Regional SME´s entrance to the hydrogen value chain

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Executive Summary

The hydrogen business is no longer just a vague vision for the future, the hydrogen business is already here and it's developing fast. During 2022 many large hydrogen and Power-to-X (P2X) projects have been launched throughout the country, of which several are planned for the Ostrobothnia region.

The hydrogen projects that are now being planned and initiated will have an important impact on the development of the hydrogen economy in the region. A common viewpoint is that these projects could function as large-scale test labs where local companies have the opportunity to test and develop their technology and services, as well as gain experience and references.

According to the EU commission, the indirect economic effects of the growing hydrogen business are expected to be significantly greater than the economic effects that are directly attributed to the production, distribution and use of hydrogen. The commissions estimation is that approximately 2/3 of the future jobs within hydrogen value chains are expected to arise within e.g. manufacturing of equipment, infrastructure, service, research and education.

The development of large-scale hydrogen/P2X projects in the region represents a totally new business with many new players involved. The structure of the projects is often unclear to most people and companies. Also many local companies have not yet realised the potential of this growing business, and in many cases the companies have not recognised that they already have products and/or services that could play a role in the hydrogen/P2X value chain.

Regional companies that want to access the growing hydrogen value chain must be active and ensure that they are updated on what is happening in the region and actively communicate with potential business partners. They must also ensure that their products and services are up to date with applicable technical and safety standards. However, all business opportunities related to the growing hydrogen economy do not require special hydrogen/P2X competence or

technology. Especially the building phase includes a lot of construction work and installations that do not require formal hydrogen and/or e-fuel competence and approvals.

The most promising business opportunities for our regional companies are likely to be found within the following business segments:

1. Construction of the production site and buildings.
2. Design and production of equipment, prefabricated building elements and metal constructions, cables, pipes, fittings, valves, tanks, etc that will be needed for the construction of the site and the installation of the process machinery.
3. Production (and design) of components and special equipment that will be used in the manufacturing of the main process equipment.
4. Services that support the planning, construction and management of the production site.

Regional companies who are seeking business opportunities in hydrogen and P2X projects need to identify which actors that are responsible for the various stages in the project and whom they should approach in order to participate in the projects. The more specialized products/services the company can offer, the bigger is the potential to reach customers outside our own region and to start exporting both products, and perhaps also know-how, to the growing global hydrogen/e-fuel market.

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1 Background

This report is prepared as part of Work package 2 of the "H2 Ecosystem Roadmap for Ostrobothnia" -project. The project has been co-funded by the European Regional Development Fund (ERDF), the City of Vaasa, Vaasa University of Applied Sciences (VAMK), Novia University of Applied Sciences (Novia), and Hanken School of Economics.

The analysis and conclusions in this report are based on document studies and interviews with representatives of approximately 65 regional, national, and global companies/ organisations. The interviews have been conducted between autumn 2021 and autumn 2022. The report further elaborates on the analysis and conclusions from the report *"Pienten ja keskisuurten yritysten rooli tulevaisuuden globaalin vetytalouden ekosysteemissä"* that was published in January 2022 under the Future Cleantech Solutions program[1].

2 Objective

The objectives of this report are to give regional companies (particularly SMEs) an insight into how large hydrogen and P2X projects are managed. Furthermore, the objectives are to provide ideas on what could be done to enhance our regional companies' possibilities to enter the growing hydrogen value chains. The target group for this report are regional SMEs, Project

[1] **The report is available in Finnish and Swedish from the following websites:**
https://www.vasek.fi/vaasanseudun-kehitys-oy-vasek/viestinta/uutiset/pienten-ja-keskisuurten-yritysten-rooli-tulevaisuuden-globaalin-vetytalouden-ekosysteemissa

https://www.vasek.fi/vasaregionens-utveckling-ab-vasek/kommunikation/nyheter/sma-och-medelstora-foretags-roll-i-den-framtida-globala-vatgasekonomins-ekosystem

owners, EPC/EPCM contractors as well as personnel and decision makers in communities and authorities.

The report focuses on the Ostrobothnia region but much of the results are generic and thus also applicable for the rest of the country.

The report does not make any estimations of potential economical values related to the growing hydrogen and P2X economy but focus only on generic business opportunities and actions needed to access the market.

3 Current projects and trends

The hydrogen business is no longer just a vague vision for the future, the hydrogen business is already here and it's developing fast. One example is the company P2X Solutions who in December 2020 launched their plans to build its first large scale hydrogen and e-fuel factory somewhere in Finland. In August 2021 the decision to place the factory in Harjavalta was presented to the public. Since then, the planning of the project has continued at full speed. The groundwork for the site has already started and the procurement process for construction and equipment is just about to start (October 2022). During 2022 many similar projects have been launched throughout the country, of which several are planned for the Ostrobothnia region. Examples of Ostrobothnian projects are CPC's plant in Kristinestad, Westenergy's plant in Mustasaari, OX2's windfarm, hydrogen and P2X plant outside of Pietarsaari and Raahen Monivoima's plant in Kokkola.

