INNOVATION AND DISTRIBUTED ECONOMIES FOR SUSTAINABLE DEVELOPMENT

The example of the Northern Netherlands

Y. Krozer[1], S. Tijsma[2], H. Brezet[3]

[1]University of Twente, Enschede, The Netherlands
[2]Province of Fryslân, Leeuwarden, The Netherlands
[3]Delft University of Technology, Landbergstraat 15, 2628CE Delft, The Netherlands,
j.c.brezet@tudelft.nl, +31 152782738.

Abstract

The issue that is discussed in this paper is: what strategy can regional policymakers adopt to revive their regional economies with regard to international competition? The province of Fryslân, a North Netherlands economically peripheral region, aims to revive its economic structure. For this purpose an investment program in energy saving and renewable energy was elaborated using the specific regional qualities. The program is framed by an agreement with the national government and the EU inter-regional co-operation program. The investment of € 2.6 billion is based on 29 activities that were derived from workshop interactions, and in which more than seventy businesses, experts and authorities are involved. The program may realize a reduction in fossil fuel use of roughly 21% compared with the present situation. The activities focus on energy saving and renewable energy in housing, mobility, wind energy on industrial parks and closed greenhouses, as well as the production of biofuels from biowaste. Business opportunities for the regional companies are assessed. The regional and local policy instruments are indicated for the program implementation. The efficiency of the regional and local instruments is assessed and found to be superior compared to the national output-subsidies. The implementation of far reaching energy saving and renewable energy programs is attractive and feasible at regional level, according to the models used. The findings are supported by similar developments in Scandinavia and Australia with the so-called Distributed Economy model.

Keywords
Distributed economy, Fryslân.

1. Introduction

What strategy can be adopted by regional policymakers to revive their regional economies with regard to international competition? This question is particularly urgent in regions that are peripheral to the centers of economic activities. There are several ways of fostering innovations. The usual strategy is to expand research and development (R&D). Therefore, some regions attract and concentrate R&D, for example the Oresund area of Sweden and Denmark, which includes Copenhagen and Malmö (Hospers, 2004). The Fryslân region in the north of the Netherlands (0.6 million inhabitants) is located on the periphery of economic and knowledge centers and therefore, it must search for other regional strategies to revive its economy.

Another innovation strategy that has gained much popularity in the last few years is attracting creative people to a region by developing outstanding living and working conditions. The success of such a "creativity strategy" is generally attributed to the acquisition of a few multimillion creative projects that attract many resources and people as happened, for instance, in the Lord of the Rings project in New Zealand (Florida, 2002 and Florida, 2005). This strategy may be more suitable for a peripheral region such as Fryslân. Yet another regional innovation strategy is the creation of a nexus for innovations; by this is meant a concentration of networks by means of exceptional meeting and information exchange facilities. The creation of a nexus makes it possible to explore local opportunities for experiments and learning, as is happening in Wales (Cooke & Morgan, 2000). This "experimentation strategy" largely depends on the possibilities to use the specific regional qualities for the creation of new economic activities. In this paper we present a translation of the "creativity" and "experimentation" strategies into an investment program in the province of Fryslân.

Fryslân has typical characteristics of an economic periphery such as net youth emigration, a relatively low-income population and high unemployment. The traditional economic basis is agriculture and food. Tourism is a major economic sector in the region but it encounters tough international competition and it is sensitive to the general international economic situation. In the past, the economic policy was focused on lowering the production costs in the region through more infrastructure, investment subsidies for newcomers and various

labor incentive schemes. Rent from the national budget has dominated economic policymaking. This rent-seeking behavior, however, did not reach its target. Gradually the notion emerged that productivity growth should be achieved through innovations with a solid basis in the regional qualities. Therefore, a policy was initiated to foster economic programs by using the regional qualities. These qualities are related to the traditional skills of co-operation between autonomous small-scale businesses, embedded in advanced spatial policy. Energy saving and renewable energy are the innovations discussed in this paper that were given priority; the other areas are the use of water and space for tourism, culture and care.

