

EnergyLab Nordhavn Newsletter

Another busy year for the EnergyLab Nordhavn project has come to an end. The project has been extended so that it now runs until end of October 2019 which allows for one more heating season (2018/2019) as well as necessary analysis, and tests of a few more solutions.

2018 became the year where the showroom inaugurated a year ago realized its potential hosting numerous events and welcoming more than 70 delegations including ministers and mayors from all over the world.

The end of 2018 also means that we are about to enter the final year of the EnergyLab Nordhavn project. We look forward to continue sharing our results with you and hope you will join us for some of our events during the spring and fall 2019.

As a small Christmas treat we have prepared two EnergyLab Nordhavn Videos. More will follow on our website in the Spring so stay tuned. In the [first film Anne Skovbro, CEO, By & Havn and Anders Bjarklev, President, DTU](#) give a short introduction to the EnergyLab Nordhavn project. In the [second film Danfoss and DTU Mechanical Engineering](#) explain why they are part of EnergyLab Nordhavn.



A new meeting place for Smart Energy professionals

A year after the official opening of the EnergyLab Nordhavn Showroom and EnergyHub it is fair to say it has been a success. As mentioned earlier EnergyLab Nordhavn has welcomed more than 70 delegations in the showroom and close to 4000 energy professionals have visited the showroom during the last year. Also the EnergyHub has proven to be a success and today several companies are located in the EnergyHub.



The showroom and the EnergyHub also offer shared workspaces that can be used by all project participants in conjunction with project meetings and other activities at Sundmolen. This setup has proven useful and allows for co-creation within the project and with external collaboration partners.

Nordic Energy Experience

In May 2018 the EnergyLab Nordhavn project took part in activities related to the Nordic Clean Energy Week. Together with the Danish Society of Engineers (IDA), Association of Nordic Engineers (ANE), By & Havn, Danfoss, ABB and Urban Help the showroom hosted numerous activities in a collaboration called Nordic Energy Experience.

During the five days more than 500 people from all over the world visited the EnergyLab Nordhavn Showroom for various events. Our main event was the official Mission Innovation Smart Grid Workshop where close to 90 people participated including several Ministerial representatives.



Official handover of the Joint Statement from Mission Innovation IC#1 Smart Grids

The purpose of the workshop was to gather decision makers, experts and others with interest in intelligent energy systems to discuss the latest advancements around the world, innovation priorities and identify international collaboration possibilities, business opportunities as well as innovation potentials.

[A joint statement](#) was handed over to government officials from Denmark (Kristoffer Böttzauw, Deputy Permanent Secretary, Danish Ministry of Energy, Utilities and Climate), Sweden (Rémy Kolessar, Director, Research & Innovation, Swedish Energy Agency), India (Harsh Vardhan, Union Minister for Science & Technology and Earth Sciences, Environment & Forests) and Italy (Stefano Queirolo Palmas, Ambassador of the Republic of Italy to the Kingdom of Denmark).

The event really proved the strength of the showroom and the E-hub surrounding it, and has inspired a long list of events, many of which have been completely unrelated to EnergyLab Nordhavn.

Sharing smart city experiences

Ever since the EnergyLab Nordhavn project started in 2015 it has experienced a massive interest from both Denmark and abroad. As a public funded project it is of course part of our purpose to share knowledge and experiences but we also expect it to be good business for our project partners. A good example is an event in Nordhavn for a smart city delegation from Ireland on 23 November 2018.

The purpose of the visit was to share our experiences as a smart city project. Ireland is expecting to increase its inhabitants with 1 million people before 2040 – most of those will be living in the four largest cities of Ireland. Sustainable urban energy



Meeting with a smart city delegation from Ireland

solutions for both new and existing neighborhoods will therefore be in high demand.