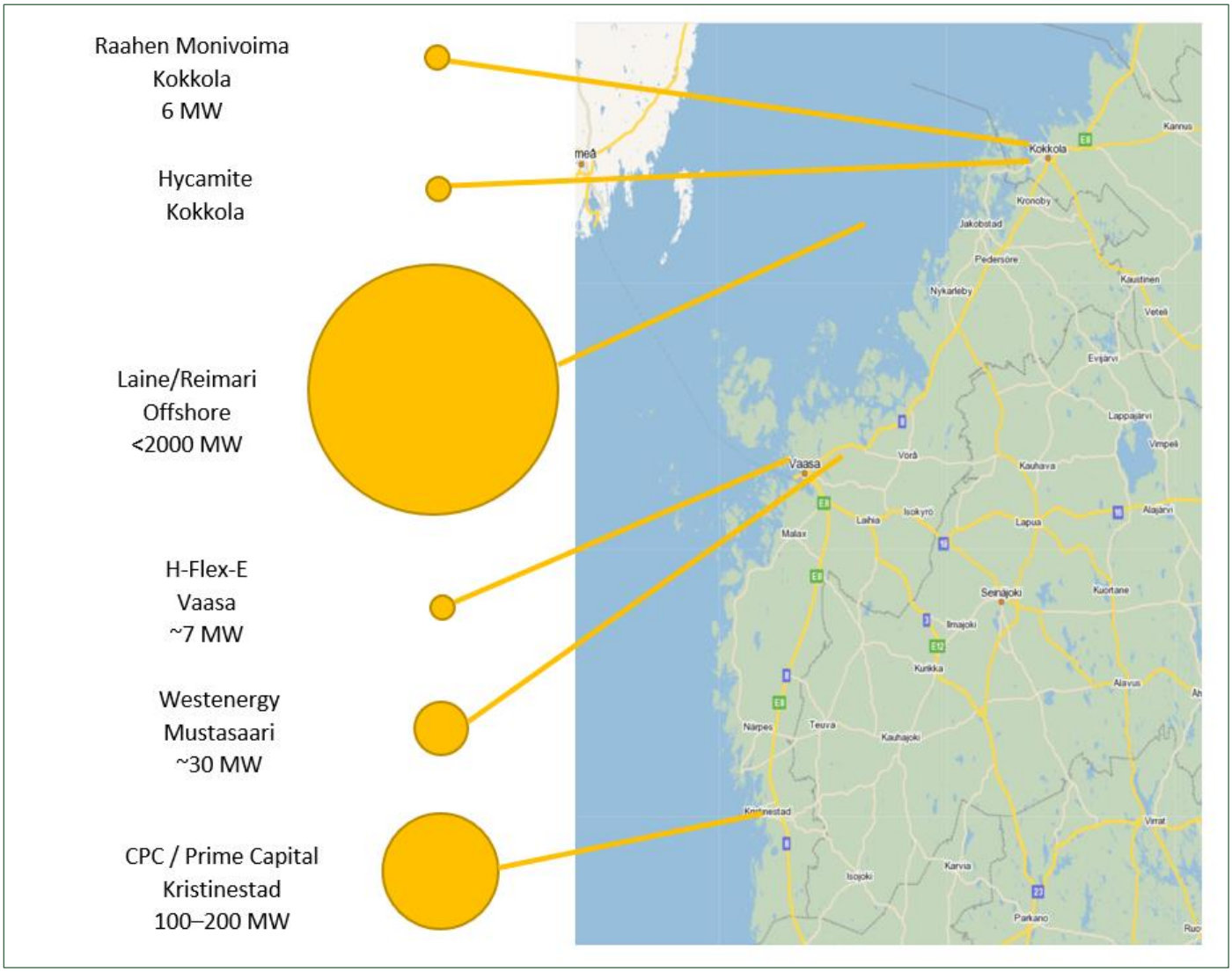

Figure 1. Map of regional hydrogen and P2X projects

In spring 2022, the state-owned company Gasgrid, together with its Swedish partner Nordion Energi, presented its plans to conduct an in-depth investigation of a future hydrogen pipeline around the Gulf of Bothnia. Last but not least, Russia's war against Ukraine has shaken the whole European energy market. As a result, the green transition is no longer just an environmental question but very much also a question of EU's future security.

Based on this development, we can probably expect that hydrogen, and various forms of hydrogen-based fuels, will play a significant role in the future here in Ostrobothnia as well.

The Ostrobothnia region has several strengths that make it very attractive for investors in the hydrogen and P2X business. First, the wind power sector develops fast along the whole coastline, which means that the region soon will be a major producer of green electricity. Secondly, the region has a rather stable electricity grid that is (at least for now) capable to transfer the large volumes of electricity that the new windfarms will produce. Other important benefits are the access to biogenic CO2 as well as the proximity to ports.

Almost all hydrogen related projects that have been recently launched in Ostrobothnia, as well as the whole country, include both hydrogen production and further processing into different e-fuels. There are two main reasons for this development. One reason is that e-fuels are so much easier to store and distribute compared to pure hydrogen. The other reason is that the infrastructure for distributing Methane (and Methanol) is already in place and there is a functioning market for these products in many parts of Europe.

A logical conclusion is that this trend with integrated hydrogen and e-fuel production will continue, and we will see more similar projects established in the region.

One of the conclusions in my previous report (December 2021[2]) was that the indirect economic effects of the growing hydrogen business are expected to be significantly greater than the economic effects that are directly attributed to the production, distribution, and use of hydrogen. According to the EU commissions estimations, approximately 2/3 of the future jobs within hydrogen value chains are expected to arise within e.g. manufacturing of equipment, infrastructure, service, research, and education. This means that companies do not need to be directly involved in hydrogen handling to become part of the growing hydrogen ecosystem. In Ostrobothnia this could mean big possibilities for companies of all sizes. In the long-term perspective hydrogen and P2X related business could potentially grow into a significant industry as regards export of green energy as well as export of technology & know-h

[2] "Pienten ja keskisuurten yritysten rooli tulevaisuuden globaalin vetytalouden ekosysteemissä"

4 What is H2, CCU and P2X

The production of e-fuels is three separate processes that are usually integrated to one process flow. Simply said, the process starts with water and electricity in one end and out comes a green fuel in the other end (E-fuel = electronic fuel).

