

Milestones H2Nodes

Milestone 17

Mobilisation of
Local Actors and Users



Milestone 17 Report

Date: 31 December 2020

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This report was published on behalf of Rijkswaterstaat (part of the Dutch Ministry of Infrastructure and Water Management) for the Connecting Europe Facility project H2Nodes.

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1. Introduction

This focus of this report is on the mobilisation of local actors and fuel cell electric vehicle (FCEV)-users during the H2Nodes project phase, in addition to the FCEV car and the two FCE buses that are deployed as test vehicles for the new Arnhem hydrogen refuelling station (HRS). Additionally, this Milestone report provides an overview of the mobilisation of local actors and users in the Rotterdam area, (where a public HRS opened in 2014, and in the Amsterdam area, where the first public HRS started its operations in 2020. The upscaling potential for HRS Arnhem after the H2Nodes project phase is described in the separate H2Nodes Milestone 11 report¹.

The goal of the underlying H2Nodes sub-activity is to influence the willingness to consider FCEV as a valuable alternative for zero-emission transport. Finding and engaging local users of FCEVs also creates a first customer base for the HRSs as from their first years of operation.

However, the extent to which FCEVs are considered to be valuable alternatives, depends on the overall performance of the product, including the availability of reliable refuelling facilities. In the case of HRS Arnhem local actors turned out to be essential to secure a timely project delivery and HRS availability. The involvement of these local actors is also included in this Milestone report.

The stimulation of the demand side and the securitisation of the supply side can be done in many ways and at various expenditure levels. The extent to which the demand side produces tangible results (when local actors put their positive attitudes toward hydrogen for transport into the actual purchase of an FCEV) is determined by the way they are approached and involved. This depends, inter alia, on the specific interest of the executives in charge of stakeholder management. If the engagement of local actors is predominantly seen as an expenditure, then cost containment is most likely to be a major driver. If local actors engagement is regarded as an investment, with a return in terms of CO₂-reduction (as well as the reduction of particles and nitrogen oxides), then the trade-off between expenditure and results is the driving force. This Milestone report includes a description of how the involvement of local actors and users was embedded in the project partnership. It furthermore explains how not only the local actor approach was set up, but which provisions were put in place to secure results in terms of local actors becoming local users.

The involvement of the above-described local actors is an ongoing process. The focus shifts from local actors required to secure HRS availability to local actors as the target group to increase the number of local users. Therefore this report describes how the involvement of local actors was shaped in subsequent phases of the Arnhem HRS project.

Chapter 2 describes the initial project phase, when public transport partners had to be found, interested and contracted to carry out the real-life testing of FCE buses, one of the core activities of the H2Nodes Act.

Chapter 3 describes how a regional initiative for active FCEV demand creation and aggregation became a core component of a regional support to secure the regional hydrogen goals and interests.

Chapter 4 describes how the FCEV demand creation and aggregation was set-up and executed.

¹ "Milestones H2NODES, Milestone 19, HRS Upscaling", July 2020

Chapter 5 contains references activities directed at the promotion of hydrogen-fuelled mobility for various groups of potential users.

Chapter 6 gives an overview of the involvement of local actors and users in the Rotterdam and Amsterdam area.

2. Engaging regional public transport operators

2.1 The regional context of stakeholder management

For the Arnhem region hydrogen is more than a sustainable alternative for fossil vehicle fuels. The region accommodates numerous innovative businesses focusing on various applications of hydrogen and various stages, from power-to-gas (hydrogen production) to gas-to-power (hydrogen application). Regional public policies were set up to create various partnerships with academia (the HAN University of Applied Sciences) and the Arnhem based hydrogen technology businesses to strengthen the regional base for the development of hydrogen as an economic pillar.

The regional (province of Gelderland) and local (municipality of Arnhem) public bodies understood that public policy-making and public-private network building are essential parts for the development of an innovative technical and economic cluster. Hydrogen-related businesses already employed a regional workforce, with a high growth potential if the region would succeed to maintain and expand its base for hydrogen and fuel cell development. Furthermore, it is expected that hydrogen will play a significant role in the overall energy transition, for example with respect to energy storage and transport, and to provide industrial high temperature heat. The initiation of hydrogen for mobility projects may enhance projects including alternative application of hydrogen.

The step from technical research and innovation to the development of an initial market with the potential for further expansion is a critical one for most new start-ups. Especially when new technology is involved, demonstration projects are required to convince potential users about the reliability and affordability of it. The regional public partners of the Arnhem H2Nodes project already supported such a demonstration project in 2010, which led to the first publicly accessible hydrogen refuelling station in the Netherlands, a 350 bar station in Arnhem, fully integrated in a 'normal' public refuelling station. The Arnhem based company HyGear co-funded the HRS and supplied the hydrogen, produced with its steam methane reforming technology. The HAN University of Applied Sciences retrofitted a privately owned rally car to use hydrogen as fuel, as part of its automotive innovation programme.

