

**COMMISSION SERVICES PAPER**

**ENERGY FOR THE FUTURE:  
RENEWABLE SOURCES OF ENERGY  
(Community Strategy and Action Plan)**

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**CAMPAIGN FOR TAKE-OFF**

DG XVII

# **CAMPAIGN FOR TAKE-OFF**

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# THE CAMPAIGN FOR TAKE-OFF

## INTRODUCTION

The White Paper for a Community Strategy and Action Plan, Energy for the Future: Renewable Sources of Energy<sup>1</sup>, sets an indicative objective of 12% for the contribution of renewable sources of energy (RES) to the European Union's gross inland energy consumption by 2010. The comprehensive strategy and action plan outlined in the White Paper sets out the means to reach this objective: regulation to create favourable framework conditions for RES, and increased funding for RES under programmes, both at national and Community levels.

In its Resolution<sup>2</sup> on the White Paper, the Council welcomed the idea of the Campaign for Take-Off (CTO) as a means to raise interest among industry, investors and the public and invited the Commission to bring forward detailed proposals. Likewise, the European Parliament<sup>3</sup>, the Committee of the Regions<sup>4</sup> and the Economic and Social Committee have welcomed the CTO<sup>5</sup>.

The CTO proposed in the White Paper and described in more detail in this working paper forms an integral part of the Community Strategy. It is designed to kick-start the implementation of the Strategy and is expected to have reached its goals by 2003. Focusing on certain key sectors proposed and elaborated below, it sets out a framework for action to highlight investment opportunities and attract the necessary private funding which is expected to make up the lion's share of the capital required. The Campaign also seeks to encourage public spending to focus on the key sectors, and, in the process, to complement private investment.

Investments necessary to achieve the goals of the CTO would have to come primarily from the private sector. A strong commitment from industry and other potential investors is therefore crucial. Equally important, Member States close involvement is required, both through marketing the ideas of the Campaign and focusing programmes and schemes on its objectives. A Renewable Energy Partnership could strengthen the necessary co-operation at Community level.

In preparing the CTO, Member States were invited to provide information on existing and planned RES policies and programmes including their preferences for sectors to be given priority under the CTO. The recommendations from the Community Institutions, the replies from Member States together with other relevant information, in particular on national and Community programmes have been used to help design the CTO. It will be adapted in the light of the reactions to this paper and taking into account new developments in the sectors concerned.

A summary and analysis of the information received from Member States on national policies and programmes is contained in Annex V.

## I. CAMPAIGN PRIORITIES

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<sup>1</sup> COM(97) 599 of 26.11.1997 Energy for the Future: Renewable Sources of Energy – White Paper for a Community Strategy and Action Plan

<sup>2</sup> Council Resolution of 8 June 1998 on renewable sources of energy, OJ C 198, 24.6.1998, p. 1

<sup>3</sup> Resolution of 17 June 1998 of the European Parliament on the Communication from the Commission: Energy for the Future: Renewable Sources of Energy – White Paper for a Community Strategy and Action Plan (A4-0199/98)

<sup>4</sup> Opinion of the Committee of Regions of 16 July 1998 on the Commission White Paper: "Energy for the future: renewable sources of energy" (CdR 57/98fin)

<sup>5</sup> Opinion of the Economic and Social Committee of 29 April 1998 on the Communication from the Commission on "Energy for the future: renewable sources of energy" (CES 633/98)

In the White Paper, three key sectors are identified, corresponding to mature technologies which are considered crucial in achieving the 12% RES goal but which need an initial stimulus to accelerate and substantially improve their market penetration, thereby developing economies of scales and, consequently, reduction in costs . The fourth priority concerns the integration of renewable energies in communities aiming at 100% of RES supply.

The original key sectors presented in the White Paper as forming the core of the Campaign remain. However, following feedback from the Community Institutions, the Member States and further research, the key sectors have in some cases been extended and/or modified as explained below and in Annex I.

## **1. Key Sectors**

The following key sectors are proposed to be promoted during the Campaign:

**1,000,000 PV systems**  
**15 million m<sup>2</sup> solar collectors**  
**10,000 MW of wind turbine generators**  
**10,000 MWth of combined heat and power biomass installations**  
**1,000,000 dwellings heated by biomass**  
**1,000 MW of biogas installations**  
**5 million tonnes of liquid biofuels**

For each key sector an indicative target is proposed, which corresponds to a limited share (between 15% and 25%) of the overall 2010 objective put forth in the White Paper for the sector in question. This share takes into account the present status of development of the particular sector, the highest percentage (25%), for example, being set for wind energy.

Following detailed analysis (see Annex I), each key sector has been divided into segments according to specific markets, fields of application or particular technologies. For each segment the installed capacity needed in the framework of the Campaign has been estimated. The most appropriate territory for each segment has also been identified. Depending on the sector and the segment, this territory is defined either as a specific area of the EU (e.g. Southern Europe), or as a particular type with certain characteristics which can be located across the Union (e.g. isolated or rural areas, farms, cities, large buildings etc.). For each type of territory an estimation of the capacity to be installed has also been made. Finally the indicative costs of each application in the territory concerned have been estimated. These costs include the average unit cost during the period of the Campaign and the total investment needed.

The analysis also identifies specific actors which could play an important role in promoting and contributing to the Campaign. Partnerships (see section II.1) involving these actors will have a decisive role in the success of the Campaign.

The figures for installed capacity and associated investment costs shown in this analysis have been estimated on the basis of information provided by the European industry in order to illustrate how the goals of the Campaign might be achieved.

The estimated installed capacity required during the Campaign and the corresponding total investment needed are summarised as an indicative scenario in the following table:

**Table I : Indicative Scenario for Developing Key Sectors 1999 – 2003**

Sector	Campaign Key Actions	Estimated Installed Capacity	Estimated Total Investment Cost billion EURO
Solar Energy	650,000 PV systems : EU 350,000 PV systems : TC	650 MWp 350 MWp	2,85 (2,45)
	15 million m <sup>2</sup> solar collectors	15 Mm <sup>2</sup>	4,7
Wind Energy	10,000 MW of wind turbine generators	10,000 MW	10,1
Biomass	10,000 MWth of combined heat and power biomass installations	10,000 MWth	5,5
	1,000,000 dwellings heated by biomass	10,000 MWth	4,4
	1,000 MW of biogas installations	1,000 MW	1,2
	5 Mio tonnes of liquid biofuels	5 Mio tonnes	1,25
<b>Total</b>			<b>30 billion EURO</b>

It should be noted that the total CTO investment figure of 30 billion EURO is higher than that shown for the CTO outlined in the White paper (20 billion EURO). Subsequent research and feedback from Member States etc has shown the need to add 4 substantial new key actions (solar collectors, domestic heating, biogas and liquid biofuels) within the key sectors (Annex I provides the details).

## **2. Integration of Renewable Energies in “100 communities”**

In addition to the key sectors, a stated goal of the CTO as presented in the White Paper is the identification of “100 communities” aiming at 100% of RES supply. The “100 communities” programme as initially proposed in the WP has already aroused much interest across the EU. The “100 communities” programme could also be a benchmark for the implementation of decentralised energy supply.

To optimise the available potential of renewable energy technologies, they should be used together wherever this is productive either in integrated systems for local power supply or in dispersed schemes for regional power supply. These obviously have to be adapted to the conditions of each specific location, so as to ensure reliable power supply to the required quality and continuity standards.

As part of this “100 communities” programme, a number of pilot communities, regions, cities and islands are being identified which can reasonably aim at 100% power supply from renewables.

There exists a large variety of communities differing in terms of size, population density, living standards, climatic conditions, building styles, cultural patterns, resource availability and, of course, energy system characteristics. However, of particular interest when examining the prospects for RES integration are the following characteristics:

- energy consumption density per area unit, compared to RES availability,
- availability and type of energy infrastructure,
- power consumption pattern,
- size.

A first categorisation of communities can be based principally on the comparison of the energy consumption density with RES availability. In each such category, subdivision according to type and size of the community can also be made. Thus, we distinguish the following categories:

Urban communities: Solar input smaller than the energy consumption density. Limited availability of other RES.

Examples: blocks of buildings, neighbourhoods in residential areas, villages, towns, large cities.

Rural communities: Solar input in range of energy consumption density. Usually, significant availability of other RES (wind, biomass, hydro).

Examples: small rural areas, provinces, regions.

