Interreg
North Sea Region
Northern Connections
European Regional Development Fund

EUROPEAN UNION

INNOVATION POWER THROUGH TRANSNATIONAL COOPERATION

Northern Connections - Final Report 2020

2016-2020

PREFACE

The First and Last Words,

In the past four years, Northern Connections has been a journey of getting to know how other cities and regions work with internationalization in order to promote innovation in SME's. It has been a learning process for all and to understand and accept that we are different when it comes to political challenges, approaching SME's, the structure of the cluster landscape and internationalization of SME's.

The development of concepts implemented in events has ensured great results on both a political and cluster level. In addition to this, tools have served as an inspiration among partners. The content of this report shows the overall results presented in an easy, readable, and tangible way. The results are multiple and hands-on for readers to be inspired by and use if relevant.

Northern Connections have been financially supported by the Interreg North Sea Region programme, a part of The European Regional Development Fund. Without their support, we would not have been able to establish the project, the partners, and the achieved results.

I would also like to thank all of the 21 partners from Scotland, Sweden, Norway, Germany, Belgium, The Netherlands and Denmark for working with me the past four years. Without your ideas, input and support it would not have been possible to come up with such great solutions as we did. The trust that we have in each other has been a key element and serves as a foundation for hopefully a future collaboration.

We wish you a pleasant reading.

On the behalf of the Northern Connections Partnership,

Alex Moreno,
Project Manager in the Northern Connections.

TABLE OF CONTENT

NORTHERN CONNECTIONS 1

ABOUT US 3

THE PARTNERSHIP 4

WP3 - KNOWLEDGE 5

WP4 - CLUSTER CAPACITY 10

WP5 - POLITICAL LEVEL 65

WP6 - LIVING LABS 71

NORTHERN CONNECTIONS

The Project Summary

The joint challenge was to test the use of domestic innovation support measures transnationally and address barriers to competition which exist between clusters and regions. Innovation support is mainly applied within narrow geographies, where calls to action are not visible transnationally - therefore, cities and clusters lack the capacity to involve SME's broadly.

Our objective was to get more enterprises to participate in transnational innovation collaboration via strengthening transnational cluster, city and region cooperation.

Main output are building capacity and transnational relations of sustainable energy clusters to provide demand-led innovation support. This creates the foundation for involving more SME's in innovation. Develop broader political backing using northern connections to create coherence between political ambitions and cluster potential for innovation support.

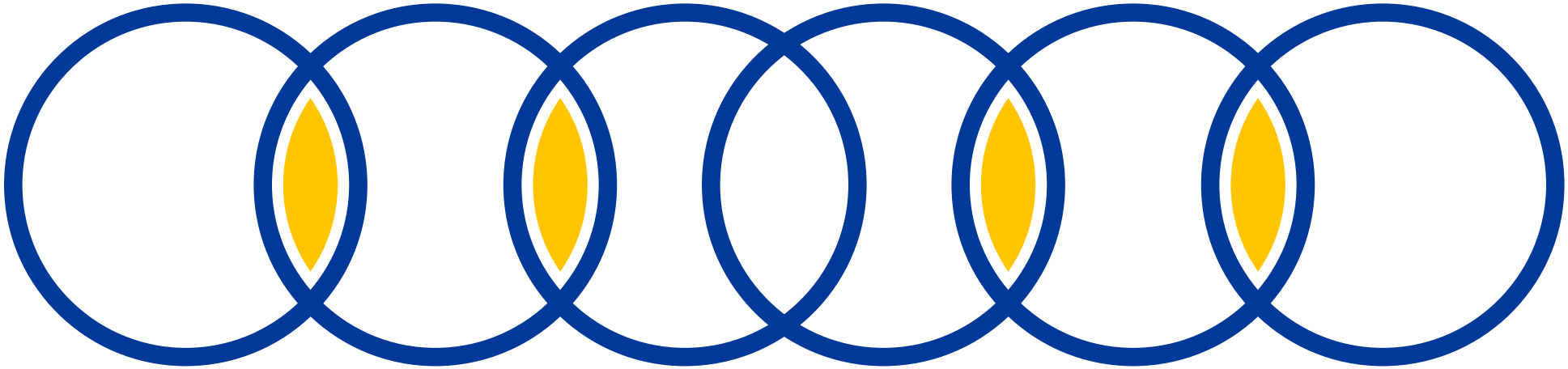
Our approach was to provide a bridge between private and public sector on transnational innovation support.
This was achieved through improving and aligning innovation support measures by creating incentives for transnational SME innovation partnerships to collaborate and establish a critical mass of innovation activity on a transnational basis.
We have piloted and created joint transnational innovation support measures aimed at broadening opportunities for SME's from different countries in the North Sea Region to participate in regional innovation activities, which ultimately have strengthened their ability to take part in the global market, create new value-chains, expaned their international network and furthermore, increased their innovation power.


OIL
OIL
OIL
OIL
CO2
CO2

ABOUT US

We are a partnership consisting of 21 clusters, cities, regions and knowledge institutions, and we work together to create innovation connections between our enterprises and clusters in the energy sector. We have though this partnership aimed to increase the innovation potential across borders.

Through our work packages, we have looked into how to involve enterprises from different countries in our Living Labs - and we develop tools for our clusters in order for them to provide the right support for the enterprises.



THE PARTNERSHIP

gemeente ALKMAAR

SH Schleswig-Holstein The Government

Oslo kommune

Falkirk Council

Scottish Enterprise

AARHUS KOMMUNE

New Energy Coalition

midt regionmidtjylland

NORTH DENMARK REGION

Hamburg

Cleantech Flanders

BUSINESS REGION GÖTEBORG

INNOVATUM

Sustainable Business Hub

RENEWABLE ENERGY HAMBURG

OREEC KUNNSKAPSBYEN CENTRE OF INNOVATION

energy CLUSTER DENMARK

Aalborg Kommune

HCU HafenCity Universität Hamburg

Region Syddanmark

nhn Development Agency Noord-Holland Noord

WP3

WORK PACKAGE 3

Knowledge

Northern Connection is promoting international cooperation through concrete activities but how can partners learn from this cooperative process? And how can this newly gained knowledge be used in the future?
Northern Connections brings cities and regions together with businesses and research institutions to develop ideas and answers to renewable energy, clean technology and circularity problems. International cooperation is promoted in three types of action:

a) Increase cooperation capacities of cluster and companies

b) Political and strategic support of internationalization

c) Living Labs to develop solutions for cities and regions

WP3 Knowledge was responsible to create a knowledge base that was used to support these three actions in the first half of the project. In the second half of the project, it was up to WP3 to evaluate the learning processes in Northern Connections and make them usable within and beyond the project partnership.

The following paragraphs will explain how WP3 was connected to the different actions in Northern Connections - and what could be learned from the Northern Connections project and about the future.

WORK PACKAGE 3

Methods and Results of WP3

How to increase the innovative capacity of clusters and companies through international cooperation?
A survey among the cluster organisations, helped identify the areas in which companies are active, how clusters have so far supported small and medium-sized enterprises and on which topics cross-border cooperation should be established in the future.

The results showed that if the companies in all clusters are added up, all important areas of production and storage of renewable energies as well as the various stages of the value chain (from research and development, design, plant construction, sales, operation to financing) are covered.

However, in order to better position the North Sea Region in global competition, a stronger international cooperation was considered to be necessary. Especially in the areas of intelligent power grids and sector coupling (energy, industry, and transport) a need for cooperation was pointed out. To promote SME's, the clusters already offer a wide range of different services.

Nevertheless, there is a need for greater support for the internationalisation of SME's. Following on from the survey results, the clusters were jointly developing and testing tools to improve the internationalisation and innovative capacity of SME's. For many partners, this was the first cooperation in the North Sea Region and could be the beginning of a closer cooperation.

WORK PACKAGE 3

How to support the internationalisation of companies politically and strategically?
In Northern Connections, regions, cities and clusters are working together on how strategies for intelligent specialisation (e.g. RIS3) can be optimised in order to support innovation by SME's across borders. The aim is to promote the international competitiveness of the North Sea Region and to expand innovation cooperation between clusters, regions and cities. An analysis of the strategies and a subsequent survey by WP3 revealed that many regional innovation strategies thus far contain little concrete information on internationalisation. The currently pending realignment of the regional innovation strategies will be used by the participating cities and regions as an opportunity to make them more internationally oriented in the future.

How to use living laboratories (Living Labs) to develop solutions for cities and regions?
Northern Connections is running Living Labs where cities and regions are formulating challenges for sustainable urban development. SME's from the entire North Sea Region are then invited to work on solutions within the framework of Living Labs in the participating cities and regions.

This cross-sectoral and transregional cooperation has the potential to create learning effects for public partners, clusters and companies. WP3 explored the learning process by conducting a survey among the project partners. The cluster partners find that the Living Lab is a successful concept and many are planning to use it in the future. As such, the Living Labs are regarded as a good way to match the needs of problem holders (cities and regions) and solution providers (SME's). More specifically, the international format of the Northern Connection Living Labs is perceived as being an effective way to support internationalisation of SME's.

A last upcoming task in WP3 will be to work out how the tried and tested approaches for sustainable development can be used beyond the lifetime of Northern Connections. This includes the questions; if and how the approaches could be used in other branches or sectors than renewable energy, clean technology and circularity.