This first hydrogen vehicle and refuelling demonstration project ended in 2013. The operator of the refuelling station, HyGear, relocated to a new location at the Westervoortsedijk. The hydrogen refuelling facility was to be included in the relocation, but this did not happen, due to lagging (hydrogen) market development and insufficient funding.

The H2Nodes project offered the opportunity to execute the initial intention to equip the multifuel station Westervoortsedijk with a hydrogen refuelling facility. Additionally, it created the opportunity to also establish a larger and more solid revenues base for it by the deployment of three FCE buses and the availability of a 700 bar facility, allowing lighter vehicles with a 700 bar installation to fill up completely.

2.2 Engagement of public transport operators

The refuelling of FCE buses, deployed in daily public transport operations, not only offered technical opportunities (by actively monitoring both the HRS and the FCE bus performances) but also provided a more solid economic base for the HRS as the production and sale of the required hydrogen was guaranteed during the project phase.

Additionally, the successful deployment of public transport buses is important to the province as it:

- is required in order to comply with the H2Nodes goals and provisions (demonstrating HRS and FCE bus performance);
- enhances the strategic positioning of the hydrogen and fuel cell technology regions in Gelderland²
- supports the preparation of the provincial organisation in its role as public transport authority to commission zero emission transport where FCE buses currently are the only zero-emission alternative to BEV buses and trolley-buses.

Given the importance of fuel cell bus deployment, the province aimed for a partnership with the public transport operator rather than commissioning FCE bus deployment, based on provisions in the public transport concession contracts³

Figure 1 shows that Arnhem is centrally located in the public transport concession area “Arnhem-Nijmegen”. That made the public transport operator of this concession the preferred public transport operator for the H2Nodes project. This was Connexxion which operated public bus transport in this area under the brand name “Brenng”.

Connexxion agreed to participate in the H2Nodes project and become one of the project partners. However, during the preparatory phase of the project doubts came up about the robustness of Connexxion's commitment to the H2Nodes goals in general and the regional goals to position H2Nodes as an opportunity for regional collaboration.

Given the key role of the bus operator, the total dependency on one became an unacceptable risk, especially against the background of signals that Connexxion was drifting away from its original intentions.

The province of Gelderland decided to explore alternative options for the public transport function. Those options were soon reduced to only one possible alternative: public transport company Syntus, operator of the Veluwe public transport concession.

² in this case demonstrated by the Arnhem-based companies HyMove (hydrogen fuel cell systems manufacturer) and HyGear (supplier of the hydrogen sold at HRS Arnhem).

³ The organisation of public transport in The Netherlands through a system of regional concessions is described in “Milestones H2NODES, Milestone 19, Procurement of additional FCEVs”, October 2020



Figure 1. Public transport concession areas of Connexxion and Syntus

Figure 1 shows the concession areas of both Connexxion and Syntus. For most bus routes in the Veluwe concession area HRS Arnhem is at a too large distance to serve as a refuelling facility for FCE buses in regular transport operations. However, Syntus also operated a transport route between its Veluwe concession Area and Arnhem (Apeldoorn – Arnhem). This route was the focus point of talks between the province of Gelderland and Syntus about the deployment of FCE buses. Connexxion kept its position as official H2Nodes partner while the province, Syntus and the Arnhem bases FCE bus developer HyMove discussed Hymove FCE bus deployment by Syntus.

At the time that the H2Nodes project was about to start – including the construction of the HRS and the procurement of fuel cell buses, Connexxion decided to withdraw. Connexxion and the other partners could not come to an agreement on the reimbursement of involved costs and neither on the conditions with respect to FCE bus procurement.

The exploration of options for Syntus to deploy FCE buses in its regular services turned out to be a valuable risk impact reduction factor. The province of Gelderland, Ministry of Infrastructure and Water Management and HyMove provided the funds that covered the costs of the deployment of 2 Syntus FCE buses. Syntus invested time to train its staff and to gather all the learning experiences to be shared within the H2Nodes project. With these commitments, the project kept enough FCEV deployment to continue.

