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Does Renewable Energy Provide New Rural Opportunities?

In many countries, renewable energy is highly prioritized, not only as a means of addressing environmental and energy security issues, but also as a potentially significant source of new employment, especially in rural areas throughout the OECD. One of the most important questions for policymakers is whether renewable energy can assist the development of rural economies. In response, this brief presents the results of a two-year project¹ led by the OECD. The findings indicate that policy focused on the potential for renewable energy in the process of rural development should be cross-sector and place based. This implies identifying local conditions and opportunities, and integrating and linking the potential of renewable energy with local rural economies, as well as adopting inclusive modes of governance to ensure social acceptance. The results also indicate that while renewable energy has the ability to create new jobs, we should not exaggerate its potential. Overall, renewable energy is potentially useful for all rural and low-population-density regions, but mainly in shifting a community facing structural economic downturn to a new lower economic equilibrium.

ONE TANGIBLE EXAMPLE of this place-based approach to renewable energy is the highly developed competence in forest biomass in North Karelia in Finland. Residue from the production of timber,

pulp, and paper has long been an important by-product used for both local consumption and export, with wood pellets for district heating and private stoves (as shown in the above image) exported as

far away as Canada. During the last few years, new locally developed technologies have contributed to improving both the efficiency of energy generation and environmental quality. The new equipment

Box 1: What is renewable energy?

In the project, we adopt the definition of renewable energy used by the International Energy Agency.

Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly or indirectly from the sun, or from heat generated deep within the earth. Included in the definition is energy generated from solar, wind, biomass, geothermal, hydro-power and ocean resources, and bio fuels and hydrogen derived from renewable resources.

Key policy recommendations

National and regional policy instruments have often used high renewable energy targets and large incentives for renewable energy production as a means of generating a “takeoff” in renewable energy. However, this project suggests that renewable energy has the potential to foster regional development through “...reducing the use of spatially blind incentives, introducing a flexible policy framework, and taking into account the characteristics of specific needs of hosting economies.” The project also contends that the impact on economic growth, for instance, through job creation, is often much lower than expected as the high targets and large incentives have often implied distortions in local and regional economies. This is because these encourage rent-seeking behaviour and the competition of renewa-

ble energy installations with, for instance, the agriculture and tourism industries. To surmount these challenges, the project proposes four key policy recommendations:

- Policy must focus on *identifying* those places that have the best potential for benefitting from renewable energy rather than adopting centrally guided policies that arbitrarily spread renewable energy projects across the national landscape.

- Policy should focus on *integrating* rural energy strategies in local economic development strategy. Environmental and energy policy also needs to align with economic policy. To achieve sustainable development, we should consider the benefits for local communities in parallel

with arguments relating to environmental and energy security.

- Policy needs to *link* the potential for renewable energy with the rural economy in order to release the potential to create new jobs. Rather than setting general national subsidies for developers, policy should develop direct functional linkages between renewable energy and core rural businesses.

- Policy has to adopt *inclusive* governance to ensure social acceptance. This can be by, for instance, including intermediate institutions that disseminate information to local communities as well as putting democratic mechanisms in place.

accomplishes both the clipping and chipping of wood residues, including deadwood and branches in the forest. In fact, the woodchips now obtained are actually better than pellets for the district heating system, and thereby reduce production costs by eliminating the pellet-pressing process. In addition, the opening up of the forest not only allows healthy trees to grow better and faster, but also allows a much richer and more diverse understory of berries and mushrooms to develop, to the benefit of both the local human and animal populations.

This policy brief addresses policymakers working with regional development in Nordic countries concerned with the ambition of exploiting the potential of renewable energy in relation to rural development. The results and policy recommendations presented derive from the project case study reports along with an executive summary and policymaker brief prepared by the OECD for a project conference in Paris in June 2012². The re-

sults also derive from the participation of Nordregio in case missions from when an OECD delegation visited the case regions.

Renewable energy profiles in four Nordic case regions

Given their shared emphasis on wood and hydropower energy, the renewable energy profiles for North Karelia and Mid Sweden are rather similar. North Karelia is a front-runner in wood energy as well as forestry and wood energy-related technology. In the region, renewable energy accounts for 63% of total energy use, compared with a national average in Finland of 28.5% and less than 9% in the European Union (EU). Other than the large amount of produced wood energy, the region is also home to a large hydropower installation. Importantly, even though sustainable development is important in North Karelia, the major reason for the deployment of renewable energy is to deepen the forestry supply chain and reduce heating costs.