WP4

WORK PACKAGE 4

Cluster Capacity

Within WP4, the aim was to produce a toolbox, which is a product of concrete experiences from the Northern Connections project. A collection of practical tools was developed to create successful events aimed at unlocking the potential for national and transregional collaborations. The following sections of WP4 is aimed at experienced matchmakers as well as anyone planning their first matchmaking event, initiating or facilitating innovative collaborations among SME's and the public sector using the Living Lab Event concept.

In the first part, the individual tools are described followed by a description of on how these were utilised through the coordination process; before, during and after the Living Lab Events held in Denmark, Norway, Sweden, Germany, The Netherlands, Belgium and Scotland.

The descriptions focus on the thematic challenges defined by the Living Lab owners in collaboration with local cluster representatives from the Northern Connections partnership. The toolbox, which functions as the results and key learnings from WP4, has been developed with inspiration from and in collaboration with **Cluster Excellence Denmark.**

▷ **Find the Northern Connections' Toolbox for Matchmakers - Innovation Support Measures 3.0 here.**


Statistical
Analysis
GLOBAL MAP
DATA
MARKET SHARE
0.49
Statistics
TOTAL RESULTS

LIVING LAB TOOLS

1. Tool: Innovator matchmaking workshop

A method for matchmaking, where 6-12 innovators are in the same room for 30-60 minutes depending on the number of participants (8-10 minutes per participant). The goal of the session is to create a setting for matching innovators based on their needs in relation to potential collaborators. The group is put together based on their product range, where there is an obvious thematic overlap.

The innovators are asked to pitch their project, what they offer, what type of collaboration or challenge they are facing and what sort of collaboration they are looking for. The format needs to be facilitated extremely strictly. When the innovator has described their needs and offer, the other innovators can ask a maximum of 2 questions and in the end the others are asked to show a number (handed out when the session starts), where they indicate their interest in further talks during the networking session.

The facilitator notes potential interest on a whiteboard, where it is easy for the participants to see, who is interested in their solutions or partnership opportunities. *The follow up by the facilitator is two fold:*

1) Ask the innovators to actively look for each other after the workshop and continue their dialogue.

2) Contact the innovators after the workshop with the contact information of the other innovators that showed interest.

LIVING LAB TOOLS

2. Tool: One-to-one meeting with challenge owner
One-to-one meetings serve as a possibility for the challenge owner and the innovator to enter a more in-depth dialogue about the possibilities to find a collaboration - e.g. joint research, collaborations or demo projects.

This tool is based on the learnings from The SCALE-UP project funded by the Interreg North Sea Region, who has successfully been using the concept for the last 5 years. The Meet the Buyer events bring large customers with cleantech innovation needs together with SMEs with innovative cleantech products, services and solutions. In the Northern Connections, we have decided to apply this approach to the public and public-private sectors instead.

The duration of the meeting should be a minimum of 20 minutes in order for the innovator or solution provider to give an in depth presentation of their technology, product or method. It is possible to have more than one challenge owner per event and it is recommended to not have more than 15 meetings per challenge responsible / challenge owner due to fatigue.

LIVING LAB TOOLS

3. Tool: Reverse pitching
Instead of letting start-ups/SMEs pitch for potential large corporations, it is performed the other way around. Large corporations are invited on stage to present, in a short pitch format, the value and offerings that they present for start-ups/SMEs to address the customer base of large corporations needs and challenges.

This can be applied to the public and public-private sector as well, where a city can pitch their offer of collaboration based on challenges identified for new projects. It can be combined with matchmaking sessions and prize award where start-ups/SMEs vote for best pitch/offering.

4. Tool: Seminars by research institutions
During the Living Lab Event, you can use the knowledge of researchers and teachers from the research institutions in your network in order to pave the road for collaboration and discussion.

Use a very charismatic and opinionated researcher, who is an expert in his/her field and make sure to underline the opportunities for collaborations. It is essential that the seminar is followed by a setting that gives the participants the possibility to reflect and discuss the ideas and research, presented - e.g. networking session, break or lunch.

LIVING LAB TOOLS

5. Tool: The B2Match organiser tool
The B2Match is a platform designed to connect people at events with efficient and goal-oriented networking. With the B2Match tool you can set up a dedicated page for your matchmaking event quick and easy.

Furthermore, with B2Match companies arrange their own one-to-one business meetings based on their profiles containing offers and requests relating to business, technology and research.

6. Tool: Webinar and video presentations
Closing the gap, when working across border and over far distances, in a project like Northern Connections, is key. Webinars and video presentations have made it possible to improve on the interpersonal relations between the partners in the project.

As such, introductory videos of challenges and Political Tools, as well as video interviews and promotion videos from our Living Lab events have made it easier to relate to the output of the project, while improving on the speed of trust between project members and organisations.

LIVING LAB TOOLS

7. Tool: Booklet

A booklet showing all the information about the participants of the Living Lab Event, which makes it easy for the participants to find information about participating innovators, presenting solutions to the challenge owner. Additional information from meetings between the different stakeholders can easily be added as a reminder for future potential business dialogues. Furthermore, the booklet should also be found on the event organisers homepage after the event.

8. Tool: Podio platform for Living Labs process

By employing a collaboration space like the project management and social collaboration tool, Podio (by Citrix) for handling the challenge owners and potential Innovators, the process of matching innovators to challenges, is made simple and easy. The innovators are asked to fill out a comprehensive application form for the specific challenges, where they indicate their competencies and product ranges and/or services. This information, which is sent by the applying innovator, makes it easier for the challenge owner, in collaboration with the cluster representatives, to screen for potential matches. The partnership has made their own based on the Podio platform.

9. Tool: Pitching

In the following context of this toolbox, pitching means presenting an idea which needs further development. The participants are then invited to share ideas, give suggestions and ask questions. Pitching works well as a part of an open event, or as a part of an event with a specific theme, where entrepreneurs and established companies pitch their ideas in front of an expert panel and the other participants.

LIVING LAB TOOLS

10. Tool: Challenge driven innovation

Demand driven innovation denotes finding a suitable match for an innovation network target group with big public investments. Thus, the method consists of a thorough analysis of interested parties, a one-day event and follow-up projects.

First, the project must have the right preparation. Begin six months beforehand by carrying out a screening and analysis of public bodies and funds. Then, carry out a target-oriented screening and contact the public players directly to identify needs and give information about the role of the network. To finish off the preparation, complete a program and the invitations based on the above mentioned analysis.

Second, the implementation part begins with arranging a one-day event with various talks, international video presentations, workshops and sector-related case studies. Followed by selecting and grouping the participants beforehand, and making sure to manage the day carefully. Hence, be sure to have a team of helpers to facilitate the day. Then, the tasks are defined by the innovation network and they can help manage the creativity of the workshops.

Third, hand out a contact sheet that allows the participants to indicate their interest in participating in later development, including possible projects.

Lastly, the post implementation should consist of a follow up on declarations of interest and contact those waiting to participate in activities and projects. The way ahead requires involving the network secretariat and partner organizations to ensure that the ideas are converted into actual projects.

LIVING LAB TOOLS

11. Tool: Business matching platform

A digital business matching site is a powerful tool for ensuring that your challenge owners and innovators can be matched in an effective and co-creative way. Platforms, where the participating actors can have a profile, and define what they are offering or looking for. In the case of Living Lab events it is a great tool for matchmaking between the participating innovators.By having calendar functionality and enabling the companies to actively screen, the participant lists for potential collaborators, thereby releasing resources for the organisers to focus on other things.

12. Tool: Speed dating

The advantage of arranging an organized matchmaking in shape of speed in relation to a larger arrangement is, that there are gathered a variety of people in advanced at the same time. The matchmaking should be a professional and relevant supplement, which can be an add on in relation to e.g. the scientific part.

13. Tool: Exclusive network meetings

Closed, exclusive network meetings for a chosen group of decision-makers from the business life and institutions of knowledge, which gives the participants the opportunity to meet under professional, but also informal circumstances.As an example, it could be an event in the evening with a joint dinner followed by a presentation from a keynote speaker.

LIVING LAB TOOLS

14. Tool: Innovation cup with students
The method is a concentrated innovation process in which companies and knowledge institutions are matched, based on the companies' need for new knowledge or product portfolio.

For instance, the company draws up a theme, which is related to its product strategy. The students are then divided into teams which have to solve the given task through an intensive innovation process. The project is held at the educational institution in question.

15. Tool: International study tour or business delegation
An international study tour to a larger organisation in foreign countries, who may have the interest to enter contracts with Danish SMEs and maybe even larger companies, that creates profitable contacts and matches. Based on the Danish companies own description and homepages, they are the ones, who should get the organisation's buyers and technicians to want the individual meetings.

The meeting will give the Danish SME's the opportunity to present their competencies and acquire knowledge of the opponent's needs. Then the door is open: This often clears the way for inquiries and subsequently a potential contract and a subcontractor deal.

