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March 2026

Regulatory experimentation for renewable energy in Ostrobothnia

Final report and proposed concept

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1. BACKGROUND AND INTRODUCTION

Background and objectives of the study

The Regional Council of Ostrobothnia is implementing a development project *Regulatory Experimentation and Innovation-Friendly Regulation in the Energy Sector*. The project is part of the European Parliament's *Preparatory Action Innovation for Place-Based Transformation* initiative. Ostrobothnia has been selected as the local focus area for an experiment aimed at reducing the use of fossil fuels. The local experiment focuses on regulatory experimentation and regulatory sandboxes.

To support the project, the Regional Council of Ostrobothnia commissioned a study to co-develop a concept for a regulatory experiment serving Ostrobothnia's regional energy ecosystem. The aims of the study were to a) define pilot areas, key objectives, required regulatory exemptions, b) clarify the roles, responsibilities and tasks of regional stakeholders, and c) secure stakeholder and partner interest and commitment to the experimentation.

Approach and methodology

The study, conducted by Forefront Oy, started in September 2025 and was completed in March 2026. The study was based on a participatory process and broad consultations with regional and national stakeholders and regulatory experts.

In practice, the study consisted of four work packages: 1) Assessment of needs and preconditions, 2) Defining objectives, 3) Assessing legislative solutions, and 4) Designing the operational model.

The work packages included the following methods and data sources:

Document analysis. The documents analysed in the assignment included existing reports, studies and other available documentation regarding a) Ostrobothnia energy sector ecosystem, b) energy sector regulations and bottlenecks (particularly around green hydrogen), c) regulatory experimentation and sandboxes, and d) relevant EU and national level regulations and regulation-related documentation.

Interviews. The assignment included several discussions and interviews with both regional and national stakeholders and experts of energy sector regulation. Altogether, 18 interviews were conducted, involving a total of 23 participants. The interviews included representatives from the following organisations: Danfoss, Etha Consulting, Fingrid, Gasgrid, Hitachi Energy, Liquid Wind, Vaasan sähkö, Westenergy, Wärtsilä, Business Kristiinankaupunki, Merinova, Business Finland, Sitra, Hanken, The Ministry of Economic Affairs and Employment, and Energy Authority. All interviews were conducted in a semi-structured format and carried out remotely via Microsoft Teams.

Workshops. Two workshops were organised during the assignment. The first workshop, organised on in October 2025, brought together regional stakeholders, researchers, and business experts (approximately 20 participants, some attending online) to discuss the overall focus and objectives of the regional regulatory experiment. The second workshop, organised in January 2026, focused on the refined concept and its practical implementation. The workshop was attended by approximately 25 participants, both onsite and via Microsoft Teams.

The study was supported by a **steering group** which included experts from the following organisations: Regional Council of Ostrobothnia, Joint Research Centre (European Commission), Merinova, City of Vaasa, Vaasan Sähkö, University of Helsinki and University of Vaasa. In total of

three steering group meetings were held during the project to discuss and provide guidance for the study.

In addition to the above-mentioned tasks, feedback from relevant stakeholders were collected by circulating draft versions of the concept by email during the course of the project.

Key definitions

Key concepts for the study are *regulatory experimentation* and *regulatory sandboxes*, which can be considered as examples and tools within the broader framework of *innovation-friendly regulation*, alongside instruments such as innovation deals, guidance services, and regulatory helpdesks. These approaches share the goal of making regulation more adaptive and responsive to emerging technologies and business models. Experiments can take different forms – from temporary derogations from existing rules (regulatory sandboxes) to pilot schemes, controlled test environments, and collaborative foresight exercises. Together, they help authorities and innovators explore how regulation interacts with new solutions in practice. Importantly, sandboxes and other regulatory experiments are not merely designed to ease compliance burdens for companies. Their purpose is also to *generate learning* – to identify, analyse and anticipate future regulatory needs rather than simply to fix existing barriers.[1]

Figure 1. Illustration of key concepts.[2]

Regulatory sandboxes are defined by the European Commission as "*schemes that enable the testing of innovations in a controlled real-world environment, under a specific plan developed and monitored by a competent authority. They are usually organised on a case-by-case basis, may involve a temporary loosening of applicable rules and feature safeguards to preserve overarching regulatory objectives, such as safety and consumer protection.*"[3] In recent years, the concept of regulatory sandboxes has evolved from narrow legal derogation mechanisms towards more interactive and learning-oriented frameworks (or "soft sandboxes") that emphasise anticipatory regulation and co-creation between regulators, businesses, and other stakeholders.[4] However, the recent European Commission draft implementing act for AI sandboxes includes already more detailed definition of

[1] European Commission (2023) Commission Staff Working Document: Regulatory learning in the EU — Guidance on regulatory sandboxes, testbeds and living labs in the EU, with a focus section on energy (SWD (2023). https://www.ceer.eu/wp-content/uploads/2024/06/COM-Guidance-on-Dynamic-regulation_swd_2023_277.pdf
[2] Adapted from: Salminen, V. et al (2025) Report for study on innovative practices in legislation around emerging tech. European Commission.
[3] European Commission (2023) Commission Staff Working Document: Regulatory learning in the EU — Guidance on regulatory sandboxes, testbeds and living labs in the EU, with a focus section on energy (SWD (2023).
[4] See for example: Salminen, V. et al (2025) Report for study on innovative practices in legislation around emerging tech. European Commission.

sandboxes. Similar process is ongoing/planned for the Net Zero Act, and the new EU Innovation Act (expected to be published in spring 2026) is set to include further definitions and guidance for regulatory sandboxes. In other words, the definitions for regulatory sandboxes are currently evolving and with the upcoming EU regulations it is likely that the concept and landscape of regulatory sandboxes will be consolidated in the next few years.

2. CONTEXT AND RATIONALE FOR REGULATORY EXPERIMENTATION IN OSTROBOTHNIA

Ostrobothnia energy ecosystem provides a strong foundation for a successful regulatory experiment

Ostrobothnia has an exceptionally strong energy technology ecosystem, and an emerging green hydrogen ecosystem. The region hosts the largest energy technology hub in the Nordic countries, bringing together a dense network of industrial companies and technology developers, SMEs, and research institutions specialising in smart grids, energy storage, automation, future fuel solutions, and renewable system integration The area has a strong foundation in clean energy technologies, supported by major industrial players, research organisations, and regional initiatives and platforms (key actors and initiatives are described in more detail in Appendix 2.).

Currently there are several significant ongoing or planned investments in renewable energy and green industries including green hydrogen in Ostrobothnia region. In recent years, the total (planned and realised) volume for hydrogen investments in Ostrobothnia has been four billion euros and the investments for carbon capture and processing 138 million euros.[5] The region's large renewable energy production, combined with its strong R&D capacity and tradition of cross-sectoral collaboration, provides strong foundations for systemic energy transition initiatives – as highlighted by the recently received EU Hydrogen Valley status.

