

7. Lessons learned



Photo: Volker Quaschnig

In light of the analysis carried out in the previous section, this section draws some conclusions on success factors which may contribute to successful penetration of renewables in the Member States.

Overall, no single factor is of overwhelming significance in the successful deployment of renewable energy technologies. Instead, it is the cumulative benefits from a series of supporting measures that determine the extent to which renewable energy is successfully exploited in any one Member State. There are, however, certain essential components which combine to help create an environment in which renewable energy exploitation can succeed.

7.1. Energy policies

All Member States now have or are working towards national energy policies that reflect their commitment towards developing renewable energy. The cases examined highlight how vital political support is in order to achieve high levels of penetration of renewable energy technologies.

At the national level, political support ensures that policies are implemented in favour of renewable energy deployment. National policies, combined with targets for increased levels of penetration, endorse support for establishing stable conditions for renewable energy development. This support includes: frameworks for access to energy markets, grid access and

price support mechanisms, all of which are crucial for renewable energy deployment. Funding for research and development programmes is also generally provided at the national level.

In addition, the studies have highlighted how regional energy policies can contribute towards encouraging renewable energy. For Member States with a high degree of regional autonomy, such as Austria, Germany and Spain, many regional authorities have brought forward legislation that is more supportive towards renewable energy than legislation implemented at national level.

There is likely to be even more focus on the importance of integrating renewable energy into regional policies, especially where targeted support programmes such as Structural Funds are key components of regional development. Regional development strategies are increasingly recognising the significance of renewable energy in sustainable development policies. These include not only the role that renewable energy plays in environmental protection, but also its contribution towards economic development, employment and inward investment, particularly for rural or remote areas.

7.2. Legislation

For electricity from renewable sources, the **feed-in law system**, through both the commercially favourable guaranteed feed-in tariffs and the provision of a long-term stable pricing structure, has given a great impetus to renewable energy developments, in particular wind energy. Three Member States (Denmark, Germany and Spain — all countries using this system) contributed 80 % of new wind energy output in the EU-15 over the period 1993–99.

Biomass power generation has also benefited from feed-in tariffs, but not to the same extent as wind. This may be because the tariffs available were less economically attractive than those for wind. Biomass power increased significantly in some Member States (Finland and Sweden) without the support of a feed-in mechanism. Successful biomass development benefits from the availability of feed-in tariffs, but it is also closely linked with other success factors, especially the availability of financial support. In those Member States that adopted the feed-in mechanism, biomass use has expanded most when capital subsidies were provided as well as feed-in tariffs.

The PV sector is not yet able to compete on a commercial basis against other renewable or fossil energy sources and therefore needs to receive subsidies to stimulate its expansion. Successful implementation of PV requires both a feed-in support for power output and a capital subsidy in order to stimulate market expansion. Those Member States (Germany and Spain) that have instigated this combination of support saw significant levels of PV deployment.

The main alternative mechanism for support to renewable energy, the **competitive tendering process**, has not been as successful as a single support mechanism in achieving rapid deployment. Indeed overall levels of renewable energy use in countries where this system has prevailed are significantly lower than levels in countries with the feed-in law system. The UK was the first to develop a competitive tendering system, through its NFFO process, but despite early expansion in renewable energy capacity during the mid-1990s, it did not continue to show such rapid growth, which is why it did not pass any of the criteria for successful penetration for any of the electricity technologies studied ⁽¹⁶⁾. Similar competitive tendering systems have been in operation in Ireland (the AER) and France (Eole) ⁽¹⁷⁾. For both of

(16) NFFO supported electricity from wind, hydro and a range of biomass sources. PV was not included. The NFFO is being replaced by a Renewables Obligation, by which suppliers are legally obliged to provide an increasing proportion of their supplies from renewable sources.

these countries, the case studies indicated that additional barriers, including grid access (France) and infrastructure (Ireland), may have hindered a more rapid expansion in wind energy deployment.

Long-term financial stability is crucial to attracting investor confidence in new installations. Guaranteed tariffs, through feed-in arrangements, provide this degree of confidence, whereas a competitive tendering system opens up uncertainties. Tendering processes generally have uncertain timescales and tariffs, and developers are also unsure whether they will be successful when they bid through the tendering system.

The newly adopted EU directive ⁽¹⁸⁾ on renewable energy and the internal electricity market suggests that the feed-in mechanism and other national direct support measures may, if necessary, be replaced by EU-wide support measures within the next decade. These may also include the implementation of green certificates, as well as tax exemptions and other fiscal measures. Some of these are in place or under development in a number of Member States. Lessons learnt from the success of the feed-in approach to date, in particular the importance of a guaranteed income and risk reduction to developers, could be useful to the design of any such replacement measures.

Legislation providing **fair access to the electricity grid** for renewable projects is important to ensure rapid uptake of renewable power technologies. Member States that took the biggest steps to address any problems of grid access are the ones where renewable electricity achieved greatest levels of penetration during the 1990s, especially for smaller-scale renewable energy projects. Problems with grid access rights and with fair access charges can be a barrier to easy connection to the grid and can jeopardise the economics of a project. In a few Member States or in more remote regions, such as Portugal or southern Italy, the grid may require strengthening before it can accept additional power load. This may be very costly or limit developments, particularly the expansion of wind energy into more remote areas.

The issues relating to grid access are an important component of the EU directive on renewable energy in the internal electricity market because of the differences between Member States in terms of how they treat grid access for small power producers. The directive requires Member States to take the necessary measures to guarantee the transmission and distribution of electricity produced from renewable sources and encourages such electricity to be given priority access to the grid.

