

1. <a href="#">MID SWEDEN UNIVERSITY</a> History Research centres Interesting projects	6. <a href="#">PROCESSUM</a> Biorefinery of the future Örnsköldsvik	11. <a href="#">Ånge invests in local anchoring of wind power</a>
2. <a href="#">Östersund Solar Park</a> Jämtkraft and Östersundshem	7. <a href="#">HYDROGEN</a> Jämtkraft	12. <a href="#">SCA Biorefinery</a> Östrand
3. <a href="#">Absolicon demo plant solar park District heating Härnösand</a>	8. <a href="#">Biogas Production In Mellersta Norrland</a>	13. <a href="#">Biofuel Region</a> Pole into town and country SiSL
4. <a href="#">Energy Valley Sollefteå</a>	9. <a href="#">Bridge Innovation</a> Digitalisation Sundsvall	14. <a href="#">Wind Power Centre in Hamnerdal</a> Developing the business sector in connection with wind power construction
5. <a href="#">Permascand</a> Ånge	10. <a href="#">Electricity in the north</a> Open electricity grid strategy	15. <a href="#">Technology development in forestry</a> Bracke and Elforest

Appendix to discussion paper Renewable energy Mellersta Norrland – ongoing interesting activities in Mellersta Norrland – May 2021



Mittuniversitetet

1. MID SWEDEN UNIVERSITY ; [www.miun.se](http://www.miun.se)

## A network university

The strategic work to establish Mid Sweden University is described on the University's website under the heading "History"; [History \(miun.se\)](http://www.miun.se)

Mid Sweden University started on 1 January 2005 after a long-term strategic work by actors in both Västernorrland and Jämtland. How it happened is a good illustration of how to work together to achieve a common vision. It is well described on Mid Sweden University website.

Although Mid Sweden University is a young university, there were several other programmes and initiatives that over the years chiseled out the areas of strength the regions have. In 1842 a navigation school for officers and sea captains was established in Härnösand and in the same year it was decided to also place a folk school seminar in Härnösand. The 1856 Forest Committee proposed "Promoting better forest management", which included a proposal for forest schools to be set up in Sweden. One of the first to be formed was Skogsskolan i Sillre, 1861. In 1897 it was moved to Bispfors and in 1970 forest schools were converted into forest institutes with forest technician training. Bispfors/Bispgården became one of two such forest institutes.

During the middle of the 20th century, many forces worked to strengthen higher education in Mellersta Norrland. However, Umeå became the one that got universities and Sundsvall and Östersund continued to collaborate with Umeå and Uppsala University respectively. In 1971, however, the Riksdag decided that a sixth school of social welfare should be located in Östersund.

The 1968 Education Report resulted in the establishment of the University of Sundsvall/Härnösand and the University of Östersund. The higher education section in Sundsvall received a technical-nature science centre, Härnösand had continued emphasis on teacher education and Östersund got a social science and system science line. In Sundsvall, the region's large industries had an impact on the direction of education. In Östersund there was early training courses on environmental and eco-technology and tourism. The University of Östersund was associated with an environmental profile and when the Forest Institute in Bispfors/Bispgården was later incorporated into Mitthögskolan, a certification work for this activity began. As a result, Mitthögskolan became the first university in Europe to receive an EMAS registration, i.e. an environmental certificate.<sup>1</sup>

Discussions on enhanced cooperation between the University of Sundsvall/Härnösand and the University of Östersund intensified in 1990, when important actors in the two regions were involved to work for the region to have a university. In Västernorrland, close cooperation with business took place in an industrial university project and in 1990 a report was submitted with proposals for "Mittnorrland University". One argument for the work that followed was the need for a new university "started from a new thinking". A strategic choice towards a common university was to first apply to merge the colleges into "Mitthögskolan". The government gave

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<sup>1</sup> Mid Sweden University, website

the green light in February 1993 to the new university. The two former colleges had different cultures and there were many challenges to work with to realise the idea of first the university and then the university. It was also not easy to explain that the university was a network college with three equal nodes. In January 2003, the government announced that **Mitthögskolan would become a university on 1 January 2005.**

Umeå University with one of its campuses in Örnsköldsvik and Processum in Örnsköldsvik are also research institutes in addition to their role as a regional innovation system. Processum is part of RISE, Research Institutes of Sweden, Sweden's Research Institute and innovation partner.

## Mid Sweden University Research Centres

Mid Sweden University has eight different research centres that will serve as spearheads for the university's profile areas and also as arenas for collaboration with financiers and other stakeholders.