E-fuels are easier to store and handle than hydrogen and they also have a higher energy content per volume unit than pure hydrogen.

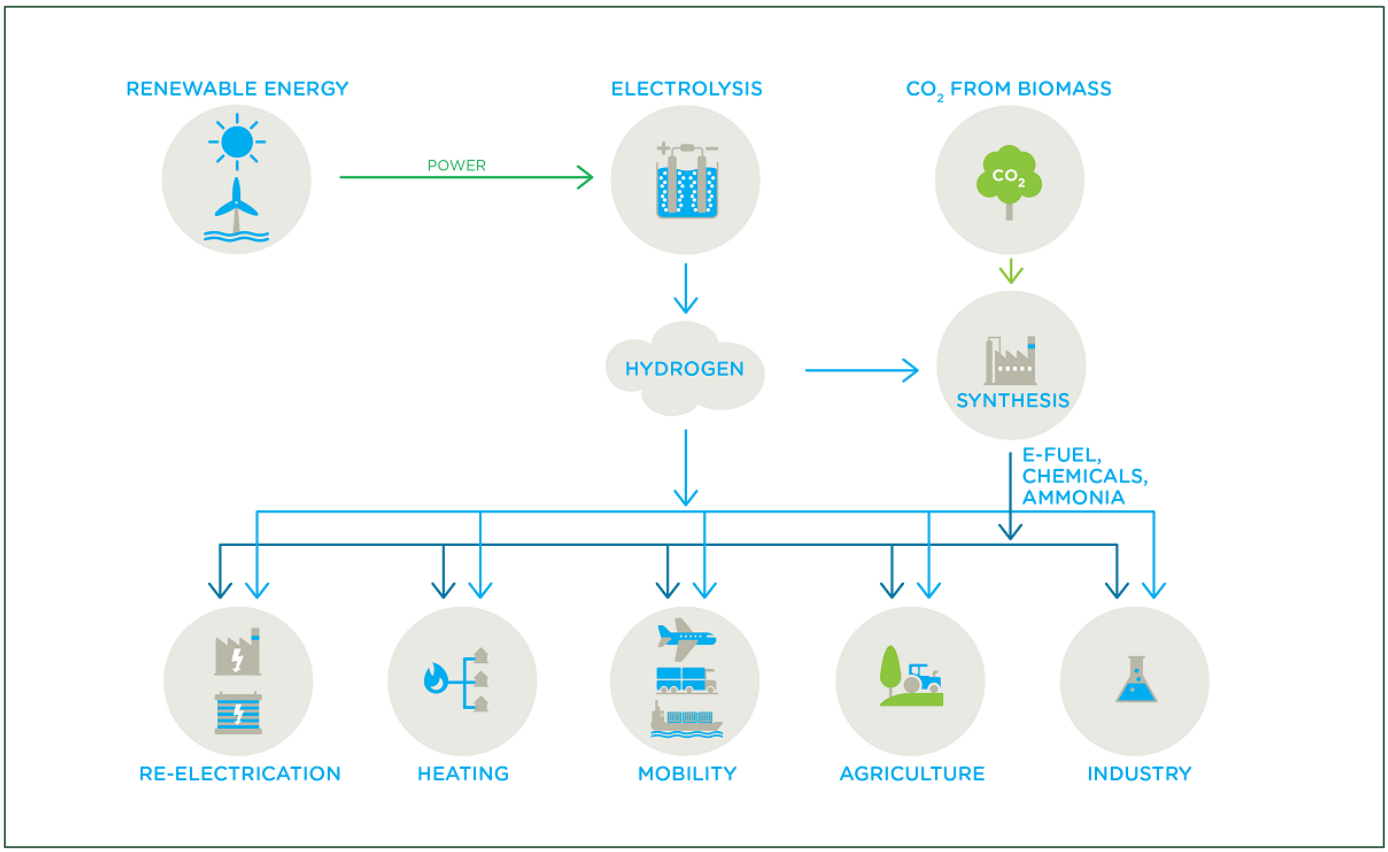

Figure 2. Overview of the P2X process [3]

[3] https://www.energiforumdanmark.dk/app-magasiner/2021/november-tema-vi-far-travlt-i-2027/power-to-x-viser-vejen-til-en-gronnere-fremtid/

Below is a short summary of the different processes. For a more in-depth explanation of the production technologies please refer to a separate report from this project called "Work package 1" which is available on the project website: https://www.h2ecosystem.org/

Electrolysis

The first step in the process is the electrolysis where water is split into its primary elements hydrogen and oxygen. The electrolysis process uses a lot of electricity. Thus, the price of electricity is the main cost driver in the electrolysis process. In order to produce so called green hydrogen the electricity has to originate from renewable sources. The size of hydrogen and P2X projects are usually measured in electrolyser capacity (MW). The electrolysers can use both fresh and seawater.

Carbon Capture

Carbon capture can be done for two purposes;

1. for use in other chemical products (called Carbon Capture and Utilisation – CCU),
2. for permanent storage deep underground (called Carbon Capture and Storage – CCS).

The technology for capturing the carbon is more or less the same in both cases. In the CCU process the carbon is collected from powerplants' and industries' flue gas and then processed with green hydrogen into Methane or Methanol. If the purpose with the CCU process is to produce green e-fuels, then the CO2 needs to be biogenic. This means that the CO2 should be captured from flue gas that originates from powerplants and industries that burn biofuel or waste material. Currently the trend is that the P2X projects will be placed so that the hydrogen production, Carbon capture and Methanation are done at the same site (or close to each other) but this might change in the future when the technology and logistics for capturing and transporting CO2 are developing.