The focus on renewable energy and green hydrogen is also well aligned with the national policy goals. The Government Resolution on Hydrogen (2023) sets a clear ambition for Finland to become a leader in the European hydrogen economy.[6] The National Climate and Energy Strategy and RDI Roadmap further recognise innovative regulation and regulatory experimentation as essential enablers for unlocking new markets and attracting investment in emerging sectors such as hydrogen, CCU, and Power-to-X.[7] Developing regulatory experiment around renewable energy is also directly aligned with Finland's key RDI policy priorities. The priorities emphasise the risk-taking capacity of RDI activities and increasing Finland's attractiveness as a destination for RDI investments, particularly in the selected thematic focus areas such as climate and disruptive technologies. [8] The recent Monitoring and Evaluation Report on Government R&D Funding further highlights the direct impact of market demand and regulation on innovation. [9]

[5] EK. Data Dashboard by EK: Green investments in Finland. https://ek.fi/en/green-investments-in-finland/
[6] Finnish Government. Government adopts resolution on hydrogen – Finland could produce 10% of EU's green hydrogen in 2030. https://valtioneuvosto.fi/en/-/1410877/government-adopts-resolution-on-hydrogen-finland-could-produce-10-of-eu-s-green-hydrogen-in-2030
[7] Government of Finland (2022). Carbon neutral Finland 2035 – National Climate and Energy Strategy (Publications of the Ministry of Economic Affairs and Employment 2022:55).
[8] National strategic choices for RDI policy and activities. Publications of the Finnish Government 2026:14.
[9] Tutkimus- ja kehittämistoiminnalla Suomeen uutta tietoa, osaamista, innovaatioita ja tuottavuutta : Valtion T&K-rahoituksen seuranta- ja arviointiraportti 2026. Valtioneuvoston julkaisuja 2026:12.

Regulatory bottlenecks are hampering the competitievenss of the ecosystem

Both EU and national level regulations are currently hampering the development of the energy ecosystem in Ostrobothnia (and other regions). Particularly for green hydrogen, an important bottleneck is related to the interpretation of CO2 sources as part of the EU Emission Trading System (ETS) and EU regulation for Renewable Fuels of Non-Biological Origin (RFNBO).[10] In practice, uncertainty over whether CO_2 from waste incineration will qualify under ETS pricing and RFNBO sustainability criteria makes it difficult to make long-term investment decisions. In some other counties (e.g. in Sweden and Denmark) national more flexible interpretations have been adopted and approved by the European Commission.[11]

Another related key bottleneck is the **lack of viable business models and market incentives** (including taxes & electricity pricing). Indeed, according to the stakeholder feedback, green hydrogen technologies are currently more advanced than business models, and investments will not proceed without clear business cases and incentives.

Increasing need for regulatory flexibility and experimentation

Currently there is a strong push and encouragement for regulatory flexibility and experimentation at the EU level, providing a good window of opportunity for planning and implementing experimentation initiatives in regions and member states. Indeed, regulatory experimentation and regulatory sandboxes have become a central element in the European Union's emerging innovation and competitiveness agenda. Recent flagship initiatives such as the *Draghi Report on the Future of European Competitiveness*, the *EU Startup and Scale-up Initiative*, the *European Innovation Act*, and sectoral frameworks including the *AI Act* and the *Net-Zero Industry Act* all highlight experimentation-based regulation to accelerate the uptake of new technologies.

Under the EU Artificial Intelligence Act (Regulation (EU) 2024/1689),[12] Member States must ensure that at least one AI regulatory sandbox is established at national level and operational by 2 August 2026.[13] As mentioned above, the Commission has also been preparing common rules for the establishment and operation of these sandboxes through an implementing act (in process at the time of writing). In Finland, the Finnish Transport and Communications Agency Traficom is currently preparing a national regulatory sandbox for artificial intelligence in response to the EU's Artificial Intelligence Act.[14] Similar process is ongoing/planned for the Net Zero Act, and it is estimated to taking place in the spring 2026.

The Finnish energy market is tightly regulated, and there have been increasing calls for regulatory experimentation and the introduction of so-called regulatory sandboxes in the energy sector in Finland. Recently the issue has also been raised at parliamentary level in the Economic Affairs Committee.[15] The current Electricity Market Act (588/2013) allows the construction of closed electricity networks and flexible tariffs (under specific conditions, most notably the requirement for equal treatment of all customers), but does not include regulatory experimentation clauses which would be necessary for any broader experimentation. In some countries, e.g. in Germany and Netherlands, legislation has been refined to include experimentation clauses. Yet,

[10] Different scenarios, drivers and regulatory bottlenecks for the hydrogen ecosystem in Ostrobothnia have been described in detail in recent report by the BotH2nia Assocation: Penttilä, K.; Noronen, V. & Kola, S. (2025) Hydrogen economy scenarios. BotH2nia, October 2025.
[11] Nordic Council of Ministers (2024) Waste incineration in the Nordic countries. A status assessment with regard to emissions and recycling. Nordic Council of Ministers.
[12] European Union. EUR-Lex. Artificial Intelligence Act.
[13] European Commission. AI Act Explorer. Article 57: AI regulatory sandboxes.
[14] Traficom. Tekoälyn sääntelyn testiympäristöt.
[15] Edilex. TaVM 11/2025 vp - HE 45/2025 vp. Talousvaliokunta. Hallituksen esitys eduskunnalle laeiksi sähkömarkkinalain ja maakaasumarkkinalain 12 ja 96 §:n muuttamisesta.

inserting such clauses in Finland would require a significant regulatory reform (and political mandate).

Overall, in Finland, the practical use of regulatory sandboxes and experimental legislation has remained limited, although the importance of the topic has been recognised in policy papers and reports. In fact, Finland is one the few EU countries where regulatory sandboxes have not yet been implemented in practice. [16] In other countries there are several examples of regulatory experimentation in the energy sector.[17]

Opportunities (and limitations) for regulatory experimentation

Regulatory experiments (especially sandboxes) are best suited for initiatives and topics, where there is a need to better understand the impacts of regulations on markets and new innovations, and to explore how regulations could be improved to support the development of new innovations or business models. In contrast, they can be unnecessarily complex and less suited for cases, where the regulatory bottlenecks and potential solutions are already known.

The challenges related to ETS and RFNBO regulations are examples of the latter and are also based on strong and complex EU regulations. Therefore, these challenges are not best addressed through (regional) experimentation, but instead through regulatory changes or interpretations on EC/national level. Experimentation should therefore focus on business models and market incentives, modelling pricing and incentive structures across the green hydrogen value chains. Setting up this kind of regional experimentation is currently not yet possible in the Finnish regulatory context.

3. REGULATORY SANDBOX FOR RENEWABLE ENERGY IN OSTROBOTHNIA

Based on the overall context and rationale discussed above, the following presents the concept for regulatory experimentation for renewable energy and green hydrogen in Ostrobothnia.

3.1. Overview of the concept

Recommendation for the concept approach

Based on the context and rationale described above, the recommendation is to build foundations for a ‘green hydrogen experimentation zone’ in Ostrobothnia with the following first steps:

1. **Establish a regulatory policy platform** to provide insights and lessons for national and EU-level energy sector regulatory reforms and experimentation, and a platform for dialogue between energy sector companies and regulators.

