Mapping of EU Member States' / regions' Research and Innovation plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy

Task 3

Case Study Report Skåne

Contract: RTD/F1/PP-03681-2015

2016-12-06

Henrik Nilsson

1. Short Regional Bioeconomy Profile

Name of the case region/country	Skåne
Member State	Sweden
GDP – Euro per capita (2014)*	37 900
Total ESIF Research & Innovation per capita per year*	4.53
Total H2020 per capita per year*	26.54
Value Chain Approach to the Bioeconomy**	Crop-based primary production, Foods and beverages, Bio-energy and fuel from biomass, Bio-energy and fuel from waste, Bio-based chemicals
Thematic Focus of the Bioeconomy Approach**	Crop Production, Beverages, Agricultural residues and bio-energy crops, Biochemical products, Food Processing
Research and Innovation Fields highlighted for the Bioeconomy**	Biology, Biotechnology, Chemistry, Life Sciences , Nano Technologies, New Materials, Logistics and Packaging, Agronomy and crop sciences, oenology, etc., Advanced Manufacturing
Bioeconomy Activity Level**	High
CASE STUDY SUMMARY	
Bioeconomy Approach	Linkage of traditional primary production to high value added innovations.
Bioeconomy Ecosystem	Strong business ecosystem related to agriculture and food industry. Big research institutes related to material science
Bioeconomy Policy Support	Coordination on regional level. Weak financial support from national level increase the reliance on EU funding
Successful initiatives and Good Practices	– Innovation procurement created a new frim in biomaterial – Triple helix cooperation created a regional biogas industry – Initiatives in the area of blue economy
Main Needs, Gaps and Bottlenecks	The main challenge facing the region is to create commercial value from its substantial innovation assets

* Source of the data: S3 – Regional Viewer: http://s3platform.jrc.ec.europa.eu/synergies-tool

** Data collected by this Study project in Task 1.

2. Regional Bioeconomy Ecosystem

2.1 Origin of Interest of the region in the Bioeconomy

An important origin in the interest of bioeconomy in Skåne is that the region have both a high productive agriculture and forestry sector, 17 % of the arable land in Sweden is situated in Skåne. The regional authority of Skåne has developed an action plan for the regional bioeconomy until 2030, which will bring together actors and enhance the prospects for a transition to a bio-based economy in Skåne.

The size of the regional bioeconomy is estimated to 3200 companies with a total turnover of 107 billion SEK (approximately 10 billion euro) and approximately 33 000 employees. The largest bioeconomy sector in Skåne, in terms of turnover, is food processing (34%) followed by energy supply (15%), construction (13%), wood, paper and furniture (12%), agriculture (12%), manufacturing and reparation of machinery for agriculture, forestry and food processing (6%), and water and sanitation (6%).

The following areas have been identified as the most important advantages for Skåne in developing an innovative bioeconomy:

- Expertise and strong private business sector within production and processing of agriculture products.
- A diversified economy which provides good opportunities for innovation and cross-fertilization between different sectors.
- Research and development in a number of universities in the region provide a knowledge intensive environment.
- Technical expertise in many industries that are closely linked, such as agriculture / food / packaging / energy
- Bio-based production from forestry, aquaculture and agriculture in the region.
- A significant degree of R & D expenditure (nearly 5% of GDP)
- Strong academic presence and a high proportion of tertiary-educated labour.

Skåne has also a strong position at the forefront of sustainable energy use and is leading the way in green public transport. Biogas production, distribution and consumption has developed during the last years.

Within the framework of Smart Specialization, the region of Skåne supports the innovation climate in three strategic priority areas; Smart Materials, which attempt to exploit the global growth potential of the research facilities ESS and MAX IV; Smart Sustainable Cities and; Personalized Health. None of these areas are specific directed towards Bioeconomy, but especially in Smart material area substantial

synergies with bioeconomy can be found. This area is driven by two major research centres; The Max IV Lab[1], started 2015 and the European Spallation Source (ESS)[2] which has a planned start 2019. These two major infrastructures of international importance will attract a large number of international researchers to conduct advanced material research, with applications in a broad range of fields: biomedicine, medicine, material technology, nanotechnology, energy research, geology and environmental science.

In relation to the smart cities priority, activities concerning biofuels are foreseen.

