European Union | European Regional Development Fund

Sharing solutions for better regional policies

SMART-Hy-Aware | Action Plan

West-Hungary

General information

Project	SMART-HY-AWARE
Partner organisation	ENG: Pannon Business Network Association HUN: Pannon Gazdasági Hálózat Egyesület
Other partner organisations involved (if relevant)	
Country	Hungary
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1. Introduction

SMART-HY-AWARE is an Interreg Europe programme with a budget of €1,359.626, --, running from the 1st of August 2019 to the 31st of July 2023. Its topic is low-carbon economy. The partners comprise: the Regional Development Agency of Aragon, Lazio Region, the province of Zuid-Holland, municipality of Delphi, Aberdeen City Council and Pannon Business Network Association.

SMART-HY-AWARE aims to promote hydrogen-electric mobility by tackling main infrastructural, technological (range anxiety related) and market uptake barriers related to hydrogen for electro-mobility through the improvement of PI linked to Structural Funds in Europe, addressing the transition to a low carbon economy, as clearly requested by objective 3.1 of the INTERREG EUROPE Programme.

Specific sub-objectives of the project, to reach the main goal, are:

- Exploiting the potential of hydrogen technologies for electro-mobility involving the whole supply chain;
- Improving regional and local strategies which focus on real needs for implementation such as giving impulses for new models of fuel cells integration;
- Increasing efficiency of green propulsion in transport;
- Improving renewable energy grids to cut down electrolysis costs and IT management applications to enable advanced planning of short-to-mid-term power productions and foster use of hydrogen power within distributed networks (Gopalakrishnan Kumar, Serhan Dermici, Chiu-Yue Lin, 2013);
- Increasing the deployment and the accessibility to refuelling infrastructure for both public and private sector in urban and rural areas;
- Supporting the deployment of alternative fuel vehicles in public transport by setting up regional financial support schemes;
- Promoting and assessing new measures favouring public-private partnership (PPP) in the e-mobility sector, by designing suitable PPP business schemes to trigger hydrogen mobility;
- Enhancing the capability of public Authorities in developing effective policies for reducing the carbon footprint of transport activities.

2. Policy context

2.1. Aim of the Action Plan

The Action Plan aims to impact:

·Investment for Growth and Jobs programme

· European Territorial Cooperation programme

x Other regional development policy instrument

Name of the policy instrument addressed:

***Szombathely 2030*-Local-city level- Policy instrument, approved by the city and involved representatives in September 2021**

2.2. Objectives

Szombathely 2030 envisages several measures to be taken in the city of Szombathely in the following 10 years. The main objective of the Strategy is to contribute to the improvement of the standard of living in Szombathely and its region by focusing on education and research-and-development by promoting industrial transformation and specializing on complex rehabilitation within the health industry.

Apart from advocating industrial transformation and innovative solutions in health industry, the strategic document explicitly- in a dedicated session- enhances the promotion of green (low-carbon) mobility solutions as well. The overarching goal of the mobility related session is to make the city environmentally friendly with the promotion of green mobility solutions which might contribute to the decrease of own car usage. In order to reach this goal, the strategy recommends various solutions such as attractive and competitive urban and suburban public transport, introduction of flexible transport in peripheral periods and peripheral districts, implementation of a coherent cycling system throughout the city, implementation of smart solutions in parking, implementation of vehicle sharing systems and further measures are also proposed to popularise the Mobility as a Service concept.