Isolated communities: Solar input bigger or in range of energy consumption density. Usually, significant availability of other RES. No or weak interconnection with external electric grid.

Examples: isolated areas, islands (small, medium, large), autonomous areas.

The level of RES penetration is highly influenced by the type and the degree of development of the current energy infrastructure. In newly built communities, for example, the energy infrastructure can be designed from the outset to accommodate RES. On the contrary, in existing communities, with a highly developed energy infrastructure, it may take years before renewables can play a significant role in the energy supply system.

In each of the candidate communities the path for maximising RES penetration should be specified. In order to develop the actions required and to monitor progress, a strategy including schedules, priorities and players must be defined. Local and regional authorities as well as regional energy centres have important roles to play in implementing this project.

Preference should be given to activities involving combinations of technology in such a way that such projects have the potential to cover the entire range from pre-feasibility study, through feasibility study and demonstration phase (mainly programme financed), to large-scale implementation with (mainly) commercial financing.

The individual costs of this initiative are difficult to define at this stage due to the different size and nature of each possible action. Moreover, a significant proportion of the “100 communities” programme will form part of the key sectors outlined above and as such will not require additional funding.

## **II. IMPLEMENTING THE CAMPAIGN**

As put forward in the White Paper on RES, the Campaign aims to promote the implementation of large-scale projects in the RES key sectors and to send clear signals for greater use of renewable energy sources. The Commission’s role will be to establish the framework, to provide technical and financial assistance, where appropriate, and to co-ordinate actions. The role of Member States will be crucial in this concerted action by promoting the aims of the Campaign and co-ordinating actions at national level. Nevertheless, although the role of the public sector is essential, the Campaign’s main objective is to help and support the private sector and to involve all interested parties in promoting renewables.

A range of actors may take part in the Campaign to promote investments in the key sectors. The actors involved vary from one key sector to another or the type of territory (see Annex I, tables I - IV) and include the following:

- national governments
- the regions;
- municipalities and their distribution utilities;

- authorities in charge of public procurement;
- energy agencies;
- RES developers and consumers associations;
- town and country planning bodies and architects;
- industry, including utilities and energy service providers, oil companies, and motor manufacturers;
- industry associations;
- farmers associations;
- forest-based industries and co-operatives;
- financial institutions;
- domestic and external trade associations;
- non-government associations.

The following actions provide a common framework to increase the involvement and focus the contribution of these actors.

## **1. The “Renewable Energy Partnership” – Involving actors in the Campaign**

To encourage and enhance the visible commitment of these actors, a “**Renewable Energy Partnership**” has been developed. Members of the Partnership would, within the scope of their responsibilities and possibilities, join and promote the Campaign and contribute to the fulfilment of its objectives. The “Renewable Energy Partnership” would apply at the following **levels**:

### **• Partnership between the Commission and public authorities, industries and associations**

Partnerships involving the European Commission and public authorities will highlight EU-wide co-operation on RES programmes implemented at national, regional or local level and bring them to join the CTO.

Partnerships involving the European Commission and industry or associations, will aim to eliminate reservations on the part of the RES industry, by creating a clear and well defined investment climate. Industry development programmes will therefore form part of the CTO.

It is worth noting that in the course of preliminary discussions held after the presentation of the Campaign in the White Paper a number of public authorities, energy agencies and industries have already expressed interest to participate in a concerted effort to promote and contribute to the objectives of the CTO.

### **• Partnership with promoters on framework agreements for the implementation of RES projects**

Framework agreements to implement RES projects can help to cement the necessary relationships among the actors concerned: public bodies, social and economical institutions, small, medium and large enterprises, environmentalists and consumers organisations, by clarifying the individual tasks to be performed by each of the actors involved in the process in order to launch and realise the project in question.

Such agreements at local level are of great importance to implement successfully a programme or project. Such agreements would be an eligibility criterion for large scale RES implementation plans joining the CTO: for instance the “100 communities” (see an agreement model in Annex II).

Beyond the broad levels outlined above, there are a number of Partnership **actions**. Clearly the most valuable of these actions would be **investment in RES installations**: actors investing in installations which provide renewable energy to third customers and opting for RES for their own energy supply, e.g. through PV and solar thermal installations integrated in the buildings of their premises.

Besides investment, action can take many other forms, such as:

- Financial institutions, (members of the Partnership), can make efforts to **facilitate access to financing** for investors in renewable energies. If necessary, special training courses can be operated in order to improve knowledge about innovative technologies of personnel involved in the granting of loans. New mechanisms to assess and reduce risks could be considered and developed. Helpful insight can be expected in this respect from an ongoing ALTENER study on renewable financing audit standardisation.
- Local, regional and national authorities, (members of the Partnership), may look into **administrative procedures** with a view to removing barriers through streamlining the authorisation procedures, such as building permits. Industry associations and consumer associations may engage in **information activities** raising the awareness of target groups for the potential of energy supply through RES. Actors involved in **export promotion**, such as external trade associations may launch new initiatives aimed at opening new markets for EU renewable technologies, together with industry, public authorities, financial institutions and partners in third countries.
- Non-government organisations can play an important role in promoting RES and raising public awareness, securing the public support vital for the success of the Campaign.

Many other actions are conceivable, depending on the specific possibilities and responsibilities of the actors concerned. Uniting these actions under a common heading will send clear signals and encourage other actors to join the “Renewable Energy Partnership”.

## **2. The role of specific Community programmes and actions**

### **2.1 Establishing the framework.**

The common framework to implement the Campaign should contain a number of different instruments designed to serve the main public and private actors. In using them these actors could join the Campaign and co-operate in the EU-wide effort. Criteria for joining the Campaign will be developed by the Commission following contacts with Member States and the other players concerned. The use of instruments in this framework should be as decentralised as possible. Public authorities, energy agencies, industry associations etc. can take part.

## **ALTENER II**

The ALTENER II programme<sup>6</sup> – shortly to become part of the Energy Framework Programme - is the main instrument to support and monitor the Community Strategy on RES and, consequently its Campaign for Take-Off. Support to the Campaign under ALTENER provides funding for the promotional actions below. Proposals received under the 1998/99 call will result in Community support for more than 200 projects, many of them directly linked to the Campaign. Projects relevant to the CTO take the following form:

- advertising support for the Campaign for Take-off,

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<sup>6</sup> Council Decision concerning a multiannual programme for the promotion of renewable energy sources in the Community (ALTENER II) (98/352/EC) OJ L159/53 of 03.06.98.

- developing project implementation plans,
- identifying candidates for specific actions such as the “100 communities”,
- collecting data for AGORES, the virtual information centre,
- developing specific marketing and promotional activities to support the CTO,
- targeted actions for large scale projects in the key sectors of the CTO.

### **Campaign Logo**

One of the main characteristics of the CTO is its EU-wide approach - a single Campaign at Union level in order to bring all projects joining the Campaign together under the same logo. This logo would be used by all partners contributing to the Campaign in their programmes, projects and other activities. In this way, the CTO can be highlighted as a concerted, EU-wide effort.

Programmes and projects eligible to use the logo are those that fall under the criteria specified in the key sectors of the Campaign and the “100 communities”. Nevertheless, it may also be possible to use the logo in projects which contribute to the Community Strategy for RES as a whole.

Eligibility of programmes and projects will have to be checked and selection made on a decentralised basis with national partners under Community co-ordination.

### **Campaign Catalogue**

The Commission intends to publish on a regular basis a catalogue summarising programmes and projects joining the CTO and documenting the results, on the basis of data collected by national partners, and made available to the public.

The catalogue will also contain information on all programmes carried out by public institutions, industry or associations, members of the Partnership as well as information about the sponsoring of the CTO.

Full information on the CTO implementation will be also available in the AGORES database<sup>7</sup>.

### **Campaign Awards**

In order to reward and highlight “best practices”, it is intended to grant awards to the best programmes, municipalities, utilities, tourist companies, building promoters, farmers, industries or their associations as well as consumer associations etc. The CTO awards would be granted every two years, the first being in 2000. Selected national organisations would promote national candidates, with a Selection Committee designated at Community level making the final choice.

### **Campaign Advertising**

Some actions covered by the CTO, such as solar thermal collectors for domestic heating, require investment in RES installations by private households. Yet potential investors may be reluctant to invest in innovative technologies due to lack of experience and information. Special advertising actions could therefore be launched focused on areas best suited for the technology and the targeted group.

