

---

WORKING PAPER 2013-5

---

Governing Innovation for  
Sustainable Development:  
Designing creative institutions

---

JOHN  
BRYDEN

STIG  
S. GEZELIUS

KAREN  
REFSGAARD



**NILF**  
Norwegian Agricultural  
Economics Research Institute

# *NILF Publications\**

---

## **Annual publications:**

“Account Statistics for Agriculture and Forestry”.

“Handbook for Farm Management”

“Norwegian Agriculture. Status and trends”

“Food and industry. Status and trends in Norwegian food and beverage industry”

## **Research results are published in three series:**

“NILF-rapport” (“NILF-report”) – Research results and comprehensive reports

“Notat” (“Working papers”) – Interim reports, memos, lectures, and final reports from smaller projects

“Discussion paper” – a series for publishing preliminary results, published on NILF’s homepage

## **Other publications:**

“A method for farm accountancy adapted to Norwegian Standard 4102”

”Regional gross margin budgets”

## **NILF is secretariat for the Budget Committee for Agriculture, which annually publishes:**

“Total Account in Agriculture”

“Model Farm Calculations”

“Report on the Implementation of Norwegian Agricultural Policy”

“Volume and Price Indexes in Agriculture”

(<http://www.nilf.no/PolitikkOkonomi/Nn/VolumPrisIndeksar.shtml>)

\* Most publications are in Norwegian. “Account Statistics for Agriculture and Forestry” and “NILF-reports” have an English summary

---

WORKING PAPER 2013–5

---

Governing Innovation for  
Sustainable Development:  
Designing creative institutions

John Bryden

Stig S. Gezelius

Karen Refsgaard



**NILF**

Norwegian Agricultural  
Economics Research Institute

<b>Series</b>	Working paper
<b>Editor</b>	Agnar Hegrenes
<b>Title</b>	Governing Innovation for Sustainable Development: Designing creative institutions
<b>Authors</b>	John Bryden, Stig S. Gezelius, Karen Refsgaard
<b>Project</b>	Green Innovation Research (M140)
<b>Publisher</b>	Norwegian Agricultural Economics Research Institute (NILF)
<b>Place of publication</b>	Oslo
<b>Year of publication</b>	2013
<b>Pages</b>	21
<b>ISBN</b>	978-82-7077-855-3
<b>ISSN</b>	0805-9691
<b>Key words</b>	innovation, embeddedness, environment, political economy, triple bottom line

## About NILF

- Research and analyses on agricultural policy, food industry, commodity trade, economics, farm management and rural development.
- Documentation of economic results in the agricultural sector at national and farm level. This includes serving as secretariat for the Budget Committee for Agriculture and preparing the annual statistics for Account Results in Agriculture and Forestry.
- Develops tools for farm management and accountancy.
- Funded by the Ministry of Agriculture and Food, the Research Council of Norway and through projects for public and private institutions.
- Main office in Oslo; regional offices in Bergen, Trondheim and Bodø.

# Foreword

---

Working paper 2013-5 is an outcome of NILFs strategic institute programme Green Innovation Research. The project is headed by Karen Refsgaard at NILF. The aim of this project is to develop knowledge about how to foster innovation that promotes environmental sustainability, economic welfare, and social equity and legitimacy. The project is funded by NILF through base funding provided by the Research Council of Norway.

## **AUTHORS**

John Bryden (NILF)

Stig S. Gezelius (NILF)

Karen Refsgaard (NILF)

February 2013

Ivar Pettersen



# Table of contents

---

SUMMARY .....	1
1 SUSTAINABLE INNOVATION: THE QUESTION OF INSTITUTIONAL DESIGN.....	3
2 INNOVATION SYSTEMS AS COLLECTIVE LEARNING SYSTEMS.....	5
3 A THEORETICAL BASIS FOR SUSTAINABLE INNOVATION .....	7
3.1 Embeddedness and Regulation: Polanyi's lessons.....	7
3.2 Social Justice and the Triple Bottom Line: the Human Rights Lesson.....	8
4 SOCIALLY EMBEDDED INNOVATION: CASES FROM THE 'GREEN' SECTOR.....	11
5 DISCUSSION AND CONCLUSIONS .....	15
5.1 The Role of Policy Intervention .....	15
5.2 Towards a New Approach: Innovation for Sustainable Development.....	16
REFERENCES .....	17





# Summary

---

The aim of this working paper is to advance the discussion on how social systems for sustainable innovation should be designed. Particularly, we discuss implications of the new Sussex Manifesto, which argues that innovations should be more directed at the needs of poor and excluded groups in society and, consequently, that innovation processes should include these groups. Based on Polanyi's work, we argue states and markets should work closely together to avoid socially detrimental effects of economic development. We focus specifically on the construction of socially embedded innovation systems that pursue the 'triple bottom line' of sustainable development: social benefits, economic benefits, and benefits to the natural environment. By including social and distributional issues, we look beyond ideas about 'green growth' that typically focus only on the 'double bottom line' of economic and environmental benefits.



# 1 Sustainable innovation: the question of institutional design

---

The aim of this working paper is to advance the discussion on how social systems for sustainable innovation should be designed. Particularly, we discuss implications of the new Sussex Manifesto (STEPS, 2010), which argues that innovations should be more directed at the needs of poor and excluded groups in society and, consequently, that innovation processes should include these groups. We argue that the Sussex Manifesto implies rethinking existent ideas about what innovation systems are and should be. Our innovation systems approach builds on the work of Lundvall (1985, 1992), Freeman (1987, 2009), Freeman & Lundvall (1988), Nelson (1993), Edquist (1997), Cooke (1992), Asheim & Isaksen (1997, 2002) and Fagerberg *et al* (2005) among others, which recognises the social context's importance to the innovation process. We argue that innovation is often best regarded a collective learning process. We are therefore less concerned with the individual Schumpeterian entrepreneur than with the question of how social processes and institutions can foster or hinder innovation. The innovation systems approach is particularly important for 'green innovation' -- defined simply as innovation for sustainable development -- because green innovation is typically tied to land and its associated natural resources; using or changing land-related resources often entails interacting or interfering with entire social systems that are connected to these lands. As Polanyi (1944) argues, such interaction, or interference, requires states and markets to work closely together to avoid socially detrimental effects of economic development.

We focus specifically on national, regional and local innovation systems that pursue the 'triple bottom line' of sustainable development: social benefits, economic benefits, and benefits to the natural environment. By including social and distributional issues, we look beyond ideas about 'green growth' that typically focus only on the 'double bottom line' of economic and environmental benefits.

Our focus is on innovation processes and systems relating to the land, including utilisation of soil, water, wind, minerals, and living resources. We are dealing with commodities that are basic needs for most of humanity, but which many poor and excluded groups still lack proper access to. Many industries, production systems and related supply chains have failed to increase -- and in some cases they have undermined -- the ability of underprivileged groups to cover their basic needs (STEPS, 2010).