2.3 Lessons learned

The fact that public bus transport in The Netherlands usually is operated by private operators in 10-year contracts implies that opportunities to set-up a hydrogen-for-transport demonstration project that includes the deployment of public transport buses, requires the co-operation of the private transport companies that operate bus services in, from or to the area where the demonstration project is located. In order to secure this co-operation, it is recommended to:

- secure the private operators' participation in future initiatives where new vehicle technologies are demonstrated by including provisions for such participation;

- include penalty clauses in case of an exit for convenience⁴.

However, it is not recommendable to enforce a private operator's involvement on the basis of these provisions only. A demonstration project such as H2Nodes includes a level of uncertainty (which is the reason it is a demonstration project) that can only be managed by partners with intrinsic motivation rather than an enforced one. Penalty clauses may stimulate a participant to not wait with its exit until a moment where it is almost impossible to come up with alternatives.

Having at least one other operator involved in the process reduces dependency on one single actor and thus secures project continuation in case the targeted operator withdraws. If there are any up-front doubts about obtaining cooperation from a public transport operator, it may be worthwhile to consider an HRS location close enough to bus depot of or bus routes operated by at least one other operator⁵. This provides back-up options in case the intended cooperation of the target operator fails.

The scenario that is considered to be the safest is the one where the public transport authority is the lead partner in partnerships including the deployment of new technology in public transport vehicles. The financial and operational arrangements with the public transport operator are then made on a bilateral basis.

⁴ In this case defined as cancellation of a party's participation in a partnership for any reason or for no reason. This could for example be the case if the board of this party decides that the partnership no longer serves its strategic objectives. Most contracts have different provisions for an exit for convenience compared to an exit for other reasons such as in case of poor performance, bankruptcy or a significant modification of the project scope.

⁵ Demonstration HRSs that serve multiple types of clients can't be placed at a bus depot. The challenge is to find a location that is both acceptable for the bus operator and all other potential FCEV drivers.

3. Managing the Vehicles-HRS interface

3.1 The timing of vehicle and HRS availability

When trying to involve more local actors and users, the advantages of FCEVs (buses, passenger cars and potentially also trucks) as a sustainable alternative to ICE vehicles should be demonstrated. The involvement of local actors will be difficult if claims are not backed up by project performance.

With having Syntus on board as a motivated partner, the next challenge for the project was the vehicles-HRS interface. In a broad economic-commercial perspective the development of hydrogen for mobility is often referred to in terms of the chicken-and-egg dilemma: FCEVs will only be sold if a sufficient refuelling infrastructure has been put in place; refuelling infrastructure can only be developed if there are enough FCEVs to provide a commercial basis. So, ideally both vehicles and the first HRS come at the same time. This was also the intention of the H2Nodes project.

As both the development of HRSs and the production of FCE buses were not off the shelf products yet, unexpected delays could happen in either of the two products. Such delays can however cancel all preliminary efforts made to expand the FCEV user base as the FCEVs that are supposed to serve as real life proof of the advantages of FCEVs are not operational, either because they are not delivered, or they lack facilities to refuel.

The H2Nodes Arnhem project faced such a timing risk. The Arnhem-based hydrogen fuel cell systems manufacturer HyMove – the supplier of the two Syntus fuel cell buses – was able to deliver the first FCE bus on time, while the development of the H2Nodes HRS faced a delay of about 1 year.

Given the importance of a successful demonstration project as a basis for future growth by the involvement of potential users, waiting for the H2Nodes HRS to become operational was not considered to be a viable option, given the optimised funding structure for the 2 buses and the H2Nodes provision that FCE buses should be deployed for a minimum period of 2 years. The Syntus Veluwe public transport concession just entered its final 2 years which meant that continuation of FCE bus deployment could not be guaranteed after the public transport concession expiration date. The H2Nodes partners were confronted with the challenge to come up with a back-up provision.

And also this time stakeholder management in a broad sense contributed to a solution. The Arnhem-based hydrogen production company HyGear was well-known by the municipality of Arnhem. As described in paragraph 2.1, HyGear was the operator and hydrogen supplier of the first HRS in Arnhem that had to close when HyGear moved to a new plot in the Kleefse Waard industrial park, adjacent to the target location of the new H2Nodes HRS. The municipality of Arnhem used its existent relationship with HyGear to explore options for a rapid development of a temporary HRS to secure the availability of at least a 350 bar facility for the refuelling of the Syntys/HyMove FCE bus. This resulted in an agreement between HyGear and the municipality: HyGear committed to the development and operation of a temporary 350 bar refuelling facility at its new location at Westervoortsedijk. The municipality committed to the co-funding of this temporary refuelling facility.



Figure 2. The HyGear temporary refuelling facility

In that way HyGear and the municipality of Arnhem managed to minimise the gap between delivery of the FCE-buses and availability of a local refuelling facility.