Living Labs

Pre-defining the concept

PA Living Lab is a research concept. A Living Lab is a user-centred, open innovation ecosystem, operating in a territorial context, integrating concurrent research and innovation processes within a public-private-people partnership. The concept is based on a systematic user co-creation approach integrating research and innovation processes. These are integrated through the co-creation, exploration, experimentation and evaluation of innovative ideas, scenarios, concepts and related technological artefacts in real life use cases. Such use, cases involve user communities, not only as observed subjects but also as a source of creation.This approach allows all involved stakeholders to concurrently consider both the global performance of a product or service and its potential adoption by users. *More information about the Living Lab concept will follow in WP6.*

Organised Living Lab Events:

- 07/09 2018 : Living Lab Event - Syd Energi (DK)
- 29/11 2018: Living Lab Event - Økern Sentrum (N)
- 08/05 2019: Living Lab Event - Hoppet (S)
- 13/06 - 14/06 2019: Living Lab Event - Billebogen & Flensburg Fjord Region (G)
- 12/09 - 13/09 2019: Living Lab Event - Hoogeveen & Alkmaar (N)
- 20/11 - 21/11 2019: Living Lab Event - Blue Gate Antwerp & Green Energy Park (NL)
- 30/01 - 31/01 2020: Living Lab Event - Grangemouth, Falkirk & Acorn CCS (GB)

Living Lab Event - Syd Energi (DK)

Syd Energi is one of Denmark's largest modern energy and telecommunications companies. With high environmental ambitions and engagement in innovation, the SE company focus on long-term and societal challenges. The aim of the internal initiatives is to create more diversity and strengthen the company's sustainability. The strategic external initiatives aim at creating more diversity by focusing on disruptive business models and creating societal impact by collaborating and supporting innovative entrepreneurship.

In order to identify new partnerships, Syd Energi was in the search for new ideas, technologies or methodologies. SE was looking for partnerships that could help the company reach the strategic goals; to create more sustainable energy and better digital communication. The SE company was looking for innovation solutions within the field of Smart home, Sensor technology or more green behaviour.

Smart home
- Optimising home activities
- Infrastructure monitoring
- Early warning systems
- Infrastructure level solutions
- Usage data and smart home, environment data

Sensor technology
- Solutions and sensors for households
- Optimization of the electric grid
- Hardware designed for the living room
- Intelligence across units
- Simple self-learning system

More green behaviour
- Nudging consumers
- Empowering consumers
- Making green behaviour
- Greener business models

Solution providers:
Neogrid Technologies, RAYBASED, UNS UNSTUDIO, KMC, FISCHER LIGHTING, ReMoni, arbnco, Carbon Cash & dLaboratory.


Interreg
North Sea Region
Interreg
North Sea Region
SMART ENERGY
Northern Connections
Living Lab Event- Syd Energi (DK)
7th of November 2018
Esbjerg, Denmark
10:00-15:30
www.northsearegion.eu/northern-connections
We are a partnership of 21 clusters, cities, regions and knowledge institutions working together to create transnational innovation between energy sector enterprises and clusters in the North Sea Region.
SCALE UP DENMARK
Powered by NEXT STEP CHALLENGE
Do you
hav
amb
Next Step Challenge strengthens your business
INSERO
Dynamics NAV
Elite IT forbinder en hvilken som helst mobilitets-løsning med økonomisystemet.
Elite IT

Tools used for Living Lab – Syd Energi (DK)

Tool: Podio
Platform for Living Lab processThe Podio platform (Project Management and Collaboration Software) was a central tool in the coordination and planning process, giving the project managers responsible the chance to share documents, produce webforms for registration of applicants and selecting innovators. The processes - and so called 'apps' - has since been used, updated and tweaked, by coordinators of the following Living Lab Events.

Tool: Webinar and video presentations
In order to give the communication a more personal character, and draw the potential applicants closer to the Living Lab representative, we took the presentation of the challenges of the Living Lab further than only text. Lisbeth Valther, CEO of SE Next Step & Blue Labs, presented the three challenge areas: More Green Behavior, Sensor Technology and Smart Home. Links for the aforementioned challenges was then implemented into the digital version of the invitational material.

Tool: Reverse pitching
A central part of the setup of the Danish Living Lab was the efforts made in order to present an agenda with an obvious value add for innovators, hereby giving potential applicants a clear sentiment for participation.
As such, Reverse pitching was an important tool, used when presenting secondary project opportunities, related to the Innovators technological knowledge areas during the event. Additionally, the session was followed by a networking session, giving people a chance to reflect on the presentation given.

Tool: Seminars by research institutions
Cutting edge research and provocative ideas can fuel inspiring conversation. This was the idea behind inviting Steffen Petersen, Associate Professor at Aarhus University, to present his take on “Smart Homes of the future - Barriers and possibilities”.

However, it is essential that the invited researcher knows both context (agenda) as well as the technology of the selected applicants participating at the Living Lab, as this provides him with an opportunity to touch upon burning questions, and areas easily relatable for the innovator.

Tool: One-to-one meeting with challenge owner
While, simple by concept, the idea behind adding value to the event by letting innovators present their selected technology to the challenge owner, in a closed setting, gave both parties the chance to move closer to each others, than when using pitches in a larger setting. In this case, we gave every selected innovator 25 minutes to pitch their technology and build on the presented material, introduced in their application form.

As the Danish Living Lab owner had already analyzed, the basic aspects of their innovative tech or service, the meeting made it possible to make an important leap in relation to trust and the professional relationship between the innovator and challenge owner. The meetings were facilitated as a parallel track, alongside the plenary session.

Living Lab Event – Økern Sentrum (N)

The city of Oslo aims to cut emissions by 50% by 2020 to be carbon neutral by 2050. Oslo has introduced a range of integrated measures to achieve these ambitious targets. An unique 'Climate Budget' is one of the main initiatives. Innovation and the promotion of new jobs in the circular economy is a priority for Oslo and the city is at the forefront of circular use of available resources. Making The Oslo Region attractive for innovation and transforming it into the world's most sustainable, smart and innovative region will require collaboration efforts. That is one of the reasons why City of Oslo is partner in North Sea Region EU project Northern Connections. Main output is building capacity and transnatio- nal relations of sustainable energy clusters to provide demand-led innovation support. This creates the foundation for involving more SMEs and startups in innovation.

Økern Sentrum is situated in the heart of Hovinbyen, one of Oslo's newest and most ambitious city development areas. Hovinbyen has a potential growth of 30-40,000 new residents and will accommodate a total of 100,000 people in addition to its 2.5 million m2 area for industry and trade. Økern Sentrum will be the central hub of Hovinbyen and will form and change Oslo in accordance with the growth strategies of Oslo Municipality. From 2020 the developers, Steen & Strøm and Storebrand will create an urban, sustainable and innovative 163,000 m2 urban centre including an indoor aquapark, a cinema, a substantial amount of housing facilities, cultural venues, offices, hotels and a leading commercial centre in Økern Sentrum. We started the search for companies and partners to help Økern Centre to develop high-tech, sustainable and shaped with tomorrows solutions as possible.

We were looking for companies, clusters and innovations, who could deliver to Økern Sentrum. The innovation challenges were circular and holistic waste management, sustainable energy solutions, green mobility & infrastructure for sustainable transport and construction period / execution.


Interreg
North Sea Region
Northern Connections
A partnership of 21 clusters, cities, regions and knowledge institutions working together transnationally to create North Sea Region innovation in the energy sector

The innovation challenges

Circular and holistic waste management
Waste management - Underground waste management opportunity
• Vacuum systems
• Central systems for waste management
• Smart handling of public waste
• Food waste programs and circular waste management

Construction period / execution
• On site circularity & re-use of materials
• Co2 mission free construction site
• Energy consumption & usage during construction period
• Re-use & circularity of materials – cradle 2 cradle

Sustainable energy solutions
Heating & cooling
• Energy wells
• Battery/storage technology

Electrical production
• Solar panels on all surfaces
• Wind power, wind trees, movement etc.
• Hydroelectric plants in the sewage system etc.

Green mobility & nfrastructure for sustainable transport
• Smart transport of goods
• Fossil free private car, cycle parking & pooling
• Car/Ridesharing

Solution providers:
6CST AS, arbnco, Asak Miljøstein AS, BiomimicryNorway, Catch Solar AS, CityQ, Clean Motion AB, DesaH BV, E.ON Sverige AB, Enjay AS, Envac Norge AS, Fortum Oslo Varme AS, FUSen AS, Hydraloop Systems BV, Hystorsys AS, ISSOL Solar Glass, Kraft Engineering, ML System, MyEnergy APS, Nabolagshager AS, NårgeSol, Nedenfra Ideelt AS, Orbital Systems AB, Photocat A/S, Pivotic Consulting AS, Pixii AS, PowUnit AS, ROAF IKS, Schneider Electric AS, SEG Holdings AS, Velove Bikes AB and wheel.me AS

Tools used for Living Lab – Økern Sentrum (N)

Tool: Booklet
A booklet was handed to each participant at the event. Besides practical information such as the event programme and schedule for the one-to-one meetings, the booklet also included information on the Northern Connections project, the two Living Labs as well as profiles and contact persons of the participating innovators. Short information about participating companies, both presenting solutions to the challenge owner and created a platform for B2B networking and cooperation. The booklet is a reminder for future potential business dialogues.

Tool: Pitching
The plenary session of the Living Lab Event in Oslo included both a pitch session and a session for reverse pitching. In the pitch session, the innovators had the opportunity to present their concepts and ideas towards the audience but also the challenge owners. The pitch consisted of a short presentation with a limited amount of time (5-minutes) and a short Q&A with the host and moderator of the event. This tool was useful to give interested parties the chance to learn about the company and its concept without straining the audience. However, many pitches in a short time is a challenge both for the innovators, challenge owners and organisers.

