# DELIVERABLE 2.1.1
# STAKEHOLDER VALUE ANALYSIS

**Authors:**
Teplov, R., Pynnönen, M., Ghoreishi, M., Immonen, M.
LUT-University (Finland)

www.huge-project.eu | info@huge-project.eu

Northern Periphery and Arctic Programme 2014-2020

EUROPEAN UNION
Investing in your future
European Regional Development Fund

**Abstract:**
The deliverable presents the results of activity AT 2.1 Stakeholder analysis. The deliverable outlines the data collection methodology and describes the procedure of stakeholder identification and classification. To illustrate the proposed approach in detail, we provide and exemplary case study from Finnish region. The report also presents the results for other project case studies.

# Table of content

# 1. Introduction

The following deliverable (DT 2.1.1- Stakeholder value analysis) presents the results of the first activity (AT 2.1-Stakeholder analysis) of the work package T2 (WP T2)- Creating Hydrogen Utilization Business Models. The activity's objective is to identify and analyse customer and business value factors for technology adaptation in different stakeholder groups. Specifically, in the following report we identify different actors ranging from customers to solution providers. Following the terminology adopted in the project we differentiate between (business) stakeholders and end-users, where stakeholders represent the supply side and end-users are customers (not necessarily private). The report will provide the approach for value based (potential) customer segmentation and serve as an input for Ecosystem map (DT 2.2.1).

We start with outlining the data collection methodology. It is very important from to engage with the relevant stakeholders from the very early stages of the project. Therefore, we suggest several data collections approaches. Depending on the stage of the project, availability of stakeholders and other practicalities one can apply all or only some of the suggested methods. After collecting the data it needs to be processed and analysed in order to identify relevant business actors and the relationships between them. Finally, the results are summarized in the table which serves as an input for following stages of ecosystem analysis (see DT 2.2.1 and DT 2.3.1 for further details).

After describing the generic framework for business actors categorization, we demonstrate the application of the developed approach to the one of project case studies (Finnish case study). We also provide the final results of the approach application to other case studies. It should be noted that this deliverable is primarily focused on the description of stakeholder value analysis approach and related data collection procedures and therefore does not contain detailed description of the case studies which can be found in respective deliverable (DT 2.5.1 Case study scenarios).

# 2. Data collection methodology

The data required for business actors identification and analysis was collected during the project activities by several means:

- data gathering workshops
- case study ideas
- interviews

Next, we will explain each of the applied method and describe their objectives.

## 2.1 Data gathering workshops

The workshops (contributed to WP T1, T2 and T3) were organized during first project period, fall 2019. The objective was to gather relevant experts and stakeholders to discuss issues and collect data relevant for task implemented under all three work packages. Therefore, each workshop consisted of three main parts addressed consequently to WP T1, T2 and T3. The detailed description of the

workshop organization and implementation details is provided in WP Communication deliverables (Deliverable DC 5.3)

In respect to WP T2 the primary aim was to identify the most promising business ideas (e.g. product, services) for hydrogen utilization in the region. The specific emphasis was placed also on identification of existing and missing business actors as well as on other enabling factors and barriers. The guidelines for workshop organization provided in Appendix I

### 2.2 Case study ideas

The collection of case study ideas was implemented during the second project reporting period after finishing the initial data-gathering workshop. The template was distributed to case-study partners in order to fill. The objective was to get the general overview of the region environment, existing business ecosystem, and better understand the aim and the idea of implemented solution. Overall, taking into account that the case-studies development is at different stages this activity aims to help partners to develop the case study ideas by providing the generic framework addressing the issues important from business perspective. The template developed for collection of initial case studies ideas provided in Appendix II.

After the receiving initial ideas the additional clarification questions (unique for each case) were sent to partners. The ideas refining is an iterative process and continues during next project periods (depending on the level of case study development). The final results will be therefore presented in the DT 2.5.1-Case study scenarios).

### 2.3 Interviews

The objective of interviews is to verify and clarify if needed the initial framework developed on the basis of previously collected data. The process is therefore still ongoing and depends on the order of processing the case studies. Depending on the case study development stage and presence of business actors in regions the interviews are organized either with case study project partners or/and with the actual business actors (both stakeholders and end-users according to the project terminology). The generic interview guide provided in Appendix III. Depending on the case study focus and actual interviewee position the guide might be adjusted by adding or removing specific questions.

