



INNOVATIVE FOOD PRODUCTION
OF FISH AND VEGETABLES



HEALTHY ENVIRONMENTS FOR PEOPLE

FOOD PARKS

SSEC SWEDISH SURPLUS
ENERGY COLLABORATION

SSEC SWEDISH SURPLUS ENERGY COLLABORATION



**Program leader of Urban Food
and Editor of this ebook**

Håkan Sandin

**Horticulturalist , Msc in Horticulture
at the Swedish University**

CEO, Program leader for SSEC, <http://sse-c.se>

Board member of the Refarm 2030, <http://refarm2030.se>

CEO of NAHC, <http://www.nahc.se>

CEO of my own company Håkan Sandin Consulting



Program leader of Urban Health

Bengt Persson

Agronomy Doctor, Landscape Architect LAR / MSA

Associate Professor, Department of Landscape Architecture,
Planning and Management, SLU Alnarp, [http://www.slu.se/
institutioner/landskapsarkitektur-planering-forvaltning/](http://www.slu.se/institutioner/landskapsarkitektur-planering-forvaltning/)

Deputy Program Manager SSEC, <http://sse-c.se>

Chairman of the BEUM Association, <http://www.beum.se>



Photo: Bengt Fellbe

A new food industry in Bjuv

Written by Bengt Fellbe, Business Manager in Bjuv Municipality

We want to continue to be a leading player in the context of developing a sustainable, mutualistic, circular food industry. Since Findus' industries were closed down almost two years ago, enormous activity has evolved in Bjuv's municipality. New companies have been established and will invest very large amounts of money the coming years. We expect that more than twenty companies will establish themselves in the next few years. This will mean an investment in food industries that will exceed two billion SEK.

Bjuv municipality has a long history of food industry and agricultural production. Findus Sverige AB, which left the municipality in 2018,

was established in 1941. Charkprodukter AB has been operating since the 1960s and so forth.

Bjuv municipality has always been characterized by major international companies. CC Höganäs and Höganäs Bjuv have their history from the mining era, with the manufacture of tiles and refractory bricks, from locally broken clay. Isover Saint-Gobain manufactures insulation materials of recycled glass.

Food Valley of Bjuv and SSEC

Ten years ago, the municipality of Bjuv, together with the major local companies and energy suppliers, and Lund University began an inventory



A close up view of the entire industrial complex now owned by FoodHills AB, The company that took over Findus Sverige AB on March 1, 2018, Photo: Bengt Fellbe



View of the entire industrial complex now owned by FoodHills AB, The company that took over Findus Sverige AB on March 1, 2018, Photo: Bengt Fellbe

work on the municipality's future location advantages. We already knew that we have an exceptionally good geographical-logistical location, with well-developed infrastructure, which provides access to both the major Swedish cities in the north as well as parts of Europe in the south. In order to make a long story short, the work was based on the fact that, in addition to its geographical location and good infrastructure to large markets, Bjuv has very good access to sustainable energy, experience and expertise in industrial symbiosis through co-operation between companies to engage in a circular and sustainable production, as well as infrastructure and large land areas that are particularly suitable for modern sustainable food industry and cultivation. It started with a collaboration called "Söderåsen Biopark", which later on developed to be "Food Valley of Bjuv" - a cluster for sustainable, mutualistic and circular food industry with associated research and development.

The municipality of Bjuv joined the SSEC network early. To work for a new Swedish modern food industry by taking advantage of local resources and outflows in society is exactly what Bjuvs

municipality has developed from and as we see that our future business community will further develop.

