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EXPERT EVALUATION NETWORK  
DELIVERING POLICY ANALYSIS ON THE  
PERFORMANCE OF COHESION POLICY 2007-2013  
YEAR 1 – 2011

RENEWABLE ENERGY AND  
ENERGY EFFICIENCY OF HOUSING  
SYNTHESIS REPORT

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# Renewable energy and energy efficiency of housing – Synthesis Report<sup>1</sup>

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## 1 Introduction

The aim of this report is to synthesise the findings of the national studies on the support provided by the European Regional Development Fund (ERDF) and Cohesion Fund for the development of renewable energy and the energy efficiency of housing in the present programming period, 2007-2013. These studies were carried out by national experts in each of the 27 Member States in Spring of this year and are published on the DG Regio website<sup>2</sup>. The report also draws from a review of the recent literature on energy policies across the EU and of the grounds for government intervention in the areas concerned, which is published on the same website<sup>3</sup>. The concern, it should be emphasised is not to summarise the contents of these reports but to draw out the main points and to put them in a wider context. It examines in turn:

- the national policies towards developing renewable energy and improving the energy efficiency of housing across the EU;
- the contribution of the ERDF and the Cohesion Fund to these policies;
- the rationale for government intervention in these two areas and the extent to which this is spelled out in official documents, especially those relating to the deployment of Cohesion Policy funding;
- the case for Cohesion policy support in the two areas concerned.

A further issue examined is the extent to which there is public debate over the policies adopted by Governments across the EU in these two areas and the form which this takes.

It begins, however, by considering the context in which policy is being implemented.

### 1.1 Background – the context for policy

All Governments across the EU have adopted the policy objective of reducing reliance on fossil fuels and increasing the efficiency with which energy is used. This is motivated by a number of related concerns:

- to help tackle climate change and increase the sustainability of economic development;
- to ensure the future availability of energy supplies by curbing the depletion of exhaustible resources;

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<sup>1</sup> This report has been prepared by Terry Ward with the assistance of Lydia Greunz and Sara Botti of Applica.

<sup>2</sup> Reference

<sup>3</sup> Incentives for developing renewable energy supplies and improving the energy efficiency of housing; Review of the literature, Augusto Ninni, Università degli Studi di Parma and IEFÉ, Università Bocconi, Milan.

- to reduce dependence on imports of energy and, accordingly, the vulnerability to external shocks and possible political pressure from outside.

The development of renewable energy is an integral part of this policy and all Member States have committed themselves to meeting agreed – and legally-binding – national targets on the proportion of energy consumption to be met by renewables by 2020, which together are designed to ensure that by then 20% of energy consumed in the EU comes from renewables.

All Governments are, therefore, supporting the development of renewable energy, though through somewhat different means, with differing weights given to public expenditure, tax concessions, loans, managed prices, legislation and so on and with differing emphasis on the different types of renewable. The choices being made in these regards broadly reflect differing views about how the costs involved should be distributed as between consumers, producers and taxpayers and what the ultimate pattern of energy production as between the different sources should be. The latter, in turn, reflects in some degree the climatic conditions (e.g. hours of sunshine) and geo-physical features (i.e. their suitability for the use of hydro, wind power, biomass and so on) in the countries concerned. The choices made also reflect differing views about how far it should be left to market forces to determine the pattern of energy production and the relative growth of the different types of renewable and how far Governments should make conscious choices about the specific types to develop.

Much the same also applies to increasing energy efficiency and reducing the consumption of energy for any given rate of economic growth. Improving the energy efficiency of residential buildings is a key element in this since housing accounts for a relatively large share of energy consumption throughout the EU and, accordingly, is a prime target for both increasing the use of renewables for heating and cooling purposes and energy saving. Differences in the approach to achieving such an improvement are also evident between countries, again reflecting differences in the philosophy towards intervention and how the costs involved should be distributed between those benefiting directly from the energy savings and the rest of society.

In both cases, the policies implemented, as in other areas, are inevitably being affected by the tightening constraints on public finances which are forcing a reconsideration of the scale of both public expenditure and tax concessions, how they should be divided between policy objectives and, indeed, whether they should be used at all in certain areas.

Choosing the appropriate policy is, moreover, particularly difficult with regard to energy where the time horizon relevant for decision-making extends over several decades. Choices have to be made in a context where there is a high degree of uncertainty about future technological developments and their effect on the costs of producing energy from different sources as well as the future path of energy prices and where vested interests have major influence. These circumstances compound the difficulty of determining the best strategy to adopt and how much reliance to place on market forces to achieve ultimate objectives as opposed to government decree. They mean that no one strategy can a priori be necessarily regarded as superior to any other. They also mean, however, that there is more need for Governments to justify the strategy being followed and to explain the measures implemented in pursuit of this. This is required to enable open debate to take place on the suitability of the measures concerned and their likely effectiveness, as well as the costs they imply both overall and for different groups in society. The latter is particularly important since for many of the

measures adopted – such as managed prices, compulsory quotas or regulation – the costs involved are far from being transparent.

Two further factors have had a major effect recently on the underlying context in which policies are being implemented in respect of renewables. The first is the apparent decoupling of the prices of the two main fossil fuels, oil and natural gas, combined with the expansion of known supplies of the latter. Whereas in the past the price of natural gas tended closely to follow that of oil, more recently, natural gas prices have remained roughly constant or have fallen while oil prices have increased markedly<sup>4</sup>. In consequence, the incentive given by the rising cost of fossil fuels to increase investment in the development of renewables has been reversed. Instead, the main incentive given by international energy market forces is to switch from oil-powered to natural gas-powered generation of electricity.

The second factor is the Japanese earthquake in March this year and its aftermath which has prompted a widespread reconsideration of plans to construct new nuclear power plants as a major means of reducing dependence on fossil fuels for electricity generation. A number of Governments have either already cancelled these plans or have delayed their implementation and some have announced the closure of existing plants from a future date, so implicitly putting even more weight on the development of renewables to reduce future fossil fuel consumption.

## 1.2 Cost differences between sources for producing energy

It is evident from the latest estimates available of the costs of generating electricity from different sources that a subsidy is required in some form or other to support the generation of electricity from renewables. Although there are problems in comparing these costs on a comparable basis, the estimates included in the national reports indicate that in each case, the cost of using renewables for producing electricity is higher than that of using fossil fuels, natural gas, in particular – which is around EUR 0.07-0.09 per kWh (Table 1). In Italy, for example, the cost of using on-shore wind power, the lowest cost renewable source, is over 35% higher than the cost of using traditional energy sources.

Table 1 Cost of producing electricity from different energy sources, EUR per kWh

	BE	FR	IE	IT	NL	PT	UK
Small hydro		0.065-0.099	0.08	0.174		0.089	
Biomass	0.245	0.103-0.180	0.11-0.13	0.205	0.122-0.213	0.110	
Biogas	0.113		0.08			0.110	
Onshore wind	0.269	0.074	0.07-0.09	0.105	0.093	0.092	0.099
Offshore wind		0.118	0.14				0.168-0.201
Solar (PV)	0.967	0.228-0.400		0.410-0.500	0.280-0.333	0.330	
Coal			0.07				0.115*
Gas			0.08	0.077			0.090*

Note: The cost estimates are not necessarily comparable across countries because the assumptions underlying them may differ, but they should be reasonably comparable within countries. For Italy, the figure shown for gas refers to the average cost of using 'traditional' sources.

<sup>4</sup> In the year up to the beginning of July 2011, the crude oil spot price (for North Sea Brent) went up from \$75 a barrel to just under \$117, an increase of around 55%. Over the same period, the spot price for natural gas (henry Hub), fell by around 2%. See <http://www.wtrg.com/daily/oilandgasspot.html>.

\*Coal with carbon capture equals EUR 0.154 per kWh; gas with carbon capture equals EUR 0.123 per kWh

Source: National reports

These figures are consistent with the latest US estimates, which indicate that the lowest cost technology for generating electricity, which is by using natural gas, was only around 70% of the cost of using the cheapest renewable source, which in the US case is biomass<sup>5</sup>. (Large hydro power plants are cheaper still, but these require an appropriate source and, in any case, increasingly raise environmental concerns.)

Costs, however, vary markedly between countries, and locations within countries, differences of 2-3 times per unit of electricity produced being evident for many of the renewable sources using similar technologies in different places in the EU<sup>6</sup>. (Large differences are evident from the figures shown in Table 1, which although these are not necessarily directly comparable across countries are indicative of the kinds of variation which exist.)

Moreover, these cost comparisons tend to understate the true difference between energy sources, since they focus on the production costs of generating electricity and leave out of account other costs which can be equally important. In the case of solar and wind power, in particular, production costs consist almost entirely of the capital costs of constructing the plant concerned, as, once built, the operating costs are close to zero. But this leaves out of account the overall system costs involved. Since both wind and solar power are 'intermittent' sources of energy which cannot be switched on and off in line with demand, the costs of storage and of supplementing them when demand exceeds what they can supply need also to be included in any comparison.

Subsidising the use of renewables to produce energy, however, can be justified on a number of grounds, not least that the market prices of fossil fuels do not reflect the true costs to society of their use and depletion, in that they leave out of account the full costs of the damage caused to the environment and their contribution to climate change. Estimates suggest, therefore, that if the social costs of the damage to the environment and human health were explicitly taken into account and included in prices, they would add 30% to the price of electricity generated from natural gas and 50% to the price of that generated from coal<sup>7</sup>. Alternatively, installing carbon capture devices in natural gas or coal-fired generating plants would have a similar effect on the costs of producing electricity from these sources<sup>8</sup>

Nevertheless, as emphasised below, a question remains over the scale of subsidy which such considerations together with others – the reduction in import costs and the increased security of supply, in particular – justify, and over how much is needed to achieve the national targets for 2020, the form which subsidies should take and who should bear the cost.

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<sup>5</sup> From a US Department of Energy Report (Energy Outlook 2010), quoted in the Literature Review prepared as background for the country studies. It should be noted that biomass is not necessarily the lowest cost of renewables everywhere, which in the EU is often onshore wind power if large hydro plants are excluded.

<sup>6</sup> See Literature Review.

<sup>7</sup> Quoted in the Literature review and taken from the ExternE project supported by the European Commission – see <http://www.externe.info/>

<sup>8</sup> In the UK, it is estimated that adding carbon capture devices to generating plants using fossil-fuels would add around 35% to the cost of generating electricity – see Note to Table 1.

## 2 National policies

### 2.1 Renewable energy sources

Renewable sources can be used to produce energy for electricity, heating and fuel for vehicles. The focus here is on the first two uses since support from the ERDF and Cohesion Fund is concentrated on these.

The most common and most important measures to support the production of electricity from renewable energy across the EU are feed-in tariffs and quotas, the latter typically taking the form of Green Certificates which are tradable. These together tend to form by far the largest element of subsidy in terms of the implicit amount of transfer to producers of renewables they involve. In most countries, this far outweighs the amount paid out in direct grants or, implicitly, in tax concessions.

