



**EXPERT EVALUATION NETWORK
DELIVERING POLICY ANALYSIS ON THE
PERFORMANCE OF COHESION POLICY 2007–2013
YEAR 2011**

**TASK 1: POLICY PAPER ON RENEWABLE ENERGY AND
ENERGY EFFICIENCY OF RESIDENTIAL HOUSING**

FINLAND

VERSION: FINAL

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**A report to the European Commission
Directorate-General Regional Policy**

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LIST OF ABBREVIATIONS

- EEN – Expert Evaluation Network
- ERDF – European Regional Development Fund
- ESF – European Social Fund
- OP – Operational Programme

1. EXECUTIVE SUMMARY

Finland is an energy intensive country due to the energy intensive nature of its manufacturing industry and the high demand for heating because of the cold climate. In 2009, heating accounted for 23% of final energy consumption and 40% of energy for heating was produced from renewable sources.

The main objective of renewable energy policy is to raise the share of renewables in total energy consumption to 38% by 2020 from 29% in 2010 and to 47% in the case of heating and cooling from 37% in 2010. The longer-term vision is that by 2050 renewable energy sources should account for around 60% of total energy consumption. Other objectives related to the climate and energy policy are to increase the use of domestic renewable energy and to reduce dependence on imported energy and also to support employment and regional policy objectives. Moreover, energy technology exports are considered to provide business opportunities for the Finnish industry.

Although the development of renewable energy and the energy efficiency of housing have regional dimensions, they are not specifically part of regional policy. The ERDF is used to supplement national policy and these areas are not central in the support programmes.

The State provides investment support for enterprises and municipalities to increase their use of renewable energy as well as support for improving the energy efficiency of housing. New measures based on feed-in tariffs for renewable energy were implemented in March 2011. In addition, new energy taxes favouring renewables at the expense of fossil fuels have been introduced.

The total amount of public support for renewable energy was about EUR 64 million in 2010. The amount will increase significantly from 2011 on because of the new feed-in tariffs coming into effect. It has been calculated that the cost of the support for renewable energy and various other forms of energy support will be EUR 300–400 million a year by 2020. The general view among specialists is that the new measures are likely to be effective in achieving the objectives. However, the high cost of the feed-in tariff scheme has been criticised. The new Government of Finland plans to re-evaluate the effects and costs of the feed-in tariff scheme in 2012. In addition, the Government plans to cut the support for renewable energy.

2. NATIONAL POLICY

Finland is an energy intensive country – the consumption of primary energy per capita is among the highest in the EU27 due to the energy intensive nature of much of the manufacturing industry and the high demand for heating because of the cold climate. The heating of buildings (residential and others) made up 23% of final energy consumption¹ in 2009 and this share has not changed significantly over the past 15 years.

Heating of residential buildings: Residential buildings accounted for 61% of the total energy used for heating in 2008. Heating methods can be divided into three categories: in-house heating (which makes up 50% of the total), electric heating (15%) and district heating (35%). In-house heating (i.e. with the heating source in the building) is the predominant method in one-family houses, the major energy source being wood-based fuels. Electric heating is used only in one-family and attached houses and the energy sources are the same as for electricity production generally². District heating is well developed in urban areas and is usually based on the combined production of heat and electricity, making the process more efficient³. Overall, about 40% of energy for heating is produced from renewable sources⁴, mainly from wood-based fuels.

Main objectives of the renewable energy policy: The main objective⁵ is to raise the share of renewable energy to 38% by 2020 from 30% in 2008 in accordance with the obligation agreed with the EU Commission. The longer-term vision is that by 2050, energy consumption should be reduced by at least a third of the 2020 level and that renewable sources would account for approximately 60% of total energy use.

Policy instruments and new reforms: The main policy measures for promoting the use of renewable energy and energy saving are described below and the rates of support in section 5.

(1) There are two schemes in use for supporting investment, both available for enterprises and non-profit organisations such as municipalities. Support for investment in bio-energy (especially biogas) plants and for pilot projects applying new research and technology is administrated by the Ministry of Agriculture and Forestry. A second support scheme is administrated by the Ministry of Employment and the Economy and it promotes the use of

1 Figures presented in this section are from Statistics Finland unless other reference indicated.

2 Distribution (2008): nuclear (33%), hydro (18%), natural gas (16%), coal (13%), wood fuels (9%), peat 8% and others 3%.