Together with the city representatives and other stakeholders, PBN representatives were contributing to elaborate the city level-policy strategic document. PBN was also contributing to the strategy with defining flagship projects in the manufacturing and health related sessions, and we were also checking the stakeholders' contributions and incorporating them into the final strategy. **Regarding mobility, PBN, based on the SMART-HY-AWARE experience, proposed the hydrogen related planned measures**-described below- which have been accepted by the other involved stakeholders, so they could be integrated into the strategy. Due to PBN's participation in the SMART-HY-AWARE project and our active role in the elaboration of the **Szombathely2030 Strategy, the implementation of hydrogen in mobility appeared as one of the proposed actions** within the sub-session related to enhancement of green mobility. Our intention was to facilitate, and influence hydrogen related activities in the region. Since PBN was the main contributor of the document, these hydrogen measures were proposed, then discussed and then approved by the other contributors (stakeholders). **According to the city level policy document, one of the Hydrogen Refuelling Stations might be installed in the City of Szombathely by 2030.** Furthermore, the policy document is highlighting that **tourism might be the**

area in the county where a hydrogen-fuelled mobility project might be implemented as a **pilot project** by the end of this decade. **In later steps- (following 2030)- the hydrogen-fuelled vehicles might also appear in everyday public transport**. Regarding the financial sources, **approximately 5.5 million EUR are planned in the Strategy to achieve these H2 related goals,** which might be financed by Integrated Transport Development Operational Program Plus 2021-2027, European Green Deal, as well as Horizon Program as possible sources already indicated in the Strategy.

2.3. Interregional exchange and learning approach

During the project, different interregional exchange and learning activities have been carried out. In the beginning of the project- 1st Aug 2019- numerous exchange activities were foreseen in a personal way, however the COVID-19 pandemic and the travel restrictions highly affected these project expectations. The partnership had to adapt to the unexpected situation and mitigation plans had to be carried out, therefore the majority of the envisaged exchange of experience activities were held in the online environment.

PBN has participated in numerous learning activities, and the ones are listed below which can be considered as relevant to the elaboration of the current Action Plan. In Session 3.1.1 the specific interregional exchanges shall be highlighted and detailed which mainly influenced our Action Plan.

- *Interregional Stakeholder Workshop & Interregional site visits*
- *Policy Learning Events organised by Interreg Europe Platform*
- *Exchange of Good Practices between the partners*
- *Permanent learning from progress meetings and steering committee meetings*
- *Participation in Mid-Term Reviews*
- *Participation in peer reviews (knowledge dissemination events)*

Apart from the interregional exchanges, PBN has been in continuous contact with our policy and thematic stakeholders/experts, and we informed them about project achievements. They also participated in some of the interregional exchange events, and they have been also providing us relevant information and updates which might be utilised in the current Action Plan. The following achievements have been carried out so far, due to our stakeholders' contributions:

- *Regional Stakeholder Workshops (one in each Semester)*
- *Feasibility study in relation with the current situation of hydrogen mobility in Hungary*
- *Preparation of a professional video, where policy makers and experts were talking about the current status and initiatives of hydrogen mobility in Hungary*
- *National Hydrogen Technology Platform activities with PBN involvement*
- *Technical workshop, with PBN's participations organised by the National Hydrogen Platform (presentation by experts and showcase of the first hydrogen-fuel cell boat in Hungary*

- *PBN's active role in the elaboration of the Szombathely2030 local strategy*
- *Contribution to the Recommendation Report on hydrogen storage and production*

3. Action 1- Hydrogen fuel cell forklift demonstration in a regional company

Our overarching goal is to implement a pilot project with Linde Gas Hungary Ltd. to demonstrate hydrogen fuel cell forklifts together with a refuelling station in a regional company in West-Hungary. Linde Gas Hungary Ltd. is one of the leading providers of industrial and medical gases in Hungary, and their industrial gases are used worldwide in every branch of industry, commerce, science and research.

Linde considers the fuel cell to be the leading technology of the future, and therefore they will be gradually integrating the corresponding solutions into their new products. This is how this extraordinary energy system develops step by step into an everyday product that will replace traditional drives in many places.

The goal of this action is to demonstrate for regional companies how hydrogen, and in particular hydrogen fuel cell forklift might be utilisable and applicable in production. Due to the demonstration of hydrogen forklifts and their usage in production, experience and lessons learnt will be gained which might contribute to future activities in hydrogen application in industrial production and logistics.