Feed-in-tariffs and Green Certificates are either implemented alone (which is the case in many countries in the case of the former and in Belgium and Sweden, in the case of the latter) or together (such as in Italy and the UK). Both are often supplemented by grants or tax concessions. In general, the amount of (explicit or implicit) subsidy varies according to the size of plant, the type of renewable and the technology used.

Renewable energy for heating, which is often combined with the generation of electricity for local use, is mainly supported through direct grants, low interest or preferential loans and tax concessions.

#### Feed-in tariffs and feed-in premiums

Almost all countries use feed-in tariffs to support the development of renewables for the generation of electricity, though in some they are confined to particular technologies. These guarantee producers a fixed price for the energy produced for a fixed period of time (see Box).

#### Feed-in tariffs and feed-in premiums

Feed-in tariffs essentially guarantee the price of electricity generated by producers of renewables and supplied to the grid for a certain period of time. Feed-in premiums enable producers to add a fixed amount to the market price. Feed-in-tariffs, therefore, ensure a certain level of income, given the costs of production, irrespective of the price of energy, while the income provided by feed-in premiums varies with the market price of electricity. Both can vary between different types of renewable, sizes of plant and the technology used, reflecting the policy preferences of Governments and the pattern of energy production they wish to encourage or the national producers they wish to support. Both tend to be fixed for a given number of years though often the level diminishes at a pre-determined rate ('degression'), reflecting (expected or actual) reductions in the costs of producing electricity as technology advances.

If the tariff level or premium is the same for different renewable sources, then effectively the relative growth of the different ones (e.g. wind power as opposed to biomass) is left to the market to decide, in the sense that the sources with the lowest operating costs will yield the highest rate of return and so will tend to attract more investment. Differences in tariff levels tend to reflect differences in production costs, technologies with higher current costs receiving a higher tariff in order to compensate for this and so to encourage their development in the expectation that this will bring down costs in future.

There are only a few countries in which feed-in tariffs are not used. Belgium, Poland, Romania and Sweden together with the Netherlands seem to be the only ones, though in Malta, feed-in tariffs are limited to photovoltaic systems (PV) and in Finland, they were introduced only very recently, in

March 2011. In the Netherlands, feed-in premiums, which add a fixed amount to the market price of energy, are used instead of tariffs. In the same way as feed-in tariffs, these represent a way of subsidising the production of renewables. However, the fact the amount which producers receive varies with the market price of energy means that they give rise to a more uncertain revenue stream and, therefore, a more uncertain rate of return on investment – though, of course, one which, depending on the movement of market prices, could turn out to be higher than if feed-in tariffs were used.

In many countries, feed-in premiums are combined with feed-in tariffs, in the sense that they are applied to particular technologies and/or sizes of plant instead of tariffs, usually to those for which there is less need to guarantee investors a fixed stream of future revenue because the risks involved are less. They are also used in many cases for biomass, especially where this can readily be replaced by fossil fuels, in order to ensure that there is always a premium above the cost of the latter to encourage its continued use<sup>9</sup>. In Denmark, for example, premiums are used for biomass and on-shore wind power. In the Czech Republic, producers are able to choose between tariffs and premiums.

In virtually all countries, feed-in tariffs and/or premiums vary between different types of renewable energy, reflecting in part the preference of Governments for the development of particular sources, though also the differences in production costs between them. No Government is, therefore, prepared to let the market determine the future pattern of energy production by applying the same rates of feed-in tariff or premium to the different types of renewable (see Box). Estonia comes closest to doing so, in that the tariffs are common across all sources of renewable energy, though there is still some variation according to the process used (such as whether electricity is produced from biomass through cogeneration or through a condensing process).

In many countries, the tariff for PV is higher than for other technologies reflecting the higher costs involved as well as the seeming desire of Governments to encourage its development. This is the case as much, if not more, in Northern Member States as in Southern ones, despite in most cases the relatively small amount of electricity generated from PV and its (apparently) limited potential<sup>10</sup>. In most countries, tariffs also vary with the size of plant or the amount of electricity generated and are higher for small producers to cover their greater costs.

Feed-in tariffs and premiums are invariably applied at the same rate within countries and do not vary between different locations. The amount of implicit subsidy going to regions, therefore, tends to vary with the prevailing sources of renewable used and the differing costs associated with their use. This reflects the differences in climate and geo-physical features, such as the availability of wood for biomass. Accordingly, there is an incentive for investors to locate the construction of new plants in regions where the costs are lowest, though there are a few exceptions as noted below where regions add their own measures to supplement national support.

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<sup>9</sup> If the cost of fossil fuels drops below that assumed when the level of feed-in tariffs were set, then producers have an incentive to switch to using these rather than biomass if the technology makes this possible. Feed-in premiums represent a way of ensuring the continued use of biomass.

<sup>10</sup> Less than 1% of electricity generated from renewables was produced from PV in 2009 and the share is projected to increase to only 7% by 2020. See Literature Review (ref).



## Green certificates

Green certificates, which are effectively tradable quotas stipulating a certain amount of electricity to be generated from renewables (see Box), are used instead of feed-in tariffs in a few countries, specifically, Belgium, Poland, Romania and Sweden as a means of subsidising production. In Belgium, they carry a guaranteed minimum price in order to ensure that the revenue stream they imply does not fall below a certain level. For PV, this is above the market price of certificates. In Italy, they are used for biomass, solar energy and off-shore wind power, feed-in tariffs or premiums being used for other renewables. In the UK (where they are called 'Renewable Obligation Certificates – ROCs), they are also used to support solar energy and off-shore wind power and are combined with feed-in tariffs for other sources.

### Green certificates

Green certificates are similar to feed-in tariffs in that they are a form of payment to renewable producers for the energy they supply. They work by producers or users of renewable sources receiving a certificate for a given amount of electricity they produce or consume. They can then sell these to other suppliers or users who are obliged to buy a certain amount of them depending on their sales or consumption, which means that it is tantamount to a quota system which stipulates the share of electricity to be supplied from renewables. This share can be increased over time to raise the demand for certificates and, therefore, their price if the growth in the supply of renewables lags behind the desired growth in consumption. As a result, producers of renewables obtain more income to invest in expanding capacity while producers using fossil fuels experience rising costs, so encouraging a shift to renewable sources.

Green certificate schemes like feed-in tariffs can be applied in the same form to different sources of renewables or vary between them. Which of the two applies, and the extent to which the form varies, reflects the philosophy of the Government towards the pattern of renewable growth and whether or not it wishes to influence this or leave it to the market to determine the relative pace of development of the different energy sources.

In Belgium, unlike elsewhere, the system of green certificates in operation varies between the three regions except in the case of off-shore wind power for which a Federal system applies. In the Flemish region, certificates are related to electricity produced, in the Walloon region and Brussels, they are related to the avoidance of CO<sub>2</sub> production. Accordingly, there are four separate markets for certificates, the three regional ones plus the Federal.

In Sweden, green certificates apply to all plants producing renewable energy built after 2003 when the scheme was introduced, except those using certain bio-fuels, and the scheme has a guaranteed duration of 15 years. The form in which the scheme is applied is the same across the different technologies, though it is coupled with grants and tax incentives to encourage the development of particular types of renewable, wind power and biomass in particular. In Poland and Romania, the scheme is also applied in a uniform way across the different sources of renewable and is combined as well as with grants, tax incentives and preferential loans. In Italy and the UK, where the scheme is limited to particular types of renewable, the form it takes varies between them, with more of a subsidy given in the UK to off-shore wind power the development of which is regarded as being of key importance.

## Grants, loans and tax incentives

In nearly all countries, direct support for the development of renewable energy sources, especially for heating, is also provided through grants, soft loans or tax concessions or typically some mixture

of these. They are used to supplement the subsidy given through feed-in tariffs and/or green certificates in the case of the generation of electricity, and are typically used to encourage the development of particular sources and technologies. In a number of cases, such as Germany, Sweden and the UK, they are focused on supporting research into the process concerned and into new technologies for using renewables more efficiently. In Malta, virtually the only means of support for renewables, apart from in the case of PV and on-shore wind power (for both of which there are investment grants as well as feed-in tariffs for the former), are soft loans at a subsidised rate of interest.

Investment grants are available for most types of renewable and for most technologies in the Czech Republic, Greece, Ireland, Cyprus, Latvia, Lithuania, Luxembourg, the Netherlands (for PV and wind power), Austria and Finland, where until March 2011, they represented the only means of support. In Belgium, grants are available only for PV, which despite the climate and the very small proportion of energy it generates, is a particular focus of policy effort.

Low interest loans are provided rather than grants in Germany and Estonia, while in Poland and Slovenia, these exist alongside tax exemptions and in Lithuania, alongside grants.

Tax exemptions are an important means of support in Spain, Latvia, the Netherlands, Portugal, Slovakia, Finland, Sweden, Belgium and the UK. In Latvia and Finland, they are available together with investment grants. This is also the case in the Netherlands, but here the new Government, elected towards the end of 2010, is in the process of radically overhauling the support provided to reduce the amount of subsidy given. In Sweden, they are concentrated on supporting wind power, both on-shore and off-shore.

Direct aid to support the development of renewables goes to a significant extent to subsidising their use in industrial and commercial enterprises and residential buildings both for power and for heating, lighting and cooling purposes as well as their use in generating electricity for distribution through national grids. Grants or tax reductions are, therefore, available for the installation of heating and hot water systems which use renewable energy produced by solar panels or biomass in most EU15 countries. This is also the case in many EU12 countries, such as in the Czech Republic, Romania and Slovenia, where grants are provided for the exchange of heating systems using fossil fuels for those using renewable energy, and in Slovakia, for solar heating systems. In many cases, resources from the ERDF and/or Cohesion Fund are used co-finance the grants concerned, as indicated below.

### Scale of support for renewables

Because of the nature of the support provided – in particular, the reliance on feed-in tariffs, feed-in premiums, green certificates, tax concessions and low interest loans, as well as direct grants – there is difficulty in estimating the overall scale of subsidy going to producers of renewable energy across the EU. In many countries, no estimates are published of the extent of support and in those where they are published, they do not in most cases cover all the elements of support. This is particularly the case as regards the effective amount of subsidy arising from tax concessions and, to an only slightly lesser extent, from low-cost or preferential loans, even where estimates are available for the support implied by feed-in tariffs or green certificates.

Few of the national reports, therefore, contain a complete estimate of the scale of support going to renewables in Member States, though it is evident from the estimates that are given that the

amount involved is substantial. In Germany, where more information seems to be available than in most other countries, the support amounted to almost EUR 11.4 billion in 2009 and in Spain, to something over EUR 4.5 billion (Table 2). It is also evident that the scale of support provided by feed-in tariffs and green certificates far exceeds that provided by direct grants or loans. Moreover, although no precise estimates are given in the national reports for the value of tax concessions, it is indicated in a number of cases that these are worth more than direct grants.