3 Main energy sources (2008): natural gas (37%), coal (24%), peat (18%), and wood and other bio-energy 13%.

4 Note: peat is not classified as renewable

5 The main guidelines of renewable energy are set in the Long-term Climate and Energy Strategy report submitted to the Finnish Parliament in November 2008. The general approach to increase the use of renewable energy as primary energy is described in the National Renewable Energy Action Plan (Ministry of Employment and the Energy 2011).

renewable energy sources, more efficient use of energy and energy saving, the introduction of new energy technology and reduction in the environmental damages caused by energy production and use. Support is also provided for electricity generation and heating and cooling systems. The scale of the aid is affected by the type, size, technology level and profitability of the project. During the economic downturn, an additional 2–5% was provided when it was considered that it would accelerate the start-up of the project.

(2) The new system of feed-in tariffs to promote the production of renewable energy was implemented in March 2011. It consists of several sub-schemes. While in the case of feed-in tariffs for electricity production from wood chips the support level is tied to the cost of emission permits, in the cases of wood fuel at a power plant and wind power the support is linked to the market price of electricity. A fixed subsidy is paid for electricity generated from hydropower. The system also includes specific support schemes for small-sized wood-fueled plants and for the small-scale use of wood, heat pumps and pellets as a source of heating. Biogas, landfill gas, recycled fuels and solar heating and solar power generation systems are also supported. The previous support schemes for small hydro power, off-shore wind power and bio waste plants have been integrated into the new system in the form of tax reductions to producers. The support is granted for a fixed term of 12 years.

(3) There is, in addition, a grant system for projects aimed at improving the energy efficiency of residential buildings (mainly residential blocks of flats and attached houses). Grants of up to 20% of the costs are given for renovating heating systems, improving insulation, installing new windows and so on. In addition, there is an alternative support system for one-family houses. The grants are allocated by the Housing Finance and Development Centre of Finland (ARA) which is under the administration of the Ministry of Environment. To promote the energy efficiency of residential property, an energy certificate for all new residential buildings and for most old ones⁶ has been compulsory since 2009. In the case of one-family housing, tax deductions are available for the costs incurred in energy improvement measures. Assistance on social grounds is also available for the installation of heating systems and equipment using renewable energy sources. For energy improvements in apartments and terraced houses, assistance was introduced during the economic downturn (up to September 2010) for measures involving the use of renewable energy. In addition, a special energy assistance scheme was introduced in 2011 to promote the use of renewables. This is intended to be in place at least up until 2020, the scale being decided each year in the national budget.

(4) A new energy taxation scheme, based on taxing the energy content and carbon gas emissions of fuel, came into effect in 2011. Its aim is to promote the use of renewable

⁶ Required in old residential buildings in which dwellings are sold or let in market.

energy sources at the expense of fossil fuels. The rate of taxation on carbon gas has been raised considerably and the scheme is expected to have a marked effect on the use of renewable energy, since it raises the cost of fossil fuels above that of renewables.

R&D support: The state allocates support for developing technologies and creating innovations for renewable energy and energy efficiency. The annual amounts of support for R&D have been significantly bigger than for other measures during the last years.

Policy changes: The energy tax reform and the new legislation on feed-in tariffs for renewables are strong measures for promoting the use of renewable energy, including in heating residential buildings. The feed-in tariffs will, however, lead to a gradual increase in the costs borne by the State⁷ and this has been subject to criticism because of the problems of public finances as a consequence of the economic downturn. At the same time, the energy tax reform means a significant increase in Government tax income, at least in the short run, though the reform too has been criticised because of the higher costs of electricity and heating for the average family and the risk it poses to the competitiveness of energy-intensive manufacturing.

Regional aspects: Energy policy in Finland is not differentiated regionally principally because of the relatively small market.⁸ Nevertheless, the policy has regional implications. There is significant regional variation in the distribution of types of housing, heating methods and the conditions for the use of renewable energy. The less favoured regions⁹ are dominated by rural areas and small towns and communities where the majority of housing units are one-family detached houses in which the most usual method of heating is in-house using wood based biomass. In large urban centres district heating predominates, the main fuels at present being coal and natural gas. Accordingly, the new policy promoting renewable energy has more effects on urban centres like Helsinki than rural and semi-rural areas. In addition, most of the land area in the less favoured regions is covered by forests, which are the principal source for wood-based renewable energy. So the growing business of wood based-fuel production is concentrated in less favoured regions, providing a stimulus for their economies.

