



Association of Mediterranean Regulators for Electricity and Natural Gas

**AD HOC Group
on Environment, RES and energy efficiency**

***Effects of the introduction of successful
mechanisms to promote RES and CHP in non-
EU countries***

FINAL REPORT

May 2010



This project is co-financed by the European Union

1. Introduction. Successful promotion mechanisms in E.U. countries

There can be no doubt that renewable energies have extensive **advantages** for society concerning industry, employment, local and regional development, checking the deterioration of trade balances, security of supply and improvements in environmental quality. As a result of all these advantages, we could point out that renewable energies constitute a guarantee for sustainable development. Nonetheless, renewable energies also suffer from **disadvantages** when compared to fossil fuels. These disadvantages arise from greater investment costs, the dispersion of energy sources and the intermittency of some of them, which lead to higher costs when taking advantage of energy. The role played by economic regulation is fundamental to guide the energy model towards the path of sustainability, especially in liberalised energy frameworks like the current one, so that market failures are reduced or minimised when regulatory mechanisms are introduced.

It is precisely at this point where economic regulation should intervene within energy frameworks that have liberalised generating activities in order to introduce regulatory mechanisms that guide investors to more efficient generation technologies from an energy-related and environmental standpoint.

There are a great range of market-based instruments governments use to subsidise renewable electricity. These can be divided into **investment support** (capital grants, tax exemptions or reductions on the purchase of goods) and **operating support** (price subsidies, green certificates, tender schemes and tax exemptions or reductions on the production of electricity).

The European Commission presented its assessment of the support schemes in the Commission Staff Working Document: "The support of electricity from renewable energy sources", that accompanies the Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources. Brussels, 23.1.2008 SEC(2008) 57 {COM(2008) 19 final} using two main criteria: one criterion measuring **effectiveness** (i.e. ability to deliver an increase of the share of renewable electricity consumed) and the other criterion measuring **efficiency** (i.e. comparison of the total amount of support received and the generation cost). In addition, the effectiveness of a policy was correlated with the average expected profit from investments in renewable electricity using the same policy.

According to the EU Commission assessment, **feed-in tariffs achieve greater renewable energy penetration, and do so at lower costs for consumers.**

The effectiveness of policies promoting wind energy, biogas and photovoltaics technologies has been highest in countries using **feed-in tariffs** as their main support scheme. However, not all feed-in schemes implemented in EU Member States have been equally successful. For onshore wind energy, Denmark, Germany and Spain have shown the highest effectiveness indicators for the period 1998-2006. High investment security coupled with low administrative and regulatory barriers in these countries has stimulated a strong and continuous growth of wind energy over the last decade. For biogas, the highest growth can be seen in Austria, Denmark, Germany, Greece and Luxembourg, all using feed-in tariff systems. For PV energy, the strongest growth in recent years can be seen in Germany, followed by Spain, Italy and Greece, that also use feed-in tariff systems.

The level of support is adapted to the generation costs which varies between EU Member States and also between technologies. Two thirds of the EU Member States are considered to have a level of support which is sufficient to cover generation costs for onshore wind, small hydro and solid biomass.

Other support mechanisms, such as **investment grants** and **tax rebates** are difficult to measure as these mechanisms are usually used as additional policy tools. The combination of investment grants and tax rebates have proved to be very successful for the development of solid biomass in some countries, but less effective for the development of wind energy.

The E.U. experience could be a good example in order to select the right mechanisms for each country, according to the particular economic and social situation of the different members.

2. Particular Barriers in other countries for RES and CHP

2.1. Insufficient information and “Know-How” in RES and CHP technologies.

RES and CHP development demand a specific and complex technology. For some MEDREG members these tech industries are not enough developed.

In many countries possibly there are not enough skilled personnel who can install, operate, and maintain renewable energy technologies. Sometimes developers often lack sufficient technical, financial, and business skills.

To sum up, in some countries there is poor information and there is an important shortage of renewable and CHP energy technology.

Also, the lack of links between technology, industry and commercial network could be an extra barrier to set an efficient energy policy.