In Mid Sweden, hydropower principally supports regional manufacturing activities (though a large component of hydropower is also exported to Nord Pool, the integrated electricity market operating in the Nordic countries), and the local production of energy has become an important regional specialization. Along with hydropower, biomass and wind energy dominate the regional energy profile. Troms is also a net exporter of hydropower, as a result of its particularly large-scale production. In Troms, renewable energy deployment is considered a means for smaller communities to attract businesses through the availability of energy.

In contrast, Zealand has a century-old history of the development of wind energy technology acquired during several decades focused on the production of energy, especially given its proximity to Copenhagen. In addition, consideration of the potential for other sources of renewable energy, such as agricultural residues and related technologies for energy pro-

duction, as a way to create new employment opportunities, have also been seen as important for the region. Currently, the production of renewable energy in Zealand includes wind, solar and agricultural biomass.

Lessons from the Nordic countries

The four key policy recommendations provide useful suggestions to consider for regional policymakers in the Nordic countries concerned with the ambition to deliver energy security, climate change mitigation and economic development through renewable energy policy. The four Nordic case regions demonstrate both challenges and success factors in implementing the kinds of policies presented.

In *identifying* those places that have the best potential for benefitting from renewable energy, we can draw lessons from the Nordic cases. In North Karelia, the combination of cheap wood, very cold temperatures and high energy costs makes district heating based on by-products from sound forest management practice a good business for local forest owners. In Mid Sweden and Zealand, where the deployment of wind energy is taking place, a success factor is the superior natural conditions for wind energy, challenged by the lack of a relationship between the deployment of wind energy and regional specialization. One undesired outcome often arising from this lack of a relationship is local opposition. Troms has a tradition of producing cheap energy, and before 1991 when hydropower plants produced cheap energy, it attracted industry to rural areas. A challenge arose in 1991 when through a liberalization process transmission charges levelled out across the country.

In adopting policy that focuses on *integrating* and *linking* rural energy strategies in the local economy, we observe success factors and challenges in the case regions. We have seen that strong national policies that are not integrated into the local economy fail to realize the full potential of renewable energy in these rural areas. In Sweden, national policies, such as those encouraging the deployment of

wind turbines, may contribute to local opposition instead of new jobs, as these policies are unanchored in local economies. National efforts aimed at supporting wind energy, implying the imposition of wind turbines in a region that does not necessarily need it (i.e. Mid Sweden), is unhelpful. Conversely, a focus on biomass energy appears likely to be more successful given that it works well without subsidies.

Similar to Sweden, the regional level in Finland is rather weak compared with the municipal and national levels. However, an important success factor is that North Karelia has been able to adapt EU and national policies to local conditions. Two of the main reasons for this are that the region has specialized in a sector (forestry) that easily connects with policies aimed at climate change mitigation, and benefits from the presence of intermediate institutions, such as co-operatives that reduce the transaction costs embedded in the use of biomass as a source of energy. North Karelia is, therefore, a good example of the desirability that the deployment of renewable energy is anchored in local conditions in order to be successful in contributing to rural development. Renewable energy transaction costs in Mid Sweden are also lower through the presence of intermediate institutions.

Even though Norway is not member of the EU, supra-national strategies, through, for instance, the European Free Trade Agreement (EFTA) and European Environment Agency (EEA), influence its renewable energy strategy. However, national strategies relating to the deployment of wind energy and other alternatives to large-scale hydropower production are not particularly successful in local communities because of the lack of a place-based approach. If the deployment of renewable energy was better linked to local dynamics, and if local compensation was available for any negative impacts, public support for renewable energy could increase.

In Zealand, it is also evident that large public subsidies are a prerequisite for the deployment of renewable energy. However, Zealand has managed to switch the

focus from the deployment of renewable energy to technology development and providing testing facilities for renewable energy. This has proven to be a successful form of branding for the region, which local communities and municipalities support. This example suggests the importance of *including* local communities to gain support for the deployment of renewable energy. Local support from the business sector has also been crucial in providing renewable energy testing facilities.

