

4. Potential factors for success

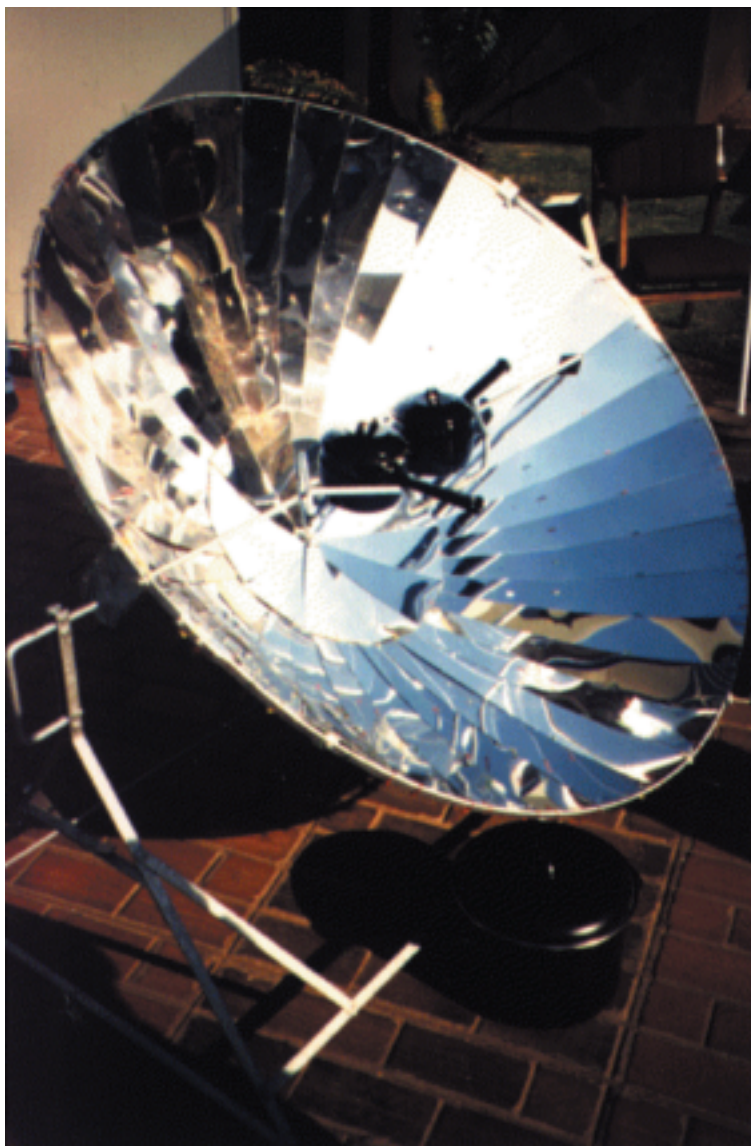


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4.1. Barriers to success

Successful penetration of renewable energy can only be achieved after overcoming many varied obstacles to an increase in their exploitation.

A large amount of information and research has already been carried out at both the EU and Member States levels focused on identifying and breaking through these barriers. Much of the work at European level was drawn together through a series of consultations to set out the framework for future initiatives and a strategic action plan for overcoming the barriers to renewable energy implementation (European Commission, 1997b). The EU White Paper on renewable energy sources (see Section 2.2) also summarises these barriers and the measures to be taken to counter them.

Renewable energy projects are generally of a smaller scale than conventional energy projects and consequently cannot benefit from economies of scale to the same extent. In relative terms, they also have high capital costs which need guarantees of long-term stable income streams to ensure financial viability. It is therefore important that the non-technical

frameworks in place do not discriminate against these kinds of projects but enable them to be brought forward as attractive and financially viable schemes.

Table 4 summarises the main types of barrier that have been identified together with the general obstacles associated with them.

Barriers and obstacles to renewable energy deployment		Table 4
Barrier	Obstacle	
Political	Lack of political motivation to support the market initiatives needed for the development of renewables	
Legislative	Lack of an appropriate legal framework and legislation at EU and national levels that support the development of renewables Difficulties with linking electricity or heat from renewables into the existing electricity and heat networks	
Financial	Lack of appropriate financing for long-term financial benefits	
Fiscal	Renewable energy technologies suffer from distorted competition from conventional energy sources (e.g. coal, nuclear) in terms of final end-user prices	
Administrative	Lack of practical support at the regional and local level to stimulate development of renewable energy projects	
Technological	Technological obstacles related to research, development and demonstration	
Information, education and training	Lack of awareness of the potential and possibilities for renewables	

The expansion in the use of renewable energy during the 1990s demonstrates that, for some technologies in some Member States, there are factors that appear to be acting in favour of implementation. Nevertheless, as shown in Table 2 and Table 3 in the previous section, it is apparent that for other technologies and in other Member States, the level of implementation is not as rapid, and obstacles are still preventing implementation.