The importance of land-related resources to the provision of basic human needs entails that these resources are bases for social systems, including both people and the institutions that regulate their interaction. If one ignores this by treating land, or the people who depend on it, as commodities in unregulated markets, institutional breakdown, environmental degradation and human deprivation may result (Polanyi 1944). We argue that systems for sustainable innovation should build on, and if possible strengthen, the social institutions of the people who depend on affected resources; only then can a triple bottom line be pursued successfully.

We thus address the research question: by which principles should institutions be designed so as to promote sustainable innovation? This entails asking: how can institutions be devised that ensure consistent and simultaneous 'triple bottom line' outcomes? What actors need to be involved, at what levels, and how?

In trying to answer these questions, we start by discussing the literature on national, regional, and ‘green’ innovation systems, smart specialisation, and the New Manifesto approach to innovation for the poor. We also review the main existing policies and institutions around innovation, arguing that such policies and institutions should be significantly more inclusive than they traditionally have been.

We move on to define sustainable innovation and outline its institutional framework and theoretical foundations. We consider institutions as both enabling and inhibiting structures, as governing structures and as facilitating structures, which can exclude or include actors and pathways. We next explore the notions of ‘top down’ and ‘bottom up’ innovation as two alternative paradigms with fundamentally different consequences for public interventions and innovation outcomes. Finally we suggest some characteristics that institutions for sustainable development should have to promote a triple bottom line, and suggest how public intervention can be organised to foster the development of such institutions.

## 2 Innovation Systems as Collective Learning Systems

---

Innovation implies learning, and learning most typically implies acquiring stimulus from others. Most innovation research now recognises that innovation is usually a co-learning process, involving many actors other than a sole ‘inventor’ or ‘entrepreneur’. Specifically, innovation normally involves joint and mutually supporting activities of a range of producers, consumers, research institutions, and governing agencies (Freeman, 1987; Lundvall, 1992). This is particularly true of ‘follower’ regions, that are not the source of an original invention but who successfully adapt it to circumstances and adopt it widely – i.e. where ‘co-invention’ is the norm (Foray et al, 2009). We thus regard innovation as a socially embedded learning process: innovations systems are collective learning systems (Senge 1990).

The innovation literature outlines four types of learning processes, each of which emphasizes particular actors in the learning system: learning through searching, doing, using and interacting (Arrow, 1982; Lundvall, 1988; Boon, 2008; Kamp, 2002; Rosenberg, 1982; Kamp *et al*, 2004; Foray, 2000/2004; Foray *et al*, 2009).

*Learning by searching* is normally thought of as R&D or ‘learning by studying’. It emphasises the roles of research communities. The results are commonly in the form of publications or prototypes. It is typically what is funded by research funding institutions. By contrast, *learning by doing* emphasises the roles of producers. Learning by doing takes place at the manufacturing stage through ‘trial and error’ practical experience, thus increasing production skills, organisational routines and manufacturing practices. In learning by doing, rules of thumb are important and the knowledge generated is more ‘tacit’ than codified. It is not normally counted as R&D activity, and tends to be internally funded through normal production expenses.

*Learning by using* emphasises the roles of those who use the product. The term refers to the fact that the diffusion and increased adoption of a product leads to improvements and is especially important with products that consist of complex, interdependent components making it difficult to predict how they will act together. This knowledge is therefore developed through active and prolonged use. We can think for example of the relationship between the I-Phone and ‘apps’ developed for it.

Many authors have stressed the importance of *learning by interacting*. Learning by interacting emphasises producer-user contacts and is closely related to ‘learning by using’ (Lundvall, 1985). The more complex the technology, the more it is the case that producing firms cannot have or develop all the necessary skills and knowledge needed, and feedback from users becomes an essential part of the process of technological improvement.

Identifying innovation systems includes identifying the system’s boundaries, i.e. who are parts of the system. The four different learning processes outlined above go some way in defining system boundaries. However, especially in natural resource-based economies, an innovation system typically also has territorial boundaries. In territorial terms, innovation systems were initially discussed as ‘national’ (Freeman 1987; Lundvall 1992), but they are also often regional or even local in character (Cooke 2001; Bryden & Refsgaard, 2006; Henue & Jacobsen 2008; Storalick et al 2010; OECD, 2012). Although there is lack of agreement in the academic literature about what consti-

tutes a 'regional innovation system', Edquist (2004) suggests that, to exist, a regional innovation system must have:

- Coherence: there must be organisations and institutions with common development trajectories, feedback loops and complementary competences between actors involved. For example, close linkages between Universities and Research Institutes and SME's
- Unified function: the actors must share a common, institutionalised goal preferably in some publicly accessible agreement or document
- Territorial boundaries: There should be recognisable geographical, institutional and at least to some extent sectoral boundaries of the innovation system the actors must have stakes and relevant activities in a specific common territory

Although a regional or local innovation system must by definition refer to a specific territory or region, this does not necessarily imply a lack of inter-relationships with other regions, or with suppliers, customers and national or international levels of governance (Cooke 2005). Indeed empirical work - for example on the development of the Danish wind industry or the Finnish biomass industry - has shown how important such external linkages and influences can be for the regional innovation system (Midtun & Koefoed 2005). Care is therefore needed in the interpretation of Edquist's criteria of 'regional boundedness', and we argue that it is more useful to think of innovation as 'regionally embedded rather than as 'regionally bounded'.

An example from the well-developed regional innovation system in North Karelia in Finland around renewable energy illustrates regional embeddedness. In this case, the development of special extraction and chipping machinery to reduce costs of transportation of woody biomass to district heating schemes was embedded in the reality of the North Karelian Forest, settlement patterns, and local expertise in forest machinery. In general we can say that the development of renewable energy in North Karelia involved a wide range of actors from the many small forest owners, through the mainly municipal or cooperative district heating companies to the manufacturers of highly efficient wood burning stoves with automatic feeders and the manufacturers of harvesting, chipping and transportation equipment. The renewable energy industry together with its local downstream industries are embedded in local natural resources, skills, cultural practices and related activities developed over time, and also exemplify strong links between regional policies and activities and policies at National level (Midtun & Koefoed, 2005; OECD, 2012). As in the case of wind turbines in Denmark during the early years of the 1970s and 1980s, cooperative and egalitarian values, and strong networks crossing enterprise, learning and research institutions, and local as well as external user communities were critical. The North Karelian innovation system was not based on pure R&D efforts or expenditure, and neither came from the activity of a single entrepreneur. There appears to be a strong sense of regional and national legitimacy, helped by the engagement of many different actors as well as the organs of democracy in the form of the Regional and Municipal Councils.

# 3 A Theoretical Basis for Sustainable Innovation

---

## 3.1 Embeddedness and Regulation: Polanyi's lessons

The notion of the embedded economy stems from Polanyi (1944) who, although using the 'embeddedness' term scarcely, emphasised that the pre-industrial economy unfolded within lasting social ties, and operated according to established social institutions. Polanyi argued that unregulated markets for land, labour, and capital in the early twentieth century lead to disembeddedness of economic life and, consequently, to social crisis. He argued that this crisis could be reversed only by reintroducing political regulation of markets. Ideas about embedded economies have been further developed by scholars concerned with the effects of social networks on modern economic life (Granovetter 1985; Smelser and Swedberg 2005). Compared to many other modern economic sectors, natural resource-based economies are special in the sense that they are embedded in social structures that are themselves embedded in physical territories; the economy's social embeddedness thus tends to reflect its territorial embeddedness.

