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Sparks!

BY INNOVATION BOOST

BUSINESS KRISTINESTAD

ÖSTERBOTTENS FÖRBUND
POHJANMAAN LIITTO

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Welcome to March's edition of SPARKS

You are now holding the third edition of SPARKS in your hands! In January, Innovation Day was held in Kristinestad with many participants. If you would like to watch it afterwards, you can do so **here**.

In this issue of *Sparks*, you can explore various research results and theses from, among others, Novia University of Applied Sciences. Links to the theses are provided directly, and some of the results are also presented in this month's issue.
As winter turns into spring, it is a good time to make use of your curiosity and follow current research that can support and develop your own activities.

During Samhällsdagarna on May 8, you will have the opportunity to meet Kenneth Widell from Wärtsilä, who will speak about the power of innovation.

Welcome to join us!

Warm regards,
Anna Bertills
Project Manager
SPARKS by Innovation Boost
Business KRS

“Framtidens grönsaker - hur tänker finländarna?” | Novia

Peter Björk (Hanken Svenska handelshögskolan), Henrik Virtanen (Yrkeshögskolan Novia), Lisa Niemistö (Hanken Svenska handelshögskolan)

The report examines how Finnish people’s eating habits and attitudes toward vegetables are changing, and what this means for greenhouse cultivation and vegetable production in Finland. The project behind the report aims to understand future consumer needs and contribute to developing a profitable and sustainable vegetable production, especially local greenhouse production in Ostrobothnia.

1 Changing consumer habits

- Finns are increasingly interested in foods that promote *health and well-being*.
- Vegetables — especially protein-rich and modern varieties — are becoming more popular among both Swedish- and Finnish-speaking populations.

There is growing demand for foods that are *sustainable, climate-friendly, ethical, and transparent* in their production chain.

2 Gap between recommendations and reality

- Nutrition guidelines recommend a much higher intake of vegetables (up to 500–800 g per day). Many consumers do not meet these levels — but a majority indicate that they *want* to eat more vegetables in the future.

3 Importance of the consumer perspective

- Understanding consumer demands and purchasing behaviors is crucial for planning what to produce, how to process, package, and sell it.
- Transparency in production and sustainability issues are important factors for consumers.

4 Opportunities for producers

- Changing preferences create *opportunities for Finnish producers* to explore new crops, products, and business models.
- The project works with trend analysis, consumer surveys, and collaboration among producers, retailers, and the education sector to meet future needs.

The report shows that the future vegetable market in Finland will be shaped by more conscious consumers who value health, sustainability, and convenience. This presents challenges but also significant opportunities for greenhouse producers and the food supply chain to develop products and processes that align with new consumer demands.

READ THE REPORT

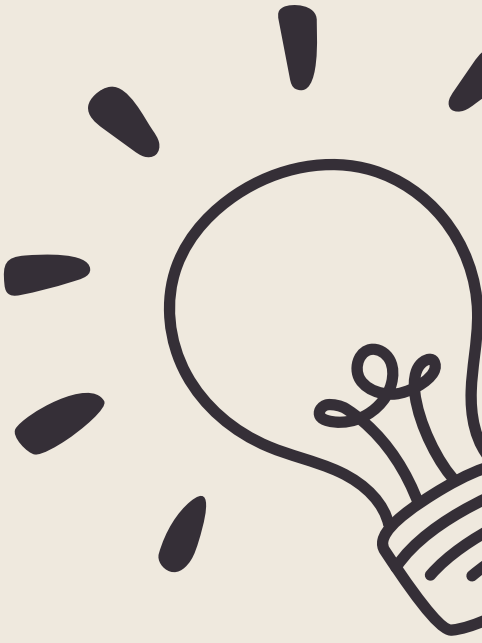
The future of residential demand response in Finland – an Ansoff matrix approach | Novia

The report **"The future of residential demand response in Finland – an Ansoff matrix approach"** by Novia University of Applied Sciences examines the future of **residential demand response in Finland**, meaning how households can adjust their electricity consumption based on price, grid load, and electricity availability.

Demand response is becoming increasingly important as the energy system shifts toward more **renewable and weather-dependent electricity production**, such as wind and solar power. This creates a greater need for flexibility in electricity consumption.
Residential demand response has strong potential in Finland, but the market is still developing and requires both technological progress and supportive policy measures.

