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**ENERGY FOR THE FUTURE:  
RENEWABLE SOURCES OF ENERGY**

**White Paper for a Community Strategy  
and Action Plan**

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# Chapter 1                      Setting the Scene

## 1.1    The General Framework

### 1.1.1   Introduction

Renewable sources of energy are currently unevenly and insufficiently exploited in the European Union. Although many of them are abundantly available, and the real economic potential considerable, renewable sources of energy make a disappointingly small contribution of less than 6% to the Union's overall gross inland energy consumption, which is predicted to grow steadily in the future. A joint effort both at the Community and Member States' level is needed to meet this challenge. Unless the Community succeeds in supplying a significantly higher share of its energy demand from renewables over the next decade, an important development opportunity will be missed and at the same time, it will become increasingly difficult to comply with its commitments both at European and international level as regards environmental protection.

Renewable energy sources are indigenous, and can therefore contribute to reducing dependency on energy imports and increasing security of supply. Development of renewable energy sources can actively contribute to job creation, predominantly among the small and medium sized enterprises which are so central to the Community economic fabric, and indeed themselves form the majority in the various renewable energy sectors. Deployment of renewables can be a key feature in regional development with the aim of achieving greater social and economic cohesion within the Community.

The expected growth in energy consumption in many third countries, in Asia, Latin America and Africa, which to a large extent can be satisfied using renewable energies, offers promising business opportunities for European Union industries, which in many areas are world leaders as regards renewable energy technologies. The modular character of most renewable technologies allows gradual implementation, which is easier to finance and allows rapid scale-up where required. Finally, the general public favours development of renewables more than any other source of energy, very largely for environmental reasons.

### 1.1.2   The Current Situation

Five years after the Rio Conference, Climate Change is again at the centre of international debate in view of the upcoming "Third Conference of the Parties to the United Nations Framework Convention on Climate Change" to be held in Kyoto in December 1997. The European Union has recognised the urgent need to tackle the climate change issue. It has also adopted a negotiating position of 15% greenhouse gas emissions reduction target for industrialised countries by the year 2010 from the 1990 level. To facilitate the Member States achieving this objective, the Commission, in its communication on the Energy Dimension of Climate Change<sup>1</sup> identified a series of energy actions - including a prominent role for renewables.

The Council of Ministers endorsed this when inviting the Commission to prepare an action programme and present a strategy for renewable energy. In preparation for the international climate change conference in Kyoto, the Commission confirmed

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<sup>1</sup> COM (97) 196 final, 14 May 1997, "The Energy Dimension of Climate Change"

the technical feasibility and economic manageability of the Union's negotiating mandate. In a recent Communication<sup>2</sup>, the Commission analysed the consequences of reducing CO2 emissions significantly, including the implications for the energy sector. In order to achieve such a reduction, the Union will require major energy policy decisions, focusing on reducing energy and carbon intensity. Accelerating the penetration of renewable energy sources is very important for reducing carbon intensity and hence CO2 emissions, whatever the precise outcome of the Kyoto Conference.

The EU's dependence on energy imports is already 50% and is expected to rise over the coming years if no action is taken, reaching 70% by 2020. This is especially true for oil and gas which will increasingly come from sources at greater distances from the Union, often with certain geopolitical risks attached. Attention will therefore increasingly focus on security of supply. Renewable energies as indigenous sources of energy will have an important role to play in reducing the level of energy imports with positive implications for balance of trade and security of supply.

Much progress has been achieved towards completion of the Internal Energy Market. Agreement has been reached in the Council of Ministers on the first phase of liberalisation of the electricity sector and negotiations in the gas sector are well under way. Opening the markets for the network-bound energies will bring market forces into play in sectors which until recently were for the most part dominated by monopolies. This will provide a challenging new environment for renewable energies, providing more opportunities but also posing the challenge of a very cost-competitive environment. Suitable accompanying measures are needed in order to foster the development of renewables.

Renewable energy sources still make an unacceptably modest contribution to the Community's energy balance as compared with the available technical potential. There are signs, however, that this is changing, albeit slowly. The resource base is better understood, the technologies are improving steadily, attitudes towards their uses are changing, and the renewable energy manufacturing and service industries are maturing. But renewables still have difficulties in "taking off", in marketing terms. In fact many renewable technologies need little effort to become competitive. Moreover, biomass, including energy crops, wind and solar energy all offer a large unexploited technical potential.

Current trends show that considerable technological progress related to renewable energy technologies has been achieved over recent years. Costs are rapidly dropping and many renewables, under the right conditions, have reached or are approaching economic viability. The first signs of large-scale implementation are also appearing as regards wind energy and solar thermal collectors. Some technologies, in particular biomass, small hydro and wind, are currently competitive and economically viable in particular compared to other decentralised applications. Solar photovoltaics, although characterised by rapidly declining costs, remain more dependent on favourable conditions. Solar water heaters are currently competitive in many regions of the Union.