2.2 Bioeconomy Stakeholders

The action plan on bioeconomy was developed by the regional authority of Skåne which is also one of the key stakeholders. There are two major universities in the region which are important stakeholders; University of Lund, with 47 000 students and 5 500 employees, with a high profile in medicine, pharmacology and globally sustainable development, and a branch of the Swedish University of Agricultural Sciences. In addition there are also Malmö university with 23 000 students and Kristianstad university college with 10 000 students.

In addition there are number of semi-public organisations important for the innovation system in general, which makes them also relevant for the development of the bioeconomy:

- The Research and Innovation Council in Skåne (FIRS) is an important hub and link between academy, public sector and private business. The organisation includes top leaders of the universities, regional political actors, municipalities, regional authorities, as well as businesses and industry. Besides its strategic mandate, FIRS is a network of leaders who can be brought together quickly to act jointly whenever a need arises. It works as task force for crises and changes, as well as a long-term strategic enabler.

- Skåne Food Innovation Network (Livsmedelsakademin). Its aim is to develop the food sector together with its 150 members and influential partners. The activities are focusing on networking and cooperation and engage in training, trainee programmes and PR.

- The chemistry[3] and packaging[4] industry have a few large businesses which are important player in fields related to bioeconomy.

[1] https://www.maxiv.lu.se/
[2] https://europeanspallationsource.se/
[3] Perstorp AB https://www.perstorp.com/
[4] Tetra Pak AB http://www.tetrapak.com/

- The food industry in Skåne is present along the entire value chain and consists of a large number of SMEs which taken together is important for the regional development of the bioeconomy.

2.3 Bioeconomy – strategies, plans and projects

As mentioned above there is a regional action plan on Bioeconomy in Skåne. This action plan is putting the Skåne region in a broader context by using a classification of regions and countries based on type of orientation of their respective bioeconomy sectors[5]. Four types are identified; i) bioeconomy dominated by agriculture, e.g. Romania, Greece, Portugal, Ireland, Crotia; ii) bioeconomy oriented towards food processing and bio-based chemical industries, e.g. Netherlands, France, Denmark, Germany Italy UK, Spain, Luxembourg; iii) bioeconomy oriented towards forestry and related industries, e.g. Finland, Sweden, Latvia, Estonia; and iv) non specialised bioeconomy. According to this classification Skåne with its orientation to the food processing and bio-based chemical industries is significantly closer to the Netherlands, Belgium, France, Denmark, Germany, Italy, UK etc. than to other regions in Sweden. Therefore, the action plan point towards seeking cooperation in those countries for regional development.

The regional action plan is pointing out a number of sub sectors in the bioeconomy relevant for the region:

The forest industry develops targeted **new bio-based products**, whose share is estimated to rise to half of the industry's export revenues by 2030. In addition to the traditional forest industry, wood material are also used innovative and high value-added wood products. Under these areas the action plan is also mention that forest biodiversity and conservation of natural values must be secured. The use of bio-based materials in the construction process will probably be a significant part of the bioeconomy in the future. The largest growth outlook for wood construction is in large-scale construction for residential flats and office buildings. It is also possible to make a successful export product of expertise in wood construction.

The chemical industry will also play a central role in many of the new bioeconomy value chains because it produces intermediates and chemicals for many different industries and with high added value. The chemical industry in Skåne has the necessary knowledge and infrastructure to further develop its role in the bioeconomy.

[5] The bioeconomy in the European Union in numbers, European Commission)

Within the **life sciences or biotechnology** business opportunities arise for drug research, health care, etc. who also holds very high value added. Those sectors have historically been strong in Skåne even if there have been a decline in private research activities in this area.

Nature tourism can generate significant employment and revenue based on both domestic and foreign visitors. This also put focus on the maintenance ecosystems as a necessary factor in order to build a strong business in this area.

A large part of the bioeconomy is and will continue to be composed of **agricultural and food industry**. New businesses throughout the food system may also arise; for example, side streams from the food industry may be used to both produce new bio-products for the chemical industry and input in energy production.

3. Bioeconomy Policy Support

3.1 General support framework

The OECD territorial Reviews Skåne (2012) notes that in spite of important R&D and patenting activities in Skåne and strong public research infrastructure, the spillovers from these input activities are not likely to be captured in the region. Globalization of value chains, deficient entrepreneurships and weak SME innovation explain why these strong assets are not sufficient to significantly contribute to growth and full employment in the region. In order to address this weakness OECD noted that Skåne needs to create more efficient cluster policies, reinforce the international dimensions of innovation and put the business in the centre of the strategy.

