.

- **Costs:** Currently, hydrogen vehicles are generally more expensive compared to gasoline or electric vehicles. The prices of hydrogen vehicles are primarily influenced by the technology still under development and small-scale production. Additionally, hydrogen itself can be costly to produce, especially if not produced using renewable energy sources.

- **Hydrogen production:** Hydrogen production requires energy, which can come from renewable or non-renewable sources. If hydrogen is produced using non-renewable energy sources, such as natural gas, it could potentially reduce the overall environmental effectiveness of hydrogen mobility. Therefore, it is important to develop efficient and economically sustainable methods for producing green hydrogen from renewable sources.

- **Safety**: Hydrogen is a highly flammable gas that requires special precautions for its handling and storage. The safety of hydrogen refuelling stations and vehicles themselves is crucial to ensure public confidence in the use of hydrogen mobility.

- **Awareness and public acceptance:** Many consumers may not be aware of hydrogen vehicles or their potential benefits. Education and public awareness are important to promote the adoption of hydrogen mobility. Additionally, some people may be reluctant to use hydrogen vehicles due to safety concerns or limited refuelling options available. Addressing this challenge has wider implications as, in a decarbonising economy, the availability of green energy is likely to lead to the relocation and re-industrialisation of energy-intensive industries and the development of sustainable urban and rural mobility. Objections to renewable energy sites to produce hydrogen and hydrogen end-uses in the regions could have far greater consequences: rejecting additional local hydrogen projects and solutions also means rejecting opportunities for diversification and resilience.

- **Regulatory barriers:** The hydrogen regulatory framework is still evolving, and some stakeholders are not sufficiently connected to the underlying rules and information on rules improvement. It's complex for local companies (e.g. SMEs, start-ups) to gather information at both national and European levels. The speed of rules development is too slow compared to the development of hydrogen projects and

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technologies, which can lead to the bankruptcy of start-ups/SMEs. Regarding the permitting procedures, at present, many regulatory experts are gaining experience in this field, but the availability of expert personnel is limited, and the workload is heavy.

- **Lack of skills:** Another key challenge is the need to increase the skills of both the local industry and universities, and to improve cooperation between these actors. Hydrogen mobility involves complex technologies and systems that require specialised expertise. However, there is often a shortage of professionals with the necessary skills and knowledge in these fields.

Policy recommendations

The development and deployment of hydrogen mobility requires a robust regulatory framework that meets regional needs, promotes innovation and ensures the competitiveness of hydrogen as a clean energy solution.

Based on discussions with experts and stakeholders, this set of policy recommendations aims to provide guidance to local and regional authorities and European institutions in shaping and implementing enablers for the establishment of hydrogen mobility, including regulatory and financial frameworks.

Through a series of meetings, including the RECIPROCITY Mobility Assembly, Mobility Missions and Workshops[1], key insights and perspectives were gathered from experts in the field. In addition, ERRIN's Input Paper on European Roadmap on Hydrogen Valleys and the valuable input received from various member regions have shaped the development of these policy recommendations. The S3 Hydrogen Valley Partnership position paper[2] has also served as a valuable reference, providing insights into regional strategies and collaborative approaches to hydrogen deployment.

For local and regional public authorities:

- **Coordinating activities, resources and funding:** Local and regional authorities need to have the capacity to play an active role in coordinating actors, activities, resources and funding in the local and regional innovation ecosystem. Regions can create a shared vision for the deployment of hydrogen solutions by developing a regional hydrogen roadmap or strategy that outlines the key development actions and policy support needed in the near future.

- **Engaging stakeholders:** Local and regional authorities need to establish a local hydrogen ecosystem involving all the relevant stakeholders, including government authorities, industry (e.g. large industry active in the local landscape, SMEs, start-ups - suppliers, consultants, technicians), research institutions and local communities. This is crucial for the successful implementation of hydrogen strategies and projects on the ground.

[1] The document includes the outputs from the following project activities: RECIPROCITY Mobility Assembly in Brussels (30/11/2022-01/12/2022); RECIPROCITY Workshop: RECIPROCITY Workshop: "From learning to replicating: Hydrogen in Mobility" (26/06/2023); RECIPROCITY Paris Mobility Mission (22-24/06/2022).

