RIGHT
RIGHT SKILLS FOR THE RIGHT FUTURE

RIGHT PILOT REPORT (draft)

[Green Hydrogen Booster]

Author: Anu Manickam, Anja Bos and Rob Wolters

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1.0 Introduction

The pilot of the Green Hydrogen Booster (GHB) has two parts. One is the implementation of regional/sustainable key performance indicators (KPI) by EnTranCe – Centre of Expertise Energy. The GHB is one of the programmes of EnTranCe. The other part is the implementation of the GHB in regional SMEs. Goal of GHB is improving the competences of the employees of SME's in the domain of hydrogen; linking them to potential partners, supplier, shareholders and customers and trying to help them in shorten their development trajectory of hydrogen related products and services by facilitating them with a dedicated testing ground at EnTranCe.

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2.0 Regional/ Strategic Context

The transition to clean, sustainable energy and energy security is a top priority, both to the EU and the Northern Netherlands. To achieve the ambitious goals of the Paris Agreement, the Northern Netherlands region will need the commitment of all European regions. As the 'Energy Valley', the Northern Netherlands is at the forefront of the transition to a sustainable energy supply. The necessity to shift to renewable energy is felt most strongly in our region. The extraction of natural gas causes earthquakes in our region and the safety of the local people makes the region more motivated to switch to other energy sources.

The region has the infrastructure and space to do so. Using sun, biomass and wind, the Northern Netherlands is already contributing to the climate challenge. One of the things the region focuses on is offshore wind energy. The region uses this energy to produce green hydrogen, which helps us to green our chemical industry. The region can store the surplus energy here and increase the sustainability of mobility by facilitating the use of hydrogen in (public)transport and ports. This is why they invest in the large-scale development of a hydrogen economy. In addition to this, they are committed to saving energy, e.g. by making homes and schools energy-neutral.

The region can only achieve this together; by collaborating with the EU, the provinces, cities, companies and citizens. Anyone can contribute by saving energy and generating sustainable energy. The Northern Netherlands promotes a bottom-up energy transition.

Hydrogen: The green industry of the future

The Northern Netherlands is actively building on the green industry of the future. Hydrogen has a vital role to play in this transition, both as an energy carrier and as feedstock. The green industry creates and retains jobs, ensures that our knowledge position is maintained and makes a concrete contribution to the Netherlands' climate objectives for 2030. That is why the region, companies and governments in Groningen and Drenthe, have established an investment agenda for the development of the hydrogen system in the Northern Netherlands. (from website www.snn.nl)

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3.0 About the Pilot

3.1 DESCRIPTION

EnTranCe is a public-private partnership that offers room for open knowledge-sharing. Here, the concept of open innovation is being put into practice. Innovative ideas are exchanged with companies, authorities and social institutions. Through stimulating innovation, EnTranCe speeds up the energy transition and strengthens the knowledge economy in the north of the Netherlands. EnTranCe is the Centre of Expertise Energy of Hanze University of Applied Sciences Groningen and is part of the New Energy Coalition.

In the first part of this pilot, regional/sustainable key performance indicators (KPI) are designed for implementation by EnTranCe. The GHB is one of the programmes of EnTranCe. The pilot will support EnTranCe to improve visibility and measurement of impact of regional sustainability goals for its programmes and participating organizations.

In the second part of this pilot, the Green Hydrogen Booster programme of EnTranCe, is observed. GHB offers SMEs and other parties to collaborate in an open innovation environment to accelerate Green Hydrogen production, distribution, storage and various usages in household, industry and mobility, grid balancing and related infrastructures for that.

The booster facilitates:

- promoting Green Hydrogen as a viable energy transition solution
- greening existing value chains and creation of new ones
- testing equipment
- upscaling innovations related to green hydrogen products and services
- identifying needs for skills and policy support
- new social and economic impact measures of energy transition projects
- knowledge development, education and communication

3.2 METHODOLOGY

The pilot was executed in February 2020 till October 2021.

EnTranCe as facilitator of Green Hydrogen Booster Project is responsible for developing the pilot in terms of defining the scope of participation of SMEs, providing test and demonstration facilities, project support, including events to invite and disseminate outcomes, etc. and coordination of innovation activities. This includes liaison with different faculties within Hanze University and external partners in the region, SMEs included, to ensure that the Green Hydrogen collaborations are optimal and business will be developed.

Hanze and the Province of Groningen will commission development of a regional social and economic impact tool as part of the RIGHT project, to support impact measurements of project activities at EnTranCe with the Green Hydrogen Booster as a test case.