Here are some of the research centres considered highly relevant for the transition to a fossil-free welfare society:

- The Centre for Research on Economic Relations (**CER**) at Mid Sweden University conducts industry-related research on the economic relations of companies and individuals, preferably in the banking, real estate, insurance, pension and auditing sectors.
- **DEMICOM** **researches** democracy and communication in the digital society. The research is interdisciplinary and includes research groups and projects that integrate and concern journalism, crisis communication, media development, organizational communication and political communication.
- **FSCN** develops knowledge and technology that improves profitability and sustainability for industry and creates new innovations and business ideas for bio-based sustainable materials from fibres and cellulose with high environmental performance.
- Sensible Things that Communicate, **STC** researches in Internet of Things, AI (Artificial Intelligence) and Sensor Systems.

### Interesting projects

At Mid Sweden University there are a number of research groups in a variety of subjects, several very relevant to the renewable energy systems of the future, [see Research groups and forums \(miun.se\)](https://miun.se)

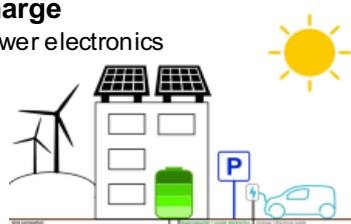
Here has been chosen to briefly present a couple of interesting and relevant projects, DRIVE and iSERV-Information for (e-)services:

To meet tomorrow's demands for green energy and transport, Mid Sweden University runs the research project **DRIVE**.

The phasing out of conventional cars has started and many are replaced by electric vehicles. In parallel, there is a major expansion of renewable energy production from solar and wind. The DRIVE research project develops new innovative solutions, from harvesting and storing energy to charging and driving the vehicles of the future. The picture below gives a quick summary of the project.

# DRIVE

## Research areas

<p><b>Harvest</b></p> <ul style="list-style-type: none"><li>• Large-scale nanogenerators<ul style="list-style-type: none"><li>• Harvest electricity from wind surfaces</li></ul></li></ul> 	<p><b>Store</b></p> <p>Green large -scale manufacturing</p> <ul style="list-style-type: none"><li>• Several battery technologies</li></ul> 
<p><b>Charge</b></p> <p>Power electronics</p>  <ul style="list-style-type: none"><li>• Fast charging and efficient conversion</li></ul>	<p><b>Drive</b></p>  <ul style="list-style-type: none"><li>• Low-voltage high-power motors<ul style="list-style-type: none"><li>• Optimized for batteries</li></ul></li></ul>

Mittuniversitetet

Dr Nicklas Blomquist

Source: N. Blomqvist, Presentation at SHREC workshop 2020

### Subproject **Harvest Energy**

New types of wind surfaces and thermoelectric systems for renewable energy from wind and land will be developed with the help of industrial actors. Jonas Örtegren Associate Professor

### Subproject **Store Energy**

Super capacitors, a type of fast batteries, can be cycled millions of times while batteries can only handle a few thousand. Mid Sweden University is the world leader in large-scale processes for supercapacitors, which builds the paper industry methods and cellulose supplemented with graphene, which provides a cheap and environmentally friendly component. Further, new knowledge is developed for a silicon powder graph composite with the goal of increasing the storage capacity of lithium-ion batteries for electric cars. Project Manager Dr. Nicklas Blomquist

### Subprojects **Load energy**

By combining Mid Sweden University's latest research results in energy storage and power electronics, research will be done on interim storage of renewable energy for use in real estate and electric cars. The energy storage facility shall also act as a power buffer in the building and enable quick charging of vehicles without the need for increased installed power in the grid or new power lines. Professor Kent Bertilsson

### Subproject **Driving Energy**

Research on a brand new electric motor, specially adapted for electric cars, is conducted with the help of the power electronics industry. Today's electric motors are optimised for full power, which is not suitable for normal driving methods for cars. The new type of engine preliminarily shows 30 % lower energy losses – leading to longer driving distances for electric cars. In addition, it is built for

low voltages that are both better for batteries and safer than today's 400 Volt. Professor Kent Bertilsson

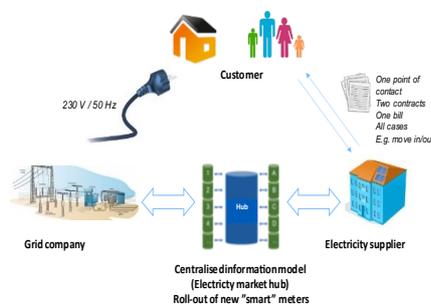
### Subproject MILAB

The Drive project is based in several cases on advanced materials technology and to support the project's sub-activities but also indirectly regional industry with adequate infrastructure, the current laboratory will be complemented and renewed with new instruments to provide a strong innovation engine for the region's materials companies.