The overall amounts of support provided to producers of energy from renewables do not in themselves indicate the scale of incentive for investment in new generating plants or the expansion of existing ones. This depends on the rate of return from the investment – i.e. its profitability – which depends in turn on the difference between the price which producers can obtain for the energy generated, as given by feed-in tariffs, premiums or green certificates and the cost of generation using the various technologies concerned. Since this cost varies markedly between countries, as well as between locations within countries and between the different technologies and types of renewable (e.g. biomass as opposed to wind, onshore wind as opposed to off-shore), so does the amount of support required to give a particular rate of return.

Table 2 Estimates of the amount of support provided for renewable energy in 2009, EUR million

	Feed-in tariffs	Green certificates	Tax concessions	Low-cost loans	Grants	Total of ests shown
Czech Republic						552
Denmark						269
Germany	10,779			338	235	11,352
Spain	4,500		est not avail			4,500
Italy	1,236	1,402				2,638
Lithuania	46			est not avail	15	61
Netherlands						2,139
Austria	280				138	418
Finland	300-400		est not avail			300-400
UK	est not avail	1,100	est not avail		est not avail	1,100

Note: Data are largely estimates. In each case, the total shown is the sum of the estimates available and not necessarily the actual total amount of support provided. For the Czech Republic, Denmark and the Netherlands, only total estimates are given in the national reports, For the Netherlands, the figure is an annual average for the years 2008-2011. For Austria, the figures relate to 2010. For Finland, the figure is an estimate of the annual cost of the recently-established system. For the UK, the figure is a rough estimate of the cost of Renewable Obligations in the 2008-09 financial year.

Source: The national reports for the countries shown.

Nevertheless, even taking account of variations in costs, the extent of support, as reflected in the implied rate of return to investment, varies substantially between Member States<sup>11</sup>. For PV systems, for example, the scale of support varies from being above the range of cost estimates for generating electricity from this source in Italy, Greece and Cyprus to within the range of cost estimates in Germany, the Netherlands and several other countries and below the minimum cost of generation in Sweden, the UK, Poland and a number of other countries. In the first case, therefore, prices for producers seem to be set higher than they need be - without them, moreover, resulting in

<sup>11</sup> See the estimates set out in the Literature Review (Tables C1-C5), which are based on the RE-SHAPING report 'Indicators assessing the performance of renewable energy support policies in 27 Member States' and the EurObserv'ER report. 'The State of Renewable Energies in Europe', both produced for DG Energy in 2010.

higher rates of growth of production than elsewhere – in the second case, high enough to give an incentive for investment so long as costs are towards the low end of the range, and in the third case, below the level required to give any incentive for investment in this type of renewable at all. A similar variation, though not necessarily with the same countries involved, is also evident for the other types of renewable. For many Member States, therefore, there is little evidence that the levels of price support for renewables have been set in the most cost effective way.

### Regional variations in support

In all Member States, energy policy is conceived mainly from a national rather than a regional perspective and is entirely, or largely, the responsibility of central Government, although in Belgium, as indicated above, each of the three main regions operates its own individual system of green certificates. Regional variations in the support available, therefore, tend to be minor, except, as noted above, where they stem from differences in the climate, weather conditions or the natural resources which exist. In the UK, there are some variations between (NUTS 1) regions in the support provided through grants, loans and equity. In Germany and Austria, although the main support is nationally administered, there are some differences in the support provided at regional (Länder) level, since most regions have their own strategy for supplementing national measures with regard to the development of renewables. This is also the case in Italy to a limited extent.

### The effect of the recession on support

The economic recession and the subsequent constraints on public finances have depressed expenditure on support for renewables in a number of countries, as well as making it difficult for private investors to access funds. This has been the case, for example, in Ireland and the UK, while in Latvia, the crisis prompted a redefinition of priorities in 2008 and 2009. As a result, EU-financed support for the development of renewable energy was suspended and at present, no grants are available to subsidise investment in wind- and hydro- power and biomass. Funding, instead, was switched to energy efficiency and cogeneration (the budget for this being increased three-fold) on the grounds that this would have a faster effect on economic activity and employment, especially in the construction industry which had been hard hit by the recession. In Lithuania too, funding for new projects in respect of the development of renewables was suspended in 2009, though it was re-initiated in 2010. In Luxembourg, pressure on public finances led to a reduction in the budget for support of renewable energy, as well as measures to improve energy efficiency, in 2011.

In the Netherlands, a grant scheme to stimulate investment in renewables was introduced as part of counter-recessionary measures and remained in operation up to the end of 2010, when public funding was withdrawn to reduce public expenditure. This was partly because of the budget situation but also because of the policy of the new Government to reduce intervention in the economy. In Italy too, there was an increase in support for renewables – as well as energy efficiency in housing – during the recession but this was motivated by the long-term aim of increasing their share of overall energy consumption rather than by a concern to counter the economic downturn.

In most countries, the recession and the constraints of public expenditure have had minimal effect on the support provided for the development of renewables for electricity generation, reflecting in large measure the priority attached to meeting the commitments made to the targets set for 2020. At the same time, as indicated below, support for investment in renewables for district heating systems and for providing energy to individual buildings was stepped up during the recession in a number of countries.

## 2.2 Energy efficiency of housing

Improving the energy efficiency of buildings is an increasingly important policy aim across the EU given the large proportion of total energy consumed in heating and cooling them. This is especially the case in many of the EU12 countries where much of the housing stock was built to low standards during the Communist era, largely in the form of apartment blocks, while the renovation of the existing stock was largely neglected.

Support for improvements in the energy efficiency of housing largely takes the form of grants, subsidised loans and tax concessions. Such improvements include (the replacement of heating and cooling systems with more efficient alternatives as well as wall and roof insulation, double-glazing, smart metering systems and so on. In many cases, reducing energy use is coupled with incentives to switch to renewable forms of energy for heating and cooling – as indicated above in relation to support for renewables – such as solar thermal systems, in particular, though also wood chip furnaces or even wind-powered or geo-thermal systems in some cases. In Greece, for example, it has been made compulsory to install central thermal solar systems in new buildings.

Increasingly, financial support has been complemented, or even replaced, by the imposition of standards and regulations relating to the construction and renovation of buildings and to the sale and rental of housing. These typically require that buildings should meet specified energy efficiency standards and that, in line with EU Directives, when they are sold or rented, details of their energy efficiency should be given and published in notices advertising the property. Certificates verifying the level of energy efficiency have, in addition, become a requirement for receiving grants, loans or tax concessions in many countries. Both the tightness of the regulations and the extent to which they are respected, however, vary across the EU. They are particularly strict in the Nordic countries, partly reflecting the amount of energy consumed by heating apartments and houses in the cold climate, as well as in Germany and Austria.

In Sweden, binding regulations are imposed on the use of energy in new buildings, which vary between climate zones and between residential buildings and commercial and other properties and which are progressively being tightened over time. In Germany, compulsory standards are also set for energy-use in new buildings, as well as in respect of renovation schemes, which need to achieve a fixed percentage reduction in energy consumption. These standards are combined with specific regulations for different types of equipment or material, such as boilers, air conditioning and thermal insulation. In the UK, there is emphasis on strengthening new-build standards through changes to Building Regulations in order to achieve the objective of zero carbon emission homes by 2016.

In addition, regulations are complemented in Finland and Sweden, by a tax on carbon which adds to the incentive to reduce energy consumption.

In many countries, however, regulations on energy use in buildings have yet to become fully effective, especially in the EU12 countries where they have been introduced more recently, though also in a few other countries. In Poland, where all new buildings as well as those put up for sale or rent are required to have an energy performance certificate, the scheme is reported to be a total failure. In Spain, which was one of the first countries to introduce the compulsory use of integrated renewable energy technologies in new buildings and in the renovation of old ones, it is reported that the implementation of the measure has been unsatisfactory.

The amount of support given for improvements made varies in a number of countries with the level of energy efficiency reached in the buildings concerned. This is the case in Germany, where financial assistance is given on an increasing scale to cases which exceed the standards set by the regulations, the highest amount being given to so-called 'passive houses', which are constructed in such a way that they do not require 'active' heating or cooling.

In many of the EU12 countries, special funds have been set up to extend loans to households for improving the energy efficiency of buildings, such as in Bulgaria, in the form of Residential Energy Efficiency Credit Facility or in Slovenia, in the form of an Eco-Fund. In the Czech Republic and Hungary, grant schemes for reducing energy use in housing are funded by revenue from selling emission certificates, as agreed in the Kyoto protocol.

In a number of EU15 countries – France, Finland, Ireland and the UK, in particular – special measures exist to assist low income households to invest in energy saving measures. In Finland, assistance on social grounds is available for the installation of heating systems using renewable energy sources. In the UK, everyone in receipt of certain social benefits or tax credits as well as those aged 70 and over is eligible for grants to cover thermal insulation.

### Regional variations in support

Variations between regions in the support given to increasing the energy efficiency of housing are much more pronounced than in respect of support for renewable energy.

In Belgium, in the Walloon and the Brussels region, the support available for energy efficiency measures varies with the income of households (three levels altogether), though the thresholds differ in the two regions. A number of provinces and municipalities give additional support, while the Federal Government also provides fiscal incentives to households for investment in energy saving. These various support measures can be cumulated, though the multiple bureaucratic procedures involved can deter people from applying for all they might be entitled to.

In a number of other countries, the support available also varies between different parts of the country, with regional and, in some cases, local, authorities implementing their own measures in addition to those available nationally. This is the case in Germany and Austria, where the Länder have main responsibility for the energy efficiency of buildings. In Italy, the central Government is responsible for defining the general framework of support measures, though regional authorities can then adapt the measures implemented to local needs. Much the same is the case in the Netherlands, where measures are formulated at the national level, but regional authorities are responsible for managing the support provided and deciding on the form which it takes.

Variations in the amount of regional support also reflect the nature of the housing stock and the extent to which it is in need of improvements in energy efficiency, especially in relation to heating and cooling systems.

### The effect of the recession on support for energy efficiency in housing

In many countries, support for improving the energy efficiency of buildings, including housing, was stepped up during the recession as one of the means of countering the economic downturn, especially as it was a way of giving direct and fairly immediate help to the construction industry and to the maintenance of employment. In a few countries, however, support for energy efficiency has been cut back more recently as a result of public financing problems.

In Germany, the Federal Government introduced a substantial fiscal stimulus package in 2008 and 2009 in response to the economic downturn, some 10% of which was for energy-related renovation of buildings, including housing. In Austria, support for energy efficiency measures in buildings was also stepped up in 2008, largely because of the expected gains to employment, with further similar measures taken in 2009 and 2011.

In Portugal, incentives for the installation of solar panels in housing were introduced in 2009 to help counter the recession. In Denmark, support for the renovation of housing and reducing energy use was implemented in 2009 for the same purpose and subsequently withdrawn in late-2010 as the recovery was underway. Similarly, in the Netherlands, additional grants were provided for double glazing in housing to support the construction industry, and in Finland, assistance was given during the recession and up to September 2010 for energy efficiency measures in housing involving the use of renewables.