Regular meetings with the pilot owners at EnTranCe have taken place.

In the first part, the regional/sustainable key performance indicators (KPI) tool was designed and presented to EnTranCe. In turn, they adapted and implemented it in their strategic plans.

In the second part, the Green Hydrogen Booster programme was executed, in which SME participation was monitored. The focus was on the knowledge, progress in development, experience, status in relation to the development of the appropriate product & services in the domain of hydrogen.

At the end of the pilot, both parts were evaluated.

3.3 STAKEHOLDERS

The stakeholders of this pilot are:
- EnTranCe Centre of Expertise energy
- Partners (10) in the Green Hydrogen Booster consortium
- Participants especially SME's of the Green Hydrogen Booster project
- A network of 100 SME's all having a relation to the hydrogen domain (hydrogreenn network)

3.4 RESULTS/OUTPUTS

In part 1 of the pilot, EnTranCe has adopted 'impact into their strategic plan and this in turn has been operationalized in 3 ways:

- Thematic approach to measure impact – mobility, industry, local and regional transition strategies, renewable gas, system integration
- Target groups – government, general public, businesses, socially oriented organizations (energy coop), knowledge institutes
- Applied research impact – professional education and re-training (lifelong learning)

EnTranCe is taking steps to realize the impact (above) and in that process design ways to monitor impacts at the level of activities and of the participants. EnTranCe sees this as a dynamic process in which the activities and participants to provide insights into their needs even as they are asked to give insights into the impact of EnTranCe's activities.

- Specifically, a partner committee has been established to provide such information. This results in pro-active and reactive approaches. This feeds into policy learning cycles.
- At the project and partner level EnTranCe is implementing a survey to gather information on the impact of the project and partnerships.
- All of the above feeds into the policy and strategy development cycles of EnTranCe.

EnTranCe will use the RIGHT tool in specifying the impact measures that it will use in their surveys on projects and partnerships. In addition, EnTranCe will offer this tool also to SMEs and other organizations in their networks.

In part 2, EnTranCe and some partners founded the hydrogreenn network in Northern Netherlands for SME's and organizations interested in hydrogen and its value chain. The further roll out of this network, the organization of meetings and events is executed by the GHB programme. This network is an important meeting and breeding place for SME's and other organizations interested in and/or are thinking of developing business in the hydrogreenn domain. Meetings are held every quarter although due to corona meetings were digital, and therefore less effective especially in contacting new members/new SME's. In the last two years GHB organised 9 bigger events (4 of them digital because of corona) with approximately 900 participants.

The hydrogreenn network especially but also other networks of EnTranCe and GHB-partners, generate input/leads for the funnel of the GHB programme: SME's who are looking for support in gaining their competences, in linking to potential; partners, shareholders, customers and /or in developing and testing are connected to members of the GHB-team. We created the opportunity to translate the different 'request for support' by SME's into a GHB-voucher.

As part of the hydrogen programme, special GHB-vouchers are available to lower barriers of investing in hydrogen support and knowledge development. Experts from the network can be connected to SME's to give various advice (economical and/or technical feasibility studies). The vouchers compensate costs of the experts. Results: regional Impact / KPI: 80 leads for the GHB-vouchers. 10 running at this moment. More measuring will be done using the SME-monitor (December '22).

Furthermore, we developed training programmes for employees of SME's and created a list of modules (hydrogen safety, legal considerations, development and engineering for hydrogen applications and so on).

On the testing ground of EnTranCe we created new facilities dedicated to the hydrogen domain: a hydrogen storage tank, a distribution network, different buildings for small hydrogen experiments, setups with fuel cells and electrolysers, heating demonstrators powered by hydrogen, a guarded area for dedicated experiments with the right safety conditions and permits.

Participation of students in real projects is positive for the development of the students and they provide support to SME, especially startups. Furthermore students are introduced to the field of hydrogen.

1. Participating SMEs increase their innovation capacity by gaining knowledge and make use of experts. As a result the throughput time of innovation shortens and innovation output increases.
2. Strengthen existing and/or creating new Green Hydrogen value chains by linking different SME's and forming business partnerships.
3. Better coherence between education programmes and business, societal and industry needs in Green Hydrogen development
4. Visibility of Northern Netherlands as Green Hydrogen innovation accelerator in NSR/RIGHT project. Networks, international programmes, websites, conferences.
5. Regional impact of Green Hydrogen developments visible through the new impact measurement tool

SME participation in innovation projects of Green Hydrogen Booster is difficult to guarantee as it depends on the specific topic and timing of the projects. However, promotional activities on green hydrogen as a new business and innovation venture (1) and strengthening existing value chains (2) is expected to be realized as will research on green hydrogen and possibly new curriculum development (3). In addition, development of the regional impact analysis (5) will also be realized.