⁷ Detailed figures in section 5.

⁸ Ministry of Employment and the Economy 2011.

⁹ Most regions in Eastern and Northern Finland and several regions outside the major urban centers in Western and Southern Finland.

3. ERDF AND COHESION FUND SUPPORT AND CONTRIBUTION TO NATIONAL POLICY

In the National Strategic Reference Framework (NSRF) 2007–2013 the objectives concerning renewable energy and energy efficiency are presented under the theme “promoting enterprises”. The objective is to promote innovations with the aim of increasing use of renewable energy sources and improving energy efficiency. The priority is the development and application of high quality environment and energy technology especially connected with wind and bio energy. It is also considered important to improve energy efficiency for safeguarding the preconditions for the energy intensive manufacturing. It can be concluded that the role of ERDF is to supplement the national policy for renewable energy and energy efficiency by keeping the emphasis on the support for enterprises to promote their development and use of renewable energy.

To increase the use of bio-energy, ERDF programmes¹⁰ support the construction of larger plants, technology projects and the preparation of large-scale development projects. ERDF programmes also provide support for enterprises to encourage them to use renewable energy and environmentally friendly production methods. New methods and new technologies are being developed to increase the reuse of waste and recycling. The ERDF programmes, therefore, supplement national measures in promoting the use of renewable energy and improving energy efficiency.

Of the finance going to projects related to climate change (around EUR 53 million) over one-third (37%) involves the introduction of renewable energy. Research on renewable energy sources and support for technology companies and consultancies both account for around a quarter.

Projects categorised as promoting renewable energy and the energy efficiency of housing account for around 3% of the total ERDF allocation (EUR 45million) and 1% of commitments (EUR 7 million) at the end of 2009 (See Annex Table A). Most of the allocation went to projects involving biomass (29%) (code 41) and energy efficiency (54%) (code 43). Support for energy efficiency, however, goes mainly to SMEs rather than to residential housing.

Renewable energy and energy efficiency are not separately distinguished in Finland’s ERDF programmes. Very little funding is allocated for housing infrastructure (code 78), which in Finland does not have a regional policy dimension. There are, however, direct and indirect links between the renewable energy projects supported by the ERDF and the energy efficiency of housing.

¹⁰ Five regional ERDF programmes: Etelä-Suomi, Länsi-Suomi, Itä-Suomi, Länsi-Suomi, Åland.

Examples of ERDF projects for renewable energy

The Dynamic Bio-energy Cluster in Central Finland is a project receiving funding from Länsi-Suomi ERDF programme. The general aim of the project is to increase the business and exports of the enterprises concerned through R&D and other development projects. The cluster includes regional companies producing heating and electricity from biofuels. According to indicators¹¹, the turnover of the cluster grew faster than that of all firms in the Central Finland region from 2005 to 2010.

One project in the cluster, undertaken with the Technical Research Centre of Finland, is the construction of a bio-energy centre in the Jyväskylä University of Applied Sciences in Saarijärvi. The aim is to stimulate investment in biogas and to equip a district heating plant in Saarijärvi with a waste-to-energy test boiler.

Another example is a project funded under the Itä-Suomi ERDF programme which is aimed at reducing the use of non-renewable energy and increasing that of renewables in Etelä-Savo, as well as providing up-to-date information on the energy use. It is estimated that the project has helped to increase both energy efficiency and the use of renewables by about 0.5% in the province.

A further example is a project funded by the Etelä-Suomi ERDF programme which is aimed at testing and developing the production and use of energy from renewable sources and supporting investment in, for instance, biofuel production plants and biofuel boiler plants.

In Northern Finland, support for renewable energy production is directed towards, inter alia, securing the supply of biomass and extending wind and hydro power, in part to encourage the growth of firms and employment in the energy sector.

4. RATIONALE FOR PUBLIC INTERVENTION

International climate agreements and the EU have set ambitious targets to reduce greenhouse gas emissions, to increase the use of renewable energy and to improve energy efficiency. The Finnish energy and climate strategies respond to the targets of the international agreements but there are also national objectives. According to the strategies, the increased use of domestic renewable energy reduces dependence on imported energy and it also support employment and regional policy objectives. Moreover, energy technology exports are considered to provide business opportunities for the Finnish industry. Public intervention is aimed at achieving the national targets for the share of renewables in total energy consumption by 2020 and realising the vision for 2050 (section 2). The targets,

¹¹ Central Finland Regional Council 2011

measures used and estimated costs for each type of renewable are presented in the Action Plan¹².