Under prevailing economic conditions, a serious obstacle to greater use of certain renewables has been higher initial investment costs. Although comparative costs for

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<sup>2</sup> COM (97) 481 final, 1 October 1997, "Climate Change - The EU Approach to Kyoto"

many renewables are becoming less disadvantageous, in certain cases quite markedly, their use is still hampered in many situations by higher initial investment costs as compared with conventional fuel cycles (although operational fuel costs are non-existent for renewables with the exception of biomass). This is particularly the case due to the fact that energy prices for conventional fuel cycles do not currently reflect the objective full cost, including the external cost to society of environmental damage caused by their use. A further obstacle is that renewable energy technologies, as is the case for many other innovative technologies, suffer from initial lack of confidence on the part of investors, governments and users, caused by lack of familiarity with their technical and economic potential and a general resistance to change and new ideas.

Globally, Europe is at the forefront for several renewable energy technologies. Significant employment is associated with the industries concerned in the European Union, involving several hundred companies, mainly small and medium-sized enterprises, in primary assembling/manufacturing alone; without taking into account other service and supply needs. For the new renewable energy technologies (i.e. not including large hydro-electric power stations and the traditional use of biomass) the world-wide annual turnover of the industry is estimated to be higher than ECU 5 billion, of which Europe has more than a one third share.

### **1.1.3 The Need for a Community Strategy**

Development of renewable energy has for some time been a central aim of Community energy policy, and as early as 1986 the Council<sup>3</sup> listed the promotion of renewable energy sources among its energy objectives. Significant technological progress has been achieved since then thanks to the various Community RTD and demonstration programmes such as JOULE- THERMIE, INCO and FAIR which not only helped in creating a European renewable energy industry in all sectors of renewables but also in achieving a world-wide leading position. This technological leadership will be maintained by the contribution of the 5th RTD framework programme in which the renewable energy technologies will have a central role to play. With the ALTENER programme<sup>4</sup>, the Council for the first time adopted a specific financial instrument for renewables promotion. The European Parliament for its part has constantly underlined the role of renewable energy sources and in a recent Resolution<sup>5</sup> strongly advocated a Community action plan to advance them. In its White Paper, "An Energy Policy for the European Union"<sup>6</sup> the Commission put forward its views as regards Community energy policy objectives and instruments to achieve them. Three key energy policy objectives were identified, viz. improved competitiveness, security of supply, and protection of the environment. Promotion of renewables is identified as an important factor to achieve these aims. A strategy for renewable energy sources was proposed, and specifically cited in the 'indicative work programme' attached to the Energy Policy White Paper.

At the same time some Member States have introduced some measures to support RES and related programmes. Some have set up plans and targets aimed at developing RES in the medium and long term. The share of renewable energies in the gross inland energy consumption differs widely between Member States, from less than 1% to over 25% (see table 1). A Community strategy will provide the

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<sup>3</sup> OJ C 241 of 25.9.1986, p.1

<sup>4</sup> OJ L 235 of 18.9.1993, p.41

<sup>5</sup> PE 216/788; fin

<sup>6</sup> COM(95) 682 of 13.12.1995, "An Energy Policy for the European Union"

necessary framework and bring added value to national initiatives increasing the overall impact.

A comprehensive strategy for renewables has become essential for a number of reasons. First and foremost, without a coherent and transparent strategy and an ambitious overall objective for renewables penetration, these sources of energy will not make major inroads into the Community energy balance. Technological progress by itself can not break down the several non-technical barriers which hamper the penetration of renewable energy technologies in the energy markets. At present, prices for most classical fuels are relatively stable at historically low levels and thus in themselves militate against recourse to renewables. This situation clearly calls for policy measures to redress the balance in support of the fundamental environmental and security responsibilities referred to above. Without a clear and comprehensive strategy accompanied by legislative measures, their development will be retarded. A long-term stable framework for the development of renewable sources of energy, covering political, legislative, administrative, economic and marketing aspects is in fact the top priority for the economic operators involved in their development. Furthermore, as the internal market develops, a Community-wide strategy for renewables is required to avoid imbalances between Member States or distortion of energy markets. The leading position of the European renewable energy industry world-wide can only be maintained and strengthened on the basis of a significant and growing home market.

A policy for the promotion of renewables requires across-the-board initiatives encompassing a wide range of policies: energy, environment, employment, taxation, competition, research, technological development and demonstration, agriculture, regional and external relations policies. A central aim of a strategy for renewable energy will be to ensure that the need to promote these energy sources is recognised in new policy initiatives, as well as in full implementation of existing policies, in all of the above areas. In fact, a comprehensive action plan is required to ensure the necessary co-ordination and consistency in implementing these policies at Community, national and local levels.