This action would have also a direct impact on the implementation of the SZOMBATHELY2030 Strategy since it is going to be a new project financed in the framework of the Strategy.

Moreover, due to the action, the increase of the hydrogen demand is also expected from industrial players. The foreseen increased demand on hydrogen shall be also influencing policy makers to apply hydrogen related projects, contributing to the overarching hydrogen objectives defined in the Strategy.

3.1. The background

From the beginning of the project (1st Aug 2019) PBN representatives have taken part in several interregional learning and exchange of experience events, and in some cases our stakeholders also joined to these occasions. All of them can be considered beneficial, but the ones are listed in Session 3.1.1 which constitute the basis for the development of the present Action Plan.

3.1.1 Link with interregional learning and exchange of experiences

The following interregional learning and exchange of experiences can be considered the most influential and relevant for PBN and West-Hungary to elaborate the current Action Plan.

- *Interregional stakeholder workshop of Lazio, South Holland, Aberdeen*

  The IRSW3, held online by **Lazio Partner** in Semester 3, was valuable for PBN's representatives, as well as for our stakeholders. It was beneficial to learn about how the regional legislation was evolving in Lazio in connection with hydrogen mobility. Since in Hungary such legislation was not existing that time neither on national nor on regional level, it was helpful to see which steps and measures were taken in Lazio to facilitate these legislations. Besides, some H2 research were also presented by Lazio stakeholders, including numerous technical information, which might

be also utilised by Hungarian stakeholders, researchers dealing with hydrogen. Furthermore, some hydrogen related projects as well as initiatives were also presented, (H2 busses, trains, heavy vehicles) and their activities results and lessons learnt were also useful for us. Since our stakeholder, external expert, from the Hungarian National Hydrogen Technology Platform, took part in the online IRSW event, he was informed about the presentations directly, but PBN also shared the presentations with other H2 experts as well.

- It was interesting for us, how H2 buses have been/are being/shall be implemented in the Province of **South Holland and in Aberdeen**. It was also beneficial to be informed how the tendering of the vehicles and the HRS are scheduled. PSH and ACC also informed the attendees about their involvement in different subsidies, which might be useful as well for the Hungarian partners. We were also informed about the Strategy preparation phases carried out in Aberdeen. The Lazio, South Holland and Aberdeen interregional stakeholder workshops were beneficial for us, and the lessons learnt were also shared with regional experts and policy makers who might be utilising the partners' good practices in our region and facilitate the hydrogen-related measures appeared in the Szombathely2030 Strategy on regional level.

- ***Connected Good Practice: Hydrogen Trucks in Aberdeen City***

  This Good Practice is reflecting how Aberdeen City Council (ACC) has successfully deployed 5 retrofitted trucks within its public sector fleet. It is true that this good practice is dealing with trucks, but it highlights that the deployment of such vehicles contributed to raise demand for hydrogen in Aberdeen. In our Action this would be also the main aim to increase the demand of hydrogen in West-Hungary with the demonstration of hydrogen fuel-cell forklifts. The good practice underlines that it is possible to implement hydrogen technology at pilot stage and then at a larger scale. The practice also shows the importance of trialling technology first before implementing it at a larger scale which might be also beneficial for hydrogen fuel-cell forklift demonstration and later implementation in other companies.

- ***Connected Good Practice: Hydrogen Refuelling Stations in Aberdeen***

  This GP describes the two publicly available hydrogen refuelling stations in Aberdeen. Both stations show different models that can be adopted for a hydrogen station, and it is also highlighted that the main beneficiaries of both stations are the hydrogen bus operators and other hydrogen truck, van and vehicle users. It is true that in our action the demonstrated forklifts shall be fuelled by mobile/rentable filling stations, however in a long-term project of our city, (according to the SZOMBATHELY2030 city level policy document, one of the Hydrogen Refuelling Stations might be installed in the City of Szombathely by 2030) we might learn useful experiences from these Hydrogen Refuelling Stations already deployed in Aberdeen.