In Ireland, expenditure on improving energy efficiency in housing almost doubled between 2008 and 2009, so more than offsetting the reduction in support for renewables (see above). Additional funding was allocated in 2010 in an attempt to boost job creation, while other public expenditure programmes were cut back.

In the Czech Republic, the introduction of a national policy for increasing the energy efficiency of residential buildings was also aimed at counteracting the reduction in construction activity and in Slovakia, additional financial support was allocated to this for a similar purpose.

In Lithuania, the renovation of apartment blocks was one of the cornerstones of the Economic Promotion Plan launched in 2009. As a consequence of the economic recession, support for increasing the energy efficiency of housing was shifted from being purely national to being financed largely by the ERDF, with a significant increase as result. In Latvia, as indicated above, there was a shift of funding from renewables to the energy efficiency of buildings, which was associated with a similar shift in the allocation of ERDF support.

By contrast, in a few countries, public financial problems and a concern to reduce budget deficits have led to cut-backs in expenditure on energy efficiency. This was the case in Luxembourg, as noted above. It was also the case in Romania, where the budget for the 'thermal renovation' of buildings was reduced by around a third in 2009 and by over two-thirds in 2010.

### 3 ERDF and Cohesion Fund support

#### 3.1 Renewable energy

A total of around EUR 4.6 billion of support from the ERDF and Cohesion Fund for the 2007-2013 period was allocated to renewable energy as at the end of 2009, which represents just under 2% of the total amount of EU funding from these two sources going to Member States over this period (Table 3, which shows the funding allocated and committed to renewable energy as indicated by the system for classifying expenditure – specifically to codes 39 to 42, which relate to wind, solar, biomass and hydro and other renewable sources, respectively). The proportion of funding allocated to this policy area, however, varies markedly between countries, from 7% in Luxembourg and just under 6% in Sweden to nothing at all in Ireland and Denmark (though see below). Only in 5 countries was the proportion more than 3% (Italy, France and Austria as well as Luxembourg and Sweden) and

in 7 countries, it was less than 1% (Spain, Portugal, Slovakia, Lithuania and Estonia in addition to Denmark and Ireland).

In general, a larger proportion of funding was allocated to renewable energy in the EU15 countries, excluding the three Cohesion countries, than in the EU12, so that there is broadly an inverse relationship between the overall scale of EU funding relative to GDP and the share of this funding going to support the development of renewables (though Denmark and Ireland represent exceptions).

Table 3 Allocation of EDRF and Cohesion Fund support to renewable energy for the 2007-2013 period and division of allocation and commitments by type as at end-2009

	Allocation to renewables		% Total allocation:				% Total commitments:				% alloc. committed
	Total EUR mn	% Total funding	Wind	Solar	Bio-mass	Hydro+ other	Wind	Solar	Bio-mass	Hydro+ other	
BE	11.9	1.2	100				76	24			47
DK	0.0	0.0									
DE	226.1	1.4	11	21	36	32	12	36	39	13	26
IE	0.0	0.0									
FR	359.6	4.5	10	32	41	17	6	46	45	2	25
IT	1,039.2	4.9	7	32	37	37	45		37	18	4
LU	1.8	7.0	14	29	29	29	100				106
NL	19.2	2.3	24	17	34	25	13	17	18	53	42
AT	24.2	3.6	0	27	71	1	3		95	2	29
FI	20.7	2.1	4	4	64	28	7	2	74	17	20
SE	52.3	5.6	24	21	34	22	53		47		2
UK	160.2	3.0	24	17	26	33	31	3	50	16	17
EL	292.8	1.8	28	12	9	51					
ES	179.8	0.7	2	62	32	4	2	49	42	7	1
PT	104.7	0.7	32	19	23	26	100				0*
BG	69.2	1.3	40	54		6	100				2
CZ	554.7	2.5	5	14	62	19	6		20	74	11
EE	10.2	0.3	67		33						
CY	6.0	1.2	100				100				109
LV	67.2	1.7	15		37	48					
LT	36.8	0.6	100				100				97
HU	202.9	1.0	12	14	56	18	2	5	88	5	15
MT	18.4	2.5	45	45	9		1	99			55
PL	780.1	1.4	29	8	44	19	17		8	75	0*
RO	191.5	1.2	30	10	25	35	55	3	18	25	29
SI	54.2	1.6	50		39	11	100				9
SK	90.3	0.9	27		27	46	53		25	22	55
EU	4,573.8	1.8	17	22	38	23	6	30	32	32	11

\* In Portugal and Poland, commitments represented only 0.2% and 0.1% of allocations, respectively

Source: DG Regio



The relatively small amount of EU funding allocated to renewable energy across countries reflects in some degree the emphasis of national support, at least for the generation of electricity, as indicated above, on feed-in tariffs, or premiums, and green certificates along with tax concessions rather than direct grants or loans. It also reflects the emphasis of Cohesion policy in the present programming period on innovation and pursuit of the Lisbon agenda, which under the Competitiveness and Employment Objective, in particular, accounts for the major share of funding.

Indeed, the above figures significantly understate the support given to the development of renewable energy in a number of countries since such support is in part categorised under R&D, pilot projects and the use and spread of technology among SMEs. This is the case in Denmark, for example, where ERDF support for renewables is classified to RTD, innovation and entrepreneurship rather than to the development of renewables as such. More fundamentally, it also reflects the limited extent to which the development of renewable energy for the generation of electricity is likely to be a central part of overall regional development strategies, except in a few cases.

Although the amount of EU funding allocated to support of renewable energy might be understated in the statistics, it is small in relation to both the overall funding available from the ERDF and Cohesion Fund and, in most countries, to the funding from national sources even if allowance is made for this understatement. This is especially so if the (largely implicit) funding provided by feed-in tariffs, premiums and green certificates, which is largely paid for by energy consumers, is taken into account along with the value of tax concessions, which in many cases are worth more to renewable energy producers than direct grants or subsidised loans.

In Lithuania, for example, where EU funding is a major source of expenditure on regional development, the amount allocated to support of renewables in the present programming period is around EUR 37 million, or some EUR 5 million a year, which compares with national expenditure in this area of EUR 47.2 million in 2009 alone. This suggests that EU funding represents around 12% of total support for renewables in the country, while in Hungary, the proportion is estimated at around 8%. In most EU15 countries, where overall EU funding is much smaller, the proportion concerned is considerably less if the support provided through feed-in tariffs, quotas and tax concessions is taken into account – around 1% in Germany and much less than 1% in the Netherlands, for example.

By far the largest part of funding from national sources, however, goes to subsidising the generation of electricity from renewables, whereas, as indicated below, EU funding is used in most countries to support the development of renewables in other ways.

#### Division of support between types of renewable

Overall EU funding in support of renewables is allocated to a large extent to biomass, which in many countries is the largest source of renewable energy and one of the fastest growing. Biomass, therefore, accounts on average for some 38% of total EU funding allocated to renewables, much more than any other source. Some 17% is allocated to wind power (onshore and offshore, though largely the latter in many countries, reflecting the relatively high cost involved), and 22-23% to both solar energy in one form or another and hydro plus other sources. This relative distribution seems surprising given the basic nature of most biomass plants and the relatively low cost involved. Much of the funding, however, as indicated below, goes to supporting the development of new systems or

the use of renewables for district heating or providing energy to individual buildings rather than to supporting the production of electricity from renewables for general distribution as such.

The division of funding between the different types varies significantly across countries, as, indeed, does the support provided from national sources. In some countries, EU funding is concentrated on much the same sources as national funding, which is the case in Austria and Lithuania, where it is simply added to the latter and is allocated in the same way (though in Austria, the amount of funding involved is very small). In these two countries, this means a concentration of EU funding on biomass, though not necessarily for the generation of electricity. In other countries, EU funding is directed to other types of renewable, to other technologies or to other types of measure than national funding.

In Belgium and Cyprus, EU funding allocated to renewables is entirely concentrated on supporting the development of solar energy and in Spain, Bulgaria and Slovenia, this accounts for half or more of the funding. In Malta, it accounts for just under half, the funding concerned being concentrated on PV, while national measures are focused on supporting solar thermal energy.

A similar share of EU funding in Malta is allocated to wind power, which in Estonia, accounts for two-thirds of EU funding going to renewables. In the other two Baltic States, by contrast, little or nothing goes to wind power.

In Greece, Latvia and Slovakia, around of half of EU funding for renewables is allocated to hydro-electric and geothermal systems, while in Germany, Romania and the UK, around a third goes to these two types of technology and in Italy, just under 40%.

### Commitments of funding

On average, only 11% of the total amount allocated to renewables had been committed to projects by the end of 2009, though the figure varies from over 100% in Luxembourg and Cyprus to zero in Greece, Estonia and Latvia and close to zero in Portugal and Poland (Table 3 above). In Portugal, this is a result of the types of project eligible for support – largely involving innovation and R&D in enterprises – being put on hold or abandoned because of the recession. In Estonia, the delays in implementation of projects are due not only to a lack of administrative capacity and problems experienced over co-funding but also to potential changes being considered in the system for supporting renewables. This has created uncertainty for investors and led to them postponing the commitment of funds. Similarly, in Greece, the delay is partly a result of changes in legislation regarding renewables.

In general, while there have been delays in spending the funding allocated to the support of renewables in many other countries too, these have tended to be broadly in line with overall delays in programme implementation. This is the case, for example, in Italy, Slovenia, where delays are reported to be because of organisational problems, and Bulgaria, where serious delays in initiating projects are attributed to administrative obstacles and inappropriate project management.

Differential delays in implementing planned measures as between different sources of renewable energy in many cases explain in large part why the division of commitments of funding between the sources up to the end of 2009 (the latest data available at the time the national reports were prepared) diverges from the division of allocation. In some cases, however, where a significant proportion of funding had been committed by the end of 2009, they reflect a shift in policy in the pattern of renewable production which is aimed for.

This is the case in Luxembourg, where the EU funding committed was concentrated on support of biomass instead of being spread across several types of renewable, as a result of a decision made to provide ERDF support only to non-profit and public organisations, which ruled out support for wind and solar energy projects. It is also the case in Belgium, where a quarter of commitments was on biomass – this being allocated to the construction of a biomass gasification plant in the Hainaut region – whereas all of the funding was planned to go on supporting solar energy. In Austria and the UK, very little funding had been committed to solar energy projects by the end of 2009 as compared with other energy sources, biomass in particular.

In Malta, virtually all of the commitments of funding on renewables had gone to solar energy projects and hardly any to wind power which was planned to receive the same amount of funding, reflecting a lack of take-up of the support on offer in the latter case. Indeed, across the EU as a whole, only 6% of the funding for renewables committed by end-2009 went to wind power as compared with some 17% of the planned allocation. This might reflect problems of carrying out projects of this type or perhaps a revision of plans and a shift towards other types of renewable.

