

# **Indicative Targets for Electricity Production from Renewable Energy Sources in Portugal**

**(2002 - 2012)**

**January/2003**

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## **REPORT**

### **Definition of Indicative Targets for Electricity Production from Renewable Energy Sources**

**(2002 - 2012)**

#### **1. Scope**

The European Parliament and the Council's adoption of Directive 2001/77/CE, on 27 September 2001, on the promotion of electricity production from renewable energy sources (RES) in the internal electricity market, has provided an official endorsement of the recognition of the priority afforded by the European Union to the promotion of electricity production from RES.

The importance attributed to endogenous, renewable energy resources is not only confined to the resolution of the EU's energy problems, including energy supply security and diversification, but also has a clearly more comprehensive transversal dimension, in terms of the formulation of other policies, in which the contribution to the European Union's environmental policy is of special importance. The increased use of renewable energy sources, both in terms of electricity and heat production, is one of the strategies to combat climate change and, particularly, endeavours to reduce greenhouse gases (GG) emissions. It is common knowledge that the increase in the use of electricity produced from RES, represents a substantial component part of the package of measures necessary to comply with the Kyoto Protocol under the United Nations Framework Convention on climate change.

In addition to the energy and environment area, it would be unfair not to make special reference to the positive impact of promotion policies for electricity production from RES in other aspects, held dear by the EU, including social and economic cohesion, regional and local development, the European Union export market and employment. The RES dossier at the recent World Summit on Sustainable Development in Johannesburg, also made special reference to the fundamental role played by renewable energies.

Directive 2001/77/CE, is currently being transposed into national law and the legislative, regulatory and administrative dispositions required to fully complete the procedure by no later than the transposition deadline of 27 October 2003, are being taken.

Notwithstanding the obligations attached to the transposition, article 3, no. 2 of the Directive also establishes that “... Up until 27 October 2002 and every 5 years thereafter, Member States shall approve and publish a report defining national indicative targets for the future consumption of electricity produced from RES, measured as a percentage of energy consumption, for the following 10 (ten) years ...”. The referred to report should also make specific reference to the measures taken or planned to achieve such targets. This document has been prepared in compliance with the said dispositions.

## **2. Measures**

Pursuant to the Directive’s scope, Portugal has undertaken to produce a minimum amount of 39% of its gross electricity consumption from renewable sources in 2010. This percentage essentially corresponds to electricity production from RES in 1997, in which the proportion accounted for by the major hydroelectric power plants was considerable, as is usually the case, and in which almost 90% of electricity production originated from such hydroelectric power stations. Portugal’s undertaking is based on the premise that the Electricity System Expansion Plan will proceed with the construction of new hydroelectric power plants with an installed power rating of more than 10 MW and that another type of renewable capacity will increase eightfold in comparison to recent developments.

Even if all of the major hydroelectric power plants defined in *PESEP 2001 (Public Service Electricity System Expansion Plan for 2001)* are built, they will only represent around 790 MW, by 2010. As electricity demand continues to increase at a rate of around 5% *p.a.*, it can be concluded that the contribution of such major hydroelectric power plants, *per se*, will not be sufficient to meet the planned targets.

Pursuant to the above scenario, the installation of additional power production capacity from other renewable energy sources is indispensable. The most rational choice would be a combination of the resource’s economic availability and the application of mature, competitive technologies. The wind sector currently appears to be particularly suited

and in a position to cater for this demand and on E4 programme (Council of Ministers Resolution no.154/2001 of 27 September) an undertaking has been taken to install 3,000 MW of electricity produced by wind, by the year 2010.

It is not, however, only in the area of energy supply that results targetted at achieving the Directive's indicative targets are to be expected. Reference must be made to the decisive role required in terms of reducing electricity consumption growth rates. Reference should also be made to existing and planned measures on the electricity demand side, as a reduction in consumption levels implies a corresponding reduction of the increase in the supply of electricity from RES. In other words, steps taken to rationalise electricity consumption levels may make a decisive contribution towards achieving the targets.