SSEC, which has members from both the private industry and municipalities, and has an academic principal with close proximity to research, has proved to be a very successful and rewarding membership for the municipality of Bjuv. In order to give concrete examples; the first year started a large Vinnova (the Swedens Innovation Agency, <https://www.vinnova.se/en/about-us/swedens-innovation-agency>), project in Bjuv municipality with stakeholders from SSEC who found synergies and development opportunities with companies in Bjuv municipality. An innovative land-based shrimp cultivation was established in Bjuv through contacts within SSEC. Together with the employment office, Region Skåne and local landowners, the municipality of Bjuv, with the help of SSEC, has developed a model for detailed planning, focusing on promoting integration and job creation through new entrepreneurship. The municipality of Bjuv develops, with the support of SSEC, a Recruitment and Training Platform in the Food and Horticulture Industry, together with the Employment Service



View of the industrial process treatment plant in Bjuv, Photo: Bengt Fellbe



View of the landscaping constituting potential areas for the establishment of new industry of fish and vegetables in Bjuv, Photo: Bengt Fellbe

and Educator in close cooperation with industry. Bjuv municipality is a project participant (<http://www.climate-kic.org/events/open-innovation-urban-food-from-residual-heat/>) in an innovation contest sponsored by Vinnova, see article about the Innovation Contest in this eBook, which aims at utilizing the residual flow for community development in urban environments. Through our municipality's high activity and presence in projects linked to sustainability, we are now also project participants in the Interreg project UBIS – Urban Baltic Industrial Symbiosis. It is an EU project focusing on Industrial symbiosis with participating countries around the Baltic Sea. Last but not least, SSEC and stakeholders connected to the network played a decisive role in the municipality of Bjuv when Nomad Foods decided to close down Findus AB in Bjuv. Through members of SSEC with high competence and high levels of business credit, a belief among entrepreneurs and investors was established for a new food industry in Bjuv, which has now also become reality through the acquisition by FoodHills AB. In addition to this, we have had a large exchange of experience and expertise through the other members, as well as the opportunity to get in touch with potential new

establishments, both Swedish and international. Our experience is that together with like-minded players, both private and public, who believe in a new Swedish sustainable food industry, SSEC is a Win-Win. The municipality of Bjuv had not been where we are now, despite its good conditions, without active participation in SSEC.

Throughout its history, Bjuv's municipality has taken advantage of local resources that the various companies have refined and created global companies with 1000's of jobs.

Vrams Gunnarstorp's estate, a very large farm, with animal, forest and grain production, has been in Bjuv's municipality since generations back. Together with EoN AB, the estate is the owner of Söderåsen's bioenergy – biogas plant.

Findus's industrial areas covering 100 hectares, including surrounding arable land, will in future constitute a resource for the establishment of the above-mentioned new food industry companies. In this context, the biogas plant with surrounding land, a treatment plant, irrigation infrastructure is also offered for new establishments.

Pushing to develop the Swedish food industry

Energy efficiency is part of Veolia's DNA where we are focusing to help the industry and community to use the resources in the most optimal way. Today our research department consists over 330 researchers and above 250 pilot installations where we constantly are pushing the boundaries forward enabling us to further reduce the usage of fossil fuels, recycle energy streams and expanding our view to include a 360 perspective adding ways to optimize the usage of resources. #Livingcircular

Energy is critical for the Food & Beverage Industry where many manufacturing processes require thermal energy such as steam, hot water and cooled water. Veolia is the global market leader for the provision of environmental services to the Food & Beverage Industry. We have been operating energy systems in the Food & Beverage Industry for more than 15 years and are trusted by over 60 Customers to manage and improve the performance of their energy systems.

At Altia distillery plant in Finland we have optimized the energy cycle, but we are not stopping there. By including a circular approach we have also replaced the fossil fuel by utilizing the by-products originating from the production. Now towards zero CO₂ emissions and zero waste volumes.

Veolia group is the global leader in optimized resource management. With over 163,000 employees worldwide, the Group designs and provides water, waste and energy management solutions that contribute to the sustainable development of communities and industries.



Through its three complementary business activities, Veolia helps to develop access to resources, preserve available resources, and to replenish them. In 2016, the Veolia group supplied 100 million people with drinking water and 61 million people with wastewater service, produced 54 million megawatt hours of energy and converted 30 million metric tons of waste into new materials and energy. Veolia Environment (listed on Paris Euronext: VIE) recorded consolidated revenue of €24.39 billion in 2016.



www.veolia.com

Photo by Håkan Sandin att King Naresuan Court outside Nakhon Ratchasima, Thailand:
A pastoral dream landscape in Thailand today replaced by a highly efficient industrial agriculture
that, with the help of chemicals and fertilizers, destroys a millennial agricultural ecosystem.