## 3. Stakeholders categorization

To design the stakeholder categorization framework we adopted the approach proposed in the work of Pynnönen et al (2008). The initial approach was designed for ICT industry applications, therefore in order to apply it for the specific project objectives several adjustments were implemented. The approach is based on Transactional Cost Economy (Williamson, 1985) and Resource-Based View (Barney 1991, Wernerfelt, 1984) theories and outlines the holistic process consisting from three stages: (1) Offering identification and decomposition; (2) Value stream derivation; (3) Resource identification and association (Figure 1).

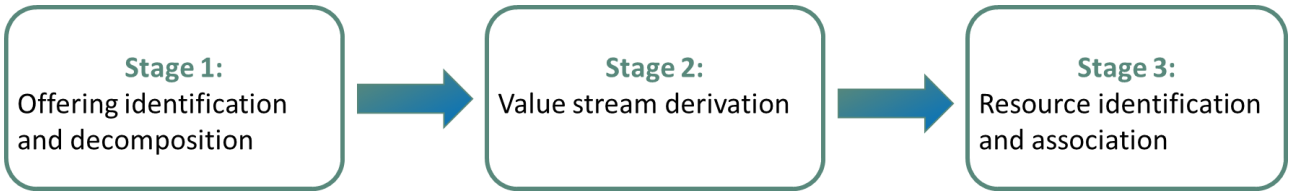


**Figure 1.** The process (adopted from Pynnönen et al., 2008)

### 3.1 Offering identification and decomposition

The objective of this stage is to collect the various offering from supply and customer-side value streams. The offering could be a product, service or e.g., information which is provided in return for money or reciprocal service. In some cases when the offering is complex it needs to be decomposed into several partial offering, they can be examined and listed separately.

### 3.2 Value stream derivation

The objective of the stage is to build value streams (i.e. linkages) between actors in the business ecosystem. The values stream consists of offering and reward (both identified and collected in previous stage). One actor can be therefore linked with multiple other actors acting both as supplier and customer (see Figure 2).


**Figure 2.** Example of value stream diagram

After accomplishing the association, the business actors (stakeholders and end-users) categorization table can be created. In our exemplary study we provide the example of such table created for Finnish case study objectives. It is important to note that depending on specific case study development level (and to the region objectives) certain business players might be missing which reveal the implementation barrier from one side but also uncovers a business opportunity from the other. The results of the activity will serve also as an input for the holistic business ecosystem map (DT 2.2.1).

### 3.3 Resource identification and association

The objective of the stage is to build the set of resources required for providing the offerings. The resources can be tangible and intangible and can be classified into several categories (depending on the case focus the categories may vary):

- technological capabilities
- access to the infrastructure
- information
- access to finance

It is important to note that sometime the distinction between resource and offering in value stream might be complicated as resource for one actor might be an offering for another. That requires the initial results verification though interviews with experts (in our case-pilot partners) and if necessary with business actors (see part 2.3) for iterative improvement of the developed map.

## 4. Application example

To illustrate the described methodology in detail, we use the exemplary case study based on the ongoing project. This case is a one of the regional case studies being developed in the project. The full version of the case study is presented in the respective deliverable (DT 2.5.1). together with other project case studies. The brief results application of the methodology on other project case studies is presented in next chapter.

### 4.1 Finnish case study outline

The idea of Finnish case study is a construction of a plant for producing synthetic fuel. The plant will utilise the by-product hydrogen and CO2 from local manufacturing companies which aligns well with priorities outlined in Finnish National Hydrogen Roadmap (Laurikko et al., 2020).

The plant can be placed in a small city located between Lappeenranta and Imatra close to Finnish-Russian border. The region is reach with natural resources such as water and forest. The population is not so dense compared to metropolitan area although there exist several relatively big cities. The electricity grid is well developed. The region is connected to the natural gas transmission network.

The region is traditionally dominated by forest and pulp and paper industries. Due to the decreasing demand, pulp and paper companies are keen to explore new business opportunities/develop new products. Woikoski, the biggest local producer of industrial gases is located in the region (the actual hydrogen producing plant is outside of the region). Also, other chemical companies are active in the region. In cities central heating is widespread while more distant communities use boilers (fuelled with oil or gas).