In cases of green innovation, we can observe the importance of territorially-embedded social networks in, for example primary activities such as forestry, wood processing, farming, and prior industrial skills for example in operation, maintenance and adaptation of forest or farm machinery (Henué & Jacobson, 2008). The form of embeddedness may vary, but includes sets of linkages formed between different actors, for example in short supply chains, which turn out to be very important for most bioenergy activities. Heanue and Jacobson (2008) describe network relationships, interactive learning, and knowledge bases as critical for assessing embeddedness in rural innovation.

Midtun & Koefoed (2005) analyse the development of innovation systems in 'green energy' in Finland, Sweden and Denmark. They stress both the linkages between local farmers and cooperatives, producers of windmills and parts, and users of windmills, as well as the political and social conditions at important phases in the innovation system. Such embeddedness ensures a large number of actors involved and with an interest in outcomes; it ensures a wide spread of beneficiaries especially where resource ownership is wide and relatively equal, as in most of Scandinavia; it helps to hit at least the social and economic 'bottom lines', and if truly green (or greener than alternatives) also hits the third bottom line. The conclusion is that to generate conditions for sustainable innovation around renewable energy, it must be embedded in the local social system and the resources which that system is organised around. This will not be a sufficient condition, but it is likely to be a necessary one.

Polanyi's arguments are relevant to the question of sustainable innovation not only because of their emphasis on social embeddedness; Polanyi's critique against market deregulation includes an environmentally-relevant distinction between 'real' and 'fictitious' commodities. A 'real' commodity is one that has been produced for sale on the market, while a 'fictitious' commodity has not. Therefore, land, labour and money are 'fictitious' commodities which Polanyi argued did not behave in the same way as 'real' commodities: Labour signifies simply human activity which 'goes with life itself'; land is not produced but exists as a nature-given basis for human lives (Polanyi 1944: 72). Treating labour and land as commodities, i.e. leaving their fates to the forces of the

market, may subvert the social and environmental bases for human existence. As Polanyi observed, it is in these fictitious commodities that the abuse of the market system can be most readily observed, as in pollution of the environment, unsustainable harvesting of natural resources, violation of people's customary use-rights, and exploitation of workers. The challenge of green innovation, then, is to ensure that economic development proceeds in such a way that these bases for existence are, at the very least, not undermined. It follows, then, that green innovation concerns some of the major challenges of our time.

## 3.2 Social Justice and the Triple Bottom Line: the Human Rights Lesson

Mainstream economics always was an ideological discipline, imbued as it is with reductionist assumptions about human motivation and driven, at least when applied to matters of public policy, by tacit utilitarian ethics. This enclosed theoretical world of utility maximisation has no room for ethical values that cannot be reduced to matters of preference; anything that cannot be treated as a commodity is effectively regarded as irrelevant to human choice. Consequently, questions of human rights and social justice have tended to take the back seat whenever a problem is being defined as an economic one, as Polanyi (1944) observed. Noteworthy is that excluding such moral questions from consideration has not made mainstream economics any less ideological; it has merely left it with an ideology that is becoming increasingly misplaced in a world where people increasingly share beliefs in human rights such as democracy and equity.

The ideological implications of neoclassical resource and environmental economics are evident in their concern with the externality concept. The externality concept implies that actors in a market may create costs or benefits that are fully or partly received by others than those who create these costs or benefits. In an attempt to motivate actors to take externalities into account when making choices, environmental economics seeks to create surrogate markets for these externalities, or otherwise to place market values on them. Thereby, they seek reward positive externalities while penalizing negative externalities. Although this idea may seem attractive, it implies commodification of values that ultimately concern human rights: Whether or not to deprive future generations of their livelihoods should never be made into a question about willingness to pay; it can only be legitimately regarded as a question of human rights. Consequently, sustainable innovation is not only economics; it is also a moral and ethical position. As Polanyi pointed out, in matters of natural resources and environment, as in other matters concerning human beings, tragedy may result from blind commodification. The fundamental problem of purely market-based approaches to sustainability is that the market 'does not in and of itself embody or produce virtuous behaviour. The market does not care' (Sullivan 2011: 33). Contrary to market liberalist views, sustainable innovation implies that markets should be embedded in social institutions, including moral rights and obligations.

Some economists, such as Harsanyi (1955) and Sen (1977), share Polanyi's concerns regarding moral questions provoked by neoclassical economics, and they try to develop economic theory that can handle also non-utilitarian moral reasons. The New Manifesto (STEPS, 2010: 1–2) forms part of this 'revisionist' legacy of economic thinking. The New Manifesto stresses the social dimensions of innovation, and reminds us that the great moral and political imperative of our age is meeting the 'interlinked global challenges of poverty reduction, social justice and environmental sustainability'. The Manifesto reflects widespread dismay that despite record levels of R&D expenditure and



technological advances, innovation rarely benefits those who needs it the most: extreme poverty, with ensuing human suffering, is still widespread; future generations face huge social, environmental and economic challenges from innovation-induced threats such as climate change. Yet, global governance, economics and politics frequently work against the interests of the underprivileged. Therefore, the STEPS Manifesto calls for a 'new politics of innovation' and a 'radical shift in how we think about and perform innovation' (STEPS, 2010:2). Specifically, STEPS calls for an approach to innovation that looks beyond science and technology by giving people's needs and their social institutions center stage. To hit the triple bottom line, the new innovation politics must address the question of who innovation is for. Taking that question seriously may entail fostering more diverse and more fairly distributed forms of innovation, giving greater attention to cultural variety, regional diversity and democratic accountability.

The emphasis in 'green innovation' discussions has commonly been on a 'double bottom line' reconciling environmental and economic goals, for example, reducing climate change by 'clean technologies' (Cooke 2008, 2012). These discussions tend to ignore social dimensions, although Cooke (2008, 2012) does consider Social Capital and Midtun & Koefoed (2005) explicitly deal with human institutions and policies in their analysis of green innovation in the field renewable energy. For the most part the discussion has gravitated towards the economic aspects of 'ecosystem services', often concerning the costs and benefits of providing such services, which implies treating ecosystem services as commodities (Millennium Ecosystem Assessment, 2007; European Communities, 2008; Giles, 2005). The New Manifesto argues that this is an inadequate approach to the discussion of how to create innovation systems for sustainable development. Although not all 'green' innovations are rural, green innovation typically includes a rural dimension by dealing with land/sea-related resources.