New food production systems need sustainable energy worldwide

To produce food in the future, we must use large quantities of energy, also at an ever-increasing scale. The three main reasons for this are:

1. The world population is set to increase to 9.8 billion people by 2050

The world's population will increase from today's 7.6 billion to 9.8 billion by 2050, according to a UN report. In just seven years, India will have passed China as the world's most populated country, the UN predicts. And by 2050, Nigeria will have taken over third place from the United States. With around 83 million people being added to the world's population each year, the upward trend in population size is expected to continue.

2. An increasing number of people are moving to our cities

Today, more than 50% of the world's population lives in cities. The world's production systems for food is changing at a furious pace and more and more energy-consuming means of production, such as fertilisers and pesticides are used. And because we still use the same agricultural land resources to produce our food, as we have for hundreds of years, it now requires many and costly methods to transport to the city, and all over the world.

3. The food needs more transports

The world is flooded with food. The variation of food available to the consumer has

	Electricity	Diesel	Oil
Cultivation and harvesting	0	1449	0
Manure management		121	
Dairy Cows	341	118	0
Beef cattle production	76	466	0
Piglet production	134	5	79
Pig production	66	0	0
Broiler production	20	0.6	46
Egg production	19	0.2	19
Total Energy	656	2160	144

Source: Mapping of Agricultural Energy Use JTI - Institute of Agricultural and Environmental Technology, author Andras Baky, Martin Sundberg, Nils Brown

dramatically increased. Food of all kinds, from every corner of the world, is nowadays available in almost every shop. Our consumption patterns are also changing. In the urbanised world we prefer to buy our food in food bags distributed to our homes, resulting in a dramatic increase in transport in and around our cities. We also consume more processed and packed food and at the same time, we also eat out at restaurants more than ever before.

Can we save energy when producing food?

The answer is as simple as it is obvious. We must always be frugal with the world's resources and we must lose our dependence on fossil fuels, especially in transport.

However, we must continue to support the growing population of the world with food, so therefore we must also increase our use of energy.

The latest reports from the UN Climate Panel PPCC, which was held in May this year show that we can supply the world with renewable energy, with a good margin. "The technological potential of renewable energy exceeds the world's energy needs during this century, notes the UN Climate Panel".

The statements below can not reasonably be denied.

1. We have built our modern societies with the help of large amounts of energy.
2. We will continue to need much more energy.
3. We can reduce the energy needed per unit, when producing our food, being more effective.
4. We need to use renewable sources of energy to save our environment.

	Biofuel	
	0	GWh/year
		GWh/year
	0	GWh/year
	0	GWh/year
	32	GWh/year
	0	GWh/year
	116	GWh/year
		GWh/year
	148	GWh/year

5. There is no shortage of renewable energy in the world

Swedish agriculture uses around 10 TWh of energy, of which 3.11 TWh in the form of diesel, electricity and biofuels, as displayed in table 1. This direct energy use will generate approximately 3.64 TWh of indirect energy needed to produce fertilizer and other means of production, of which fertilizer use is about 2.31 TWh. Production in greenhouses and drying costs for cereals consume somewhere between 3-4 TWh, altogether a grand total of about 10 TWh/year.

We are now working to increase the production of fish and vegetables in Sweden, with the aim of making use of surplus energy that would otherwise be wasted. Doing so we will need to increase our demand of electricity and heat with approximately one hundred percent in the short term.

