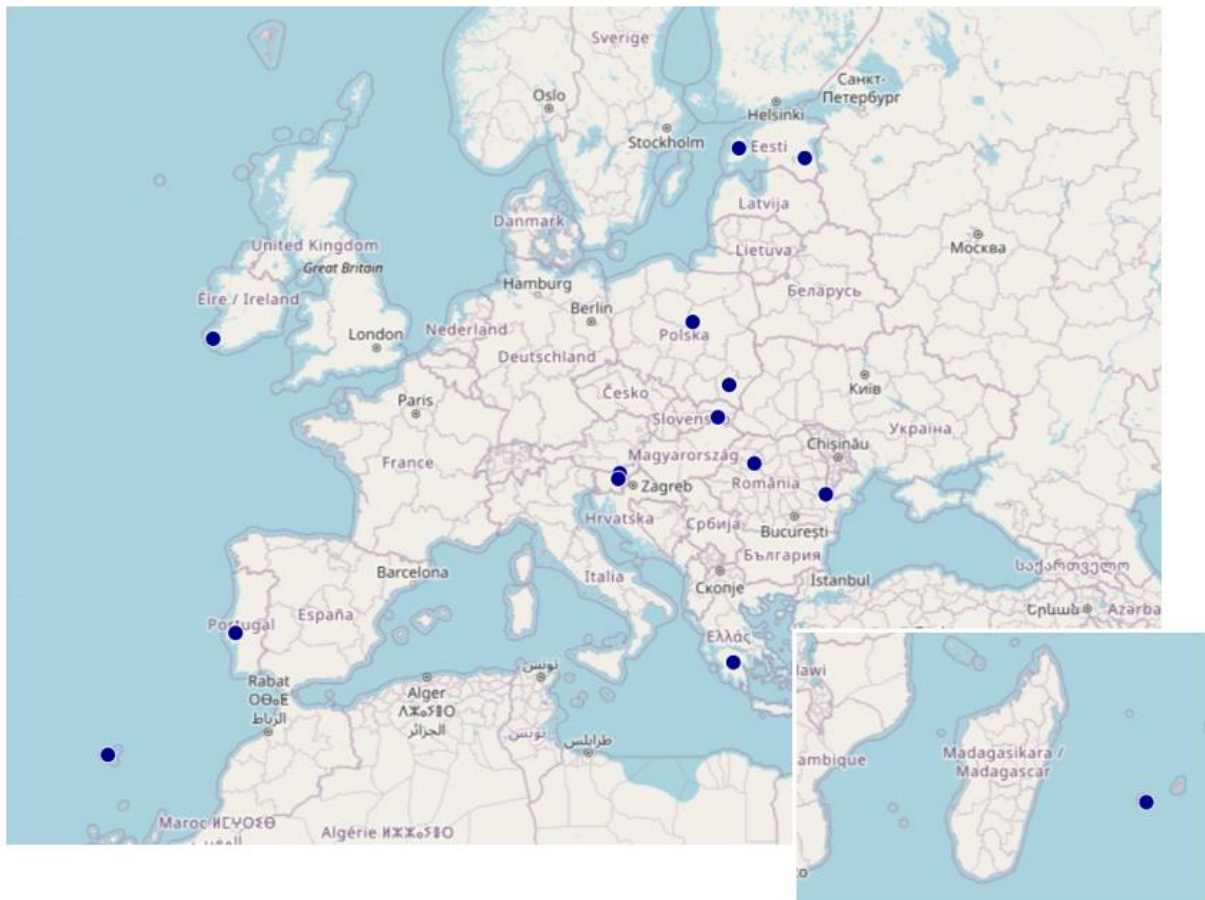


A REPORT FOR THE CLEAN HYDROGEN JOINT UNDERTAKING AND PREPARED BY SPILETT, ERM,
ARIEMA, DELTAH AND REFORM INSTITUTE

Project Development Assistance for Regions II - Cohesion Countries, Outermost Regions, and Islands (PDA II)

March 2024



1 Executive summary

Context

In mid-2022, the Clean Hydrogen Partnership appointed Spilett new technologies GmbH and a subcontracted consultancy team to support hydrogen project development via the Project Development Assistance for Regions initiative. This round of “PDA” built upon a similar programme funded by the Fuel Cells and Hydrogen Joint Undertaking which ran between 2019 and 2021 and which supported the hydrogen project development in 11 regions across Europe. Whereas the initial PDA exercise was open to public sector bodies throughout Europe seeking support with hydrogen project development, the second round (“PDA for Regions II”) focused exclusively on Cohesion Countries, Outermost Regions, and Islands. In both cases, public body representatives of cities and regions were invited to apply for support from expert consultants paid for by the FCH JU / Clean Hydrogen Partnership and the first phase of the initiatives entailed a process via which interested regions were selected before a year-long period of project development assistance was provided. The timing of these initiatives is summarised in the figure below.