### **2.1. Energy Efficiency and Endogenous Energies Programme (E4)**

One of the effects of establishing the national indicative targets in Directive 2001/77/CE, was to stress the urgency of the need to prepare a strategic RES promotion plan.

This shortcoming has been remedied by the launch of the already referred to E4 Programme. The Programme, more than a collection of multiple, diversified measures comprises a national strategy designed to improve national economic competitiveness and modernise Portuguese society, while, at the same time, protecting living standards by reducing emissions, particularly CO<sub>2</sub>, promoting energy efficiency and placing greater emphasis on the exploitation of endogenous energy sources.

The actions set out in the Programme have been designed to cater for the challenges we have established for ourselves as a country, such as doubling available energy production capacity and electricity produced from endogenous sources over a timespan of between ten to fifteen years, reducing the energy intensity of GDP, exploiting the potential of the Iberian and European market and improving the management of the load diagramme, while also including a wide range of energy efficiency opportunities, ranging from the territorial and urban planning up to technologies and processes levels, improving the quality of the electricity service and the prices of electricity, natural gas and other types of fuel.

The Programme's intervention strategy is essentially based on a three pronged approach:

- Diversifying access to forms of energy available in the market and increasing the guarantee of service provided by energy supply companies;
- Promoting energy efficiency improvements, contributing to the reduction of energy intensity in terms of GDP and energy import costs and as a means of combatting climate change;
- Placing greater emphasis on the exploitation of endogenous energies, as a balance between technical and economic feasibility and environmental constraints.

The application of this strategy involves a broad range of measures. Several are already in force and others will be successively introduced, on the basis of their expression and opportunity. These range from the setting up of the Iberian electricity market, to the creation of an effective programme to promote renewable energies and the adoption of a broad range of energy efficiency measures.

E4 measures of particular interest from a viewpoint of complying with the Directive's targets, are set out below:

- Promoting national electricity market restructuring measures, in parallel with Portugal's full integration in the internal electricity market and more specifically, the creation of the Iberian market;
- Strengthening the National Electricity Transport Grid and its interconnection with European grids, notably by means of more and better interconnections with the Spanish grid;
- Increasing the flexibility of access and incentives for the rapid development of electricity production through the progressive use of cleaner fuels such as combined heat and power, cogeneration and microgeneration solutions and the use of renewable sources, including major hydroelectric power plants;

- Promoting the use of RES. This includes both RES which have already been technically and economically consolidated (wind energy, small hydroelectric power plants) and emerging and medium term potential solutions such as biomass, photovoltaics, solar heating and wave energy;
- Promoting electricity microgeneration from RES (photovoltaics, microturbines), particularly targetted at the architectural integration of receiving devices on buildings;
- Implementing a procedure for the allocation and control of “Green Certificates” for electricity production from renewable sources;
- Promoting exemplary projects demonstrating the efficient and environmentally relevant exploitation of endogenous energies, notably in terms of emerging technologies.

Reference should also be made to several energy efficiency measures which may, to a certain extent, help to pursue the Directive’s targets:

- Greater endeavours to improve the efficiency and quality of the national electricity system service in terms of production, transport and distribution and reduction of electricity costs;
- Improving the management of the Public Service Electricity System’s grid capacity to handle deliveries of electricity originating from the “Independent Electricity System” (i.e. producers not bound to sell their production to Public Service and SRPs (special regime producers));
- Exploiting incentives for actions designed to improve environmental quality and demand-side management in terms of electricity regulation and particularly the tariff system;
- Launch of sustained promotional actions for demand-side management in the use of electricity, in various sectors of economic activity, via marketing initiatives targetted at directing consumption and the dissuasion of increased consumption;