Based on the projects that have been launched so far it seems obvious that biogenic CO2 will be in focus for P2X projects in the region. It is also likely that there will be a growing market for captured biogenic CO2. In other parts of the world captured CO2 is already becoming a trade commodity, so in the future we might have CCU Hubs where captured carbon is collected and traded to P2X processors (or for permanent storage – CCS).

Methanation and Methanol production

The E-fuel (electro fuel) production process is usually integrated with the electrolysis process in order to decrease the need for large scale storage of hydrogen. The production process itself is a chemical process where the green hydrogen is mixed with the captured CO2.

E-methane is in principle the same as natural gas (LNG), though it is CO2 neutral. Methanol is liquid at room temperature and therefore easier to handle than other E-fuels and pure hydrogen. Both E-methane and E-methanol contain carbon which causes CO2 emission when used in combustion engines. But since the carbon is biogenic then the emissions are considered carbon neutral.

So far, all P2X projects that have been launched in our region aim at producing E-methane. The nearest planned E-methanol project is Liquid Wind in Örnsköldsvik, Sweden.

Ammonia production

Green ammonia is produced from hydrogen and nitrogen. The nitrogen is captured directly from the air and mixed with the green hydrogen in a chemical process. The main use for green ammonia is as fuel in the heavy transport sector and as feedstock in the production of fertilisers.

Ammonia does not cause any emissions that impact the climate. But ammonia is a very poisonous gas that can cause severe harm to humans in case of leakages to air. Ammonia leakages to water (e.g. from a tanker) would cause severe harm to all marine life in the affected water.

5 Challenges and opportunities

The hydrogen projects that are now being planned and initiated will have an important impact on the development of the hydrogen economy in the region. Most of the companies interviewed for this report emphasize the importance of local hydrogen and P2X pilot projects. A common viewpoint is that these projects could function as large-scale test labs where local companies have the opportunity to test and develop their technology and services, as well as gain experience and references.

What are the weaknesses and threats that our companies must overcome?

- Many local companies have not yet realized the potential of this growing business, and in many cases the companies have not recognized that they already have products and/or services that could play a role in the Hydrogen/P2X value chain.

- The development of large-scale hydrogen/P2X projects in the region represents a totally new business with many new players involved. The structure of the projects is often unclear to most people and companies. The structure can differ from project to project and people in general are not aware of who does what in the jungle of Investors, Project owners, System integrators, Project planners, Main contractors etc.

- Much of the core process-equipment for the hydrogen and P2X production processes will be sourced from large multinational companies that already have well established supply chains for all the needed components, machines, etc. This means that it can be difficult to enter such markets for local companies without having references and proof of compliance with applicable standards.

- Hydrogen is classified as extremely flammable. Production and storage of hydrogen is therefore governed by strict safety regulations. Buildings and machinery used for the production and handling of hydrogen must meet the ATEX standards. Also, other appliances used in the facilities (e.g. illumination and other electricity installations) must comply with the ATEX standards. Currently, there are not so many companies in the regions that have experience with the ATEX approval process. Lack of experience from such processes can become a challenge for those companies that need to get their products ATEX certified.

- The Project owner together with the EPC/EPCM contractor and the Main contractor has the responsibility to ensure that all applicable technical and safety regulations are followed at all times in hydrogen/P2X projects. The approval process for becoming a qualified product or service supplier for such projects are therefore quite strict. This can be a challenge for SMEs that do not have experience from working with such standards and specifications.

- Neste (together with AGA) in Porvoo is one of the largest producers and consumers of hydrogen in the Nordic countries. But except for Neste/AGA there are not many companies in the country that use hydrogen on a large scale in their production processes. So, the knowledge and experience in handling hydrogen in Finland is limited to a rather small number of companies and their internal expertise. In the Ostrobothnia region there is currently less than a handful of companies that produce and/or use hydrogen.

What are the strengths and opportunities that our regional companies possess?

More local jobs as well as new business opportunities for local companies are often used as one "marketing argument" when new hydrogen and P2X projects are launched. Discussions with representatives of the companies that are running some of the large hydrogen and P2X

projects in the region show that this is something that they really focus on. But they are also very clear that it is up to the regional companies to be active in building business relations and to ensure that their products and services are up to date with applicable technical and safety standards.

The business opportunities within the hydrogen and P2X economy can be looked upon from many different angles. One way to diversify the business opportunities is to define them as:

- Business that requires specific competence or technology that complies with applicable quality, safety and security standards
- Business that is not directly related to hydrogen or P2X technology (e.g. construction).

Another way to diversify the business opportunities is to characterise them as:

- Business that is related to the construction of a particular production site (manufacture of process equipment, construction work, etc.)
- Business that is related to operations, service, and maintenance of the site.
- Business that is related to the distribution and use of the produced fuel.

A conclusion from this is that all business opportunities that relate to the growing hydrogen economy do not require special hydrogen/P2X competence or technology. Especially in the development phase there will be lots of business opportunities for regional companies within various segments of the value chains. Discussions that have been held with various company representatives point out a few segments where the business opportunities for our regional companies seems most promising:

1. Construction of the production site and buildings.
2. Design and production of equipment, machinery, pipes, prefabricated metal constructions, cables, etc that will be needed for the construction of the site and the installation of the process machinery.

3. Production (and design) of components and special equipment that will be used in the manufacturing of the main process equipment.
4. Services that support the planning, construction, and management of the production site.