3.5 DISCUSSION OF FINDINGS

EnTranCe is still in the process of implementation of impact measurements and taking the next steps to support partners to also use impact measurement tools.

In addition, the set-up of SMEs participating in this pilot project is valuable reflecting EnTranCe's success in creating an open innovation and test facility space for energy transition. This concept could be relevant to other regions as a good practice even as it offers opportunities for collaborations in co-developing Green Hydrogen value chains and markets across the North Sea Region. Linking SME's and different organizations, creating new business partnerships could result in discovering gaps in the hydrogen value chain. Working together with (new) partners is challenging and enables new possibilities.

Creating dedicated test facilities at a central location in the region strengthens a meeting and breeding place for SME's (referring to the dedicated testing ground of EnTranCe). It creates a bridge between (an applied) university and the work field.

3.6 CASE STUDIES/EXAMPLES/STORIES

- In order to test a new type of electrolyser with a distinctive dynamic behaviour that connects directly, to the electrical output of a solar farm, a test programme was created.
- Economical and technical case study of a Combined Heat and Power (CHP) used as green heat generator in district heating, powered with a mixture of natural gas and hydrogen.
- A project to develop and create an industrial electrolyser as a step forward from the existing table top electrolyser. This involves a factory producing machines for oil and gas industry exploring opportunities in the hydrogen value chain.
- Development of a powerpack for electrical tooling and cranes in road construction projects. The powerpack collects sustainable energy complemented with hydrogen. It supplies and reloads the electrical equipment at night.

4.0 Conclusions

4.1 CHALLENGES

Instruments used now – the question is if this is the right instrument – knowledge voucher. Material investment by companies are much larger. We are too early in the development of green hydrogen chain. The larger initiatives are not helped by this instrument.

Finding businesses and finding business willing to take on the challenge of developing green hydrogen businesses is the key challenge. And if you want to support these businesses is this in the area of support in facilitating of credit and finances.

4.2 OPPORTUNITIES

- Creating other instruments than vouchers to support and help SME's.
- Better and larger investment instruments and support.
- In the network, more knowledge is available but not always free accessible.

4.3 RECOMMENDATIONS

More instruments are necessary to tackle a wide range of the challenges that SME's have during the time that the payback time of investments is relatively long.
Relatively small vouchers can help in (a limited) number of cases. However, it ignites the willingness of companies to go further with developments. The SME's are hooked on a new business network with a lot of new business opportunities and a number of them start with accelerating. The market is not yet ready.

4.4 NEXT STEPS

Regional/sustainable key performance indicators (KPI) implemented by EnTranCe will be monitored and adapted. Furthermore, partners (SMEs) will be encouraged to adopt the regional/sustainable key performance indicators (KPI) in their own organizations.

5.0 Outputs for new strategy and policy for Skills education and SME innovation

Outputs / Lessons learned from GHB:

- The transformation of electrical to hydrogen energy and visa verse is subject of further optimization. However the first applications are developed using the waste of such transformation: coupling with heating application (heat pump uses of fuel cells and electrolysers).

- Being good in a domain with a certain type of expertise of products sometimes changes in a different domain. An SME discovered that being good in metal forming and metal working for appendages in oil and gas industry (big valves) logically can be translated to the hydrogen domain. A spinoff could be producing big metal components with high accuracy in the realisation of key components in de realisation of electrolysers. Opportunities exist (but were not in focus) and can be triggered in other domains.

- A designated place like EnTranCe/Green Hydrogen Hub supports creation of ecosystems.

- Additional case studies are supplementary best practices:
  - Noordelijke Scholings Alliantie
  - National Programma Groningen (NPG) – part Human Capital
  - Just Transition Fund (JTF)

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6.0 Potential for upscaling/learning Transfer/Internationalization

- A designated place like EnTranCe/Green Hydrogen Hub supports creation of ecosystems.
- Additional case studies are supplementary best practices:
  - Noordelijke Scholings Alliantie
  - National Programma Groningen (NPG) – part Human Capital
  - Just Transition Fund (JTF)
- Replicating Green Hydrogen Booster can result in a North Sea Region Green Hydrogen Hub.

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