As from September 2018 to July 2019 The HyGear refuelling facility served as the temporary fuel source for the refuelling of at first one and later two Syntus FCE buses and a FCE passenger cars.

3.2 Lesson learned

The mobilisation of regional and local actors and users will not be very successful if the underlying project predominantly demonstrates the negative effects of having no refuelling facility in place in time rather than the advantages of the deployment of FCEVs.

This risk is higher in a market where both HRSs and FCEVs are not “off-the-shelve products and in the private sector where relatively small private suppliers have limited funding options to either speed up developments or to cover the costs of delay.

At such moments an active role of the municipality can provide a short-term solution and secure the achievement of its long- term goals. This active role includes:

- the provision of (temporary) funding (in compliance with EU regulations regarding state aid);
- the establishment and maintenance of a network of small and medium sized hydrogen technology companies, to be able to identify alternative actors that can contribute to manage the risk described, for example by delivering temporary facilities that can fill gaps as a result of a mismatch in the delivery of essential project components.

4. The FCEV demand-creation initiative

4.1 A regional show case versus a solid project business case

Now that the delivery and deployment of FCE buses was taken care of, as well as the availability of the temporary refuelling facility, the focus of the H2Nodes Arnhem partners shifted towards the development of the permanent H2Nodes HRS. The fact that only 2 instead of the originally aimed 3 FCE-buses were deployed also meant that during the H2Nodes project period 1/3 less income from hydrogen sales would be generated.

Total Gas Mobility had arrived at the stage where various alternative HRS levels were technically and financially evaluated. A high-capacity HRS with hydrogen production by Steam Methane Reforming (SMR) required a net investment that Total Gas Mobility considered to be too large in relation to its expected revenues earning capacity. Various alternatives were brought up, including a low-investment option, based on a phased development, starting with the purchase of offsite produced hydrogen, using tube trailers to for transport and local storage.

The regional partners had the ambition to not only establish refuelling capacity in quantitative terms, but also in qualitative terms and in terms of having a showcase for regional cooperation, where HyGear is the supplier of hydrogen (on an SMR basis) and HyMove the supplier of the FCE-buses. The main goal of the Ministry of Infrastructure and Water Management was to prevent any further project delay and to have the regional refuelling capacity available as soon as possible.

4.2 Structuring the partnership

Section 4.1 describes the situation of the divergent interests and priorities between the organisations that established the HRS Arnhem partnership. The risks were considered to be too high and the differences too big to get to a quick solution, while further delays were not acceptable either.

In order to facilitate the development of solid business cases for the production, distribution and deployment of sustainable fuel the Ministry of Infrastructure and Water Management had commissioned the development of a business case toolbox with financial models that provide a financial forecast of sustainable fuel production, distribution or deployment projects⁶. One of the sustainable fuel distribution models was specifically designed for the financial forecast of HRS development: the Hydrogen Integrated Business case Impact Tool (HIBIT). This tool is set up with a dashboard that allows a quick what-if impact analyses with having financial and environmental⁷ effects directly available. This tool was accepted by all partners to be used to a) produce the financial forecasts of project modifications and b) evaluate these forecasts in terms of business case key financial ratios.

⁶ Source: Business Case Toolbox for Sustainable Fuels, Rijkswaterstaat, <https://rwsduurzamemobiliteit.nl/kennis-instrumenten/toolbox-businesscase/>. Note: this is just an example and does not show the business case calculations for HRS Arnhem.

⁷ In terms of reduction of CO₂, particles and nitrogen oxides

Figure 3 shows this dashboard. All partners attended the stakeholder sessions, where the following aspects were subject of discussion and agreement:

- long term development of the HRS Arnhem hydrogen sales as a basis for the calculation of future revenues;
- pre-determined return on investment for the HRS developer/operator;
- capital expenditure and operational expenditure for various alternatives;
- in case the resulting return on investment was lower than the pre-determined return on investment, a mix of the following instruments was added and its effect were determined:
 - provision of investment grants (in addition to H2Nodes grant money);
 - guarantees with respect to minimum sales volumes;
 - demand creation (leading to additional revenues in the start-up phase).

