



CLUSTERING REMOTE REGIONS FOR ENERGY RESILIENCE AND GROWTH

# Energy Practice and Service Inventory

The partners in the GREENER project “CLUSTERING REMOTE REGIONS for ENERGY RESILIENCE and GROWTH” have worked together for a year, combining the efforts of 3 Northern Periphery and Arctic Programme funded projects ([SMARCTIC](#), [LECo](#) and [h-CHP](#)) to address a common challenge: increasing awareness and transferring knowledge about the latest energy solutions to public authorities, communities and businesses across the NPA area.

The project is led by the [ERNACT network](#) (Ireland) with close cooperation from [Centria University of Applied Sciences](#) and [University of Oulu](#), both in Finland.

The partnership has collated an inventory of Good Energy Practices and Innovative Energy Services, including excellent examples of wind, solar, snow, ocean, and geothermal energy systems, and valuable energy services for both individuals and businesses.



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Northern Periphery and  
Arctic Programme

2014–2020



EUROPEAN UNION

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European Regional Development Fund

# ***GOOD ENERGY PRACTICES***

## ***Seasonal thermal energy storage***

The pilot project called “EVAKOT - Best practices and tools for energy storage and usage optimization” built a pilot installation of seasonal thermal energy storage.

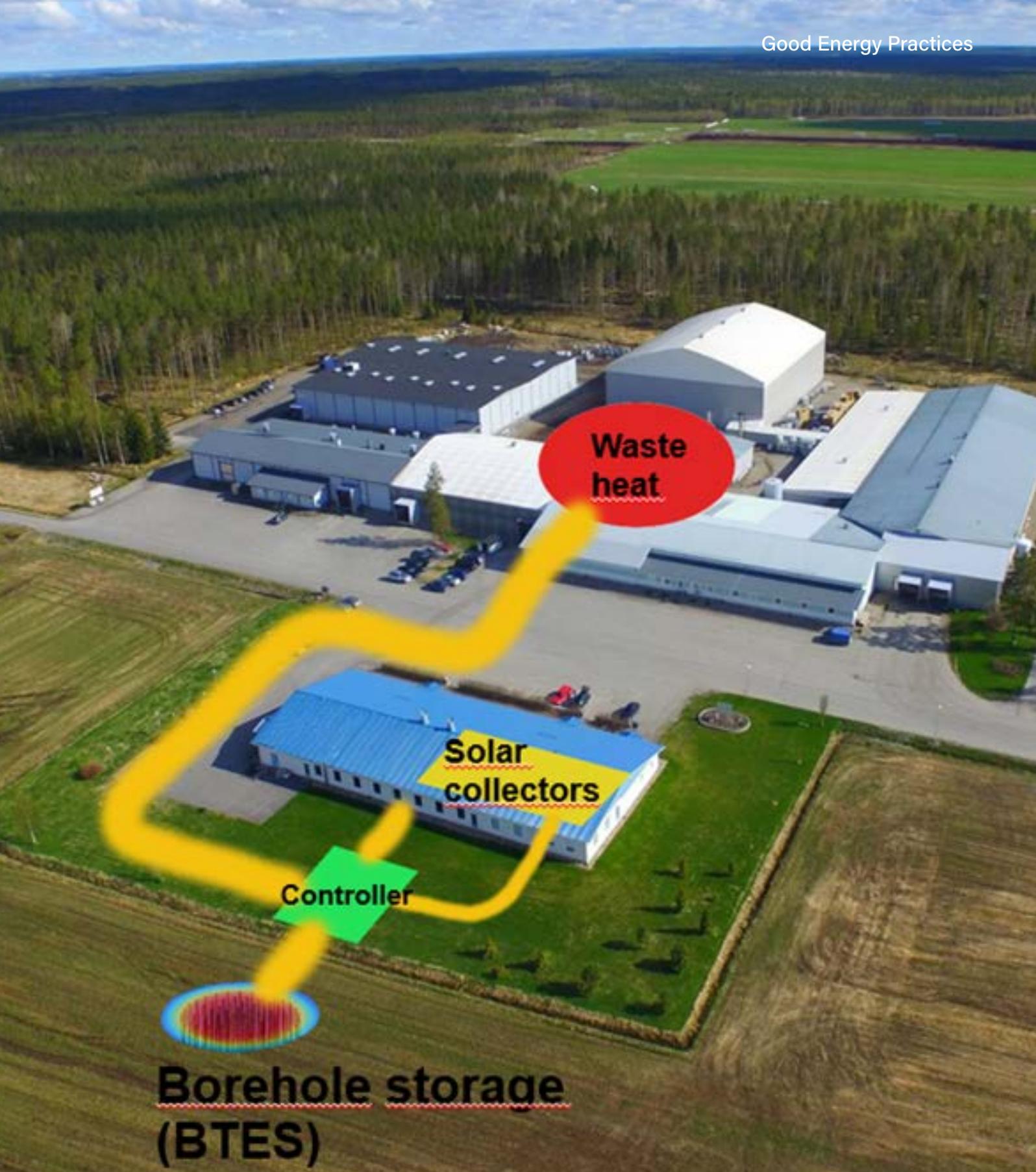
A large-scale Borehole Thermal Energy Storage (BTES) was installed in a factory that had excess waste heat during the summer months. This waste heat is stored in the ground for several months and extracted during the winter months to heat factory buildings.