Tool: One-to-one meeting with challenge owner

After the pitch session, several one-to-one meetings between the innovators and challenge owners were scheduled parallel to a plenary session. Since the challenge owners received initial information on the innovators and its concepts during the pitch session, the length of each meeting was kept short. For the innovators, the one-to-one meetings were an opportunity to provide the challenge owners with more in-depth information and exchange contact details. Despite the preceding pitch session, the innovator's feedback was that the time of each meeting could still have been longer to discuss more details.

Tool: Seminars by research institutions

During the Living Lab Event we used researchers from the research institutions in our network in order to pave the road for collaboration and discussion. We had success with using very charismatic researcher who underlined the opportunities for collaborations. The networking time after the Living Lab gave the participants the possibility to discuss the ideas and research presented.

Living Lab Event – Hoppet (S)

Gothenburg, the second largest city in Sweden, is undertaking it's greatest development in mo-dern history and will grow by nearly a third by 2035. The City of Gothenburg plans to invest €600 million a year in new schools and housing projects, all of which must meet strict sustainability criteria. The Hoppet preschool is a pilot project for these future developments and will be built using fossil-free materials and processes. This cutting-edge project will set the standard for future urban development in the city and will open up a thriving market for sustainable suppliers.

Hoppet was seeking solutions and products that was, or have the potential to become, fossil-free through the whole construction process and the operation of the building. Recycled and re-used products was also of interest. Selected suppliers had the opportunity to see their solutions implemented after the event. The construction phase started in 2019 and the goal is to complete the project by December 2021. The innovation challenges were the following:

Fossil-free and climate-neutral building materials for:

- Electrical installations
- Heating, ventilation and air conditioning products
- Sealants and waterproofing
- Foundation
- Insulation
- Wall constructions
- Paints and adhesives

Construction phase:

- Transport
- Work vehicles
- Dehumidifiers
- Energy consumption
- Temporary facilities

Solution providers:

PLOCKHUGGET, ISSOL, HOUSE HEMP, Kebony, Altered, Hunton, Fischer Lighting, Ramirent, Øko-tømreren, CS - Rv & Håltagning, Green Furniture Concept, Climate Recovery, Nature Impact, Forbo, One Reality, Repur, IT NOCK - Massiva Trähus, Deutsche Amphibolin-Werke Von Robert Murjahn, Hemp in a box, Kenoteq, Zostera, Nordiska Hamp Kompaniet, Tarkett, KALK and Juteborg.


Living Lab Hoppet

Tools used for Living Lab – Hoppet (S)

Tool: Podio Platform for Living Lab process
The Podio platform (Project Management and Collaboration Software) was a central tool in the coordination and planning process, giving the project managers responsible the chance to share documents, produce webforms for registration of applicants and selecting Innovators.

Tool: Webinar and video presentations
In order to give the communication a more personal character, draw the potential applicants closer to the Living Lab representative and make the challenges easier to understand for the applicants, we took the presentation of the challenges of the Living Lab further than only text. Anders Hall, project leader for the preschool Hoppet presented the challenges in a short film which was enclosed in the invitation.

T**ool: Business matching tool**
When going into the screening process to find companies matching the communicated challenges the tool EEN Match was one of the tools used. Unfortunately, the matches we got were not exactly in line with the challenge owner's needs.

Tool: Booklet
The booklet was an item produced for the participants at the Living Lab, containing a short presention of the selected participating innovators with contact information, making it easy to remember their specific products and an opportunity of contacting them. Information about Northern Connections and contact details to project members responsible for Living Labs were also included.

Tool: Exclusive network meetings
As a preparation for the Living Lab and a possibility for the Living Lab owner to meet with the innovators and Northern Connection partners on a more informal basis a dinner was arranged the evening before the Living Lab.

Tool: Pitching
Pitching is a very attractive tool for companies reaching out with their products to an audience, independent of size. By delivering clear guidelines and objectives to the solution suppliers beforehand the pitching had a consistent format.

Tool: Reverse pitching
A main goal was to give the innovators a view of the large market potential. Therefore, representatives for larger real estate projects were invited to conduct reversed pitches, herby providing additional business opportunities for the selected innovators.

Tool: One-to-one meetings
For the solution suppliers to get a fair chance to, more in-depth, present their solutions, one-to-one meetings with the challenge owner were conducted parallel to the plenary sesson. The meetings lasted approximately 20-30 minutes which was sufficient time for both parties to receive relevant information.

Living Lab Event – Billebogen (D)

The North of Germany is the leading region for renewable and sustainable energy as well as mobility solutions in Germany. Within the Northern Connections project, the City of Hamburg and State of Schleswig-Holstein jointly invited companies to present their innovative ideas regarding an intelligent energy supply and smart mobility solutions for cities as well as a for rural areas.

The City of Hamburg is the second largest city in Germany with approximately 1.8 million inhabitants and an annual influx of around 20,000 new inhabitants. The city is therefore committed to building more than 10,000 new houses each year as well as realizing new industry and office spaces. One of the new districts that are currently developed in Hamburg is the project "Billebogen". It is realized by the HafenCity GmbH, who is planning to mix new-build offices with multi-layered commercial, industrial and manufacturing spaces on a total area of 230,000 square meters in the coming years. The challenges of the Living Lab "Billebogen" was focusing on an integrated and efficient energy supply system and to provide a full e-mobility infrastructure. The innovation challenges were the following:

District Energy Solutions

- Intelligent connection of power, heat and cooling grids and systems
- Efficient inclusion of energy storage and demand side management
- Connect office with industrial and commercial energy consumption patterns

Further/Optional

- Improve the life-cycle impact of "Billebogen" by using Cradle-to-Cradle design principles

Sustainable Mobility Solutions

- Develop charging infrastructure for a range of e-mobility vehicles and distribution ranges

- Include charging infrastructure capacities in overall energy supply system

Solution providers:

H2Tec, Energy Ville, Plan Energi, Hysopt, Wagner Solar, Desah, Skoon, Fraunhofer, KTC, Averdung and Dezera.

Living Lab Event – Flensburg Fjord Region (D)

Located in the north of Germany directly on the Danish border, the “Flensburg Fjord Region” consists of the City of Flensburg with 95,000 inhabitants and the surrounding rural region Eggebek, consisting of 34 municipalities with another 67,000 inhabitants. Together, they form anational model region with the common ambitious goals of reducing their greenhouse gas emissions by 100 percent until 2050 and also cutting their total energy consumption in half during the same time period.

For the City of Flensburg and the local utility company Stadtwerke Flensburg GmbH, two of the three challenge owners of the living lab “Flensburg Fjord Region”, the focus was to find innovative ways of improving their urban district heating system. The Amt Eggebek, the third challenge owner of this Living Lab, was focused on sustainable solutions for combined renewable energy and glass fibre solutions including small-scale power-to-X technologies (sector coupling).
The innovation challenges were the following:

District Energy Solutions
- Large scale heat pumps (0.5 MWth to 1 MWth) using energy from sea water for district heating
- Low temperature district heating (LowEx) solutions
- Inclusion of solar thermal heating in district heating
- Load management system for renewable electricity system including battery storage and bus charging
- Smart regional energy systems on renewable energies, power-to-X and glass fibre (sector coupling)

Sustainable Mobility Solutions
- Complete e-bus charging infrastructure for City of Flensburg
- Flexible, shared, supplemental, zero-emission “last mile” mobility solutions for rural areas

Solution providers:
H2Tec, Energy Ville, Plan Energi, Hysopt, Wagner Solar, Desah, Skoon, Fraunhofer, KTC, Averdung and Dezera

Tools used for Living Labs Billebogen & & Flensburg Fjord Region (D)

Tool: Pitching
The plenary session of the Living Lab Event in Hamburg included four pitch session. In each pitch session two to three innovators had the opportunity to present their concepts and ideas towards the audience but also the challenge owners. The pitch consisted of a short presentation with a limited amount of time (3-minutes) and a short Q&A with the host and moderator of the event. This tool was useful to give interested parties the chance to learn about the company and its concept without straining the audience.

Tool: One-to-One Meeting with Challenge Owner
After the pitch session, several one-to-one meetings between the innovators and challenge owners were scheduled parallel to a plenary session. Since the challenge owners received initial information on the innovators and its concepts during the pitch session, the length of each meeting was kept short (10 minutes). The short meetings allowed the topical separation of the challenge owners, so that in total three different one-to-one meetings were happening simultaneously. For the innovators the one-to-one meetings were an opportunity to provide the challenge owners with more in-depth information and exchange contact details. Despite the preceding pitch session the innovator's feedback was that the time of each meeting could still have been longer to discuss more details.

Podio Platform for Living Labs Process

The Podio Platform (Project Management and Collaboration Software) was the central tool to manage the registration of innovators and participants. Within Podio, a web form for registration was created, published and disseminated. On the backend, provided information from the innovators could be managed and exported. The data within Podio was used to create documents, such as registration lists or company profiles. Further details and information was provided in a public BOX folder that was continuously updated. After the event, a second web form was created within Podio to evaluate the Living Lab event, itsorganisation and outcome. All presentations that were held during the event were saved centrally and disseminated among the participants via a public BOX folder.