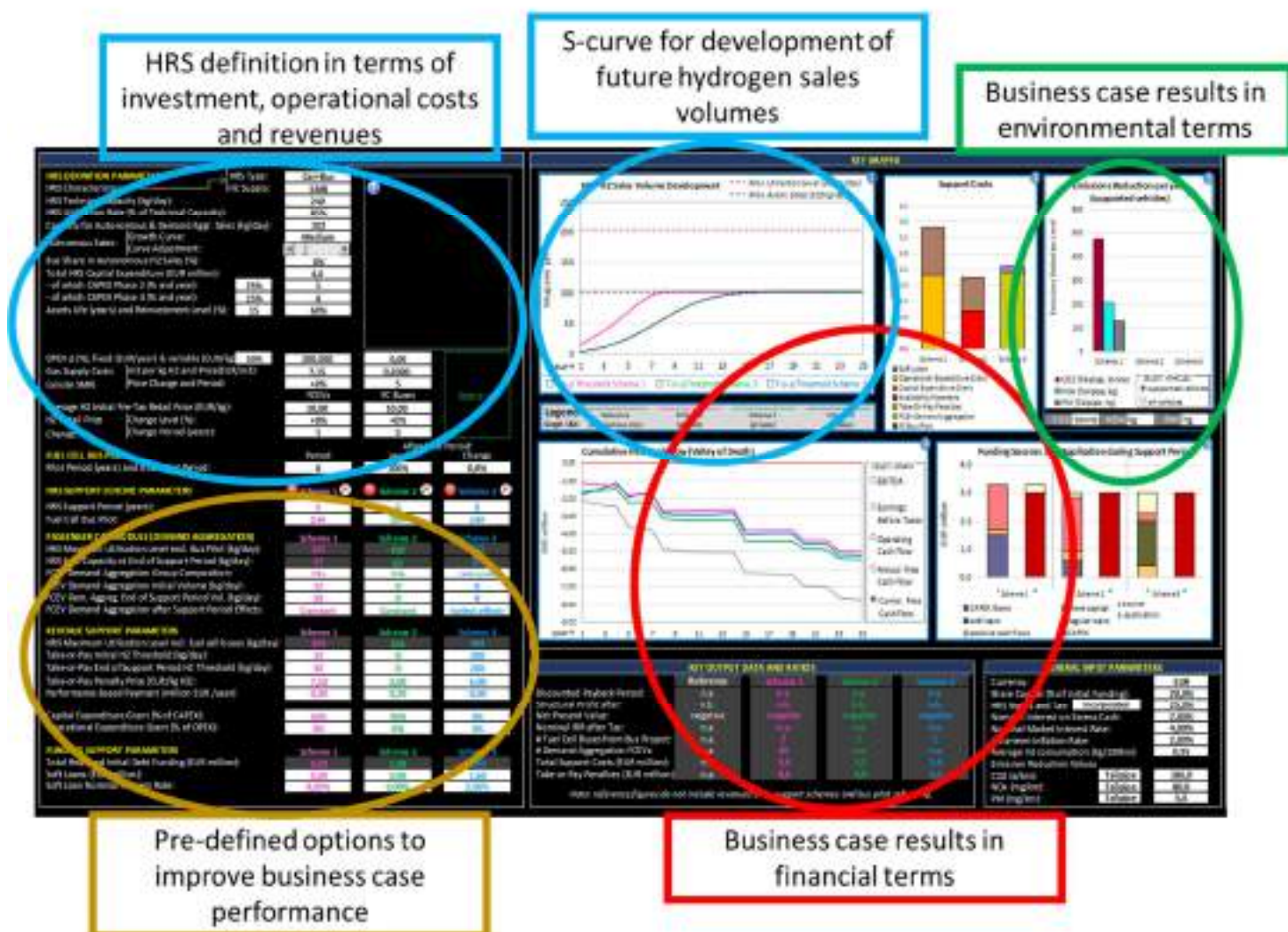


Figure 3. Dashboard of the Hydrogen Integrated Business case Impact Tool (HIBIT)

This structured process resulted in the following additional partnership aspects:

- a) Total Gas Mobility agreed to the development of an HRS supplied by hydrogen produced by HyGear using SMR (as desired by Arnhem) and accepted a pre-determined return on investment;
- b) The Ministry of Infrastructure and Water Management nominated the HRS Arnhem project for a grant from a new facility to stimulate innovation with respect to investments in sustainability⁸;
- c) The municipality of Arnhem and the province of Gelderland agreed to avail a budget to accelerate hydrogen sales by mobilising and contracting new local FCEV users.

The additional financial components b) and c) enabled Total Gas Mobility to develop the HRS as mentioned in component a.

These additional partner commitments secured the development of an HRS that not only provided a refuelling capacity compliant with the capacity provisions in H2Nodes Grant Agreement's provisions but also included activities to mobilise a group of local FCEV users that use HRS Arnhem as their main refuelling location. As not only the availability of refuelling capacity but also the actual use of the capacity was included, the HRS project could serve a showcase for a successful regional collaboration and an actual demonstration of one of the most distinctive aspects of FCEVs versus BEVs: a refuelling process that takes around 3 to 5 minutes, similar to the refuelling of conventional petrol or diesel cars.