Read more at [www.miun.se/milab](http://www.miun.se/milab); Project Manager Dr. Magnus Hummelgård

### Project iSERV Information for (e-)services – Electricity market subproject

Tomorrow... (from 2023)  
"Supplier centric model"



Mittuniversitetet  
Dr. Håkan Sundberg

See also [Pres 2019-04-23 rev 0.5 \(miun.se\)](http://Pres 2019-04-23 rev 0.5 (miun.se))

The iSERV project has been a broad focus on digitalisation of services. The project has developed the conditions for providing new e-services to both private companies and the public sector, while standardising information and guaranteeing the quality of the information.

A sub-project concerns the Swedish electricity market and the introduction of an information hub on the Swedish electricity market. Energy companies in Sweden are facing the biggest change since the liberalisation of the electricity industry in the 1990s. As of 2020, a completely new model on the electricity market has been introduced which means that the supplier becomes the point of contact for all customer cases, including for services previously provided to the electricity network owners. The next step is corresponding work at Nordic level.

In Sweden, an electricity market hub will be built that connects grid owners and suppliers and enables information exchange and cooperation. This offers significant opportunities for electricity companies to develop new markets and services.

The new cooperation model and the new Electricity Market Hub will bring major changes to the architecture and interoperability of electricity companies. The objectives of the sub-project have been:

- 1) to identify factors and a methodology for interoperability of regional energy companies' information systems and processes;

- 2) analyse the centralised information model based on time and quality requirements and identify opportunities for developed services;
- 3) evaluate customer benefits and needs, and
- 4) build an integrated model with proposals for service design and choice of channels.

Supervisor/Researcher: Dr. Håkan Sundberg, PhD student: Jwan Khisro

Project partners: Sydkraft Hydropower/Energy Data Association, Jämtkraft, Fyrphase, Härnösand Energi och Miljö AB, Övik Energi and Bergs Tingslags Elektriska AB

### **An interesting new approach to present research**

Torbjörn Skytt has collaborated with researchers in Copenhagen and has been a doctoral student at Mid Sweden University since 2015. Now he has turned his eyes towards the forests of Jämtland, which he “counts on” together with other Swedish researchers. Torbjörn studies energy flows in Jämtland by making a survey where he has followed carbon dioxide and methane emissions and removals of carbon dioxide. The idea is that through the geographical delimitation it will be a context for the issue of CO<sub>2</sub> and greenhouse gases and thus easier to understand the global problems. This work is now available through MIUN Research Exhibition.

**MIUN Research Exhibition** develops methods and working methods for building exhibitions based on current research, and then presents these in both physical galleries and digital spaces. The idea is that research from different subject fields should be dressed in a more experiential form by designating selected parts of it.

The overall theme of the exhibitions currently being produced is forest and sustainable development. This exhibition runs from 1 January 2020 to 31 December 2022 and here you can take part in Torbjörn Skytt’s project on the **measurement of emissions and storage of carbon dioxide in the forest**.

Read more about this and other research projects on Mid Sweden University’s website.

## 2. Östersunds solpark — Jämtkraft



Image from Jämtkraft: Östersunds solpark first summer

Östersund solar park is located between the district heating plant and E14 in Östersund on land that has previously been military shooting ranges and is now owned by Östersundshem. In total, the solar park has 30,000 shares, each of which represents 100 W in power. It is estimated to correspond to just under 100 kWh per year, but this depends on the park's production (number of hours of sunshine). Half of the shares in the park will be owned by Östersundshem and about one sixth of Jämtkraft. This means that there are 10 000 shares available for private and corporate customers who are members of Östersund Solar Park Economic Association.

Everyone has the opportunity to buy photovoltaic shares in Östersund solar park. The offer is aimed at both consumers and companies who want to participate in and are electricity trading customers at Jämtkraft AB. Solcellsandelar is purchased through membership of Östersund solar park economic association and as a shareholder in Östersund solpark you then become a member of Östersund Solar Park economic association, and thus can benefit from renewable solar energy from the park. A share purchase gives the right to the part of the park's electricity production corresponding to the number of shares purchased (value of 0.1 KW of power per share which corresponds to approximately 100 kWh/year/share). The value of the electricity produced by the shares is determined by the current electricity price at Nord Pool, which is the independent trading venue for all electricity in the Nordic region. The value of the shares in the solar park is therefore based on how much solar energy is produced in the park and how much this electricity is worth.

The remuneration for the production of the shares is shown on the electricity trading invoice in the form of a deduction that reduces the cost of your regular electricity consumption. The amount of deduction you receive from your electricity bill depends on how many shares you have purchased, how much solel these shares have produced and the electricity price on the market at the moment.

A common question that is asked in this context is, why are the shares not set off against the electricity you consume at home? The answer is that, unfortunately, the current tax rules do not allow it to do so.