The role of Member States in the implementation of the Action Plan is crucial. They need to decide on their own specific objectives within the wider framework, and develop their own national strategies to achieve them. The measures proposed in this White Paper must also be adapted to the particular socio-economic, environmental, energy and geographic situation of each Member State as well as to the technical and physical potential of RES in each Member State.

With a view to illustrating the potential effects of specific policy initiatives in the renewable energy field, the Commission sponsored an exercise referred to as TERES. The TERES II study<sup>7</sup> builds on one of the scenarios previously developed in the Commission's European Energy to 2020<sup>8</sup> report but goes further by adding various specific renewable energy policy assumptions to form three additional scenarios. These scenarios predict the contribution of renewable energy sources to gross inland energy consumption to be between 9.9% and 12.5% by 2010. The technical potential, however, is much larger.

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<sup>7</sup> TERES II, European Commission, 1997

<sup>8</sup> European Energy to 2020. A Scenario Approach, European Commission, 1996



The various scenarios clearly illustrate that renewable energy sources can make a significant contribution to the energy supply of the European Union. On the other hand the renewable energy component of the energy mix is very sensitive to changing policy assumptions. Unless specific incentives are put in place, the large potential for renewable energy will not be exploited and these sources will not make a sufficient contribution to the European energy balance.

## **1.2 The Debate on the Green Paper**

As a first step towards a strategy for renewable energy the Commission adopted a Green Paper on 20 November 1996<sup>9</sup>. A broad public debate took place during the early part of 1997 focusing on the type and nature of priority measures that could be undertaken at Community and Member States' levels. The Green Paper has elicited many reactions from the Community institutions, Member States' governments and agencies, and numerous companies and associations interested in renewables. The Commission organised two conferences during this consultation period where the issues were extensively discussed.

The Community Institutions have delivered detailed comments on the Green Paper as well as opinions on what should be the essential elements and the major actions to be undertaken for a future Community strategy on renewable energy sources and the role of the Community in this process. The Council in its Resolution<sup>10</sup> on the Green Paper, affirms that adequate action on renewables is vital for achieving sustainable economic growth, the aim being a strategy that would lead to improved competitiveness and a substantial share of renewables in the long term. Thus, it confirms that Member States and the Community should formulate indicative targets as a guideline for this ambitious indicative target of doubling the overall share of renewable in the Community by 2010. The Council Resolution states that such a comprehensive strategy should be based on certain basic priorities: harmonisation of standards concerning renewables, appropriate regulatory measures to stimulate the market, investment aid in appropriate cases, dissemination of information to increase market confidence with specific actions to increase customer choice. It also takes the view that adequate provision for the support for renewables in the Fifth Framework Programme for Research, Technological Development and Demonstration is required, as well as effective co-ordination and monitoring of progress in order to optimise available resources.

The European Parliament in its Resolution<sup>11</sup> on the Green Paper recognises the important role that renewable energy can play in combating the greenhouse effect, in contributing to the security of energy supplies and in creating jobs in small and medium enterprises and rural regions. It believes that the European Union urgently needs a promotion strategy which will tackle the issues of tax harmonisation, environmental protection and standards, internalisation of external costs, and ensure that the gradual liberalisation of the internal energy market will not place renewables at a disadvantage. It proposes a goal of a 15% share of renewables for the European Union by the year 2010. It calls on the Commission to submit specific measures to facilitate the large-scale use of renewable energy sources and advocates certain specific measures. These include the setting of targets per Member State, the concept of a common energy-related tax model, free non-discriminatory access to the grid combined with a minimum payment by the utilities

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<sup>9</sup> COM(96)576 of 20.11.1996, "Energy for the future : renewable sources of energy"

<sup>10</sup> Council Resolution n° 8522/97 of 10 June 1997

<sup>11</sup> PE 221/398.fin

for the electricity supplied from renewable energies, the main features of a plan to establish a European fund for renewable energies, a strategy for a common programme to promote renewable energies to include a further 1,000,000 photovoltaic roofs, 15,000 MW of wind and 1,000 MW of energy from biomass.

Parliament's Resolution also calls for a buildings directive, a plan for greater use of structural funds, a strategy for the better utilisation of agricultural and forestry biomass and an export strategy for renewable energy technologies. It reaffirms its belief in the need to increase the Community budgetary appropriations in support of renewable energy sources to the level currently used for nuclear research. It also proposes the constitution of a new Treaty for the promotion of renewable energy sources. The Committee on Agriculture and Rural Development of the Parliament has also issued an Opinion in which it considers that the contribution of biomass-derived energy to the primary energy mix could reach 10% by 2010. It also calls for a better co-ordination of European Union energy policy and the common agricultural policy and emphasises the need to make the necessary arable land available under the latter.