The group from Ireland consisted of a mix of city planners (engineers and architects) as well as local government officials and developers. Several of the project partners participated - ABB, By & Havn as well as Balslev. The group met in the EnergyLab Nordhavn showroom followed by a short guided tour in Nordhavn to see the demonstrations after which the session ended with a one hour workshop where participants were to define the obstacles towards implementing the same solutions in Irish cities. One of the main purposes of the visit was of course to showcase the competencies and expertise of our partners to initiate further collaboration.

We hope to see new Danish Irish collaborations and perhaps similar projects in Ireland over the next years.

Successful demonstration of thermal storage in buildings

During the heating season 2017/2018 HOFOR has together with researchers from DTU carried out demonstrations in 14 Nordhavn buildings with the purpose of utilizing buildings for short term thermal storage to reduce peak load production in the district heating network. Based on positive findings from the demonstrations in EnergyLab Nordhavn HOFOR has started a larger roll-out of the concept in a down town area of Copenhagen.

In the spring of 2018 the FlexHeat heat pump system at the Cruise Ship Terminals in Nordhavn was finalized and put into operation. In the 2018/2019 heating season the system will be optimized and various system configurations will be tested to demonstrate the benefits of the integrated FlexHeat energy system based on a heat pump, electrical boilers and thermal storage.

Read more about other of the demonstrations [here](#).



Do you want to learn more about thermal storage or the FlexHeat contact Kristian Honoré, Work Package Leader, HOFOR.

FlexHeat heat pump installed in the Cruise Ship Terminal in Copenhagen

Application of the grid connected battery

The grid-connected battery, operated by Radius, has been in operation since spring 2017. Since then tests have been carried out with the primary application: peak shaving of the general load on the 10 kV grid. In addition, the battery management system is also designed to utilize the spare battery capacity for trading on the reserve market in order to demonstrate a positive business case.

The heat booster substation

An important element of the project is the demonstration, led by Danfoss on the Heat Booster Station (HBS) for ultra-low temperature district heating. It is now in operation in *Havnehuset*, supplying 22 flats in a multifamily building with domestic hot water and domestic hot water circulation. Tests have shown that the electric power consumed by the two heat pumps amounts to a range of 11-17% of the total heat supply to the system, depending on the domestic hot water consumption. The electric load shift potential is limited to app.12 kWh/day, whereas the district heating load shift potential is app.120 kWh/day, which is in the same range as the load shift potential based on the buildings passive thermal capacity relating to the heating system.



Torben Ommen, DTU, explaining the HBS concept to Sui Zhenjiang, Deputy Mayor of Beijing in May.

Nerve Smart Systems will take over from CleanCharge

CleanCharge Solutions is in the process of being merged into its sister company, Nerve Smart Systems. This will strengthen the project activities through a direct involvement of Nerves expertise in electric mobility and energy storage solutions. Nerve Smart Systems will work for a greater and more optimized integration of the already established charging stations for electric vehicles and we will drive development on electric mobility to new levels.

Nerve Smart Systems is currently working on the patent pending EU funded revolutionizing battery control system, Nerve Switch(r) that will result in best TCO, safety and flexibility of battery systems. Nerve Switch (r) will be integrated in the companys 350kW CCS battery buffered charging stations and in future smart grid energy systems.

Nerve will continue the work with the EV charging infrastructure established P-hus Lüders. The latest progress is the quick chargers that are operating with quarterly settlements based on the business case approved by By & Havn.

EnergyLab Nordhavn awarded with the Danish ‘Energi og miljøprisen 2018’

In March EnergyLab Nordhavn project was awarded with this year’s Danish “Energi og miljøprisen”. The award was presented to a candidate who has achieved substantial results and has increased the public knowledge of energy topics. Read more [here](#).



Kristian Honoré and Christoffer Greisen accepted the award.

Project Meetings

The annual project seminar in September included discussions on the roll out for the flexible heat consumers and the opportunity that the project has to inform the planning of Levantkaj. It was of course hosted in the project showroom on Sundmolen.