[2] S3 Partnership publishes position paper for a dedicated roadmap for Hydrogen Valleys | ERRIN Website

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- **Public awareness and acceptance:** Public authorities should contribute to promoting public awareness and acceptance of hydrogen as a viable and sustainable energy solution. Through targeted activities, they will be able to raise public awareness of the benefits and value of hydrogen solutions for local society and the environment. Citizen involvement activities on hydrogen policy should be mainstreamed. In addition, public authorities responsible for public education need to invest in the needs of the wider hydrogen ecosystem through education programmes and support for innovation hubs in the region.

- **Infrastructure development:** Establishing a robust and extensive hydrogen infrastructure network is crucial. Addressing the challenges associated with infrastructure development, including cost, scalability, safety, and compatibility with existing energy systems, is essential. Local authorities need to act in line with the infrastructure plans being drafted at the EU level since hydrogen infrastructure will become European.

For European public authorities:

- **Tailor policies to local needs:** EU hydrogen-related policies should consider the specific characteristics and needs of different regions. Recognising regional diversity in energy resources, industrial sectors and infrastructure requirements is important for developing targeted policies that can effectively drive hydrogen deployment at the local level. This can be achieved through flexible policy frameworks that allow for adaptation to regional contexts.

- **Align with existing policies:** Ensure that the regulatory framework for hydrogen mobility aligns with existing policies such as the Trans-European Transport Network (TEN-T) and Trans-European Energy Networks (TEN-E). Coherence and integration across different policy areas will enhance the effectiveness and efficiency of hydrogen deployment efforts.

- **Develop a common safety regulation**: Strict standards and regulations are necessary to ensure the safety of infrastructures and vehicles, as well as public acceptance.

- **Guarantee mechanisms:** Recognise the challenge of the infrastructure/demand dilemma and take comprehensive measures to address it. The EU and national authorities could establish guarantee mechanisms to incentivise private sector investments in hydrogen infrastructure, ensuring that investments remain financially viable even in the early stages when demand is limited. Additionally, extend application deadlines for EU funding calls related to hydrogen infrastructure projects, allowing investors and developers more time to plan and implement projects in alignment with market demands. Consider offering risk assumption mechanisms to share the financial burden between public and private stakeholders, fostering greater confidence in hydrogen projects.

- **Make hydrogen accessible and competitive:** Create market conditions that make hydrogen an economically viable and attractive option. This involves federating the industrial offer, reaching sufficient scale and encouraging massification to lower costs. It is crucial to invest in R&I&D to address challenges related to materials, recycling and cost reduction. The competitiveness of hydrogen will be a key factor in its success as an energy transition solution.

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- **Foster citizen acceptance and ownership at EU level:** Promote wide public awareness and understanding of hydrogen technologies and their benefits at European level. Ensuring citizens are well-informed and engaged is crucial for the acceptance and adoption of hydrogen mobility solutions.

- **Regional representation in governance structures**: Ensure that regional and local authorities have a seat at the table in relevant governance structures and decision-making bodies related to hydrogen policy and funding. This includes participation in the governance of EU initiatives like the Clean Hydrogen Partnership. Regional representation Including the regional and local authorities in these governance structures will allow the representation of diverse perspectives, expertise and local priorities in EU funding and decision-making processes.

By implementing these policy recommendations, European institutions can create a supportive regulatory framework that facilitates the deployment of hydrogen mobility while considering regional needs, driving innovation and ensuring public acceptance.

Funding-related recommendations:

- **Defining synergies**: Facilitate synergies between European, national and regional funds to support all aspects of hydrogen projects, with a particular focus on hydrogen mobility.

- **Developing funding schemes for hydrogen vehicles:** Currently, EU funding instruments such as Connecting Europe Facility (CEF) and its Alternative Fuel Infrastructure Facility (AFIF) are not supporting the regional and local authorities in acquiring hydrogen vehicles for urban, local and regional mobility. Addressing the funding gap is crucial for scaling up hydrogen mobility solutions from research and development to market deployment.

- **Supporting skills development:** Allocate funding through programmes such as Erasmus+, as well as European Partnerships like Clean Hydrogen Partnership to scale up projects focused on developing skills related to hydrogen, such as the Green Skills for Hydrogen initiative.

- **Funding for communication and public acceptance:** Provide funding for communication and public acceptance activities to engage citizens and ensure their active involvement in the transition to hydrogen mobility.

- **Public-Private Partnerships (PPPs):** Encourage collaborative initiatives between the public and private sectors to leverage public funding and private investment. PPPs can help share risks, combine resources, and drive the development of hydrogen projects through a shared funding approach.

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Annex - RECIPROCITY case studies focusing on Hydrogen Mobility

Three RECIPROCITY case studies focusing on hydrogen mobility are analysed to give an overview of the key elements for hydrogen deployments and good practices at local levels.