Food production in-house where people live

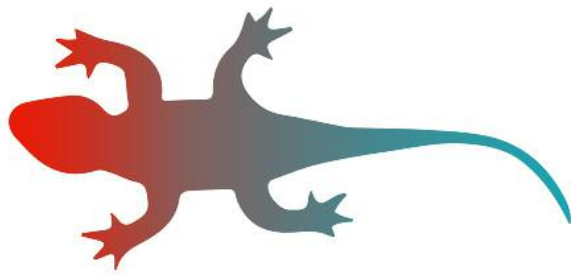
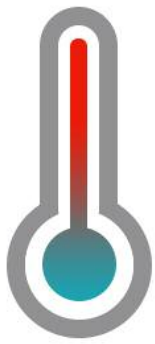
Producing our food in-house, where people live, is undoubtedly part of our effort to save energy. Simply because it is so efficient when calculated per produced kg of fish and vegetables.

- Prioritizing the production of fish and vegetables in-house is undoubtedly one of the most effective ways to increase food production in the world. By definition, it is an exponential innovation, that has the potential to quickly reach one billion people in a person's lifetime.
- By producing food in-house, we can place it exactly where we wish and where we have full control over all flows, giving us possibilities to develop circular and mutualistic production systems.
- By placing them in urban areas where people live, we reduce the need for transportation and can also benefit from surplus heat, electricity, organic materials and other unused resources created in the city.
- Then we can also more easily employ people who have no work.

By producing in-house, we are open to endless innovation possibilities by using high technology and ingenious solutions that the world has not yet seen.



Håkan Sandin
Horticulturist
 Msc in Horticulture at the Swedish University of Agriculture
Program Leader
 SSEC, Swedish Surplus Energy Collaboration
<http://sse-c.se>
VD/CEO
 NAHC, Nature Assisted Health Care Holding Ltd
<http://nahc.se>



ectogrid™ – A revolutionary concept for sharing surplus thermal energy

In modern cities there are enough thermal energy flows generated by human activity to provide the base for both heating and cooling of the entire city. Sharing surplus heat and cooling saves money – and the environment. The problem is the lack of solution that’s fully enabling this. Problem is now solved. Now there’s ectogrid™.

By connecting buildings and sharing the energy between them, all available energy flows will be used in an efficient way. One building needs heat and another building in the area needs cooling. When heat is produced, cooling is also generated, and vice versa. Today all this energy is released into the atmosphere or is recycled with inefficient and costly methods, says Dr Per Rosén, senior specialist at E.ON and inventor of ectogrid™.

Only one cool and flexible grid is needed, but it serves several purposes – distribution for both heating and cooling as well as for storage and flexibility which also makes more room for intermittent renewable energy.

ectogrid™ is a product and a patented technology, powered by and with heritage from E.ON, however the technology can be licensed by anyone interested in realizing an ectogrid™ system. And the concept is suitable for residential and all types of commercial buildings.



We match different needs of various buildings and processes and create a win-win solution, says Fredrik Rosenqvist, Innovation Director at E.ON.

ectogrid™ decreases both pollution and the energy consumption in a city, says Fredrik. This is a revolutionary technology that will help fight climate change and transform the energy market worldwide.

The ectogrid™ concept was discovered and incubated via E.ON’s innovation accelerator programme :agile. More information about the concept can be found at: www.ectogrid.com



Photo: Peckas

Europe's largest Aquaponic company expanding after just under 10 months of operation

Written by Anneli Kuusisto and Carina Åberg

Härnösand municipality is striving to be involved in the ongoing expansion of Sweden's food industry through collaboration with SSEC.

In Härnösand, Northern Sweden, you will find Europe's largest true aquaponic sustainable production of tomatoes and fish. The method was developed at a smaller scale over a 20 year period by Pecka Nygård. Peckas Naturodlingar is the company responsible for scaling-up this idea. The production started only 10 months ago, and already produces 20 tons of fish and 200 tons of tomatoes annually, and there are plans for more. The company is in the process

of expanding their greenhouses in Härnösand to double the current capacity. By 2021, the company aims to produce 500 tons of fish and 5,000 tons of tomatoes across different sites around Sweden. A development that the municipality of Härnösand more than welcomes.

Härnösand municipality participates in the network of SSEC – a research and development program that works to conserve natural resources in a better and smarter way. The network also gives companies in Härnösand the opportunity to be seen in a global context and to gain valuable knowledge through the participants.