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<sup>7</sup> The virtual information centre "AGORES" is the name of the database created and funded under the ALTENER II programme and is the Commission's response to the European Parliament opinion concerning the creation of a unique information centre for RES

## **Events and Publishing**

Conferences and other events and initiatives are planned, bringing together members of the Partnership to share experience in all of the key sectors. Sharing of experience can be of particular importance for partners in the “100 communities” programme in order to promote best practice and synergy.

### **2.2 RTD and technical assistance**

The 5<sup>th</sup> Framework Programme contains a major demonstration component, together with associated measures, related to RES. Two key actions related to RES are proposed in the Framework Programme:

Key Action 1: Cleaner Energy Systems, including Renewable Energies

Key Action 2: Economic and Efficient Energy for a Competitive Europe

The development of technology closely linked to the market is essential for the large-scale implementation of RES. The demonstration part of the 5<sup>th</sup> Framework Programme will reduce risks associated with a change of scale of RES and accelerate their market penetration.

With regard to technical assistance to third countries, the Commission has increasingly supported international co-operation through the energy programmes THERMIE and SYNERGY, as well as ALTENER II for Associated Countries, in order to help EU industry and technology manufacturers to take the opportunities offered by the expanding markets in the developing world and facilitate technology exchange. Other Community co-operation programmes, such as PHARE, TACIS, MEDA and others have also played important roles in this regard.

### **2.3 Regulatory measures**

The Campaign is an integral part of the Community Strategy and Action Plan and will be helped by a number of regulatory measures proposed and itemised in the White Paper. These include a Directive to promote electricity from renewable energy sources in a harmonised framework within the internal electricity market; the Community proposal on the taxation of energy products, providing for tax reductions or exemptions for RES; measures within the revised Structural Funds and the CAP and rural development policy and so on.

Also within the internal market, European standards on RES equipment are being developed by the CEN/CENELEC financed under the ALTENER programme. Technical aspects of the standardisation mainly in the field of grid systems will be developed under the 5<sup>th</sup> Framework Programme and by the European Commission’s Joint Research Centre. Those standards will provide a harmonised, EU-wide framework for the expansion of the EU RES industry.

### III. THE ROLE OF PUBLIC FUNDING

It is estimated that around 75-80% of the capital required to achieve the goals of the CTO would have to come from private sources, encouraged by changes in the regulatory framework proposed in the White Paper, and facilitated by the package of promotional and other actions described above.

However, additional incentives through public support are considered necessary in order to trigger and complement the private investment, with the magnitude of support necessary varying from technology to technology.

The total amount of public funding required to achieve the planned goals is estimated at around 7 billion EURO. Details on how this estimation has been made can be found in annex III.

In response to the request of the Council to provide information with regard to the financing of the Campaign, the Commission has gathered and analysed information on policies and programmes on RES promotion, both at the national and the Community levels. A number of possible sources have been identified in the course of this analysis.

#### **1. Support at national level**

In all Member States, the promotion of RES has become an increasingly important goal of energy and environmental policy in recent years. Increasing numbers of programmes and schemes provide public funds in support of RES investment at the national, regional and local levels.

An analysis of national programmes and schemes (see Annex V) shows that the funds which have been made available under promotion policies to the RES sector have consistently increased in recent years and can be estimated on the basis of the most recent data to amount to at least **1,2 billion EURO per year**. The exact amount is probably higher than this, given that the information obtained was not entirely complete, in particular with regard to support granted at the regional and local levels and the support stemming from fiscal incentives.

The estimated total amount of public support takes into account all forms of support, including price support granted through fixed feed-in tariffs for electricity produced from RES. It should be noted that contrary to conventional forms of support, such as direct subsidies and tax incentives, this type of support is not paid from the general budget. However, the analysis shows that this form of support has become the most important support instrument in Member States and, therefore, it is essential to include it in the context of the CTO.

As regards the future, all Member States have indicated that they intend to develop further their policy of RES promotion. Many programmes are scheduled to continue or increase in the coming years, especially schemes to promote electricity produced from RES. A number of Member States have set up national strategies and targets with regard to the future share of RES in overall energy supply, following the lead given by the Commission in its White Paper on RES.

Support schemes and programmes organised by Member States could therefore be a major source of support for the investment covered by the Campaign.

#### **2. Support at Community level**

As regards Community programmes, the Structural Funds and the demonstration activities foreseen in the fifth RTD Framework Programme (1999-2003) are relevant in terms of the investment required to support the Campaign.

## 2.1 The Structural Funds

During the present programming period (1994-1999), energy-related spending from the Structural Funds amounted to some 2900 million EURO, which corresponds to a share of around 1,5% of the overall budget of the Structural Funds (200 billion €), allocated primarily under the **European Regional Development Fund (ERDF)**. RES development features in nearly all programmes for objective 1 regions and amounts to around 300 million EURO corresponding to a share of 10,5 % of total energy-related spending. Projects have been supported in Greece, Spain, France (Corsica, overseas territories), Ireland, Italy, Portugal, Austria and the United Kingdom (Northern Ireland, Highlands and Islands), featuring notably the CTO key sectors, i.e. wind, solar and biomass.

Despite this, the potential support of RES projects under the Structural Funds has not yet been fully exploited. As a result, and in line with policy to promote sustainable development, the Commission in its proposal for the revised Regional Fund<sup>8</sup> has identified RES development as a priority field for intervention.

Another potential source of promotion for RES development is **the European Agricultural Guidance and Guarantee Fund (EAGGF)**. Indeed, The Common Agricultural Policy (CAP), as expected to be reformed under Agenda 2000, will provide a number of opportunities and support for bio-energy crops.

The encouragement of non-food production, including agricultural production intended for energy uses, falls within the scope of rural development. Therefore, when establishing their development plans, national competent authorities can decide to put emphasis on the non-food sector. For instance investments on agricultural holdings linked to the production intended for bio-energy are eligible for support. In addition, support can be provided for afforestation and environmental-friendly bio-energy crops, the latter under the agri-environmental scheme.

In addition, the *set-aside scheme*, which is part of the support system for arable crops producers, provides other opportunities and support. There are specific provisions for multiannual crops devoted to biomass production, within the voluntary set aside-scheme: the set-aside payment can be granted for a five-year period, and national aid is allowed to cover the establishment costs. As regards the compulsory set-aside rate, particularly important for liquid biofuels, it is set at 10 % until 2006. Furthermore, the Commission in its recent Communication on sustainable agriculture gives priority to the environmental dimension and the role that a proper use of biomass residues can play for example in combating fires etc.

These measures could contribute to the supply of raw material for biomass installations. However, the possibilities to support biomass energy should be kept under review, in line with the statement made in the White Paper on RES whereby biomass should be promoted using all available policy instruments, including those in the agricultural sector.

In view of the above, the Structural Funds, in particular the ERDF and the EAGGF as described, could become an important source of possible support for RES, in line with relevant statements in the Commission White Paper on RES and with the Council Resolution on the White Paper, recognising that regional policy could make a significant contribution to the promotion of RES.

## 2.2 Research, Technological Development and Demonstration Programmes

A second important source of investment support for RES projects is the Community policy in the field of Research, Technological Development and Demonstration (RTD). The 4<sup>th</sup> Framework Programme for RTD and more particularly the Non Nuclear Energy part gave a priority to RES, representing 45% of its total budget. An amount of around 153 million EURO was spent for investment support in favour of demonstration projects concerning innovative renewable technologies and/or applications under the THERMIE programme.

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<sup>8</sup> Proposal for a Council Regulation on the European Regional Development Fund, OJ C 176 of 9 June 1998.

The fifth RTD Framework Programme (1998-2002)<sup>9</sup> includes a specific programme “Energy, environment and sustainable development”, in which the energy part has been allocated an amount of 1043 million EURO in the financial perspective. The promotion of cleaner energy systems, including RES, is a priority of the programme. As regards 1999, out of the 208 million EURO available for energy, 60% is foreseen for RES, of which 75 % for demonstration. This leads to an available amount of 95 million EURO available for RES demonstration projects in 1999 alone.

Against this background, it is assumed that the fifth RTD Framework Programme could be a further important instrument at the Community level suitable to provide support for RES investment concerning the technologies covered by the Campaign.