Clearly, the situations in individual Member States and for individual technologies have created different framework conditions, some of which are more favourable towards increased exploitation of renewables than others. However, in many instances it can be difficult to identify the conditions that have resulted in successful implementation of projects — or it may be difficult to replicate these conditions in new market conditions.

4.2. Factors influencing renewable energy deployment

This study aims to identify the range of factors that can influence the likely successful implementation of renewable energy projects and assess how they work.

The principal factors studied are based around the key criteria given in Table 4.

- **Political:** How strong is political support for renewable energy?
- **Legislative:** How accessible is the energy market to independent electricity producers?
- **Financial:** How accessible is funding for investments in renewable energy projects?
- **Fiscal:** How favourable is the fiscal infrastructure for renewable energy?
- **Administration:** How favourable are the administrative arrangements for obtaining permission to construct a renewable energy project?
- **Technological development:** Is there support for the development of strong national capabilities in renewable energy technologies?
- **Information, education and training:** Is support given to widely disseminate information on the benefits of renewable energy?

Each factor is discussed in more detail below. These factors will be used in the following section to evaluate those Member State/technology combinations that met both the selection criteria for successful penetration. They will also be used in Annex 4 to evaluate the most interesting cases of those Member State/technology combinations that met only one criterion.

4.2.1. Political

How strong is political support for renewable energy?

EU-wide support for a greater use of energy from renewables is demonstrated strongly through the 1997 EU White Paper on renewable energy sources, and more recently the 1999 Campaign for Take-Off and the 2001 directive on renewable energy in the internal electricity market. All of these form the basis for action plans for subsequent implementation at Member States level, through coordinated activities at national, regional and local levels. In particular, support is demonstrated through the adoption of **policies in favour of renewables**. These are often developed in conjunction with the development of an overall **national energy plan**. One of the most important elements to consider here is the adoption of **official targets for the level of uptake of renewables**, usually expressed as a target level of use of renewable energy (heat and/or power) in the Member State. For Member States that have strong regional governments, these national targets may also be translated to appropriate regional targets. Alternatively, there may be no national targets at all, but only targets developed at the regional level.

4.2.2. Legislative

How accessible is the energy market to independent electricity producers?

For small independent power generators (renewable or fossil-fuelled), it is essential that there are access agreements that permit them **access to the electricity grid** to distribute their electricity. The costs and logistics of connecting to the grid can be significant for small energy schemes, and the imperfections associated with grid connection arrangements have not yet been removed in many Member States.

Another important aspect for renewable power producers is the availability of a **market** for their power, usually achieved by connection and transmission via the main electricity supply grid. Due to the generation characteristics of renewable energies and their higher generation costs compared with other forms of energy, the absence of a guaranteed market for renewable power seriously jeopardises the financial viability of many renewable energy projects.

Different Member States have adopted different approaches to providing support for a guaranteed market for renewable generation, but generally there have been two main mechanisms which governments have used:

'Feed-in' arrangements — with a fixed price for electricity generated, and purchase/sale arrangements available continually, coupled with a purchase obligation by the utilities. The feed-in arrangement is a legal obligation on utilities to purchase electricity from renewable sources. It also sets the prices to be paid for electricity generated from these renewable sources, generally higher than the price that would be available outside the tariff mechanism. These tariffs may vary for different renewable energy technologies, and are generally linked to prices paid by final consumers.

Tendering arrangements — a competitive process based on periodic calls for tender, to support a certain predetermined quantity of renewable electricity. Under this system, a fixed amount of renewable energy is supported through a levy on electricity consumers, which is directed at specific renewable technologies through a tendering system. This system enables specific renewable technologies to be supported, even those at differing stages of technological development, because the tendering system encourages competition within technologies. This has resulted in cost reductions for many of the technologies supported.

There are two more recent developments in new initiatives to support electricity from renewable sources:

Green pricing schemes. Green pricing allows consumers to support the generation of electricity from renewable sources by paying a voluntary premium. The schemes being developed are varied in their design, ranging from consumers paying a fixed premium per year to support new renewables developments (whilst themselves still receiving some 'brown' or non-renewable power), to receiving all of their power from renewable sources.

