

Innovation in the Nordic Bioeconomy, Rural Development and Rural-Urban linkages

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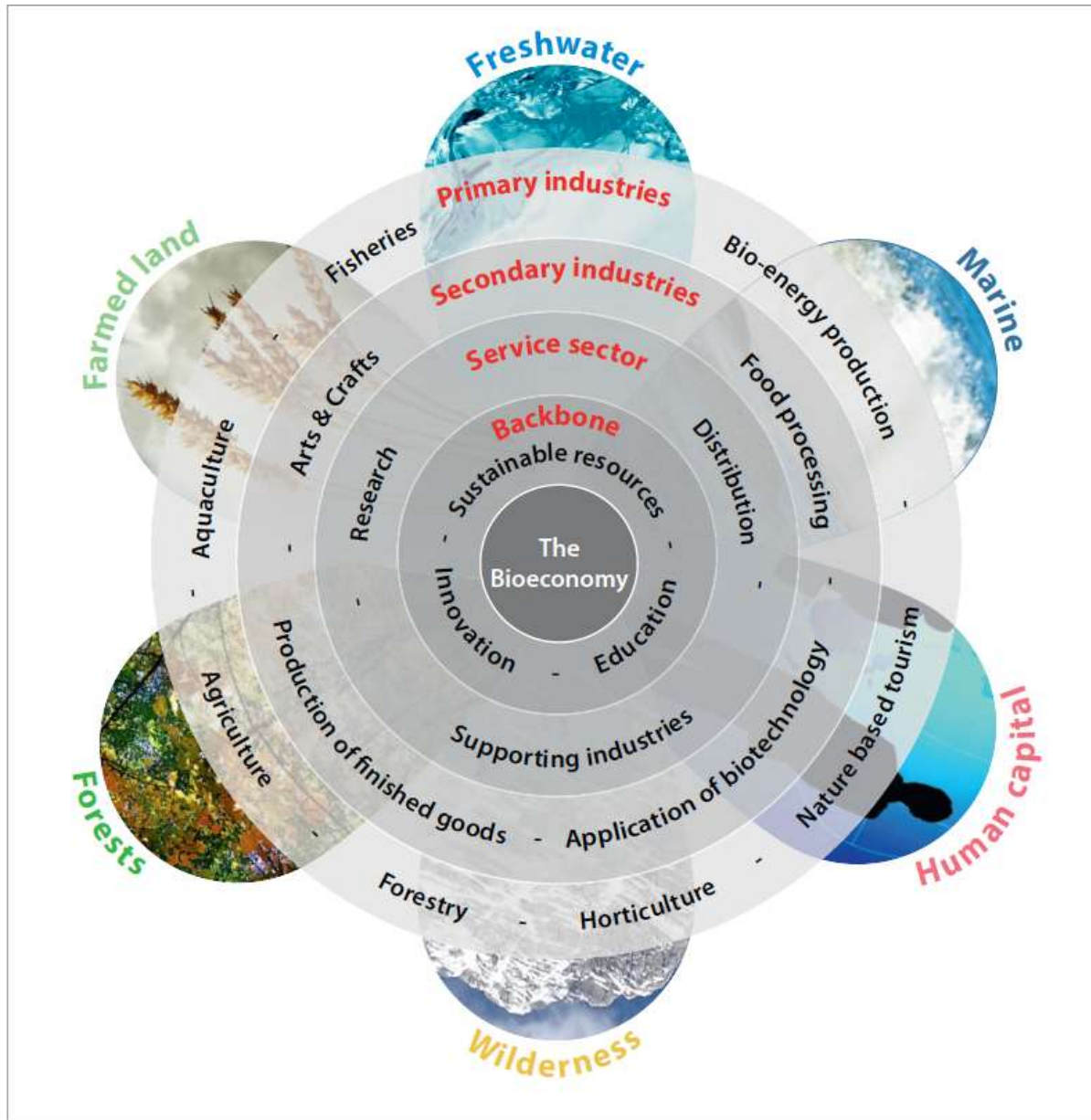
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'Bioeconomy'

A broad definition & scope



“Bioeconomy refers to an economy that relies on renewable natural resources to produce food, energy, products and services. The bioeconomy will reduce our dependence on fossil natural resources, prevent biodiversity loss and create new economic growth and jobs in line with the principles of sustainable development.”



Icelandic definition of Bioeconomy: From Matis Ltd

Scale of the Bioeconomy

- EU
 - 2 trillion Euros and provides some 22 million jobs or about 9% of the EU labour force (CEC)
- Nordic countries
 - 184 billion + Euros (turnover) or 10% of the economy,
 - Iceland: 18%
 - Finland: > 16%
 - Norway: 6%
- How important for rural regions?
 - Örnsköldsvik region, Sweden
 - The bioeconomy is reckoned to provide some 25% of employment
 - Bioeconomy cluster and biorefinery (SEKAB, Processum etc)
 - But this is high...