### **3. Support in the framework of Third Countries Co-operation**

Under Member States' and Community external assistance programmes such as the European Development Fund (EDF), PHARE, TACIS and MEDA, RES projects have played an important role within the energy-related assistance, including promotion of PV installations. However, in view of past practice and in line with the approach followed generally by donors of external assistance, the financial support to achieve the third countries related objective of the Campaign (350,000 PV systems) will have to come primarily from loans made available to recipient countries for the purpose of RES development, complemented by grants. Given the expected growth in energy demand in Asia, Latin America and Africa, which to a large extent can be satisfied in a sustainable manner using renewable energies, it can be expected that the financial sources available for RES projects will increase considerably in the coming years. In fact, a number of financial institutions involved in external assistance, such as the EIB, the World Bank, have intensified their lending support for RES in the developing world and intend to further extend this policy.

The expected increase in financial resources that will be made available for RES investment in these countries, should lead to increasing technical co-operation export possibilities for EU companies. In view of this, the objective of the CTO to promote the installation of 350,000 PV village systems in the developing world, supplied by EC industry, is deemed necessary in order to provide focus for increased efforts at both the national and Community levels.

Increased export opportunities for the European industry will strengthen the sector as a whole, leading to creation of jobs in the Community and decreases in costs due to economies of scale.

More details on past activities and current policies under external assistance instruments are given in annex IV.

### **4. Indicative financing scenario**

From the above, it may be concluded that a number of programmes, at the national and Community level, can provide support for the objectives of the CTO. In view of the amounts spent in the past on RES promotion and the future potential, the major share of public support will come from national programmes, complemented by Community programmes and, as regards the third countries' initiative, by sources from various financial institutions.

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<sup>9</sup> Decision No 182/1999/EC of the European Parliament and the Council of 22 December 1998 concerning the Fifth Framework Programme of the European Community for research, technological development and demonstration activities (1998-2002), OJ L 26, 1 February 1999, p. 1

Accurate forecasts regarding exact amounts that could be made available under the various national and Community programmes are not possible for a number of reasons. However, an indicative scenario regarding the amounts that may be made available under the various sources, in order to secure the public financing of around 7 billion EURO required to 2003, could be a helpful reference. Therefore, on the basis of the information available on past and existing programmes, with regard to both the scope and the available budgets, future opportunities and planned national and Community policies, the following indicative scenario has been established :

National programmes:	6 billion EURO
Community programmes:	
Structural Funds	0,4 billion EURO
RTD	<u>0,5 billion EURO</u>
Total public support	± 7 billion EURO

For this scenario a number of assumptions have been made with regard to future budgets and the possible share of support for RES which are outlined in detail in annex III. On the basis of these assumptions, the scenario shows how the goals of the CTO with respect to public support could be achieved without assuming unrealistically high additional funding, in the light of past and planned future policies. Strong commitment to the goals of the Campaign and increased efforts at all levels are however essential, in particular with regard to support granted under the various national schemes and programmes which, as an indication, would have to increase by around 10% annually.

## **SUMMARY and CONCLUSIONS**

The Campaign for Take-Off proposed in the White Paper and described in more detail in this working paper is an essential and integral part of the overall Community Strategy for RES. It aims to accelerate the development of the Strategy in its early stages to the year 2003. Investment opportunities will be highlighted by promotional and public relations activities. National and Community programmes and schemes would trigger and complement private capital. Both the promotional measures and the complementary public funding should focus on key sectors, in order to increase the impact and visibility of the concerted efforts.

It is estimated that the Campaign will require investment funding to the tune of around 30 billion EURO with some 75-80% coming from private sources. The balance should be provided under public programmes and schemes, triggering the private investment, together with the package of promotional actions forming an essential part of the CTO. Much of the necessary public funding is already in the pipeline and planned, mainly at national level, but also from Community programmes. It will however have to be properly focused on the key sectors of the Campaign, requiring careful co-operation and co-ordination between the Commission and Member States. It will also be necessary for public funding to be increased consistently and sufficiently over the period in question if the goals of the Campaign are to be met.

Strong commitment of industry and other potential investors is crucial to the Campaign. Equally important, Member States close involvement is required, both through marketing the ideas of the Campaign and focusing programmes and schemes on its objectives. The role of the Commission is to enable funding under Community programmes, co-ordinate activities at Community level, provide a framework for the Campaign, with the main instrument being the ALTENER II programme, and promote Partnership with public authorities and the private sector and monitor the progress of this Campaign.

The Campaign consists of a careful choice of priority sectors, a package of implementing measures together with funding guidelines. It is not a goal in its own right but is designed rather to give the Community's overall RES Strategy an early and significant stimulus on the way to achieving its 12% target by the year 2010.

The implementation of the Campaign for Take-Off, as set out above, will be adapted in the light of the reactions to this paper and taking into account new developments in the sectors concerned.

# ANNEX I – KEY SECTORS

## 1. Solar Energy

### **1.1 1,000,000 kWp Photovoltaic Systems**

Photovoltaics (PV) is a high technology with strong export potential in a very competitive global market and fierce competition with Japan and the USA. There is a very motivated PV industry in Europe, which should be supported in its effort to further develop domestic and export markets. Besides leading European energy companies, many SMEs are active in the field. There is much scope for their number to increase and for large numbers of jobs to be created.

An ambitious and visible promotion campaign is needed in order to provide a sufficiently large market base to enable the prices to fall substantially, and so the Campaign will comprise an EU wide 650,000 kWp PV initiative for the domestic market and an export initiative for 350,000 kWp PV systems in developing countries.

A large part of the future PV market will be associated with building applications, especially in Europe where the electricity grid reaches almost all consumers. A 450,000 kWp roof top systems campaign in the European Union can be achieved with the installation of 150,000 systems of an average capacity of 3kWp each. An 150,000 kWp building facades programme in commercial, institutional and public buildings as well as in tourist, sport and recreational facilities can be achieved with the installation of 5,000 systems, assuming an average size of 30 kWp for each building. The campaign in the EU can be strengthened with an additional capacity of 50 MW for stand-alone systems. These systems can be installed in isolated homes (there are about 300,000 such homes in the Union), for small island electrification (particularly in the Mediterranean area) and for summerhouses especially in the Scandinavian countries. The campaign would make up 21% of the 3 GWp estimated implementation potential described in the White Paper. This is a very significant campaign for the future of PV, even though it will affect less than 1% of the 20 million houses and non-residential units which will probably be built between now and 2005. This is without taking into consideration the equally large potential for PV retrofitting in existing buildings.

PV can have a major contribution in the electrification of the more than one billion people without electricity in the developing world. A very well distributed and decentralised electricity system of very low capacity for minimum basic needs is the only realistic system which could be implemented in a foreseeable time frame of 20 to 25 years. The PV potential in the non-electrified developing world is estimated to be more than 16 GWp. Europe with its industry can and should play a major role in this process. The present Campaign includes an export initiative for 350,000 PV village systems of an average capacity of 1 kWp each, for the developing countries. The emphasis will be on systems for rural household electrification (150 MWp), but all the basic applications will be covered (water pumping - 80 MWp, Education - 80 MWp, Health - 20 MWp, Communication - 20 MWp).

This campaign should incorporate specific actions such as:

- Promotion of photovoltaics in schools and other public buildings. This action has not only an educational effect to increase knowledge and awareness at an early and receptive age, but it is technically sound as it minimises the need for storage capacity and in many cases can benefit from advantageous financing;
- incentives for photovoltaics applications in tourism, and sports and recreational facilities, which offer considerable potential due to strongly peaking seasonal demand in mass tourism and the fact that a large proportion of tourist sites are isolated and/or mountainous or otherwise expensive to supply from grids;
- Incentives for financing from public funds and city utilities, for instance by spreading the extra cost for photovoltaics over the entire customer base as opposed to the sole purchasers for solar electricity.

The present average PV system cost for grid- connected applications is about 6 €/Wp. This cost is expected to decrease substantially over the next years. It is assumed that, for the period 1999 -

2003, the average cost could be around 4 €/Wp. This cost increases according to the type of application as can be seen from table attached. The overall investment cost needed for the PV Campaign is estimated to be 5.3 billion €

## **1.2 15 million m<sup>2</sup> of Solar Thermal Collectors**

Solar thermal heating technology is almost fully mature. High quality products are available, solar systems are reliable and their productivity can be guaranteed. There is nevertheless scope for further cost reductions from larger scale production and improvements in both production processes and marketing.