2.2. Low investment levels for RES and CHP projects

The development and commissioning of electricity generation projects based on clean energies is highly conditional upon each country's economic evolution and political situation. The economic crises suffered by some countries over the past few years have not allowed an appropriate energy policy to be drawn up as regard to renewable energies or even the improvement of already established conventional energies.

This social and political situation, as well as the lack of economic security, creates a feeling of uncertainty among possible investors, who are uncertain about the return on the high costs involved in implementing these facilities.

Renewable and CHP energy systems have a much more investment cost by KW than conventional energy sources. The energy investments require higher amounts of financing for the same capacity installation. This makes the cost of renewable energy investments more dependent on the cost of capital than conventional energy systems.

Capital markets may also demand a premium in lending rates for financing renewable energy projects as more capital is being risked compared to conventional energy projects.

In some countries poorly developed financial markets, products, and institutions, as well as high credit and economic risks are strong barriers for RES and CHP projects.

2.3. Insufficient network capacity

It is true that some renewable technologies like wind energy are intermittent and need backup energy; others like biomass are not. In any case, developing countries generally have a certain degree of generation flexibility like fuel oil or hydraulic power that can play this role. Wind energy cannot cover demand peaks or cover an increase in demand and widen electricity supply without being accompanied by other energies. It is, however, evident that all renewable generation, and specifically wind energy, will reduce the need to generate electricity with fossil fuels. It will therefore reduce the need to buy fuel, energy dependence and the associated economic and social risks it entails.

RES and CHP technologies are most difficult to manage for the network Systems Operators than conventional technologies. The main reasons are:

- Predictability (Some of the technologies are not predictable with accuracy).
- Operation (Some of RES technologies as wind or solar, are not easy-to manage)
- Long time response.

In some countries, network capacity is not strong enough to manage this new RES and CHP energy, which involves an extra barrier to new projects. The location of generation units in remote and isolated places could be an additional problem in terms of connection to the network.

2.4. Legislative and regulatory framework undeveloped or without stability.

Developing countries have implemented **some legislation** that attempts to incentivize and support the exploitation of natural resources as sources of primary energy. Nevertheless, in most cases this legislation **does not tend to be stable**, which in practice means that the progress of projects is slow and difficult.

Non clear guidelines for authorization procedures, non-objective and non-transparent procedures for grid connection, and long times to obtain authorisation for grid connections are examples of some barriers to develop RES and CHP.

In the absence of a clear and stable legal framework, independent power producers delay or stop future investment projects for renewable or CHP energy facilities. A clear legal framework is necessary for project developers to plan and finance projects on the basis of known and consistent rules.

2.5. Lack of experience in promotion mechanisms.

For many countries there is no previous experience to test the success of the promotions policies. It could involve an extra difficulty at the beginnings. Evaluating costs and fixing tariffs properly, with no past experience, could be a very difficult task.

These countries fix some kind of investment support (capital grants, tax exemptions, or reductions in the purchasing goods) or operations support (price subsidies, tax exemptions or reductions on the production of electricity)

Furthermore, bureaucratic and administrative process could be an extra barrier if there is no previous experience in this issues.

The pricing system and the setting of electricity tariffs also hinder the energy sector's "clean development". Extreme poverty in some countries obliges a relatively low tariff ("social tariff") to be set in order to be in a position to supply electricity to most of the population as an "essential service". This approach makes it difficult to cover costs that go beyond those of conventional generation.

2.6. Lack of electricity supply for all consumers

In some non-EU countries, some consumers have not access to the distribution and transmission lines. This could be a priority for this countries, before RES and CHP development. On the other hand, this issue can be an opportunity for RES and CHP technologies to supply electric energy to isolated areas.

3. Possibility to introduce successful mechanisms and eliminate barriers for RES and CHP in other countries.

3.1 Guaranty of regulatory stability

The stability of regulation is a basic starting point to promote RES and CHP. National and foreign private investors will be interested on invest in new facilities if there is low regulatory risk.

The experience in many industrialized countries shows that stability in regulation of electricity generation is a very important aspect for new investments.

Furthermore, reducing the risk is a key point to reduce the premium demanded for capital markets.

Without prejudice to the foregoing, regulation has to offer sufficient guarantees to ensure that economic incentives are stable and predictable during the entire life of a facility.