## 4 Socially embedded innovation: cases from the 'green' sector

---

Kamp *et al* (2004) applied the innovation systems framework to the cases of windpower technology in Denmark and the Netherlands, both long term users of wind power. The authors sought to explain the difference in performance of the Dutch and the Danish wind turbine innovation systems between 1973 and 2000, specifically examining differences in the relevant learning processes in the two cases. They found that the major difference was in learning by interacting, which was much stronger in the Danish case, especially for small-scale subsystems. In Denmark, there was evident trust between those involved, a joint frame of meaning, tight links between producers, users and researchers, and the actors were at the same cognitive level. This was not the case in the Netherlands. Related to this, learning by using was also much stronger in the Danish case because in Denmark the users were keen on wind power, and local investment subsidies were introduced early to give local users stakes in the industry. The Dutch case was relatively characterised by learning by studying. In contrast to Denmark's local investment subsidies, the approach in the Netherlands was much more heavily dependent on R&D subsidies, and was led by large companies and research institutes. This 'science and technology push' approach was not successful in the Netherlands. Boon (2008) also compares the development of the wind industry in the Netherlands and Denmark, concluding that the Danish case is characterised by having much more interaction between owners, manufacturers, and government than could be observed in the Dutch case.

Buen (2005) examines the influences of the very different policies in Norway and Denmark on innovation in the wind industry, finding that the policy mix, and its adaptation over time, was an important factor in the Danish success story of the development of wind turbines and related innovation there. He points out that in the Danish case, the increase in windmill capacity correlated with the 30 percent investment subsidy that was introduced in 1979. Instead of giving this subsidy to suppliers, Danish authorities gave them to cooperatives and individuals that lived nearby the turbines. Subsidies were given only to investments in turbines that had been properly tested and approved, thereby stimulating quality. The investment and the sale of surplus electricity were made tax deductible. Buen concludes that these policies increased the public support for Danish wind power development. This she contrasts with Norway where wind energy policies, until the late 1990s at least, were motivated by power-supply needs rather than needs for industrial and technological development. Noteworthy is that Danish wind-turbine development was governed so as to spread its benefits among local residents; the process was carefully governed with the needs of people in mind. The process fostered inclusion and equality rather than simply profitability.

Midtun & Koefoed (2005) also analyse the Danish success in energy-based innovation. They point out that Denmark has become a leader not only in wind-based energy, but also in straw-fired technology for Combined Heat and Power (CHP) and District Heating (DH) production. They note the movement of Danish industry and electricity sectors towards a 'multi-fuel' power plant concept, which means that producers of power can choose between a number of alternative inputs, as well as producing, for example, both heat and electricity. They stress the largely straw-based deliveries from farm-

ers, the fact that large Danish plant- and boiler industries are using biofuel technologies as part of a strategy to become comprehensive turnkey technology providers incorporating renewable energy and environmentally efficient power plant technologies. With respect to wind, on the ‘supply’ side they emphasise the productive interplay between small-scale initiatives and industrial competencies with roots in supplies to farming and mechanical industry. But they equally emphasize the stimulation of the demand side for turbines in the domestic market through policies favouring private co-operative owners, which, in turn, led to the strong turbine cost-reduction. Successful diffusion to larger national and international markets followed as a result. Midtun & Koefoed argue that the political and social conditions were critical for the early development of the innovation system in wind, and subsequent cost-reduction. These conditions created very widespread support – indeed consensus – around the need for renewable energy, including support from farmers, cooperatives, environmental movements, and all political parties. As a result, Government was able to adopt positive policies with initial investment subsidies favouring local cooperatives and shareholdings by local residents, feed-in obligations and tariffs, regulation of the electricity industry, and state support for R&D and technology development. This early effort paid off, and the financial support could be considerably reduced by the early 1990’s without losing the consensus.

It can be argued that the case of Finnish bio-fuel and CHP, similar to the Danish cases, illustrates the importance of the learning by using and learning by interacting approaches. Midtun and Koefed (2005) ascribe the success of the Finnish CHP and bio-energy industry in establishing and maintaining an innovation system to the ability of this industry to supply Finland’s expanding district heating system while simultaneously serving the need of the Finnish forest industry. Adoption and diffusion of CHP in industries was due to the availability of cheap local fuels, poorly developed rural electricity networks, guaranteed internal markets for process heat and power, and the availability of technological competence and skills. In the early stages of Finland’s green energy development, before 1970, by-products (black liquors and wood waste) from the pulp and paper industry were used for process heat and industry auto-production in CHP-boilers. This was followed by a rapid growth of municipal district heating schemes, initially based on peat. There was also increased use of peat in industry electricity production from the mid 1970s, but mostly in conventional boilers. There was then a refocus from peat to wood waste both in industry and municipal district heating schemes in the late 1970’s and 1980s. Midtun and Koefoed (2005) note that the greening of the Finnish energy sector, despite serving industrial needs, was primarily politically motivated. The success of this political initiative in terms of securing the change it desired was thus fostered by the ability of solutions to serve the needs of the key actors involved. Midtun and Koefoed (2005: 13) argue that municipal, industrial and public energy companies were involved in the innovation process from the 1970s. In the case of BioEnergy, there was a strong link between the development and use of peat and public rural policies, leading to strong State support for peat production in the early years. Later, peat production was commercially viable without government subsidy, although through a state-owned company (VAPO Oy). Growing municipal DH systems represented major markets for peat, placing municipal authorities in the combined roles of users and local policy-makers. Public support switched to wood fuels and development of wood-based technologies in the 1990’s, and the mitigation of climate change was given as the key reason for this switch. There were no significant government subsidies for DH, so municipalities had to obtain commercial loans if they wanted more DH plants. Private investors in DH networks received districts and rural public policy loans with low interest rates. The risks were moderate, however, as the municipalities would normally pass the costs on to the consumers by raising electricity prices. Private investors in DH networks

were usually granted low-interest loans. Under Districts (or Regional) Policy, the production of bio-energy was particularly subsidised in high-unemployment regions. CHP was attractive to municipalities, helping their self-sufficiency and independence. It played a key role in post-war modernisation and industrialisation processes.

‘Formal and informal networks with bonds to the forest industries provided legitimation for both CHP and biofuel developments. Alliances and partnerships between municipal, private and state-owned energy companies secured beneficiary institutional conditions for CHP.’ Midtun & Koefoed, 2005: 126-7)

Similar to the Danish case, Finland’s bio-energy development is a case of public policy-driven innovation that facilitates a socially embedded economy. Rather than being driven by unregulated markets, these innovation processes have been carefully directed towards social inclusion and the needs of several stakeholder groups.

It may be no coincidence that these cases of green innovation are to be found in societies with strong traditions for governing markets and for state/industry interaction. The governance model of the Nordic countries is significantly similar to the one that Polanyi called for; this governance model evolved during the first half of the twentieth century as a social and political reaction to the crises created by unregulated markets (Borgen *et al* 2006). It is thus the historical result of experiences expressed in Polanyi’s work (Gezelius forthcoming).

The findings of these case studies are supported by the recent OECD study of renewable energy as a rural development strategy (OECD 2012). They demonstrate clearly support Polanyi’s argument that to improve our ‘habitation’ needs the State and Market to cooperate with each other (Polanyi 1944: 257): the market alone cannot produce innovation systems which simultaneously or sequentially improve the triple bottom line of social, economic, and environmental conditions.