The market is growing at accelerated rates: from the half a million square meters of solar collectors produced in 1993 to the current annual installation rate of one million square meters. The main market development is concentrated in only three European Union countries (Austria, Germany and Greece). In the White Paper it is estimated that a total installed capacity of 100 million square meters could be achieved by 2010. In order to maintain an important market growth rate a long-term action plan involving the solar industry, the market actors and the public authorities is needed. The Campaign for Take Off could contribute substantially to this direction. Domestic hot water (DOW) production has been by far the main application until today. The possibilities of further penetration into the market of DOW systems are still very high, especially in those countries and regions where their presence is weak or non-existent. It is extremely important, though, that other applications (large collective systems, district heating, space heating and cooling etc.) which are already technologically mature penetrate the market in a large scale. The Campaign for Take Off has a target of 15 million square meters of collectors for 2003 and is concentrated in five market/application segments:

- Domestic hot water production. An installed capacity of 5 million square meters in those countries and regions where the solar thermal market is not developed seems a feasible estimation for the Campaign. Special effort should be made for the development of the market in Southern Europe where the economics are better.
- Large collective solar systems. Several systems have been installed during the last few years in most EU countries, mainly as demonstration projects. The difficulties linked to system design, optimising the installation size and maintenance have now been mastered. The support of the Campaign could help reach an installed capacity of 3 million square meters in this sector.
- Space heating. This application is more adopted for the Northern part of Europe, since it is more interesting when the heating season is long. It can be used as a support to a conventional heating system. An active support during the Campaign could help in installing 3 million square meters of collectors for this application.
- District heating. This is the most economically rational way of using solar thermal energy. Numerous sites in Denmark and Sweden have been equipped with solar collector's areas covering from 1,000 to 5,500 square meters. Considerable market development is expected in Denmark, Sweden and Germany where district heating plants are frequently used. Two million square meters are expected to be supported during the Campaign.
- Air-conditioning and industrial process heating. Certain solar collectors can be used to heat a transfer fluid up to 110 C, efficiently. This heat source can be used in connection with an absorption cooling plant for air-conditioning or directly, as industrial process heat. Both of these applications have been experimented successfully in southern Europe. A 2 million square meters installed capacity in this sector seems feasible and highly desirable given the fact of the high rates of air conditioning installations in Southern Europe.

The present average solar collector cost for domestic hot water production is about 500 €/m<sup>2</sup>. This cost is expected to decrease over the next years. It is assumed that, for the period 1999 - 2003, the average cost could be around 400 €/m<sup>2</sup>. This cost changes according to the type of application as can be seen from table attached. The overall investment cost needed for the Solar Collector Campaign is estimated to be 4.7 billion €

## **2. Wind Energy**

## **10,000 MW of Wind Turbine Generators**

Wind energy today is competitive and has already been widely installed at specific sites with favourable conditions. Areas potentially suitable for wind energy applications are dispersed throughout the European Union. At present, some have to bear additional costs due to their particular location, which increases installation and/or operational costs (areas far from existing grids, in very cold, hot or dusty climates, offshore, islands, remote rural areas etc.). In particular, there is enormous potential for offshore wind farms. They have the advantage of higher wind speeds, although access is clearly more difficult. In order to achieve large-scale penetration of wind energy in the European Union these areas must also be used. A specific campaign is thus required to support large wind farms in such locations and the development of such new or adapted technology as may be appropriate. This programme will clearly imply a major role for the utilities most concerned.

The 10,000 MW of wind energy installations proposed here represent 25% of the feasible overall wind energy penetration for 2010 outlined in the White Paper. The objective of 10,000 MW can be divided into sub-objectives for different market segments. For each market segment the territory of application and the actors involved can, then, more easily be identified. Five market segments are included in the campaign with estimation for each segment of the feasible installed capacity for the period of the campaign:

- Privately owned wind turbines. They usually range from a few kW to 2 MW. They are owned by farmers, small co-operatives, local authorities, industrial factories etc. The campaign should support those that are installed in isolated areas, islands, low wind sites. Estimated capacity 450 MW.
- Small commercial wind farms. (<5MW). They are installed by investment groups, large co-operatives, industrial factories etc. The campaign should support those installed in hostile sites, isolated areas, islands, low wind sites. Estimated installed capacity 1,000 MW.
- Large commercial wind farms (5 - 100 MW). Large projects established by specialised developers (Independent Power Producers) which build and operate the project. The wind farms installed offshore, in hostile sites, far from the grid and in low wind sites will be supported during the campaign. Estimated installed capacity 4,500 MW.
- Utility owned wind farms (5-100 MW). The electricity from the wind is part of the generation mix of the utility. The main support should be given to offshore installations, but also to those installed in hostile areas and low wind sites. Estimated installed capacity 3,000 MW.
- Niche markets. In this category are included the relatively small stand alone installations for electrification in rural areas with only a little or no infrastructure as well as the special applications such as wind - desalination, wind - diesel, ice production, water pumping, telecommunications etc. An estimated installed capacity of 1,000 MW in islands and isolated areas is expected.

The effort of the European manufacturers to develop and test new Wind Turbine Generators will also actively be supported by the Campaign. It should include: a new generation of Multi Megawatt machines, especially for offshore applications, lightweight/flexible designs, small reliable turbines, specific designs for low or high wind speeds and for offshore or hostile sites. A total of 50 MW WTG is estimated to be developed and tested during the Campaign period.

The average ex-works cost of wind turbines for wind farms is today less than 800 €/kW of installed capacity. Project preparation cost depends heavily on local circumstances, such as condition of the soil, road conditions, proximity to electrical grid sub-stations, etc. For flat onshore sites the overall cost of an installed wind farm is about 1,000 €/kW. This cost could increase substantially for offshore and unconventional site applications. On the other hand, costs are expected to fall by at least 20% by 2005. It is then logical to assume the average investment cost over the period 1999 - 2003 can be about 800 €/kW for flat onshore sites. The investment needed for the proposed 10,000 MW will be in the order of 10.1 billion € (see table attached).

## **3. Biomass**

Biomass is a widespread resource as it includes in addition to woody biomass and the residues of the wood working industry, energy crops, agricultural residues and agro-food effluents, manures as well as the organic fraction of municipal solid waste or source, separated household waste and sewage sludge. Energy from biomass is versatile in that it can produce electricity, heat, or transport fuel as appropriate, and unlike electricity it can be stored simply and usually economically. In

addition, production units can range from small scale up to multi-megawatt size. The overall objective of the White Paper of increasing the contribution of RES to 12% by 2010 can be achieved only with a large contribution from biomass use. For that reason, the biomass part of the Campaign has a particular weight. It will cover a wide range of selected applications in all three-demand areas - heat, electricity and transport. The overall contribution of the Campaign is estimated to be around 14.5 Mtoe representing 16% of the White Paper estimated, penetration of biomass by 2010. The investment needed for the Campaign is estimated to be 12.4 billion €

### **3.1 10,000 MWth of Combined Heat and Power Biomass Installations**

Bioenergy is among the most promising areas within the biomass sector, and combined heat and power using biomass has the greatest potential in volume among all renewable energies. Consequently, a campaign to promote and support decentralised biopower installations throughout the European Union is essential. Such installations could range in scale from a few hundred kW to multi-MW and combine different technologies, as appropriate to local circumstances, including fuel switching. Wherever possible use should be made of opportunities for rationalisation through regional and local level implementation.

The estimated contribution of biomass in combined heat and power plants, as outlined in the White Paper, could be 26 Mtoe by 2010. This corresponds typically to an overall installed capacity of approximately 20 GWe or 60 GWth. The promotion of 10 GWth through this campaign represents 1/6 of this amount. It will in particular be important to take measures in the early years of this action plan in order to launch a bioenergy market.

### **3.2 1,000,000 Dwellings Heated by Biomass**

Presently the most important market for bioenergy in the E.U. is the low temperature heat market. The greater contribution of biomass comes from domestic heating. The ways of heating, however, are different from country to country.

More than 85% of all dwellings in the E.U. are being heated by single house systems. Depending on the country oil, natural gas or electricity is dominating. In countries where forestry traditionally plays a role, products from forestry have been utilised to heat houses for centuries. However, the number of houses heated with wood is decreasing constantly. It is important to reverse this trend with the introduction of modern, efficient wood furnaces (logwood, woodchip, pellet systems). Technologies for domestic heating with wood have seen a major breakthrough in the last two decades. Emissions dropped dramatically and at the same time efficiency was enhanced from around 50-55% to more than 90%. The conditions exist in order to change the image of domestic heating with wood from the perception of an outdated practice to that of a high tech, ecological lifestyle.