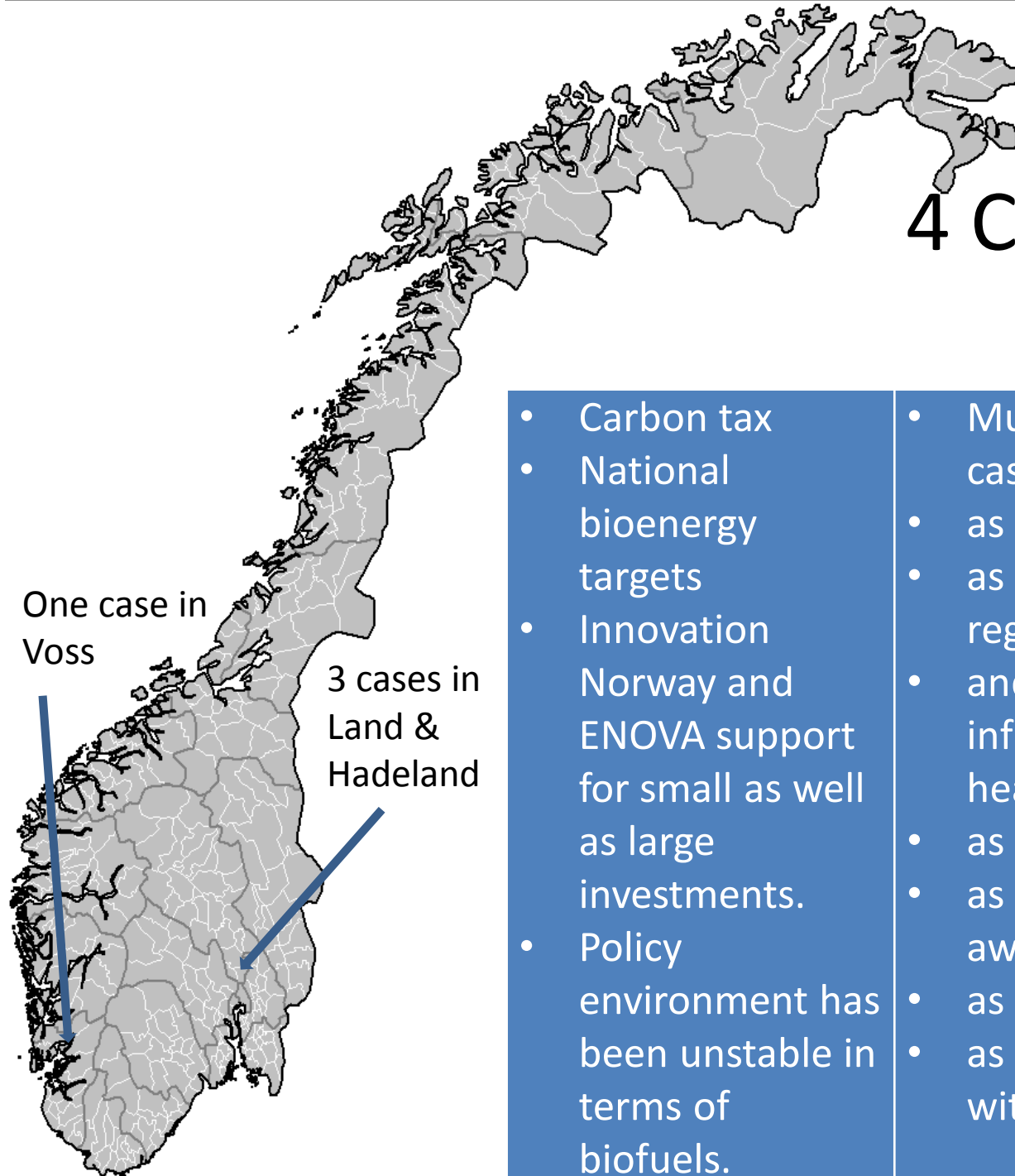
Nordics see considerable scope for future bioeconomy development, BUT

- Expected benefits may not reach rural regions.
 - competing demands for bio-resources
 - high biomass extraction costs
 - regulations/ policies may be too rigid/ centralised
 - institutional arrangements may prevent the utilisation of ‘free’ raw materials (“waste”) or positive synergies
 - opposition to harmful/ offensive emissions
 - low end product prices because of competing products, poor C-tax regimes
 - external ownership and IPR rents may absorb a high proportion of any surplus

Key conditions

- *Embeddedness* in local resources, history and skills
- *Local ownership* of resources, transportation, heating plants, transformation plants, etc
- *Municipal enthusiasm*, engagement and appropriate local regulation
 - *Market creation*
 - *Legitimacy*
- *The circular economy*
 - *Closing loops*
 - *Capturing Synergies*
- *The 'Grounded' approach*
- *NB Raw materials costly to transport.. So ...*

4 Cases in Norway



- Carbon tax
 - National bioenergy targets
 - Innovation Norway and ENOVA support for small as well as large investments.
 - Policy environment has been unstable in terms of biofuels.
- Municipalities active in all four cases as customers,
 - as investors,
 - as local regulators (eg of building regulations)
 - and in some cases as infrastructure providers (district heating pipe network);
 - as member of GRIPs;
 - as 'brander' and raiser of awareness;
 - as legitimiser;
 - as coordinator and link agency with sources of expertise etc.