### **OUTCOMES**

The customer’s overheating of the factory building during the summer months is solved.

The customer’s external energy demand for heating during the winter months is reduced.

Heliostorage Oy has tested their solar collector, made technical changes and the product is now sold commercially.



## CONTACT

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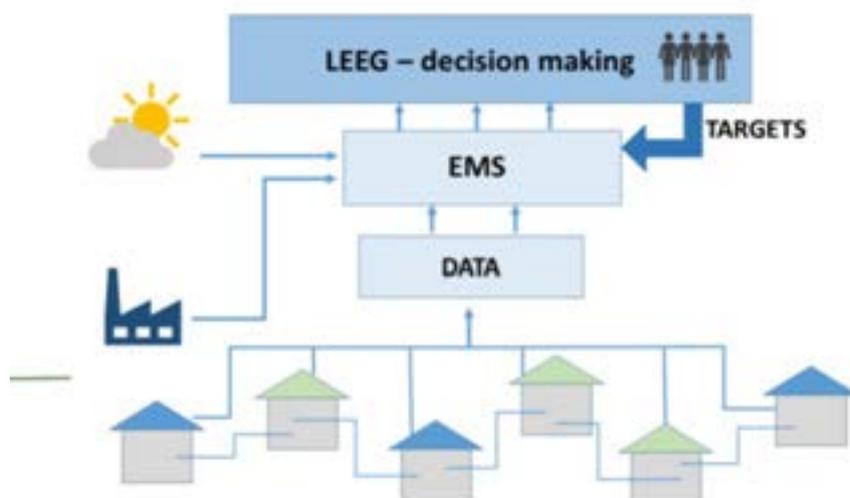
# Energy Management System

The aim of this energy efficiency action was to unify the monitoring of energy consumption and increase the energy and cost efficiency by utilizing the energy management system (EMS) in Sievi municipality, and to reach the targets of the Sustainable Energy Action Plan.

The EMS combines the information received from various energy / heat / water / ventilation consumption measurements, databases and digital systems, and controls the building automation optimizing and improving the operational efficiency. The maintenance data produced about the building technology by the EMS can be utilized also to foresee a need of repairs contributing a shorter out-of-service time. The EMS produces also reliable data supporting a long-term planning of energy investments. The system furthers energy efficiency actions in Sievi by supporting the decision-making of the local energy efficiency group, LEEG.

## OUTCOMES

According to the estimations being based on the use of the EMS, the total cost savings in electricity, heat and water consumption will be app. 70 000 € in Sievi municipality in five years. Taking into account the greenhouse gas emissions produced by the heat and electricity production, the decrease of CO<sub>2</sub> emissions will be more than 135 000 kg. The carbon footprint of energy consumption will be decreased 5 %.



## CONTACT

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## Liquefaction of biogas



The aim of the project is to develop a new technology that will enable the small-scale liquefaction of biomethane in a cost-effective way. The liquefaction solution is based on the principle of cryogenic processing, which utilizes very low temperatures instead of high pressures to condense the gas.

Theoretical calculations show that liquefaction with cryogenic method is profitable. The unit is expected to consume approximately 2.5 - 4.4 kg of liquid nitrogen per 1 kg of liquid methane.

It is efficient to store and transport methane in liquefied form. Small-scale production can bring efficiency to production and create new business opportunities to primary producers.

## CONTACT

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## *The UK's biggest community wind farm*

Point and Sandwick Trust was established after a series of public meetings in 2005 and went on to build, and now operate the UK's biggest community wind farm, Beinn Ghrideag. The 9MW wind farm is the largest community wind farm in the UK and is built on common grazing croft land on the Isle of Lewis.

### OUTCOMES

The £14 million project is 100% community owned and currently produces approximately £900,000 a year in net profit for the local community. Once capital costs have been repaid, it is expected to generate £2 million a year for community projects on the Western Isles.