District heating (with or without cogeneration) provides a possibility to supply low temperature heat, but due to high investment costs (grids for distributing the heat) it needs financial support. It is more developed in those countries where relevant support schemes exist and the climatic conditions are appropriate (Austria, Denmark, Finland, Sweden).

In many countries, where district heating is not developed, dwellings are heated through central heating systems, mainly with natural gas. In areas outside district heating and natural gas distribution, biomass based central heating systems could be developed. A significant potential exists for micro combined heat and power biomass units for large buildings (hotels, hospitals, office blocks, prisons etc) as well as block units.

The Campaign will include all three options (individual wood furnaces, central heating, district heating) for a total of 10,000 MWth or approximately 4.5 Mtoe.

### **3.3 1,000 MW of Biogas Installations**

The exploitation of biogas has an important environmental benefit, since it consists largely of methane, a gas with a large greenhouse impact. In the last 10 years efforts in certain E.U. countries have focused on developing large centralised biogas plants. During the last few years many small farm plants have also been developed in certain areas of the Union. It is expected that a market will develop for both options. In the White Paper it was estimated that the contribution which could be made by biogas exploitation from livestock production, agro-industrial effluents, sewage treatment and landfill by 2010 is 15 Mtoe. For the Campaign the promotion of 1,000 MW of biogas installations representing approximately 15% of the overall White Paper projection for 2010 is considered appropriate.

### **3.4 5 million Tonnes of Liquid Biofuels**

Liquid biofuels are currently finding competition difficult, given the low oil prices, but their implementation is particularly desirable. The White Paper estimates that the market of liquid biofuels could be in the order of 18 Mtoe per year in 2010. The Campaign could substantially help in the development of the sector by promoting the most productive crop species with the maximum benefit and minimum environmental impact. An objective of 5 million tonnes is put forward.

# ANNEX II – STRUCTURE OF A FRAMEWORK AGREEMENT

## TITLE OF THE AGREEMENT

List of Parties involved:

.....  
.....

Text of the Agreement:

### 1. Background

Description of present situation, perspectives and obstacles

### 2. Objectives

Definition of the objective (e.g. a target of .... MW wind power, or PV, etc.)

### 3. Actions

Detailed description of the actions to implement and their timing; careful description, for each action, of task allocation among parties

### 4. Financial resources

Statement of sources of financing and their allocation among parties, including the costs for the agreement management and monitoring

### 5. Management

Definition of functions and identification of components of the steering committee that will manage the agreement

### 6. Monitoring

Identification of the independent party that will monitor the process, definition of the indicators to monitor and cost estimate

### 7. Commitments of each party

Detailed description of each party's commitment, either as actions to implement and as financial involvement.

## ANNEX III

### The role of public funding

#### Public funding necessary to trigger the private investment

As a basis for the estimation of the amount of public funding necessary to trigger the total investment covered by the Campaign, the ratio between the total RES investment made in the EU in 1998 and the estimated total public support has been used. The total investment is estimated to be in the order of 4 billion EURO and the public support under national and Community programmes is estimated at 1,5 billion EURO. Taking into account that this figure includes support for research and development, it can be concluded that an average public support of around 30% is currently provided to the RES sector as a whole. Given that the Campaign for Take-off concerns only mature technologies where significant decrease in costs can be expected through increased market penetration and, thus, economies of scale, an average public support in the range of 20-25% could be considered appropriate for the key sectors of the CTO.

In addition, the range of support for each of the key sectors has been estimated. For this purpose the current support practices in Member States and the difference between the actual unit energy cost for each Renewable Energy Technology concerned and the average unit cost for conventional energy have been used as a basis. For the calculation of the average rate of support per key sector covered by the Campaign the division into segments suggested in Annex I has been taken into account.

The estimated indicative public support for the Campaign for Take-Off is presented in the following table.

**Table 1 - Estimated indicative public support for the CTO in the EU (1999-2003)**

Campaign Key Sectors	Estimated Total Investment Costs billion EURO	Range of Support %	Average rate of Support %	Estimated Total Public Funding billion EURO (indicative)
PV in EU	2,85	35-80	45	1,2825
PV in Developing Countries <sup>10</sup>	(2,45)	-	-	-
Solar Collectors	4,7	0-30	15	0,705
Wind Turbines	10,1	10-40	20	2,02
Biomass CHP	5,5	20-60	30	1,65
Domestic heating	4,4	0-20	10	0,44
Biogas	1,2	20-40	25	0,3
Biofuels	1,25	30-70	50	0,625
<b>Total</b>	<b>30,05</b>			<b>7</b>

The conclusion is that an indicative public funding support of 7 billion EURO over the lifetime of the Campaign would be needed to trigger the total funding amount of 30 billion EURO necessary to achieve the goals of the Campaign.

<sup>10</sup> Support primarily in the form of loans, see chapter III.3

TABLE 2

## Public support scenario

<i>I. National support</i>	<i>Mill. EUR</i>	<i>Explanatory comments</i>
Reference: current estimated total funding per year	1200	Estimation made on the basis of information received from Member States
Annual increase in %	10,0	Considered ambitious but realistic in view of priority given to RES development in Member States
Funding available in 1999	1320,0	
Funding available in 2000	1452,0	
Funding available in 2001	1597,2	
Funding available in 2002	1756,9	
Funding available in 2003	1932,6	
Total national funding available 1999 – 2003	8058,7	
Share available for CTO in %	(75)	Not all funds available will be spent on the Campaign since some technologies not covered in the Campaign will continue to receive support.
Total national funding available for CTO	<b><u>6044,0</u></b>	
<b>II. Community support:</b>		
1. Structural funds		
Total amount available as of financial perspective	130000	Financial perspective covering the period 2000-2003 (Commission proposal, subject to the outcome of negotiations on AGENDA 2000)
Share of energy in %	(2,5)	1.5% (1994-99) assumed to increase to 2.5% as a result of sustainable energy policies
Total funding available for energy	3250	
Share of RES %	(15)	In the White Paper on RES a share of at least 12% is set as an objective within the energy programmes supported under the Regional Fund
Total funding available for CTO	<b><u>487,5</u></b>	
2. RTD		
Budget 1999	99	
Estimation '99 - 03	500	Considered realistic in view of 1999 budget and priority RES is given under the specific programme "Energy, environment and sustainable development"
Total Community	<b><u>987,5</u></b>	
<b>TOTAL</b>	<b>7031,5</b>	

## **ANNEX IV**

### **Third Countries co-operation**

#### **Support for RES in the framework of Third Countries Co-operation**

It is estimated that Member States committed around 1000 million EURO annually in grants and loans between 1992 and 1996 in support of energy initiatives in the developing world<sup>11</sup>. This figure includes both technical and financial assistance. RES projects have played an increasingly prominent role within the energy-related assistance, including promotion of PV installations. For a number of Member States RES development has become a priority of their co-operation policy in the field of energy.

Within the Community external assistance programmes ("European Development Fund" for ACP countries and co-operation programmes with Asia and Latin America), an amount of 230 million EURO has been spent between 1995 and 1997 for energy related projects. A number of important investment projects in the field of RES have been supported. Examples include a regional solar programme for nine Sahel countries (total budget 70 million EURO) which installed 1260 kWp of PV systems, supplied by the EC industry, and a 20 million EURO Biomass CHP programme for ASEAN countries, supported with 5 million EURO, which led to contracts for the EC industry of around 16 million EURO.

As regards the ACP-countries, the Commission, in collaboration with the recipient countries and Member States, is currently developing a strategy on energy as a tool for sustainable development for ACP countries, intended to be a guideline for future co-operation. Development of RES, including PV, will be one of the main features of this strategy.

The European Investment Bank has granted loans of about 230 million EURO between 1993 and 1997 for projects in the RES-sector outside the EC located primarily in Africa but also in Costa Rica, Pakistan, Lithuania and Norway. In 1998 the lending for RES projects outside the EU increased significantly and further loans totalling 149 million EURO had been signed by October 1998, primarily in Africa. In a recent publication<sup>12</sup> the EIB has described the opportunities for RES to receive EIB support as very promising in view of the fact that the financial competitiveness is improving, in particular compared to other decentralised applications.