The analysis is based on the Ansoff matrix, which divides development strategies into four categories:

1. **Market penetration**
2. **Market development**
3. **Product development**
4. **Diversification**



1. Market penetration - increased use of existing solutions

This refers to wider use of already available technologies, such as:

- smart meters
- hourly electricity pricing
- control of heating and hot water systems

These solutions already exist but are not fully utilized by households. Increased use could lower costs and improve the balance of the electricity system.

2. Market development
- reaching new customer groups

Demand response can be expanded to more types of users, such as:

- detached house owners
- housing companies
- energy communities

The development is still at an early stage because many households lack the necessary technology or incentives to participate.

3. Product development
- more advanced servic

New services may combine multiple technologies, for example:

- home energy management systems (HEMS)
- battery storage
- smart charging of electric vehicles

Such solutions can optimize both energy costs and peak power fees, making demand response more profitable.

4. Diversification
- completely new solutions

This category includes more future-oriented innovations, such as:

- Vehicle-to-Grid (V2G), where electric cars can supply electricity back to the grid
- local electricity markets and energy communities
- blockchain-based energy trading
- households participating in reserve markets

These solutions have high potential but require:

- new technology
- regulatory changes
- consumer willingness to participate.

Conclusion

The report concludes that:

- Residential demand response can become an **important part of Finland's future energy system**.
- Development is expected mainly through
  - more services
  - a larger market
- More advanced solutions exist but are not yet widely deployed.
- To reach full potential, the following are needed:
  - technological development
  - clear economic incentives
  - regulatory changes
  - active consumers

Ny forskningsmiljö färdigställd i Vasa – WSTAR erbjuder lösningar för energieffektiva datacenter | Novia

A new research environment for energy-efficient data centers has been completed in Vaasa as part of the WSTAR project (Wasa Zero Emission Data Centre). The initiative is a joint research infrastructure involving University of Vaasa, Novia, Åbo Akademi University, and Vaasa University of Applied Sciences.

The goal of the project is to develop sustainable and low-emission solutions for data centers, whose energy consumption is increasing rapidly as society becomes more digital. Estimates suggest that data centers could account for up to 4% of Finland's electricity use by 2030 if efficiency is not improved.

The research facility, located in the Technobothnia laboratory, includes a small data center used to test technologies such as

- energy-efficient cooling systems
- waste-heat recovery
- energy storage and flexible electricity use
- optimization of power consumption and automation.

The infrastructure will support research, education, and collaboration with companies, helping both large energy firms and small businesses develop new innovations for sustainable data center technology. The project is funded by the Research Council of Finland and the EU NextGenerationEU program.

Carbon Neutral Vaasa 202X | VAMK

The Vaasa University of Applied Sciences project Carbon Neutral Vaasa 202X is part of the City of Vaasa's strategy to become carbon-neutral by the end of the 2020s. The project focuses on developing a digital IoT-based data platform that collects real-time information on energy use, transport, emissions and other climate-related factors in the city. By gathering and analysing this data, the platform helps evaluate climate actions, supports decision-making and enables the testing of new technologies before they are implemented on a larger scale. The platform is developed in cooperation with universities, companies and public organisations, with the aim of improving energy efficiency, reducing emissions and creating new innovations through the better use of data. At the same time, the project strengthens collaboration between research, industry and the city, positioning Vaasa as a testbed for sustainable and smart-city solutions.

The long-term goal is not only to achieve carbon neutrality locally but also to develop methods, technologies and cooperation models that can be applied in other cities and industries. In this way, the knowledge and solutions created in the project can benefit organisations far beyond Vaasa.

For companies outside Vaasa, the project is relevant in several ways. The tools being developed for monitoring energy use, emissions and efficiency in real time can be applied in many different regions and sectors, helping companies reduce costs, improve sustainability and comply with environmental regulations. The project also supports the green transition and the increasing ESG requirements that many companies face today. As organisations are required to report emissions and demonstrate sustainability improvements, a data-driven approach makes it easier to measure environmental impact and make informed decisions in line with EU and global market expectations.