As noted above, the ERDF is used to supplement national intervention and there are no specific selection or evaluation criteria set in ERDF programmes for the projects concerned.

The general objectives of energy policy are widely accepted in Finland. However, during the preparation of the new reforms (feed-in tariffs and the energy tax) there was much debate about the weight accorded to the measures, the costs and the distribution of these between social groups and firms. The National Audit Office of Finland¹³ expressed severe doubts about the rationale for the new legislation in its inspection report (2010): "Finland's objectives for increasing renewable energy are challenging and they are difficult to obtain... Feed-in tariffs to be taken into use in 2011 in their present form are not the best way to reach the objectives from the point of view of State finances. The volume of support will be impossible to anticipate and the system will bind the State's expenses for a very long time in the future."

5. RATE OF SUPPORT AND PROFITABILITY

Feed-in tariffs¹⁴

The feed-in tariff scheme to support electricity production from wood chips is implemented so that when the cost of an emission permit is EUR 10 per ton of CO₂ the support provided is EUR 18 per MWh, and when the cost of an emission permit is EUR 23 per ton of CO₂, the support is zero. There is also a fixed subsidy¹⁵ of EUR 6.9 per MWh for electricity produced from wood chips, though this is not paid for wood chips if the average market price of an emission permit in a given year exceeds EUR 18 per ton of CO₂.

The feed-in tariff for electricity produced using wood fuel is equivalent to the difference between the target price of EUR 83.5 per MWh and the market price of electricity. In addition, there is a heat premium of EUR 20 per MWh if electricity generated at the plant is based on an efficient combined heat and power production system in accordance with the CHP Directive.

The feed-in tariff for wind power is equivalent to the difference between the target price of electricity and the market price, the former being set at EUR 105.3 per MWh up to 2015 and

12 Ministry of Employment and the Economy 2011

13 Finland's Supreme Audit Institution reporting directly to Parliament.

14 The support schemes are described according to Finland's latest national action plan for promoting energy from renewable sources (by the Ministry of Employment and the Economy).

15 The scheme of fixed subsidies for electricity production is based on a guaranteed price and is meant to complement subsidies tied to market prices. All the producers who do not or have not received any other production aid and are producing electricity from biogas, wood chips or wind power or in a small hydroelectric power plant are entitled to fixed subsidies. Fixed subsidies vary according to production technology.

EUR 83.5 thereafter. The additional fixed subsidy for wind power is EUR 6.9 per MWh, which is not paid if the average market price of electricity in a given year exceeds EUR 76.6 per MWh.

The scale of the feed-in tariff for biogas is similar to that for wood fuel. The heat premium in this case is EUR 50 per MWh and there is also a fixed subsidy of EUR 4.20 per MWh, which, as for wind power, is not paid if the average market price of electricity in a given calendar year exceeds EUR 76.6 per MWh. The same fixed subsidy and the conditions attached to it also apply to hydro power. Support for solar heating and solar power generation systems continues to take the form of a direct subsidy.

Energy grants for residential property

The Housing Finance and Development Centre of Finland (ARA) gives grants for using renewable energy in heating and for improving energy efficiency. The maximum support is 20% of total costs up to a limit of EUR 200,000. The total available sum for grants, however, was only EUR 30 million in 2011. Consequently, only a small proportion of applications are accepted. The ERDF plays no role in financing such grants.

6. COSTS, PUBLIC SUPPORT AND PRICES¹⁶

Renewable energy

The total amount of public support for renewable energy was about EUR 64 million in 2010. This amount will increase significantly in 2011 and the following years as a result of the new feed-in tariff system. The National Audit Office (2010) anticipates that the cost of the support for renewable energy and various other forms of energy support will be EUR 300–400 million annually by 2020.

Wind Power: With production of 6 TWh, the cost of support is estimated at around EUR 200 million a year if the market price is EUR 50 per MWh.

Wood chips/other energy from wood: Under present conditions, the cost of support for small-sized wood plants is around EUR 18 million and will be around EUR 36 million by 2020. The additional cost of support given the current price of emission permits is EUR 11 million a year as electricity generators no longer receive tax subsidies for electricity produced from this source. The total cost of the support is estimated to be around EUR 24.8 million in 2011.

