



# BIOECONOMY

## – the Growth Engine of Nordic Regions?

Why this buzz about bioeconomy, you might wonder? Perhaps because it can be seen as a “silver bullet”, able to avert several staggering threats to our societies: economic and demographic decline in rural areas; joblessness and the climate crises. Clearly, there are several good reasons for the Nordic countries to dig deeper into their bountiful biological assets. First, it is about replacing

fossil fuels with biofuels and replacing non-degradable products with bio-degradable ones. Second, the bioeconomy could boost the productivity and product development within agriculture, fisheries, forestry and the chemical industry. Finally, the bioeconomy creates new jobs in sparsely populated areas, by utilizing existing natural resources in new ways.

THE NORDIC REGION contains a multitude of biotic natural resources; from the marine environments off the Icelandic and Norwegian coasts to the vast forests of Finland and Sweden and the fertile agricultural soils in Denmark.

Since 2014 bioeconomy has been high on the Nordic policy agenda. The total turnover of the key bioeconomy sectors in the Nordic countries was approximately €184,000M in 2014 according to Nordic Innovation (2014). This constitutes 10% of

the total Nordic economy.

The share of the economy represented by the bioeconomy is highest in Iceland and lowest in Norway. In the Nordic region, growth potential is found in a wide range of bio-based products such as chemicals, bio- »

» fuels and gas, nutrients and medicine.

There are differences in the extent to which the bioeconomy is prioritized on the national political agenda. So far, Denmark, Finland and Iceland are the forerunners in this regard. Finland and Denmark recently launched new national policies and strategies to promote bioeconomy.

In the following pages we present five Nordic cases of bioeconomy at work – and the impeding and enabling factors.

### Box 1. Defining bioeconomy

International actors and governments have different ways of defining bioeconomy. The aim is clear though: to develop an economy that is based on the sustainable utilization of renewable resources. In its “Communication on Innovation for Sustainable Growth: A Bioeconomy in Europe”, the EU considers the bioeconomy to consist of food, agriculture, paper and pulp, forestry and wood industry, fisheries and aquaculture, bio-based industries, biochemicals and plastics, enzymes and biofuel sectors. In policy-making, a bioeconomy is in many cases also seen as requiring a cross-sectoral approach that calls for a broad range of system-level changes and innovation.

# NORDIC CASE STUDIES

## ICELAND – South Iceland region

*“Bioeconomy in a sparsely populated region – without always calling it bioeconomy”*

### Enabling conditions

- The region is a major producer of agricultural products and fisheries. Tourism creates new markets.
- Considerable potential: competences and knowledge of primary food production
- National level: Matis Ltd, an Icelandic food and biotech R&D organisation, promoting region’s food innovations
- A specialized national funding instrument was created to increase the value of food and non-food marine products.

### Impeding factors

- Scarce population, lack of educated workforce, vulnerable for out-migration
- Small companies, small innovations. Companies require external encouragement.
- The regional structure makes it difficult to create joint strategies but the policy framework in Iceland is being reformed
- Ecoinnovation is included in the national strategy Iceland 2020, but implementation has been slow due to government changes



*Indicative maps of the case studies on this spread: Nordregio / Julien Grunfelder*

## DENMARK - Lolland region

*“Green economy focus & bioeconomy initiatives in a region undergoing restructuring”*



### Enabling conditions

- Long tradition of renewable energy production and active local community
- Vestas Wind Systems, a world leading manufacturer in the wind energy sector
- Green Center was created in 1988 in Lolland to help farmers innovate
- A regional development strategy that places renewable energy as a core priority and catalyst for other developments
- Denmark aims to become completely energy independent by specializing in clean technologies. One objective is to utilize 50% of the manure for biogas.
- A European Strategy for Sustainable, Competitive and Secure Energy 2020 (EU policy 2006) has been accompanied by financial support to regions like Lolland.

### Impeding factors

- Structural challenges of industrial development, out-migration, dependence on local labour markets
- Location disadvantages: weak urban networks and infrastructure; difficulty in connecting with neighbouring regions
- Low density: difficult and expensive implementation of strategies that would improve the efficient use of resources (water, energy)
- Renewable energy sectors’ continued dependence on public subsidies. Farmers don’t find it profitable to harvest biomass for biogas.

## NORWAY – Østfold region

“Region with a locomotive bioeconomy company”

### Enabling conditions

- The knowledge base & reputation created by the world class biorefinery Borregaard
- National Strategy for Biotechnology 2011-2020: investment in research, development and the commercialization of biotechnology
- Public support system as an additional asset: Industrial Biotech Network Norway
- The Research Council of Norway focuses on the bioeconomy through the Research Programme BIONÆR on Sustainable Innovation in Food and Bio-based Industries 2012-2021
- White Paper No. 7 (2008–2009) “An innovative and Sustainable Norway”

### Impeding factors

- The competitive situation in Norway between fossil fuels and biomass - low profitability
- Decline in the number of jobs in the region, especially related to management and academic professions
- High costs in Norway make it difficult to compete in the global market
- Limited access to raw materials

## SWEDEN – Örnköldsvik

“Long-term commitment towards regional bioeconomy cluster”