- Promoting the use of the most efficient electrical equipment and household appliances (classes A, B) and encouraging the adopting of energy and environmental efficiency criteria in terms of purchasing;
- Promoting and strengthening electrical equipment and household appliances labelling inspections;
- Promoting energy efficiency measures in buildings belonging to the State and administrative bodies;
- Updating and strengthening actions designed to promote energy efficiency in buildings and their energy climatisation systems, notably, the revision of *RCCTE-Regulamento das Características de Comportamento Térmico dos Edifícios (Regulations on the Characteristics of the Thermal Behaviour of Buildings)* in the form of Decree Law no. 40/90 of 6 February) and *RSECE-Regulamento dos Sistemas Energéticos de Climatização em Edifícios (Regulations on Energy Climatisation Systems on Buildings)* in the form of Decree Law no. 118/98 of 7 May.
- Developing the regulations on the energy certification of buildings and creation of adequate control mechanisms.

All of the measures have been complemented by the preparation and publication of legislation. Some of this legislation, designed to pursue the listed objectives has already been approved and published while other legislation is currently under preparation.

Two national programmes, launched by the Ministry of the Economy under the E4 Programme are currently in progress: the *Programa Nacional para o Solar Térmico (Solar Hot Water Programme)* and the *Programa Nacional para a Eficiência Energética dos Edifícios (P3E) (National Programme for Energy Efficiency in Buildings)*, designed to coalesce all E4 building related measures.

The aim of the “Solar Hot Water Programme” is to create a sustained market for 150,000 square meters of solar panel installations *p.a.* This could lead to a number of around one million square metres of panels installed and in service by 2010, but will represent no more than 7% of the exploitable potential.

The direct consequence of the desired target, over the referred to timespan, will be:

- A contribution of 0.1 Mtoe in terms of final energy (0.15 Mtoe in terms of primary energy, most of which will no longer be imported);
- A 0.8% reduction of greenhouse gas emissions, comprising 0.5 Mton of CO<sub>2</sub> equivalent avoided;
- The estimated creation of more than 1,500 new jobs.

To achieve its objectives, the Programme will be developed in line with the following guidelines:

- Promotion of the image and exploitation of the economic and social interest of the “solar heating” option for water heating applications;
- Development of two solar heating market structuring elements: hot water produced by solar heating sales services and the sale/installation of solar panel systems;
- Improving the quality certification procedure for solar systems/fitters and designers;
- Strengthening/adapting of tax and financial incentives.

The principal objective of the “National Programme for Energy Efficiency in Buildings (P3E)” is to increase energy efficiency in buildings in Portugal, through the development of a wide range of measures already referred to in E4. Another of P3E’s objectives, is to diminish GG emissions by around 650 thousand tonnes *p.a.* by 2010.

These objectives involve the implementation of several measures, whose schedule is set out in the following table.

## P3E Schedule

Measures	2001				2002				2003				2004
Revision of RCCTE													
RCCTE Training Actions													
Revision of RSECE													
RSECE Training Actions													
Certification of Buildings – Formalisation													
Qualification of Energy Auditors for Buildings													
Training Actions													
Certification of Public Buildings – Launch													
Certification of Public Buildings – Performance													
“Energy Efficiency in Buildings” Brochure													
Awareness Campaigns													
Revision of MAPE*													

\*Medida de Apoio ao Aproveitamento de Potencial Energético e Racionalização dos Consumos (Support Measure for the Exploitation of Energy Potential and Rationalisation of Consumption)

## 2.2. Legislation

The publication of legislation of special relevance to electricity production from RES, particularly includes, *inter alia*, the following:

- **Ministerial Order (“Portaria”) no. 764/2002 of 1 July** – Establishing the tariff for low voltage electricity production facilities, licensed under the terms of Decree Law no. 68/2002;
- **Decree Law no. 97/2002 of 12 April** – Creating the *Entidade Reguladora dos Serviços Energéticos* (“Energy Services Regulatory Authority”) and approving its respective articles of association;
- **Decree Law no. 68/2002 of 25 March** – Regulating low voltage electricity production activities;

