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Portuguese Directorate-General for Energy and Geology

October 2009

Fourth progress report on achieving the indicative targets for electricity production from renewable energy sources in Portugal (2007-2008)

1. BACKGROUND

In accordance with **Article 3(3)** of Directive 2001/77/EC of 27 September 2001 on the promotion of electricity produced from renewable energy sources, every two years Member States approve and publish a report **analysing progress made towards achieving national indicative targets** for the production of electricity using renewable energy sources, with a view to meeting the commitment to be achieved by 2010.

This is Portugal's **fourth such report**; it outlines trends in the production of electricity using RES in the last two years. Production of this kind is a major means of reducing carbon intensity and constitutes a major contribution towards achieving diversification and sustainability within the energy sector.

2. ANALYSIS OF TRENDS IN NATIONAL TARGETS WITHIN THE FRAMEWORK OF PROMOTING RENEWABLE ENERGY IN THE LAST TWO YEARS

Given their strategic importance and the developments recorded with regard to renewable energy in recent years, the Portuguese Government has stepped up previous measures, in accordance with Council of Ministers Resolution No 1/2008 of 4 January

2008, which defines new commitments for 2010, establishing, in particular, that 45% of end electricity consumption should by then come from renewable sources.

New **objectives** for various renewable energy sources have therefore been established:

- **Wind Energy**: installed capacity should be increased by 1 950 MW by 2012, to reach a total of 5 100 MW (plus 600 MW from upgrading for current equipment); investment should also be made in a wind energy technological cluster. This has strengthened the existing policy, the main features of which are as follows:

  - In July 2005, a phased open tender was launched, the objective of which was the allocation of 1 800 MW of connection power, linked to the establishment of an industrial cluster, involving investment of approximately €1 750 million and the expected creation of 1 700 jobs directly and 4 500 indirectly. It also set in place the conditions for establishing an Innovation Support Fund (*Fundo de Apoio à Inovação* - FAI) in the field of renewable energy;

  - In October 2006, the first phase was completed, with the award of 1 000 MW (and upgrade of 200 MW);
  - In September 2007, the second phase was completed and 400 MW awarded;
  - In late 2008, the third phase was completed and 200 MW awarded.

An industrial and RTD cluster linked to the tenders was set up, involving a large number of companies and an industrial complex for the integral production of wind generators. The cluster for Phase A has been completed and the industrial and RTD cluster linked to Phase B is in the final stages.

By means of Order No 32276-A/2008 on 17 December 2008 issued by the Portuguese Ministry for Education and Innovation, an Innovative Support Fund (FAI) was set up, endowed with €76.8 million, with an initial allocation of €35 million by the Phase 1 Consortium and €4.1 million from the Phase 2 Consortium, with the second instalment from the Phase 2 Consortium (€4.2 million) already having taken place.

- **Hydroelectrical energy**: power from existing hydroelectric infrastructures (Picote, Bemposta and Alqueva) is to be increased so that installed capacity is 5 575 MW by 2010.

The **PNBEPH (National Programme of Barrages with High Hydroelectrical Potential)**, approved in October 2007, identified and defined priorities for investments to be made during the period 2007-2020, promoting the construction of eight new barrages which will enable 70% of potential national hydroelectrical power to be utilised. The putting into practice of this programme is essential if Portugal is to meet its renewable energy targets in 2020.

- **Biomass**: installed capacity should be increased by 100 MW, by means of a network of electricity production plants by 2010, to reach a total installed capacity of 250 MW, linking in with forestry resources and in accordance with the policy of reducing the risk of fires.
    - In 2006, 15 tenders for the allocation of electricity production capacity were launched (a total of 100 MW), meant for thermal forestry biomass thermal plants, involving investment of around €225 million and the creation of around 700 jobs. Bids were submitted in respect of 13 of these tenders, corresponding to 96 MW. The projects are at various stages of completion; the first biomass plant under these tenders will begin operations by the end of 2009.