The examples of success factors and challenges presented above and in the table at the end of this policy brief all demonstrate that approaches to renewable energy that are cross-sector and place based tend to be more successful in contributing to rural development than top-down approaches such as, for instance, national subsidies. One important question then is whether we should decentralize national guidelines, incentives and subsidies to the regional and local level to more fully exploit the benefits of renewable energy in rural areas of the Nordic countries.

Box 2: More examples

To enable the reader to draw their own conclusions on how a region can benefit from the four key policy recommendations, Table 1 at the end of this policy brief exemplifies the success factors and challenges in the four Nordic case regions.

Endnotes

¹ In many countries, governments have invested considerably in supporting renewable energy developments. However, what are the economic impacts of these policies and investments? Can renewable energy help to develop rural economies? These are two of the main questions discussed in the project.

The OECD project *Linking Renewable Energy to Rural Development* took place over two years with experiences drawn from 16 regions across Europe and North America. The four Nordic case regions subject to scrutiny in the project are Mid Sweden (consisting of the counties of Jämtland and Västernorrland), Troms in Norway, Zealand in Denmark, and North Karelia in Finland. All four regions are rural with a low population density relative to their respective national settings. In a Nordic comparison, Zealand stands out with a population of about 820,000 persons and a density of 110 inhabitants per km². In North Karelia, the total population is 657,000 and the density is 8 inhabitants per km². Troms and Mid Sweden have respective populations of 460,000 and 370,000 persons, with respective population densities of 4 and 5 inhabitants per km². Nordregio was responsible for coordinating the work relating to the four Nordic regions. This work included helping the regions to

prepare background reports on the regional setting along with facilitating the OECD missions to the four regions. For additional information of the project, see www.nordregio.se/oecdrenewableenergy

The OECD will next implement a research project that will assess regional development issues in the Arctic region. The Arctic has attracted large investments over the last decade for a number of reasons, including increased demand for natural resources, climate change, new options for accessing the region and the new geopolitical equilibrium. Future development projects represent a great opportunity but also a challenge for remote communities in the region. The project will run for two years, will involve key international stakeholders and experts, will focus on creating regional networks within the Arctic (in the form of case studies) and will produce a report on observations and recommendations at the end of the process.

² OECD (2012) *Linking Renewable Energy to Rural Development: Case Studies (draft version)*

OECD (2012) *Linking Renewable Energy to Rural Development: Executive Summary and Brief for Policy Makers*

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Nordregio conducts strategic research in the fields of planning and regional policy. We are active in research and dissemination and provide policy relevant knowledge, particularly with a Nordic and European comparative perspective.

North Karelia (Finland)	Mid Sweden	Zealand (Denmark)	Troms (Norway)
<i>Policy must focus on identifying places that have the best potential to benefit from renewable energy</i>			
<p>Success factor: Renewable energy deployment is coherent with regional specialization and contributes to the competitiveness of the forest industry. Renewable energy provides new business opportunities for forest owners in relation to woody biomass (for instance, district heating).</p> <p>Challenge: Top-down incentives from the EU are not necessarily considering specific circumstances in North Karelia. For instance, large subsidies triggered by the EU for wind power may distort the local economy, given the market is very small (wind resources are not optimal and wind power could impinge adversely on local tourism).</p>	<p>Success factor: Good potential to deploy wind turbines given the presence of good wind resources. Local natural potential corresponds with national incentives.</p> <p>Challenge: Instalment of wind turbines not well integrated with regional specialization, resulting in opposition from local communities.</p>	<p>Success factor: Given that wind resources in Zealand are among the best in Denmark, the region has attracted a large number of wind installations. In addition to similar positive experiences through including farming residues as a major contribution to biomass-based energy production, this has led to new approaches, such as algae production, being adopted.</p> <p>Challenge: Renewable energy sectors remain dependent on public subsidies. Renewable energy would not be an alternative to conventional fuels without the presence of large public subsidies.</p>	<p>Success factor: Until 1991, hydropower plants and the production of cheap energy in rural areas attracted industry and in turn rendered tax revenues for local communities.</p> <p>Challenge: After liberalization of the electricity market in 1991, this major driving force in attracting large industries became weaker as transmission charges levelled out across the country.</p>
<i>Policy should focus on integrating rural energy strategies in local economic development strategy</i>			
<p>Success factor: One specific feature of North Karelia is that conventional energy is expensive in these remote areas. Locally produced energy is therefore a good solution, and energy self-sufficiency is a key aspect of local and regional policy.</p> <p>Challenge: Large (EU) subsidies for wind energy could cause distortion in the region.</p>	<p>Success factor: Local district heating systems owned by the municipality have the potential to link energy and economic development policy. Local forest owners provide forest residues (creation of jobs) at the same time as renewable energy contributes to reduction of emissions (part of the regional strategy).</p> <p>Challenge: Through green certificates, the national government supports the instalment of wind energy but this does not fit well with regional specialization and creates conflicts with local communities.</p>	<p>Success factor: The development of the renewable energy sector has served to facilitate structural economic downturn to a new lower economic equilibrium. Zealand has added to its competitive advantage by primarily focusing on the production of renewable energy and the provision of testing facilities.</p> <p>Challenge: Zealand (and Denmark more generally) is a world leader in wind energy, but Zealand has failed to attract energy-intensive manufacturing because of unreliable renewable energy supplies.</p>	<p>Success factor: The implementation of the 2009 RES Directive will provide an opportunity for regions to become involved in a national renewable energy strategy.</p> <p>Challenge: National government liberalized the electricity market in 1991, which reduced the existing competitive advantage held by rural areas.</p>