In this context it is important to note that major international financial institutions, such as the World Bank, the Inter American Development Bank and the Asian Development Bank, have become increasingly involved in RES support and intend to further extend this policy. A prominent example in this context is World Bank Solar Initiative which includes an operational programme to integrate commercial and near-commercial renewable energy technologies into World Bank funding programmes.

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<sup>11</sup> Source: Energy as a tool for Sustainable Development for ACP-countries (Report commissioned by the European Commission and UNDP, final draft, November 1998)

<sup>12</sup> BEI Informations , 4 – 1998, No. 99

# ANNEX V

## RES IN EU MEMBER STATES

### 1. Objectives of the Member States' survey

At its first meeting (19.3.98) the Renewable Energy Working Group, consisting of the Commission and Member States, initiated a survey on national renewable energy policies and programmes. This survey should provide for:

- mutual information and exchange of experience regarding RES policies, dissemination strategies and tools;
- monitoring of RES deployment in the EU compared to the agreed goals of the White Paper "Energy for the Future : Renewable Energy Sources";
- improving co-ordination between Member States' RES policies and Community action;
- assistance in the implementation of the "Action Plan", and more detailed planning of the "Campaign for Take-off", the main instruments towards achieving the targets set out in the Commission's White Paper.

In May 1998, a questionnaire was sent to all 15 Member States plus Norway (as an EEA country). The completed questionnaires were received between June 1998 and January 1999.

### 2. Motivation for RES policy

The main objective of an energy policy favouring renewable energies is to achieve sustainable, environmentally sound energy supply. In this context, RES support is considered as an important factor for meeting national CO<sub>2</sub> reduction targets. This was indicated by almost all MS governments. The second important aspect was that RES are considered to be "indigenous" energy sources, and thus improve energy supply security. The objective of achieving a greater diversity in the national energy mix is linked to this argument.

Some RES technologies are still considered to need further innovation and technical development for major cost reductions. This is the main motivation for the various R&D programmes for RES technologies.

Under certain conditions RES technologies are already economically viable or close to the break-even point. Therefore, some governments also indicate an "improvement of economy of energy supply" as an aim of their RES policy.

Job-creating effects of RES as mainly decentralised energy supply systems were also mentioned, together with the fact that the use of RES is based on wide social consensus in the population.

### 3. Coherent RES strategies

Industry will only invest in renewable energy technologies, if it has confidence in reliable, favourable long-term framework conditions. For governments, this results in the setting of targets and identifying and removing non-technical barriers.

The majority of the governments logically have advanced from sector or energy-source related programmes to coherent RES promotion strategies as an integral part of national energy policy, published in the form of documents. In several countries preparation of such strategies has recently been completed or is in the final phase (*Belgium -Wallonia, Ireland, Italy, Luxembourg, United Kingdom*).

The Commission's White Paper has evidently motivated Member States' governments to prepare corresponding Green (*Ireland*) or White Papers (*Spain, Italy*).

Several countries (*Austria, Finland, Sweden*) traditionally have a high share of RES in their energy balance, mainly based on large hydro power stations and biomass. Although the RES share in these countries is considerably higher than the 12% adopted as EU wide target by 2010, national policy aims at increasing the RES contribution further.

*Denmark, Greece, the Netherlands and Spain* are examples of countries, starting with a low RES share in the seventies, then adopting medium and long-term objectives and action plans with environmental (greenhouse gas reduction) targets. Their national surveys show that such targets, based on a broad political consensus and acceptance level, have progressive and stimulating effects. As an example, in Spain the targets for the year 2000 had already been overtaken by almost 200% (including installations under construction) by the end of 1997.

*Austria* has no national target, but rather regional targets. One region (Upper Austria) even has the ultimate goal of 100% RES supply in coming years.

Among the countries without national targets (at least for the time being) are *Germany* and *France*, the countries with the highest energy consumption in the EU.

#### **4. Instruments of RES policy implementation**

There is a wide range of renewable energy technologies: some provide electricity, others heat; some are small-scale and decentralised, others are in the multi-MW-range; some are economically competitive, others need – apart from in niche markets – additional support; some are “classical”, others still in an experimental stage. This diversity needs flexible, “tailor-made” promotional instruments, and the survey clearly shows that Member states are generally looking for packages of appropriate instruments.

Renewable energies are a classical field for research and technology. Nine of the surveys explicitly mention national R&D programmes, which may be limited to institutional support to research centres/ universities, or also include programmes for the support of individual projects.

Eight countries also mention programmes for the support of RE technology demonstration projects, in order to bridge the gap between lab-scale or pilot plants (as the result of an R&D project) and large-scale dissemination.

All national surveys indicate that independent power production is possible, so that RES electricity may be injected into the grid. All these countries mention special, favourable tariffs for electricity generated from RES. The approaches, however, vary greatly. Such tariffs may be subject to competition, may be mandatory on utilities at a price level fixed by the government, or may be the consumer's choice. Tariffs may also vary in relation to the energy source in question (higher for PV, lower for wind, biomass and small hydro).

Most governments consider electricity feed-in tariffs alone as not sufficient to trigger wide-scale RES dissemination, and therefore provide additional assistance in the form of grants, low-interest loans, or tax incentives. Such support may be given for RES producing heat (solar collectors, firewood, biofuels), those considered to be not yet economically competitive, or to balance less favourable boundary conditions (e.g. wind in off-coast areas).

The technology and investment-related support measures are usually accompanied by measures addressing legislation and standardisation, information and advice to potential consumers, as well as professional training activities.

#### **5. Annual expenditures for RES support**

Unfortunately the financial data delivered were generally incomplete. Problems in the estimation of annual budgets for support programmes are due mainly to the following:

- no Member States was able to indicate the budgetary consequences of support resulting from fiscal incentives, tax exemptions and tax relief, or to estimate the resulting private investments. Although such support tools are an important promotional instrument and widely applied, they could not at all be taken into account in estimating the amount of financial support within this survey;
- it can be difficult to give annual budget data for pluriannual programmes;
- some support programmes also include renewable energy sources under the heading of rational use of energy, or support to environmentally sound technologies, so that in this case the RES share is difficult to estimate;
- governments are usually well informed about national programmes, but often have less knowledge of regional and local programmes;
- little data is available regarding private investments stimulated by public support measures;
- Research and Development programmes generally dispose of an important demonstration component, linked to investment. Governments generally were not able to indicate the “demonstration ratio” of such programmes. Therefore, within this survey, R&D(&D) programmes were also counted as “support”.

The annual amount spent for RES support in the EU is, according to the survey, about 1.2 billion EURO. 53% of this expenditure (615 million EURO) is spent for “direct” support measures, such as grants and subsidies, whereas 47% (538 million EURO) are “indirect” support measures (support for RES electricity fed into the grid, low-interest credits etc.). The amount indicated as annual corresponding private investment is 1.399 million EURO. Total expenditure for RES (support plus related private investment) therefore amounts to about 2,6 billion EURO per year. This would correspond to a support ratio of about 45%. Most of the support programmes indicated have,

however, considerably lower support rates. Therefore, the amount of the corresponding private investments seems underestimated.

The “support” share included in tariffs for RES-sourced electricity fed into the grid contribute to about 40% of overall RES support expenditure in the countries of the survey and have thus become by far the most important individual support tool. The annual amount is about 475 million EURO.

*Germany, the UK, Denmark and the Netherlands* are the countries with the highest support expenditure for RES in absolute figures. *Denmark and Austria* lead as to budget spent per head of the population. Taking into account the total RES expenditure (support plus corresponding private investment) per head of the population, the leading European countries are *Denmark, Austria, Ireland and the Netherlands*.

Renewable energy technologies have known impressive growth rates in recent years. Preparation and adoption of new or reinforced national strategies is likely to give an additional push to market development. Among the new programmes, which were not taken into account as “expenditure”, as they will only start in 1999, may be cited the “100.000 PV Roof-Programme” (*Germany*), the “CO2 Reduction Plan” (*Netherlands*), the programmes “10.000 PV Roofs” and “Solar Communes” (*Italy*), the “Procurement Aid for New Electricity Generating Technology” (*Sweden*).

*Belgium, France, Greece, Ireland, Italy and Portugal* indicate that they apply Community Structural Funds for their RES promotional activities. Indeed, for Greece and Portugal, these funds are a major financial tool for implementation of their national RES programmes; for Italy, they play an important role at regional level.