### CONTACT

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## Irish Street Community Centre Solar PV and Battery Storage

The Irish Street Pilot was funded through the SECURE Interreg programme in 2019 to trial how solar and battery storage could work in practice within a community centre building. The battery storage system was installed by The Electric Storage Company and the data analysis from the project was used as part of a fit and tell study developed by the company.

### OUTCOMES

The installation of the system has seen a reduction of electricity consumption of between 30% in the first year and 40% in the second year. The building can generate the majority of its electricity consumption during the summer months.



### CONTACT

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## Ocean Heat

10 MW heat pumps in Vestmannaeyjar island were installed in 2018. Seawater is used in those heat pumps. The seawater is cooled down and heat is delivered in fresh district heating water at 77°C to customers on the island.

### OUTCOMES

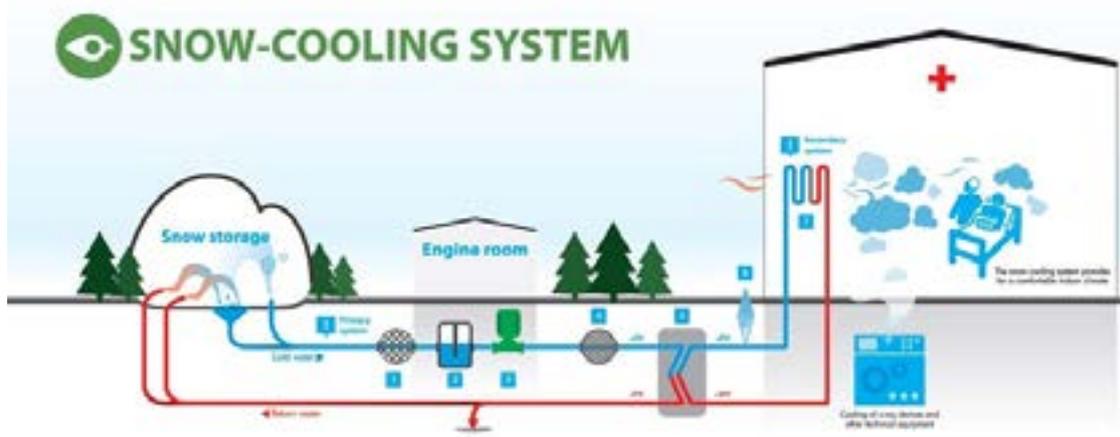
The project has been running since 2018, saving 40 GWh electricity annually.



### CONTACT

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# Snow Cooling



The Sundsvall hospital is a massive structure that covers about 190000 m<sup>2</sup> and, naturally, requires a heavy-duty cooling system in order to maintain a comfortable indoor climate as well as keeping a variety of technical equipment from overheating. The county council of Västernorrland committed to a more environment-friendly and energy-saving alternative in making use of a natural resource that is easily available in the north of Sweden, namely snow.

Snow collected from the streets of the Sundsvall Municipality is collected and stored in an insulated snow pool. In the summer, melted snow is pumped through a heat exchanger, where the water cools the technical equipment as well as the ventilation air which passes through the hospital.

## OUTCOMES

This solution has decreased the hospital's use of electricity for cooling from 900 MWh to 65 MWh a year, which is a decrease of over 90 percent.

Snow cooling offers three major benefits. First of all, electricity consumption is greatly reduced. Using snow to cool the hospital has reduced the need for electricity for cooling by more than 90 percent. The energy requirement to cool the hospital used to be 900 MWh per year but snow cooling requires only 65 MWh for pumps. Secondly, no Freon-based refrigerants are used and thirdly, polluted snow is cleared away.

## CONTACT

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## ***Solar collectors in a detached house***

Solar collectors were installed on the roof at the site. The detached house was built in 1985 and has a floor area of 125 cubic meters. The house has a water-circulating underfloor heating and a wood boiler. Due to the collectors, it is no longer necessary to produce hot water by other methods during the period from late spring to early autumn. The collectors work as well in the winter when the sun is shining. Previously, domestic hot water was produced solely by burning wood in a boiler also in the summer. The example shows that solar collectors apply to Finnish conditions as well.

### **OUTCOMES**

The main benefit is that there is no longer a need for burning wood in the boiler for producing domestic hot water during late spring to early autumn which increases living comfort. This also saves wood for the actual heating season about 2 cubic metres in a year.

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## Ground source heat pump in a detached house

The house has had a ground source heat pump since 2008. After the failure of the first pump, the house was heated by direct electric heating and wood for a little over a year until a new ground source heat pump was installed in the house. These steps are clearly visible in the measurements of electricity consumption.