See more information on Jämtkraft's website. [Produce your own electricity with solar cells | Jämtkraft \(jamtkraft.se\)](https://www.jamtkraft.se)

### 3. Solar Thermal Park, Härnösand – district heating



Photo high plain Solar Thermal Park – demonstration plant source: [www. Processnet.se](http://www.Processnet.se)

In Härnösand, Sweden's largest solar park is being built with concentrating solar collectors for district heating, the high plain 2023 Solar Thermal Park. The solar collectors follow the sun during the day and concentrate the light so that they can produce heat that the district heating network can receive. The plant will be Europe's largest district heating connected solar field with concentrated solar collectors and can work up to 160 degrees working temperature.

The project has been preceded by the pre-study "The Future of District Heating", co-financed by Region Västernorrland and companies, real estate companies, energy companies and by the municipalities Härnösand, Kramfors and Sollefteå. The project has identified a number of locations in Ådalen that are suitable for solar heating and the choice eventually fell on Härnösand.

The facility is a demo facility and will be completed in 2021 and then 3000 square meters of solar collectors will produce one million kilowatt hours of solar heat per year. If the solar installation goes well, Härnösand can also eventually have a larger solar installation. The assessment of Absolicon, which builds the plant, is that a solar plant ten times the size of the demonstration plant and a seasonal storage facility capable of storing solar heat from summer to winter would mean that fuel can be completely stopped in the heating plant during the summer half-year.

In addition to district heating networks, the solar collector is suitable for industries that consume large amounts of heat and steam such as textiles, dairies, chemical industries and breweries. The solar collectors provide temperatures up to 160 C and the high temperature has been problematic with older technology. Now it is loose through a silver mirror that concentrates the light in a narrow line on a receiver tube filled with pressurised water. The solar collectors follow the sun during the day and retain the heat under a protective glass. (Source: [Large-scale solar heat tested in Härnösand – HVAC-Forum \(vvsforum.se\)](http://Large-scale%20solar%20heat%20tested%20in%20H%C3%A4rn%C3%B6sand%20-%20HVAC-Forum%20(vvsforum.se)))

The high plain Solar Thermal Park is thus built by Absolicon and the Swedish Energy Agency, which have granted SEK 8 million in co-financing.

#### 4. Energidalen, Sollefteå



Energidalen i Sollefteå AB is a municipal development company owned by Sollefteå Municipality.

The company was founded in 1990 and will conduct technology and service development in the field of renewable energy and the purpose of the business is to promote business development and employment in the municipality.

Since its creation in 1990 Energidalen i Sollefteå AB has focused on bioenergy, but Energidalen has now expanded its operations to the entire area of renewable energy. During the period 2017-07-01 to 2020-03-31, Energidalen ran the development project “Vindkraft – generator for sustainable development” with Sollefteå Municipality as project owner in close cooperation with Energidalen and five wind power municipalities in the inland Norrland, representatives of the energy industry and various organisations.

For more information about Energidalen’s activities and projects, please visit [www.energidalen.nu](http://www.energidalen.nu)

## 5. Permascand, Jungaverk; [Contact](#) | [Permascand](#)



Permascand in Ljungaverk develops and sells electrochemical solutions and catalytic coatings to the industry. A major focus is on hydrogen and the company is now investing heavily in developing the hydrogen technology of the future. SEK 300 million will be invested and a technology and innovation centre will be built.

Permascand is the world's leading manufacturer of electrochemical solutions. Now it has a vision to become a leading supplier of equipment for the production of green hydrogen. The company believes that green hydrogen will play a significant role in the energy system of the future in energy storage, as a feedstock in industry, in balancing the electricity grid, and as fuel for vehicles. But it is argued that today's production technologies need to be developed and streamlined to make green hydrogen competitive.

This is why they are now investing SEK 300 million over three years in a full-scale technology and innovation center and also investing in the company's research team. Permascand will conduct advanced research and development to enable large-scale and cost-effective production of green hydrogen for energy storage.

Permascand has 50 years of experience in manufacturing electrochemical solutions on an industrial scale and today supplies critical components to several world-leading players in the hydrogen market.

The centre's geographical location is guided by the availability of skills and customer demand. The starting point is Permascand's research centre in Ljungaverk. The company is now recruiting international excellence in electrochemistry, metallurgy, mechanics, engineering design, construction and hydrogen.

On 18 May 2021, Permascand announced its intention to carry out an offer of the company's shares.

## 6. Processum, Örnsköldsvik (information from <https://www.processum.se/sv/>)



Processum Technology Park AB was founded in 2003 with Processum's Interest Association as owner. Early, Mid Sweden University and Umeå University also came with their strong chemistry part as partners. SLU Umeå, Luleå University of Technology and Turku Academy also joined as academic partners in the cluster. When possible development opportunities were studied, the strategy was chosen to focus on biorefinery development on a forest industrial base, and the name was changed to Processum Biorefinery Initiative AB.