In general, substantial resources are invested in the early stages to pick up ideas that have the potential to become new enterprises but the need of financing for businesses in growth/expansion phase outstrips the supply. The region therefore see a great need to adapt the financial instruments to the needs of different companies and industries. The sources for financing the innovation system in Skåne today are diverse:

- EU: ERDF, EAFRD, Horizon2020
- National: Vinnova, (Swedish innovation Agency) Tillväxtverket (Swedish Agency for Economic and Regional Growth), Almi (Advisory Services, Loans and Venture Capital)
- Regional: The Regional Authority of Skåne
- Local: Municipalities and Associations of municipalities
- Academia: Universities/University colleges

- Private: Private co-financing of EU-project, research projects and financing of players within the system

3.2 Bioeconomy Policy Support

During interviews it was noted that an important aspect of the development of the regional bioeconomy is the creation of markets for existing products and innovation. Here the public sector has an important role to fill since it can create market niches through the means of directed public procurements.

The action plan on bioeconomy is providing an overarching strategy for investments in the bioeconomy on short and long time horizon in order to maximise the potential of bioeconomy with respect to R&D.

- Short term investments (3-5 years) should focus on developing the knowledge on product development, demonstration of existing bio-based products, and commercialisation of those.

- Investments on longer time horizon should instead focus on getting maximal potential from biomass. This includes development of technology for production processes, use of materials, and sustainable us of resources. An important part of this is development of bio-refineries since bio-fuel is an alternative to fossil fuels.

In relation to bio-refineries, it shall also be noted that on national level, the conditions for development in this sector have not been ideal. The Swedish government have in recent years shown lack of determination on how to support innovation in this area. For example, in 2013 a law which made it obligatory to mix a certain share of biofuel in all fossil fuels sold in Sweden, was adopted. This law would have dramatically decreased the commercial risk of developing new bio-fuels and bringing them to the market. Nevertheless, in June 2014 the law was withdrawn which resulted strong hesitation form the private business to invest in this area in Sweden. In a legislative proposal of March 2016 to the parliament, the Swedish government are suggesting to set up a state-owned venture capital fund primarily oriented to build and maintain large scale demonstration facilities, for example in the bio-refinery area. This proposal may to some extent limit the negative consequences of the increased market risk in the area.

3.3 ESIF and H2020 resources for the Bioeconomy

Support through ESIF funds are considered to be important for the development of the bioeconomy in Skåne, e.g. through financing of incubator and business

networks. The reliance of EU support is especially articulated in relation the food industry which have not received much attention form national innovation support.

The European Commission's "Action plan for the European Union Strategy for the Baltic Sea Region" mentions bioeconomy as one of the main priorities, where marine energy, blue biotechnology and sustainable use of biomass are pivotal topics.

It shall also be noted that the strategy mentioned above is financially neutral and relies on a coordinated approach, synergetic effects and, on a more effective use of existing EU instruments and funds, as well as other existing resources and financial instruments, where the ESIF funding is pivotal. The actions and projects under the strategy can also be funded by many other financial sources (Horizon 2020, BONUS Joint Baltic Sea Research and Development Programme, the LIFE programme, Education and Culture programmes, etc.), as well as national, regional, private sources.

Among the funding sources the Interreg programme for the Baltic Sea is important. This programmes has two priority axis related to Bioeconomy:

- Efficient management of natural resources, targeting at the reduction of pollution of the waters in the Baltic sea region and the strengthening of resource-efficient growth, in particular sustainable production and use of renewable energy, energy efficiency and resource-efficient blue growth. Total ERDF support to this priority is 84 million euro.

- Capacity for innovation, targeting actions to strengthening the ability of the Baltic Sea region to create and commercialise innovation. It aims at supporting a framework for the generation of innovations building on complementarity in a diverse region in such a way that new, smart combinations of competences and strengths can develop and reach its full potential. Total ERDF support to this priority is 84 million euro.

The regional ERDF programme which covers Skåne has a three priority axis which have relevance of the development of the bioeconomy:

- Smart growth and innovation, TO 1; 10 million euro.
- Smart growth – small and medium size enterprises, TO 3; 22 million euro.
- Sustainable growth – reduction of carbon dioxide emissions, TO 4; 9 million euro. This priority is explicitly mention bioeconomy as a part of the solution e.g. development of biofuels.