[16] Salminen, V. ym. (2020) Innovaatiomyönteinen sääntely: Nykytila ja hyvät käytännöt. Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja 2020:27; JRC (2023) Making energy regulation fit for purpose. State of play of regulatory experimentation in the EU Insights from running regulatory sandboxes. JRC Science Policy Report.
[17] See for example: GreenLab in Denmark (see Appendix 2). More examples e.g.: Gangale, F. et al (2023) Making energy regulation fit for purpose. Insights from running regulatory sandboxes. JRC Science for Policy Report, European Commission. Currently Sweden is also exploring opportunities for energy-sector sandboxes: Energimarknadsinspektionen; Vinnova. (2025). Regulatory sandboxes under the Net-Zero Industry Act: Analysis and implementation considerations. Vinnova Sweden’s Innovation Agency.

2. **Launch a collaborative RDI initiative** ('market acceleration') for developing and modelling business models and supporting the market uptake of innovations, for example related to green hydrogen.

It is recommended that while the concept as such should not be limited to specific energy sector technologies or topics, the initial thematic focus of the concept would be on the green hydrogen, given its strategic importance for the regional energy ecosystem.

Overall goal and purpose of the concept

The overall goal of the concept is to strengthen regional, national and EU-level competitiveness by creating a regulatory environment that enables experimentation, supports regulatory learning, and reduces uncertainty for investments in emerging renewable energy technologies and business models.

By providing a structured framework for regulatory experimentation, the concept would allow companies and regulators to jointly test new solutions, generate evidence on how regulation works in practice, and inform the development of more adaptive and innovation-friendly regulatory approaches. In this way, the initiative would support both the deployment of clean energy solutions and position Ostrobothnia and Finland at the forefront of the clean industrial transition.

Overview of the concept and key functions

In practice, the proposed concept is structured into three modules. The modules are interlinked, and each of the three modules builds foundations for the other modules.

- **Module A: Regulatory policy platform.** Module A would function as a regulatory policy platform that anticipates bottlenecks in renewable energy business models and supports national and EU-level regulatory reforms, while serving also as a knowledge hub for companies through guidance and up-to-date regulatory information. Its purpose is to lay the groundwork for the experimentation zone (Module C) by providing concrete models and roadmaps, facilitating structured dialogue between key actors, and producing recommendations for policy reforms and regulatory experiments.
- **Module B: Market acceleration.** Module B would focus on the co-development of viable renewable energy business models – particularly in green hydrogen – and on modelling renewable energy markets to demonstrate market potential and identify regulatory bottlenecks. It would connect ecosystem actors and RDI projects with regulators via Module A, producing concrete value chain case examples, analytical evidence for regulatory reform, and potentially a virtual model of the regional experimentation zone (Module C).
- **Module C: Regional Experimentation zone.** Module C would establish a regional experimentation zone to explore market incentives – such as taxation models, tariffs, and electricity pricing mechanisms – supporting renewable energy innovation and business models. In the longer term, the concept could evolve into a dedicated testing zone or industrial park enabling large-scale pilots and demonstration projects.

An overview of the concept and the three modules is presented in the following figure (Figure 2). The modules of the concept are described in more detail in the following subchapters.

Figure 2. Regulatory sandbox for renewable energy in Ostrobothnia.

It is recommended that while the concept as such should not be limited to specific energy sector technologies or topics, there should be clear initial focus in each three modules. It is recommended that the initial thematic focus of the concept would be on green hydrogen and its derivatives.

3.2. Module A: Regulatory policy platform

Key objectives and deliverables

The role of the regulatory policy platform would be to provide foresight on regulatory needs and anticipates potential bottlenecks affecting renewable energy business models, supporting both national and European Commission-level regulatory reforms. In addition, it would serve as a central source of knowledge for startups and businesses by providing regulatory guidance and up-to-date information on relevant developments.

The purpose is to support the establishment of an experimentation zone (Module C) by providing concrete and visual examples, models, and frameworks (e.g. operation models roadmaps), and by facilitating structured dialogue between regulators, businesses, and research organisations. The main deliverables would include recommendations and insights for policy reforms and potential regulatory experiments, as well as guidance and updates on planned and ongoing regulatory reforms.

Added value for key stakeholders

The public authorities and regulators would benefit from an evidence-based understanding of how regulatory frameworks influence innovation, investment decisions, and market formation in green hydrogen and related sectors. The platform strengthens regulatory learning and preparedness for forthcoming national and EU-level legislation by facilitating dialogue with regulators, companies and research organisations. EU-level institutions, such as the European Commission and the Joint Research Centre, also benefit from regional evidence and models that can inform innovation-friendly regulatory reform and support broader EU policy objectives.

Companies would benefit from increased regulatory clarity and predictability, helping them better anticipate bottlenecks and align investments with evolving regulatory requirements. Research and higher education institutions gain opportunities to contribute to and study regulatory development

processes, strengthening their role as knowledge partners in national pilot initiatives. Regional development actors benefit from improved coordination and cooperation between policy, business, and research communities, as well as more transparent and predictable regulatory processes at regional level.

Implementation and roles of key actors

It is recommended that the regulatory policy platform is initially organised as an informal project- or network-based collaboration, building on existing actors and networks to avoid creating new structures. After the initial phase, opportunities for a more institutionalised model could be explored.

The Regional Council of Ostrobothnia could take the leading role in organising the next steps. Other key actors to be engaged in Module A include energy sector and clean tech companies (providing insights on regulatory needs and bottlenecks), national authorities and regulators (e.g. the Energy Authority, the Ministry of Economic Affairs and Employment, and the European Commission, contributing information on planned and ongoing reforms), as well as universities and research organisations (supporting policy research and analysis of regulatory barriers).

Funding options

The platform could be initially funded through regional funding, such as European Regional Development Fund (ERDF) or other sources – ideally with co-financing from other national or regional sources.

Once the operating model is established and the hub's activities are stabilised, it could be scaled into a national (or EU-level) network with support from national funding sources (e.g. Business Finland, Sitra) or EU funding (e.g. Horizon Europe). Alongside financial resources, the platform would rely on structured in-kind contributions from experts, including strategic advisory input, mentoring, and active participation in governance structures.

Next steps

As the concrete next steps, it is recommended to launch a regional development project to

1) establish a network of experts and stakeholders, and to schedule first stakeholders meeting(s) for 2026.
2) initiate a research study for modelling the regulatory experimentation zone in Ostrobothnia (Module C) and preparing concrete policy recommendations for enabling and supporting energy sector regulatory experimentation and sandboxes. The study could in particular examine how a regional experimentation zone could be designed in line with the Net-Zero Industry Act (NZIA) provisions on regulatory sandboxes, including governance arrangements, mechanisms for capturing regulatory learning, and processes for communicating findings to regional, national and EU-level decision makers.