As an alternative, Arnhem and Gelderland could have availed additional grant money to the HRS Arnhem. That would also have secured HRS development but without having any form of 'guarantee' on the actual use of this facility during the first operational years by third party FCEV drivers. By investing funds in demand creation rather than HRS assets, Arnhem and Gelderland supported HRS Arnhem in an indirect way, through mobilising users that otherwise might not (yet) have switched to an FCEV. FCEVs provided a basis for sustainable market development, whereas the commitment to deployment of the Syntus buses did not exceed the H2Nodes project period. Providing additional funds to HRS development through market stimulation rather than providing investment grants, means not just HRS availability but overall HRS performance is required to generate income. The difference is that FCEV-users only pay for delivered hydrogen and that no income is generated in cases of default.

4.3 The demand creation and aggregation initiative

In 2019 the province of Gelderland and the municipality of Arnhem allocated a budget for the stimulation of the use of hydrogen for mobility, demonstrating its positive environmental effects, in combination with the creation of a solid revenues-base for HRS Arnhem. As there were no blueprints available for the operationalisation and implementation of these objectives, Arnhem and Gelderland came up with the following approach to mobilise market expertise, creativity and experience:

⁸ DKTI-provision, <https://www.rvo.nl/subsidie-en-financieringswijzer/dkti-transport>

- the public announcement of the intention to involve the market in the process to reach the goal of 80 additional⁹ FCEVs in the Arnhem region, using HRS Arnhem as main refuelling facility, and availability of a total all-inclusive budget of EUR 960k;
- the public tendering of an approach including ideas how to mobilise local FCEV users as well as proposals for project management.

The main criteria used to evaluate the received market proposals were clustered in the following categories:

1. financial robustness;
2. capability to secure the 80 additional FCEVs
3. compliance with the demand to mobilise users specifically in the Arnhem region;
4. exposure of the project as a result of publicity-efforts; and
5. "extras" – the creation of additional values that support the intended goals.

Additionally, the evaluation also included criteria with respect to creativity and required budget, but these categories were positioned in a sub-ordinate position compared to the five main categories.

This approach triggered partnerships of various private organisations active in sustainable development, communication, vehicle sale and vehicle leasing. With the financial support of Gelderland and Arnhem the selected consortium¹⁰ launched H2-Drive as a brand name for the initiative to involve potential local users and to contract the actual FCEV users. This coalition came up with a distinctive approach that included a preference for spending a relative large part of the available funds on stakeholder management compared to funding deals for FCE buyers / users. This meant it was able to reach a larger group of potential users compared to other proposals.

H2 Drive organised meetings for interested potential FCEV users, including a kick-off meeting in December 2019, attended by 180 persons.

⁹ "Additional" refers to the number of FCEVs refuelling at HRS Arnhem as an evident result of the demand creation initiative, in addition to the number of FCEVs that refuel at HRS Arnhem without a relation to this initiative.

¹⁰ Participating organisations: Gloedcommunicatie, H4 Lease, Herwers, Stichting Kiemt en KplusV



Figure 4. successful launch of H2-Drive at an event at 11 December 2019, where alderwoman Mrs. Cathelijne Bouwkamp hands over the first stimulations package to Mr. Kevin Rijke, the CEO of the Industriepark Kleefse waard Arnhem

A dedicated H2 Drive website was launched¹¹, including information about fuel cell vehicles in general and the H2 Drive initiative and incentive package in particular. The incentive package for each vehicle included:

- 50% discount on the hydrogen refuelling costs at HRS Arnhem during a five year period and up to a maximum of EUR 3.000;
- a mobility service package including free towing / replacement vehicle / alternative transport in case of HRS default or in case of an empty tank in The Netherlands during a five year period and up to a maximum of EUR 6.000;
- access to H2-Driver Community providing services including vehicle driving instructions and provisions for vehicle maintenance.

The package was available until 24 July 2020 for anyone who bought or leased an FCEV as from 11 December 2018 and works or lives within a 30 km radius around Arnhem, and therefore is likely to predominantly use the Total Gas Mobility HRS Arnhem to refuel.

The H2-Drive initiative became a success right after its launch. However, the outbreak of the covid pandemic, had a significant impact on the sale of vehicles in general and also caused a decline in FCEV sales.