Table 1: Success factors and challenges in the four Nordic case regions (continues on the next page)

North Karelia (Finland)	Mid Sweden	Zealand (Denmark)	Troms (Norway)
<i>Policy needs to link renewable energy with the rural economy in order to release the potential to create new jobs</i>			
<p>Success factor: One key to success lies in the capacity of regional actors to organize the production of biomass at a very low marginal cost.</p> <p>Challenge: Low population density is an obstacle to large-scale district heating systems.</p>	<p>Success factor: Intermediate institutions reduce transaction costs, for instance, by coordinating biomass production, distribution and research.</p> <ul style="list-style-type: none"> ■ District heating reduces energy costs in city areas. The same actors opposing wind energy are positive about the use of biomass for district heating, mainly because while it decreases CO2 emission, it also reduces energy costs. <p>Challenge: Lack of public support for wind energy increases transaction costs (for instance, through the intervention of specific institutions). One example is the environmental courts where a single person can request intervention.</p> <ul style="list-style-type: none"> ■ Job creation is limited given the lack of integration between the deployment of wind turbines and local businesses. 	<p>Success factor: Tradition of local production and development of technologies in wind and biomass-based energy production continues through solar panel production, installation and maintenance.</p> <p>Challenge: Renewable energy has not dramatically affected Zealand's economic performance, which still features unemployment and low productivity.</p>	<p>Success factor: Norway has a tradition of sharing the benefits of natural resources with local communities.</p> <p>Challenge: Despite this tradition, recent drivers of national renewable energy deployment do not benefit local communities and may erode regional competitive advantages linked to cheap hydro energy.</p>
<i>Policy has to adopt inclusive governance to ensure social acceptance</i>			
<p>Success factor: Local actors are central to success. Forest owners organize themselves to make marginal costs as low as possible. On the demand side, households obtain cheaper heat and energy than from a conventional electricity grid.</p> <p>Challenge: The success of biomass was not immediate. It took time to convince locals to switch from oil to wood residues. Creation of local co-operatives managed to overcome this obstacle.</p>	<p>Success factor: The involvement of a local co-operative of forest owners reduced transaction costs in handling biomass for heating/energy. This resulted in strong social acceptance.</p> <p>Challenge: Local communities see limited benefit and creation of jobs in relation to the instalment of wind turbines. Turbines are also considered a menace to the local environment.</p>	<p>Success factor: Focusing on providing testing facilities for renewable energy demands support from local communities, and direct involvement from local institutions and the business sector.</p> <p>Challenge: Although designed to minimize noise, wind turbines affect their immediate surroundings. However, a specific body, the Wind Secretariat, has the task of assisting local communities in designating the location of turbines and the overall planning process.</p>	<p>Success factor: Local companies, owned by counties and municipalities, often focus on regional development and "putting money back into the community".</p> <p>Challenge: Local communities and industries are suspicious of wind installations, fearing negative impacts on the environment and tourism.</p>

Table 1 (continued from the previous page): Success factors and challenges in the four Nordic case regions