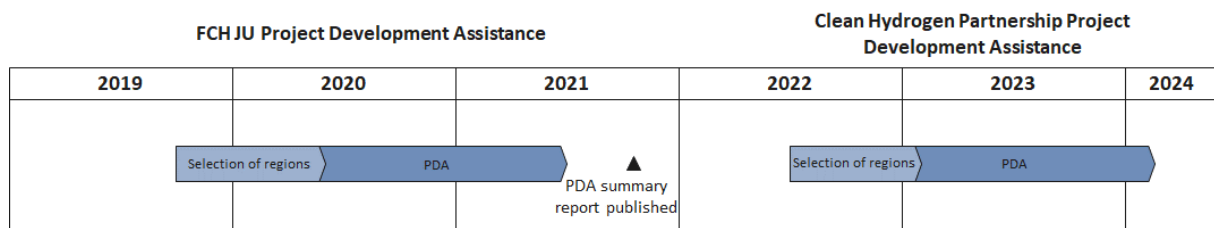


Figure 1: Timing of Project Development Assistance funded by the Fuel Cells and Hydrogen Joint Undertaking and the Clean Hydrogen Partnership

The overall objective of the PDA process was to support public sector bodies with the development of a diverse¹ range of hydrogen projects and to help the projects mature to a point where they could begin implementation.

Overview of projects supported in PDA II

A total of 14 different projects from cities and regions in nine different European countries were supported under PDA II. While there was interest in applications in various sectors (industry, transport (land and marine), and heat), road transport applications, in particular buses, were the most common target end use. The projects seek to develop new hydrogen production facilities, typically electrolyzers in the low megawatt / low tens of megawatts scale for the initial phases of deployment, linked to existing and / or new build renewable electricity generation assets (typically solar PV and wind turbines), as illustrated in the following figure.

¹ Diversity in terms of application areas and geographic spread. One of the aims was to support the development of projects in areas with no / limited uptake of hydrogen and fuel cell technologies to date.

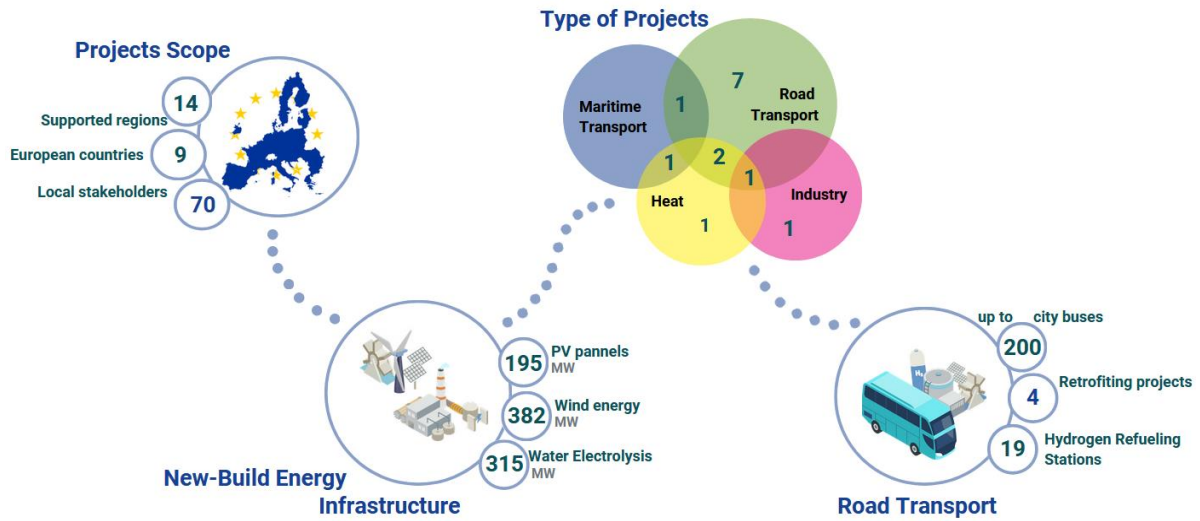


Figure 2: Overview of the regions and application areas supported under PDA II

As indicated above, most of the projects envisaged some use of hydrogen in mobility applications, and if realised, these projects will lead to the installation of new hydrogen refuelling stations in multiple locations across Europe as shown below.