Still, a total of 70 H2-Drive packages were awarded. About 30 packages were awarded within a period of a few months after the H2-Drive launch. About 40 packages were awarded shortly after it was announced that due to the impact of Covid-19 the H2-Drive initiative would not be extended beyond

¹¹ <https://www.h2-drive.nl/>

the July 2020 expiration date. This total of 70 FCEVs is less than the targeted 80, but still an impressive result, given the impact of Covid-19 on overall car sales, and the HRS compression performance issues as described in the Milestone 11 report.

The group of FCEV users predominantly consists of business users. H2-Drive put serious effort in the approach of taxi companies, resulting in the fact this segment represents more than 50% of acquired new FCEV users.

In addition, throughout the project many local stakeholders were informed by targeted communication campaigns, contributing to press coverage and more public awareness of hydrogen mobility as a clean and sustainable available alternative. All FCEV drivers (not limited to H2-Drive participants) have access to a Whatsapp group where experiences are shared.

4.4 Lessons learned

The most important lesson learned is that the actual establishment of a solid market for the first HRS in a region, requires more than just informing potential users. It should be an offer that is substantial enough to compensate for typical drawbacks for early users, such as limited overall HRS availability and HRS performance issues during start-up. This requires a financial commitment from stakeholders to avail funds for incentive packages. Refuelling at HRS Arnhem can't be enforced and it is also not desirable to limit FCEV drivers with respect to the refuelling location. However, a 50% discount on purchased fuel and the fact that the targeted group has a working or living location in the region sufficiently secures the use of the targeted HRS.



Figure 5. Evaluation remarks with respect to demand aggregation, presented by the municipality of Arnhem.

5. Other local actor initiatives in the province Gelderland

The H2-Drive initiative is the most substantial one in budget and direct result in additional FCEV and hydrogen sales. One of its objectives was to strengthen the HRS business case through the establishment of early revenue generation form hydrogen sales in a market where FCEVs are already available.

Additionally, the province of Gelderland is also working on developments similar to H2Nodes, and developments including the mobilisation of local actors targeted in transport segments where no fuel cell vehicles are deployed yet while they are a very promising alternative to currently uses diesel vehicles. These include:

- The JIVE2-project, including the development of an additional HRS, the deployment of 10 FCE buses and demand creation in other user groups;
- The H2 Truck Initiative, a demonstration project more specifically (but not exclusively) targeted at transport and logistics activities.

Both initiatives are described in The H2Nodes Milestone 11 Report¹².

¹² "Milestones H2NODES, Milestone 19, HRS Upscaling", July 2020

6. Local actor and users in the Rotterdam and Amsterdam regions

6.1 Introduction

The Netherlands has a strong presence of organisations that support the development of hydrogen and a fuel cell vehicle market. These partially originate from the Dutch government (for example H2Platform) or from the private sector (for example WaterstofNet). These organisations track HRS development and projects around FCEV deployment. This has led to a wide array of stakeholders becoming involved in the FCEV market in various sectors and vehicle segments along the NSB-corridor.

This section provides more in-depth info about the main Dutch Nodes of the NSB-corridor: Rotterdam and Amsterdam. The Port of Rotterdam and Amsterdam are both important energy hubs, where both see a future role for hydrogen^{13,14}. Several initiatives aim to expand freight transport to start using FCE trucks¹⁵. Due to the scope of the H2Nodes project with a focus on buses and cars, this is left out of this section.

6.2 Rotterdam

By the end of 2020 Rotterdam has one operational HRS, two HRS development plans with funding and three initiatives that still need to be funded¹⁶. The first ever HRS along the entire NSB-corridor is located in the Rotterdam-region, namely the Air Liquide HRS at Rhoon (next to the A15 highway). The Rhoon HRS (both 350 bar and 700 bar) is open since 2014, which is year that the H2Nodes project started¹⁷. This station supports a growing group of FCEV users, as well as a FCE bus pilot project with the Province of South Holland. Rijkswaterstaat was among the first users of the station by adding two Hyundai ix35 FCEVs to their car park right after the first station opened¹⁸. This helped to provide a showcase how FCEVs perform in real life. The two FCEVs are still in use in 2020, though no extra vehicles were added as no new HRS became operational near the main Rijkswaterstaat offices in Utrecht and Rijswijk.