The case utilises power-to-x technology in order to produce carbon-neutral synthetic fuel which can be used by both various customers, both private and business (the current project priority due to the development stage and expected producing scale are business users-aviation companies, marine shipping operators). The important prerequisite for achievement project objectives is usage of green electricity (from e.g. wind farms). Therefore, while the synthetic fuel being used in conventional engines still produce emissions the project reduces the overall system carbon footprint first by providing the synthetic fuel produced in ecologically friendly way and second by utilising CO2

emissions from local manufacturer which otherwise would be release in the atmosphere. The project, therefore aims to contribute to emission reduction during the transition period before the technological advances enables shift to emission-free types of engines.

## 4.2 Stakeholder value analysis

At the current state, the case ecosystem is relatively compact and in addition to the actual synthetic fuel plant consists only of several key actors: commodities/raw material providers (electricity provider, hydrogen provider, CO2 provider) and customer(s). In addition to these key actors the system opens opportunities for other players providing intermediary services (such as CO2 capture, preparation and transport). Following the project terminology, we call supply side actors-stakeholders and customer side actors-end-users. Next, we will analyse the identified actors from the perspective of their offerings, value streams and required resources.

P2X plant.

The central actor in the case ecosystem. The plant where the synthetic fuel is produced with the use of hydrogen and CO2. The gases should be supplied in the prepared (purified) form. The electricity required for the process should be received from renewable sources in order to meet the aim for reducing carbon-footprint of the overall cycle. The output of the plant is synthetic fuel which can be mixed with conventional fuel or used as such. Own resources consist of tangible-equipment, machinery and intangible-process know-how, R&D capabilities, networks.

Electricity supplier.

Commodities provider. Local company responsible for electricity supply. Receives monetary transactions in return to supplied electricity. From the company perspective the value stream does not significantly differ from other industrial customers value streams (i.e. supplied electricity in return for monetary compensation). However, the company should be able to provide green/renewable electricity in order to fulfil the case requirements. Therefore, the resources consist of generating capacity for renewable energy and electricity grid to supply the required energy.

Hydrogen supplier.

Raw material supplier. Local chemical company responsible for hydrogen supply. The primary product is hydrogen and related services (storage, purification, transport). The company receives monetary compensation. The company requires resources for hydrogen production and handling and transportation (both technological equipment and engineering expertise) as well as access to raw resources and energy.

It is important to note that in this case the utilized hydrogen is by-product from other process and otherwise remains unused, therefore we do not consider resources for hydrogen production within current model (hydrogen will be produced anyway). However, in principle the ecosystem can accommodate dedicated hydrogen production which though, might require additional players and respective modification of supply chain.

CO2 supplier.

Raw material supplier. Local manufacturing company. For them CO2 is a waste/emission from their primary activities, therefore by capturing and supplying carbon dioxide to synthetic fuel plant they reduce their emissions released into the atmosphere which enables them to avoid associated

payments and simultaneously improve public image. The company requires resources (equipment and expertise) in CO2 capturing, handling and transportation.

Intermediary service provider.

Company providing CO2 handling services (including capturing, purification, storage, transportation, etc). Provides the required services for monetary compensation. The company requires the respective resources: technical equipment and expertise.

Energy company (customer).

The company buying the synthetic fuel from the plant and selling it to the actual customers (e.g. ship operators, airports, etc.). All transactions are monetary but in addition to the financial benefits the company can improve public image promoting usage of ecologically friendly synthetic fuel vs conventional fossil fuel. The company requires resources for handling the fuel which are assumed to be present as the company already operates on market.

The summary of stakeholders is presented in the table below. Overall, in the current format each involved business actor is connected through value streams with other and no missing actors have been detected. Noticeable that for majority of actors involvement in the new ecosystem does not require significant changes in the current business model and/or acquiring new resources which is beneficial for case implementation. Furthermore, the identified value streams between actors enables flexible adjustments of the ecosystem and actors replacement which enables case replicability in other regions.