### Enabling conditions

- Örnköldsvik region has a long tradition in forestry, trade and heavy industry
- Access to natural resources, primarily wood
- Public-private co-operation and long-term financial commitment
- The Örnköldsvik Biorefinery of the Future Cluster: >20 member companies, using biotech to create new products
- National level: Swedish Research and Innovation Strategy for a Bio-based Economy: because of good natural geographic conditions, industry and infrastructure, Sweden has good conditions for conversion to a bio-based economy
- Steadily increasing share of biofuels in transportation and heating

### Impeding factors

- Political will for change is partly lacking. Action is requested to correct market failures by e.g. inserting tax incentives and biofuel quotas.
- The national bioeconomy policy has not been updated recently
- Hesitant regional mindset due to some failed bioeconomy investments in the past
- The technologies are ready to scale-up, but the demand for green solutions is insufficient



## FINLAND - Forssa sub-region

“Bioeconomy with regional branding and public-private initiatives”

### Enabling conditions

- Tradition of agriculture, industry and applied education in the region
- Cluster of several research institutions, cleantech companies and educational institutions related to bioeconomy
- The Finnish National Strategy on Bioeconomy (2014). “Pioneer of the global bioeconomy”
- Regional large-scale biorefinery initiative: Brightgreen Forssa program (2014)
- The Envi Grow Park eco-industrial park as a flagship for Forssa bioeconomy (closed circulation of energy and materials )
- Active public-private cooperation
- National & international networking

### Impeding factors

- Old mindset: “smokestack industry”
- Shortage of qualified labour
- Weakened regional and local financing of bioeconomy initiatives
- Need for additional high-growth companies to form a critical mass for the Forssa regional bioeconomy cluster, and to provide inspirational examples

## POLICY RECOMMENDATIONS - national and regional level

The five Nordic case studies can be summarized as a common call for action and true implementation of national and regional bioeconomy strategies. The following messages were put forward to decision-makers:

- Create a common understanding of the concept *bioeconomy*. This has an impact on ambitions, visions, tools, and learning between countries and regions. Interesting initiatives are also found in places where the bioeconomy concept is not emphasized, e.g. South Iceland case.
- Design and implement financial incentives, stimulating demand for bio-based products and services. What is called for (in all case studies) is the facilitation of markets, increased profitability in biomass, effective infrastructure and action by consumers.
- Focus on export promotion and the global nature of bioeconomy: Open-up a new export markets for bio-based products and services – through Nordic cooperation, elimination of border obstacles and other EU-initiatives.
- Promote regional co-operation and pooling of resources between regional and local sectors and actors, through regional clusters or quadruple helix models. The case studies underline that public-private partnerships are very favourable for developing the bioeconomy and enabling entrepreneurship, financing, up-scaling, education and vocational training. Such examples of active private-public cooperation are found in Forssa, Finland and bioeconomy cluster in Örnsköldsvik, Sweden.
- Ensure long-term national and regional, political and financial support in developing regional bioeconomy sectors or industries, including up-scaling of demonstration plants to larger facilities. See e.g. VINNOVA's support to the biorefinery in Örnsköldsvik, Sweden.
- Supply statistics: Make it easier to monitor the actual impact of bioeconomy on regional development (in jobs, CO2 reduction and economic growth).
- Encourage further Nordic bioeconomy cooperation and knowledge exchange, co-financing of demonstration plants and other development projects.

### Box 2. THIS POLICY BRIEF

is based on a report by Nordregio (Bioeconomy in the Nordic region: Regional case studies, [www.nordregio.se](http://www.nordregio.se)), commissioned by the Nordic Working Group on Green Growth—Innovation and Entrepreneurship of the Nordic Council of Ministers (NCM), investigating different regional bioeconomies in five Nordic countries. The Nordic regions that have been analysed are Forssa in Finland, South Iceland, Østfold in Norway, Örnsköldsvik in Sweden, and Lolland in Denmark.

#### Further reading / Additional references:

Future Opportunities for Bioeconomy in the West Nordic Countries commissioned by Matis, Icelandic Food and Biotech R&D.2014.  
Available on: [www.matis.is](http://www.matis.is)

Innovating for sustainable growth – A bioeconomy for Europe (EC 2012).  
Available on: <http://ec.europa.eu/research/bioeconomy>

Nordic Innovation (2014): Creating value from bioresources. Innovation in Nordic bioeconomy. Nordic Innovation report 2014:01.  
Available on: [www.nordicinnovation.org](http://www.nordicinnovation.org)

#### Forthcoming publication:

The potential of industrial symbiosis as a key driver in Nordic regions (Nordregio, fall 2015)

### Contact

Jukka Teräs, Senior Research Fellow  
[jukka.teras@nordregio.se](mailto:jukka.teras@nordregio.se)

*Nordregio is a Nordic research institute within the fields of urban planning and regional development. We provide policy relevant knowledge with a Nordic and European comparative perspective.  
[www.nordregio.se](http://www.nordregio.se)*



**NORDREGIO**  
Nordic Centre for Spatial Development



**norden**

Nordic Council of Ministers