3.3. Module B: Market acceleration

Key objectives and deliverables

The purpose of the Module B is the co-development of viable renewable energy business models and the modelling of renewable energy markets, with particular focus on green hydrogen, to illustrate market potential and identify regulatory bottlenecks. The purpose is also to connect energy ecosystem actors and ongoing RDI projects with regulators through the regulatory policy platform (Module A).

The main deliverables of the module include concrete case examples focusing (at least initially) on selected green hydrogen value chains, as well as evidence and insights that directly feed into the work of the regulatory policy platform. In addition, the module could develop a virtual modelling of a regional experimentation zone (Module C).

Added value for key stakeholders

The primary stakeholders are companies and research organisations within the Ostrobothnia energy ecosystem, especially EnergySampo and existing Veturi initiatives and related co-innovation projects in Ostrobothnia.

For companies the concept enables the co-development and validation of new business models and strengthens collaboration with research institutions and public actors. Research and higher education institutions benefit from access to collaborative RDI projects, and interdisciplinary research opportunities.

Implementation and roles of key actors

The market acceleration is recommended to be initially organised as a collaborative co-creation or co-innovation project structure, building on existing leading companies and/or the EnergySampo innovation ecosystem. In the longer term, the concept could evolve into a more institutionalised national network or model, depending on stakeholder interest and demonstrated impact.

The key actors in the module include energy ecosystem companies and research organisations in Ostrobothnia, with particular emphasis on EnergySampo, Energy Transition Valley, existing leading companies (Veturi),[18] and related co-innovation projects.

Funding options

Initially the funding could be based on RDI project funding from Business Finland (including co-funding from companies and research organisations), potentially as part of an ongoing Business Finland (Veturi) initiatives in the region.

Next steps

As a concrete next step, it is recommended to establish a project consortium and prepare funding applications for a joint RDI project.

3.4. Module C: Experimentation zone for green hydrogen

Key objectives and deliverables

The experimentation zone is envisioned as a regional policy experiment designed to explore market incentives – such as taxation models, tariffs, and electricity pricing mechanisms – for supporting renewable energy innovation and business models. The experimentation could be implemented in the Ostrobothnia region but would require changes to national level legislation. As a longer-term opportunity, inspired by the GreenLab example (see the Appendix 2), the concept could be expanded to include a dedicated testing zone or industrial park for large-scale demonstration and pilot projects.

Added value for key stakeholders

The primary stakeholders of the experimentation zone would be companies working with renewable energy solution in Ostrobothnia, public authorities, and regulators. For companies, the zone would provide an opportunity to experiment new business solutions and models under real operating

[18] Business Finland. Veturiyritysten ja -ekosysteemien rahoitus.

conditions and market mechanisms. For public authorities and regulators, the zone would offer an opportunity to test regulatory approaches and to generate practical evidence for future national-level reforms.

Implementation and roles of key actors

Setting up a regional experimentation zone is not currently possible within the existing regulatory framework, and the establishment would require targeted regulatory reforms for enabling the experimentation, and a strong national-level mandate. Taking into account the upcoming parliamentary elections in the first half of 2027 and the need for national-level regulatory reforms, the earliest realistic timeframe for establishing the experimentation zone is the first half of 2028.

Establishing an industrial park similar to the GreenLab example could be based on existing regulation related to closed distribution networks (§11 in the Electricity Market Act, 588/2013) and would not necessarily need any changes to regulation as such.[19] The Act already allows for the creation of microgrids, changes in electricity tariffs through the DSO, and automatically granted electricity market licenses for minor construction projects. Utilising these opportunities could deliver tangible cost and competitiveness benefits such as cheaper electricity through tailored DSO tariff structures or avoiding congestion hours through a microgrid. However, establishing such zone or microgrid would require substantial infrastructure investments, which are not considered realistic under current conditions.

Therefore, it is recommended that Module C is implemented initially through Modules A and B, which would provide the foundations for future regulatory experimentation and regulatory reforms.

Next steps

As preparatory steps, it is recommended to first implement Modules A and B to build the foundations required for launching the experimentation zone in H1/2028.

[19] The Electricity Market Act reform in 2013 introduced the concept of microgrids / closed distribution networks which requires an official permit process and very clearly defined geographic area, processes, and roles. Since the concept of closed distribution networks is relatively new, there are only a very limited number of such networks in Finland. Kilpilahti bio- and circular economy industrial park in Porvoo is perhaps the most prominent example of such networks.

4. TIMEFRAME AND SUMMARY OF NEXT STEPS

Table 2 presents the preliminary schedule for implementing the proposed concept and its three modules.

Table 1. Preliminary schedule and next steps for implementing the proposed concept.

Moduke	Next steps / Deliverables	Timing	Responsibility
A: Regulatory policy platform	• Organising a network of experts and stakeholders & setting up regular events/meetings for 2026. • Launching a research/study for policy recommendations.	First meeting in Q2/2026. Study results available by the end of 2026.	Regional Council of Ostrobothnia
B: Market acceleration	• Setting up a project consortium and preparing funding application for a collaboration project.	Q2/2026; Project start H2/2026. Q1/2027: Pilot projects	EnergySampo innovation ecosystem
C: Experimentation zone	• Building on lessons from Modules A and B to preparing foundations for the regional experimentation zone.	Target time frame for experimentation zone launch: H1/2028.	Regulatory policy platform (Module A)

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APPENDICES

Appendix 1. Ostrobothnia Energy Ecosystem

Companies

Ostrobothnia region hosts the largest energy technology hub in the Nordic countries, including several established larger companies and SMEs. Also, several national energy companies such as Fingrid or Gasgrid, have significant operations and activities in the area. The following (non-exhaustive) list covers examples of key companies identified in the process.

- **ABB.** ABB is a global technology leader in electrification and automation. There are approximately 5,300 ABB employees in Finland, of which approximately 1,500 are in Vaasa. In Vaasa, the main operations relate to motors, low-voltage products and systems, electricity transmission and distribution systems, power generation systems, and overall design of the process industry. https://new.abb.com/fi
- **EPV Energia.** EPV Energy generates and acquires electricity and heat for its shareholders, i.e. Finnish energy companies. EPV Energy focuses on emission-free and reliable energy generation with determination and purpose. The aim of the company is to achieve carbon-neutral electricity generation by 2030. https://www.epv.fi/
- **Danfoss**. Danfoss provides engineer solutions that increase machine productivity, reduce emissions, lower energy consumption, and enable electrification. Danfoss supports the green transitions with high-pressure pumps and energy recovery devices. The company supplies a range of products related to electrolyzer power conversion solutions. https://www.danfoss.com/en/
- **Fingrid.** Fingrid is Finland's transmission system operator. The customers of the company are electricity producers, network operators, major consumers of electricity, and other electricity market operators. Majority owners are the Finnish state and the National Emergency Supply Agency. Other owners include pension and insurance companies and other institutional investors. https://www.fingrid.fi/en/
- **Gasgrid Finland** is a Finnish state-owned natural gas transmission system operator, offering natural gas and biogas transmission services and is responsible for the gas transmission system operations in Finland. https://gasgrid.fi/en/
- **Hitachi Energy.** Hitachi Energy develops, manufactures and maintains transformers and reactors, control, automation and monitoring systems for electricity grid management, as well as transmission and distribution network solutions, such as substation complexes, in Finland. The company is investing in a new Hitachi Energy Park production and technology center in the Vaasa region. https://www.hitachienergy.com/about-us/company-profile/country-and-regional-information/finland
- **Koppö Energia Oy.** The company, established in 2022, aims for production of synthetic methanol (carbon-neutral) in the area located in Kristinestad. The production process will be based on carbon dioxide captured from flue gas streams and hydrogen produced using renewable electricity. The synthetic methane production process produces heat and oxygen as by-products.
- **Vaasan Sähkö**. Vaasan Sähkö, founded in 1892, is one of the first energy companies in Finland. The company is based in Vaasa, but it supplies electricity to everywhere in Finland. https://www.vaasansahko.fi/en/about-vaasan-sahko/
- **Westenergy**. Westenergy advances circular economy and carbon-neutral energy by refining waste into district heat, electricity and recovered materials. The company operates in