**Table 1.** Summary of value analysis (Finnish case study)

| **Business actor** | **Role in ecosystem** | **Value inflow** | **Value outflow** | **Resources required** |
|---|---|---|---|---|
| Synthetic fuel plant | Central (focus actor) | Electricity<br>Hydrogen<br>CO2<br>Monetary reward | Monetary reward<br>Monetary reward<br>Monetary reward<br>Synthetic fuel | Technological know-how<br>Equipment and infrastructure |
| Electricity supplier | Supplier (commodity/raw material) | Monetary reward | Electricity | Green electricity generation capacity |
| Hydrogen supplier | Supplier (commodity/raw material) | Monetary reward | Hydrogen (by-product) | Technical equipment and infrastructure |
| CO2 supplier | Supplier (commodity/raw material) | Reputation<br>Emission payments savings | CO2 | Technical equipment and infrastructure |
| CO2 capturing and handling | Intermediary service | CO2<br>Monetary reward | Monetary reward<br>CO2 (processed, purified, etc.) | Technical equipment and infrastructure |
| Energy company | Customer | Synthetic fuel | Monetary reward | Technical equipment and infrastructure |

# 5. Case studies results

In the following chapter we outline the results of stakeholder categorization and value analysis for the remaining project regional case studies. Each subchapter contains a brief description of case study objective and the summary table.

## 5.1. Iceland Case study

The objective is to evaluate the potential for large vehicle deployment in Iceland. Most goods in Iceland are transported with trucks, but due to its population it is not a major market for any OEM (cars or trucks). At the beginning of 2020 a total of 13.100 trucks were registered in Iceland, with roughly 7.000 trucks over 12 tons. This transport category alone is responsible for a large percentage of the fuel consumption as they are driven considerable distances even though they are not very many but the sector is responsible for 23% of total transport emissions in 2017.

Table 2 contains summary of stakeholders. Overall, in the current format each involved business actor is connected through value streams with other. The ecosystem interlinks various actors enabling efficient value exchange between players. The ecosystem also shows potential for by-product utilization and consequently entering new players who can benefit from growing hydrogen economy.

**Table 2.** Summary of Iceland case stakeholders

| **Business actor** | **Role in ecosystem** | **Value inflow** | **Value outflow** | **Resources required** |
|---|---|---|---|---|
| Transportation company | Central actor | Hydrogen (as fuel)<br>Equipment and its maintenance<br>Monetary reward | Monetary rewards<br>Transportation service<br>Customer feedback | Finances,<br>Technological expertise<br>Infrastructure |
| Electricity provider | Supplier (commodity/raw material) | Monetary rewards | Electricity | Green electricity generation capacity |
| Hydrogen producer/supplier | Supplier (commodity/raw material) | Electricity<br>Water<br>Monetary rewards | Hydrogen<br>Monetary rewards<br>Storage, transportation services | Finances,<br>Equipment<br>Infrastructure |
| Water supplier | Supplier (commodity/raw material) | Monetary rewards | Water | Technological capability<br>Infrastructure |
| HRS operator | Service provider | Hydrogen<br><br>Monetary rewards | Monetary rewards<br>Refuelling, storage services | Finances,<br>Equipment<br>Infrastructure |
| Truck supplier | Supplier | Monetary rewards<br>Customer feedback | Hydrogen trucks<br>Service and maintenance | Technological expertise<br>Equipment<br>Infrastructure |
| Retail chains, businesses, contractors | Customers | Transportation service | Monetary rewards | Finances<br>Awareness |

## 5.2. Faroe Islands Case study

The overall aim of the study is to investigate whether hydrogen has the potential of being a commercial and technical solution contributing to the green transition in the Faroe Islands. The Faroe Islands consists of 18 islands and cover an area of 1,400 square kilometers with approx. 52,000 inhabitants. Currently several projects are engaged with the transformation of the energy sector in the Faroe Islands to decouple CO2-emissions in 2030. An expansion of the renewable energy production is ongoing as new windmills are currently being erected and more renewable energy will be implemented through the next decade. To cope with grid fluctuations from renewable sources a production of hydrogen can help stabilize the level of energy in the grid.

Table 3 contains summary of stakeholders. Overall, in the current format each involved business actor is connected through value streams with other. The ecosystem interlinks various actors enabling

utilization also by-products thus increasing the overall efficiency and open new business opportunities.