The Swedish national ERDF programme is also entirely directed towards TO 1, 2, and 4, and the purpose of this programmes is to complement the regional programmes and enable synergies between regional, national and EU funding. The intervention under TO 1 (27 million euro) is focused on R&I infrastructure and

synergies between academia and business. The intervention under TO 3 (23 million euro) is focused on venture capital, especially in relation to energy efficiency, and TO 4 (78 million euro) is focused on energy efficiency and use of renewable energy and R&D concerning reduction of carbon dioxide emissions.

4. Successful Initiatives and Good Practices

4.1 Gaia Biomaterial

Region Skåne has conducted an innovation procurement of bio-based disposable aprons for the health care. The winner is a Skåne based company called Gaia Biomaterials and their winning disposable apron consists of 91 percent of renewable material. Compared with conventional plastic aprons used today, it means a total reduction in carbon dioxide emissions by over 250 tonnes per year. The innovation procurement has been done as a pilot project with support from the Swedish Energy Agency and is a way for Region Skåne to meet the political target to be fossil-free in 2020.

The innovation procurement has in many ways differed from a regular procurement process. A project team was formed at Region Skåne with broad expertise in areas such as environmental, market, health care and innovation issues. The group made a market survey, which meant that a number of potential suppliers were identified. These were invited to joint dialogue meetings, where innovation procurement presented in detail and provided an opportunity for discussion. Four qualified bids were submitted.

Innovation procurement was conducted as a so-called negotiated procedure, which gave Region Skåne staff the opportunity to coach the four bidders to sharpen their offers further. The winner could get a grant of up to 50 000 euro depending on how well the offer matches the requirements profile. The coaching resulted in an improvement of all the tenders, including the winner. The difference between Gaia Biomaterials original tender and tender after the coaching was a significant increase in the proportion of renewable material, and a price cut of 30 percent.

Gaia Biomaterials will deliver a test series to be evaluated in the care of a special test panel. Starting autumn 2016, the company will deliver bio-based disposable aprons for the whole health care in Region Skåne, in total about 5.2 million aprons.

4.2 Biogas

Starting in 2009 Region Skåne launched an action plan to develop an industry for production of biogas. The regional interest in biogas originated in an abundance of waste products, including manure from the agriculture sector. This action plan have managed to gather important actors form public, private and academic sectors in order to build a new industry. An important reason for the success have been that municipalities have created a regional market by replacing the fossil fuel driven public transport buses with gas driven buses; today 99 % of the buses used for public transport is driven by regionally produced biogas. Despite the reginal success, the general national and global development, including the vehicle industry, is turning away from biogas as a future solution for the transport sector and therefore the future expansion of this experiment is uncertain. The LIFE funded project BIOGASSYS have been a part of the promotion and development of this industry.

4.3 Blue Economy

Region Skåne is one of six partners in a project funded by the Baltic Sea Interreg programme; Smart Blue Regions, which seeks to enhance blue growth opportunities, i.e. bioeconomy related to the maritime resources, based on increased capacity of the regions to implement research and innovation strategies for smart specialisation (RIS3). The project is still in an early phase which focus on inventory of capacity and potential in the blue economy. Region Skåne do not specifically mention blue economy in their RIS3 strategy but they consider their focus areas as easily transformed into actions relevant for blue economy growth.

In the area of blue economy the project BUCEFALOS is worth mentioning. BUCEFALOS was a regional project in which EU LIFE+, the City of Malmö, Region Skåne and Trelleborg Municipality were investing about 3 million EUR to enable the region of Skåne to work towards the resource-efficient use of the excess aquatic biomass which is mainly treated as waste. The project did primarily demonstrate the potential of producing renewable energy from biomass in the form of biogas. The project did run from 1 September 2012 to 31 August 2015. Another related project was the WAB[6] project (Wetland Algae Biogas, funded by South Baltic Interreg programme) led by the Trelleborg municipality including 11 partner organisations in Sweden and Poland. The project resulted in a pilot plant for biogas production based on algae and restoration of wetlands including algae cultivation. The project had a double aim; to produce renewable energy from biomass and; by using algae

6 http://www.trelleborg.se/globalassets/files/samhallsbyggnadsforvaltningen/filer/hallbarutveckling/wab_finalreport-inet.pdf

which are absorbing nutrients from the water, and restoring wetlands; limit the extreme eutrophication of the Baltic sea.

5. Needs, Gaps and Bottlenecks to Deploy the Bioeconomy

Skåne has many challenges in relation to innovation system in general which also spills over on development of an innovative bioeconomy. The main challenge facing the region is to create value from its substantial innovation assets. Strong performance in innovation is not necessarily generating employment and growth. Aggregate growth in Skåne is weak and the region risks failing to capitalise fully on large-scale investments, such as the Max IV and ESS facilities for materials research, which are among the largest research facilities in Europe.