- **Ministerial Order no. 295/2002 of 19 March** – Regulating the procedure for obtaining electricity production licences for small hydroelectric power plants;
- **Decree Law no. 339-C/2001 of 29 December** – Altering Decree Law no. 168/99 of 18 May, which revised the regime applicable to the payment for electricity production, under the Independent Electricity System’s “special regime” production;
- **Decree Law no. 313/2001 of 10 December** – Altering Decree Law no. 583/99 of 13 December, revising the regulations on operating conditions and tariffs on the combined production of heat and electricity activities;
- **Decree Law no. 312/2001 of 10 December** – Defining the new management regime for electricity delivery capacity on *Public Service Electricity Grids* produced by *Independent Electricity System* power plants;
- **Decree Law no. 538/1999 of 13 December** – Reviewing the cogenerating activities regime;
- **Decree Law no. 168/1999 of 18 May** – Reviewing the regime applicable to electricity production activities, under the terms of *SEI (Independent Electricity System)*, based on the use of renewable sources or industrial, agricultural or urban waste;
- **Decree Law no. 313/1995 of 24 November** – Establishing the *SEI* juridical regime on the electricity production activities of hydroelectric power plants of up to 10 MVA, in addition to electricity production from renewable energies.

In terms of environmental constraints, reference should also be made to the publication of legislation by the Ministry of the Environment and Territorial Planning (currently known as the Ministry of Cities, Territorial Planning and the Environment), and particularly *Despachos* (Rulings) nos. 11091/2001 (2<sup>nd</sup> series) and 12006/2001 (2<sup>nd</sup> series), designed to simplify the organisational aspects of renewable energy projects, notably those classified under the *EIA (Environmental Impact Assessment)* juridical regime and increasing the flexibility of the procedure for permission to use land located in the *National Ecology Reserve*, considered a *sine qua non* for the development and

full performance of the already existing investment projects portfolio submitted under the terms of Decree Law no. 312/2001.

### **2.3. Other Measures: Instruments Providing RES Incentives**

There are essentially two direct support mechanisms for electricity production from RES in Portugal: a juridical regime establishing differentiated payments based on the type of technology and an operating regime for electricity production from renewable sources and a support measure for investment in RES based energy production projects.

Decree Law no. 168/99 of 18 May, which establishes a differentiated tariff for electricity production from RES, owing to its environmental benefits, was recently updated and improved by Decree Law no. 339-C/2001 of 29 December, which altered the former legislation and revised the regime applicable to *SEI* electricity production activities.

Financial incentives include the creation of MAPE, a support regime under the scope of the *Third Community Framework Support for Portugal* for investment in electricity production equipment from RES, natural gas or RES cogeneration equipment and operations designed to promote the rational use of energy. The MAPE is regulated by Ministerial Order no. 198/2001 of 13 March and the alterations contained in Ministerial Order no. 383/2002 of 10 April, as part of Section 2 of the *POE* (“Operating Programme for the Economy”) under the *Community Framework Support Programme* in force between 2000 e 2006.

In terms of Section 3 of the *POE*, reference should also be made to the “Support Measure for the Modernisation and Development of Energy Infrastructures”, designed to, *inter alia*, support investment projects in public transport infrastructures and electricity and natural gas distribution.

## **3. Indicative Targets for Period 2002-2012**

### **3.1 Premises of Preparation of Electricity Supply Evolution Scenarios from RES**

In preparing the evolution scenarios for electricity produced from renewable energy sources, special attention was paid to the expansion strategies prepared by *Rede*

*Eléctrica Nacional, S.A. (REN)* for the “Public Service Electricity System” in its role as the *RNT* concessionaire and the *PESEP 2001*, prepared by *Direcção Geral de Energia (DGE)* (“Portuguese Directorate General for Energy”).

Studies, commissioned in 2000, on the potential uses of renewable energies for electricity production, notably wind energy, small hydroelectric power plants and biomass, have, to a certain extent been used as markers to indicate the maximum penetration of such technologies. Estimates of the evolution of electricity produced from RES, have been in line with the values defined in the studies, except for wind energy potential, in which exploitation of less than the 2,500 hours level has been forecast, owing to the fact that the tariff conditions were revised with a view to compensating projects with fewer operating hours than the threshold in question, owing to environmental restrictions.