## **5. Sectoral priorities for the “Campaign for Take-off”**

The questionnaire proposed that governments recommend the priorities to be included in the “Campaign for Take-off” from a list of ten renewable energies and RES application fields. Priorities vary widely from one country to another.

The overall evaluation shows that biomass is considered as the top priority (nr. 1 in the ranking for “direct combustion”, nr. 4 for “fossil fuel substitution”), followed by wind energy and solar energy (PV, active and passive) in buildings. This provides confirmation for the “key sectors” selected in the Campaign.

## **6. Conclusions**

Although there is an important diversity regarding strategies and tools for RES promotion, a general trend may be identified: Support for Research, Development and Demonstration (R, D&D), which continues to play a key role, is complemented by promotional activities aiming at creating a “critical mass” for a dynamic market development. Most recently, promotional systems (already applied or under discussion) emphasise competitive elements and fiscal incentives.

“Indirect” support instruments are most appropriate for large-scale dissemination programmes, whereas “direct” support tools (grants, subsidies..) should refer mainly to technologies in the R&D or demonstration stage. Expenditure for “indirect” support has risen considerably in recent years, and this may indicate that governments consider RES technologies generally to be technically mature and viable. The focus of RES promotion is obviously moving from R&D&D support to large-scale dissemination. Economies of scale are seen today evidently as the main motor for cost reduction and innovation.

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## **Norway**

While not being a member of the European Union, Norway is a European partner in the framework of the EEA. In spite of the actual high share of RES (almost 100% of the electricity is generated from 850 hydropower plants) the country is actively promoting bioenergy, wind and solar, aiming at a diversification in the national energy mix. Promotional activities include support of R&D, demonstration, market introduction and tax incentives. The annual budget (1998) for the promotion of "non-hydro RES" is 35.7 million EURO (without considering tax incentives).

### 1999-2003

MARKET/ APPLICATION/ TECHNOLOGY SEGMENTS	ESTIMATED INSTALLED CAPACITY	TYPE OF TERRITORY	ESTIMATED INSTALLED CAPACITY	AVERAGE UNIT COST EURO
<b>1. Combined heat and power</b> * small scale <1MW * medium scale 1-20 MW * large scale >20 MW	<b>10,000 MWth</b>	* Isolated rural areas * Decentralised agricultural areas * Highly organised agricultural areas	2,000 MWth 5,000 MWth 3,000 MWth	1,000 500 350
<b>1. 1,000,000 dwellings heated by biomass</b> * individual domestic heating (logwood, woodchip, pellet systems) * central heating units * district heating plants	<b>10,000 MWth</b>	* Private homes, farms * Large buildings, blocks * Cities, small urban communities	6.000 MWth 2.000 MWth 2.000 MWth	400 300 700
<b>1. 1,000 MW of biogas installations</b> * large centralised plants * farm scale plants	<b>1,000 MW</b>	* Municipalities * Farms	800 MW 200 MW	1,000 2,000
<b>1. 5 Million Tonnes of Liquid biofuels</b>	<b>5 Mio Tonnes</b>	Cities		250
<b>TOTAL</b>				

**1,000,000 kW<sub>p</sub>**

### 1999-2003

MARKET/APPLICATION/TECHNOLOGY SEGMENTS	ESTIMATED INSTALLED CAPACITY	% CTO	TYPE OF TERRITORY	ESTIMATED INSTALLED CAPACITY	% CTO	AVERAG UNIT COS EURO
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<b>1. 450,000 kW<sub>p</sub> roof top systems</b> (150,000 systems with an average size of 3 kW <sub>p</sub> ): Individual houses, Apartment Buildings, Schools, Tourism, Sport Facilities	<b>450 MW<sub>p</sub></b>	45	Northern Europe Southern Europe	350 MW <sub>p</sub> 100 MW <sub>p</sub>	35 10	4,000/kW 4,000/kW
<b>2. 150,000 kW<sub>p</sub> building facades</b> (5,000 systems with an average size of 30 kW <sub>p</sub> ): Commercial buildings, Institutional public buildings, Tourism, Sport, recreational Facilities	<b>150 MW<sub>p</sub></b>	15	Northern Europe Southern Europe	100 MW <sub>p</sub> 50 MW <sub>p</sub>	10 5	5,000/kW 5,000/kW
<b>3. Stand alone rural development</b>	<b>50 MW<sub>p</sub></b>	5	* Isolated homes (mainly Mediterranean) * Island electrification (mainly Mediterranean) * Summer houses (mainly Scandinavian)	20 MW <sub>p</sub> 20 MW <sub>p</sub> 10 MW <sub>p</sub>	2 2 1	6,000/kW
<b>4. Developing world</b>	<b>350 MW<sub>p</sub></b>	35	Developing countries	350 MW <sub>p</sub>	35	7,000/kW
Rural household electrification Water pumping Health Education Communication	150 MW <sub>p</sub> 80 MW <sub>p</sub> 80 MW <sub>p</sub> 20 MW <sub>p</sub> 20 MW <sub>p</sub>					
<b>TOTAL</b>	<b>1,000 MW<sub>p</sub></b>	<b>100</b>		<b>1,000 MW<sub>p</sub></b>	<b>100</b>	

**15 Mio m<sup>2</sup>**

**1999-2003**

MARKET/APPLICATION/TECHNOLOGY SEGMENTS	ESTIMATED INSTALLED CAPACITY	% CTO	TYPE OF TERRITORY	ESTIMATED INSTALLED CAPACITY	% CTO	A UN
1. Domestic hot water production (2.4-10 m <sup>2</sup> )	5 Mm <sup>2</sup>	33.3	EU countries and regions whose market is not developed	5 Mm <sup>2</sup>	33.3	.
2. Large collective solar systems Hospitals, hotels, collective housing, sport facilities (>100 m <sup>2</sup> )	3 Mm <sup>2</sup>	20	All EU countries	3 Mm <sup>2</sup>	20	;
3. Space heating (20-50 m <sup>3</sup> )	3 Mm <sup>2</sup>	20	Northern Europe Southern Europe	2.4 Mm <sup>2</sup> 0.6 Mm <sup>2</sup>	16 4	;
4. District heating (>500 m <sup>2</sup> )	2 Mm <sup>2</sup>	13.3	Northern Europe	2 Mm <sup>2</sup>	13.3	;
5. Air conditioning and industrial process heating	2 Mm <sup>2</sup>	13.3	Southern Europe	2 Mm <sup>2</sup>	13.3	.
<b>TOTAL</b>	<b>15 Mm<sup>2</sup></b>	<b>100</b>		<b>15 Mm<sup>2</sup></b>	<b>100</b>	

**10.000 MW**

**1999-2003**

MARKET/APPLICATION/TECHNOLOGY SEGMENTS	ESTIMATED INSTALLED CAPACITY	% CTO	TYPE OF TERRITORY	ESTIMATED INSTALLED CAPACITY	% CTO	AVER/ UNIT C EUR
1. <b>Privately owned wind turbines</b> (<2 MW)	450 MW	4.5	islands isolated areas low wind sites	150 MW 150 MW 150 MW	1.5 1.5 1.5	1,000/ 1,000/ 800/k
2. <b>Small commercial wind farms</b> (<5MW)	1,000 MW	10	islands isolated areas low wind site hostile sites	300 MW 300 MW 200 MW 200 MW	3 3 2 2	1,000/ 1,000/ 800/k 1,000/
3. <b>Large commercial wind farms</b> (5–100 MW)	4,500 MW	45	offshore hostile sites far from grid low wind sites	1,000 MW 1,000 MW 1,500 MW 1,000 MW	10 10 15 10	1,250/ 1,000/ 1,000/ 800/k
4. <b>Utility owned wind farms</b> (5–100 MW)	3,000 MW	30	offshore hostile sites low wind sites	1,500 MW 500 MW 500 MW	15 5 5	1,250/ 1,000/ 800/k
5. <b>Niche markets</b> (stand alone, wind–diesel, wind–desalination, telecommunication, ice production, hybrids)	1,000 MW	10	islands isolated areas	600 MW 400 MW	6 4	1,300/ 1,300/
6. <b>Development and testing of new wind turbines</b> (multi–MW, small, lightweight, WT adopted for hostile and low wind sites)	50 MW	0.5	Test sites	50 MW	0.5	2,000/
<b>TOTAL</b>	<b>10,000 MW</b>	<b>100</b>		<b>10,000 MW</b>	<b>100</b>	