- **Solar photovoltaic energy**: two medium-/large-scale power plants are in operation:
    - The **Amareleja Photovoltaic Solar Plant (in Moura)**, began operating in December 2008. Its installed capacity is 46.4 MW and it has an estimated annual production of around 90 GWh/year. It occupies an area of 250 hectares and has 262 080 photovoltaic modules built into 2 520 solar trackers. A total €262 million has been invested, involving the setting-up of a factory manufacturing photovoltaic modules, which has been operating since July 2008.

    - The **Serpa Photovoltaic Plant** has been operating since January 2007, with installed capacity of 11 MW and forecast production in excess of 18 GWh/year. Investment amounted to €62 million.

As regards **distributed micro-generation**, an innovative policy is being adopted, one which was not covered in the simplified and virtual allocation process, involving a register of orders on the Internet. Once an order is accepted, photovoltaic solar panels or small wind generators can be installed. Electricity is then produced which enters the system and the connection is coordinated with the relevant distributing entity.

- The '***Time for Renewables***' programme aims to install 50 000 microgeneration systems (the equivalent of approximately 165 MW 'installed power') by 2015.

- **Wave Energy**: a Pilot Zone has been created with potential total production of up to 250 MW in order to ensure the technological development of new wave technology pilot projects. Legislation regulating the relevant authorisations (licences and permits) has also been published, and installed capacity increased to 200 MW (Decree-Law No 5/2008 of 8 January 2008 created an exclusive pilot zone on the Portuguese coast for the production of electricity using wave energy and established the system for managing access to the performance of this activity).

- In September 2008, a wave energy plant, located in Póvoa do Varzi m, entered the pre-commercial stage, with an installed capacity of 2.25 MW, and initial investment of approximately EUR 8.5 million.

- **Biogas**: various projects are being developed, with the aim of achieving the target of 100 MW of installed capacity for units involved in the anaerobic treatment of waste.

- **Geothermal energy**: allocation of power for developing small experimental high enthalpy geothermal projects.

2.1. System of incentives

As regards the system of incentives to encourage the production of electricity, Portugal has implemented a scheme of incentives, broken down per type of technology, with the right to feed into the grid and to set the relevant tariff (feed-in tariff), as shown below:

Table 1- SCHEME OF INCENTIVES

TECHNOLOGY	**AVERAGE INDICATIVE TARIFF** Decree-Law No 225/2007 (€/MWh)	
	up to 5 MW	over 5 MW
Wind	75	74
Hydro up to 10 MW	77	75
Photovoltaic of more than 5 kW	317	310
Photovoltaic • 5 kW	450	
Solar-thermo-electric • 10 MW	273	267
Photovoltaic micro-generation • 5 kW	470	
Photovoltaic micro-generation > 5 kW and • 150 kW	355	
Forest biomass	109	107
Animal biomass	104	102
Biogas involving anaerobic digestion of MSW/WWTP (municipal solid waste/waste water treatment plant), livestock effluent and agri-food waste	117	115
Landfill gas	104	102
MSW (incineration)	54	53
Waste-derived fuel (incineration)	76	74
Demonstration wave power up to 4 MW	260	
Pre-commercial wave power up to 20 MW		191
Commercial wave power – first 100 MW		131
Commercial wave power – subsequent 150 MW		101
Commercial wave power – thereafter		76

3. PRODUCTION OF ELECTRICITY USING RENEWABLE ENERGY

As regards achieving the indicative target of 39% of gross electricity consumption by 2010, pursuant to Directive 2001/77/EEC, Portugal is pursuing this objective, based on the reference data from 1997 used by the Commission to establish the starting situation under the Directive. In addition, the situation in Portugal has been characterised by a year in which precipitation was 22% higher than the average year.

Given the importance of hydroelectricity in the national electric producing system, Portugal has consistently used the same methods for hydroelectrical energy over the years, gauging its hydroelectrical production by means of an annual productivity index, defined by the REN (the Portuguese Operator of the Energy Transmission System), taking as a baseline gross electricity production produced from renewable energy in 1997.