In 2005, Vinnova launched a multi-stage call "dynamic innovation systems in early-stage regions", Vinnväxt 2005, and Processum applied through the "Future Biorefinery" initiative. In 2008, Future Biorefinery was named one of the winners, involving at least 10 years of funding from Vinnova.

In 2011, a pilot park is being built with equipment to test and scale up promising projects in biorefinery. In 2013, Processum Intresseförening sells 60 % of its shareholding to SP Technical Research Institute of Sweden and the company becomes a subsidiary of the SP Group. In 2016, SP will merge the Technical Research Institute of Sweden, Innventia and Swedish ICT into a group, RISE Swedish Research Institute. SP Processum is therefore a subsidiary of the RISE Group.

Through its expertise, industry experience and networking, Processum is an international player in biorefinery development. The organisation of researchers and experts with complementary competences is at the forefront of developing and developing new technologies, methods and products for direct application in industry. Biorefinery is an area that requires broad collaboration and access to specialist expertise in several areas. Processum's areas of expertise within biorefinery are Biotechnology, Organic Chemistry, Residue Materials, Energy, Patents and System Analysis. There are specialists who both have specific expertise in their subject area and know-how to manage development projects.

Within Processum, many projects are ongoing, all of which are part of the biorefinery development that takes place within the cluster. Processum's industrial environment can take projects all the way from laboratory to demonstration scale, which has made the site unique and an internationally recognised location for biorefinery development from forest raw materials.

7. **Hydrogen – Jämt force;** [Good results for production of renewable aviation fuel in Östersund | Jämtkraft \(jamtkraft.se\)](#)



[Development of future fossil-free aviation fuel – IVL Svenska Miljöinstitutet](#)

On the link above you can read and download the full project report from a collaboration between Jämtkraft, IVL and Lund University:

Together with Jämtkraft, Chalmers and Lund University, IVL Swedish Environmental Institute has investigated whether it is possible to start large-scale production of fossil-free aviation fuel.

Carbon dioxide is collected from the CHP chimney in Lugnvik outside Östersund and mixed with hydrogen to produce the aviation fuel. The hydrogen needed for the process shall be produced from renewable electricity.

The aim of the project is to get sustainable aviation fuel as a final product. The amount of CO<sub>2</sub> from the CHP plant dimensioned how much aviation fuel can be produced.

The project has been completed and the results will be used in the further work. The goal is to have a plant in Östersund ready for the production of renewable electrofuel within five years.

The results show that there are good conditions for producing renewable aviation fuel in Östersund at a competitive price compared to other renewable aviation fuels. Ulf Lindqvist, Head of Unit Heat Jämtkraft, explains that production can be integrated with Jämtkraft's existing biofuel-fired combined heat and power plants. In addition, it is planned to build a new CHP plant to be inaugurated in 2024, which is expected to provide even better conditions for producing renewable aviation fuel.

## 8. Production of biogas in Mellersta Norrland – some projects and activities

Biogas is a renewable energy source with a high environmental performance. Biogas is the gas that is formed when organic matter (fertiliser, food residues, plants, waste water, etc.) is decomposed in oxygen-free environments by microorganisms and consists mainly of methane and carbon dioxide. Almost all biogas is thus made from residues and waste, which means that biogas plays a central role in the transition to a circular and fossil-free economy in Sweden and can contribute to increased self-sufficiency of fuel. A large part of the raw materials come from agriculture and the food chain, which play an important role in increasing biogas production.

In 2018, the Government appointed an investigation into the conditions for biogas production in Sweden. The inquiry (SOU 2019:63) was submitted in December 2019 and proposes a new developed support system that will create good conditions for biogas and the possibilities to produce domestic vehicle fuel. The study proposes a target for biogas production to increase to 10 TWh/year by 2030.

In July 2020, the European Commission decided to approve the Swedish requests for continued tax exemptions for non-food-based biogas and biogasol used for heating and engine operation respectively. The European Commission's decision is valid for 10 years.

### **The Householding Society: Increase in agricultural biogas production – follow-up and technology development**

The overall objective of the Swedish Householding Society's project is to develop methods and knowledge about efficient management and operation of biogas plants through collaboration between entrepreneurs, advisers and researchers, leading to increased biogas production and improved climate and environmental benefits.

The Swedish Householding Society in Jämtland is very active in the development of agricultural biogas production. In 2020 there were also 9 biogas plants at farm level in the county of Jämtland



Härnösand Biogas; [Härnösand biogas – HEMAB](#)

Härnösand's biogas plant in Äland is unique in terms of technology selection and small scale. Biogas is produced from food waste from Härnösand, Sundsvall and Örnsköldsvik. Up to 6000 tons of food waste is handled in a dry-sweetening process. The activities include the reception and pre-treatment of food waste, dry-sweetening, gasgrading, compression and refuelling.