In addition, the project acts as a testbed for new technologies and business opportunities. By piloting smart-city and energy solutions, it creates knowledge and practical results that companies can use to develop new products, services and business models for international markets. At the same time, the project demonstrates how collaboration between universities, industry and the public sector can drive innovation. This type of cooperation model can be adopted in other regions to accelerate development and reduce risks.
As energy prices rise and climate regulations become stricter, companies everywhere need better ways to optimise energy use, logistics and production. The solutions being developed in the Carbon Neutral Vaasa 202X project address exactly these challenges and therefore have relevance far beyond the local context.

READ THE ARTICLE

T1.1 Results of energy potential on the area under consideration | University of Vaasa

The report is part of the PEAK project, which studies how a regional energy system in Ostrobothnia could develop toward carbon neutrality using renewable energy sources. The research focuses on the electricity distribution area of Esse Elektro-Kraft and nearby municipalities such as Pedersöre and Kauhava.

The goal is to identify the renewable energy potential of the region and the requirements for integrating it into the electricity grid.

The study highlights several key findings regarding the region's renewable energy potential. Wind power shows the strongest potential, with five wind energy projects currently planned in the area. If implemented, these projects could add approximately 693 MW of new electricity capacity to the grid within the next few years. Some of the projects have already received the necessary permits, while others are still undergoing environmental and land-use approval processes.

Solar energy is also emerging as a promising renewable energy source in the region, although its development is still at an early stage. Two planned solar parks in Kauhava could together add about 170 MWp of solar capacity by 2028. Interest in solar energy is expected to grow in the coming years as technology costs continue to decrease and policy support for renewable energy strengthens.

In addition to wind and solar energy, the study identifies significant potential for biogas production. According to the analysis, Pedersöre and Kauhava could theoretically produce around 109,832 MWh of biogas annually. However, expanding biogas production will require improvements in logistics, infrastructure and the overall biogas value chain to ensure efficient collection, processing and distribution of raw materials and energy.

Overall, the report concludes that the region has considerable potential for renewable energy development, particularly in wind power, but also in solar energy and biogas. To fully utilise this potential, several developments will be necessary, including stronger electricity grid capacity, increased investments in renewable energy projects and improvements in energy logistics and infrastructure. Close collaboration between energy companies, policymakers and local stakeholders will also be essential. Together, these efforts could support the development of a more resilient and carbon-neutral regional energy system.

READ THE REPORT

T1.2 Improving the Reliability of Distribution Network through Renewable Energy, Electric Vehicle and Battery
| University of Vaasa

The study examines how electricity distribution networks can remain reliable while integrating more renewable energy, electric vehicles (EVs), and battery storage systems (BESS). The transition to renewable energy and electrified transport changes the load patterns in power grids and can create challenges such as peak demand, voltage instability, and network congestion. The goal of the research is to evaluate how these technologies can be coordinated to improve grid reliability and flexibility.

Key technologies studied

1. Solar photovoltaic (PV)
Solar power increases renewable electricity generation but creates variability in supply.

2. Electric vehicles (EVs)
EV charging introduces new electricity demand patterns. For example, large numbers of EVs charging at the same time can create new evening peaks in electricity consumption.

3. Battery Energy Storage Systems (BESS)
Battery storage can store surplus renewable energy and release it during periods of high demand, helping to balance the electricity system.

Main findings

1. Energy storage increases renewable energy use
When solar panels are combined with battery storage, excess solar power can be stored instead of curtailed, improving the efficiency of renewable energy use.

2. Batteries reduce peak electricity demand
The simulations show that battery storage can reduce peak evening demand by about 24.8%, which significantly lowers stress on the electricity network.

3. EV charging changes the load profile
Electric vehicles create new peaks in electricity consumption (e.g., around 7 PM). However, battery systems can compensate for this extra demand by discharging electricity during peak periods.

4. Strategic battery placement improves voltage stability
Placing batteries at nodes with low voltage levels helps stabilize the grid. Charging and discharging cycles keep voltages within acceptable limits (±5 % of nominal voltage).

5. Integrated energy systems improve grid resilience
The coordinated operation of solar energy, EV charging, and battery storage creates a more flexible and stable smart grid, which supports electrification and renewable energy expansion.

Conclusions

The study concludes that combining renewable energy, electric vehicles, and battery storage can significantly improve the reliability and flexibility of electricity distribution networks.

Battery storage plays a key role by:

- storing surplus renewable energy
- reducing peak demand
- stabilizing voltage levels
- balancing EV charging loads

Together, these technologies support the transition toward smarter, more sustainable energy systems.