7.3. Fiscal measures

Fiscal measures act in favour of renewable energy in two ways: as part of wider environmental tax initiatives and/or as fiscal arrangements to encourage investment in renewable energy.

Environmental tax initiatives are inter alia implemented as part of Member States' environmental policies, particularly to reduce greenhouse gas emissions. These taxes recognise and reward the environmental benefits from renewable energy, and are increasingly seen as a way of internalising the environmental costs and benefits of energy systems. The case studies demonstrate that environmental taxation is becoming increasingly common in many Member States (Austria, Denmark, Finland, Italy, the Netherlands, Sweden). Taxes are mainly focused on the carbon dioxide or energy content of the fuel, but also on emissions from pollutants (SO₂, NO_x). Renewable energy benefits either through exemptions or refunds from the taxes, or by being subsidised from revenue raised from the taxes. In Sweden, the introduction of carbon dioxide and energy taxes, from which biomass is exempted, helped both biomass district heating and biomass combined heat and power plants to expand, as the taxes made other options, in particular coal-fired district heating and coal-fired combined heat and power plants, more expensive.

(17) Eole supported electricity from wind only. Since June 2001 Eole has been replaced by a system to support wind similar to the feed-in law system.

(18) Directive of the European Parliament and of the Council on the promotion of electricity produced from renewable energy sources in the internal electricity market (2001/77/EC).

Many Member States also allow tax exemptions/reductions or tax incentives for individuals or companies to invest in renewable energy projects. Again, this approach rewards investment in clean technologies, and can also encourage a greater level of awareness of and investment in renewable energy by business or the public.

7.4. Financial support

Financial support to renewable energy schemes is found in almost all the Member State/technology combinations studied, and is clearly an important factor in influencing the successful implementation of renewable energy technologies, for both power and heat. Nevertheless, in the case of wind energy, when feed-in arrangements are implemented there is progressively less requirement for developers to receive grants towards their installations. The commercially favourable guaranteed prices available through feed-in support give investors sufficient confidence to invest in the market without needing further financial support.

Some national, regional and municipal governments have recognised the potential economic and social benefits of providing support to renewable energy projects, as well as the related environmental benefits. As a result, the EU Structural Funds and other, non-energy, EU funds, are being accessed. For example, biomass district heating schemes have expanded considerably in a number of regions in Austria by receiving targeted financial support through, inter alia, the Structural Funds.

A number of the projects identified in the case studies were supported through banking institutions. The perceived risks of investing in a renewable energy project are reduced if successful examples of the technology already exist. Thus in Member States where renewable energy technologies are well established, there are now financial institutions willing to provide favourable loans towards renewable energy and other environmental projects, because they are confident of their financial viability. The role of the regional government is also important at the early stages of technology development. In these instances, the regional government can create the necessary framework conditions to encourage initial investment by banks in the technology.

7.5. Administration

Most of the successful Member State/technology combinations are backed by strong support for renewable energy developments not only at national level but at the level of local or regional administration. Renewable energy can be deployed successfully only if there is active support and public acceptance for renewable energy at the level at which individual projects are brought forward for approval, in most cases at the local or regional level. A strong commitment from regional or local government is one of the ways that this can be achieved.

Renewable energy schemes can help to stimulate local investment, employment and social cohesion, especially in rural or remote regions. Local authorities which recognise these benefits are generally the ones which provide the most active support towards renewable energy implementation.

7.6. Technological development

A number of Member States have provided strong and consistent support towards technological development of renewables, often targeted towards a specific technology which is most appropriate for their national circumstances (e.g. Denmark with wind, Finland with biomass). They are now benefiting from this investment in the form of strong and expanding domestic capabilities. For example, Danish companies are world leaders in wind turbine manufacture, providing direct or indirect employment for up to 12 000 people in Denmark, with over 70 % of domestic manufacturing for export (Danish Wind Turbine Manufacturers Association).

There is still a need for further targeted funding for research and development. The European Commission in particular plays an important role through its energy support

programmes, which assist research, development and demonstration of new technologies, working with national research programmes.

7.7. Education, information and training

In some Member States citizens have a high level of environmental awareness and a desire to reduce dependence on fossil or nuclear energy sources, and understand the role that renewable energy can play. As the case studies emphasise, they are sometimes also well aware of a specific renewable energy, because it is already used extensively (e.g biomass). However, in some other Member States education and information campaigns are essential to generate interest and informed debate amongst the general public.

The success of a renewable energy project, and its subsequent replication, ultimately resides with its public acceptability at local level. At the local level, emphasising non-energy benefits is an important component in the acceptability of renewable energy, especially its role in providing an income stream and local jobs. Cooperative participation in a project can be a successful way of involving the local population in a new renewable energy development. Cooperative financing of renewable energy projects is common in a number of Member States, particularly Denmark, Germany and Sweden. The role of the developer could also be important to the public acceptance of a new renewable project and requires that developers work with the local community to provide information about the nature of the new developments and their potential benefits. In Spain, the example of wind energy included a strong element of information dissemination to the local community before the project was fully accepted.

Energy agencies

The role of regional energy agencies in implementing national and regional policies at the local level is also important. Energy agencies can work with municipalities, utilities, developers and the local population to stimulate interest in implementing renewable energy technologies. A number of successful projects have been brought forward with the support of energy agencies, especially smaller-scale projects such as solar water-heating systems targeted at individual households, district heating systems and PV projects in new buildings. The European Commission has recognised the significance of energy agencies and financially supports their establishment. There are now agencies located in cities, regions and islands that are successfully implementing renewable energy and energy efficiency projects.