Tool: Booklet

After registering on the day of the event, a 32-page booklet was handed to each participant. Besides practical information such as the event programme and schedule for the one-to-one meetings, the booklet also included information on theNorthern Connections project, the two Living Labs as well as profiles and contact persons of the participating innovators.

Living Lab Event – Alkmaar (NL)

InVesta: Biomass and gasification technologies

The Energy Innovation Park is a business park with a focus on businesses (start-ups, SME's and international players) in innovative and existing energy technology. It is an attractive location for companies from both inside and outside the region, especially due to the clustering of energy-related companies and projects. The park offers an excellent energy infrastructure for high-quality heating, connection to the nationalgas grid and a high-voltage grid (150 kV).

InVesta: The future for renewable gases is now!

Prominently located at the park is InVesta, an expertise center for biomass and gasification technology. Entrepreneurs, researchers and govern- ment work together on sustainable and innovative renewable gas initiatives. The focus is on technological developments in the field of biomass gasification and broad application of the gases produced with the aim to ensure structural reinforcement of the biomass gasification chain in the Netherlands. InVesta promotes, facilitates and connects parties to develop and market innovations in the biomass gasification chain. InVesta is of interest to parties wishing to test and demonstrate techniques in the chain. InVesta makes facilities available where pilots and demos can be tested and presented. InVesta is looking for new cost-efficient technologies to accelerate the development towards large-scale commercial application of 'syngas' or 'product gas'. This applies to the complete chain from biomass to end product - and includes the preparation of (new) biomass feedstocks, all technologies for gasification and the use of syngas to all kinds of renewable products.

The innovation challenges

InVesta was looking for companies with economic viable technologies (or part of technologies) that lead to a lower cost of sustainable syngas and their applications. Besides that InVesta was interested in companies that wanted to test and demonstrate their new innovations and products.

- Pre-treatment techniques (sorting, grinding, drying, torrefaction, pyrolysis, etc.)
- Gasification technology (conventional gasification, supercritical gasification, etc.)
- Gas cleaning (sulfer and chlorine removal, etc.)
- Synthesis technology: from syngas to application (biofuels, green gas, green chemicals, hydrogen)

Living Lab Event – Alkmaar (NL)

Liquid hydrogen: the next step in the hydrogen economy

The company HYGRO will operate the first hydrogen wind turbine in the world in the North of the province Noord-Holland in 2020. The Energy Innovation Park will be one of the following production sites. Various potential customers of HYGRO indicated that they prefer liquefied (cryogenic) hydrogen.

High-pressure hydrogen is todays standard for storage and transport of hydrogen, from production to end-user. The disadvantages are the high costs of the storage and the relative low energy density. The – much higher – energy density of liquefied hydrogen could offer significant benefits for the use of hydrogen for heavy duty users such as vessels and trucks, and saves costs in transport and storage. If the challenges of the high costs of liquefying hydrogen could be solved (cryogenic, -253°C), liquefied hydrogen will be the next step in the hydrogen economy. For HYGRO, liquefied hydrogen could mean lower costs for storage and transport, making hydrogen as a fuel even more attractive. In making this transition possible, HYGRO was looking for parties, who were able to liquefy hydrogen cost-effective with small scale liquefaction plants of capacities around 40kg/hour. Besides that, HYGRO was ooking for parties that could offer all the required equipment for storage, filling infra- structure and techniques for the application of liquefied hydrogen in vessels and trucks.

The innovation challenges

The aim of this part of the project is to make decentralized liquifaction of hydrogen costs efficient.
We were therefore looking for several technologies related to liquefied hydrogen:

- Liquefied hydrogen production
- Pipe systems• Storage and transport systems
- Liquefied hydrogen systems for vessels and trucks (fuel cells technology)
- Safety techniques


Interreg
North Sea Region
IDEA
INVESTA
EXPERTISE
CENTRUM

Solution providers:

Alles Over Waterstof, Ampulz, APS BV, Bahcesehir University, D4, Deodrive Fuel Cell Energy Consultants, Dutch Boosting Group DWG, Elugie, Encon Clean Energy BV, H2planet, H2Tec Ltd. & BV, Howden Compressors, ICAMCYL, IGES, INB HYNOCA, Kiwa Multimetaal, Nproxx, PowUnit AS, Pro-Control Process Automation, STERCORE BV, Swedish Exergy AB, TDE BV io, Total Nederland N.V., UMOE ADVANCED COMPOSITES AS, Van Campen Ecotechniek BV and Yokogawa Europe BV

Living Lab Event - Hoogeveen (NL)

Techno-economic blueprint for the heat supply in Nijstad Oost on 100% hydrogen

The Dutch municipality of Hoogeveen is developing a new location with 80 houses at the west side of the city of Hoogeveen; Nijstad-Oost. With this development, the municipality wants to contribute to the energy transition in the Netherlands, especially focused on building new houses which do not require naturals gas as its main resource for heating.

The goal of this project is to deliver a (techno-economic) blueprint and corresponding technology concept for the heat supply of the 80 houses in Nijstad-Oost on 100% hydrogen (H2), based on operating with a hydrogen central heating boiler. Finally, this blueprint and technology must be transferable and scalable for existing residential areas in the Netherlands. Besides the nationwide reduction of natural gas use, market opportunities are being created for the involved parties. There are also other topics and aspects included in the blueprint besides the technological developments, such as the social business case, sourcing strategy and the support amongst the residents. This approach willbe set off with other hydrogen related solutions (fuel cells, local heat network, etc.), in order to gain insight on the pros and cons of the blueprint and accompanying solutions.

This project does not stand on its own, Nijstad-Oost is a demonstration project which serves as a pilot and an accelerant for the application of hydrogen in the built environment. The reason the project does not immediately start with converting and retrofitting existing buildings, is because of the fact that it wants to begin from a green meadow in order to create an organized and controlled environment which is com- parable with the already existing built environment (in terms of infrastructure and equipment). From this controlled environment, we want to create a sense of security and acceptance which is the starting point to existing buildings, the adjacent district Erflanden, for which 2000 houses are aimed to be heated through Hydrogen.

The key challenge of the project is focused on creating new residential areas without having the need for natural gas as the key energy carrier to supply heating and to make urban areas more sustainable. Experiences from this project are also used to work on retrofit hydrogen CV boiler solutions for the existing residential areas. Subsequently, step-by-step blending tests shall be executed with the final goal: 100% hydrogen.


22

The innovation challenges

For the development of the techno-economic blueprint for heat supply by means of hydrogen in the Nijstad Oost residential area in Hoogeveen, the project developers was looking for technological and non-technological solutions and aspects related but not limited to the following:

• A hydrogen gas flow meter or monitorig system which is suitable for usage in residential environments taking into account retrofit possibilities

• Retrofit household appliances (like e.g. furnace, stove, boilers etc.) for which hydrogen can be used to operate/power them

• Cost-efficient hydrogen compression and storage solutions

• Cost-efficient electrolyser with smart power system

• Odour suitable to be mixed with hydrogen which is either divergent
(or with equal smell) from the odour applied to/mixed with natural gas

• Regulatory and legal issues dealing with hydrogen in the built environment
• Safety and hazard issues related to hydrogen production, distribution and in particular utilisation within the houses

Solution providers:
Alles Over Waterstof, Ampulz, APS BV, Bahcesehir University, D4, Deodrive Fuel Cell Energy Consultants, Dutch Boosting Group DWG, Elugie, Encon Clean Energy BV, H2planet, H2Tec Ltd. & BV, Howden Compressors, ICAMCYL, IGES, INB HYNOCA, Kiwa Multimetaal, Nproxx, PowUnit AS, Pro-Control Process Automation, STERCORE BV, Swedish Exergy AB, TDE BV io, Total Nederland N.V., UMOE ADVANCED COMPOSITES AS, Van Campen Ecotechniek BV and Yokogawa Europe BV

Tools used for Living Labs Alkmaar & Hoogeveen (N)

Tool: B2Match matchmaking and event organisation tool

The key tool used was the B2Match tool to organise both the B2B matchmaking meetings as well as the overall organisation of the event's programme. Advantages of utilising this tool are that: all information regarding the event can be found in one central place and if details in content or programme change this does not need to be communicated with all invited parties; easy communication to (filtered) participants via standard messages including action buttons; possibility to set up and work together on the website and settings; organise pre-arranged B2B meetings; share presentations etc. afterwards with all participants; gather feedback fromparticipants both about the event in general as well as on each individual meetings that took place to keep track of possible new collaborations; etc. For the development agency it was the first time they made use of the tool whilst Energy Valley had experience with it but it was very easy to learn.

Tool: Pitching

Pitches by solution providers were given at the individual workshop rounds. For each workshop we reserved three slots which means in total 9 slots per parallel workshops round and with two rounds we had the possibility to have 18 pitches. In practice, after selection by the challenge owners, there were 13 pitches provided.

Tool: One-to-one meetings with the challenge owners

After the workshops all participants could participate in the matchmaking sessions and request and plan meetings via the B2Match tool. Each participant received a personalised agenda detailing their participation and schedule of B2B meetings. On the day itself, the possibility for requesting meetings was also still open by using the free B2match app. On the app participants could also find their personal agenda.

Tool: Booklet

For the event, we also made a booklet with all key info relevant for the day including the Living Labs, the Northern Connections project, location and floor plan, solution providers, all participating organisations etc.