Construction work

As with all construction projects, all contractors, sub-contractors and their employees must comply with applicable rules and regulations as well as specific criteria defined by the project owner and main contractor. In addition to this, certain parts of the buildings and constructions will be used for processing and/or storing hydrogen and e-fuels which means that sub-contractors and their employees will have to comply with the specific criteria that apply to installations that will be used for processing and storing these substances. On the other hand, companies that have the formal competence to carry out such work will most likely be in a good position when more such projects will be launched. Formal competence that meets the standards for storing/handling hydrogen and e-fuel is also needed for companies that want to carry out service and maintenance on such machinery in the future.

Production of equipment that is used for on-site installations

The second segment covers material, machinery, components, prefabricated constructions, etc that are installed at the site [4].

This segment includes products that sometimes, but not always, must conform with specific hydrogen/e-fuel technical and safety standards. For instance, metal constructions for carrying pipes do not need to conform to specific hydrogen standards while the pipes, fittings, valves, tanks, reactors etc must comply with applicable hydrogen standards and requirements.

[4] The segment does not include equipment and components used in the main process equipment that is usually prefabricated at the supplier's premises and delivered fully assembled to the site.

Production of components used in the main process equipment

The third segment is probably the most demanding as it covers production (and sometimes also product development and design) of components for use in the main process equipment. Such equipment needs to pass through rigorous testing and validation processes before they can be approved by the customer. In most cases, the supplier must also be able to provide references which prove that the company has the necessary experience and expertise to produce the components in question.

This means that the threshold to access such supply chains can be quite high. But on the other hand, this is the segment where companies have the biggest potential to reach customers outside our own region and (if successful) start exporting both products, and perhaps also knowhow, to the growing global hydrogen/e-fuel market.

Systems and services

Companies seldom have the possibilities to have all necessary competencies and resources under one roof. From time to time there is always a need to buy services from external service providers. This can be anything from Design and development of IT systems used for data analysis and system integration, Consultation/engineering services for the planning and construction phase, Juridical consultation, Environmental impact assessments, Training/education etc.

This type of services usually has no geographic limitation and companies within this segment should therefore have great opportunities to grow outside the regional market.

6 How are the large Hydrogen and P2X projects managed?

Hydrogen and P2X is a more or less completely new business in our region. The hydrogen and P2X businesses that are now being planned are often managed by companies/organisations that are previously almost unknown to the local business representatives. These can be large multinational companies that until now have not been operating in this part of the world. Another type of governance is those that are driven by new consortiums of "old" regional or national companies that now get together and develop new joint projects.

Interviews with representatives of companies from various business segments have shown that there is a lot of uncertainty about the planned projects and what regional SMEs can/should do to get "a piece of the cake". This section of the report is an attempt to briefly explain how these large projects are planned and managed.

6.1 Project planning and sourcing

Hydrogen projects are typically implemented using EPCM (Engineering, Procurement, Construction Management) or EPC (Engineering, Procurement, Construction) models, where the responsibilities and roles between different actors vary. Figure 3 gives a brief overview of the main steps that large projects usually contain.

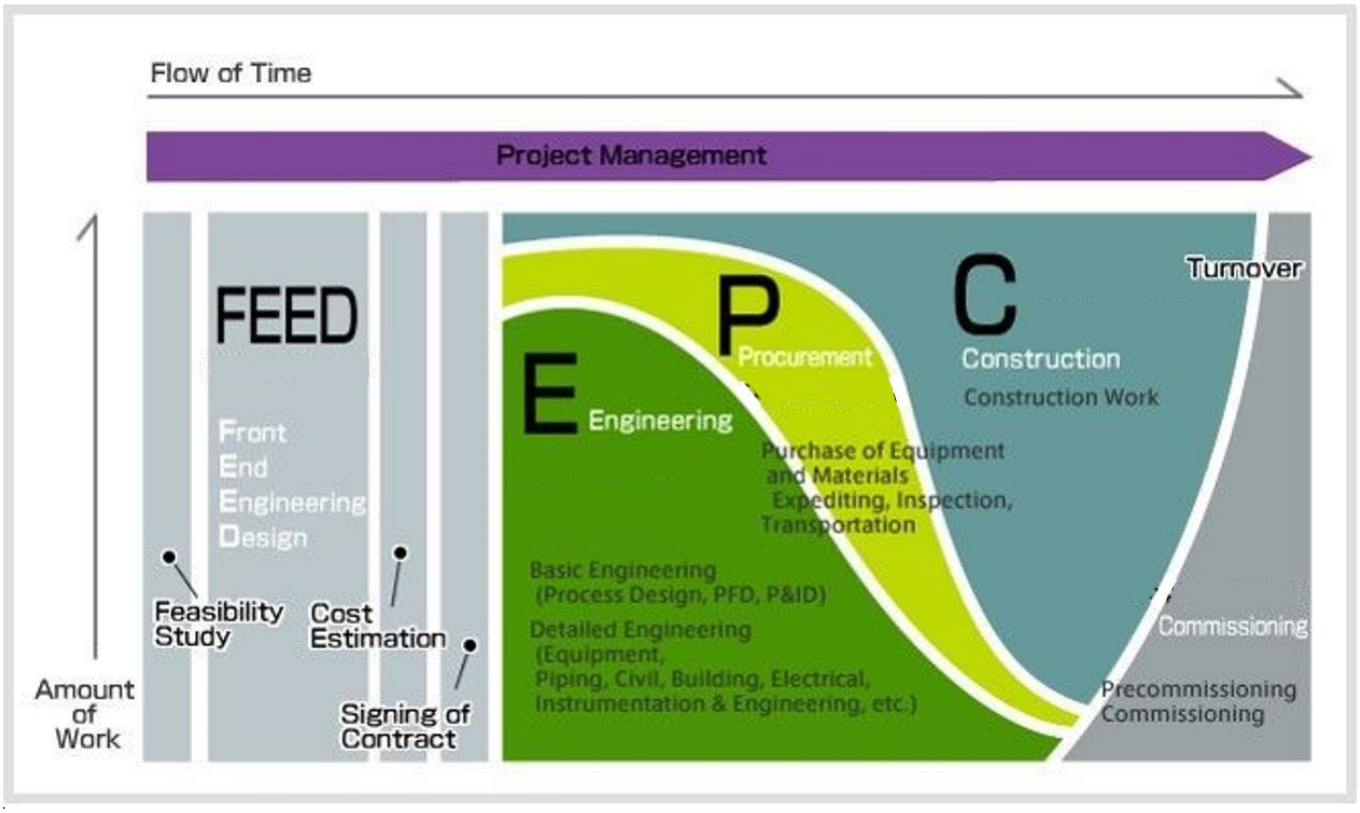

Figure 3. Overview of the EPC project model [5]