Although the Nordic governance tradition of politically governed market economies may facilitate socially embedded innovation, as illustrated by the Danish and Finnish cases, several cases illustrates that such a governance system does not guarantee that innovation has a high degree of social embeddedness. Regardless of governance system, socially embedded innovation requires conscious political design in each case specifically. Norway, for example, offers a mixed picture regarding the social embeddedness of innovation, despite having a governance tradition similar to those of Denmark and Finland. The first Norwegian document treating this area is the White Paper on Innovation from 2008 (Government of Norway 2008). This document promotes a society where sustainability and innovation provide the building blocks. This is to be accomplished through the promotion of a creative society, creative people and creative enterprises. Central and local governments will play a key role in this process, and tools such as Innovation Norway, the Norwegian Research Council and SIVA SF are central (Nærings- og handelsdepartementet 2008). What is interesting and to some extent exceptional in the Norwegian case is the explicit recognition of the role of local governments. In this respect one can observe interesting local ‘innovation experiments’ such as in the Halden Regional Park in SE Norway, dealing with innovative ways of managing large water bodies to encourage new enterprises, and improve quality of life for residents. This Regional Park is an institution for collaboration between five neighbouring municipalities to solve common problems regarding economic stagnation and population decrease. The five municipalities collaborate based on a Charter defining the collaboration’s purpose and basic rights and obligations for the municipalities. Subsequently, the regional park engages researchers to identify stakeholders and to acquire inputs from these stakeholder regarding needs, ideas and knowledge. These inputs subsequently provide the basis for a regional innovation platform. Another good case that we observed is in Sogn og Fjordane County, where there is a scheme to attract young innova-

tors to the County (Refsgaard *et al*, 2011). Whilst that feature of the Norwegian approach to innovation is notable, it remains the case that most R&D relating to innovation is also research-led in Norway, and in particular through the programmes of the Norwegian Research Council.

In Norway, there is no widely promoted national innovation policy. Rather Innovation is embodied in the remit of several Ministries or Departments, Government and Quasi-Government Agencies and Companies (e.g. Statoil), and local government. Thereby, local conditions may be decisive in determining the form of innovation chosen.

It may thus be no coincidence that the cases of socially embedded innovation we observed in the Nordic countries emerged in very specific local settings. They may have emerged from knowledge of local conditions rather than from a general policy idea.

The case of the EU illustrates that grand policy design is often still predominantly oriented towards learning by studying. Current EU innovation policy is composed of a set of measures all of which can be subordinated to the Europe 2020 Strategy in one way or the other. The policies related to innovation in the EU are framed by the economic crisis that the Community is going through, and the development of such policies is seen as an important tool to solve these problems.

*‘At a time of public budget constraints, major demographic changes and increasing global competition, Europe’s competitiveness, our capacity to create millions of new jobs to replace those lost in the crisis and, overall, our future standard of living depends on our ability to drive **innovation** in products, services, business and social processes and models’*

(The European Commission, 2010a).

The EU’s idea of ‘smart growth’ is an economy based on knowledge and innovation, and it is one of the three growth strategies of the EU, the other two being ‘sustainable growth’ and ‘inclusive growth’ (COM(2010)2020). One of the seven ‘flagship initiatives’ promoted as part of the Europe 2020 Strategy is the ‘Innovation Union’ (COM(2010)546). The document ‘Regional Policy contributing to sustainable growth in Europe 2020,’ calls for ‘Stronger involvement of the local and regional authorities in the Europe 2020 Strategy’ (COM(2011) 17). However, the core policies around R&D and Innovation are in the EU’s Seventh Framework Programme for Research, Technology and Development. It is fair to say that the EU’s innovation policies are dominated by a ‘learning by studying’-approach: The EU’s innovation policies are largely devised and implemented by or through research interests based in Universities and Research Institutes.

The purpose of the New Manifesto, is to turn the insights gained from such specific local experiences (such as – in our discussion - the Danish and Finnish cases) into a set of general principles for policy design, in particular when it considers ‘green innovation’ as we use the term here. We think that the EU’s Innovation Policies, for example, could benefit from taking these principles into consideration to a greater extent if the cause of sustainable development is to be advanced.

# 5 Discussion and Conclusions

---

## 5.1 The Role of Policy Intervention

Given that green innovation cannot be left to markets alone, what is the role of public policy? According to Foray *et al* (2009:2), smart specialisation involves ‘a learning process to discover the research and innovation domains in which a region can hope to excel’ in which ‘entrepreneurial actors are likely to play leading roles’ because of ‘the needed adaptations to local skills, materials, environmental conditions, and market access conditions’. The necessary knowledge is unlikely to be ‘publicly shared knowledge, and instead will entail gathering localized information and the formation of social capital assets’. Since the process involves significant market failure for any ‘first mover’ the role of public policy is important. They argue that since the social value of discovering the relevant regional specialization is very high, regional public authorities should have a strong interest in this process. Importantly, the public sector at both National and Regional levels, and usually both, should play at least three key roles. First in incentivizing the coming together of the relevant actors in the ‘innovation platform’. Second, on-going monitoring and evaluation of effectiveness of the process and its outcomes. Third, in complementary investments including education and training, R&D, etc. addressing the new knowledge needs of the specialisation. However, in ‘green innovation’ we address the problem of destruction of natural resources and people through market activities, and in this case the role of public policy goes beyond correcting the knowledge market failures identified by Foray *et al*, important as these are. In particular, public policy becomes a key means of addressing the social evils which result both in and from poverty, social exclusion and destruction of nature.

In our limited review of innovation policies, we stress differences between national policies and local initiatives. Our evidence suggests that bottom-up processes can be found locally, whereas the top-down technology-based paradigm of innovation prevails in broad national or multi-national policies. This top down approach has not always been very successful, as in the cases of wind turbines in the Netherlands and the UK when compared with a much more bottom-up process in the Danish case. These national or multi-national top-down approaches are first and foremost concerned with innovations which can augment national competitiveness and economic growth in an increasingly global economy. Secondly, they pursue ‘green innovation’ to support ‘green growth’ understood mainly as growth with fewer impacts on climate change. Such top-down innovation policies are not in any significant or direct way concerned with social needs; the poor and socially excluded, if considered at all, are assumed to benefit through some kind of unspecified ‘trickle down’ process, or indirectly (greater consumer choice, healthier products etc.). Therefore, these policies seem inappropriate for the kind of ‘innovation for sustainable development’ discussed above. The top-down approach is reflected in national and multi-national research policies: Research councils are increasingly directed by Governments to look at areas of future ‘competitiveness’; public research funding is granted through programmes which have almost pre-defined what innovation is desirable for society as a whole. In practice, such guidance is drawn up by the elders in the science community, and often framed to an extent in their own interests. The key policies largely or wholly ignore the participation of non-scientists, especially the poor and excluded in society, and they frequently also ignore public goods. Instead, they focus on private goods and reflect mainstream thinking on the role

of 'free' markets in the efficient allocation of resources. Consequently, these policies often support patenting and a strong notion of property rights around innovation and IPR issues, especially as the measurement of patent registrations is one of the main statistical indicators of innovation performance at national and international levels. By contrast, in matters of sustainable innovation, key issues are the basic needs and institutions of humans. Sustainable innovation seeks new ways of doing things that avoid social and environmental catastrophes. Therefore, the need is for rapid adoption of new ideas rather than restricted access implied by patents or other forms of strong property rights.