H2 ABERDEEN (UK)[3]

Aberdeen City Council has taken big steps forward in embracing hydrogen as a renewable energy solution for public transport, recognising the need to diversify from its oil and gas-dependent economy.

With over a decade of experience in utilising hydrogen, the city has established itself as a pioneer in the field. Indeed, a significant portion of the UK's oil and gas workforce possesses transferable skills that can be harnessed in the renewable hydrogen sector. Aberdeen aims to capitalise on this potential by promoting hydrogen as a key driver of the energy transition.

The journey towards hydrogen mobility in Aberdeen began in 2013 when regional and local authorities made a deliberate decision to accelerate hydrogen use cases. Since then, the entire hydrogen ecosystem in North East Scotland has witnessed substantial growth, accompanied by numerous projects and demonstrations. Notable milestones include:

- The official **Hydrogen Strategy** in 2015.
- The creation of the **"H2 Aberdeen"** brand to structure its local hydrogen ecosystem and drive its renewable hydrogen agenda.
- The participation in the **first Europe's largest hydrogen bus trial,** which provided valuable insights and served as a successful use case for hydrogen mobility. While the buses have since been repurposed for training purposes, the project highlighted the unique challenges and opportunities associated with hydrogen adoption.

Aberdeen currently operates **two hydrogen refuelling stations (HRS),** capable of delivering 130 kg/day and 360 kg/day, respectively. These stations support the refuelling needs of cars, vans, buses and larger vehicles, all powered by hydrogen derived from renewable sources. However, as the HRS approach the end of their lifespan, significant investments are required to replace crucial components, such as electrolysers, with estimated costs ranging from £1.2 million to £1.5 million.

Moreover, the city has been a test case for the world's first hydrogen-powered double-decker buses, with 15 currently in service and ten more expected soon. While the project has been well-received by the community, ensuring sufficient hydrogen availability for the buses remains a challenge, further emphasising the critical role of infrastructure development.

Additionally, Aberdeen has implemented the "H2ICED Vehicles" program, converting diesel trucks to hydrogen fuel use and reducing CO2 emissions by up to 40%. This initiative enables the city to explore additional use

[3] https://www.aberdeencity.gov.uk/services/environment/h2-aberdeen

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cases for hydrogen and aims to retrofit 35 vehicles in 2023, contributing to a total fleet of approximately 100 vehicles.

Thanks to its extensive efforts, Aberdeen now boasts **one of the largest hydrogen fleets in Europe. Collaborating with various local partners**, such as the post office and health and social care organisations, Aberdeen has integrated hydrogen-powered vehicles into diverse sectors. The fleet includes road sweepers known for their reliability, efficiency, and quiet operation, as well as public-use cars and larger trucks. Moreover, the city has actively participated in research and development initiatives, such as the HECTAR Interreg project, and has even introduced hydrogen-powered cargo bikes to support clean last-mile deliveries.

Looking ahead, Aberdeen has exciting plans for further advancements in hydrogen mobility. In 2023, the city entered into a joint venture with BP, establishing the **"Aberdeen H2 Hub"**. This ambitious endeavour aims to provide low-cost green hydrogen refuelling stations by early 2025, facilitated by a large solar plant and wind farms for renewable energy generation. The project also envisions expanding hydrogen adoption to include trains, trucks, marine applications, and even the local heat network, ultimately positioning Aberdeen as a hydrogen exporter to the world.

To ensure continued progress, Aberdeen aims to strategically position itself to **deliver on regional and national ambitions.** The city intends to adopt **a regional approach to maintaining and developing hydrogen infrastructure**, enabling local hydrogen supply to support other regions, and facilitating regional demonstrations. Furthermore, Aberdeen seeks to foster collaborations and attract future projects.

With 89% fleet compatibility with zero-emission vehicles, of which 57% electric vehicles and 32% fuel cell vehicles by 2030, Aberdeen will play a crucial role in shaping the future of sustainable transportation. By leveraging its expertise, investing in infrastructure, and fostering collaborations, the city is paving the way for a greener and hydrogen-powered future.

HYCENTA (AUSTRIA)

HyCentA, Hydrogen Research Centre Austria, founded in 2005, is an independent research centre in Graz, Austria, based at the Graz University of Technology. It operates one of the most modern hydrogen research infrastructures in Europe with laboratories, test benches and hydrogen refuelling facilities and has comprehensive know-how in the field of safety, testing, approval, certification and legal frameworks of hydrogen technologies. The focus is on the production of renewable hydrogen by means of electrolysis and the storage of electricity surpluses in the event of a temporal and/or local oversupply of renewable energies (power-to-X).