In January, with direct electric and partial wood heating the consumption was 6,8 kWh while average temperature being -12.8 degrees of Celsius. With approximately the same average temperature in a month consumption with the old and the new heat pump were 3,6 kWh and 2,9 kWh. This clearly shows the benefit exploitation of geothermal energy.

### OUTCOMES

To date, the new pump has delivered 58 MWh of the heat of which 8 MWh for domestic hot tap water and used 16 MWh of the electricity. Thus, the pump's coefficient of performance (COP) is 3.625. If a house has underfloor heating instead radiators, heating water temperature is lower, and COP would be better.

Payback time of the new pump, in this example, is calculated to be less than the warranty time, which is six years, but there was no need to invest in a new bore-hole.



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# ***INNOVATIVE ENERGY SERVICES***

## ***Gas Conversions for Vehicles***

ECO Concept offers total energy service solutions including addressing soaring fuel costs by converting petrol vehicles to bi-fuel and diesel vehicles to dual fuel.

In practice, it is possible to install a gas conversion in most cars. Most common conversion is to make a petrol-engine to work with gas. In diesel fuelled cars, diesel is needed to ignite the gas. Mixture is typically half and half. An aftermarket conversion is becoming increasingly common due to rising fossil fuels prices.

ECO Concept has lengthy experience in turning diesel and petrol-powered vehicles and machinery into versions that run on gas. The services are fully compatible with the present goals of transitioning from fossil fuels to locally produced biogas. A biogas conversion for a petrol-fuelled car costs starts EUR 3000, depending the size and type of a gas tank. After a warm-up drive of a few kilometres, a petrol-car can run completely on gas and the switch of fuels is not even noticeable. Vehicles of good quality are being used in heavy transport. Conversion to use by gas means that transport entrepreneurs would need to use only half as much expensive diesel fuel as they did before. Taxation and the low price of fuel have previously been impediments to biogas vehicles from becoming more common. Now the situation is reversed, and requests for biogas alterations are more common.



## CONTACT

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***Energy Counselling Service for organisations, households and companies***

Local and municipal energy counselling is a free of charge service, funded by the Swedish Energy Agency. It provides households, companies and organisations with independent energy advice, mainly by email, phone or direct consultations. It is key to empower those who are seeking advice to make sound decisions and a focus lies on an integrated approach to energy efficiency and renewable energies.



### Energy and climate consultancy

Are you thinking about your energy use? Maybe you want to change the lighting, get a new heating system or buy a new washing machine?

With us at the municipal energy and climate advisory service, you get tips and advice. Completely free and independent. Contact us and we will be happy to tell you more.

## CONTACT

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## ***Affordable Warmth Scheme***

Affordable Warmth Scheme funded by Department of Communities Northern Ireland and Northern Ireland Housing Executive to improve energy efficiency in homes and address fuel poverty for home owners in low-income households. Measures include cavity wall insulation, loft insulation, hot water jacket, draught proofing, boiler and radiator replacement, installation and commissioning of a heating system.

### **CONTACT**

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## ***Motiva - Sustainable Development Company***

Motiva Ltd. is a state-owned development company that promotes the efficient and sustainable use of energy and materials to businesses. Motiva has been very successful in implementing energy services and advising to the general public in Finland. Many regular citizens, and especially businesses refer to Motiva when some energy related topic needs to be solved. The good reputation has been slowly developed over many years, and due to continuous funding from the government, a real institution of knowledge has been created.

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## OkoFEN Pellet Boilers

ÖkoFEN is a specialist in pellet boilers and one of the leading suppliers of different solutions for various application areas based on renewable energy sources. From economical and convenient pellet heating systems through to space-saving pellet tanks. A typical pellet boiler replacing an oil boiler saves 8.5 tons of CO<sub>2</sub> in a year which is as much as 45 000 km by car.

A typical pellet boiler replacing an oil boiler saves 8.5 tons of CO<sub>2</sub> in a year. With "zeroflame" technology, particle dust emissions are 1-2 mg/m<sup>3</sup> (13% O<sub>2</sub>); compared to air driven wood log boiler dust emission could be as high as 150 mg/m<sup>3</sup>.



## CONTACT

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## ***Finnish Home Owners' Association***

The majority of Finns want to live in their own home. The Home Owners' Association wants to promote small housing and bring more real options to Finnish housing policy.

The Association honours individual housing, a sense of community, and comfortable living environs. Being part of larger coalitions like the International Union of Property Owners (UIPI) and benefiting from the co-operation of the Nordic brother organisations - the Swedish and Norwegian home owners' associations Villaägarnas Riksförbund and Huseiernes Landsforbund - we are able to receive crucial information beforehand and are thus able to make initiatives early on in the process. International co-operation is the way to knowledge and results.



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