3.2. Action

The action is planned to be implemented through several activities listed within this session. The below listed engagement activities are not explicitly planned/defined in the SZOMBATHELY2030 Strategy, however we are convinced that all of these planned sub-actions will be contributing to the implementation of the Strategy either an indirect or a direct way.

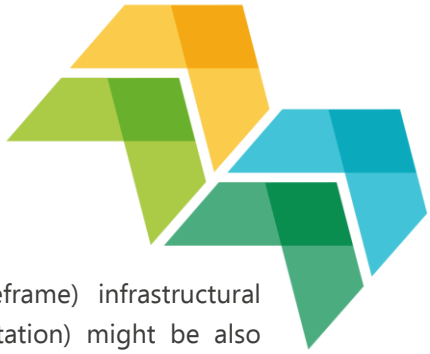
The main action would consist of the following sub-actions in a step-by-step basis:

1. Negotiate with Linde to demonstrate their hydrogen fuel cell forklift together with mobile filling station
2. Contact the relevant regional companies where hydrogen forklifts might be utilised and demonstrated in production/logistics
3. Identification of the regional company where this forklift would be demonstrated and tested in production/logistics
4. Addressing the associated cross-cutting issues, such as training for regional company where the hydrogen fuel cell forklifts shall be demonstrated
5. Demonstration and pilot implementation of the hydrogen forklift in the chosen regional company→ The exact details of the demonstration still need to be further discussed with the involved players, however our main aim is to demonstrate the fuel-cell forklift, as an alternative application in the industrial field, to regional companies (5 companies on a yearly basis) and the objective is, that at least one company will establish direct collaboration with Linde in the field of hydrogen application in their premises based on the experience of the action.

   Within this sub-action the following activities are planned to be carried out

   a) Analysis of conventional forklifts operation
   b) Definition of the work scenario for hydrogen fuel cell forklift (usability, operating hours, etc.)
   c) Define parameters to be analyzed in the pilot (savings, worker acceptance, etc.).
   d) Demostration phase
   e) Analysis of results

6. Implementation of H2 Investment in Szombathely → Based on the increased demand from the industrial players, generated from the pilot implementation demonstration of the hydrogen forklift, in order to achieve the tangible H2 Investment goals- described in the SZOMBATHELY2030 policy document, policy makers will apply new projects in the dedicated calls, (Integrated Transport Development Operational Program Plus, European Green Deal, Horizon Europe) which have been also already indicated in the SZOMBATHELY2030 development plan. As Session 3.4 shall indicate, the concrete realisation of this planned action might be beyond Phase 2, since according to the scheduled timeline of the SZOMBATHELY2030 Strategy, the application to new mobility/hydrogen projects in the above-mentioned dedicated calls is foreseen from 2024.



Therefore, in the following next steps (beyond the Phase 2 timeframe) infrastructural investments (e.g: hydrogen fuel cell vehicles, Hydrogen Refuelling Station) might be also implemented in our region as it is envisaged by 2030 in the SZOMBATHELY2030 Strategy with utilising different national and EU level programs (e.g: Integrated Transport Development Operational Program Plus, European Green Deal, Horizon Europe)

3.2.1 Objectives

- The main objective of the action is to demonstrate the technical and economic feasibility of the implementation of a hydrogen fuel-cell forklift at a regional company
- Industrial players will have the opportunity to widen knowledge in hydrogen technologies.
- Possible utilisation opportunities of hydrogen application (fuel cell forklift) will be demonstrated which might be also relevant for other companies in the region.
- The increase of the hydrogen demand is also expected from industrial players. The foreseen increased demand on hydrogen might be also influencing policy makers to apply hydrogen related projects, contributing to the overarching hydrogen objectives defined in the Strategy.
- The action will have a direct impact on the SZOMBATHELY2030 Strategy as Policy Instrument, since it shall be considered a new project in the framework of the SZOMBATHELY2030 Strategy, and due to this, the proposed action will change the Policy Instrument
- Further regional companies will be utilising hydrogen applications (e.g: fuel-cell forklift in production/logistics) in their premises further increasing the experience, and generating demand towards hydrogen applications
- Furthermore, based on the experiences and lessons learnt to be gained in the fuel-cell forklift demonstration at a regional company, the concrete hydrogen measures foreseen in the SZOMBATHELY2030 strategy might be enhanced with utilising different national and EU level programs (e.g: Integrated Transport Development Operational Program Plus, European Green Deal, Horizon Europe)