Nonetheless, it is also useful to establish transparency mechanisms for:

- a) Annual incentive updates, by associating updates to the evolution of robust indexes (like the CPI, ten-year bonds, etc.).
- b) Periodic reviews every four years in order to progressively adapt incentive levels to each technology's learning curve. For reasons of legal security, such reviews should only affect new facilities.

3.2. Definition of specific national targets/objectives

The definition of National targets in National legislation it is a key point for each member. It is important to define at least, these parameters:

- Current level of RES and CHP technology.
- National future targets for specific RES and CHP technology types. (In % or MW installed)
- Deadline to reach targets.
- Economic impact assessment of the effort necessary to reach targets.

Targets have to be ambitious, but realistic, and according with the economic, social and physical features of the country, and the possible evolution of the energy prices. The volatility and growing price of a barrel of oil should lead governments to reconsider other ways of generating electricity that reduce foreign dependence, perhaps at a higher cost.

It is also important to define the targets, taking into account other national priorities as tourism, industry development, employment etc.

In order to define the targets, is very important to study carefully the country potential and national possibilities for each technology. In general, key points to consider are:

- The existence of a lot of as yet unexploited energy potential.
- Regulations those are favourable to attaining greater energy penetration, which have allowed developers' expectations and confidence to be strengthened.
- A mature industrial sector having a firm interest in the renewable sector.

- The existence of technology and the capacity to develop manufacturing at a national level.
- The planning conducted by regional authorities supports the targets laid down by the Plan.
- The incorporation of technological enhancements, allowing for a high level of renewable energy penetration without affecting the security of electricity supplies.

3.3. Definition of network development plans

To achieve a good level of RES and CHP development, and to combine these targets with the guaranty of the supply, it is necessary to get a strong network. So, a minimum network development has to be defined in mandatory planning.

The development of electricity produced from renewable energy sources will increase the need for stronger grids and interconnectors.

In the development plans is necessary to take into account that network has to connect customers and places where renewables resources are.

The advance in international grid interconnections and the promotion of international electricity markets will help to achieve the targets.

3.4 RES and CHP access regulation and grid integration.

It is important to develop connection procedures for RES and CHP facilities. Non-discriminatory access rules and priority in dispatch have to be established.

Members shall ensure that network operators in their territory guarantee the transmission and distribution of electricity produced from RES and CHP. They shall also provide for non-discriminatory connection to the grid system of electricity produced from RES and CHP. Transmission system operators shall give dispatch priority with market based balance responsibility to generating installations using renewable energy sources, always complying the security of supply guarantee.

The Government shall clearly define any technical specifications which must be met by RES and CHP equipment and systems in order to be connected to the grid and to benefit from support schemes.

In order for Transmission System Operators to guarantee the security and the adequacy of the power systems installations, the new generators which are close to be connected to the grid have to comply with the grid codes and technical specifications.

As an example, an obligation for RES and CHP generators could be to connect the facilities to a Control Center, in order to improve operation network.

3.5 Collaboration programs between members

Developing mechanisms to collaborate in promotion of RES and CHP could be a way to remove certain barriers.

To promote efficient industries, and to develop Research and Development issues, collaboration between different countries is a key point.

This collaboration could involve different aspects:

- Technology (i.e. with High-tech transfer technology programs)
- Regulatory collaboration: Regional associations as MEDREG, ARIAE, ICER, etc.
- Technical collaboration between Technical System Operators (TSOs)
- Training programs (i.e. CEDDET, Florence School of Regulators, Universities, etc.)

3.6. Definition of promotion mechanisms

The Government must define promotion mechanisms with transparency and stability in national legislation.

The mechanisms have to be open and flexible to adapt to the economy evolution, but with the enough stability guaranty to support investments.

It is also necessary to introduce some support schemes, wich could be divided into investment support and operating support (feed –in tariffs achieve greater energy penetration and do so at lower cost for consumers).

As has been pointed out, it is important to set a methodology wich involves an effort to provide certainty and objectivity in the special scheme's remuneration. The definition of technology groups and subgroups (types of technology) is important in this regard, so that their investment and annual operating costs are known. The *remuneration* for each type of technology is firstly determined through the methodology and, on the basis of this, the *regulated tariffs and premiums* are calculated in a subsequent stage.