As can be seen in Figure 3, the procurement of machinery, material as well as contractors, and sub-contractors is spread over a long period of time. The selection of main process equipment is often done in an early stage of the project while the procurement of secondary equipment, contractor and sub-contractors services starts later in the process. These latter procurements are handled by different actors in the process chain.

[5] https://arvengtraining.com/en/main-contracts-used-in-industrial-projects/

6.2 Who is doing what?

Regional companies who are seeking business opportunities in hydrogen and P2X projects need to identify which actors that are responsible for the various stages of the project and whom they should approach in order to participate in the projects. Figure 4 is an attempt to describe the various roles that are involved in large scale hydrogen and P2X projects.

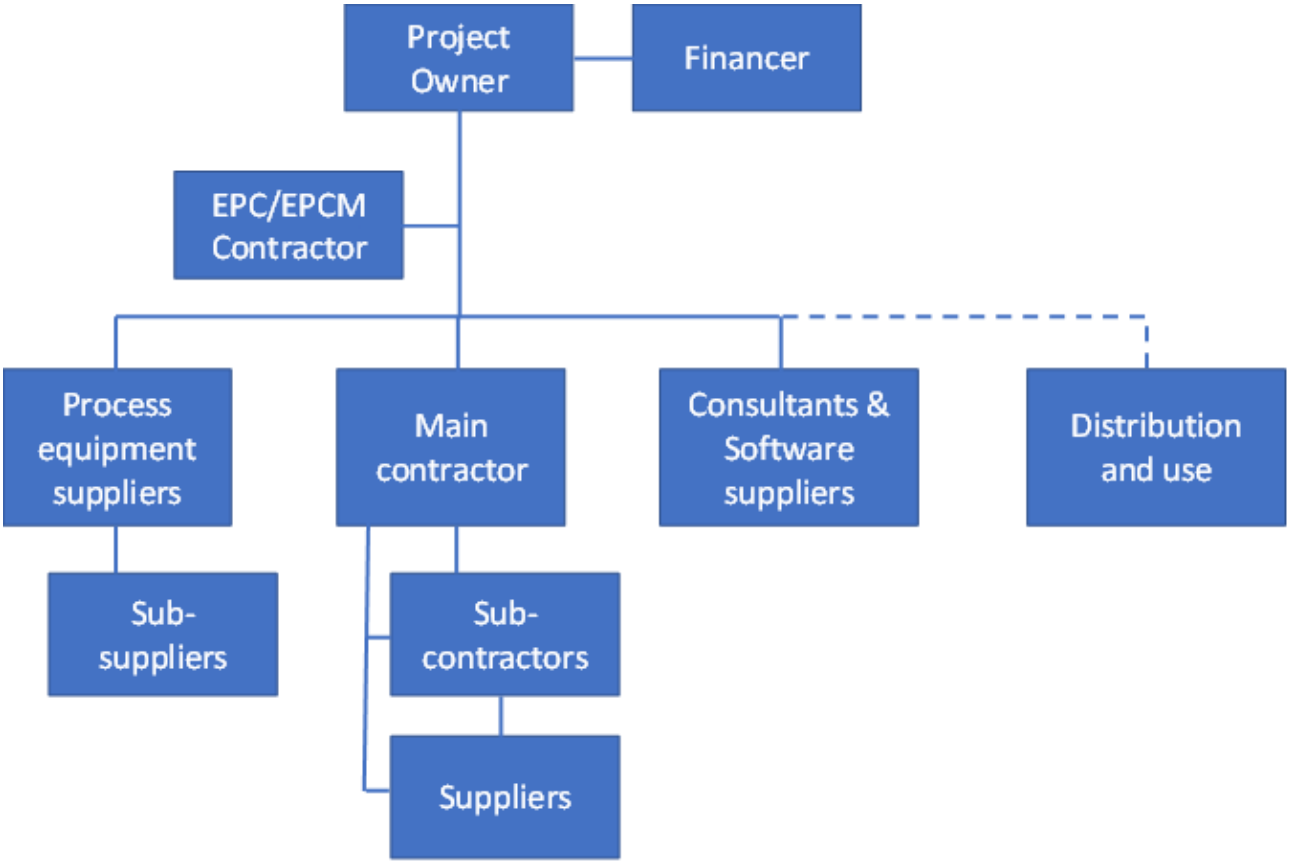

Figure 4. EPC/EPCM process map with roles and functions

It's not easy to put companies into a specific group because many companies have a large portfolio of products and services that they offer. Companies can often have different roles in different projects depending on the project setup. Thus the description below should not be seen as a definite truth but only as a way to describe the main type of actors in the process and examples of companies that provide such services/products.

Project owners (System integrators)

The project owners are naturally the ones who have the main responsibility for the overall planning and execution of the project. The project owner chooses the ECP/ECPM contractor and usually also takes the final decision in the selection of process equipment as well as main contractor for the site construction.