3.2.2 Target Group

The target group of our action is really diversified, accordingly:

- The chosen company where the fuel cell forklift shall be demonstrated and piloted in logistics field. They will have the opportunity to widen their knowledge in hydrogen technologies.
- Other companies (SMEs and LEs of the region), since the experience and lessons learnt of the fuel cell forklift demonstration might be transferred to their cases as well.
- Local (Municipality of Szombathely) and regional policy makers (Vas County Authority): the demonstrative action, due to the increased demand, will contribute to develop and implement hydrogen mobility and achievement of the objectives of the SZOMBATHELY2030 Strategy.
- General public, since the lessons learnt and experiences of the forklift demonstration shall be publicly disseminated.

3.2.3 Content

In the first part of the action, negotiation rounds will be held with Linde Gas Magyarország Zrt, who shall be providing the fuel cell forklift as well as the mobile filling station. Based on the conclusions of the negotiations, the regional company will be identified where this forklift will be demonstrated and tested in production/logistics.

In order to prepare for the demonstration and testing associated cross-cutting issues shall be carried out, such as training for regional company where the hydrogen fuel cell forklifts shall be demonstrated.

The main phase of the action shall be the demonstration and testing of the fuel cell forklift in the chosen regional company. The forklift shall be available in the company for a few weeks, and after that the conclusions, experience and lessons learnt will be summarised and shared which might be also relevant for other companies and policy stakeholders in the region.

3.3. Partners and players involved

- Linde Gáz Magyarország Zrt. → Linde's industrial gases are used in countless applications, from life-saving oxygen for hospitals to high-purity & specialty gases for electronics manufacturing, hydrogen for clean fuels and much more. In their Budapest premise, one Hydrogen Refuelling Station, as well as a hydrogen fuel call car (Toyota Mirai) are available. They also possess fuel cell forklifts which shall be demonstrated and tested in a regional company. Their experts might train the company representative in connection with the hydrogen applications focusing on the fuel cell forklift parameters and utilisation.
- Regional companies→ Apart from the specific company- where the fuel cell forklift shall be demonstrated and tested in logistics- other companies will benefit from the action since they will be informed about the conclusions, experience and lessons learnt of the demonstration, which might be also transferred to their case as well.
- National Hydrogen and Fuel Cell Association→ The Hungarian Hydrogen and Fuel Cell Association is an independent, scientific and technical-oriented non-governmental professional organization that aims to help the introduction and expansion of the usage of hydrogen as an environmentally friendly energy source and the diffusion of hydrogen technologies (especially fuel cell technologies) in Hungary.
- Municipality of Szombathely and Vas County Authority→ They, as local and regional public authorities will be involved in the action, and the lessons learnt and experience of the forklift demonstration in a regional company will be shared with them in order to enhance the facilitation of further hydrogen related projects- defined in the SZOMBATHELY2030 Strategy.
- Chamber of Commerce of Vas County→ The goal of the chamber is to create a service-minded, entrepreneur-friendly chamber with their new services, which will be the center of the county's economic life, a place that acts as a forum. They aim to play a leading role in the region in realizing a business economic environment whose members can prosper and compete effectively domestically and in the global market. The main results of the forklift demonstration will be also shared with them.

- Managing Authority for Regional Development Programmes, Deputy State-Secretariat of Economic Development Programmes Ministry for National Economy→ They, as Managing Authority from Hungary will be also informed about the lessons learnt and experience of the forklift demonstration which might also enhance the hydrogen related projects in strategies and policy instruments on national level.