The Danish case represents to some extent an exception to this mainstream philosophy of innovation. The first Danish patent law in 1895 ensured that processes and techniques regarding agriculture could not be patented. Inventions should not benefit the individual alone, but should also be available for the people. This production philosophy was to a significant extent carried out by Poul la Cour. La Cours concept implied tens of thousands of wind turbines on the Danish farms creating development and wealth in the rural areas at disposal for the whole population.<sup>1</sup>

## 5.2 Towards a New Approach: Innovation for Sustainable Development

We argue that, in many cases, focusing on social inclusion and taking social institutions into account are required to meet the triple bottom line of abolition of poverty, environmental enhancement, and equitable economic improvement. This triple bottom line is 'green innovation plus' because of the explicit recognition of the special position of both human beings and the environment. Rather than 'green innovation', we prefer the term 'innovation for sustainable development' because the label 'green' is often restricted to meaning environmentally friendly, which we believe, on the basis of both theory and experience, to be insufficient.

Meeting the needs of the poor and socially excluded implies their engagement as equals in innovation process. Economic development is thus not a colonial style paternalistic process. People's needs must have priority, their voices must be heard and given equal weight, and institutions must be kept in place to ensure this.

Following Polanyi, we further conclude that there are prior value considerations about the decisions involved, reflected in culture and politics in democratic societies. It is not sufficient just to address the knowledge market failures identified by Foray, even if those provide a partial justification for policy interventions. It is necessary to adopt goals for such innovation that satisfy environmental and human needs as well as – and more important than - adding to the economy. In other words, the goals of innovation have to incorporate the 'triple bottom line' of sustainable development, and go beyond mere 'green' innovation. The relevant knowledge for innovation processes in this context is not only or even mainly within the Academy, although the Academy has a contribution to make. Nor is it only in the private or civil sectors, which again have important contributions to make. Equally, it is not only or mainly found in the public sector which, as a democratic instrument, nevertheless has a crucial part to play. Therefore, in building the knowledge needed through any learning process, it is often necessary to involve all these groups, including citizens from disadvantaged groups. Innovation for sustainable development is thus a collective endeavour involving different kinds of actors, with different kinds of knowledge.

---

<sup>1</sup> <http://www.tvindkraft.dk/TextPage.asp?MenuItemID=50&SubMenuItemID=120>



We use the term ‘innovation platform’ to describe the institution which brings these disparate groups together to develop innovations for sustainable development. It is essentially a ‘round table’ which brings together people/ institutions with different skills, knowledge and roles in relation to any particular challenge, and who share a common goal of taking that challenge, essentially through some form of innovation. It should be a ‘flat’ or non-hierarchical organisation. The idea of a ‘Platform’ is originally derived from ‘soft systems’ thinking (Checkland 1981; Checkland & Scholes 1990). We have observed such platforms in the ‘real’ world in relation to several areas of ‘public good’ interest, including especially renewable energy and water management, both of which have large implications for human welfare, climate change etc, and both of which involve significant public goods and bads (positive and negative externalities). The idea of the ‘Platform’ also builds on the work on national and regional innovation systems, and on smart specialisation, all of which emphasise the need for a ‘learning process’ that goes beyond the formal learning of the Academy.

A crucial point is who to involve in any innovation platform, and what level (territorial or subject matter) is appropriate. One size does not fit all. First of all, it is important that any platform is of a manageable size; social media and other methods can and may be used to greatly enlarge and open possibilities of participation to the widest group possible as well as to create transparency. Secondly, it must be seen to be broadly representative of the relevant interests including ‘ordinary people’. Third it must include those with important specific knowledge (including local knowledge) which is not normally codified (for example by established research) - producers, users, public bodies, ngo’s, and the public. It is important to remind ourselves often that the kind of knowledge we need is a collective product.

Constructing the innovation platform entails handling the conflicting requirements of social inclusion and keeping a manageable size. Given that whole populations cannot be involved in a platform ‘around the table’, it is important to be transparent and to encourage other inputs to the process. Electronic media such as Facebook groups provide this opportunity effectively and at low cost.

There can be many platforms at different scales and levels – they are not expensive to start or run, since they aim to answer the various needs of those round the table, providing them with an incentive to participate. They can be - and often ought to be - ‘bottom up’. But since they are producing a ‘public good’ in the form of new knowledge and new ways of doing things that are of wide social benefit, there is a role for the public sector to support them. While knowledge market failures may provide a formal rationale for such intervention, the issue is in our view wider than a purely economic one.

In our view, any innovation platform for sustainable development must:

1. agree common goals and intent (to what question is this ‘platform’ the answer to?);
2. identify relevant existing formal and informal knowledge relevant for the question (scoping beyond and within the platform);
3. identify gaps in such knowledge and seek to have these filled (including, but not only, through R&D);
4. identify relevant barriers to change (regulations, institutions, policies, path dependency, etc);
5. identify and agree courses of action (a) which the actors themselves have power to implement (b) which they need other actors to implement;
6. connect with the wider world beyond the locality, region, nation in question
7. We also believe that any platform should have a limited life, but the limits cannot be specified in advance.

Our own operationalisation of this approach is a method for developing regional innovation systems aimed at producing triple bottom line outcomes. We call this method, developed in a recent project on sustainable rural development in the Halden Regional Park, *the Grounded Innovation Platform (GRIP)* approach. The key characteristics of a GRIP are:

- It is supported by public policies
- It consists of private and public stakeholders
- It gives stakeholders voice regarding their Needs, Ideas, and Knowledge (NIK)
- It has a clearly defined geographical boundary
- It is constructed from the bottom up
- It operates in a democratic and consensus-oriented manner
- It pursues a triple bottom line of innovation

GRIPs are constructed through the four-step process of:

1. Mapping stakeholders in a geographical area
2. Giving these stakeholders NIK-voice regarding the triple bottom line
3. Constructing an innovation platform based on NIK inputs
4. Empowering this platform so that it can define the further innovation process

More specifically, we aim to develop this Regional Park by the following tasks:

- To identify the important stakeholders in the area, including businesses, local organisations, authorities and interested citizens.
- To conduct a series of key informant interviews to identify important needs, motivations and conditions for action.
- To bring the stakeholders together in seminars to conduct a SWOT-analysis, collaborating with researchers, of the area and to define their needs for further interaction. These ad hoc seminars are supplemented with a more permanent web-based forum for further communication.
- To design, based on the qualitative data, a questionnaire that is distributed and marketed online to residents in the area.
- Based on all data, to design a permanent platform for interaction between industries, policy makers, and residents. The purpose of this platform is to facilitate collaboration between businesses, to coordinate public policies with grassroots initiatives, to define and to negotiate conflicting interests and values and an early stage in the innovation process.

This, for the moment at least, is the approach we take in our ‘green innovation group’ when undertaking action research in local innovation systems. At the same time, we intend to record the experience of existing and new ‘local innovation platforms’ that come to our attention, so that the social processes and outcomes may be observed and help to improve our thinking on the practice of innovation for a ‘better world’.