**Table 3.** Summary of Faroe Islands case stakeholders

| **Business actor** | **Role in ecosystem** | **Value inflow** | **Value outflow** | **Resources required** |
|---|---|---|---|---|
| Aquaservice catamaran operator | Central actor | Hydrogen (as fuel)<br>Equipment and its maintenance<br>Monetary rewards | Monetary rewards<br>Customer feedback<br>Aquaservice | Finances, Technological expertise |
| Electricity provider | Supplier (commodity/raw material) | Monetary rewards | Electricity | Electricity generation capacity (e.g. curtailed electricity) |
| Water supplier | Supplier (commodity/raw material) | Monetary rewards | Water | Technological capability<br>Infrastructure |
| Hydrogen producer/supplier | Supplier (commodity/raw material) | Electricity<br>Monetary rewards | Monetary rewards<br>Hydrogen<br>Oxygen (by-product)<br>Storage, transportation services<br>Excess heat | Finances, Equipment<br>Infrastructure |
| HRS operator | Service provider | Hydrogen<br><br>Monetary rewards | Monetary rewards<br>Refuelling, storage services | Finances, Equipment<br>Infrastructure |
| Catamaran producer | Supplier | Monetary rewards<br>Customer feedback | Equipment<br>Service and maintenance | Technological expertise |
| Fishing farm | Customer | Aquaservice<br>Oxygen<br>Heat (warm water) | Monetary rewards<br>Fish | Finances, Equipment<br>Infrastructure |
| District heating provider | Customer | Excess heat | Monetary rewards | Finances, Equipment<br>Infrastructure |
| Retail, markets, exporter, food producers | Customer | Fish | Monetary rewards | Finances |

## 5.3. Aran Islands (Ireland) Case study

The objective is to explore the potential for H2 application on the existing ferries (cargo & passenger) located in Galway port and the practicalities involved in terms of infrastructure required. Currently there is no H2 infrastructure existing in the area. The local Energy Co-Operative on the Aran Islands are working towards complete decarbonisation and intend to install a wind turbine in the near future and are considering H2 as a potential method of storage. The co-op are also involved in other hydrogen related projects (SEAFUEL) studying the potential for producing and using hydrogen in transport on islands. The islands are mainly served by a passenger ferry to the port of Rosaveal, on the west coast of Galway. During the summer months a new passenger ferry (built 2019) serves the islands from the port of Galway in Galway city. The cargo ferry to the islands also runs from this port, delivering goods, materials, vehicles and livestock among other things to and from the islands. Between Galway port, in Galway City, and Rosaveal port to the west, there is a large wind farm. There is an opportunity to use the curtailed wind power to produce hydrogen for use in port by the ferries, and other machinery in the port such as forklifts, auxiliary power, etc. The port is located in near proximity to the bus and train depots in the city, and so there is an opportunity to expand the H2 application there also.

Table 4 contains summary of stakeholders. Overall, in the current format each involved business actor is connected through value streams with other and no missing actors have been detected. Noticeable that for majority of actors involvement in the new ecosystem does not require significant changes in the current business model and/or acquiring new resources which is beneficial for case implementation. Furthermore, the identified value streams between actors enables flexible adjustments of the ecosystem and actors replacement which enables case replicability in other regions.

**Table 4.** Summary of Aran Islands case stakeholders

| **Business actor** | **Role in ecosystem** | **Value inflow** | **Value outflow** | **Resources required** |
|---|---|---|---|---|
| Ferry/boat operator | Central (focus actor) | Hydrogen (as fuel)<br>Harbour services<br><br>Monetary rewards | Monetary rewards<br>Monetary rewards<br>Transportation services | Finances, Equipment |
| Electricity provider (local wind turbine operator) | Supplier (commodity/raw material) | Monetary rewards | Electricity | Electricity generation capacity (e.g. curtailed electricity) |
| Water supplier (local) | Supplier (commodity/raw material) | Monetary rewards | Water | Technological capability<br>Infrastructure |
| Hydrogen producer/supplier (local) | Supplier (raw material)/service | Electricity<br>Monetary rewards | Monetary rewards<br>Hydrogen Storage, transportation services | Equipment<br>Infrastructure |
| HRS operator (local) | Service provider | Hydrogen<br><br>Monetary rewards | Monetary rewards<br>Refuelling, storage services | Equipment<br>Infrastructure |
| Electricity provider (Galway wind farm operator | Supplier (commodity/raw material) | Monetary rewards | Electricity | Electricity generation capacity (e.g. curtailed electricity) |
| Water supplier (Galway) | Supplier (commodity/raw material) | Monetary rewards | Water | Technological capability<br>Infrastructure |
| Hydrogen producer/supplier (Galway) | Supplier(raw material)/service | Electricity<br>Monetary rewards | Monetary rewards<br>Hydrogen Storage, transportation services | Equipment<br>Infrastructure |
| HRS operator (Galway) | Service provider | Hydrogen<br><br>Monetary rewards | Monetary rewards<br>Refuelling, storage services | Equipment<br>Infrastructure |
| Galway port | Service provider | Monetary rewards | Harbour services | Equipment<br>Infrastructure |
| Local businesses, contractors, travel agencies, individuals | Customers | Transportation services | Monetary rewards | |