The gas produced in the new plant is consumed locally and thus avoids long journeys.

### **Östersund Municipality – biogas strategy; [Biogastrategi.pdf \(ostersund.se\)](#)**

The aim of the strategy is to show how Östersund municipality should work to meet supply and demand for vehicle gas and describe how the municipality can work towards increased use of vehicle gas.

### **Östersund Municipality – Göviken biogas**

Göviken's waste water treatment plant is Östersund's largest waste water treatment plant. It cleans the drain from 55 000 people in and around Östersund. During the treatment of the waste water, it becomes sludge that is digested into biogas in a digestion chamber. Biogas is used as fuel for cars. On

average, approximately 1500 m<sup>3</sup> of gas is produced per day. The biogas then goes into the pipeline to the filling station in Lugnvik.

**Municipality of Östersund – planned digestion plant;** [Rötga Plant – Östersund.se \(ostersund.se\)](https://ostersund.se)

The municipality of Östersund plans to build a digestate plant next to Gräfsåsen's waste facility, together with the county's municipalities. Food waste will become vehicle fuel and bio-fertiliser – a contribution to the circular economy. The Swedish Environmental Protection Agency is involved in financing the digestate plant to 45 % because it contributes to reducing the amount of greenhouse gas emissions.

**Biogas in the north and BioFuel Region;** [Biofuel Region Bioga Project – BioFuel Region](#)

Biogas North is the network that BioFuel Region operates since 2010. The ambition is to put biogas in northern Sweden on the map. Through the network, Biofuel Region has run, and is running, a number of projects concerning biogas. An example of an ongoing project, see below:

2019-2021 Baltic Biogas Circles

Baltic Biogas Circles will promote biogas as an alternative fuel in the Baltic region. Biofuel Region is leading the work to strengthen and expand existing cooperation networks together with seven European partners and develop new project ideas. The project is run by BioFuel Region and will run during 2019 to 2021. The funding of SEK 550000 comes from the Swedish Institute and participating partners; Gasum, Stormossen AB, Estonian Biogas Association, Saaremaa municipality in Estonia, Zemgale planning Region and Ekodoma in Latvia and Gdynia city in Poland.

## 9. Bridge Innovation, Sundsvall – Digitalisation

# bron.

<https://www.broninnovation.se/>

**The bridge is Västernorrland's IT cluster and an innovation environment that brings together over 90 private and public actors to collaborate for digital innovation.**

The bridge is an IT cluster and digital innovation hub in Västernorrland, which is based on the existence of a large pool of IT skills and innovation power and which, on this basis, will promote opportunities for development and long-term sustainable growth also increase the region's attractiveness for new skills, new capital and the establishment of new businesses. The goal is to create a region where people want to live and where together they strive towards an equal, inclusive and digital society. Through various initiatives and projects, Bron is working towards three focus areas: **Innovation and growth, skills and attractiveness** as well as **networking and meeting place**.

The bridge has a well-established collaboration between many strong actors in private business, public operations and academia. In Region Västernorrland, one of Sweden's oldest IT companies was developed when Skogsbrukets Datacentral SDC was formed in 1961 in Sundsvall as an economic association to coordinate and rationalise timber reporting. The initiator was the then Domänstyrelsen, MoDo, SCA and the Forest Ownership Movement. Using computers to streamline the work was an important endeavour. In 1963, the first computer, IBM 1410, was installed and soon an accounting system became operational. The first years of operation were focused on Norrland, but during the last year of the decade the whole country became connected. Since 1 January 2019, Bioometria is the new organisation for timber measurement and accounting and is a merger of four compounds: SDC, VMF Qbera, VMF Syd and VMF Nord.

Digitalisation is an important prerequisite for the transition to a sustainable society. For example, in line with the EU Green Deal of December 2019, the European Commission has set out a series of measures aimed at avoiding net greenhouse gas emissions by 2050. Achieving these objectives recognises the need for significant technological progress in several areas, and digital technologies will be an important tool to improve efficiency and contribute to the transition to sustainable societal development.<sup>2</sup>

The bridge is a non-profit organisation founded in 1988. The association owns the company Bron Innovation AB, which runs all operations within the network.

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<sup>2</sup> The new EU Green Deal; [A European Green Deal | European Commission \(europa.eu\)](#)

## 10. Electricity in the north

### Elinorr – electricity network companies in Norrland



See: [www.elinorr.se](http://www.elinorr.se)

Elinorr is a network with 17 independent local electricity grid companies in southern/central Norrland and Dalarna that together create collaboration, societal benefits, skills and economies of scale. Elinorr cooperates in strategic development issues, purchasing and grid operation. The aim is to create a long-term positive development and to be able to offer customers reliable electricity distribution at a low cost and a sustainable future.