This resulted in the preparation of the following technical potential table:

<i>Renewable Energy Source</i>	<i>Power Production Capacity (MW)</i>	<i>Energy (GWh/year)</i>
Wind (1)	3,140	7,065
Small hydroelectric power plants (2)	1,281	3,906
Biomass (3)	530	3,200
<b>Total</b>	<b>4,951</b>	<b>14,171</b>

(1) for the 2,500 hours *p.a.* threshold, without environmental restrictions

(2) includes small *SENV (Electricity System not Bound)* hydroelectric power plants with a total installed power rating of 56 MW

(3) includes solid urban waste

The reference scenario for hydroelectric power plants of more than 10 MW, includes Alqueva in 2003, Baixo Sabor in 2009 (the latter still subject to a certain degree of uncertainty owing to the eventuality of environmental constraints) and Fridão in 2011, as the principal candidates for the expansion of the hydroelectric sub-system, in addition to two increases in power production capacity (Venda Nova II in 2004 and Picote II in 2008). The completion of these power plants will permit a 914 MW increase in capacity in terms of expansion and new hydroelectric power projects, increasing the current power production capacity of the major hydroelectric power plants to around 5,100 MW.

### New SEP Hydroelectric Power Plants up to 2012

<i>New SEP Hydroelectric Power Plants</i>	<i>Power Production Capacity (net) (MW)</i>	<i>Year</i>
Alqueva	236	2003
Venda Nova II	179	2004
Picote II	233	2008
Baixo Sabor	138	2009
Fridão	128	2011
<b>Total (MW)</b>	<b>914</b>	

Note: All of the power plants in consideration are reversible

In establishing a strategy and a significant number of actions to promote RES and, particularly by defining quantifiable objectives, the E4 Programme comprises an inevitable reference source in terms of establishing targets. The Programme, in this area, has essentially been designed to promote a highly significant growth of installed power production capacity based on the use of wind energy.

### 3.2 Strengthening of *RNT*

Determination to comply with the Directive, also includes RNT planning for handling the delivery the energy produced by *SRPs* (“Special Regime Producers”). The expectation of a large number of *SRP* projects requires a redimensioning of the *RNT*, without, however, jeopardising compliance with security and planning standards and operating conditions. The current grid does not have the capacity to take delivery of and transport the full amount of *SRP* production capacity required to comply with the targets established in the Directive. To achieve this objective it would be necessary to install delivery capacity for more than 3,700 MW produced by *SRP*, in addition to a supplementary increase associated with hydroelectric power plants of more than 10 MVA, which are not considered to be *SRPs*. Investments in this area must, therefore, be meticulously planned, in parallel with the development of *SRP* projects, with a view to suitably catering for applications for the delivery of energy produced by them, but without excessively penalising end-users who could be prejudiced if the grid expands more than is strictly necessary.

*REN* submitted a “*Specific Plan for Strengthening the RNT for SRPs by 2010*” at the end of 2001 in an endeavour to meet the Directive’s demands. The plan is made up of three stages. The first stage of the plan is scheduled for completion in 2006, the second in 2008 and the third in 2010 and will include a total number of 10 new *SRP* production delivery points, 6 of which, located in zones of greater resources during the Plan’s first stage. The construction of new *RNT* lines and the strengthening of existing elements, lines and sub-stations have been planned in addition to these delivery points. The Plan essentially encompasses zones with the greatest wind and hydroelectric power production capacity, identified in the previously referred to studies, in terms of the potential use of renewable energies for electricity production. The zones in question therefore comprise almost the whole of the Minho, Trás-os-Montes e Alto Douro, Beira Alta and Beira Baixa regions as well as the Western Estremadura zone.