## 5.4. Scotland Case study

The objective is in exploring the use of hydrogen for heating buildings with no access to the gas grid. The particular focus is placed on the Hemsdale's Primary School where the existing oil boilers with the alternative fuel systems. The preliminary estimations show that by-fuel (hybrid) system running on LPG and hydrogen is the most appropriate for the current situation as such system enables the best balance between costs and negative environmental impact reduction. The Highland Council region covers 1/3 of Scotland's landmass and includes many remote rural settlements and islands.

The Highland Council owns ~14,000 domestic homes and >1,000 non-domestic buildings across the Highland region. Schools are present all across the region, with the majority using fuel other than mains gas for heating. These buildings are among the higher energy users in The Highland Council's portfolio. There is very limited gas infrastructure, and the vast majority of buildings rely on high cost and/or high carbon fuels for heating. The energy landscape of the Highlands has plenty of opportunity for renewable generation. However, electricity grid infrastructure is aging and limited, resulting in many renewable assets becoming curtailed.

Table 5 contains summary of stakeholders. Overall, in the current format each involved business actor is connected through value streams with other. The ecosystem interlinks various actors enabling efficient value exchange between players. The ecosystem also provides opportunity for new players who can join the developing ecosystem and thus benefit from growing hydrogen economy.

**Table 5.** Summary of Scotland case stakeholders

| **Business actor** | **Role in ecosystem** | **Value inflow** | **Value outflow** | **Resources required** |
|---|---|---|---|---|
| Hemsdale Primary School | Central actor | Hydrogen<br>LPG<br>Boiler equipment<br>Transportation and storage<br>Installation, service and maintenance<br>Expert support | Education services<br>Technology verification testbed/showcase | Finances<br>Expertise in education<br>Premises |
| Hydrogen supplier | Supplier (commodity/raw material) | Monetary rewards | Hydrogen<br>Storage, transportation services | Finances,<br>Equipment<br>Infrastructure |
| LPG supplier | Supplier (commodity/raw material) | Monetary rewards | LPG<br>Storage, transportation services | Finances,<br>Equipment<br>Infrastructure |
| Boiler equipment provider | Supplier | Monetary rewards<br>Customer's feedback | Boiler equipment | Technological capability |
| Transportation company | Service provider | Monetary rewards | Logistics services | Equipment<br>Infrastructure |
| Contractor(s) | Service provider | Monetary rewards | Installation<br>Maintenance | Technological capability |
| The Highland council | Customer | Education services<br>Technology verification | Monetary rewards<br>Expert support | Finances<br>Technical and economic expertise |

## 6. Conclusion

The report provides the deliverable for the first WP T2 HUB activity-Stakeholders analysis. Specifically, in the report we describe the data collection process (the templates for data collection provided in Appendices I, II and III) and present the approach used for the business actors value identification and classification. We also provide the illustrative example based on Finnish case study (part of the project regional case studies) and results for other project case studies. The outcomes of this analysis will serve the next WP activity-Ecosystem analysis (see respective deliverable DT 2.2.1 Ecosystem map) and provides information for understanding the relationships between business ecosystem actors, the rationale for them to participate in the specific project (case), enables identification of missing actors and consequently business opportunities. Combining the holistic understanding of the existing (or projected) ecosystem with the results of techno-economical analysis for specific technical solutions (implemented in WP T1) one can design the efficient business model for hydrogen utilization.

The presented case study demonstrates the application of proposed approach. We identified the existing (required) business actors and derived the value streams between them. We also created the list of resources (tangible and intangible) required to participate in the ecosystem and to deliver and capture the expected value. It should be noted that as the case is currently still under development not all the relevant information is available, therefore the cases are not complete at the current stage. However, the primary aim of the example is to illustrate the application of the approach while the extensive description of the cases will be presented in the latter deliverables (DT 2.5.1). Following the proposed example existing or projected business ecosystems can be analyzed and value maps created which eventually serve as an input for creating (or modifying) the ecosystem and business model for focus actors.

## References

Barney, J. (1991). Special theory forum the resource-based model of the firm: origins, implications, and prospects. *Journal of management*, *17*(1), 97-98.