Ostrobothnia, covering about 70 municipalities. Westenergy is owned by seven municipal waste management companies. https://westenergy.fi/en/

– **Wärtsilä.** Wärtsilä is a global leader in innovative technologies and lifecycle solutions for the marine and energy markets. The company offering covers future-fuel enabled balancing power plants, hybrid solutions and energy storage & optimisation technology. https://www.wartsila.com

Research organisations and initiatives

Besides companies, there are also several research organisations with significant expertise and ongoing initiatives around energy sector in Ostrobothnia.

– **The University of Vaasa.** Energy transition" is one of the university's three strategic focus areas guiding research, education, and partnerships. As an example, within the interdisciplinary research platform of Energy Lab / VEBIC (Vaasa Energy Business Innovation Centre),[20] the University of Vaasa has integrated laboratories for boosting future fuels (fuel-lab), combustion engines (ICE-lab) and research for reliable integration of electrical and energy systems (FREESI-lab). Future Resilient Energy Systems (FRES) is a research programme that explores the energy transition from a technological point of view. University of Vaasa is also leading the **Energy Transition Valley (**see below)[21].
– **University of Helsinki, Vaasa Unit for Legal Studies** conducts legal research with one of the focus areas in energy sector regulations.
– **VAMK University of Applied Sciences (VAMK)** combines expertise in the fields of technology, business, health care and social services, and design. Energy transition, smart digitalisation and clean transition are among the key areas of expertise. As an example, the ongoing Vaasa Climate Commitment project aims to create an ecosystem for carbon neutrality efforts in Vaasa. The project brings together the city, educational institutions, and businesses to advance carbon neutrality targets.[22]
– **Novia University of Applied Sciences.** Campus Vaasa provides a wide range of studies, such as Business Administration, Health and Welfare, Technology and Seafaring. One of the Novia's research area is Sustainable Technology, in which new methods for production and use of renewable energy are developed. As an example, the Mapping CO2 Streams in Ostrobothnia: Unlocking Potential for P2X Economy (MAP-UP-P2X) project investigates the possibilities for regional use and further processing of both carbon dioxide (CO2), oxygen (O2) and hydrogen (H2) regionally for industry and society's needs to replace peat energy production.[23] VETY-osaaja (Hydrogen Master) project aims to provide the necessary skills and to better equip workers in regional companies to participate in the design and manufacturing of new green technology plants.[24] In addition, Novia participates in EU projects aimed at accelerating the adoption of the CCUS technologies, including research on Ship-Based Carbon Capture (SBCC)[25].
– **Åbo Akademi University.** Åbo Akademi, with campuses in Turku and Vaasa, is offering a range of academic programmes and research activities with relevance to energy systems and technology. Åbo Akademi's research is anchored in the Process and Energy Technology domain, which integrates material and energy flows with economic and legislative

[20] University of Vaasa. VEBIC. https://www.uwasa.fi/en/research/research-platforms/vebic
[21] University of Vaasa. Energy Transition Valley. https://www.uwasa.fi/en/research/energy-transition-valley
[22] Vaasan yliopisto. Vaasa Climate Commitment. https://www.uwasa.fi/en/research/projects/vaasa-climate-commitment
[23] Novia. MAP-UP-P2X: Mapping CO2 Streams in Ostrobothnia: Unlocking Potential for P2X Economy. https://www.novia.fi/en/rdi/our-projects/map-up-p2x-mapping-co2-streams-in-ostrobothnia-unlocking-potential-for-p2x-economy-2
[24] Novia. VETY-osaaja. https://www.novia.fi/en/rdi/our-projects/vety-osaaja-hydrogen-master-vatgas-expert
[25] Novia. Novia UAS joins EU's Mission to Restore Our Oceans and Waters, 18.9.2024. https://www.novia.fi/en/news/research/novia-uas-joins-eus-mission-to-restore-our-oceans-and-waters-#:~:text=Novia%20works%20with%20its%20broad%20expertise%20in,simulations%20to%20prevent%20accidents%20and%20reduce%20the

perspectives in order to improve efficiency and reduce environmental impacts. This includes laboratory-based and systems-oriented research that connects sustainable energy solutions, process optimisation, novel energy storage approaches and system modelling to real-world challenges faced by energy companies.[26]

- **Hanken School of Economics.** Through its presence in Vaasa, Hanken is a base for education and collaboration related to energy transition**,** sustainability and business innovation within the broader energy ecosystem. In addition to its educational activities and participation in regional collaboration networks, Hanken is involved in several concrete research and ecosystem development initiatives that connect business expertise with energy transition challenges.
- **VTT** is a state-owned research institute (under The Ministry of Economic Affairs and Employment) playing a role in technology development and demonstration for carbon capture, hydrogen integration, CO_2 utilisation, e-fuels, and Power-to-X technologies. VTT conducts R&D on synthetic fuel production, CO_2 conversion, and industrial symbioses (e.g., steel, pulp, and chemical sectors) as well as leads or participates in national and EU R&D programmes (e.g., Hydrogen and CCU roadmaps, P2X Finland) that provide scientific data for policy and market development. In addition, VTT supports ministries and the Energy Authority with technical standards, LCA methodologies, and verification systems for RFNBO compliance. While VTT does not have a local office in Ostrobothnia, VTT, University of Vaasa, University of Oulu and Wärtsilä Finland are currently building an energy laboratory for the development of future engines.[27]