Living Lab Event - Blue Gate Antwerp (B)

Smart Mobility Hub: How to connect Blue Gate Antwerp with the city?

Blue Gate Antwerp (BGA) is the climate neutral business park reserved for innovative companies with a well-defined ambition: linear growth through circular operations. Together with like-minded businesses, they will activate circular flows at the micro and macro levels. This delivers cost efficient collaborations both on and off site. Businesses located on the park are committed to the eco-effective industry, in which they will produce the same qualitative end product while reducing the use of raw materials.

The site is located just next to Antwerp and it holds unique opportunities in terms of logistics and accessibility. The park can be reached by water, public transport and the road network. It is BGA's ambition to develop a mobility hub on the site, that supports an evolution to fossil free and shared mobility services for the site as well as towards the city. This entails sustainable and shared logistics between the companies, thereby reducing empty shipments, optimizing routes and creating central loading and parking spaces. The shared logistics will be used for on-site transports, as well as towards the city.

Additionally, shared vehicles can be used on site and in the city, not only by the companies but also by Antwerp residents and tourists. The flexible mobility hub on BGA will continually seek synergies between its available infrastructure and future mobility needs in the city of Antwerp. The central parking site for privately owned vehicles, might for example evolve to a night-time loading and parking bay for shared autonomous vehicles, thus alleviating parking problems in the city.

Solution providers:

Skoon, Insplorion, Autodelen.net, Solenco, E-Trucks, EnergyVille (Polfliet), Off grid testing, Ectogrid, Collectric, Hysopt, Taskforce, Dutch Energy, FluidTech, Posetron, SunOyster, UAntwerpen, Blue Heat, Nuvve, Vaasa U,
Encon, Johanneberg Science Park and CoolDH.


OMAN
© vito

The innovation challenges

Sustainable fossil free mobility

• Infrastructure requirements for new alternative fuels (electrical, hydrogen, methanol)
  - Connected grid for fuel distribution for several users (use and produce), loading point and storage solutions
  - Infrastructure needed for own fuel generation
  - Safety solutions
  - Future proof: flexible, circular construction methods for mobility infrastructure

• Fossil free fuelled vehicles - logistics: trucks, forklifts, tow trucks (for own maintenance), transport drones and cars
• Solutions to upgrade the mobility hub to autonomous transport

Organising mobility hub

• A platform for company owners: sharing information to identify synergies and optimising routes
and stimulating synergies between companies, some examples:

• 3 companies loading 1 truck for transport to the city

• On-site exchanges by loading and unloading in the same transport

• App or platform for city of Antwerp: sharing information to inform/help travellers and eserving/calling a car

• Organising autonomous transports in future

• Construction: how to make buildings and infrastructure on BGA adaptable for future changes in mobility

Living Lab Event - Green Energy Park (B)

Green Energy Park with event partner MatexiGreen

Energy Park is the result of the collaboration between the Vrije Universiteit Brussel (VUB - Free University of Brussels), the Universitair Ziekenhuis Brussel (UZ Brussel - University Hospital of Brussels), the Energy Cluster Flux50, the municipality of Asse, the Flemish Government and several companies. The park is a centre of expertise in sustainable energy systems, mobility, smart regions and healthcare technology. It offers facilities for research, development, pilot studies, showcases, education and trainings. An on-site green datacentre offers sufficient capacity to support calculations by research institutes and companies. Green Energy Park aims to stimulate strategic partnerships to develop solutions for the future. One of their research domains is sustainable energy and mobility. The park will be equipped with a low-temperature thermal grid and a large electric grid.

All buildings in the park can partake in the “CO2 neutral smart multi energy grid” by supplying and utilising energy. Excess heat from the data- centre, heat pumps, cogenerations and different renewable energy sources will be added to the grid. Energy will be stored in multiple batteri- es, electrical cars, heat buffers and underground storage. Due to the park’s location nearby a residential area, the thermal part of the grid will be extended to the residential development, in collaboration with Matexi.

The multi energy grid will consist of a (mainly) low temperature thermal grid and an electric grid. On the business park of Green Energy Park solar and wind energy are generated and will be injected in the electric grid. All companies located at the park are connected and can inject to or consume from the electrical and the thermal grid. The thermal grid will be extended form the business park to the adjacent existing busi- ness area and to the nearby newly built residential area. Also here, users can inject or consume heat. This creates a bi-directional interaction between the business park and the residential area.

Solution providers:

Skoon, Insplorion, Autodelen.net, Solenco, E-Trucks, EnergyVille (Polfliet), Off grid testing, Ectogrid, Collectric, Hysopt, Taskforce Dutch Energy, FluidTech, Posetron, SunOyster, UAntwerpen, Blue Heat, Nuvve, Vaasa U, Encon, Johanneberg Science Park and CoolDH.

The innovation challenges

Techno-economic blueprint for a CO2 neutral multi energy grid in Green Energy Park:

- **Technical set-up of the thermal grid**
  - Infrastructure for thermal grids
  - Heat recovery solutions in the datacentre
  - Bi-directional interaction with different end-users (professional and residential)
  - Bi-directional heat pumps (user as suppliers and purchaser), fuel cells, booster pumps - Heat storage solutions

- **Technical set-up of the park's electric grid**
  - Bi-directional interaction between GEP's electric grid and the national electric grid
  - ICT solutions for connection between electric and thermal grid

- **Economical set-up of the CO2 neutral grid** to develop well-balanced tariff structures with respect to the different stakeholders*, considering the bi-directional interaction with different end-users and the national electrical grid

- **Communication protocols:** steering of the grid, development of self-learning algorithms and cybersecurity solutions

- **Set up of a legal and regulatory framework:** Currently, the regulation of heat production and exchange is limited. A well-balanced framework describing the responsibilities of different stakeholders, will promote the development of thermal grids

Tools used for Living Labs
Blue Gate Antwerp & Green Energy Park (B)

Tool: One-to-one meeting with challenge owners
We used one-to-one meetings between the living lab owner (represented by 2 persons) and innovators of 20 min.

Tool: Seminars by research institutions
Some research institutes were invited as a speaker during the plenary session, but also researchers were invited as innovators, which could pitch on stage (plenary).

Tool: Webinar and video presentations
We did not organize a webinar, but we aimed to have the same outcome as this tool. We did this by calling the partners individually to talk and discuss the challenges. On one hand to make sure they understood our living lab profile, and on the other hand to start the discussion on possible solutions to the challenges. With the discussion we were able to identify interesting innovators and speakers.

Tool: Booklet
We made a booklet containing the schedule, innovator information and names of attendees. This booklet was made in order to gather all information about the event - but also, so the solution providers could get in touch with each other later on after the event.

Living Lab Event - Grangemouth, Falkirk (GB)

The UK government declared a climate change emergency in 2019 with a commitment to transitioning to Net Zero carbon economy by 2050. The Living Lab Event was a response to climate change and to rise of new industry in Scotland. The Grangemouth Industrial Complex comprises petrochemical refinery, chemicals industry hub and Scotland's busiest port. The CCU development action plan for Scotland, highlighted key opportunities for valorised CO2 as commodity chemicals, biofuels and niche products such as small-scale opportunities in the food,horticulture, feed and construction industries. Falkirk Council was seeking partnerships with which to collaborate in the informing of the future CCU business case and to directly participate in development of its strategic direction. They invited companies and institutions, solution providers of innovative and technical solutions to demonstrable the ability and expertise of their innovative products. The opportunity was for companies to collaborate with Falkirk Council and partners, at this critical development stage of their Investment Zone Growth Deal business case, to Scottish and UK Governments.

The innovation challenges

- Generation of renewable energy and/or models for provision of green energy to Grangemouth for CCU activity
- Hydrogen solutions and models for integrating hydrogen with CCU activity (at multi-megawatt scale)
- Solutions for direct uses of CO2 and uses of captured CO2 (including chemical, bio, horticultural)
- Ideas and models for infrastructure and service models required for collaborative CCU activity

Solution providers and stakeholders:

ABB, Aeon Geoscience Systems, Agile Energy Recovery (Inverurie) Ltd, Aker Solutions, Alma Hydrokultur, Baker Hughes - Turbomachinery & Pro- cess Solution, CalaChem Limited, Cambridge Carbon Capture Ltd, Celtic Renewables Limited, Cullum Ltd, Deep Branch, Biotechnology, Doosan Babcock, Eco3 Partnership Ltd, Edinburgh University, Edrington. Facilitating Change, FCC Environment, GFD Ltd, Greenskill Environmental Te- chnology Ltd, H2Tec Ltd. & BV IBioIC. INEOS FPS, INEOS Grangemouth, InVesta, Living Water Ecosystems, Limited, Maalie, NCIMB, New Energy Coalition, NiTech Solutions Ltd, Opus 12, Scottish Carbon Capture & Storage, Seawater Solutions, Sustainable Thinking Scotland CIC TWEFDA Ltd, University of Edinburgh, UrbanTide Limited and Weatherproofing Advisors Ltd.