Laurikko, J., Ihonen, J., Kiviaho, J., Himanen, O., Weiss, R., Saarinen, V., Kärki, J., & Hurskainen, M. (2020). National Hydrogen Roadmap for Finland. *Buisness Finland.* [Online] Available at: https://www.businessfinland.fi/4abb35/globalassets/finnish-customers/02-build-your-network/bioeconomy--cleantech/alykas-energia/bf_national_hydrogen_roadmap_2020.pdf

Pynnonen, M., Hallikas, J., & Savolainen, P. (2008). Mapping business: Value stream-based analysis of business models and resources in information and communications technology service business. *International Journal of Business and Systems Research*, *2*(3), 305-323.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic management journal*, *5*(2), 171-180.

Williamson, O.E. (1985) *The Economic Institutions of Capitalism*. New York, NY: Free Press.

# HUGE PROJECT

Hydrogen Utilization & Green Energy

## Info gathering Workshop: HUB Model

**The overall objective** of info gathering workshop on HUB model is to identify the most promising business ideas (e.g. product, services) for hydrogen utilization in the region.

After the introduction of HUB model the actual workshop starts. The workshop consists of 4 phases described below. Depending on organizer experience and available equipment each phase can be implemented completely offline or with the use of supplementary software so each partner can decide themselves on the most convenient way of workshop organization.
**The most important is the Phase 1.** During this phase the initial ideas should be collected.

| | |
|---|---|
| Phase | Ideation (phase 1) |
| Phase objective | To collect initial ideas (from each participant) about hydrogen business (e.g. products, services, etc.) |
| Phase format | Brainstorm, all participants in one group |
| Phase duration (estimated) | 5-15 min |
| Phase questions/expected output | What are the most interesting (promising) applications for hydrogen in your region (solutions, services, industry application, technologies, etc.)?<br><br>20-50 ideas (not necessary unique) |
| Software (optional) | Mentimeter, Kahoot |
| Process | After initial beefing (about the HUB model and workshop objectives and procedure) the participants are asked to submit their ideas regarding potential utilization of hydrogen in the region and in their business (product, service, etc.). Each participant submit own ideas-no group work or discussion is encouraged (but not strictly prohibited either). Depending on the workshop organization the ideas can be submitted through the software or with post-its (offline). At this phase, the facilitator does not filter any ideas so duplicates are allowed. The phase ends either after the saturation |

| | |
|---|---|
| | (no new ideas coming) or after the reaching the time limit (that can be decided on spot, depending on how active the participants). |

| | |
|---|---|
| Phase | Sense-making (phase 2) |
| Phase objective | To organize and filter ideas collected in phase 1, eliminate repetition |
| Phase format | Facilitated discussion (one group) |
| Phase duration (estimated) | 30 min |
| Phase questions/expected output | Which of the collected ideas belong to the same category/similar<br>Decreased number of ideas (approx10 ideas, depending on initial number and diversity) |
| Software (optional) | Mentimeter, Kahoot (mostly to demonstrate the full list of collected ideas) |
| Process | Facilitated discussion should involve all participants who can read the ideas submitted by other and jointly decide which of them can be merged (i.e. repetitions) and how (and if) the remained unique ideas can be grouped (e.g. product/service, by type of industry, etc.). Depending on the initial ideas amount and diversity there might no clear categories emerge-in this case the primary objective is to identify the unique ideas and remove the repetitions. During the discussion facilitators edit the idea list and make categories if needed. |

If phase 3 is implemented with the software there might be need to organize a short coffee break after phase 2 in order to prepare on-spot questionnaire for voting.

| | |
|---|---|
| Phase | Rating and selecting (phase 3) |
| Phase objective | To rate ideas from phase 2 and select the most promising ones |
| Phase format | Voting (individual), selection (joint discussion) |
| Phase duration (estimated) | approx. 15 minutes (excluding preparation if implemented with the use of software) |