# References

---

- Arrow, K.J. 1962. 'The Economic Implications of Learning by Doing'. *Review of Economic Studies* 29 (3): 155–73.
- Asheim, B., Isaksen, A. 2002. Regional innovation systems: The integration of local 'sticky' and global 'ubiquitous' knowledge. *Journal of Technology Transfer*, 27: 77–86.
- Asheim, B., Isaksen, A. 1997. Location, Agglomeration and Innovation: Towards Regional Innovation Systems in Norway? *European Planning Studies*, 5 (3): 299–330.
- Boon, M. 2008. *Why did Danish entrepreneurs take the lead in the wind turbine industry and not the Dutch? A study on the interaction between evolution and strategy of two communities in an emerging industry*. Erasmus University Master Thesis . Entrepreneurship and New Business Venturing . February.
- Borgen, S.O., P.O. Røkholt, and A. Sørensen, 2006. *Norsk landbrukssamvirke – fra forvaltning til marked*. Oslo: NILF.
- Bryden, J and Refsgaard, K. 2008. Does all innovation, creativity and growth happen in cities? In Tanvig, H (Ed) *Innovation Systems and Rural Development*. Faculty of Life Sciences, University of Copenhagen. Forest & Landscape Working Papers 27/2008.
- Buen, J. 2005. Danish and Norwegian Wind Industry: The relationship between policy instruments, innovation and diffusion. *Energy Policy* 34 (2006) 3887–3897.
- Checkland, P. 1981. *Systems thinking, systems practice*. Wiley.
- Checkland, P. and Scholes, J. 1990. *Soft systems methodology in action*. Wiley.
- Cooke, P. 1992 Regional innovation systems: competitive regulation in the new Europe. *GeoForum*, 23: 365-382.
- Cooke, P. 2001. Regional innovation systems, clusters, and the knowledge economy. *Industrial and Corporate Change*, 10 (4): 945–974.
- Cooke, P. 2005. 'Regionally Asymmetric Knowledge Capabilities and Open Innovation: Exploring' Globalisation 2' – A New Model of Industry Organisation', *Research Policy*, 34, pp. 1128–1149.
- Cooke, P. 2008 'Social capital & green innovation', presented at OECD Workshop on 'Partnership from Development & Diffusion of Innovation'
- Cooke, P. 2012). Transversality and Transition: green innovation and new regional path creation, *European planning studies*, 20(5), 817–834.
- Edquist, C. .1997. *Systems of Innovation: Technology, Organization*. Pinter, London.
- Edquist, C, 2004. Systems of Innovation – A Critical Review of The State of the Art. In J. Fagerberg, D. Mowery and R. Nelson (2005) *Handbook of Innovation* . Oxford: Oxford University Press
- European Communities, 2008. *The economics of ecosystems and biodiversity*. Interim Report. Brussels.
- European Commission 2010a. Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions - Europe 2020 Flagship Initiative Innovation Union. COM(2010) 546 final
- Fagerberg, J. Mowery, D and Nelson, R. 2005. *Handbook of Innovation* . Oxford: Oxford University Press

- Foray, D 2000/ 2004. *The Economics of Knowledge*. Edition La DECOUVERTE, Paris 2000 and MIT Press, 2004.
- Foray, D., David, P.A., Hall, B. 2009. Smart Specialisation – The Concept. Knowledge Economists Policy Brief no. 9, June. Accessed on 30/4/12 at [http://ec.europa.eu/invest-in-esearch/pdf/download\\_en/kfg\\_policy\\_brief\\_no9.pdf](http://ec.europa.eu/invest-in-esearch/pdf/download_en/kfg_policy_brief_no9.pdf)
- Freeman, C., 1987. *Technology policy and economic performance: lessons from Japan*. Pinter, London.
- Freeman, C., Lundvall, B.A. (Eds.), 1988. *Small Countries Facing the Technology Revolution*. Pinter, London.
- Freeman, C. (2009) in Drechsler, Wolfgang, Erik Reinert, Rainer Kattel (Eds) *Techno-economic paradigms: essays in honor of Carlota Perez*. London, Anthem.
- Gezelius, Stig S. Forthcoming. Rethinking the Farm Economy: Acquisition of Labour and Capital in Norwegian Rural Communities.
- Giles, J. 2005. Millennium group nails down the financial value of ecosystems. *Nature*, 434. 547. March.
- Government of Norway. 2008. *Et nyskapende og bærekraftig Norge*. Stortingsmelding nr 7 (2008–2009). Oslo: Nærings- og handelsdepartementet.
- Granovetter, M. .1985. Economic action and social structure: the problem of embeddedness. *The American Journal of Sociology* 91 (3) pp. 481–510.
- Harsanyi, John C. 1955. Cardinal Welfare, Individualistic Ethics, and Interpersonal Comparisons of Utility. *Journal of Political Economy* 63(4): 309–321.
- Henué, K. & Jacobson, D. .2008. Embeddedness and Innovation in Low and Medium Technology Rural Enterprises. *Irish Geography*, 41 (1): 113–137.
- Kamp, L.M., 2002. *Learning in wind turbine development: A comparison between The Netherlands and Denmark*. Thesis (dr.). University of Utrecht. Discussed in Boon (2008).
- Kamp, L.M., Ruud E.H.M. Smits, Cornelis D. Andriessse . 2004. Notions on learning applied to wind turbine development in the Netherlands and Denmark. *Energy Policy* 32 (2004) 1625–1637
- Lundvall, B.A., 1985. Product Innovation and User Producer Interaction. Serie om industriell utvikling (31)
- Lundvall, B.A., 1988. Innovations as an integrative process—from user–producer interaction to the national system of innovation. In: Dosi, G. et al. (Eds.), *Technical Change and Economic Theory*. Pinter Publishers, London.
- Lundvall, B.-Å. 1992. *National Systems of Innovation. Towards a Theory of Innovation and Interactive Learning*. London: Pinter Publishers
- Midtunn, A., Koefoed A.L (2005), Green Innovation in Nordic Energy Industry: Systemic Contexts and Dynamic Trajectories, in: *Towards Environmental Innovation Systems*, Weber, M., Hemmelskamp, J., (Eds.), 1<sup>st</sup> edition, XII, Springer, Berlin, 115–136.
- Millennium Ecosystem Assessment Toolkit. 2007. Island Press. ([http://islandpress.org/assets/library/27\\_matoolkit.pdf](http://islandpress.org/assets/library/27_matoolkit.pdf))
- Nelson, R.R. (ed). 1993. *National Innovation Systems: A Comparative Perspective*. New York, Oxford University Press.
- OECD. 2012. *Linking Renewable Energy to Rural Development*. Green Growth Studies. Paris, OECD.
- Polanyi, K 1944 (2001edition). *The Great Transformation: The Political and Economic Origins of Our Time*. Boston, Beacon Press (Originally published in New York by Farrar & Reinhart.)