The term system integrator is often used within the hydrogen and e-fuel business to describe a company that is bringing together various subsystems from different suppliers into one whole integrated production process.

Examples of project owners and system integrators are: CPC & Prime Capital, P2X Solutions, Ren-Gas, Skarta, Nilsson Energy, Liquid Wind, Air Liquide, and Ørsted. Also wind farm developing companies such as Ethawind, OX2 and Skyborn Renewables Offshore Finland can sometimes take the role as project owners in hydrogen/e-fuel projects.

Financers

In most cases the project owner is also financing the project to some extent. Most projects are however also financed through external financers. These can be energy companies like ST1, Neste, Vaasan Sähkö, EPV, Herrfors etc.

The relatively low price on electricity is also attracting large foreign investors to invest in P2X production in Finland. In the future we will hopefully also see more engagement and investments into P2X projects from the Finnish forestry sector and the chemical industry.

There is a strong urge from the authorities to speed up the green transition within Europe and there are currently quite a lot of subsidies available for these kinds of projects on both EU and country level.

The possibilities for the general public to invest in hydrogen and P2X projects are so far rather limited. It is however likely that similar national investment funds will be established for

hydrogen and P2X projects as those that have been recently established for investments in wind- and solar parks.

Engineering Contractor (EPC/EPCM Contractors)

The EPC/EPCM contractor (engineering contractor) usually takes responsibility for a large part of all the analysis and pre-project planning that needs to be done in the early stage of the project. The EPC/EPCM contractor is also responsible (or closely involved) in the RFI and RFQ processes for the selection of process equipment suppliers and the Main contractor. In large projects, the EPC/EPCM contractor typically handles (either in-house or through sub-contractors); Feasibility studies, Front-End Engineering Design (FEED), Cost calculations, Engineering, Plant design, Process design, Environmental Impact Assessment, Request for information, Request for quotation, Permit applications.

Examples of companies in this segment are: Ramboll, AFRY, Sweco, Elomatic

Process equipment suppliers

The main process equipment are the electrolysers, the carbon capture equipment and the equipment used in the production of Methane, Methanol or Ammonia.

The electrolysers are primarily produced by a few multi-national companies that dominate the market. The same goes also for CCU and Methane, Methanol and Ammonia production technology.

Finland does not yet have many companies with own development and production within these areas. Some exceptions are Q Power in Parainen who is producing own Methanation production units and CarbonReUSe in Savonlinna who produce equipment for carbon capture.

Examples of producers/suppliers of main process equipment are;

- Electrolysers: Siemens, NEL, Sunfire, ThyssenKrup, Elcogen and Convion
- CCU: CarbonReUSe, CO2 Capsol, Woima
- Methanation, Methanol and Ammonia production: Q Power, Haldor Topsoe, MAN Energy Solutions

Process equipment sub-suppliers

The main process equipment producers usually have well-established supply chains, but business is growing rapidly and there will be a need for them to broaden their sourcing.

The technical requirements on products and production processes are however very strict for companies that want to be approved as suppliers of such equipment. Usually the customers also expect that the suppliers have references which prove that their products and systems comply with the strict requirements. On the other hand, once our regional companies manage to establish business relations with such large customers then there are big potentials to grow on the global market are.

Several of our regions' Energy-cluster members are already producing components and system solutions that are used by these large producers of main process equipment.

Main contractors

The main contractor has the overall responsibility for the construction site and ensures that the project is carried out according to agreed time schedules and specifications. The main contractor seldom has all the required resources and expertise in-house but hires external sub-contractors who do a lot of the actual work with construction and installations.

The main contractor is, together with the sub-contractors, also responsible for the procurement of equipment that is used in the construction and installation processes (except for main process equipment).

Examples of large construction companies in the region that have the potential to act as main contractors are; YIT, Skanska, NCC, Lujatalo, PEAB and SRV.

Sub-contractors

Large construction projects usually involve tens of different sub-suppliers that carry out their part of the work on-site. The sub-contractors that are involved in the construction phase are usually selected by the Main contractor, though the System integrator might also be involved in this, at least for the more critical processes. As mentioned earlier in this report, all construction work and installations do not require formal hydrogen and/or e-fuel competence and approvals.

Interviews with representatives from System integrators and EPC/EPCM contractors show that there is a clear expectancy that local sub-contractors have good knowledge of applicable legislation and other guidelines.

Examples of sub-contractor assignments where our regional SMEs are likely to be in a good position are; Foundation and earthworks (Earth construction companies), Pipe & tank installations, Electricity installations, Heating, ventilation, and air conditioning installations (HVAC work), Safety and security installations, Service and maintenance.

Suppliers/producers of building and installation equipment

As mentioned earlier in this report, large construction projects need a lot of equipment for the construction and installations. Much of this is often sourced locally in order to save transport costs and add flexibility. Examples of such products and equipment can be: prefabricated building elements and metal constructions, drainage systems, cables, pipes, fittings, valves, tanks, reactors etc.

Also within this segment there can be possibilities for the regional companies to access a broader market with the opportunity to scale up production for international customers.

Examples of regional companies with potential to grow within this segment are; Jukolux, EFC Finland, Japrotek, NCE, West Welding, Uwira, Maprotec, Escarmat, Comsel, Ampner, Easy Test System Solutions, Arcteq.

Consultants, Software developers

The large-scale hydrogen and P2X projects that will be planned for the region will require lots of analyses and investigations on the profitability of the projects, the technical conditions, environmental consequences, and more. This requires knowledge of e.g. land planning processes, licensing, security permits and financing. This segment possesses a big business potential for consultants and experts with local knowledge, provided that they possess the skills and expertise required. The segment also includes the need for juridical expertise that can support companies of all sizes in the above-mentioned licensing and permitting processes.