The estimated evolution of deliveries of *SRP* power production capacity capable of being handled by the *RNT* (presentation of *RNT* expansion plan in June 2001) is set out in the following table:

<i>Reference Year 1</i>	<i>MW</i>	<i>% of Target</i>
By 2003	1,700	40%
2004/2005	2,000	47%
2005/2006	3,000	70%
2007/2008	3,800	88%
By 2010	4,300	100%

### 3.3 Indicative Targets for Electricity Production from RES

The evolution of electricity production from renewable energies for the next 10 years has been estimated in accordance with the premises put forward and the energy policy determination of promoting endogenous energy sources and ensuring compliance with the Directive’s indicative target. It has essentially been estimated on the basis of data supplied by *REN* and in accordance with the strengthening and foreseeable expansion of the *RNT*.

The main premise is therefore the firm conviction that the objective set for Portugal in the Directive on the promotion of the use of electricity produced from RES, for 2010, will be achieved. The means of so doing, the type of technologies and preferred RES, in

addition to the measures and mechanisms used for the purpose in question will be left to the discretion of each Member State, with the Commission reserving the right to monitor the objectives and adequacy of the measures and mechanisms, based on the regular reports submitted by Member States, to the European Parliament and the Council up to 31 December 2005, followed by a summary report on the Directive's application every 5 years.

Under the Directive on Renewables, Portugal must achieve a target of 39% of its electricity production from RES in terms of gross electricity consumption in 2010.

Gross national electricity consumption is defined as being domestic electricity production, including self-production, plus imports, less exports. This definition coincides with the definition used in the Directive.

A total mainland consumption of 54.3 TWh in 2010 has been assumed in accordance with the reference scenario. Gross consumption will be around 62 TWh after taking grid losses and power plants own consumption into consideration, which, under the terms of the Directive, will require production from renewable sources of around 24.2 TWh.

#### Evolution of Total/Gross Electricity Consumption between 2002 and 2012 (TWh)

<i>Year</i>	<i>Total Consumption on Mainland A</i>	<i>Grid Losses B</i>	<i>Own Consumption by Power Plants <math>C=0.045*(A+B)</math></i>	<i>Gross Consumption on Mainland <math>D=A+B+C</math></i>	<i>Production from Renewable Sources 39% of Gross Consumption on Mainland <math>E=0.39*D</math></i>
2002	40.3	4.1	2.0	46.4	--
2003	42.0	4.2	2.1	48.3	--
2004	43.7	4.3	2.2	50.2	--
2005	45.5	4.4	2.2	52.1	--
2006	47.1	4.5	2.3	53.9	--
2007	48.8	4.6	2.4	55.8	--
2008	50.6	4.8	2.5	57.9	--
2009	52.4	4.9	2.6	59.9	--
<b>2010</b>	<b>54.3</b>	<b>5.0</b>	<b>2.7</b>	<b>62.0</b>	<b>24.2</b>
2012	58.3	5.3	2.9	66.5	25.9

The reference scenario, adopted on the *SEN's (National Electricity System)* expansion needs, was “exacting” in terms of demand evolution, in conjunction with a minimalist transfer scenario of consumption from *SEP* to *SENV*, while also involving a set of demand-side management programmes (DSM).

Tables forecasting the evolution of installed power production capacity and supply of electricity from RES have been prepared in line with this scenario on the basis of the values published in *SEP's* Expansion Plan for 2001.

**Evolution of Installed Power Production Capacity in Power Plants Producing Electricity from RES (MW)**

<i>Year</i>	<i>Hydroelectric (SEP+SENV)</i>	<i>Hydroelectric (SRP)</i>	<i>Wind</i>	<i>Biomass + Biogas</i>	<i>Solid Urban Waste</i>	<i>Photovoltaics</i>	<i>Wave</i>	<i>Cogeneration w/Biomass (1)</i>	<i>TOTAL</i>
<b>2002</b>	4209	235	200	20	66	1	2		4736
<b>2003</b>	4445	245	260	25	66	1	5		5056
<b>2004</b>	4624	255	340	30	66	12	10		5340
<b>2005</b>	<b>4624</b>	<b>270</b>	<b>500</b>	<b>40</b>	<b>66</b>	<b>20</b>	<b>20</b>		<b>5540</b>
<b>2006</b>	4624	300	900	80	66	30	20		6020
<b>2007</b>	4624	350	1300	110	66	50	20		6510
<b>2008</b>	4857	410	1800	140	66	50	20		7343
<b>2009</b>	4995	480	2400	170	66	50	20		8181
<b>2010</b>	<b>4995</b>	<b>500</b>	<b>2930</b>	<b>200</b>	<b>66</b>	<b>50</b>	<b>20</b>		<b>8761</b>
<b>2011</b>	5123	505	2950	200	66	50	20		8914
<b>2012</b>	5123	510	2970	200	66	50	20		8939