It is necessary to get basic information for each kind of technology concerns investment costs and average operating costs and income taken from real facilities started up during the preceding period. This information is completed with average technical characteristics. The basic information includes the following points:

- Hours of use
- Energy performance.
- Project's economic life and investment depreciation period.
- Unitary investment and, if appropriate, investment grants.
- Company tax and, if appropriate, prevailing write-offs.
- Operating costs: fuel, if appropriate, operations and maintenance, insurance, fees (for use of land or flow rate) and others.
- Operating income other than from the sale of electric energy to the grid: sale of electric or thermal energy to associated industries, sale of by-products in the case of cogeneration (pulp, dry waste, fertilizers, etc.), energy recovery or waste reduction fees, and, if appropriate, income from emission rights or from the sale of green certificates.

Economic incentives granted to companies or individuals embarking on projects with renewable energy resources, establishing **tax exemptions** for the importation of machinery destined to these ends and setting **premiums** to encourage savings on energy consumption are to be found among the measures taken in some developing countries

However, **capacity tenders and the subsequent signing of long-term agreements** between the public administration and the awardees of the tenders have not been used to date.

4. External Financing

Developing countries must have external financing to increase their renewable capacity. There are some sources of external financing:

4.1. Flexibility Mechanisms

The agreements reached at the Kyoto Protocol have allowed investments to be made through the Clean Development Mechanisms (CDM) or the Joint Implementation Mechanism (JIM) by the agreement's signatory countries (Annex I countries, or developed countries) in less developed countries in order to reduce the former's CO₂ emissions. These mechanisms were established to promote the transfer of technology to third countries and to help developed countries meet their commitments.

This is because these projects can obtain CO₂ emission rights if they can show they avoid emissions in their countries thanks to CDM. Additionally, such countries can sell these emission rights to companies subject to the European emissions market or to countries with emission reduction commitments according to the Kyoto Protocol. The income generated by the sale of rights therefore comes from developed countries and reduces the need for support for renewables in developing countries, as well as the costs this would involve for their economies.

This system is benefiting countries with renewable energy potential lacking the economic resources to carry out costly projects.

Many of the projects put forward to encourage renewable energies are aimed at providing electricity to disadvantaged places located in rural areas lacking electricity coverage, which is one of the major problems affecting developing countries.

4.2. Official Aid Development (ODA)

Access to electricity and other advanced forms of energy is an essential component in the fight against poverty and underdevelopment. Almost a third of the world's population completely lacks such access. In the face of this reality, the international community, the governments of different countries and a range of institutions have studied, planned and started up several mechanisms to deal with this situation.

4.3. Private initiative

The essential role played by electricity supplies demands that the regulatory framework ensures profitability and the continuity of efficiently made private investments.

Systems based on electricity service concessions in rural areas are an appropriate model for efficient and continuous electricity supplies. The concession scheme¹ is attractive for large private companies, local companies, cooperatives and other forms of organization of the community benefits from it.

The concession model facilitates the creation of sufficiently large markets as a guarantee for business sustainability and in order to extend and ensure electricity supplies to as many consumers as possible.

¹ "Electricity Regulation in Isolated Rural Areas of Guatemala" Project, Activity B1.3: "Key Issues for Regulation". Energy sans Frontières.

One example is the Desertec Industrial Initiative. The aim of this initiative will be to start supplying electricity to the European Union and to generate sufficient power to meet the needs of the producer countries as soon as possible. The target is to supply around 15% of Europe's electricity by 2050. The focus of the Desertec initiative in the field of power generation will be on the sun and wind as renewable sources of energy. This initiative shall be financed from contributions made by the participating companies, even additional funds may be raised from public sources.

4.4. Post Kyoto mechanisms and flexibility mechanisms in the Directive 2009/28/CE

The new Post Kyoto mechanisms that will be implemented in Mexico 2010, can be a good opportunity for new projects.