Another interesting segment is the need for advanced IT solutions. The control systems for the main processes are a critical part of the product package and therefore usually developed in-house by the producers. But there are a lot of other IT solutions that are needed for these kinds of large projects. Energy systems today are becoming more and more integrated and in order to run optimally, lots of data need to be collected and analysed. Examples of segments where our regional companies have a strong position are e.g. electrical systems and automation, large scale optimization and grid flexibility (AI, digitalisation), and safety solutions. This can often be a combination of products and services.

Examples of regional companies with a potential to grow within this segment are: Rejlers, Fimpec, Granlund, Rescue Team Finland, Firea-Group, Wapice, Huld, and Gambit.

Distribution and use

The vast growth in the production of hydrogen and e-fuels that is planned for the region also means that a lot of new green fuels will be available on the local market. This offers lots of business opportunities to both new and established companies within the fuel distribution sector.

The ready fuels will to some extent need to be transported via road, either to the fuelling stations or to the ports for further transport to the European/global market. Most likely some of the captured CO2 will have to be transported from the capturing site to the production site.

For the regional ports, the planned investments in hydrogen and P2X production offers good opportunities, both in terms of incoming goods for the construction of the sites but even more for the export of the produced e-fuels. The possibility for ships to refuel with carbon neutral fuels is also likely to be an advantage for the ports in our region.

Last but not least, the increasing numbers of wind farms together with a growing hydrogen and P2X business in the region have the potential to convert the region's entire transport sector from fossil fuels to new locally produced electricity and e-fuels.

Examples of regional companies with a potential to grow within this segment are: Stormossen, Jeppo Biogas, regional transport companies, forwarding agents and the ports of Kokkola, Pietarsaari, Vaasa, Kaskinen and Kristinestad.

Competence development and training

Companies as well as individual experts and workers must ensure that they comply with applicable formal competence requirements if they intend to be part of the hydrogen and P2X value chain in the future. Competence development within hydrogen and P2X safety and regulations will be needed also among regional politicians and decisionmakers.

Regional education institutions on all levels will have an important role to play in meeting these growing training needs. Most likely will there also be room for consultants and individual experts to offer their training services directly to companies & authorities (or as sub-contractors to the education institutions).

7 How to enhance local businesses

As shown earlier in the report, the business opportunities connected to the growing hydrogen business are not only connected to the hydrogen production process itself but there are lots of positive indirect effects that regional companies can benefit from.

SME's own responsibility

The responsibility for our SME's possibilities to get access to the growing hydrogen value chain lies first of all with the companies themselves. They must be active and ensure that they are updated on what is happening in the region and actively communicate with potential business partners. SME's that want to enter this market must also ensure that their products and services are up to date with applicable technical and safety standards.

The system integrators and EPC/EPCM Engineering contractors get a lot of inquiries from all kinds of companies that want to get a piece of the cake when new large projects are established. Regional companies that want to access this market have to be able to stand out from the crowd with clear competitive advantages.

Local sourcing reassures support from local stakeholders

Local stakeholders such as communities, investors etc could insist on a certain level of local procurement when large scale projects are planned. This should be done already in the planning and approval phase. Similarly, Investors and Project owners can gain support from local stakeholders (including authorities and other decisionmakers) by committing to source a certain amount of products and services from local companies. Local authorities could also

persuade foreign Investors/Project owners to commit to sell a certain amount of the produced hydrogen and/or e-fuel on the local market.

Build partnerships

Local business networks, Entrepreneur associations and Regional development companies can play an important role in supporting regional SMEs to get access to the growing hydrogen value chain. A key point is to make the regional SMEs aware of the business potentials that lies within the hydrogen and P2X business. At the same time it is also important to make the Project owners and EPC/EPCM contractors aware of what products and services that are available from the regional market. These organisations can contribute a lot by identifying the potential business partners on both sides and then enhance a two-way communication between the potential sellers and buyers. They also have an important role in collecting, evaluating, and disseminating research results, and to enhance the cooperation between business and science.

8 Final conclusions – Suggestions for next steps

Work Pack 3 from this project[6] provides a list of generic action points that are considered important to promote the development of the hydrogen economy in our region. The suggestions in this report focus more on issues that are considered important for the region's SMEs and their possibilities to benefit from the growing hydrogen and P2X business.

1. There is a need for a continuation of the regional hydrogen network that can support the development of hydrogen and P2X business in the region. This Hydrogen network must work for the whole region.

[6] The work pack 3 report is available on the project website: https://www.h2ecosystem.org/

2. The network should keep track of planned and on-going projects in the region and actively communicate relevant information to concerned stakeholders. The network should also establish regular communication with all planned and implemented hydrogen and P2X projects.
3. A supplier/partner database should be established. This means data about regional companies that have the potential to offer products or services for hydrogen or P2X projects. The Network should coordinate and administrate the database but the individual companies themselves should feed the database with relevant information about the company, their products/services and formal qualifications.
4. Matchmaking events between Project owners and selected local SMEs should be arranged.
5. An open information platform should be established. The platform should contain information about e.g.:
    - Ongoing and planned hydrogen and P2X projects incl. timeline, project partners etc.
    - Description of hydrogen and e-fuel production processes.
    - Explanation of different fuels incl. pros and cons
    - Permit processes and applicable regulations
    - ATEX certification process
6. Identify training needs at the regional companies and authorities. Assist education institutions to coordinate trainings and education programs.
7. Carry out mapping of regional sources of biogenic CO2.

H2 ECOSYSTEM ROADMAP

FOR OSTROBOTHNIA

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