Living Lab Event - Acorn CCS (GB)

As the UK government declared to commit to transitioning to Net Zero carbon economy by 2050.
The Acorn Carbon Capture and Storage Project is taking action. The matchmaking event was conducted in order to discuss technologies, innovations and ideas that can capture and valorise CO2, reduce emissions and develop new income streams. The Acorn Carbon Capture and Storage Project is well progressed and currently midway through the completion of Front End Engineering Design (FEED) ahead of the Final Investment Decision in 2020. The firstphase of Acorn will be operational in 2024 with the capacity to handle and sequester up to 2mtpa of CO2. Subsequent planned phases would see Acorn expand to handle 16mtpa of CO2. Most of the innovation / technical aspects of the project have already been resolved. As capacity increases Acorn plans to link captured CO2 to future utilisation points in Peterhead and Grangemouth Industrial Complex.
For Acorn to secure ongoing development and increase CO2 handling capacity, they had several innovation challenges:

The innovation challenges

• **Supply of CO2:** The recent progress on resolving the London Protocol means that captured CO2 can now be supplied in bulk across the North Sea. A key aspect of Acorn is the importation of liquid CO2 via ship into Peterhead Port, where it will be offloaded and piped to St Fergus, compressed further, piped offshore and then sequestered into the Acorn CO2 Storage Area.

• **Revenue Model:** Upon successful completion of FEED, the Acorn project will need to secure further capital investment for the first phase of the project by the first quarter of 2021. To justify the required scale of investment, the business models (including financial mechanisms with Government) for industrial capture and CO2 transport and storage are needed. The Acorn project is working with relevant Government agen- cies to accomplish this in the right time frame, but would welcome ideas on financial models that could be applied.

• **Collaboration Partners:** To implement the company's ambitions, Acorn requires to identify enterprises with interest in CO2 capture, and the road, pipeline and ship transportation of CO2. Alongside interest, innovative solutions and technology are sought, regarding both CO2 capture and CO2 transportation via the various channels.


Interreg
North Sea Region
Northern Connections
European Regional Development Fund
EUROPEAN UNION
Northern Connections
Carbon Capture & Utilisation
Response to Climate Change &
Rise of New Industry in Scotland
Edinburgh 30th & 31st January 2020
www.northsearegion.eu/northern-connections
Workshops - Round One
Workshop Name
Time

Exchanging knowledge

The main idea behind the setup and outline for the programme used at this Living Lab event was to engage companies and academia - local & international participants to exchange knowledge and explore collaboration opportunities. This event combined contextualpresentations relating to the challenges and opportunities derived from CCU in Scotland.

Alongside these, the innovation challenges were presented and further explored in workshop sessions attended by stakeholder companies/academia/government agencies. Subsequently, there were opportunities for informal networking as well as one-to-one meetings booked through the event matchmaking tool. At the matchmaking sessions, Living Lab challenge owners had fixed tables and the ability to request meetings with all participants, and vice versa. In addition, bi-lateral conversations between event participants could be booked.

Solution providers and stakeholders:

ABB, Aeon Geoscience Systems, Agile Energy Recovery (Inverurie) Ltd, Aker Solutions, Alma Hydrokultur, Baker Hughes - Turbomachinery & Process Solution, CalaChem Limited, Cambridge Carbon Capture Ltd, Celtic Renewables Limited, Cullum Ltd, Deep Branch, Biotechnology, Doosan Babcock, Eco3 Partnership Ltd, Edinburgh University, Edrington. Facilitating Change, FCC Environment, GFD Ltd, Greenskill Environ- mental Technology Ltd, H2Tec Ltd. & BV IBioIC. INEOS FPS, INEOS Grangemouth, InVesta, Living Water Ecosystems, Limited, Maalie, NCIMB, New Energy Coalition, NiTech Solutions Ltd, Opus 12, Scottish Carbon Capture & Storage, Seawater Solutions, Sustainable Thinking Scotland CIC TWEFDA Ltd, University of Edinburgh, UrbanTide Limited and Weatherproofing Advisors Ltd.

Tools used for Living Labs Grangemouth, Falkirk & Acorn (GB)

Tool: B2Match matchmaking and event organisation tool
B2Match Programme was the key tool utilised to organise this event, from pre-registration of this event to feedback from delegates, this tool effectively allowed for proper tracking, efficient changes/edits and easy navigation. User-friendly and intuitive, this tool enabled organisers to update the website & settings accordingly and allowed for better team-work with event managers.

Centrally located information made for easy changes in terms of agendas, content, etc. Changes and/or information were communicated easily to participants (filtered or otherwise) and the 'action' buttons made for easy navigation to the pages needing attention from delegates. Pre-arranged B2B meetings could be determined efficiently + tool allowed for easy sharing of presentations with all delega- tes. The B2 match phone app (available via download) made it simple for delegates to check meetings/agendas.

Apart from delegates' feedback on the event and meetings that we attended, organisers will be able to keep track of possible new collaborations via this app.

Tool: Pitching
Pitches by solution providers were given at the individual workshop rounds. We provided a total of 14 pitches for the three workshops and with two rounds we had 28 pitches

Tool: One-on-one meetings with the challenge owners

After the workshops all participants could participate in the matchmaking sessions and request and plan meetings via the B2Match tool. Each participant received a personalised agenda detailing their participation and schedule of B2B meetings.On the day itself, the possibility for requesting meetings was also still open by using the free B2match app. On the app participants could also find their personal agenda.

Tool: Booklet

For the event, we also made a booklet with all key info relevant for the day including the Living Labs, the Northern Connections project, location and floor plan, solution providers, all participating organisations etc.

WP5

WORK PACKAGE 5

The Political Level

The aim and focus of WP5
The aim of WP5 - Political and Strategic Capacity has been to support the overall aim of the project by improving the public innovation support and minimizing the political and administrative barriers for transnational innovation. On a more concrete level, WP5 has aimed at creating awareness about the role public organizations actually can play in this field. How they can push and support innovation – and solve public sector challenges.

Furthermore, WP5 facilitates the exchange of experience and knowledge between cities and regions with regards to potential for solutions from other countries, companies and clusters. The idea is to call for increased cooperation between cities and clusters/business networks.

In other words, WP5 aims to show that a coordinated, and cooperative effort from cities and clusters as well as business networks can make a difference when it comes to unlocking the potential of transnational innovation, and that coupling and creating coherence between political ambitions and potential for innovation is a smart way of achieving the goal.

▷ **Find the Northern Connections' Policy Recommendations and Tools here.**

WORK PACKAGE 5

Results and Key Learnings of WP5

Key Learning No. 1: Cities/regions can push innovation and a green transition in many ways
Cities and regions have many ways and tools to push for innovation and green transition, but Northern Connections has shown that there are especially 3 tools with scale up potential for pushing green innovation. The three tools, which revolve around the cities' and regions' use of their position and buying power to set high standards and push for innovative and green solutions, are:

a) **Converting political ambitions into measurable actions and budget,** which also can serve as the basis for comparisons and benchmark between individual cities and regions, and act as a long-term direction for enterprises and what they can come to expect of demands from the public sector. Concrete examples are the Climate Budget in Oslo and Green Bonds in Gothenburg.

b) **Positioning the city/region as a "buyer".** Cities and regions can raise the bar for innovative solutions by asking for solutions that might not yet exist. Cities and regions should position themselves as buyers in need an innovative solution where the details and technical specifications are not known, and thereby indirectly push for innovative solutions. Parallel to this, cities and regions should create an openness that allows companies and stakeholders interested in testing/providing solutions to the challenges to contact the city or region - regardless of geographical position.

WORK PACKAGE 5

c) **Innovative Public Procurement.** Companies can test their solutions to city challenges together with the public sector providing foundation for transnational growth possibilities. Innovative solutions to city service delivery and challenges are not always found locally. Solutions can be found in cooperation with companies from other regions and the purchaser can, during the market dialogue process benefit from including companies from other regions/countries as well.

Opening for innovation partnerships with both local companies and companies from other countries provides opportunities to the local companies for entering collaboration and innovation partnerships foreign companies.

In this process, it is advantageous to involve the relevant cluster organization to identify the companies – locally and abroad. All three tools show that political ambitions definitely can be a driver for innovation and green transition, especially when cities and regions make sure to be open to new ideas and accessible for external partners and providers.

In which way is your city green?

Cities set visions and direction for the green economy transition through these three tools. We have possibilities to set demands and priorities. The development of innovative green solutions can be pushed with cities as the drivers.

This is also a way of defining how your city is green and sustainable. By acting as drivers for innovative solutions we simultaneously define what we mean, when we as individual cities talk about green growth and transition. We show our green DNA - where we stand out from other cities as well as where we have cooperation potential.

WORK PACKAGE 5

Key Learning No. 2: Living Labs are efficient for cooperation between cities/regions and clusters/business networks
Living labs help cities/regions and clusters/businesses in learning about the potentials already existing in the market. The living lab approach proved valuable /to be an argument to be applied when catching organizational and/or political attentionWe have showed that a coordinated effort and close cooperation between cities/regions and clusters/business networks can make a difference and lift internationalization, new market potential, new solutions for public challenges.

Key Learning No. 3: Share knowledge
Cities and regions face similar challenges with regards to the green transition and push for transnational innovation. There are so many ways in which cities and regions individually try figure out how and what to do to overcome the challenges within existing rules of i.e. procurement and tender. Inspiring one another with our experiences can help cities and regions to reach new levels of green transition.This can also help to break down the obstacles which lie within the organizational culture and codes of practice.