Directive 2001/77/EC did not establish methods for processing this hydrological component, but did use the reference data from 1997 for establishing indicative targets. Since the Directive did not impose any methodology, Portugal set its target using a method that took into account the fact that the reference year was a year of high rainfall, which is unlikely to be repeated in subsequent years. Since the first report, which related to 2002, Portugal has always applied the same method , using as a basis the reference data from 1997, given that the point has been made that gauging targets in 2010 should be done using the same methods as those used to establish targets in 2001, although it also takes into account the efforts made by the Commission to harmonise methods between Member States, something provided for in the forthcoming Directive.

The table below shows trends since 1997 in the production of electricity produced using renewable energy.

Table 2 - ELECTRICITY PRODUCTION USING RENEWABLE ENERGY SOURCES (GWh)

Type of energy	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total hydroelectrical	*[Translator's note: please see original for figures]*											
Large-scale hydroelectrical (> 30 MW)												
Small-scale hydroelectrical (> 10 <= 30 MW)												
Small-scale hydroelectrical (<= 10 MW)												
Wind												
Biomass + solid urban waste + biogas												
Biomass (with cogeneration)												
Biomass (without cogeneration)												
Solid urban waste												
Biogas												
Geothermal												
Photovoltaic												
Wave/tidal												
Total production from renewables (actual)												
Gross prod. and import balance												
% of renewables (actual)												
HPI (base year – 1997)												
Total corrected hydroelectrical (HPI = 1)												
Total renewables production (with correction for hydro)												
% renewables (with correction for hydro)												

Source: Directorate-General for Energy and Geology/Directorate-General for Energy

In 2008, total production was 15 345 GWh, which represents a 9% reduction since 2007, as a result of trends in hydroelectrical energy (see figure 1).

Wind energy increased by 42% in 2008 compared to 2007. It should be noted that, in practical terms, current installed capacity with regard to wind power is 2 800 MW, distributed across 172 parks, with a total of 1 495 wind generators throughout continental Portugal; 40% of installed capacity is situated in parks with a capacity of 25 MW or less.

There has also been an increase in solar photovoltaic energy, due to the plants in Moura and Serpa coming on-line (see figure 2).

Therefore, in 2008, for the purposes of the Directive renewable energy sources accounted for 43.1 % of gross electricity consumption figures.

Figure 1 - PRODUCTION OF ELECTRICITY PER TYPE OF RES

[Key to graph:

Biomass + RSU + Biogás = Biomass + solid urban waste + biogas

PCH (> 10 and <= 30 MW = Small-scale hydroelectrical (> 10 MW and <= 30 MW)

Fotovoltaica = Photovoltaic

Eólica = Wind Energy

PCH (<= 10 MW) = Small-scale hydroelectrical (<= 10 MW)

Prod. Ren. Total com hídrica corrigida = Total renewables production (with correction for hydro)

Grande Hídrica (>30 MW) = Large-scale hydroelectrical (>30 MW)

Geotérmica = Geothermal]

Table 3 - TRENDS IN INSTALLED CAPACITY (MW)

Type of energy	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Total hydroelectrical	*[Translator's note: please consult original for figures]*								
Large-scale hydroelectrical (> 30 MW)									
Small-scale hydroelectrical (>10 <= 30 MW)									
Small-scale hydroelectrical (>10 MW)									
Wind									
Biomass + solid urban waste + biogas									
Biomass (with cogeneration)									
Biomass (without cogeneration)									
Municipal solid waste									
Biogas									
Geothermal									
Photovoltaic									
Wave/tidal									
Total									
Average annual growth rate (2000-2008)									

Figure 2 - INSTALLED CAPACITY FOR RENEWABLE ENERGY (MW)

[Key to graph:

Biomass + RSU + Biogás = Biomass + solid urban waste + biogas

PCH (<= 10 MW) = Small-scale hydroelectrical (> 10 MW and <= 30 MW)

Eólica = Wind Energy

Geotérmica = Geothermal

Grande Hídrica = Large-scale hydroelectrical

Fotovoltaica = Photovoltaic

PCH (> 10 MW e <= 30 MW) = Small-scale hydroelectrical (> 10 MW and <= 30 MW)]

In December 2008, Portugal's installed capacity based on renewable energy sources was 8 151 MW.