The regional action plan on bioeconomy mention a number general topics which needs to be address in order to develop the regional bioeconomy.

Communication

Increased and improved communication is a prerequisite for the increased development and use of bio-based products and services. It comes in a variety of levels: the business-consumer, business-companies, universities, companies, business-public sector, etc.

Example of activities;

- Increase awareness of new opportunities within bio-based products
- Create demand for bio-based products
- Create arenas where different parts of the value chain can meet and exchange ideas
- Demonstrations and mutual learning

Education

The knowledge of the challenges and opportunities with bio-based production must increase. By investing in education, students from various disciplines may acquire basic knowledge in bioeconomy in order to improve the ability of business and industry to switch to sustainable production in a number of areas. For example, education of purchasers can give great effect by creating early demand for new types of materials and products. By increasing collaborations between industry and academia, research can more quickly turn into practice and enterprises can increase their innovative capacity.

Examples of activities:

- Increase knowledge of bioeconomy in a number of higher education institutions and programs
- Initiate cross-sector collaboration within academia and between academia and businesses

Intra-regional cooperation

Greater collaboration between stakeholders is essential to develop the opportunities in the bioeconomy. To build trust between the actors and to find partners who can strengthen the operations are important.

Example of activities:

- Increased cooperation between government, business, academia and civil society
- Clearer regional investment in green industries and smart specialization
- Interaction between procurement and training

International cooperation

There is a large international market for bio-based materials and products. Many of the companies in the region are already on the international market. Nevertheless the domestic market is often a prerequisite for SMEs. By building partnerships with regions with similar conditions, the competitiveness of the SMEs can increase. Prioritised countries in the EU are the Netherlands, Belgium, France, Denmark, Germany, Italy, UK, Spain, Luxembourg and Ireland.

Example of activities:

- Identify international markets for bio-based products and services
- Take advantage of the EU programs for research and innovation to build strong partnerships between industry and academia in various countries

Finance and business models

Many bio-based innovation never reach the consumer because they either compete with established products or are too expensive to develop to a finished product. Therefore strategic market analysis needs to be improved and public interventions needs to be linked to private co-funding providing a strong market orientation. Furthermore it is important to combine innovative financing solutions to new business models and to link different sectors with each other where collaborations are not natural. Finding solutions for the financing of large-scale bio-refineries is also a particular priority.

Research and innovation

Investment in research and innovation must be expanded and further developed. Skåne has a good opportunity with its universities and several research and innovation environments. Industry is diversified across a variety of industries and with a strong base in bio-based production, especially in agriculture, food and energy.

Examples of activities:

- Strengthen cooperation among actors
- Increase the exchange between research and industry, for example through more industrial doctoral students
- Strengthen primary production innovation
- Increased focus on sustainability innovation support

6. Information Sources

Literature and Documents:

An international Innovation strategy for Skåne 2012-2020, FRIS, SIS, 2011

Functional review of Blue Growth RIS3 steering process and operational structure, Region Skåne 2016

Handlingsplan för en Skånsk bioekonomi 2030, Region Skåne

OECD Territorial Review Skåne, 2012

Operational programme: Interreg Baltic Sea Region programme 2014-2020

Operational programme: National regional fund programme for investments in growth and jobs 2014-2020, Sweden

Operational programme: South Sweden 2014-2020

Proposition 2015/16:110, Swedish Government

Teknologiska innovationssystem inom energiområdet, Swedish Energy Agency 2014

Relevant websites:

http://www.livsmedelsakademin.se/

http://www.jti.se/index.php?page=english

http://www.lrf.se/mitt-lrf/regioner/skane/

http://www.lu.se/

https://www.maxiv.lu.se/

https://europeanspallationsource.se/

http://www.krinova.se/

http://www.trelleborg.se/globalassets/files/samhallsbyggnadsforvaltningen/filer/hallbarutveckling/wab_finalreport-inet.pdf

Interviews and Contact details:

Name	Position	Institution/ Organisation	Phone	Email	Interview Date
Håkan Samuelsson	Environmental strategist	Regional authority Skåne	+46 44 309 30 50	hakan.samuelsson@skane.se	30 Nov. 2016
Pia Sandell	Project manager for Skånes action plan on Biogas	Regional authority Skåne	+46 705-36 60 27	Pia.AC.Sandell@skane.se	30 Nov. 2016