One reason to choose for energy saving and renewable energy is that the larger part of Fryslân is below sea level, which creates a sense of urgency regarding climate change and sea level rising. Another reason is the notion of self-reliance within the population with their specific language and culture, which has favored the development of tools and working methods that brought about self-sufficiency as can be seen in the high concentration of mechanical engineering businesses for local mobility, like bikes, skates, yachts, installations, and so on. These skills have been extremely useful for the renewable energy sector. The Frisian region was the cradle of modern biogas installations and windmill parks in the seventies. These technologies, however, were lost as a result of international competition to other regions, for example to Styria in Austria and Bavaria in Germany with regard to biogas installations and to Navarre in Spain, Emden in Germany and North Jutland in Denmark in respect of windmills.

New opportunities emerge such as the production of renewable energy based on seawater barriers (the salt to freshwater gradient and the waterfall gradient), the relatively high solar intensity in the region, as well as huge amounts of residue from agriculture (manure, grass and so on). The businesses in the region take advantage of such opportunities with some positive results. The region accommodates a high density of electricity production from solar energy in Europe, a large number of zero-energy houses, plants for the production of biogas and biodiesel, a high density of filling stations for mobility, demonstration projects of energy production from the sea barrier are under way as well as the use of a micro-generator converting heat into electricity in households. These activities encouraged the regional policymakers to champion energy saving and renewable energy use in the Netherlands and in Europe. Based upon a longer-term agreement “Het Energie-Akkoord Noord-Nederland” between the North Netherlands provinces and the Dutch Government, the regional policy

seeks to achieve a high share of renewable energy in the total energy use (Rijksoverheid en Noord-Nederland, 2007).

This paper discusses the program aiming to create a forefront position for the region in energy saving and renewable energy use and discusses policy instruments at regional level that can foster such a transition in the regional economy. It is shown that a regional economy based on energy saving and renewable energy does not collide with sound economic development and that the regional policies are instrumental for this purpose. The program is reviewed in section 2; consequently we will compare the generic and the specific policy instruments, followed by a review of possible specific instruments. Finally, conclusions are drawn.

2. Investment program

The investment program is briefly presented to indicate the possible actions and consequences of these actions for inhabitants and companies as well as their impact on costs and jobs. The energy saving and renewable energy program for the province of Fryslân is carried out within the framework of the Energy Agreement (Energie-Akkoord), which has been signed by the Dutch Government and the provinces of Fryslân, Groningen, Drenthe and the northern part of the province of North-Holland. The Energy Agreement aims at 50 PJ of renewable energy and 5 million tons of CO_2 emissions reduction in 2011. The reason to specify Fryslân's actions is that its economic structure differs substantially from that of the other provinces.

The provinces of Groningen en Drenthe accommodate a major European deposit of natural gas and they opt for large-scale investments in bio-liquids such as the largest bio-methanol plant in Europe whereas the investments in the province of Fryslân require many small-scale investments. Based on the regional number of inhabitants (about 30% of the North Netherlands) and corrected for the expected large-scale bio-fuel production in the other provinces, the targets for Fryslân in 2011 are set at 13.5 PJ of renewable energy and 1.2 million tons of CO_2 emissions reduction. It is a lot compared to the 2.8 PJ of renewable energy use and no CO_2 emission reduction in 2006.

The target implies a 21% reduction of fossil fuel use in the province. Therefore, decisive actions parallel to each other are necessary. The program to accomplish the targeted reduction has been drafted based on the involvement of businesses, experts and authorities. A number of workshops were organized to generate ideas for actions and create a sense of

urgency. Approximately 70 organizations have been involved in the process of program preparation. The investment program covers: energy saving in households including energy-neutral houses, (bio-)gas mobility, low-energy greenhouses and industrial parks, and second generation bio-fuel production that is bio-residues processing. Beneath are shown the envisaged actions in renewable energy and in energy saving for CO_2 emission reduction (in italics) with investments in millions of euros (in brackets). The idea is not to specify technical details but to indicate the scope of actions in consumption and production. Scheme 1 summarizes the action in the Energy saving and renewable energy program in Fryslân. It should be noted that most of the actions address energy consumption.