READ THE REPORT

Enertelligence project | VAMK

The **Enertelligence project (2023–2025)**, led by Vaasa University of Applied Sciences, explored how digital tools can help industrial SMEs in Ostrobothnia improve energy efficiency and support the green transition. Working with regional companies, researchers analysed energy use, interviewed industry representatives and developed digital service concepts for monitoring and optimizing energy consumption. The study found that many SMEs lack clear access to energy data, making it difficult to identify inefficiencies. Digital solutions that visualize and analyse energy data can help companies reduce energy costs, lower emissions and improve decision-making. The project concludes that data-driven energy management can strengthen both sustainability and competitiveness in regional industry.

Key findings

1

SMEs need accessible energy data
Many small industrial companies lack clear and usable energy data. Digital tools that **visualize energy consumption and performance** can help companies identify inefficiencies and optimize energy use.

2

Data-driven decision-making improves energy efficiency
Using analytics and real-time data enables companies to:

- monitor energy consumption
- detect waste and inefficiencies
- optimize production processes.

3

Digital services can support the energy transition
The project developed **service concepts and demonstrations** that help companies adopt energy optimization solutions and integrate renewable energy into their operations.

4

Energy optimization can create new business opportunities
The research highlights that digital energy solutions can generate **new "green" service businesses**, particularly in areas such as:

- energy data analytics
- optimization services
- digital monitoring tools.

READ MORE

Nordic Fibres: Local Diversity and new Possibilities | Novia

The **NorNa project ("Nordic Natural Fibres in Circular Economy")** explored how traditional natural fibres like flax, hemp, nettle and wool – materials with deep historical roots in Nordic agriculture – can become modern business opportunities through circular economy principles. The final report maps current developments, challenges and potential pathways for growth, with implications for sustainable rural enterprise development.

Why Natural Fibres Matter Now

Natural fibres are renewable, biodegradable, and less dependent on fossil-based inputs than synthetics – making them attractive in an era of increasing environmental awareness and supply chain volatility. Unlike many commodities, fibre crops can also support biodiversity, diversify farm income, and improve soil health.

Key strategic takeaways for regional businesses:

- **Broad market potential:** Natural fibres have applications across **textiles, construction materials, bio-composites, gardening products and packaging** – far beyond traditional textiles.

- **Value chain integration:** Partnerships between farmers, processors, designers, and brand owners are crucial for moving from raw fibre to marketable products.

Sector Highlights and Business Opportunities

The report's Nordic sector review reveals both mature niches and emerging fronts:

Flax (linen):
There's renewed interest in linen, especially for sustainable textiles and technical applications. However, **processing infrastructure is limited** in the region – a bottleneck and opportunity for investment in retting, scutching, and spinning facilities.

Hemp:
Driven by innovation in building materials and circular products, hemp is gaining traction. But the sector remains **fragmented and in need of coordinated value chains and clearer legal and logistical frameworks**.

Nettle:
Nettle fibres are still largely experimental, with **no mature commercial supply chain**. Yet nettle offers an interesting niche for diversified farms and specialty products – especially if processing solutions can be developed locally.

Wool:
Sheep wool is abundant in Nordic agriculture but often under-utilized. There is clear commercial scope for:

- **Non-textile wool products** (e.g. insulation, pet bedding, composites);
- **Local wool processing hubs** to reduce logistics costs for farmers;
- Collaboration between **craft and industrial players** to build scale.

Networks, Skills and Knowledge

A standout insight is that **networks and skills development are at the heart of market creation**. NorNa organised a series of seminars, study visits and collaborations with educational institutions – linking students, farmers, designers and researchers. These interactions didn't just share knowledge but set the foundation for future regional initiatives and new business concepts.

Takeaways for Ostrobothnia Business Leaders
For companies in Ostrobothnia – with agriculture, textile design and bioeconomy on the regional agenda – the NorNa findings point to several strategic entry points:

- **Create local processing capacity** – e.g. retting or wool processing – to capture value from raw fibre crops instead of exporting unfinished materials.
- **Innovate products for new markets** – from eco-friendly building materials to premium niche textiles and biocomposites.
- **Build cross-sector partnerships** – connecting farmers with designers, educators and circular economy innovators to develop holistic value chains.
- **Leverage regional branding** – a Nordic natural fibre identity can be a powerful selling point in international sustainability-oriented markets.

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