| | |
|---|---|
| Phase questions/expected output | Rate each of the proposed ideas on scale 1-7 (other scales e.g. 1-5, 1-3 also possible) in terms of **value potential, market size, time to market**. Where 1-denotes the worst (i.e. the lowest value, the smallest market size, the longest time to market) and 7 denotes the best (i.e. biggest value, the biggest market size, shortest time to market).<br>All ideas need to be evaluated, abstentions not permitted.<br>Specific questions:<br>Value potential: How big is the value potential for customer?<br>Market size: How big is the market in this solution field?<br>Time to market: How quickly the business can be established?<br><br>Final output: 3-5 the most promising ideas (with the highest overall score) |
| Software (optional) | Mentimeter, Survey monkey, Webropol (any software for online surveys available) |
| Process | In case of online voting the questions could be in form of scale selection matrix (i.e. Likert scale). It would be more convenient if each question has own page (2-3 pages overall). Each participant gets a link to the survey and votes for each of the idea evaluating its value potential, time to market. After that, the average scores for each idea are calculated (separately for each question, i.e. separately for value potential and time to market). The final (overall) score is calculated as a sum of individual question scores (each question has equal weight =1). Finally, 3-5 ideas with the highest overall score are selected in a brief joint discussion.<br>In case of offline voting the procedure is the same with the exception that the actual voting can be performed with different colour post-its. In this case the scale can be simplified (1-3 scale), so that e.g. red colour=1-the worst, yellow=2- average, green=3-the best. |

| | |
|---|---|
| Phase | Ideation on the selected (phase 4) |
| Phase objective | To elaborate on ideas selected in phase 3 (as the most promising) |
| Phase format | Facilitated discussion |
| Phase duration (estimated) | 30-45 min (depending on the time left) |

| | |
|---|---|
| Phase questions/expected output | What are the factors facilitating the implementation (i.e. drivers)?<br>What are the barriers for implementation of the selected ideas?<br>Which capabilities required for implementation of the idea?<br><br>Collection of drivers, barriers and required capabilities for each idea. |
| Software (optional) | Not necessary. E.g. just Powepoint or word for visualisation purposes, so workshop participants can see all the selected ideas and questions. |
| Process | Following the questions workshop participants discuss the selected ideas. Facilitator record the ideas presented and guide the discussion. Important to record if the emerged issues (e.g. some barriers) relate to all of the selected ideas or only to certain specific.<br><br>Depending on the number of workshop participants and time available the discussion can be organized in groups such that each group work on one specific question. I.e. first group discusses drivers, second – barriers and third – capabilities required. Alternatively, (e.g. if the number of participants is too small for 3 groups) the discussion can be organized in one group and questions are processed one by one. |

# HUGE PROJECT

Hydrogen Utilization & Green Energy

## Case study template (WPs TEA&HUB)

Please provide a brief explanation (ideas) of your region case study by the describing the following topics. The description does not need to be extensive, **overall approx. 2 pages**. Please, try to address all topics but if some of them cannot be described at the current stage it is ok to leave them empty.

**Region:**

**1)Region background (briefly general and in respect to hydrogen related activities and infrastructure)**

**2)Focus area/product/solution to be developed (i.e. case study topic, industry if applicable)**

**3)Objectives and aims (problem to be solved, what do we want to achieve with this case: short-term, long-term if applicable)**

**4)Other ongoing initiatives/project which may relate to the current case study (opportunity for collaboration)**

**5)Perceived challenges (for implementing the intended solution)**

**6)Scaling perspectives (e.g. to neighbourhood regions)**

# HUGE PROJECT

Hydrogen Utilization & Green Energy

## Interview guide (WP T2, HUB model, AT2.1, 2.2. Ecosystem and stakeholder analysis: value mapping)

The objective of the interview is to better understand the place and role of the company in the current (and future) ecosystem and to map value streams (financial rewards, savings, services etc.) to and from the company. The interviews are semi-structured (i.e. the questions below are not the exact questions but rather topics which need to be covered during the interview). The topics can be adapted in respect to the respondent position and knowledge.

Interviewer(s):

The interview should start with short presentation of our vision of business model, and ecosystem describing what we understand by value proposition (see slides attached)

1. Interview date, place, format (online/offline)
2. Interviewee profile (name, age, gender, position in the company, responsibilities, background)
3. Company/business unit profile (operation area, size, independent company or branch…)
4. Current field
    a. place in the current ecosystem (partners-upstream/downstream)
    b. Competition level and the main factors defining the competitive advantage
5. Value proposition (see presentation slides)
    a. Company's interest in hydrogen technologies application, relation to circular business models/ecosystems, reason for that (or for the lack of interest)
    b. Current understanding of these topics within the company
    c. Which value is perceived?
6. Future of industry
    a. Perceived challenges which may demand shifts in current operation mode (i.e adopting circular business model)

b. New opportunities?

c. Are there obstacles for adopting new operation modes? What?