#### **An important project for Elinorr – Strategy for Open Electricity Networks**

The vision of the project is to create open electricity networks where end customers and market participants can connect and use all the equipment they want with specially distributed generation, energy storage and new consumption. These open electricity networks shall create conditions for cost accuracy, operational security and standardisation. Elinorr has studied different scenarios for the future to help local networks position themselves to effectively meet customers' future needs. Local networks need to plan and develop their activities in a way that maintains great flexibility during a period of rapid change.

[Elinorr – strategy for Öppna Elnät \(pdf\)](#)

**11. Ånge invests in local anchoring of wind power; [Establish wind power in Ånge municipality – Ånge Municipality \(ange.se\)](#)**

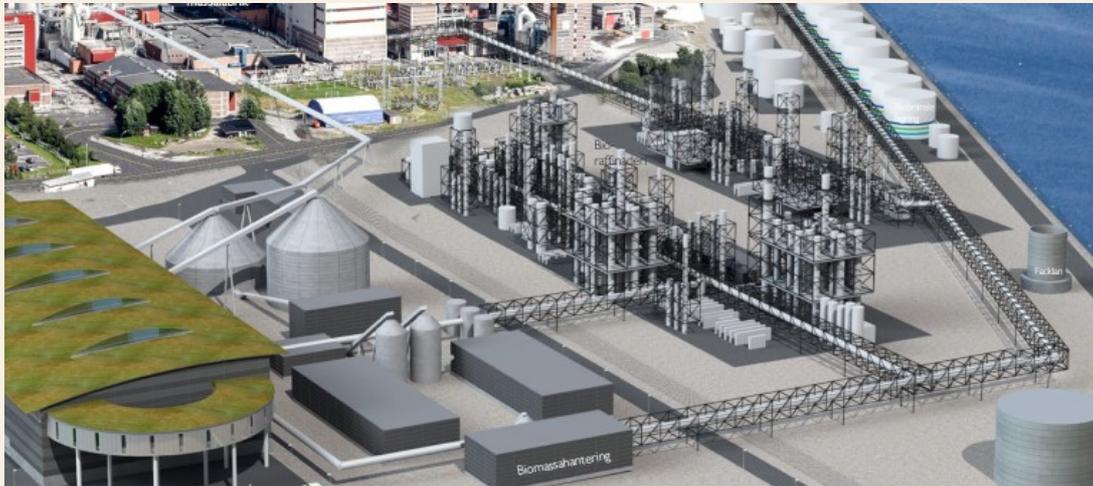
Ånge Municipality, with the support of Region Västernorrland, the European Regional Development Fund, Almi business partner Mitt, the Entrepreneurs in Ånge and Västernorrland and the business incubator BizMaker, has started a project that will lead to more entrepreneurs earning revenue from the wind power industry. In parallel with the wind farms in the municipality, they are working on anchoring work for these establishments and the aim is to increase the benefit and value of these establishments for the local community. The work has resulted in many lessons, the main conclusions being that a transparent process is important at an early stage, and that communication and dialogue are key words to enable increased local value and thus anchor the wind power project.

The project in Ånge focuses on five work areas that will increase local value from wind power development in the municipality and region:

- Use of renewable electricity on site, for example through the establishment of electricity intensive industries.
- Competence supply of wind power projects with local skills, but also finding ways for those companies that choose to “grow up” and develop with wind power deployment
- Identify and develop Ånge municipality’s increasingly strategically advantageous geographical position in the middle of Sweden, in the middle of the electricity network and in the middle of the rail network.
- Explore possibilities for investing in renewable energy.
- Stimulate, support and create the conditions for local engagement – that local entrepreneurs, non-profit sectors and individuals benefit from investments in wind power.

## 12. SCA Biorefineries — biojet – Östrand

### Östrand Bioraffinaderi



BIOREFINERY, ANDERS EDLING  
HULTGREN,  
ANDERS.HULTGREN@SCA.COM



8

In October 2020, the Land and Environment Court of Östersund District Court authorised SCA Biorefinery Östrand AB to build and operate a biorefinery in connection with the pulp mill SCA Östrand. The plant will be able to produce 300 000 tonnes of biofuels per year in the form of renewable petrol, diesel, aviation fuel and chemicals. See further: [SCA obtains authorisation for a biorefinery on Östrand – SCA](#)

The County Administrative Board of Västernorrland, the Swedish Environmental Protection Agency, the Agency for Marine and Water Management, MSB and Timrå and Sundsvall municipalities, have essentially endorsed the activities but had some comments on the conditions laid down. — [Authorisation for biorefinery – Swedish Courts](#)

### 13. Biofuel Region; [Biofuel Region Our Objectives – BioFuel Region](#)

Biofuel Region is a member-based development initiative for northern Sweden that will contribute to the transition to a fossil-free vehicle fleet and the transition to the bioeconomy. Biofuel Region was established by a Tripel Helix leadership (business, academia and the public sector) in 2003 in harmony with Vinnova's first Vinnplant call and has successfully initiated, channelled and coordinated various development and cooperation projects between municipalities and other actors. The projects usually include actors and activities within Region Jämtland/Härjedalen and Region Västernorrland. Biofuel Region is a non-profit organisation and funding is provided through membership fees, regional funds and project funds.