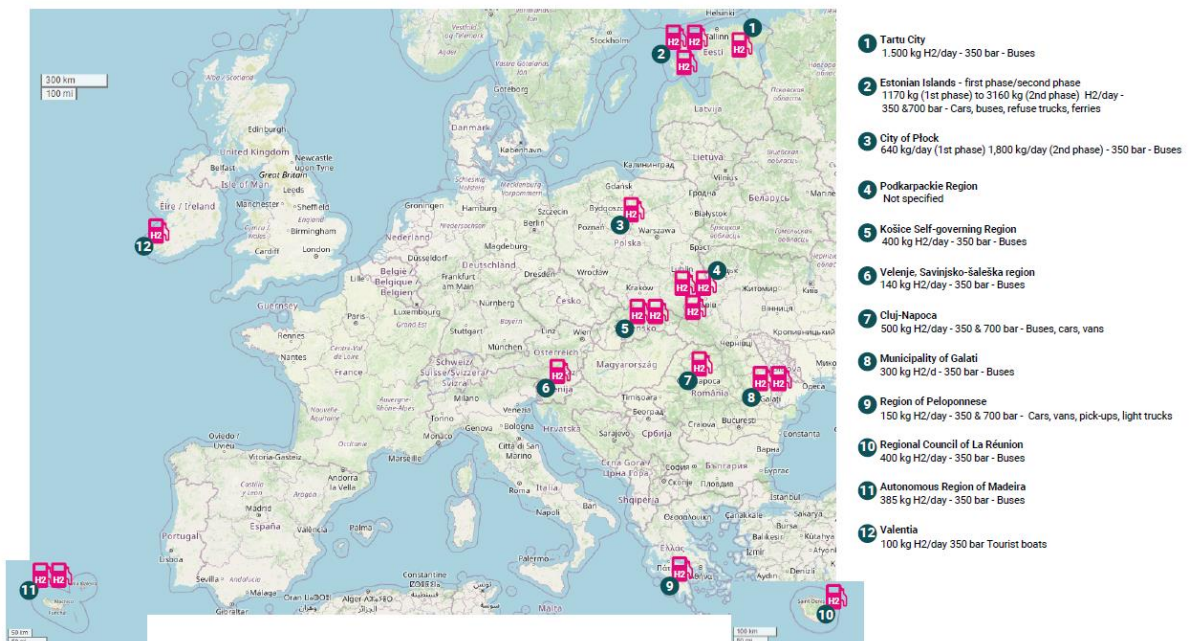


Figure 3: Map showing numbers and capacities of new hydrogen refuelling stations planned as part of the PDA II projects

Scope of support under PDA II

The offers to regions selected to benefit from support under PDA II typically included support with validating and developing the project concept, forming and organising a project delivery group, and carrying out analytical and other project development support tasks (such as outreach to technology suppliers, budgeting and planning, business case assessment, etc.). Support with securing funding for the projects was beyond the scope of the services provided.

In addition to providing support to selected regions, the PDA II programme addressed general topics which were broadly applicable to all regions through “Observer Network” activities. These were composed of a series of webinars presented both by external speakers and by the PDA consultancy team, and written deliverables providing information on European hydrogen policy and regulations and providing a step-by-step set of actions required to develop a hydrogen project.

Observer Network webinars run under PDA II		Observer Network deliverables
1	Industry pitch: Green and clean H2 production	1) EU Policy Support for Hydrogen
2	Islands Knowledge Sharing	
3	Overview on European policies and regulations related to hydrogen technologies	
4	Industry pitch: Hydrogen Refuelling Technologies and Vehicles	2) EU Regulations for Hydrogen Projects
5	Best practises in project design & development	
6	Procurement and operatorship models	3) Glidepath for hydrogen project development
7	Funding best practice	
8	Funding and financing strategies	

Figure 4: Overview of the webinars organised and run under PDA II and additional deliverables produced to support the development of hydrogen projects

Conclusions

The primary conclusions from the PDA II initiative are as follows:

- The overall objectives of the PDA II, i.e. to support the development of hydrogen projects in cohesion countries, outermost regions, and islands, have been met. The programme assisted development of a diverse range of projects in nine different countries covering all the target geography types. It will not be possible to assess the full impact of the PDA initiative for several years, as the projects will require further time to progress towards implementation.
- Several of the projects are developing into “hydrogen valleys” and starting the process of acquiring the funding and financing needed to deliver the planned activities. As with the first round of PDA (2019 – 2021), all projects are expected to require public funding to help cover the additional costs of implementing clean hydrogen-based solutions relative to incumbent fossil fuels.
- Although the original aim of PDA II was to help applicants develop to a point where they can implement projects within two years of the conclusion of PDA services², experience from the first round of PDA

² This was one of the requirements of beneficiaries applying for support via the [h2regions.eu website](https://h2regions.eu).

suggests that full implementation may take longer. In total, 11 projects were supported during the first round of PDA, with an expectation that project implementation activities would begin within a year of the conclusion of the PDA services. However, it seems that many of these projects have changed scope or scale since, reacting to a dynamic project context, or remained in the planning phase and are yet to deploy the technologies two and a half years after the conclusion of the PDA support.