Scheme 1: Summarized actions in the Energy saving and renewable energy program in Fryslân

Energy consumption
Households: *Insulation (447),* Heat pump plus storage (98), Solar boilers (56), *Micro co-generator (63),* PV (157), *Economy* light (17), CO_2 neutral dwelling (168)
Transport: *Cars 50 bio-fuel & gas stations (15),* Hybrid cars (81), *Gas for gasoline (244),* SNG (244), CBG (244), Bio-diesel (49), *EU CO2 standard (98)*
Industries: wind energy on industrial parks on land (70), Closed greenhouses (68), Other (11)
Bio-residues processing to biofuels
Incineration for electricity and heat (150), three technologies for bio-fuels (331), Other (5)

The following is estimated for every action: present energy use, reduction of fossil fuel use and the CO_2 emission reduction through the action, investment costs, capital costs at 5% interest rate, operational costs and savings due to less energy use. The results are summarized in Table 1.

Table 1: Summary of the results of investment energy program in Fryslân without interest and without subsidies

Summary	Total fossil reduction in PJ		CO_2 emission reduction	Investments in € mln		Annual costs (after savings in brackets)
	Total	of which renewable	Mln tons	Total	of which renewable	in mln euros
Households	8,1	4,2	0,475	1.016	478	110 (-10)
Cars mobility	16,3	9,1	0,941	974	244	136 (110)
Industries	3,8	3,8	0,223	70	70	28 (20)
Horticulture	0,2	0,2	0,017	68	68	10 (-8)
Subtotal	28,4	17,3	1,656	2128	860	275 (112)
Bio-residues processing to biofuels				481	481	46 (-3)
Total				2609	1341	321 (108)
Import biofuels (*)	-9,0	-9,0	-0,502	Import from Groningen/Drenthe		
Total						
labor 27,094 persons (sum investments in 5 years and annual costs)						
* excess of bio-fuel consumption of bio-fuel in Fryslân compared to regional production						

The expected result of the investment program in Fryslân is 19.5 PJ of fossil fuel reduction, of which 8.4 PJ due to renewable energy. The total expected investments in Fryslân are estimated to be € 2.6 billion, of which € 1.3 billion in renewable energy. The total investments in consumption are expected to be about € 2.1 billion, of which € 1.34 billion in renewable energy. It means an investment of € 662 per inhabitant in the region per year. The total expected investments in the bio-residues processing require about € 0.5 billion but as a result of slower progress in large scale bio-fuel production in Drenthe and Groningen more efforts are needed in the bio-residues processing in Fryslân and the total investments can rise to € 3.1 billion. The expected costs and revenues have been estimated at 5% interest on capital investment and without subsidies. The annual costs are expected to be about € 0.3 billion. These estimates are based on the energy prices of the end of 2006. Lower energy costs due to less fossil fuel use provide net revenues of approximately € 0.1 billion a year. The net revenues are mainly in households. About 27,000 jobs can be created during the five years of the program. It means on average about 5,500 jobs a year, thus giving substantial job opportunities to about 26,000 unemployed people in the region. Based on indicative qualitative strength assessment, one finds sales opportunities for the Frisian businesses above € 0.8 billion. A major contribution to the Netherlands climate and energy policy can be achieved. About one quarter of all waste will be well-utilized.

The estimates show that the energy saving and renewable energy program in Fryslân is socially attractive. However, the revenues of the program are far below commercially attractive profitability. Consequently the program cannot emerge spontaneously through market forces because transfer from public to market interests is imperfect. For a better transfer policymaking is required.