Furthermore, work is being done on innovative storage technologies and fuel cells for the energy and fuel sector and on sustainable drive solutions for mobility with new fuel cells and storage systems. The topic of circular economy of hydrogen technologies and technological system optimisation for the use of renewable hydrogen is also a focus.

In addition, HyCentA also support politics and business in the preparation of concept and strategy analyses in order to efficiently translate complex issues into solutions and successfully position them on the market. HyCentA had and has several projects going on in the following fields:

- *Electrolyse and Power-to-X*
- *Green energy and industry*

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- *Green mobility*
- *Circularity and system optimization*

At the beginning of 2023, HyCentA was promoted from a COMET project to a COMET centre in the COMET funding programme of the Austrian Funding Agency FFG. The COMET competence centres are financed by the federal government - specifically by the Ministry of Climate Protection (BMK) and the Ministry of Economic Affairs (BMAW) - and the federal states of Styria, Upper Austria, Tyrol and Vienna.

Further information about HyCentA can be found on their website: https://www.hycenta.at/en/hycenta-austria.

HY2.ZERO INNOVATION NETWORK (GERMANY)

The HY2.ZERO Innovation Network is accelerating the industrialisation of hydrogen and fuel cell technologies through new and improved solutions. This R&D initiative supports the transition towards greener alternatives and meet ambitious climate protection goals.

As the world strives to reduce CO_2 emissions, particularly in the transport sector, the need for alternative technologies has never been more pressing. By 2030, the goal is to cut CO_2 emissions in the transportation industry by 40% compared to 1990 levels. Achieving this target relies on the integration of alternative drives and energy sources, with hydrogen fuel-powered fuel cell vehicles emerging as a compelling solution.

The HY2.ZERO network unites experts from diverse fields in collaborative research and development (R&D) projects aimed at developing innovative solutions. These projects revolve around three main development topics:

1. **Fuel Cell Production Technologies**: Focuses on advancing the production of fuel cells, making them more efficient and cost-effective.
2. **System Components for Fuel Cells**: Concentrates on developing essential components that enhance the performance and durability of fuel cell systems.
3. **On-Site Hydrogen Generation Technologies**: Explores solutions for producing hydrogen on-site, addressing the challenge of hydrogen infrastructure.

The HY2.ZERO initiative actively promotes R&D projects by facilitating collaboration among experts and organisations. Its key activities include organising workshops, fostering the exchange of knowledge, technology, contacts, and ideas, conceptualising project ideas, forming project consortia, identifying suitable funding sources, coordinating with funding agencies, supporting ongoing projects, and providing direct access to cluster members and partners. The network also encourages joint application and demonstration projects to fast-track the development and deployment of hydrogen technologies.

In addition, to raise awareness and promote the adoption of hydrogen and fuel cell technologies, HY2.ZERO employs various marketing and public relations strategies:

- Online Presence: Articles about the network are featured on its website, social media platforms, flyers, newsletters, and relevant media outlets.
- Industry Engagement: The initiative actively participates in trade fairs, hosting workshops to engage with potential users and partners.
- Networking Events: HY2.ZERO organises networking events to foster collaboration and innovation within the hydrogen ecosystem.

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- Job Market Support: The network utilises the online job market and the TechBase's Job Wall to connect talent with opportunities in the hydrogen sector.
- Podcast HY2.ZERO: A network podcast provides a platform for discussing the latest developments and insights in the world of hydrogen and fuel cell technologies.

FUEL CELL CARGO PEDELECS (FRANCE)

The rise of e-commerce has transformed the last-mile delivery landscape, with more people ordering goods online and receiving frequent but smaller parcels at their doorsteps. Cargo pedelecs, electric bicycles with cargo capacity, have emerged as a solution for last-mile delivery.

However, conventional batteries have limitations in terms of energy supply and performance at low temperatures, limiting the potential of cargo pedelecs. In contrast, zero-emission fuel cell technology offers greater energy capacity even in cold temperatures, fast refuelling, and improved durability at comparable costs. By replacing internal combustion engine vehicles, a fuel cell cargo pedelec (FCCP) can reduce CO_2 emissions by 5.5 tons annually.