Biofuel region wants to contribute to the global sustainability goals, the EU's goals for a developed bioeconomy and renewable transport energy, as well as the Swedish goals regarding bioeconomy



and fossil freedom.

Below a short presentation of two projects covering Mellersta Norrland; Jämtland and Västernorrland counties:

**Renewable in the tank; Jämtland and Västernorrland County.** The project is ongoing between 2019 and 2022 and the total budget is SEK 8.2 million. Funding comes from the European Regional Development Fund (ERDF), Region Jämtland Härjedalen, County Administrative Board Västernorrland and BioFuel Region AB. The initiative includes strategic work, knowledge dissemination, support to companies and public procurement and the result will contribute to:

- Decarbonisation
- Implementation of the counties' climate strategies
- Enhancing regional competitiveness of the business community

**SiSL Central; Västernorrland and Jämtland counties.**

Pole into City and Land (SiSL) Mellersta Norrland focuses on creating good conditions for charging cars in Västernorrland and Jämtland counties. The project will run during the years 2018-2022 with a budget of SEK 8 million. Co-financing comes from the European Regional Development Fund (ERDF), Region Jämtland Härjedalen, Region Västernorrland, County Administrative Board Västernorrland, BioFuel Region, County Administrative Board Jämtland, HEMAB, Kramfors Municipality and Sollefteå Municipality. Partners in the project are BioFuel Region AB and the Energy Office at Region Jämtland Härjedalen.

#### 14. Wind Power Centre, Hammerdal; [Vindkraftcentrum's offers](#)



## Vindkraftcentrum.se

**The Wind Power Centre's mission is to contribute to the local and regional benefits arising from the establishment of a wind farm.**

Wind power expansion is seen by Vindkraftcentrum as a second electrification of Sweden and when about 80 municipalities are now facing the establishment of new or continued large-scale wind power, they want to encourage municipalities to take the opportunity to develop the business sector in connection with the new "base industry initiative". Renewable energy can be seen as a motor for further business development.

Vindkraftcentrum helps municipalities to carry out forecasts for wind power buildings, forecasts showing what works will take place and when. The forecast can be used by municipalities, industry and project promoters to ensure that skills are really available and in place when needed. Training coordinators, regional entrepreneurship organisations and employment services can also be involved early. A good result for the work is when local residents and young people educate themselves in wind power technicians. Today there is a great demand for this competence and polytechnics are located in Strömsund, Piteå and Varberg.

Vindkraftcentrum also operates project-specific databases where companies can register and offer their services.

See also Vindkraftcentrum's website.

## 15. Technology development in forestry relevant for bioenergy extraction – BRACKE and ELFOREST

Bracke — [Manufacturer of forest machines and machines – Bracke Forest AB](http://www.brackeforest.com/)



Picture from [www.brackeforest.com](http://www.brackeforest.com/) <http://www.brackeforest.com/>

Bracke Forest in Bräcke has been manufacturing forestry tools and machines since 1922. The company develops and manufactures soil processors, planting units, felling heads for forest management and bioenergy extraction and equipment for mechanical sowing. All product development takes place in close cooperation with forest companies, entrepreneurs and Swedish forest research.

The picture above depicts Bracke C16.c, which is a cumulative aggregate for forest management and bioenergy. Bracke C16.c combines grubbing-up with the possibility of exploiting biomass. This means that the unit is suitable for mechanical felling in, for example, young forest clearing, thinning, string clearance, crane corridor ring and clearing along roads, field edges and wiring streets.

Elforest; [Elforest Technologies AB](http://www.elforest.com/)



Image from

Elforest started in 2006 as a developer and manufacturer of the world's first electric hybrid-powered forwarder (see picture). Elforest Technologies is based in Arnäsvall outside Örnköldsvik. There are facilities, equipment and competence to take projects all the way from the idea stage to working machine.

Today, Elforest Technologies is exclusively a technology consultant offering excellence in battery technology, electric power, hybrid systems, and electrohydraulic systems. With knowledge of components, system integration and control systems, the company helps customers to develop the machines and vehicles of the future.