Green certificates. Green certificates benefit producers of renewable electricity and are issued according to the amount of renewable electricity produced or sold into the grid. Demand for green certificates can come from several sources. There may be voluntary demand from consumers who wish to purchase ‘green electricity’. The government can also stimulate demand by stipulating that suppliers should provide their consumers with an increasing proportion of their power from renewable sources. The value of the certificate can assume a separate market value through trading between electricity suppliers. Trading in green certificates is being developed in a number of Member States and at a European-wide level.

4.2.3. Financial

How accessible is financial support for investments in renewable energy projects?

The capital costs of building renewables projects are a significant barrier to their implementation, especially for newer technologies that are more costly and that have less of a track record in implementation (e.g. photovoltaics). Finance may be provided from either public or private sources:

Public support can be made available for renewable energy projects through grants or loans:

- grants — public sector support at EU, national, regional or local level;
- low-interest loans — usually through national or regional financial institutions with public subsidy support;
- loan guarantees — again, usually provided with public subsidy support.

Private sector funding of renewables projects from banks and other financial institutions such as venture capital organisations is of vital importance to the long-term commercialisation of renewables. It can be provided either in conjunction with or without public funds, depending on the financial viability of the project.

4.2.4. Fiscal (taxation)

How favourable is the fiscal infrastructure for renewable energy?

Energy produced from renewable sources currently competes against energy from conventional sources at a disadvantage in many cases. There are several reasons for this. Many of the fossil and nuclear fuel plants operating in Europe today were built with significant subsidies, while much of the large fossil generation is from older power plants where the capital costs have now been recovered. Both of these factors enable these types of plant to generate at lower cost compared with new plant which must take capital investment costs into account. This is particularly challenging for renewable energy plant because capital costs contribute a very high proportion of total plant costs.

In addition, the external costs of energy production from fossil or nuclear sources are sometimes not fully taken into account when deriving electricity generation costs. External costs from nuclear or fossil fuel plant include their contribution to pollution through carbon dioxide, sulphur dioxide, nitrogen oxides and other emissions and pollutants (fossil fuel plant), or to nuclear waste generation and to risks of radioactive contamination (nuclear plant). Benefits from renewable energy reflect the benefits of energy provision from non-fossil, clean energy sources, and the potential benefits of providing decentralised power production (embedded generation).

As a result of all these and other issues discussed in this section, costs of renewable generation are currently higher than that of conventional (fossil or nuclear) generation.

Some Member States have started to address these issues, usually through the imposition of a **carbon or energy tax**. These aim to modify energy consumption levels and patterns to encourage greater energy efficiency and a greater use of renewable resources. Some Member States also provide **tax exemptions/reductions** or **tax incentives** (for example accelerated depreciation of capital investments in renewable energy) to companies or individuals making use of or investing in renewables-related goods or services. These encourage investment in clean energy projects.

4.2.5. Administration

What are the administrative arrangements for obtaining permission to construct a renewable energy project?

Public authorities have an important role to play in supporting the conception, siting and development of new renewable energy projects. **Achieving planning permission** can be one of the biggest barriers to implementation of new renewables projects in some countries or regions. This is especially true for wind projects, but larger biomass and many hydro installations also encounter problems related to their construction. However, the ease with which planning permission can be obtained varies between different Member States. Responsibility for giving permission may be at the local, regional or national level, and may be carried out on a project-by-project basis, or may form part of a wider planning process that has already provided a framework for the location of new projects.

4.2.6. Technological development

Is there support for technological development of strong national capabilities in renewable energy technologies?

Support for research and development (R&D) plays a vital role in the progression from research and technological development through demonstration to final full-scale commercialisation of a new technology. All renewable energy technologies benefit from R&D support to ensure the continued development of a strong and competitive industry. Support is especially important where renewable energy technologies are still at early stages of development — for example photovoltaics.

Technological support focuses not only on R&D, but also on demonstration and implementation of new technologies as they mature. For a Member State to build up its indigenous capabilities in a developing market such as the renewables market, it is important for the emerging industry to be given consistent and targeted support for demonstration and implementation projects.

4.2.7. Information, education and training

Is support given to widely disseminate information on the benefits of renewable energy?

Dissemination activities to promote the benefits of renewables are a vital component of a national renewables support programme. These include the provision of information to all of the principal actors and groups involved with the development of renewables — financiers, planners, politicians (local and national), and the general public — to raise awareness and educate about the potential of renewable energy. It is also very important to support training initiatives for new renewable energy developments, such as for solar heating installers or for farmers wishing to grow new energy crops.

The development of renewable energy is closely linked to its level of acceptance by the people who will benefit from it and who will see the new renewable energy projects being built in their area. Public acceptability is vitally important for new renewable energy developments, particularly since projects are often smaller scale and their greatest impacts occur at the local (community) level.