Public policies play a critical role – Swedish case

Örnsköldsvik municipality and wider region: 29,000 inhab.



National Bioeconomy Strategy.

VINNOVA
(Public agency for innovation systems) via VINNVAXT programme for regional specialisms

- Biofuel Region platform for 4 northern counties.
- Local Municipal adoption of ethanol buses, and municipal DH.
- Development of local vision and 'brand'. Municipal and National support for the Biorefinery of the Future Cluster, with quad+ helix form.
- Estab of Regional Pilot Process plants in Umeo and Örnsköldsvik

Finnish case

Forssa,
18,000 inh.



National Bioeconomy Strategy 2014.

Key national funding support bodies, SITRA and Tekes

- Started in 1990s with new Municipal Dump and Waste management company LHJ.
- Local company first biogas from waste and food processing by-products.
- Envi eco-industrial park; Forssa Envitech club (2006).
- Forssa Cluster cooperation.
- Brightgreen Forssa concept, as a Brand.
- Bioeconomy and sustainable use of Natural Resources one of 5 strategic foci in Home Regions Strategy 2013-14.

Focus on Green and Sustainable Development since the 1990s.

Vestas (Wind Turbines) a world leader.

- Lolland Community Testing Facility (CTF) developed 2007.
- Development of Innovative Partnerships including Community (Quadruple Helix).
- Co-creation with cluster development, Industrial Synergy, Innovation Platforms, meetings & networking.
- Regional Advisory Group developing ideas for Bioeconomy.
- Membership of National innovation networks.
- Green Centre, Lolland estab. 1988, started Algae Innovation Centre with Aalborg and Roskilde Universities.