Business and research networks and clusters

- **Merinova.** Merinova is a regional development company, whose mission is to make the energy cluster in the Vaasa region even more successful. Merinova provides a diverse service of business development for companies in the energy industry and in addition, technology centre services alongside the company Vaasa Parks, who is Merinova's partner. Merinova has several ongoing projects related to the energy sector in Ostrobothnia.
- **EnergyVaasa**. EnergyVaasa is the largest energy technology hub in the Nordic countries. It is the leading cluster in energy technology in the Nordic region with over 180 companies. A total of 13,000 people is employed by the companies, which have a combined turnover of 6 billion euros. 80 percent of sales come from exports, and this accounts for 30 percent of Finland's total exports in energy technology. EnergyVaasa is also known for its investments in research and development: total spent on R&D is currently 250 million euros and planned investments on energy technology infrastructure are worth 1.9 billion euros in the EnergyVaasa region by the end of year 2030. Key players in the cluster include Wärtsilä, ABB, Danfoss and Hitachi Energy. https://www.vaasa.fi/en/energyvaasa/
- **EnergySampo.** EnergySampo innovation ecosystem exists to co-create carbon-neutral energy solutions for sustainable future. The founding members are ABB, Danfoss, Hitachi Energy, Vaasan Sähkö, VEO, VMT Capital and Wärtsilä. Together the companies invest over 200 million euros in innovation and development annually. The ecosystem collaboration is about making the most of that investment by creating joint research and development projects to come up with innovative solutions for the future, about joint customer-deliveries of comprehensive solutions and joint funding arrangements of relevant projects. The EnergySampo is building on the excising experience on smart clean energy transition,

[26] Åbo Akademi. Process and Energy Technology. https://www.abo.fi/en/process-and-energy-technology
[27] Vaasan yliopisto. Uutinen 28.10.2024. Vaasan yliopisto, Oulun yliopisto, VTT ja Wärtsilä rakentavat energialaboratoriota tulevaisuuden moottoreiden kehitykseen. https://www.uwasa.fi/en/newshub/news/university-vaasa-university-oulu-vtt-and-wartsila-are-building-energy-laboratory

system-level solutions, large-scale piloting and decarbonization and carbon neutrality. https://www.energysampo.com/

- **Energy Transition Valley**. Energy Transition Valley, led by the University of Vaasa in collaboration with actors of the Vaasa energy technology cluster, strengthens the research, development and innovation activities of companies in the region through new research infrastructure and extensive doctoral education. Its aim is to accelerate research-based solutions for clean energy production, optimisation, storage, and their rapid commercial application. The initiative seeks to build a research ecosystem that attracts international talent and investment, creates new jobs, and supports export-driven green growth. The partners in the Energy Transition Valley include the University of Vaasa, ABB, Wärtsilä, Vaasan Sähkö, Hitachi Energy, Danfoss, VEO, VNT Management, the City of Vaasa, VASEK, the Ostrobothnia Chamber of Commerce, and the Regional Council of Ostrobothnia. https://www.uwasa.fi/en/research/energy-transition-valley
- **BothH_2nia Hydrogen Valley**. BothH_2nia, managed by the BotH2nia Association, is a network of operators interested in hydrogen energy. The objective of the network is to create a Nordic hydrogen cluster around the Gulf of Bothnia. BothH_2nia invites all businesses, research institutes, investors, municipalities and cities to roll up their sleeves for a greener future. The valley hosts a dynamic ecosystem of companies, in which project partners include e.g. Hycamite, P2X, and Wärtsilä, alongside smaller tech firms and start-ups, who are collectively investing 350 million euros annually in research and development, driving innovation and scalability. In the valley, seventeen distinct hydrogen value chains have already been identified across seven NUTS3-level regions.

Municipalities and other regional public stakeholders

- **City of Vaasa and 13 other municipalities in Ostrobothnia** (Kaskinen, Korsnäs, Kristiinankaupunki, Kruunupyy, Laihia, Luoto, Maalahti, Mustasaari, Närpiö, Pedersören kunta, Pietarsaari, Uusikaarlepyy, and Vöyri).
- **Business Kristinestad**. Business Kristinestad (Kristinestad Business Center Ltd.) is a subsidiary of the city of Kristinestad offering assistance and support to businesses in the coastal Ostrobothnia region.
- **Jakobstad Region Development Company Concordia**, providing support to entrepreneurs, businesses, and investors looking to grow and thrive in the Jakobstad region.
- **VASEK Vaasa Region Development Company** is a regional business and development company owned by the municipalities in the Vaasa region. VASEK serves the companies in the region by offering business services alongside regional development activities and marketing of the region.
- **Dynamo Närpes** is a regional development company that aims to help entrepreneurs starting a business, develop already established companies, selling, buying or transferring a business, enter new markets etc.
- **Regional Council of Ostrobothnia.** The Council is a statutory joint municipal authority formed by the fourteen municipalities in the region of Ostrobothnia. The aim of the Council is to build up the necessary conditions for a balanced development and economic growth and strengthen the competitiveness of the region. The development efforts are financed both by national and EU resources.

National stakeholders and key national policies

The Ministry of Economic Affairs and Employment in Finland (Työ- ja elinkeinoministeriö, TEM). The ministry has a coordinating role in energy policy and regulation but does not directly

regulate energy markets. The ministry sets the policy framework, prepares legislation, and oversees the agencies responsible for regulation and implementation.

The Energy Authority (Energiavirasto). The Energy Authority is Finland's independent national regulator for the energy sector, operating under the Ministry of Economic Affairs and Employment. Its role is to implement and enforce energy legislation and to supervise the functioning of electricity and gas markets in line with both Finnish law and EU regulations.

The Ministry of the Environment (Ympäristöministeriö, YM). The ministry is responsible for ensuring that Finland's energy policy and regulation are consistent with the country's climate, environmental protection, and sustainability goals. While it does not directly regulate energy markets, it plays a key strategic and coordinating role in integrating environmental and climate considerations into energy legislation, planning, and implementation.

The Ministry of Transport and Communications (Liikenne- ja viestintäministeriö, LVM). The Ministry has a role in Finland's energy transition within the transport and communications sectors, ensuring that national and EU climate and energy objectives are implemented in mobility, logistics, and digital infrastructure. The ministry is responsible for energy-related policies in transport and mobility systems, focusing on reducing emissions, increasing renewable energy use, and improving energy efficiency.

Economic Development Centres (EDCs): From January 2026 onwards, the Centres will take over most of the former ELY Centres' regional development, business-support and implementation tasks, acting as regional facilitators for sustainable investments. Their role in energy-related governance is primarily administrative, facilitative, and investment-enabling: supporting project development and regional coordination, acting as regional intermediaries for EU and national funding and support instruments, and helping advance the local deployment of clean energy and industrial decarbonisation solutions (including CCU and RFNBO-related investments) in line with Finland's carbon neutrality and regional development objectives. In parallel, the **Finnish Supervisory Agency** becomes the key public authority for environmental permitting and supervisory/enforcement functions that were previously distributed across regional structures (notably AVI/ELY environmental functions), reflecting a shift toward a more centralised "one-stop" permitting and supervision model for major projects.

Business Finland. Business Finland operates under TEM as the main public funding agency for innovation and industrial transition projects. Besides open applications, Business Finland has been recently funding energy sector R&D projects through several thematic programmes and initiatives such as the Hydrogen and Batteries programme (2023-2028), Flexible Energy Systems programme (2024-2030), and through the Leading Company Initiative (Veturi).

Sitra. The Finnish Innovation Fund, promotes and finances the renewal of Finland. Sitra finances experiments, studies, and innovations, and starting in 2026 the aim of the amount of annual funding is 15 million euros. In addition to funding, Sitra support partners, e.g. innovative cities, in project implementation, joint development, and network building.