3.4. Timeframe

Main Action	Sub-Action	Planned timeframe
Action 1: Hydrogen forklift demonstration in a regional company	**1.1** Negotiate with Linde Gas Magyarország Zrt. to demonstrate their hydrogen fuel cell forklift together with mobile filling station in a regional company	2022 August-September
	1.2 Contact the relevant regional companies where hydrogen forklifts might be utilised and demonstrated in production/logistics **1.3.** Identification of the regional company where this forklift would be demonstrated and tested in production/logistics	2022 September-October
	1.4 Addressing the associated cross-cutting issues, such as training, for regional company where the hydrogen fuel cell forklifts shall be demonstrated	2022 November-December

	1.5. Demonstration and pilot implementation of the hydrogen forklift in the chosen regional company	2023 January-February
	1.6 Based on the increased demand from the industrial players, and the results of the forklift demonstration, policy makers will apply new projects in the dedicated calls in order to achieve the tangible H2 Investment goals- described in the SZOMBATHELY2030 policy document, (Integrated Transport Development Operational Program Plus, European Green Deal, Horizon Europe	From May 2023 N.B.: Preparatory phases for application of new projects are feasible in Phase 2, but the concrete application might be implemented/submitted beyond the timeframe of Phase 2

3.5. Costs and funding sources

Action	**Estimated cost**	**Funding source**
1.1-1.5:	50.000 EUR	Combination of municipality and private funds
1.6:	Approx. 5.5 Million EUR	IKOP Plusz (ERDF+ Cohesion Fund)→English full name: *Integrated Transport Development Operational Program Plus* ○ 1st priority axis: "Strengthening clean

		urban-suburban transport" ○ 3rd priority axis: "More sustainable and safer road mobility" ○ 3.2 priority axis: "Developing sustainable, smart and intermodal national, regional and local mobility that is resilient to the effects of climate change *European Green Deal* ○ Priority: Accelerating the shift to sustainable and smart mobility *Horizon Europe:* Pillar II, 5th Priority: Climate, Energy and Mobility; Encouragement of carbon-neutral solutions

3.6. Expected impact

The defined action, and its proposed sub-activities, will be unequivocally contributing to the hydrogen measures of the SZOMBATHELY 2030 Strategy. The Policy Instrument will be improved by financing the proposed action as a new project within the framework of the strategy.

The main impacts expected in the region thanks to this action are based on the acquisition of knowledge in the demonstration/operation of a hydrogen fuel cell forklift in an industrial field, this learning experience will have an impact of the followings:

- The regional company- where the fuel-cell forklift shall be demonstrated- will evaluate fuel cell forklift, both technical and economic aspects and they will widen their knowledge in hydrogen technologies.

- The experience and lessons learnt of the fuel cell forklift demonstration might be transferred to other companies as well.
- The increase of the hydrogen demand is also expected from industrial players. The foreseen increased demand on hydrogen might be also influencing policy makers to apply hydrogen related projects, contributing to the overarching hydrogen objectives (Hydrogen Refuelling Station and fuel cell bus installation by 2030 in our city) defined in the SZOMBATHELY2030 Strategy.
- Local and regional public authorities will be involved in the action, and the lessons learnt and experience of the forklift demonstration in a regional company will be shared with them. They might use the results of this action as a basis for the replicability of the demonstration project in other fields, as well as they might enhance the facilitation of further hydrogen related projects- defined in the SZOMBATHELY2030 Strategy-and the enhancement of hydrogen technologies in the region. According to the scheduled timeline of the SZOMBATHELY2030 Strategy, the application to new mobility/hydrogen projects in the dedicated calls is foreseen from 2024, but this action and its results are expected to contribute to the preliminary works of application in Phase 2.
- The lessons learnt and experiences of the fuel cell forklift demonstration shall be publicly disseminated, so the general public will also gain information about the application of the hydrogen technology in an industrial field.