### The projects supported by EU funding

As indicated above, the amount of the ERDF and Cohesion Fund allocated to support of renewables is small in the present programming period, especially in relation to the support given by national Governments in respect of the use of renewables for generating electricity. EU funding, however, represents a substantial proportion of the direct grants supporting renewables in a number of countries, in the EU 12 especially. Much of this direct support is on the use of renewables for generating heating, either alone or in combination with electricity for local consumption.

Despite its relatively small size, the support provided is significant in a number of countries where it is used to complement national funding in that it goes largely to purposes other than supporting electricity generation from renewables for general distribution, which is the focus of national policy. It is, therefore, used, in addition to producing heating, to support R&D in respect of renewables, the testing of new technologies and helping to develop an industry around renewables in the sense of producing the machinery and equipment required (see Box for a summary of the kinds of projects supported by EU funding). Nevertheless, in a number of countries, as indicated below, it is used to supplement national support for renewables in electricity production, raising questions about the added-value it generates in these cases, especially as regards its contribution to strengthening regional development.

#### Categories of renewable project receiving ERDF support

The ERDF is used to support a range of projects across the EU. The different kinds are indicated below together with examples of the countries providing support for the projects concerned. The countries listed in each case are those in which the kind of project in question was mentioned in the national report. The countries not listed may well support similar projects.

Research and Technological Development	Germany, Denmark, Austria
Pilot projects and innovation	Netherlands, Portugal, Luxemburg
Cluster development	Finland, Austria, Germany, France, Poland
Use of renewables by SMEs	Austria, Germany, Italy, Poland, Slovakia
Heating, cooling and cogeneration	Spain, Italy, Belgium, Malta, Estonia, Latvia, Lithuania, Hungary, Slovenia, Cyprus

Awareness raising	Belgium, Cyprus
Electricity generation	Belgium, Luxembourg, Finland, Sweden, Italy, Poland, Romania, Slovakia

### Projects in the EU15 countries

As noted above, much of the ERDF support going to renewables across the EU is not classified to renewables as such (i.e. to codes 39-42 of the classification system, as set out in Table 3 above). This is especially so in Denmark, as already noted, where 31 projects co-financed by the ERDF supporting the development of renewable energy had been initiated by the end of 2009. These range from assistance to SMEs to develop new technologies for renewables to large-scale support for clusters specialising in the production of the equipment needed to produce renewable energy. In Austria, too, the ERDF supports a similar range of measures with the same end-objective as part of policies for strengthening regional innovation and competitiveness. Equally in Finland, the ERDF is used to co-finance the development of the Bio-energy Cluster in the Central region, aimed at increasing the exports of the enterprises concerned. In Germany, it is concentrated on the development of new technologies and, accordingly, complements national funding which is focused on supporting the production of electricity from renewables.

Similarly, in both the Netherlands and Portugal, ERDF financing is centred on supporting innovative and pilot projects. In the former, a large part of funding went to support a pilot bio-processing plant, while in the latter such support is complemented by assistance to clusters which bring together businesses and research centres specialising in renewable energy technologies. Equally, in Spain, the ERDF is used to finance projects which are not directly intended to produce electricity for the national grid, which are supported through feed-in tariffs or premiums, but instead goes on smaller local systems, such as solar panels on buildings or biomass burners for heating and hot water supply.

In Belgium, the ERDF is used to support renewables only in the Walloon region, where it mainly goes to equipping municipal offices and other public buildings with solar panels and lighting, partly as a means of raising public awareness of the technology and to encourage its wider adoption.

### Projects supported in the EU12

In much the same way as in Belgium, EU funding in Cyprus is also concentrated on PV systems and on their installation in particular in public buildings with the same aim of raising awareness of the potential of solar panels. In other EU12 countries too, EU funding is used to co-finance measures other than those aimed directly at supporting the production of electricity from renewables as such. In Poland, it goes partly to assisting the development of companies manufacturing equipment used for the generation of power and heating from renewables, in Slovakia, to expanding the use of renewables in enterprises.

In Malta, as noted above, it is used to encourage the installation of PV panels on buildings and in Estonia, the conversion of heating systems to using renewables. In Hungary, the ERDF goes to supporting the use of renewables in local heating and cooling systems in enterprises, local authorities, schools and hospitals, which is also the case in Lithuania and Latvia. Indeed, in Latvia, funding for heating systems was continued when support for renewables more generally was cut back. In Slovenia, around EUR 40 million from the Cohesion Fund is allocated to co-financing investment in systems for the cogeneration of heating and electricity from renewables.

### ERDF support for electricity generation from renewables

Nevertheless, the ERDF is also used alongside national measures to support the production of electricity from renewables in a number of countries. In most cases, however, but not all, the plants concerned are small-scale or pilot projects or they involve the co-generation of electricity and heating in local areas. In the Hainaut region in Belgium, which receives funding under the Convergence Objective, the ERDF is being used to support the construction of a biomass-gasification plant. In Finland, it has been allocated to the construction of large plants fuelled by bio sources of energy as well as supporting the supply of biomass and extending the use of wind and hydro-power in the north of the country. In Luxembourg, the ERDF is co-financing two projects for producing electricity from biomass. One of these is a pilot project involving the production of biogas from bio-waste and vegetal matter to provide electricity to a significant proportion of the population, The other involves the use of hydro-power. In Italy, as indicated below, the ERDF is being used in the Marche region to supplement national support for the various types of renewable and is allocated between them in much the same way.

In Poland, the ERDF provides support for the construction of wind farms and hydro-power plants with a capacity up to 10 MW as well as biomass and biogas plants. In Slovakia, the ERDF is co-financing the construction and upgrading of plants producing energy from renewables, especially from biomass. By the end of 2010, it had supported a number of small scale projects which together added almost 30 MW to installed capacity. Projects already contracted will add a further 66 MW by the end of 2012. In Hungary, the ERDF is the main source of direct grants for financing investment in energy production, though since 2010, these have been focused on the co-generation of electricity and heating from renewables. This is also the case in Estonia.

### Regional differences in EU funding for renewables

The scale of support for renewables from the ERDF and Cohesion Fund and its allocation between different energy sources and technologies varies across regions in a number of countries. This reflects the differing emphasis put on this by regional authorities as well as the geophysical features and climates of the regions concerned.

In Denmark, each of the five regions has formulated its own policy for the development of renewable energy and of associated technologies as an integral part of its overall development strategy. ERDF support, though small, makes a significant contribution to financing this.

In Germany, the scale of ERDF support allocated to renewables and its division between the different sources varies between regions according to local conditions and the potential for economic development which they offer. In Bremen, for example, support is concentrated on off-shore wind power and helping to develop a cluster of specialisation around this, while in the southern regions, the emphasis tends to be on geothermal energy. In many regions, however, where conditions do not favour any particular type of renewable, support is spread more evenly and tends to be smaller in scale.

In France, the amount of EU funding going to renewables and its allocation between technologies also varies markedly across regions reflecting the potential for development of the different sources. The scale of allocation, therefore, varies from 24% of the total ERDF available in Poitou-Charentes, half of it going to supporting the development of biomass and most of the rest to solar energy, to under 3% in Limousin and only just over 1% in Guadeloupe.

Similarly in Sweden, most of the ERDF allocated to renewables in the country - 75% in total – is concentrated in two regions, Mid Norrland and Upper Norrland. In the first, 80% of this funding goes to support the development of biomass as an energy source, reflecting the region's efforts to take advantage of its large forests, while in Upper Norrland, 70% of funding goes to hydro-electricity projects. By contrast, three Swedish regions - Stockholm, West Sweden and East Mid Sweden – do not allocate any of the ERDF they receive to the development of renewables.

In the UK, the ERDF has been used alongside funding from national sources to support renewable energy. Each (NUTS 1) region decides the scale and allocation of support according to their comparative advantage in developing the sources concerned and in relation to their overall development strategy. How far ERDF support adds to that from national sources, however, is difficult to determine because of a lack of information.

In Italy, ERDF support and that from national sources overlap to some extent, as both tend to be allocated to the same types of renewable and, in some cases, to the same types of project. In Marche, for example, where renewable sources account for only a small proportion of total regional consumption of energy, a decision was taken to increase EU funding going to all the main types by a similar amount regardless of the extent of national support provided. In a number of other regions (such as Veneto, Piemonte and Lombardia), however, the EU funding allocated was adapted to the support from national sources to avoid cumulating incentives for the same type of renewable. At the same time, the amounts involved are relatively small.

#### Changes in EU funding allocated to renewables

In most countries, there has been little or no change in the allocation of EU funding to renewables over the programming period. The main exceptions are Latvia and Estonia. In the former, as noted above, the recession led to a review of EU funded activities with the aim of shifting resources towards those with a more direct effect on economic activity and employment. In 2009, measures aimed directly at supporting the production of renewable energy were cancelled. In Estonia, EU funding allocated to renewables, as well as to energy efficiency, has been cut back substantially. This was because of a need to provide additional support to enterprises and because measures to support the development of renewable energy had been slow to start up. Financing for renewables was, therefore, switched to national sources, with sales of CO<sub>2</sub> quotas providing much of the revenue.

In Lithuania, by contrast, an additional EUR 32.7 million has been transferred from other measures to support renewable sources of energy, especially for heating and cogeneration schemes, because of a need to expand their use as well as a desire to assist the construction industry. Most of the additional funds allocated, however, have yet to reach projects.

In Italy, a number of regions have changed the form of support for renewables with the aim of making it more effective. In Campania, for example, a change was made in order to include regional agencies among the beneficiaries, so reducing the energy costs for municipalities and public institutions. In Veneto and Lombardia, changes were prompted by the introduction of national legislation preventing incentives for renewables being cumulated.

### 3.2 Energy efficiency of housing

In the initial regulations the energy efficiency of housing was explicitly excluded from the areas in which the ERDF could be used, except in EU12 countries. Even in the latter, funding needed to form

part of a wider urban development plan targeted at distressed area and to be concentrated on apartment blocks (multi-family housing), buildings owned by public authorities or non-profit organisations (i.e. social housing). Moreover, an upper limit was imposed on the proportion of funding which could be used for this purpose – 2% in respect of support to housing and 4% in respect of energy efficiency in general, implying a maximum of 6% of the total funding available. However, as part of the European Economic Recovery plan, the regulations were relaxed and energy efficiency of housing was made eligible for support from June 2009 in all parts of the EU. The maximum amount of funding was kept at 4% of the total ERDF allocation, with no increase in the overall amount of the latter. The express intention was to further social cohesion, as well as boosting economic activity, and it was left to each Member State to decide on the type of housing to be covered – or, indeed, whether to extend support to this area at all.