The Economic and Social Committee<sup>12</sup> and the Committee of the Regions<sup>13</sup> have also presented detailed comments on all chapters of the Green Paper, which also stress, analyse, and support the overall goals relating to sustainability and the different ways the potential contribution of renewables can be maximised. Furthermore, these contributions set out ways in which the role and responsibilities of regional and local public authorities and other bodies could be best harnessed to facilitate renewables support and market penetration. Given the predominantly decentralised implementation of most renewable technologies, practical measures in this direction would allow recourse to the subsidiarity principle, in the framework of a Community Strategy and Action Plan, facilitating local authorities in their decision-making power and environmental responsibility. Moreover, this context is a prime example where energy policy aims and those of structural and regional policy can synergise with one another to great effect, as illustrated by the case of rural, island, or otherwise isolated communities where sustainable development and the maintenance of a population base can be actively supported by replacement of inefficient small-scale fossil fuel use by renewables plants. That leads to better living standards and job creation.

More than 70 detailed written reactions have been received from Member State agencies, industries, professional associations, regional associations, institutes and non-governmental organisations following the publication of the Green Paper. The extensive public debate on the Green Paper and the many contributions received have provided valuable input for the Commission in drafting this White Paper and in proposing the Action Plan.

## **1.3 Strategic Goals**

### **1.3.1 An Ambitious Target for the Union**

In the Green Paper on Renewables the Commission sought views on the setting of an indicative objective of 12% for the contribution by renewable sources of energy to the European Union's gross inland energy consumption by 2010. The overwhelmingly positive response received during the consultation process has confirmed the

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<sup>12</sup> CES 462/97 of 23-24 April 1997, Opinion of the Economic and Social Committee

<sup>13</sup> CdR 438/96.fin, Opinion of the Committee of the Regions

Commission's view that an indicative target is a good policy tool, giving a clear political signal and impetus to action. The strategy and action plan in this White Paper therefore, are directed towards the goal of achieving a 12% penetration of renewables in the Union by 2010 - an ambitious but realistic objective. Given the overall importance of significantly increasing the share of RES in the Union, this indicative objective is considered as an important minimum objective to maintain, whatever the precise binding commitments for CO<sub>2</sub> emission reduction may finally be. However, it is also important to monitor progress and maintain the option of reviewing this strategic goal if necessary.

The calculations of increase in RES needed to meet the indicative objective of 12% share in the Union's energy mix by 2010 is based on the projected energy use in the pre-Kyoto scenario (conventional wisdom, European Energy to 2020, see footnote 8) It is likely that the projected overall energy use in the EU 15 may decrease by 2010 if the necessary energy saving measures are taken post Kyoto. At the same time, the enlargement of the Union to new Member States where RES are almost non-existent will require an even greater overall increase. It is therefore considered at this stage, that the 12% overall objective cannot be refined further. It is in any case, to be emphasised that this overall objective, is a political, and not a legally binding tool.

### **1.3.2 Member States Targets and Strategies**

The overall EU target of doubling the share of renewables to 12% by 2010 implies that Member States have to encourage the increase of RES according to their own potential. Targets in each Member State could stimulate the effort towards increased exploitation of the available potential and could be an important instrument for attaining CO<sub>2</sub> emission reduction, decreasing energy dependence, developing national industry and creating jobs. It is important, therefore, that each Member State should define its own strategy and within it propose its own contribution to the overall 2010 objective, indicate the way it expects different technologies to contribute and outline the measures it intends to introduce to achieve enhanced deployment.

Nevertheless, it should be emphasised that both the Community and the Member States have to build on existing measures and strategies, as well as tackle new initiatives. Some Member States have developed national Plans for RES and set objectives for 2010, 2020 or even 2030. Annex III outlines the plans and actions of Member States for renewables development. Member States are indeed already making efforts to develop RES and the Community Strategy will provide a framework to encourage those efforts and to ensure their cross-fertilisation. Action at the level of the Community can provide added value in terms of the sharing and transfer of successful technological and market experiences.

### **1.3.3 Possible Growth of RES by Sector**

Achievement of the average 12% overall indicative objective for the Union clearly depends on the success and growth of the various individual renewable technologies. Views expressed during the consultation process on the Green Paper confirmed that it is important to analyse how the overall objective can be achieved by a contribution from each sector, and hence to estimate the contribution each renewable source is likely to make. The potential sectoral growth of RES suggested in this Strategy has to be considered as a first attempt to identify a possible combination of renewable technologies that could allow the EU to reach the overall target, within technical, practical and economic limitations. However, renewable energy technologies may well evolve differently, depending on many factors, including market developments, options chosen by Member States and technical developments. The estimate share of different technologies are clearly indicative and will serve to help monitor progress