Härnösand's promises to their inhabitants is to achieve the goals set by United Nations Development Programme (UNDP) – to lead the way to the future through an everyday life in Härnösand, reaching the goal where society is in balance with the environment by 2045. One of several approaches to the Härnösand municipality's environmental and sustainability efforts is to create conditions to reduce climate impact from food consumption.

Peckas Naturodlingar is contributing to achieve these goals.

Read more at www.peckas.se

Food Parks of Härnösand

Härnösand is located in the north part of Sweden, an area not usually associated with large-scale production of fish and vegetables. But the municipality of Härnösand has dedicated to invest in the development of industrial sites (Food Parks of Härnösand), where food companies can establish themselves. The objective is to provide an infrastructure ensuring, in a competitive and innovative way, that primary food producers can be established as well as companies that

want to process fish, vegetables and other food, in an industrial environment specially designed for this purpose.

Härnösand is a driven and committed municipality focusing on energy, recycling and fossil-free solutions. Härnösand welcomes entrepreneurs who see opportunities in the context described above.

Based on Sweden's goals in the national food strategy, a regional action plan for development is currently being prepared.

Food Technology Parks of Härnösand

The region is a globally leading industrial county, largely based on forest and energy. The regional University of Mid Sweden therefore conducts high quality and innovative research in these areas. There are also powerful and world leading companies in the region, such as SCA, Mondi, Valmet and AkzoNobel.

When it comes to food production, a cooperation on research and development with the Mid Sweden University and The Swedish University of Agriculture is now planned and hopefully underway.



Photo: Peckas

With the forest as a base for an emerging food industry, we can supply this new industry with biologically produced plant protection agents, fertilizers and diesel. We can also provide feed for fish and other animals based on the forest as a raw material supplier.

An extensive survey will also identify how the Mid Sweden University can explore new research areas.

The national food strategy is clear – it will provide more jobs and sustainable growth across the country.

In Härnösand we want to create a national center for production, research, development, innovation and education in food technology.

A powerful similar initiative is Food Valley of Bjuv in southern Sweden, Scania, also described in this eBook, whose goal is to establish an International Reference and Testing Center. Bjuv and Härnösand municipalities are part of the Swedish Surplus Energy Collaboration, SSEC and therefore working to develop a nationwide industry of fish and vegetables.

The masterplan is thus to establish Härnösand and the Region of Västernorrland as part of this development and become the Center of Northern Sweden for a sustainable, mutualistic, circular food industry with the extensive Swedish forest industry as base.

For further information contact:

Härnösand Municipality

Anneli Kuusisto
anneil.kuusisto@harnosand.se

Investor services: Are you interested in establishing your business in the region and become part of the new FoodTech center? Our regional investment promotion agency High Coast Invest will support you

High Coast Invest

Mikael Aamisepp
Director of Investment
mikael@highcoastinvest.com

Food and Towns

Welcome to the conference the 19 September in Malmö

The conference is held in Swedish only because the remaining competitors only come from Sweden and Island. Any questions from other foreign interests can be answered by either Bengt Persson or Håkan Sandin, see contact information at the beginning of the eBook.

The below-described competition is now approaching its final and rewards will be awarded to the winning proposals. One million SEK will be awarded to the winners.

SLU Alnarp together with Malmö city, Climate-KIC and the residual heat consortium SSEC organizes an all-day conference at Studio in Malmö on 19/9 on Food and Cities. The conference will address whether it is possible to achieve a food production of importance in cities. Experiences and ideas from different cities will be presented together with experiences and views from companies, organizations, authorities and research. The conference ends with the presentation of the final proposals in the Vinnova-funded innovation food competition Urban Food from Residual Heat and the prize amount of SEK 1 million is being distributed.

Program and application (by 12/9) at <https://malmo.se/4.5c6f59e616436ac201f163b.html>

MEMBERS OF THE SWEDISH SURPLUS ENERGY COLLABORATION