In practice, as indicated below, many Member States have decided not to divert ERDF support to this use, at least up to now. Those that have taken up the option have tended to concentrate support on social housing, though the comparatively brief time which has elapsed since the change was made means that relatively few projects have so far got underway. Even in the EU12 countries, as also indicated below, only a very small proportion of EU funding, in practice, has been allocated to this area.

The initial exclusion of the energy efficiency of housing from the scope of ERDF support in many countries means that it was not separately identified in the classification system used for the allocation of funding. Instead, it was included as part of the category ‘Energy efficiency, co-generation and energy management’ or as part of ‘Housing infrastructure’.. Accordingly, it is difficult to identify the amount of Cohesion policy funding going to housing. All that is possible in many countries is to identify the total amount going to the two categories in which expenditure is potentially included, which accordingly gives the maximum support going to this area<sup>12</sup>. In practice, it is likely to be significantly less than this.

Overall, some EUR 5.3 billion of the ERDF and Cohesion Fund for the present programming period was allocated to the two categories of intervention across the EU as a whole as at the end of 2009, equivalent to 2% of the total financing available from these two sources (Table 4). The proportion concerned again varies significantly between Member States, ranging from 10% in Lithuania<sup>13</sup> and just under 7% in Ireland to zero in Denmark and Cyprus and less than 0.5% in Greece and Spain. In only 7 countries was the proportion greater than 3% and in five, it was 1% or less. The proportion includes support for Housing infrastructure in all the EU12 countries, apart from Cyprus, the Czech Republic and Slovenia, though in only two of the EU15 countries (Italy and Portugal), where the amount involved is relatively small.

Table 4 Allocation of ERDF and Cohesion Fund to Energy efficiency, co-generation and energy management plus Housing infrastructure, 2007-2013, and amount committed at end-2009

	Allocation		% allocation committed	% allocation on housing infrastructure
	Total EUR (mn)	% Total funding		
BE	19.0	1.9	27.7	
DK				

<sup>12</sup> Only ‘tends’ because it is possible that some funding is included in other categories, such as support for solar energy.

<sup>13</sup> Within this, as indicated below, just over 5% is allocated to energy efficiency in housing, so under the limit imposed by the regulations.

DE	252.1	1.6	27.0	
IE	25.0	6.7	30.3	
FR	224.8	2.8	13.7	
IT	915.4	4.4	5.3	12.1
LU	0.5	2.0	111.2	
NL	34.3	4.1	26.1	
AT	6.0	0.9	167.2	
FI	24.2	2.5	10.7	
SE	9.2	1.0	1.2	
UK	150.7	2.8	3.4	
EL	71.2	0.4	0.0	
ES	119.5	0.4	1.6	
PT	152.8	1.0	2.3	4.0
BG	212.0	3.9	30.2	15.2
CZ	759.2	3.4	17.3	
EE	71.3	2.4	38.7	11.1
CY				
LV	90.2	2.3	21.8	33.2
LT	576.5	10.0	51.8	35.7
HU	279.9	1.3	5.1	44.2
MT	16.4	2.3	66.2	5.2
PL	658.9	1.2	1.6	36.9
RO	365.0	2.4	0.0	30.6
SI	105.7	3.2	0.0	
SK	154.6	1.6	19.4	49.2
EU	5,294.4	2.0	15.1	17.9

Source: DG Regio

Only some 15% of the total funding allocated to the two categories concerned had been committed to projects by the end of 2009 across the EU as a whole, though this is still more than in respect of support for renewable energy, the proportion ranging from over 100% in Austria and Luxembourg to zero in Greece (as in the case of renewable energy), Romania and Slovenia, where it is above average.

The above figures, however, cover all energy efficiency measures and, as indicated, in a number of countries, little or no EU funding is allocated to housing as such. In Germany, Austria and Slovenia, along with Denmark and Cyprus (where no funding at all is allocated to energy efficiency measures, at least as classified), housing remains explicitly excluded from ERDF support, though some support goes to energy efficiency measures in public buildings and somewhat more to those in SMEs. In Ireland, ERDF support is confined to energy saving schemes in social housing, while in Finland, most of the support goes to SMEs and very little to housing. Similarly, in Portugal, only a marginal share of the ERDF allocated to energy efficiency is intended for housing and most is earmarked for SMEs. In all of these countries, energy efficiency in housing is funded from national rather than EU sources, so that ERDF support can accordingly be regarded as being complementary to national support measures.



In a number of other countries, ERDF support for energy efficiency in housing is confined to some regions. In Belgium, it is limited to the Flemish region, where it is restricted to social housing, as it is in Ireland. In Sweden, it is significant only in Upper Norrland and Mid Norrland, which together account for almost 80% of the total ERDF going to this area in the country and in four regions (Stockholm, West Sweden, East Mid Sweden and Smaland and Islands), no EU funding at all is allocated. In France, the latter is also the case in some regions, such as Bourgogne, while in Ile de France, EU funding is confined to social housing and in Picardie, it is concentrated on financial engineering measures, low interest loans in particular.

Despite the pressing need for improvements in the energy efficiency of housing in the EU12 countries and the limited amount of support from national sources, the EU funding allocated to this is small in many cases and well below the maximum limit set in the regulations. In Poland, less than 1% of the total funding received goes on this. In Estonia, following the reduction in the overall ERDF support allocated to energy-related measures, funding going to energy efficiency measures in housing was reduced to only just over 1% of the total received as opposed to over 4% which was initially planned.

In Slovakia, little or no EU funding has up to now been allocated to energy efficiency in housing, support being concentrated on SMEs and public buildings. However, a pilot programme for Bratislava was approved in June this year to provide low-interest loans for investment in housing infrastructure through the newly-established Urban Development Fund (UDF), financed by a JESSICA initiative, with a budget for improving energy efficiency of EUR 11.5 million.

In Bulgaria, support for energy efficiency has been concentrated up to now on public buildings, but it is planned to launch measures for renovating housing and for improving energy efficiency through insulation, more effective heating systems and the use of renewables.

In Hungary, although no support is given directly for housing improvement, funding is allocated to the modernisation of district heating systems which serves to reduce the energy costs of households. In Romania, the amount of EU funding allocated to increasing the energy efficiency of housing is modest and confined to social housing and apartment blocks, but support has also been given to improving centralised urban heating systems which has a significant effect on households.

In contrast to the cutback in the allocation of EU funding to energy efficiency measures in Estonia, the reverse has occurred in Latvia. As indicated above, support has been increased substantially for improving the insulation of apartment blocks and social housing and for centralised heating systems as well as for co-generation power plants using renewables. The aim is to increase employment as well as reducing energy costs for households.

The proportion of EU funding allocated to energy efficiency in housing in Lithuania, however, dwarfs that in other countries. Two programmes together absorb over 5% of the total ERDF going to Lithuania (i.e. close to the maximum under the regulations). One provides 'soft' loans from a JESSICA holding fund for the modernisation of 'multi-apartment buildings'. The other provides grants to lagging regions (defined at the NUTS 4 level – i.e. municipalities) for the same purpose. Both are focused on increasing energy efficiency in particular. The first programme, which was launched in 2009, was intended to counter the effects of the recession both by reducing heating costs for home owners and by stimulating the construction industry. How far it has succeeded in doing so, however, is questionable. While all the funding has been transferred to the JESSICA Holding Fund,

and therefore has been certified by the European Commission, only three projects have so far started compared to the 2,000 projects a year which were planned. Delays have been caused by the recession itself, which has made people reluctant to take on new loans, especially because there was a feeling that the terms of the loans were likely to be made more attractive in the future. But there have also been administrative problems due to the novelty of the financial engineering measure.

Elsewhere, in Greece, where programmes have been slow to be implemented, two measures were launched in the first part of 2011 to improve energy efficiency with a particular focus on housing. The first, the 'Saving in Households' programme, has an overall budget of EUR 396 million, the second, which includes support for energy inspection as well as for investment in energy saving, one of EUR 155 million. The two have a total far in excess of the overall amount allocated to energy efficiency measures as at the end of 2009 and signal a marked shift in priorities<sup>14</sup>.

#### 4 The rationale for Cohesion policy intervention in energy

As indicated at the outset, public intervention in the market for energy to support the development of renewables can be justified on a number of grounds – in particular, that the price of fossil fuels fails to reflect the true cost to society both of the environmental damage their emissions cause and their contribution to global warming and of the depletion of exhaustible resources. The dependence on imports and the vulnerability to outside influence that this gives rise to is a further justification. Intervention to support improvements in energy efficiency in housing can be justified on similar grounds, that it serves to reduce the consumption of fossil fuels and their rate of depletion both by reducing the overall use of energy and by bringing about a shift from fossil fuels to renewables for heating, lighting and cooling purposes.

However, the fact that public intervention in these two areas might be justified still leaves a number of questions open. These include in particular:

- How much intervention should there be in terms of the scale of support, or subsidy, given?
- What form should intervention take and, more specifically, who should bear the costs of the support provided in the two areas concerned?
- And most relevantly in the present context, what should be the role of Cohesion policy, and the EU resources provided for this, in these two areas?

The official documents relating to the implementation of Cohesion policy and the use of EU funding for this purpose published in Member States, and indeed by the EU, give at most a general justification for intervention in these two areas but stop short of providing specific answers to these three questions. The failure to do so in respect of the first two questions, together with the lack of information available on the extent of national support provided and the inherent difficulties of identifying this, given the nature of the measures used, makes it hard to assess what the contribution of Cohesion policy funding should be and on which specific aspects it should be targeted. It makes it equally difficult to assess both the likely effect of the additional funding it represents on the supply of renewable energy and energy saving, especially in quantitative terms, and to verify ex post that this effect has been achieved. This is especially so where EU funding goes to supporting the use of renewables to generate electricity where in all cases it adds only marginally

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<sup>14</sup> The allocation to the two programmes together amounts to around 3.5% of the total ERDF available, just below the maximum figure of 4% allowed under the regulations.

to the – mostly implicit – funding provided by national measures through feed-in tariffs and other price support schemes. More generally, the allocation of funding for this purpose raises a question about its contribution to regional development, since the regions in which renewable sources are located may gain little from their exploitation unless they are able to develop an industry around them.

These issues are considered further below.

#### 4.1 The justification for intervention according to official documents

The arguments presented in official documents for using the ERDF and Cohesion Fund to support renewable energies and measures to increase energy efficiency in housing and other buildings tend to be very general in nature, referring variously to a concern to protect the environment, to reduce dependence on imports and to further regional development. The arguments do not feature prominently in programming documents in particular, though these are typically not conceived as places to set out the detailed rationale for public intervention. The underlying justification for the use of Cohesion funding for these purposes seems to be the existence of an EU-wide policy for expanding the share of energy demand met by renewables and reducing overall energy use in relation to GDP and the specific targets which Member States have committed themselves to achieving. This is explicitly stated in a number of countries (such as Denmark, Finland, Sweden, the Czech Republic, Latvia and Portugal) but seems implicit elsewhere.