Note: (1) The total installed cogeneration power production capacity forecast in 2010 was 1,700 MW. It was not possible to provide a breakdown between biomass and fossil fuels. The production values submitted in the following table assume a figure of around 25% for biomass in terms of total production from cogeneration.

#### Evolution of Production by Electricity Power Plants using RES (GWh)

<i>Year</i>	<i>Hydroelectric (SEP+SENV)</i>	<i>Hydroelectric (SRP)</i>	<i>Wind</i>	<i>Biomass + Biogas</i>	<i>Solid Urban Waste</i>	<i>Photovoltaics</i>	<i>Wave</i>	<i>TOTAL</i>	<i>Cogeneration w/biomass</i>	<i>TOTAL + cogeneration w/biomass</i>
<b>2002</b>	13591	797	383	35	450	1	2	15259	1246	16505
<b>2003</b>	13958	832	518	68	450	1	10	15837	1325	17162
<b>2004</b>	14370	866	675	110	450	9	25	16505	1405	17910
<b>2005</b>	<b>14210</b>	<b>910</b>	<b>945</b>	<b>147</b>	<b>450</b>	<b>21</b>	<b>50</b>	<b>16733</b>	1484	18217
<b>2006</b>	14193	987	1575	252	450	52	55	17564	1538	19102
<b>2007</b>	14147	1126	2025	399	450	100	60	18307	1591	19898
<b>2008</b>	14465	1316	3488	525	450	125	60	20429	1644	22073
<b>2009</b>	14761	1542	4726	651	450	139	60	22329	1697	24026
<b>2010</b>	<b>14725</b>	<b>1698</b>	<b>6350</b>	<b>777</b>	<b>450</b>	<b>140</b>	<b>60</b>	<b>24200</b>	<b>1750</b>	<b>25950</b>
<b>2011</b>	14963	1741	6629	851	450	140	60	24555	1762	26596
<b>2012</b>	14996	1758	6680	872	450	140	60	24626	1777	26733

#### 3.4. Costs Associated with Achieving the Target

The estimated costs necessary to meet the target, only consider the direct costs of energy production investments, power plants and delivery and transport infrastructures. They do not, for example, include line maintenance costs or energy losses from grids deriving from long distance transport. A very high level of capital expenditure concentrating on too small a timespan can, nevertheless, be anticipated.

In terms of the delivery of energy production to the public grid, reference must be made to the fact that most *SRPs* are sited in locations which are far away from the grid and principally far away from the point of consumption and the energy must therefore be delivered to consumption centres. This represents additional costs on the development and modernisation of such infrastructures.

The plan to strengthen the *RNT* to taking delivery of energy from *SRPs* includes around 70 infrastructure projects encompassing the line connection panels between the power plants and *REN* sub-stations, in addition to the lines and sub-stations. A part of such projects has other functions in addition to taking deliveries from *SRPs* and the costs in respect of such functions must therefore be separated. This has been carried out by *REN* which, using the indicative grid for 2010 in the *RNT* Investment Plan for 2000-2005 as a reference, only considered the costs of the bringing forward of and alterations to the

content and/or scheduling of already planned and new projects to be relevant in the case of *SRPs*.