Also, in the Directive 2009/28/CE, new flexibility mechanisms will be implemented in order to achieve the 20/20/20 targets for the EU countries. One example is the Mediterranean Solar Plan Project:

4.4.1. Mediterranean Solar Plan

The Mediterranean Solar Plan (MSP) aims to attain an installed power of 20 GW with renewable energies in southern Mediterranean countries by 2020.

The common approach for financing these projects is based on both public and private funding, community funding and loans from the European Investment Bank as well as from other international financial organizations. The sovereign funds of countries from the Gulf Cooperation Council interested in taking part in a project like the Mediterranean Solar Plan can also contribute to the investment.

Although it is certainly true that the current economic and financial crisis will not facilitate the tasks of mobilising the necessary funding, the development of a renewable energy project in North African countries is a priority to ensure the region's sustainable development. In this regard, the participation of private initiatives should be promoted, especially direct foreign investment (DFI). The advantages provided by this option concerning, for instance, the financing of renewable generation facilities should be taken into consideration. DFI does not affect public budgets and it promotes job creation and technology transfers. It also trains human capital and enables the development of new industrial sectors.

Some estimates suggest that 70% of PSM projects will be financed through private funds, which fits in with the free access model with regulation through premiums. Now then, this will only come about as long as the regulatory conditions in the different countries are profitable. Foreign investment, and more specifically European foreign investment, has shown an interest in the potential of renewable energies on the southern shores of the Mediterranean. However, there are constraints to their development due to the fact that the public finances of countries in the south of the Mediterranean are not capable of providing sufficient economic incentives to renewables.

This problem should be overcome through external funding mechanisms, both for the facilities themselves and through a tariff remuneration framework for any green electricity exported to the EU (which is compatible with the new Directive to promote renewables). Other measures consisting of tax measures through tax write-offs, agreeing upon loan bonuses and setting up guarantee funds to reduce the projects' risk levels could be adopted. The private sector could become involved in these projects through public-private partnerships for important investments. Additionally, other ways to reduce the projects' risk levels should be taken into account, such as strengthening the role played by energy services companies, giving them a capital stake and ensuring the facilities' maintenance.

Furthermore, as part of international funding, the role played by the European Investment Bank should be highlighted. However, other international and regional banks could also be used, like the World Bank, the African Development Bank or regional Arab institutions. These instruments could include donations and concession loans.

Another possibility lies in mobilising the recourse to the clean development mechanisms (CDM) laid

down by the Kyoto Protocol. CDMs constitute a financial tool that is scarcely used in the region.

Lastly, Development Cooperation could also make a contribution through the funding of facilities that contribute to the fight against energy poverty, along with technical and training programmes.

Technical cooperation is another of the aspects highlighted by the main studies, which stands out most in two areas of action: (i) in the use and development of the technologies associated to renewable energies; and (ii) in the electricity sector's management and regulation.

Training programmes could comprise three levels and should be considered as a key element for cooperation between the EU and developing countries:

- Vocational training to have local human resources available that would allow new energy sources of be disseminated and consumers to be satisfied.
- Training in research and development (R&D) and innovation in renewable energies given to research organisations considered as a point of reference in the countries in question to encourage the transfer of technology.
- Training given to the regulatory bodies and civil servants of developing countries, thereby extending the transfer of knowledge to the field of managing and regulating renewable energies and the electricity sector.

5. Conclusions

The definition of National targets in the National legislation it is a key point for each member. Targets have to be ambitious, but realistic, and according with the economic, social and physical features of the country, and the possible evolution of the energy prices. The volatility and growing price of a barrel of oil should lead governments to reconsider other ways of generating electricity that reduce foreign dependence, perhaps at a higher cost.

The setting forth of economic incentives and tax exemptions in sectoral regulations on the basis of technologies, along with installed capacity targets, constitutes an important energy and environmental policy instrument, which guides the decision-making of investors within a liberalised regulatory framework like the electricity generating activity framework. However, capacity tenders and the subsequent signing of long-term agreements between the public administration and the awardees of the tenders have not been used to date.

It is important to develop connection procedures for RES and CHP facilities. Non-discriminatory access rules and priority in dispatch have to be established.

Developing countries must have external financing to increase their renewable capacity. There are some sources of external financing. The Mediterranean Solar Plan shall be the main mechanism to increase this capacity.