- Given that support in PDA II was targeted at projects in cohesion countries, outermost regions, and islands, there is a higher risk of projects not proceeding to full implementation in the envisaged time relative to the first round of PDA due to issues such as remoteness, lack of scale, restricted pool of technology and service providers, etc.
- Several common challenges were faced by many of the cities and regions in PDA II, a selection of which are described below. Further challenges and lessons learnt are included in the main body of the report. Challenges include:
 - Identifying suitable demands for renewable hydrogen in appropriate applications with the scale and certainty of demand needed to create a viable business case for all actors in the value chain (i.e. hydrogen producers through to consumers).
 - Difficult economic case for solutions based on renewable hydrogen – in some sites there was enthusiasm from stakeholders, including potential end users of HFC technologies, but without a full appreciation of the likely cost premium relative to incumbent technologies. Some potential hydrogen customers expressed a willingness to switch to hydrogen fuel but only if cost parity with fossil fuels could be attained. With current energy prices and under most existing regulatory regimes such a target is not feasible without subsidies to reduce the costs of hydrogen (and / or additional taxes on fossil fuel-based solutions).
 - Remote locations – seeking to develop innovative hydrogen energy projects in remote regions can lead to challenges in terms of identifying companies willing to supply and provide on-going support to the technologies needed to implement hydrogen energy projects. Costs for delivering products and supporting them during operation also tend to be higher for remote regions compared to areas closer to population centres which makes the economic case more challenging.
 - Competition with larger projects – as noted above, the projects supported under PDA II typically envisage initial phases of deployment with hydrogen demands that can be met by electrolysers in the low megawatts / low tens of megawatts scale. Many equipment suppliers are focusing on projects at the tens / hundreds of megawatt scale and above as the industry prepares to scale up in the context of targets to deploy multiple gigawatts of electrolysis capacity in various countries across Europe over the coming decade. In addition, funding programmes increasingly aim at large-scale projects to accelerate decarbonization, which

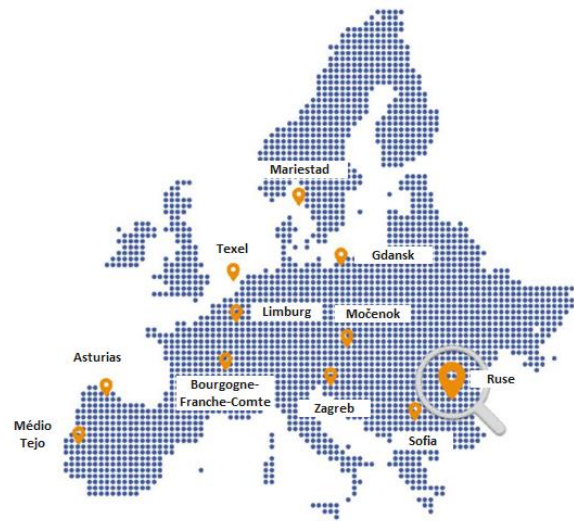


Figure 5: Projects supported under the first round of PDA

increases pressure on “fast followers” to start at higher scales than appropriate for a learning phase in a remote region.

- The consultancy teams also recorded lessons learned through the delivery of PDA to the regions, which included:
 - Benefits of developing close working relationships with the local delivery team – as with any project, developing open, trusting relationships between the individuals involved is critical to success. While most people have become accustomed to conducting many meetings virtually, there is benefit to in-person interactions. In the context of PDA, site visits and in-person meetings between the consultants and local project teams are recommended early in the process.
 - Including consultants able to communicate in the local language (and ideally with a good understanding of the local context) is beneficial. While “local” consultants may not always possess the technical knowledge or experience of developing hydrogen projects, a mixed team comprising relevant experts and consultants with strong local knowledge and communication skills can be an effective solution.
- Results of the surveys completed by the recipients of PDA were largely positive, i.e. most of the respondents rated the support as “satisfactory” or “beyond expectations” and the estimated maturity levels of the projects increased substantially as a result of the assistance provided. The regions also appreciated the “observer network” activities and the ability to network with and learn from other project developers, including those at more advanced stages of development. This highlights the importance and value of initiatives such as the [Mission Innovation Hydrogen Valley Platform](#).

Selected quotes from respondents to the PDA II survey of supported regions

“The PDA has been a significant contributor to the ramping up of the project. Gaining all the insights has tremendously helped us progress in our initiatives, and we are very grateful.”

“We strongly believe that presenting existing initiatives significantly increases the learning ability of those supported. Seeing other implementation variants has enabled us to better gauge the scale and all the implications surrounding the project.”

“We have obtained valuable information regarding the possible technical partnerships for project implementation, as well as the necessary regulatory requirements that need to be met.”