The following table summarises total costs and costs allocated to *SRPs* in respect of the strengthening of the *RNT*, based on the Specific Plan's 3 stages:

<i>EUR million</i>		
<i>Stages of Plan</i>	<i>Total Cost</i>	<i>SRP Cost</i>
Stage 1	94.8	55.6
Stage 2	62.3	26.3
Stage 3	51.3	27.8
<b>Total</b>	<b>208.4</b>	<b>109.7</b>

The cost should be split up among *SRP* promoters.

The value of direct investments in production facilities can be estimated, by considering constant prices, based on the unit prices referred to in the *SRP* Evolution Scenario (2002-2010) prepared by *REN* and the reference prices taken from the E4 Programme Brochure, published by *DGE*. The values by conversion technology are set out below:

Hydroelectric (*SRP*) - 1.50 €mn /MW; Wind - 1.05 €mn /MW; Biomass and Biogas - 1.75 €mn /MW; Photovoltaics - 6.0 €mn /MW; Wave - 1.6 €mn /MW

#### Evolution of Investments in Electricity Production from RES (€mn)

<i>Year</i>	<i>Hydroelectric (SRP)</i>	<i>Wind</i>	<i>Biomass + Biogas</i>	<i>Solid Urban Waste</i>	<i>Photovoltaics</i>	<i>Wave</i>	<i>TOTAL</i>
<b>2002</b>	30	126	16	0	0	3	175
<b>2003</b>	15	63	9	0	0	5	92
<b>2004</b>	15	84	9	0	66	8	182
<b>2005</b>	<b>23</b>	<b>168</b>	<b>18</b>	<b>0</b>	<b>48</b>	<b>16</b>	<b>273</b>
<b>2006</b>	45	420	70	0	60	0	595
<b>2007</b>	75	420	53	0	120	0	668
<b>2008</b>	90	525	53	0	0	0	668
<b>2009</b>	105	630	53	0	0	0	788
<b>2010</b>	<b>30</b>	<b>557</b>	<b>53</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>640</b>
<b>Total</b>	<b>428</b>	<b>2993</b>	<b>334</b>	<b>0</b>	<b>294</b>	<b>32</b>	<b>4081</b>

Note: Does not include investments in SEP hydroelectric power plants.

#### 4. Current Situation of Applications for Interconnection Points

470 PIRs (“Preliminary Information Requests”) were submitted under the terms of Decree Law no. 312/01 of 10 December in the period between 1 January and 31 December 2002. 70 delivery points, split up among the following technologies, were allocated during the same period:

<i>Type of Production</i>	<i>Preliminary Information Requests</i>		<i>Allocated Power Rating</i>	<i>Allocation of Delivery Points</i>	
	<i>No.</i>	<i>Power Rating (KVA)</i>	<i>(KVA)</i>	<i>No.</i>	<i>Power Rating (KVA)</i>
Wind	319	6,807,000	1,200,000	34	566,772
Hydroelectric	75	181,315	85,000	8	29,810
Thermal (biogas)	16	35,860		2	3,520
Solar	15	117,143		-	-
Cogeneration	45	542,725		26	254,160
<b>Total</b>	<b>470</b>	<b>7,684,043</b>	<b>1,285,000</b>	<b>70</b>	<b>854,262</b>

#### 5. Conclusions

Considering the referred to evolution, both in terms of the installed power production capacity and production for each of the conversion technologies, even excluding the value of cogeneration based on biomass, the value of 24,200 GWh, indicated in the Directive for the year 2010 is achievable, provided that the gross electricity consumption scenario referred to in this document is not revised upwards. Two other constraints on achieving the targets are associated with the maintenance of the current RES promotion incentive instruments, i.e. the juridical regime establishing differentiated payments by technology and the operating regime for electricity production based on renewable sources and the investment support measure for energy production projects from RES. Without these supports, particularly in tariff related matters, a major flow of capital into other investment areas is more than probable.

**Note:** Reference should be made to the fact that, this year’s figures do not include data on total electricity consumption and production figures from renewable energy sources in the Autonomous Regions of Madeira and the Azores. These figures will be included in a future revision of the document.