Key Learning No. 4: Differences and diversities create innovation power
To some degree differences and diversities between cities/regions might reduce the prospects for working together and creating new knowledge together, since the starting points and individual circumstances are too different. We have, however, learned that innovation power often will benefit from differences and diversities, if you adapt the solutions and ideas from other cities/regions to your own circumstances. With differences and diversities of cities/regions follow an abundance of solutions, which can be inspiring for everyone. Transnational cooperation is therefore quintessential for innovation power.

WP6

WORK PACKAGE 6

Living Labs

The aim and focus of WP6
The key focus of the activities within WP6 have been centered around the concept of the Living Labs, organising events on the Living Lab cases and bringing together innovation challenge owners with solution providers from all over Europe to try and connect and initiate new business- and innovation collaborations.

There is no standard definition of the concept of a Living Lab. It has been defined as a methodology, an organization, a system, an arena, an environment, and/or a systemic innovation approach. In general, Living Labs deal with user-centered, open innovation ecosystems and often operate in a territorial or regional context. They integrate research and innovation processes for user-driven open innovation, involving companies, researchers, public organizations, users and others.

A Living Lab involves four main activities:

1) Co-creation: Co-design by users and producers

2) Exploration: Discovering emerging usages, behaviours and market opportunities

3) Experimentation: Implementing live scenarios within communities of users

4) Evaluation: Assessment of concepts, products and services according to socio-ergonomic, socio-cognitive and socio-economic criteria

WORK PACKAGE 6

Within Northern Connections, our approach on Living Labs is a bit different and very much focused on concrete innovation challenges for which solutions are demanded. We define Living Labs as real life environments like demonstration and investment projects that are facing concrete energy related challenges for which innovative solutions are requested and can be provided.

The Living Lab should be open to transnational solution providers; have investments already taken place and/or planned; and furthermore, there needs to be public and private engagement. Our main goal has been to bring together these stakeholders in order to stimulate new innovation collaborations on a transnational level.

This is done via so-called open solution pitches at each Living Lab event, where innovative SME's from the North Sea Region are engaged by the Northern Connections partners based on the formulated innovation challenges.

WORK PACKAGE 6

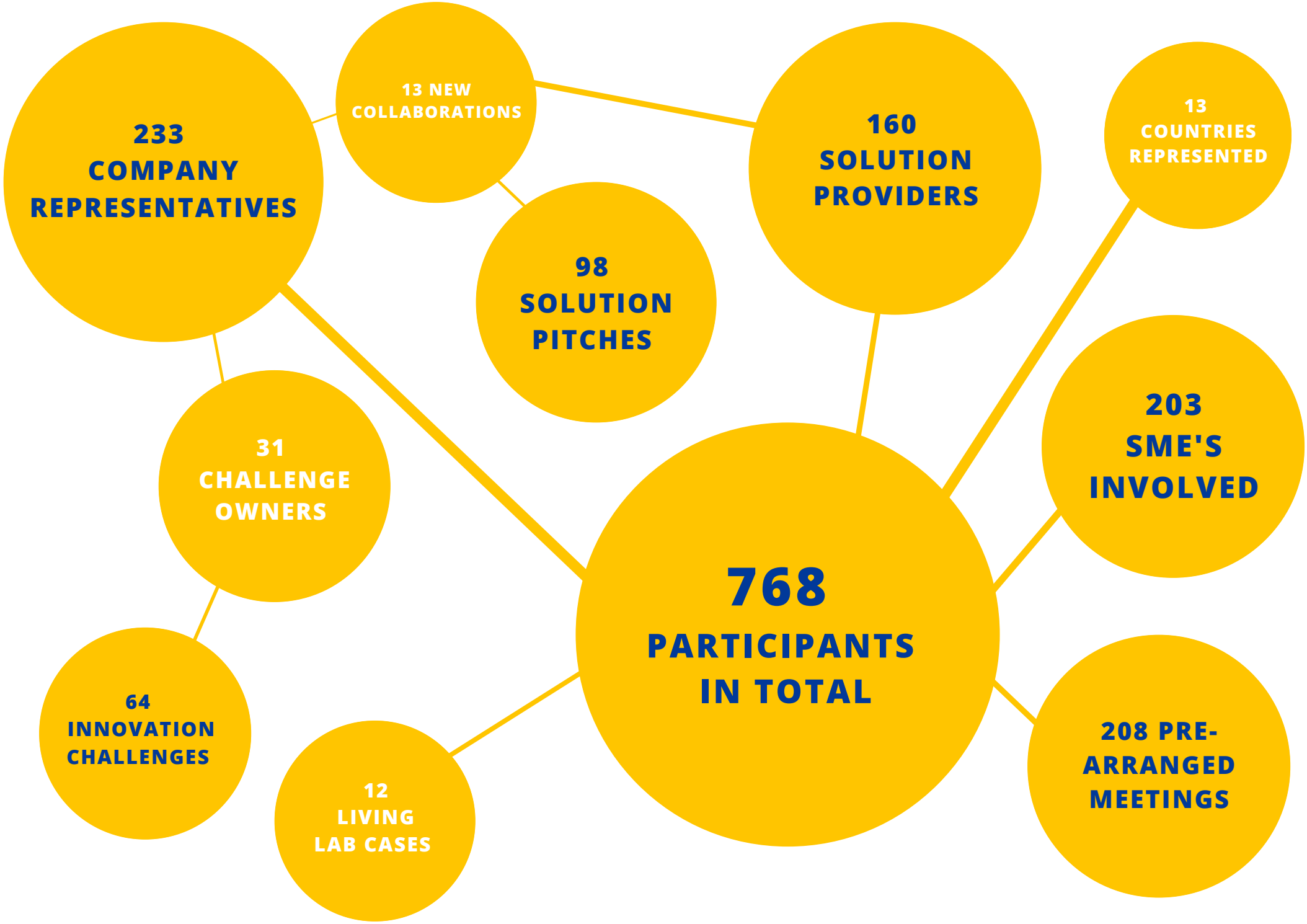
Results and Key Learnings of WP6

As can be seen in the overview of statistical data, the Northern Connections partners have organised 7 different Living Lab events thus far which took place in each respective participating region. There are currently even two additional Living Lab events planned in Denmark and Sweden.

The topics and themes of the different Living Labs cover a broad range of energy related aspects. These include smart grids, mobility, sustainable construction materials and processes, renewable gases like hydrogen and green gas, solar PV, sensor technology, smart homes and buildings, heating networks, and Carbon Capture Utilisation and Storage.

The concept and approach to organise a Living Lab event has been an exciting but also a complex and challenging endeavour for the Northern Connections partners. None of the partners had explicit experience in both understanding exactly what the concept of a Living Lab meant or could mean in the context of the project as well as organising a Living Lab event.

However, this has been a key learning point, where the project partners shared their experiences, best practices and relevant tools that could be utilized to optimally and most efficiently organise these events. Before any event was to be organised, each of the partners had to identify relevant cases, projects and sites which could potentially serve as a Living Lab case. These have been compiled into one large inventory containing 170 potential Living Lab cases for which events could be organised. Subsequently, 40 out of these have been preselected as high potentials which met all of the requirements for a Living Lab.


233
COMPANY
REPRESENTATIVES
13 NEW
COLLABORATIONS
160
SOLUTION
PROVIDERS
13
COUNTRIES
REPRESENTED
98
SOLUTION
PITCHES
31
CHALLENGE
OWNERS
203
SME'S
INVOLVED
768
PARTICIPANTS
IN TOTAL
64
INNOVATION
CHALLENGES
12
LIVING
LAB CASES
208 PRE-
ARRANGED
MEETINGS

WORK PACKAGE 6

Once the Living Lab cases were selected, it was key to discuss and align with the challenge owners in charge of realising the projects and getting them on board to understand what a Living Lab is and the service Northern Connections could offer them by engaging innovative SME's which are able to provide solutions.

As project partners we have learned a lot from each other about the whole process from identification to alignment with challenge owners, inviting SME's and organising these events. In the end we have been very successful with seven Living Lab Events, where over 700 participated from 13 different countries of whom 200 SME's, almost 300 meetings were pre-arranged, 100 pitches given and almost 20 new international collaborations have been initiated.

One of the key advantages and appreciations mentioned by both challenge owners and participating SME's has been the unique opportunities created in which supply of innovation and solutions was provided based on clearly formulated demand through innovation challenges in real life energy demonstration- and investment projects.

TIMELINE LIVING LABS

November 2018
The first Living Lab was held in Esbjerg, Denmark with 25 participants.

> Read More

November 2018
The second Living Lab was held in Oslo, Norway with 80 participants.

> Read More

May 2019
The third Living Lab was held in Gothenburg, Sweden with 150 participants.

> Read More

June 2019
The fourth Living Lab was held in Hamburg, Germany with 88 participants.

> Read More

September 2019
The fifth Living Lab was held in Alkmaar, The Netherlands with 122 participants.

> Read More

November 2019
The sixth Living Lab was held in Brussels, Belgium with 150 participants.

> Read More

January 2020
The seventh Living Lab was held in Edinburgh, Scotland with 153 participants.

> Read More

September 2020
The eighth Living Lab will be held in Denmark on the 24th of September as an online session.

> Read More

November 2020
The last Living Lab Event will be announced - follow our website for more information.

> Read More

Read more on our webpage:
www.northsearegion.eu/northern-connections

Follow us on Twitter:
@NorthseaConnect