Appendix 2. GreenLab example (DK)

Name	GreenLab (or "GreenLab Skive", located in Kåstrup near Skive in Denmark)
Site area	~60 hectares (greenfield industrial park).
Legal form	Non-profit public-private partnership; has an Innovation Foundation created in 2023.
Regulatory model	Time-bounded, geographically defined regulatory test zone with co-designed monitoring, pre-approval mechanics and continuous reporting to regulators.
Core capability	SymbiosisNet (digital + physical grid for sharing energy and data), test & demo infrastructure for PtX, hydrogen pipe tests, large renewables connection.
Key technologies	Electrolysis / Power-to-X, hydrogen infrastructure, heat batteries, biogas, pyrolysis and advanced recycling, protein extraction, battery integration.
Knowledge / research partners	DTU, Aalborg University, Aarhus University, SDU, Villum Fonden and other academic partners.

Mission and objectives

GreenLab Skive (commonly "GreenLab") is an eco-industrial park and integrated energy testbed designed to accelerate commercial scaling of renewable, Power-to-X, and circular-resource solutions. Its mission is to create an "energy symbiosis" in which renewable generation, storage, conversion (Power-to-X), and industrial by-products (heat, oxygen, CO_2, waste streams) are co-located and actively exchanged, enabling full-chain testing of green technologies under real operating conditions. GreenLab positions itself as both a **research and demonstration platform** and a **facility-as-a-service** ecosystem for companies developing integrated energy solutions.[28]

GreenLab's stated purpose is to be a **technology enabler** ("the perfect host" for technology companies), accelerating R&D to commercial scale while facilitating sector integration and industrial symbiosis. This way, it seeks to:

1. Accelerate industrial decarbonisation by enabling large-scale testing and demonstration of new energy technologies (Power-to-X, electrolysis, storage, heat batteries, circular energy flows).
2. Provide **facility-as-a-service**, or shared infrastructure and market enablers (energy, grid connections, data, SymbiosisNet) so innovators can scale from pilot to market.
3. Operate as a **national research & innovation hub** and living lab that hosts mission-driven research with universities and funders (Research Community, GreenLab Academy, Villum-funded projects).[29]
4. Serve as a **replicable model** for green hydrogen / Power-to-X industrial clusters (UNIDO highlights it as a best-practice example).[30]

[28] GreenLab. GreenLab — Regulatory test zone and model (presentation, 29.10.2025).
[29] GreenLab. A global research platform fit for today's challenges.
[30] UNIDO (2023) Green Hydrogen Industrial Clusters – Guidelines, p. 20-25;

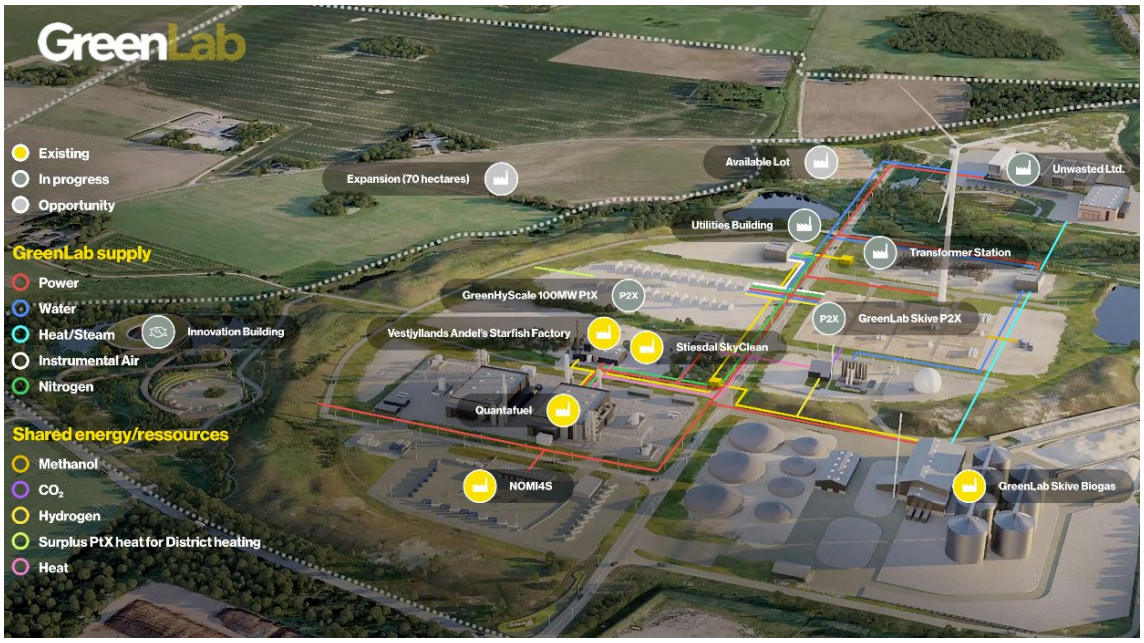

Figure 3. Overview of GreenLab industrial cluster. Source: GreenLab (2025).

History and evolution

Since starting as a local community project in the 1970s, GreenLab has evolved considerably, achieving the following key development milestones:

- **1970s – 2016**: GreenLab's roots lie in Skive Municipality's long-term energy efforts that began after the 1970s oil crises, when the town pioneered low-energy housing and renewable investments. In the 2000s, the municipality faced economic decline and sought green growth as a recovery path, creating Energy City Skive and Energy Foundation Skive (2009) to drive local clean-energy projects. A Climate and Energy Strategy 2029 (2010) and a steering committee united officials, researchers from Aalborg University, and local firms around a shared vision for a green industrial park. Between 2014 and 2017, workshops and spatial planning produced a master plan and local framework plan securing a 60-hectare site. By 2016, the project shifted from direct municipal management to Energy Foundation Skive, separating political and commercial functions and enabling neutral facilitation.[31]
- **2017 – 2019**: GreenLab was formally launched as an eco-industrial park in 2017. Energy Foundation Skive created a collaborative space for firms and researchers, and the SymbiosisNet™ concept—an integrated energy-and-resource network—became the park's defining feature. By 2018–2019, the first companies located on-site, cooperation agreements were signed with the Technical University of Denmark (DTU) and Skive College, and GreenLab Skive A/S was incorporated as a public–private partnership with Eniig (Norlys), Skive Municipality, Energy Foundation Skive, and Spar Vest Fonden.[32]
- **2020 – present**: Since 2020, GreenLab has expanded rapidly, adding wind and solar capacity, pipelines, and Power-to-X projects. In 2021, the Danish Energy Agency granted regulatory test-zone status, allowing experiments with local energy exchange. GreenLab and DTU established a Villum-funded research platform supporting 12 projects (2022–2024), while