The advisory board gathered, also in September, and the advice included a straightforward recipe from ZESO architects on how to package and convey the results and findings from the project to support international business development - a concept that is being piloted towards visitors from Dublin and Limerick.



The Work Package Leader Group meets every month to coordinate the work across work packages. Here assembled at the meeting on 15 November 2018.

Data

During 2018 the Energydata.dk – the data warehouse solution for EnergyLab Nordhavn was launched. A number of data interfaces are implemented and below data are now available at Energydata.dk:

- Heat meter readings from HOFOR
- Smart Power meter readings from RADIUS
- EV charging at the parking house
- Detailed data from 30 apartments in Frihavnstårnet and Sundmolen
- A Danfoss heatbooster solution for ultra-low district heating
- Actual weather data in Nordhavn
- Detailed weather forecast for Nordhavn
- CO2 information
- Power Grid information
- Power spot prices

In addition to the above data interfaces, a generic API for sending data to the energydata.dk is available and has been used to collect data from a fuel-shift test and live implementation.

A simple GUI is available in the energydata.dk and data can be exported for further off-line analysis. This off-line analysis is complemented with an API making it possible to select data from the energydata.dk to an application. The first demonstration where this will be used is in an enhancement of the fuel-shift installations. An API is available in the Energydata.dk making it possible to send control signals over the KNX protocols to control devices in the connected apartments. This is being utilized in a demonstration to control the temperature set points in different rooms in a number of apartments

Outreach

The download section of the project website has expanded significantly during the past year. Research and conference papers can be downloaded as well as deliverable reports and progress reports from the work

packages. As the project enters the concluding phase, the focus will be on securing stakeholder value from the project. In other words ensuring that the results and findings are anchored with the project partner organizations or outside the project consortium if that is relevant. We get a number of relevant requests for such collaboration and are treating these on a case-case basis. Go to the [EnergyLab Nordhavn website](#) for more information.

A few examples of research done this year:

Allocation of investment costs for large-scale heat pumps supplying district heating (Henrik Pieper):

New correlations for investment costs of large-scale heat pumps (HPs) connected to district heating were developed based on 26 built HP projects, 3 planned projects and 12 offers of HP units. The total costs were divided into: the HP unit itself, heat source, construction, electricity, consulting and others. For the heat source, the costs were further divided for: ambient air, flue gas, groundwater, industrial excess heat and sewage water. The results showed that the specific investment costs decrease for larger capacities, that the investment costs differ depending on the heat source and that 46% to 62% of the investment costs was placed on other parts than the HP itself. The developed cost correlations may provide help during the planning process of new large-scale HP projects to decide among different available heat sources and to estimate the expected investment cost. [Read more here.](#)

Feasibility of heat pumps supplying district heating systems - case study for Austria and Denmark (ISEC conference 2018, Graz) (Wiebke Meesenburg):

An economic analysis was conducted; showing that district heating supplied by central heat pumps is economically feasible compared to individual heat supply from air-to-water HPs down to low linear heat demand densities (LHDD). The economic benefit increased with increasing LHDD, i.e. less energy. The reduction of seasonal peaks in low energy buildings benefited the economic feasibility of ambient source HPs. A reduction in electricity cost would decrease the LCOE of individual unit's more than central units in heat-sparse areas (without a priori existing DH network). An analysis of the current policies in place showed that the implementation of large scale HPs benefits from tax reductions on electricity, research and dissemination activities, the non-profit regulation and the condition of socioeconomic feasibility in Denmark, while the Austrian subsidies for biomass based units is a barrier. [Read more here.](#)

Demand side management in urban district heating networks (Hanmin Cai)

Based on research from the EnergyLab Nordhavn project a new paper from PhD student Hanmin Cai explains how flexible energy consumption can save up to 10% of energy costs without compromising the comfort level. [Read more here.](#)

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Happy New Year to all Energy Enthusiasts