The feed-in tariff for small CHP plants is expected to lead to 60 new plants being constructed by 2020 and to increase the use of wood fuel by 1–1.5 TWh. However, the

¹⁶ If not otherwise mentioned, the costs of the support schemes are described according to Finland's latest national action plan for promoting energy from renewable sources (by the Ministry of Employment and the Economy).

increase in electricity generated this way is expected to be small – some 0.2 TWH – on account of the low power to heat ratio of the plants concerned. In 2010 the cost of the support scheme was estimated to be around EUR 3.8 million in 2011 and around EUR 34 million in 2020¹⁷.

Biogas: The cost of biogas support was estimated in 2010 to be around EUR 2 million in 2011 and around EUR 10 million by 2020 if the market price of electricity is EUR 50 per MWh¹⁸.

Energy efficiency in residential housing

The evidence is that energy efficiency has a minor effect on the price of new houses. Moreover, in old houses the costs of investment to improve energy efficiency in most cases outweigh the discounted value of the reduction in maintenance costs.

7. CONCLUSIONS

Finland has a national policy for promoting renewable energy and energy efficiency of housing, which is supported by the ERDF.

The traditional measures of support were grants and subsidies for enterprises, municipalities and home-owners. New measures based on feed-in tariffs for renewable energy together with taxes on energy favouring renewables have been introduced recently. The combined effect of these is expected to be sufficient to achieve the targets for the share of renewable in final energy consumption and reduction in energy use set for 2020, so long as the measures are kept in force. In addition, increases in the use of renewables will also stimulate economic activity in many less-favoured regions, especially in Eastern and Northern Finland, where there are significant reserves for wood based bio-energy. The state also allocates significant sums for the R&D connected with renewable energy and energy efficiency. The role of ERDF is to supplement the national policy and its emphasis is in promoting innovations with the aim of increasing use of renewable energy sources and improving energy efficiency. ERDF does not support directly the production of renewable energy or energy efficiency of housing because it would not be appropriate to create an overlapping regional system.

The high cost of the new measures, however, has provoked criticism, including criticism from the National Audit Office of Finland, which has suggested trying to find lower cost measures for reaching the same objectives. For example in the case of wind energy, the Audit Office recommends that the support would be directed towards promoting the introduction of new technology. They have also noted that the total cost of the feed-in tariff

¹⁷ Ministry of Employment and the Economy 2010.

¹⁸ Ministry of Employment and the Economy 2010.

scheme would not be manageable in the same way as the earlier energy support scheme because some of the new feed-in tariffs are tied to the market price of electricity. The feed-in tariff scheme will also bound the budget funds for the next 12 years.

The Audit Office is also concerned about the connection between the use of renewable energy and the forest industry. The most important form of renewable energy in Finland is wood energy, of which the majority is obtained from the by-products of the forest industry. Wood chips which are not the by-products of the forest industry are more expensive to produce and thus require more public support. Therefore, the majority of the use of renewable energy depends on the production of the forest industry and is not directly a target of the climate and energy policy. A possible decline in the forest industry's output hence represents a significant risk for the use of renewable energy.

The new energy taxes have also been criticized because of their social and regional effects, the latter being felt mainly in urban areas, where it will take some time to convert to renewable energy for heating.

According to the program of the new Government nominated in June 22 the effects and costs of the feed-in tariffs will be evaluated in 2012 and the system may be revised accordingly after that. In addition, the Government plans to cut the support for renewable energy by EUR 25 million annually.

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Niina Isotalo, Energy Market Authority of Finland

Petteri Kuuva, Ministry of Employment and the Economy, Energy Department

Anja Liukko, Ministry of Employment and the Economy, Energy Department

TABLES

Annex Table A – Allocation and commitments of ERDF, ESF and Cohesion Fund (end 2009) in EUR million

Renewable energy	allocation	commitments
39 wind	0.8	0.3
40 solar	0.8	0.1
41 biomass	13.2	3.0
42 hydroelectric, geothermal and other	5.9	0.7
Total	20.7	4.1
Energy efficiency in residential housing	allocation	commitments
43 Energy efficiency, co-generation, energy management	24.2	2.5
78 Housing infrastructure	0.0	0.1
Total (1)	24.2	2.6
Total ERDF+ESF+Cohesion fund	1596.0	724.7
Total ERDF+Cohesion fund	977.4	377.8

(1) Note: not all investment is for energy efficiency in residential housing. Source: DG REGIO