The existence of the Rhoon HRS also allows public transport operators RET and Connexxion to conduct pilots for FCE bus operations. RET tested two FCE buses as a pilot project within their

¹³ <https://www.portofrotterdam.com/en/doing-business/port-of-the-future/energy-transition/hydrogen-in-rotterdam>

¹⁴ <https://www.portofamsterdam.com/nl/business/ladingstromen/natte-bulk/waterstof>

¹⁵ <https://www.waterstofnet.eu/nl/overzicht-projecten/mobiliteit>

¹⁶ <https://www.waterstofnet.eu/nl/overzicht-waterstof-tankstations-benelux>

¹⁷ <https://opwegmetwaterstof.nl/tanklocaties/air-liquide-rhoon/>

¹⁸ <https://www.groen7.nl/hyundai-zet-eerste-waterstofauto-op-nederlands-kenteken/>

concession between 2017 and 2019¹⁹, which has led to the purchase of another 50 FCE buses for South Holland, Groningen and Flevoland. Connexxion started with a pilot of 4 FCE buses for the region Hoeksche Waard-Goeree-Overflakkee, just south of Rotterdam, with a possible expansion of another 20 buses in 2021²⁰ (part of Jive2 project described in the Milestone 19 report).

An important demand aggregation project that involves the Rotterdam region (as well as Amsterdam and Utrecht in the Netherlands) is another CEF-funded project called H2Benelux²¹. H2Benelux project aims to deploy 8 HRS and at least 80 FCEVs between 2017-22 in the Benelux region to tackle the chicken-egg issue. Total (formerly Pitpoint) is responsible for the deployment of the HRS Cappele a/d IJssel, which is just north of Rotterdam. An important element within the local stakeholder engagement pillar of the project is that the H2Benelux combines supply and demand of vehicles and HRSs and includes financial support for both (for vehicles the first 10 FCEVs per HRS). More information on the status of demand aggregation is available in the next section.

Besides the demand aggregation support within the H2Benelux project, Total organizes local stakeholder events for each HRS to increase local awareness around FCEV driving (see for example the organization of H2 Business day in Breda (50km south of Rotterdam) at the end of 2019²²).

6.3 Amsterdam

By the end of 2020 Amsterdam has one operational HRS and three HRS development plants with funding²³. The city of Amsterdam released their strategic plan on charging infrastructure²⁴ in December 2020, which includes the possibility to deploy several HRSs.

Since October 2020 Amsterdam has become the first region with an operational H2Benelux HRS, which is the Den Ruygenhoek station (700 bar only) of Shell along the A4 highway near Amsterdam Schiphol Airport²⁵. Several demand aggregation events were organised in 2020 by Rijkswaterstaat and other H2Benelux partners. This was part of the requirements of the CEF funding and the Dutch funding via the pilot project policy instrument DKTI-T. The main demand aggregation strategy is setup as follows:

- Different types of events are needed to involve local stakeholders during the development of an HRS. General information sessions at the start of the project, followed by specific

¹⁹ <https://www.ovpro.nl/bus/2017/07/04/waterstofbus-is-een-op-een-inwisselbaar-met-een-dieselbus/?gdpr=accept>

²⁰ <https://www.waterstofnet.eu/nl/nieuws/4-waterstofbussen-van-vdl-on-the-road-in-de-provincie-zuid-holland>

²¹ <https://www.rijkswaterstaat.nl/english/environment/projects/h2benelux/index.aspx>

²² <https://www.pitpointcleanfuels.com/nl/bredaopwaterstof/>

²³ <https://www.waterstofnet.eu/nl/overzicht-waterstoftankstations-benelux>

²⁴ <https://www.amsterdam.nl/parkeren-verkeer/amsterdam-elektrisch/strategisch-plan-laadinfrastructuur-2020/>

²⁵ <https://h2benelux.eu/stations/amsterdam-den-ruygenhoek>

gatherings with user groups several months before opening, ending with concrete purchase sessions around the opening of the stations.

- It is important to involve all partners in the value chain (HRS, vehicles, public authorities and user groups).
- Make sure that the user groups are the ones that talk the most in order to properly identify opportunities and barriers to FCEV uptake.
- Identification of specific user groups where worries can be addressed together with the partners in the value chain. Also make sure how the user groups actually acquire their vehicle (privately or via a lease construction).
- Enable one stakeholder to take the lead for follow-up actions per segment (for example the municipality for special purpose taxi's).

The first session was targeted at the taxi sector, including special purpose taxi's (e.g. transportation services for disabled people). A second session was organised in collaboration with the association of Dutch leasing companies (VNA) to inform the lease car market on the FCEV market (leased cars represent half the newly registered vehicles in the Netherlands). In Q4 2020 several sessions were organised by the H2Benelux consortium and FCEV manufacturers to inform big corporations and organisations in the Amsterdam area that have vehicle fleets how to start with FCEVs. Several of these companies already deployed at least one FCEV. The next step is to have follow-up conversations between the market players to reach a concrete deal to start adding more FCEVs on the road.

There are currently no FCE bus initiatives in the Amsterdam region.