##### Renewable energy

The main grounds for public intervention to support renewable energy sources reported in the country studies relate to the environmental benefits from reducing the use of fossil fuels, especially from cutting greenhouse gas emissions, and to the increased security of energy supplies which will result. In some countries, though many fewer, mention is also made of the effect of such support on strengthening the competitiveness of regional economies through helping to develop their expertise in renewable energy technologies and stimulating innovation, while the gains to employment are cited in only three countries (See Box).

The gains, therefore – and accordingly the case for intervention – tend to be viewed more from a national or international perspective than a regional one. This is not too surprising since energy policy, as is evident from the earlier part of this report, is mainly national in scope. Central governments, therefore, tend to determine the overall strategy for meeting the demand for energy – especially the demand for electricity where generation wherever it occurs needs for the most part to be integrated into a national, or even international grid – even if some measures might be implemented at regional level. Indeed, there has been growing pressure at EU-level for policy to become pan-European in scope and not just national, especially in respect of the development of renewable energy. This is to ensure ‘resources are developed where it makes most economic and environmental sense’<sup>15</sup>, with trade in energy taking place between Member States and the necessary infrastructure being put in place to facilitate this.

Accordingly, leaving aside measures which are local in scope, such as the installation of district heating systems or of solar panels on individual buildings, although some regions might gain from developing renewable energy sources, this is by no means the case for all or even most regions –

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<sup>15</sup> ‘Renewable Energy: Progressing towards the 2020 target’, Communication from the Commission to the European Parliament and the Council, SEC(2011) 131 final. Jan 2011.

Regions which are favourably placed to exploit their natural resources in this way do not, therefore, necessarily have the capacity to use it as a basis for their economic development or even to ensure that it represents a major advantage for them.

Much depends in this regard on the type of renewable concerned and the extent to which it adds to economic activity beyond the plant construction stage. Wind farms, hydro-electricity schemes or solar energy systems require only a limited work force to operate and maintain them and, therefore, might contribute relatively little to the regional economy once they have been constructed. (The example of Groningen in the Netherlands, which is home to the largest natural gas field in Europe, but which benefits hardly at all from the income it generates, virtually all of which goes outside the region, illustrates this<sup>16</sup>).

<p>Rationale for public intervention in renewable energies</p> <p>The various justifications stated in official documents for supporting the development of renewable energy supplies can be grouped as follows:</p> <p>Environmental benefits</p> <p>The achievement of environmental benefits was mentioned by most Member States, citing one or more of the following gains:</p> <ul style="list-style-type: none"><li>• Reducing energy consumption from fossil fuels</li><li>• Diminishing greenhouse gas emissions</li><li>• Helping to meet international goals, such as those agreed under the Kyoto protocol</li></ul> <p>Energy security</p> <p>The aim of increasing energy security and/or reducing dependence on imports is mentioned by 12 Member States.</p> <p>Economic competitiveness and regional development</p> <p>The effect of support in achieving economic gains and in assisting regional development is mentioned by 10 Member States in different ways, while another refers to the jobs created in the sector:</p> <ul style="list-style-type: none"><li>• Strengthening economic competitiveness through the development of expertise in renewable energy technologies, especially in regions where renewable sources are located (mentioned in Germany, Austria, Belgium, Denmark, Greece, Portugal and Lithuania)</li><li>• Creating opportunities for local and regional development (Germany and Ireland)</li><li>• Stimulating innovation through R&amp;D in renewable technologies (Germany, Austria, Denmark, the Netherlands, Greece and Portugal)</li><li>• Increasing employment through the jobs created in the renewable energy sector (Belgium, Ireland and Poland)</li><li>• Stimulating economic growth (Ireland and Malta)</li><li>• Increasing the attractiveness of regions as places in which to invest (Belgium)</li></ul>
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Even during the construction phase, much of the machinery and equipment required, including the switchgear and so on needed to distribute the power produced to the national grid, is likely to come from outside the region, unless it becomes a centre for renewable energy technology and specialises

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<sup>16</sup> Groningen, paradoxically, has the highest GDP per head in the Netherlands, , boosted by natural gas and North Sea oil, and the lowest income per head.

in manufacturing the equipment required by the plants concerned. This is explicitly recognised in Germany and Denmark, in particular, where, as indicated above, policy efforts, with the help of the ERDF, have been devoted to developing the industry supplying the various pieces of equipment required as well as supporting the production of renewable energy as such. Relatively few regions, however, are likely to possess the potential for developing a supply industry of this kind which is capable of competing on world markets and those that do tend not to be the places where renewable resources are located.

The case for using Cohesion policy funding to support renewables, therefore, seems to rest to a large extent on the general gains to regions as a whole from reducing reliance on fossil fuels and from a more rational and environmentally sustainable use of energy.. Except in a few cases, lagging or problem regions are unlikely to be in a position to exploit renewables as a key element in their development strategy. Nevertheless, it is important, in terms of their attractiveness as places to live and invest, that they do not fall behind in the growing use of renewables for heating, lighting and cooling purposes. This, moreover, can boost economic activity and employment in the local economy, especially in construction.

### Energy efficiency of housing

Very little is said in official documents about the rationale for public intervention to support investment in energy efficiency of housing. Few Member States explicitly include any justification at all for public support in this regard in the background documents to Cohesion policy programmes. Those that do are:

- Bulgaria, the Czech Republic, Lithuania, Malta and Italy, which refer to the improvement in living conditions and the gain to social cohesion that it is likely to lead to, as well as the reduction in CO<sub>2</sub> emissions and/or the more rational use of energy sources that will result;
- France, Cyprus and Malta, which refer to reduced levels of CO<sub>2</sub> and more rational use of energy as well but also, along with Italy, to the reduction in dependence on imports of fuel;
- Estonia, which cites the aim of raising awareness of the gains to be made from improving energy efficiency.

In practice, however, there are strong grounds for public intervention in this area – as implicitly recognised in the change to ERDF regulation in 2009 and as reflected in the expansion of investment in energy efficiency in many countries as a means of countering the recession.

### The case for intervention in the energy efficiency of housing

Investment in improving the energy efficiency of housing should, in principle, if the market is operating efficiently, be justified by the prospective returns in the form of lower energy bills and adding value to the property in any future sale. If these returns are less than the costs involved in making the modifications, whether in new houses being built or existing ones being renovated or re-equipped, or if there are obstacles to the returns being realised, then the market is not functioning efficiently. If any of these circumstances occur, then the market is failing to reflect the gains to society from reducing energy consumption or from shifting to more sustainable energy sources.

Public invention can be justified – even if the arguments are not explicitly included in official policy documents – where the market is not functioning in this way or where house-owners and builders are not sufficiently aware of the returns to the modifications concerned to make informed decisions. Justification for intervention as such, however, does not necessarily translate into justification for

government funding of the investment concerned. Indeed, it means to a large extent a need for establishing the framework conditions for the market to function effectively rather than for spending public money.

This applies in particular to two further reasons why the market may not function properly as regards energy efficiency. The first arises from the institutional arrangements in place which mean that house-owners do not necessarily receive the benefit of any gain in energy efficiency from an investment, and, secondly, from the free-rider problem in multi-owner housing. In the first case, tenancy agreements may be framed in such a way that those renting the property are responsible for meeting energy costs rather than owners, who accordingly have little incentive to incur the cost of the investment required to reduce energy bills. In principle, such a problem should be resolved by owners raising the rent to cover the cost concerned, leaving tenants with the same overall outgoings as before (a higher rent but lower energy bills). In practice, however, rent agreements and the regulations in force might prevent this from being possible.

In the second case, where action to improve energy efficiency involves making changes to an apartment building – such as installing a new central heating system or additional insulation – it may require all of the people owning apartments in the building (which may run into 100s) to agree to share the cost concerned. Any one owner refusing to do so might, accordingly, prevent the work required from being carried out. Indeed, they have an incentive to refuse if the work is likely to go ahead without them since they would then enjoy the benefit of lower energy bills without bearing any of the cost. In principle, this possibility can be prevented by appropriate regulations requiring apartment owners to share in the cost of any renovation if a minimum number of other owners agree to the work being carried out. Such regulations, however, might not be in place in practice or be effectively applied.

In reality, these circumstances, or the market not functioning as it should even where they do not exist, appear to be common across the EU. There is evidence from many of the EU12 countries, where there is a particular need to improve the energy efficiency of apartment blocks, built to low standards in the communist era, that the problem of obtaining unanimous consent for energy efficiency measures often exists. More generally, although the price of housing and rents may to some extent reflect the energy efficiency of buildings, there is little evidence that they provide sufficient incentive for owners or builders to invest in improvements. In particular, while it may be the case that prices and rents in some instances are higher if the costs of heating or cooling the house are lower, there is in most countries no evidence available (in the form of research studies or survey data) to indicate that they systematically capture the extent of energy efficiency.

There is, however, some evidence available in some countries, especially in those where the energy costs associated with housing are high – in many EU12 countries, especially – and piecemeal evidence in others to suggest that the link between energy efficiency and house prices is becoming closer. This is especially the case as energy certification schemes, which are an important means of improving the functioning of the market in this respect, become established.

In Estonia, the premium for energy efficiency is estimated in some areas to be around 5-10% of house prices. In the Czech Republic, the price differential between apartments in renovated and non-renovated buildings is estimated to be similar. In Lithuania, research suggests that the premium on prices can reach 18% and rents might be 20% higher if heating bills are low. In the Netherlands, where an energy performance certificate scheme was established in 2008, there is research

evidence that prices of houses with low energy use are around 3% higher than those with high use. In Portugal, it is estimated that certifying housing as having low energy consumption can increase its value by 10-15%.

In many countries, energy certification has either been introduced only recently or is in the process of being established. The experience in Denmark and Belgium is that it takes some time for such schemes to be generally applied in an effective way and to have a significant influence on both behaviour and prices. At the same time, the experience is also that the schemes concerned require an adequate level of funding to function properly, which is perhaps why they have so far not had much effect in some of the countries where they have been introduced.

A major problem in identifying the effect of energy efficiency is that it is only one of many factors influencing house prices and rents. In both Finland and the UK, other factors are considered to dominate, while in Ireland, Greece and Spain, as well as the Czech Republic, it is reported that the economic downturn and the turmoil in the housing market which has accompanied it have added to the difficulty of detecting the effect of energy efficiency on prices.

Nevertheless, it is considered in a number of countries where no direct quantitative evidence exists (e.g. Germany, Denmark, Cyprus, Belgium, Hungary and Bulgaria) that energy efficiency is tending to become increasingly important in relation to other factors. Only in a few countries (Spain, Malta and Slovenia) is it reported that house prices and rents do not include a premium for energy efficiency.

## 4.2 Public debates in Member States on intervention

There is a debate in a number of countries about the rationale for supporting the development of renewable energy sources. This mainly centres on the financial sustainability of incentives and on the possible lock-in effects of intervention (in Finland, Sweden, Austria, Portugal and the Czech Republic). In other countries, the debate centres on related issues such as the redistributive effects of energy policy (as in Germany), the rationale for maintaining targets while reducing financial support for achieving them (Estonia) or the effects of the closure of traditional power plants (Latvia). There is little public debate on the rationale for supporting improvements in energy efficiency in housing, or indeed, in any other area.