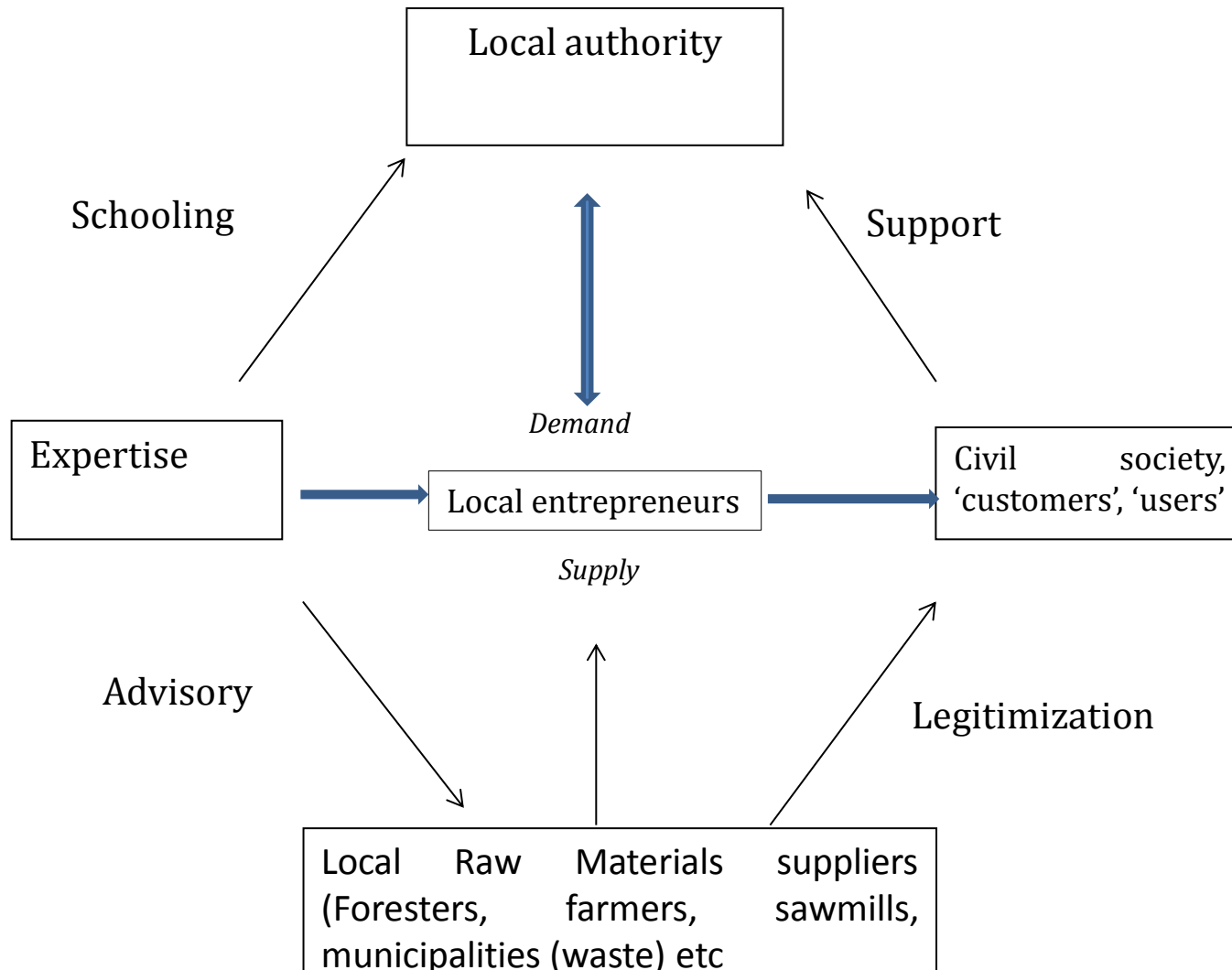
Danish case: Lolland



See also

- Nordregio's reports
 - GREECO – Green Economy Case Studies
 - Bioeconomy in the Nordic Region: Regional Case Studies (Working Paper 2014:4)
- NILF, Grounded Innovation
 - TRIBORN project on forest based bioenergy
- OECD, Public Governance and Territorial Dev.
 - Linking Renewable Energy to Rural Development
 - And various innovation (Edinburgh, Russia) and other conferences (e.g. Memphis, 2015)
- Nordic Innovation (2014): Creating value from bioresources. Innovation in Nordic bioeconomy. Nordic Innovation report 2014:01

The 'Quintuple Helix' IP is Common in the Nordic bioeconomy



The Forest Bioeconomy

- Offers considerable opportunities to Northern Europe, including NW Russia, Scandinavia and the Baltics
 - Persistent surplus of growth over harvesting
- Is – and will remain - a key element in recent Bioeconomy Strategies (eg Finland)
- Can be beneficial for rural places and people, but this is not guaranteed ...
- Needs institutional changes ...
- Challenged by regulatory uncertainty and regulatory conflicts

Innovation in the Bioeconomy

- Technological challenges remain to be solved
 - E.g. Enzyme technology for breaking down cellulose and lignin must be much cheaper and produce large volumes; pyrolysis and gasification; hydrolysis etc
- But at present the major problems are institutional!
 - Innovations needed to
 - Link the actors (raw materials, waste streams, manufacturers, local authorities, knowledge brokers, users, national and supranational regulators etc)
 - Cross traditional boundaries and 'join up' policies and levels
 - Tax CO₂ and other harmful emissions and environmental bads properly to give better and more consistent signals to actors
 - Encourage and permit local adaptations, 'small' local policies etc.
 - Urban-rural linkages very important

Towards a Paradigm Shift for Innovation?

Who is innovation for?
How is innovation 'sustainable'?

- Quad or Quintuple Helix Combining
 - Public authorities, research and training, raw materials, transformation enterprises, consumers
- DUI + STI *with stakeholder and citizen engagement*
 - DUI = Doing, Using, Interacting mode refers to experience-based, implicit, embedded and embodied knowledge.
 - STI = Science, technology, mode is characterised by science-approach – formalisation, explicitation and codification
- Context, common and necessary bioresources
- Analysis of financial results from many countries
- Primarily innovation related activities Low-tech, DUI-innovation and innovation (Jensen, Johnson, Lorenzc, & Lundvall 2007. Forms of knowledge and modes of innovation, *Research Policy*)
- *EIPs – EU Innovation Partnerships also reflect this paradigm shift*

Conclusions

- The bioeconomy is important in the Nordic countries
- Considerable future potential is seen in forest, marine & 'waste' bioeconomy
 - *Transition to 'low carbon economy'*
 - *Rural and regional development*
- Synergies and symbiosis very important for the economics and locational clustering
 - *Variable geometry needs flexible policies*
- No 'heavy' policies for the bioeconomy in the Nordics
- Local policies and engagement in local and regional innovation platforms around the bioeconomy are very important
- Joined up government and decentralised policies needed
 - Incompatible sectoral policies and regulations
 - Fitting actions to context
- Local innovation platforms with quadruple or quintuple helix configuration are important.
- Typically involve small towns and rural hinterlands
- Traditional innovation support systems not always very helpful!

Thank you!

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