[31] Mortensen, L., Kørnøv, L., Gjerding, A. N., Rattigan, E., & Schlüter, L. (2024) Middle-out evolution of greenfield eco-industrial parks: The journey of GreenLab, Denmark. Journal of Industrial Ecology, 28, 1816–1829, p. 1823.
[32] Mortensen, L., Kørnøv, L., Gjerding, A. N., Rattigan, E., & Schlüter, L. (2024) Middle-out evolution of greenfield eco-industrial parks: The journey of GreenLab, Denmark. Journal of Industrial Ecology, 28, 1816–1829, p. 1824.

annual GreenLab Summits and replication initiatives consolidated its role as a national demonstration hub.[33]

Legal status and management

GreenLab Skive A/S is incorporated as a **public–private partnership (PPP)** – a limited company with mixed ownership: the municipality, local energy companies, and regional investors each hold shares. This PPP arrangement allows GreenLab to act simultaneously as:

- a commercial landlord and infrastructure provider;
- a neutral convener for industrial tenants and regulators; and
- a facilitator for R&D projects and funding consortia.[34]

The company operates under a **board of directors** composed of municipal, corporate, and independent members, balancing political accountability and business agility. Operationally, GreenLab manages shared physical infrastructure and digital infrastructure.[35]

Regulatory and legal background – the test-zone framework

On 5 May 2021, the Danish Energy Agency designated the GreenLab industrial park as an official regulatory test-zone for energy systems (first such permission in Denmark and one of a kind in Europe). This designation gives GreenLab a dispensation from parts of the existing electricity regulation and enables it (and companies on site) to experiment with novel business models, shared infrastructure and integrated energy solutions outside the traditional rules-set. Combining renewable electricity generation, industrial consumption, Power-to-X conversion, green hydrogen and storage, GreenLab's test-zone status is aimed at helping to relieve grid congestion and accelerate the integration of large volumes of renewable power.

The test-zone framework is characterised by:

1. **Geographical and temporal limits:** The zone is confined to the Skive industrial park and operates under a ten-year learning horizon.[36]
2. **Co-design and regulatory supervision:** Authorities co-define the scope, learning questions, and safeguards; all experiments are monitored and reported jointly.[37]
3. **Simplified permitting:** GreenLab maintains pre-approved environmental envelopes, enabling projects to connect and begin operations within six–seven months instead of multiple years.
4. **Risk assessment and monitoring:** Each project must submit safety documentation and agree on a monitoring protocol; results feed into national rule evaluation.
5. **Learning and feedback:** Empirical findings are used by national authorities to adjust guidelines on local balancing, tariff structures, and hybrid grid connections.

The scheme for regulatory test zones (Danish: *regulatoriske testzoner*) that GreenLab follows was legislated by Denmark's Energy Agreement of 29 June 2018.[38] The scheme allows selected innovative energy projects to receive time-limited regulatory dispensations from specific provisions of Denmark's energy and supply laws so they can test new business models, technologies and

[33] Mortensen, L., Kørnøv, L., Gjerding, A. N., Rattigan, E., & Schlüter, L. (2024) Middle-out evolution of greenfield eco-industrial parks: The journey of GreenLab, Denmark. Journal of Industrial Ecology, 28, 1816–1829, p. 1824.
[34] Mortensen, L., Kørnøv, L., Gjerding, A. N., Rattigan, E., & Schlüter, L. (2024) Middle-out evolution of greenfield eco-industrial parks: The journey of GreenLab, Denmark. Journal of Industrial Ecology, 28, 1816–1829, p. 1822-1825.
[35] GreenLab. GreenLab — Regulatory test zone and model (presentation, 29.10.2025).
[36] GreenLab. GreenLab — Regulatory test zone and model (presentation, 29.10.2025).
[37] Mortensen, L., Kørnøv, L., Gjerding, A. N., Rattigan, E., & Schlüter, L. (2024) Middle-out evolution of greenfield eco-industrial parks: The journey of GreenLab, Denmark. Journal of Industrial Ecology, 28, 1816–1829, p. 1822-1825.
[38] Energy Agreement of 29 June 2018.

integrated solutions that the existing regulatory framework would otherwise block. The Danish Energy Agency administered the scheme, required applicants to report results publicly, and has published guidance and calls for applications.

The scheme was administered via a dedicated secretariat in the Danish Energy Agency, set up with five years' funding (from the 2018 agreement) to handle applications for test zones. The secretariat was closed on 1 January 2024; thereafter applications go to the relevant specialist unit in the Energy Agency.

The following 10 criteria are included in the Danish Energy Agency's overall assessment of an application for allocation of a regulatory test zone:[39]

- The project is subject to regulation under the jurisdiction of the Ministry of Climate, Energy and Utilities.
- The project's implementation is challenged by a regulatory barrier.
- The project is innovative.
- The project promotes the green transition.
- The project's solution is not yet offered commercially.
- The project benefits consumers and businesses.
- The project is ready to be included in a test process.
- Consumers and businesses can be adequately protected during the testing process.
- The project can be limited in time.
- The applicant must publicly communicate the results of the test process.

Projects developed at GreenLab

GreenLab hosts a portfolio of mission-driven projects spanning renewables, energy storage, Power-to-X and research-led demonstrations. Notable examples and themes are:

- Integrated renewable park — large wind and solar capacity constructed to supply local conversion and industrial demand (~80–84 MW total renewables capacity, plus a high-capacity transformer station).[40]
- SymbiosisNet™ — a digital-physical platform enabling dynamic exchange of electricity, heat, hydrogen, oxygen, and CO_2 between co-located companies.
- Power-to-X demonstrations: Large-scale electrolysis pilots (e.g., the GreenHyScale project under Horizon Europe) with research partners including DTU and Aalborg University.[41]
- Industrial symbiosis projects: Waste-heat integration, circular-carbon capture and utilisation, and joint logistics for hydrogen and CO_2 transport.
- Educational and research collaborations: Formal partnership agreements with universities and international research institutes supporting PhD projects and test protocols.

[39] Advokatfirmaet Energi & Miljø. Energistyrelsen udpeger de første regulatoriske testzoner.
[40] GreenLab. GreenLab — Regulatory test zone and model (presentation, 29.10.2025).
[41] UNIDO (2023) Green Hydrogen Industrial Clusters – Guidelines, p, 20-21.

Key outcomes and learnings

In 2025, GreenLab reports **+3 bn DKK** in cluster investments, **110 new FTEs**, **86% green electricity usage** in the cluster, **84 MW** installed wind/solar, **200 MW** transformer capacity, **21 mission-driven research projects**, and **>15,000 visits/year**.[42]

The initiative has also achieved learnings in the four following areas:

1. **Technical:** demonstrating that local balancing can relieve stress on the national grid and increase renewable integration.
2. **Institutional:** showing the importance of collaboration and involvement from different actors (Danish Energy Agency, Utility Regulator, Energinet, local and national politicians etc.) to advance innovation.
3. **Regulatory:** producing empirical data on tariff, settlement, and Power-to-X rules that informed Danish sandbox policy discussions.
4. **Societal:** generating considerable investments, new jobs, and international attention.[43]

[42] GreenLab. GreenLab — Regulatory test zone and model (presentation, 29.10.2025).
[43] GreenLab. GreenLab — Regulatory test zone and model (presentation, 29.10.2025).

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