In Sweden, there is a debate about the long-term consequences of support for particular types of renewable energy, particularly wind power and biomass, and whether the Government's belief that these will ultimately be viable without public support is justified. The concern is that if this belief proves to be mistaken, then the country will be locked into costly technologies with adverse implications for either economic competitiveness or public finances or both. The counter-argument is that support should be neutral as regards types of technology, so leaving the market to determine the pattern of development of renewables.

A similar debate is taking place in Austria about the rationale for further support for biogas and biomass, with some arguing for a withdrawal of subsidies on the grounds that even in the long run these technologies (which are among the lowest cost options for generating electricity from renewables) are unlikely to be competitive and others arguing for an increase in subsidies.

In Slovenia, here is an intensive public debate about the rationale of supporting plants fuelled by biomass and the reduced production of food or animal feed that results.

In the Czech Republic, debate centres on the high level of support for PV, and the higher prices of electricity that this gives rise to, and the justification for this, with a large section of the public considering the level of support to be a prominent example of Government mismanagement and a result of intensive lobbying by interest groups.

In Italy too, public debate tends to focus on the large financial support for PV systems, which is interconnected with the debate on nuclear energy, with the Government planning, before Fukushima, to construct new nuclear plants and to reduce support for PV and solar thermal systems at the same time, a plan which has since been reversed as a result of a referendum.

In Belgium, there is no real public debate but it is increasingly emphasised by international bodies that the high-level of support for solar energy is not the most-cost effective way of reducing reliance on fossil fuels.

In Hungary, there is concern about the intensive nature of support which is concentrated on a few technologies, such as large scale biomass in particular, and whether this represents the most cost-effective allocation of public funds.

In Finland, while the general objectives of energy policy are widely accepted, there is debate about the scale of support, the costs involved and their distribution across society. The main concern is that the volume of support will constrain public finances for many years into the future.

In Estonia, there is the beginning of a debate on the increasing burden of subsidies to renewables and the rise in electricity prices that this is causing. While the Government plans to reduce tariffs, the issue is whether or not existing targets with regard to the development of renewables will still be achieved. A similar debate is taking place in Spain and Portugal.

In the Baltic States, there is a debate about how to reconcile increasing demand for electricity with the reduction in supply resulting from the closure of two sources of production, the Ignalina nuclear plant in Lithuania and the oil-shale extraction plants in Estonia. The regional consequences of these closures are also a matter of concern, given the depressed nature of the regions concerned.

In Luxembourg, debate is focused on the adverse effects of the extensive use of biofuels and the location of wind-power and biomass facilities. This debate is mirrored in Greece, where there is frequent hostility of local communities to the siting of wind farms.

Such public hostility needs to be taken into account when considering the role of renewable energy in regional development. In particular, it highlights the importance of demonstrating the economic gains to the regions concerned of the construction of these kinds of plant which can offset – or at least compensate for – the obvious damage to the landscape. These gains, however, may not be immediately evident if most of the machinery and equipment required comes from outside the region, if few long-term jobs are created in operating and maintaining the plants and there are few apparent spill-over effects on the regional economy.

## 5 Concluding remarks – what role for Cohesion policy?

As indicated above the amount of support provided by national Governments across the EU for renewable energy is substantial, even if difficult to estimate in practice, and far exceeds the resources allocated from the ERDF and Cohesion Fund to this. As also indicated, while there are ample grounds for renewable energy to be supported, the scale of this support and its distribution



between types of renewable still need to be justified. There is equally a need to clarify the role of Cohesion policy, since there is a serious question-mark over the added-value of the funding it provides if this is simply used to supplement the substantial support given by national measures. This is particularly the case if the size of national support, and, accordingly, the contribution of Cohesion policy funding to it, is unclear.

The scale of support for increasing energy efficiency in housing is also difficult to estimate, consisting as it does of preferential loans and tax concessions as well as direct grants, together with systems of regulation which involve administrative costs as well as imposing costs of compliance on house-owners. It is evident, however, that it is small as compared with the support going to renewables.

There also seems to be a clear role for Cohesion policy to provide support to investment to energy efficiency, so contributing to social cohesion and territorial balance through helping to even up housing and, therefore, living conditions across the Union. This is particularly the case in the EU12 countries where the need for improvements in the energy efficiency of housing is considerable, though also in some of the more depressed parts of the EU15.

## 5.1 Renewable energy

In principle, the support provided for the development of renewable sources of energy in Member States should be determined by the policy commitment of increasing their share of energy consumption to the targets agreed for 2020. The scale of support should be designed to give investors sufficient incentive to expand production by enough to meet these targets while ensuring that they do not make excessive profits. In other words, the aim in this regard should be to put in place measures of support that are cost effective, which achieve their objective without imposing an excessive cost on taxpayers and/or consumers. Such a calculation is made more difficult by the uncertain nature of future developments in the market for energy, by the problems of projecting the prospective course of fossil fuel prices and, therefore, the costs of producing electricity from gas or coal as well as the pace of technological advance in doing so from different types of renewable.

As indicated above, the evidence suggests that the amount of support provided and the rate of return on investment implied by the level of feed-in tariffs or green certificates relative to costs vary considerably across countries and within countries for different types of renewable. These variations clearly reflect the differing views of governments about the future pattern of energy production which should be aimed for and, accordingly, about which renewable technology should be favoured as well as about the scale of incentive necessary to stimulate the investment required to achieve policy targets. These views, however, remain implicit and the estimates of the rate of return, or profitability, of investing in different types of renewable can only be very approximate given the limited amount of information available. As the national reports make clear, few Member States publish official figures for the costs of generating electricity using different technologies or for the cost of supporting these technologies and still fewer explain the rationale for the scale and pattern of support provided.

Given the size of this support and the uncertainty surrounding future developments in the energy market, it is important that decisions made in this regard and the assumptions underpinning them are as transparent as possible so as to open them up to public scrutiny and debate. This is all the more important because of the strength of vested interests pushing for one type of technology or

another to receive preferential treatment. It is particularly important if Cohesion policy is used to complement national support, otherwise it becomes impossible to assess its contribution and the added value of spending the resources it provides in this way.

Even leaving aside this difficulty, there is in any case a serious questionmark over the use of Cohesion policy funding simply to add to national support measures subsidising the production of electricity from renewables. In particular, the gains to regional development are likely in most cases to be short-lived, lasting only as long as the generating plants concerned are being constructed and even then, much of the machinery and equipment used is likely to come from outside the region.

The potential added-value is more apparent if Cohesion policy is used instead to fund activities other than those directly associated with the generation of electricity for general distribution. This means, in particular, supporting research into new or improved methods of exploiting renewables and assisting the development of an industry to produce the machinery and equipment required both in generating plants and in distribution networks. Only a limited number of regions, however, possess the capability of undertaking such research and of developing an industry which can compete effectively on global markets. Those that do are not necessarily the locations where renewable resources are most available or which are best suited to the construction of generating plants.

A more general case can be made for using Cohesion policy funding to support investment in the use of renewables for heating, cooling and lighting of buildings (residential, commercial and public) or in local areas (such as in district heating schemes). This can contribute to social cohesion by improving living conditions in lagging and/or depressed regions while at the same time helping to meet EU-wide objectives of reducing reliance on fossil fuels and combating climate change. Equally, as demonstrated by its inclusion among the measures introduced to counter the effects of the recession, it can help stimulate the local economy by increasing activity in the construction industry in particular.

## 5.2 Energy efficiency of housing

The same general case can be made for the use of Cohesion policy funding to support improvements in the energy efficiency of housing more widely defined to include measures for reducing energy consumption as well as shifting to more sustainable energy sources. These measures include wall and roof insulation, double glazing for windows and more energy-efficient heating and cooling systems. As in the case of the use of renewables to provide power and heating to buildings, support for such measures can help to reduce disparities in housing and living conditions across regions while stimulating activity in the local construction industry and contributing to the wider objective of saving energy.

At the same time, while support can be justified in terms of the positive externalities, or social returns, that it gives rise to, it is important to ensure that funding is used in a cost-effective way. This means that it does not simply give subsidies to house owners or add to the profits of property companies that would have invested in the measures anyway because of the saving on fuel bills they lead to and that it is not used in situations where alternative non-financial measures are more appropriate.

In particular, there is a prior need to establish the framework conditions to enable housing markets to function more effectively in relation to energy use. This involves, in particular, ensuring that there is general awareness of the gains to be made from investing in energy efficiency not only among house owners but also among potential lenders. It also involves the application of suitable regulations governing landlord-tenant relations and the setting of rents as well as the rights and responsibilities of apartment owners in multi-family buildings. There is equally a need to extend certification schemes verifying the energy consumption of houses and requiring potential buyers or tenants to be informed of this, together with regulations on the energy consumption of new buildings and those that are renovated. Such measures, however, need to be properly monitored and policed if they are to be effective in influencing house prices and rents so that they give a suitable incentive for investment in energy efficiency. This inevitably has a cost which in low-income countries might be difficult to meet despite the potentially high rate of return involved and which might represent a suitable use of EU funding in the future.

The fact that house owners stand to gain from the investment concerned implies that they should contribute to the cost, which is typically the case since the grants or tax deductions available across the EU in most cases cover only part of the expenditure involved. The issue is what proportion of the costs should be covered in this way. This depends on the extent of incentive required for owners to undertake the investment, which is likely to depend in turn on how far the kinds of framework conditions discussed above have been put in place and their effectiveness. It also tends to depend on the income of the owners concerned and on their ability to borrow to cover the costs of the investment not met by subsidy. In general, therefore, the support provided needs to be larger for low income owners and in deprived areas where investment in energy efficiency is unlikely to be made without a significant subsidy. The focus of support in many countries on deprived areas – which was a condition of the use of the ERDF to improve energy efficiency in housing in the initial guidelines – and on social housing is consistent with this.

For higher income house owners in more prosperous areas, it may be that the establishment of the appropriate framework conditions would enable the market to provide sufficient incentive for investment in energy efficiency. Imperfections in the financial market, however, might make it difficult for owners to access borrowing to cover the costs involved<sup>17</sup>, which accordingly argues for the provision of preferential loans, perhaps at low interest rates, in order to ensure that the costs of investment can be met.

In sum, cost effective support of improving energy efficiency in housing implies a mix of measures, with an appropriate balance between regulations and certification, preferential loans and direct grants at varying rates – as well as perhaps tax concessions which serve the same purpose. The aim should be to provide sufficient incentive for investment and assistance to those on low incomes while recognising explicitly the significant gains to owners which can result from undertaking such expenditure.

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<sup>17</sup> See Literature Review, pp.40-41, on the reluctance of banks to lend for investment in energy efficiency.