The Interreg North-West FCCP project aims to harness the potential of FCCPs by developing an innovative logistics concept tailored to their performance characteristics, fuel cell technology advancements, and urban freight transport needs. The involvement of the cities is essential for the success of the project. Ultimately, the project seeks to integrate emission-free FCCPs into delivery chains, promote sustainable urban development, and provide valuable information to cities and the transport sector to reduce CO2 emissions in European cities.

Issy-les-Moulineaux is a pilot partner in the project and is involved in the implementation and testing of two different fuel cell cargo pedelecs. These bikes have a storage capacity of around 1.5m3 and can carry loads of up to 250kg, making them a faster and more efficient means of transport. The city has equipped one of the bikes with a hydrogen system, extending its range and significantly reducing refuelling time to around 10-15 minutes. This initiative is in line with the wider objective of reducing emissions in the city's urban logistics and creating France's first hydrogen district.

GetHyGA (SPAIN)

The GetHyGA initiative is an action plan emerged from the Aragon Hydrogen Master Plan. Its objective is to create an industrial ecosystem, or Hydrogen Valley, in Aragon. It has been promoted by the Department of Industry, Competitiveness and Business Development of the Government of Aragon through the Foundation for the Development of New Hydrogen Technologies in Aragon (FHA).

It details actions that are based on the objectives of decarbonisation or electrification of those sectors that need to reduce or eliminate the carbon footprint of their activities and processes.

GetHyGA focuses on public-private cooperation and foresees a collaborative development through multiple partnerships between the actors involved (companies, energy and hydrogen sector, education and training institutions, R&D&I, public administrations, etc.). In particular, the project is expected to involve all parts of the value chain of the Aragonese industrial environment, from the production, transport and storage, to its final use as an energy vector for mobility or industrial purposes. The five main areas of GeTHyGA are energy and environment, reindustrialisation and industrial conversion, promotion of R&D&I, training, skills and talent, and definition of regional policies.

GetHyGA contributes to rebalancing economic activity and employment, reversing the trend of population decline in certain areas of the region and involving other regions and other EU countries.

The total budget of all the initiatives that constitute GetHyGA is 2,354 million euros, with an expected economic impact of 10,865 million euros over the next 15 years.

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The GetHyGa initiative was launched in July 2021. This is the result of a year's work to define and evaluate each of the projects proposed by each of the companies. All these projects are defined in the project report, together with the main contacts of all the participating entities.

The main result achieved so far is the commitment of several entities (78) to the initiative, which is the basis for the development of a complete hydrogen ecosystem in Aragon.

H2PiyR (FRANCE & SPAIN)

The H2PiyR is a demonstration project that aims to connect the Pyrenean regions of Spain and France to central and northern Europe through a hydrogen refuelling infrastructure.

To this end, four topics have been analysed: the existing types of hydrogen refuelling stations (HRS), two types of on-site electrolysers (alkaline and PEM), the possibility of supplying these electrolysers with renewable energy, and finally, the deployment of two HRS in Huesca (Spain) and Pamiers (France). Two hydrogen fuel cell electric vehicles and ten hydrogen fuel cell electric bicycles are being refuelled in both HRS.

H2PiyR has adopted a working methodology with the aim of achieving its introduction in the regions concerned and ensuring its continuity in the short term. Firstly, in the planning phase, the project carried out an in-depth analysis of the constraints that represent a barrier or, on the contrary, an opportunity in the H2PiyR regions and that affect the construction of the HRS. Secondly, the construction of the HRS was initiated. Finally, the demonstration and implementation of HRS and hydrogen vehicles was carried out.

The impacts of the project were quantified in environmental and socio-economic terms. The main stakeholders and beneficiaries of this project were the entities of the regions involved that gained experience in hydrogen infrastructure, as well as the regions themselves, which deployed their first HRS and hydrogen vehicles deployed.

H2PiyR is a successfully implemented project (1.6 million euros) that can serve as a model for developing and expanding hydrogen infrastructure and mobility in other regions. The methodology, results and lessons learnt from H2PiyR can be transferred to other regions that are in an initial phase of HRS infrastructure deployment or even in a higher penetration phase. The technical validation results can serve as a starting point for decision making in HRS deployment projects. In addition, the impact reports provide a basis for learning about the nature of mobility, its technical feasibility and its positive environmental impact.

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RECIPROCITY (Replication of innovative concepts for peri-urban, rural or inner-city mobility), coordinated by R-Tech (Germany), involves 10 partners including clusters, regional development agencies, innovation accelerators and universities. The project started in February 2021 and will run for 32 months.

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