- Refsgaard, K., Bryden, J., Nordskog, K., Baardsen, S., Cappelen. 2011. *Comparative perspectives on rural development and policy challenges in Sogn og Fjordane*. Report of the ICRPS Summer Institute. Oslo, NILF.
- Rosenberg, N., 1982. *Inside the Black Box: Technology and Economics*. Cambridge University Press, Cambridge.
- Sen, Amartya K. 1977. Rational Fools: A Critique of the Behavioural Foundations of Economic Theory. *Philosophy and Public Affairs* 6(4):317–344.
- Senge, P M. 1990. *The Fifth Discipline: The Art & Practice of The Learning Organisation*. New York, Doubleday.
- Smelser, N.J. and R. Swedberg 2005. Introducing economic sociology. Pp.3–25 in N.J. Smelser and R. Swedberg eds., *The handbook of economic sociology*, 2<sup>nd</sup> ed. (Princeton: Princeton University Press)
- STEPS. 2010. *Innovation, Sustainability, Developmen: A New Manifesto*. Brighton: STEPS-Centre.
- Stolarick, K., Denstedt, M., Donald, B. & Spencer, G. M. 2009. Creativity, Tourism and Economic Development in a Rural Context: the Case of Prince Edward County. *Journal of Rural and Community Development* (5): 238–254.
- Sullivan, Sian. 2011. Banking Nature? The financialisation of environmental conservation. *Antipode*. DOI: 10.1111/j.1467–8330.2012.00989.x.

## *Previously published in this series – 2012*

---

- 2012–1 Environmental and climate analysis for the Norwegian agriculture and food sector and assessment of actions. John Hille, Christian Solli, Karen Refsgaard, Knut Krokann, Helge Berglann, 153 s.
- 2012–2 Støtte til økologisk landbruk. Oddmund Hjukse, Ole Kristian Stornes, 42 s.
- 2012–3 Utbyggingsbruk i Hordaland. Torbjørn Haukås, 52 s.
- 2012–4 Innovasjon i landbruket. Trygve Kjølseth, Ivar Pettersen, 29 s.
- 2012–5 Hva skal det være: epler i løsvekt eller emballert? Butikkforsøk med norske, økologiske epler. Anna Birgitte Milford, 31 s.
- 2012–6 Handlingsrommet for konkurransedyktige verdikjeder for mat. Ellen Henrikke Aalerud, Julie Nåvik Hval, Ivar Pettersen, Johanne Kjuus, 99 s.
- 2012–7 Fleire dyr på sommerferie? Evaluering av beiteordningene. Agnar Hegrenes, Julie Nåvik Hval, Leif Jarle Asheim, Mads Svennerud, 102 s.
- 2012–8 Økonomien i jordbruket i Nord-Norge 2010. Øyvind Hansen, 73 s.
- 2012–9 Økonomien i landbruket i Trøndelag i 2010. Utviklingstrekk 2001–2010. Tabellsamling 2006–2010. Inger Sofie Murvold Knutsen, Svein Olav Holien, Knut Krokann, Siv Karin Paulsen Rye, Kristin Stokke Folstad, 87 s.
- 2012–10 Økonomien i jordbruket på Østlandet. Utviklingstrekk 2006–2010. Tabellsamling 2006–2010. Terje Haug, 87 s.
- 2012–11 Betalingsvillighet for landbrukets produksjon av kollektive goder. En litteraturgjennomgang. Arild Spissøy, Anna Birgitte Milford, Sjur Spildo Prestegard, 36 s.
- 2012–12 Melding om årsveksten 2011. Normalårsavlinger og registrerte avlinger. Ola Wågbo, Oddmund Hjukse, 18 s.
- 2012–13 Økonomien i jordbruket på Vestlandet. Trendar og økonomisk utvikling 2001–2010. Heidi Knutsen, Torbjørn Haukås, Anastasia Olsen, 72 s.
- 2012–14 Økonomien i jordbruket i Agder-fylka og Rogaland. Trendar og økonomisk utvikling 2001–2010. Tabellsamling 2006–2010. Heidi Knutsen, Torbjørn Haukås, Anastasia Olsen, 78 s.
- 2012–15 Økologisk frukt og bær i Norge. Hvor mye produseres og hvordan omsettes det? Anna Birgitte Milford, 33 s.
- 2012–16 Utbyggingsbruk i Hordaland – del 2. Torbjørn Haukås, 40 s.
- 2012–17 Grensehandel – utvikling, årsaker og virkning. Anna Birgitte Milford, Arild Spissøy, Ivar Pettersen, 57 s.
- 2012–18 Utbyggingsbruk i Østfold og Akershus. Gry-Heidi Ruud-Wethal, Lars Johan Rustad, Ingrid Fjellstad Luke, 41 s.
- 2012–19 Verdiskaping i jordbruk, skogbruk og tilleggsnæringer i Rogaland. Heidi Knutsen, Torbjørn Haukås, 62 s.
- 2012–20 Verdiskaping i Møre og Romsdal. Siv Karin Paulsen Rye, 61 s.
- 2012–21 Pelsdyrhold i Norge – avvikling, arbeidsforbruk og selskapsform. Ivar Hovland, Erik Bøe, 17 s.
- 2012–23 Gjennomgang av de direkte og kostnadssenkende tilskuddene over reindriftsavtalen. Valborg Kvakkestad, Ellen Henrikke Aalerud, 81 s.
- 2012–24 Dekningsbidragskalkyler Nord-Norge. Ole Kristian Stornes, 45 s.

## *Previously published in this series – 2013*

---

- 2013-1 Økonomien i jordbruket på Vestlandet. Trendar og økonomisk utvikling. Anastasia Olsen, Torbjørn Haukås, 76 s.
- 2013-2 Økonomien i jordbruket i Agder-fylka og Rogaland. Trendar og økonomisk utvikling 2002-2011. Tabellsamling 2007-2011. Anastasia Olsen, Torbjørn Haukås, Heidi Knutsen, 80 s.
- 2013-3 Økonomien i jordbruket i Nord-Norge 2011. Øyvind Hansen, 71 s.
- 2013-4 Verdiskaping i jordbruket i Trøndelag. Siv Karin Paulsen Rye, Stefan Brunzell, Kristin Stokke Følstad, Heidi Knutsen, 84 s.

---

## HEAD OFFICE

Mailing address:	Street address:	Telephone:	+47 22 36 72 00
Postboks 8024 Dep	Storgata 2-4-6	Telefax:	+47 22 36 72 99
N-0030 OSLO		E-mail:	postmottak@nilf.no
		Internet:	www.nilf.no

---

## REGIONAL OFFICES

Bergen	Mailing address:	Postboks 7317, N-5020 BERGEN
	Telephone:	+47 22 36 72 40
	Telefax:	+47 22 36 72 99
	E-mail:	postmottak-Bergen@nilf.no
Trondheim	Mailing address:	Postboks 4718 – Sluppen. 7468 TRONDHEIM
	Telephone:	+47 73 19 94 10
	Telefax:	+47 73 19 94 11
	E-mail:	postmottak-Trondheim@nilf.no
Bodø	Mailing address:	Statens hus, Moloveien 10, N-8002 BODØ
	Telephone:	+47 22 36 72 51
	Telefax:	+47 22 36 72 99
	E-mail:	postmottak-Bodo@nilf.no

---

ISBN 978-82-7077-855-3  
ISSN 0805-9691