3. Policy instruments

The key factor in policy making is to find ways how to foster the transfer from public to private interests. We focus on economic instruments in policy making because direct regulation of energy use through permits is enforceable only in some specific cases. There are essentially two types of economic instruments available for such a transfer. The first one is national support of delivery of renewable energy through subsidizing. It is a generic policy instrument. It is widely used in European countries. Some countries use subsidies on a massive scale, mainly subsidized delivery of renewable electricity to the grid and tax exemptions on delivery of bio-fuels. The second type of instruments aims at assistance with risky investments in new solutions. It entails specific instruments that can be used in regional policy making. Assistance with risky investments is restricted because of the EU regulations on competition and therefore it is limited to assistance with research, development and demonstration projects. The specific instruments are less substantial in terms of amounts of money but could be just as effective and more efficient. We will compare the effects of these two types of economic instruments and then elaborate on several specific regional instruments.

The comparison is done in the following manner. In the case of generic, national economic instruments we calculate a normal commercial, interest-rate of 15% on capital investments. Then, the subsidies are estimated that are needed to achieve the break-even point between the costs and the savings due to less energy use. It is done on the assumption of perfect allocation of the costs and revenues between the sectors, which means that the subsidy is simply added to the savings in the calculations. The alternative is a policy making that enables companies to decrease the interest rate from 15% to 5%. The low 5% interest rate is usual for long-term loans, securities and sometimes even in housing mortgages.

Table 2: Simulation of economic instruments in policymaking: subsidy for output and lower interest on capital

In million euros	15% interest rate with subsidy for output		5% interest rate without subsidies	
	capital costs	net revenues after savings = subsidy	capital costs	net revenues after savings
Households	179	-117	102	-40
Cars mobility	194	13	126	81
Industries	14	-3	9	14
Horticulture	14	-15	9	-10
subtotal in use	400	-122	246	44
Biofuel processing	77	-56	39	-18
Total	477	-178	285	26

In case of a usual commercial interest on investments about € 178 million in subsidies would be needed to encourage investments in energy saving and renewable energy production. In particular, huge subsidies would be necessary in housing (insulation and low-fossil use in households) and in the production of biofuels from bio-residues. In case of a low interest on capital investments the net revenues approximate € 26 million without the subsidies. The advantage of the low interest on the capital investment compared to the subsidies for output adds to the total of € 205 million. This outcome is due to high capital investments in energy saving and renewable energy use. Given the targets for energy saving and renewable energy, the simulation shows that conventional policy making based on the output-subsidies is more expensive than policy making based on reducing the interest rate on capital investments. The advantage of the low interest rate on capital investments in renewable energy and energy saving is too important to be neglected. Therefore, the issue is how to lower the interest rate without disturbing the financial markets.

4. Policy instruments for risk reduction

The interest on capital investments usually covers two main components: earning on credit and risk coverage. The earning on credit largely depends on international and national circumstances and we can neglect this issue within the framework of regional policy. The issue of risk can be addressed at regional level because policy instruments can reduce the risk of private investments in uncertain projects. Based on discussions with various

authorities and experts a number of specific regional policy instruments can be identified to promote investments in energy saving and renewable energy. The policy instruments should address the users of fossil fuels such as housing corporations, lease companies, gasoline station owners, small and medium size industries, farms and finally, even households. We distinguish between financial instruments and regulations.

4.1 Financial instruments

The possibilities to cover the investments through public means are limited because the energy sector has largely been privatized. EU and Dutch policies restrict massive direct public investments but the regulations do allow support of investments in renewable technologies under the tendering and procurement standards that maintain an international level playing field. Within such a framework, several policy instruments are available to reduce the risks of investments in energy saving and renewable energy, apart from national output-subsidies. Such risk reducing financial instruments are particularly important for innovative projects such as the use of photovoltaïcs (PV), gasification and so on. We will mention a few possible financial policy instruments but the list is not exhaustive. Several of these instruments are being supported by a recent advise on sustainable development for the region by the Social-Economic Council of the Northern Netherlands (SER Noord-Nederland, 2010-a and SER Noord-Nederland, 2010-b).

- Regional and local authorities can attract investments through an infrastructure that encourages energy saving for example through local grid and biogas networks.
- Support of private investment can be provided via utilities in order to provide infrastructure such as sludge processing of water boards.
- The local taxation system can be adapted for example by differentiating taxation for house owners on the basis of energy saving standards.
- The barriers posed by EU regulations can be avoided through clustering of businesses and experts for technology development.
- Regional co-financing may consist of participation in projects through the regional development corporations.
- The regional development corporations may also provide co-financing for the development of innovative projects such as renewable technologies.
- Regional authorities can generate EU funds for regional development and for research, development and demonstration of new solutions.
- Grants from national and EU funds can be used to generate and disseminate know how and to build up capacity of human resources.

- Schooling funds can be used to upgrade the skills of workers and experts in the relevant sectors and expertise of the authorities.

Such financial instruments, although insufficient to cover the investment costs, attract the private sector to make risky investments. The financial instruments can be focused on the most risky parts of the investments. A “first mover facility” for renewable energy in Fryslân is presently in the process of negotiation. Such a facility combines national funds with regional funding in order to provide guarantees and soft loans for risky projects. It is estimated that the regional “first mover facility” of € 15 – € 20 million a year during a few years may generate substantial investments in the region to attain the targets in the program if regional authorities enforce regulations that encourage energy saving and use of renewable energy.

4.2 Regulations

The local and regional authorities are the main buyers of products and services and they are the regulators of procurement in the private sector.

- The procurement of the regional and local authorities can be guided by the strict criteria on energy saving and use of renewable energy in public utilities, housing, lighting, electric and household appliances and so on.
- The regional regulations can address private sectors through energy saving and renewable energy specifications for constructions, rewarding tenders with renewable energy in public transport, procurement and lease of vehicles that are energy saving and use renewable energy, contests with rewards for outstanding performance.
- Regional and local authorities can differentiate local fees, taxes and rules with regard to people’s behavior such as lower parking fees for “clean cars” or lower taxes for “clean establishments” like gasoline stations with renewable energy.
- There are various promotional possibilities, like contests with rewards for cleaner actions, labels and quality scans, education and marketing of renewable energy.
- Environmental legislation gives regional and local authorities also flexibility in licensing innovative solutions and spatial planning that enables renewable energy.

In the province of Fryslân preparations are being made for a task force for the execution of the program, to implement such regulatory instruments, monitor progress and support negotiations between public and private interests.

5. Conclusions

The paper shows that the regional investment program in energy saving and renewable energy of € 2.6 billion in the province of Fryslân is socially attractive. It provides positive

results in terms of environmental improvements through a 21% reduction of fossil fuel use. It makes it possible to decrease unemployment by almost 20% and provide market opportunities for local small and medium size enterprises at negligible cost increases to households, even at a benefit under favorable conditions. The challenge is to create good conditions for that investment. Other regions in and outside Europe are now also focusing on the possibilities of a “Distributed Economy” model, fostering the local economy with sustainable innovation while at the same time maintaining –but refining- the connection to the global economy as well (Krozer & Brezet, 2009; Biggs et al., 2010; IIIEE, 2009; Ryan, 2009).

The key issue here is to define and implement the policy instruments that reduce the risks of investments. Given the targeted renewable energy and energy saving, the policy instruments that reduce the risks are equally effective and more efficient than the commonly used subsidies for output. The risk reduction down to the interest level that is usual in public finances and securities makes it possible to foster the investments. Several instruments at regional level can reduce the risks. The regional instruments can be financial incentives for research, development and demonstrations as well as guarantees and soft loans by the regional development corporations. Such financial incentives can be combined with regional regulations in the procurement of utilities and services as well as marketing and promotion of sound energy use. This way, the regional and local authorities create a market for renewable energy and energy saving with overall positive monetary results for businesses and public.

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