

FORECAST DOCUMENT

(in accordance with Article 4(3) of Directive 2009/28/EC)

1. Introduction

This document has been drafted in accordance with Article 4(3) of Directive 2009/28/EC), which provides for the following:

“Each Member State shall publish and notify to the Commission, six months before its national renewable energy action plan is due, a forecast document indicating:

(a) its estimated surplus production of energy from renewable sources by comparison with the indicative trajectory which could be transferred to other Member States in accordance with Articles 6 to 11, as well as its estimated potential for joint projects, until 2020;

and

(b) its estimated demand for energy from renewable sources to be satisfied by means other than domestic production until 2020.”

Directive 2009/28/EC brings together into one single legal instrument the provisions on producing electricity, thermal energy (heating and cooling) and transport from renewable sources, the main goal of the EU27 being to reach the targets of 20% of final gross energy consumption and 10% of transport energy from renewable sources by 2020.

For Romania, the target defined by Directive 2009/28/EC for the year 2020 is 24% of final gross energy consumption from renewable sources, an increase of 6.2% by comparison with the reference year 2005 (the reference value for 2005 is 17.8%).

Promoting the use of renewable energy sources (RES) has been a major energy policy objective and the total technical energy potential of Romania's renewable energy sources was assessed and published as early as 2003.

The national technical potential of the renewable energy sources:

Source	Annual potential	Application
Solar	60 PJ/year 1.2 TWh	Thermal energy Electricity

Wind (theoretical potential)	23 TW-h	Electricity
Hydro, of which below 10 MW	36 TW-h 3.6 TW-h	Electricity
Biomass and biogas	318 PJ	Thermal energy Electricity
Geothermal	7 PJ	Thermal energy

The values in this table represent the maximum quantity of energy that could be produced annually from each renewable source by using currently available technologies, without taking into account economic and environmental constraints.

To develop this potential and reach the targets, Romania has established a legal and institutional framework appropriate for promoting the use of renewable energy sources in line with the Community *acquis*.

In 2003 Romania adopted the “Strategy for the development of the renewable energy sources”, approved by Government Decision No 1535/2003.

Directive No 2001/77/EC has been transposed into the national legislation by Government Decision No 443/2003 on promoting the production of electricity from renewable energy sources. Government Decision No 1892/2004 on establishing a mechanism for promoting the production of electricity from renewable energy sources, amended by Government Decision No 958/2005, has defined a system of mandatory quotas coupled with a trading system for green certificates. The market for green certificates is based on Order No 22/2006 of the National Energy Regulatory Authority (ANRE) - Regulation on the functioning of the market for green certificates.

Under “Romania’s Energy Strategy for 2007-2010”, approved by Government Decision No 1069/2007, the 2010, 2015 and 2020 targets for the share of electricity from renewable sources in gross domestic electricity consumption are 33%, 35% and 38%, respectively.

To promote the production of electricity from renewable sources, Romania uses the system of mandatory quotas coupled with the trading system for green certificates. On the basis of this mechanism, suppliers acquire mandatory quotas of green certificates and the electricity is sold separately on the energy market. The acquisition quotas for green certificates are established in correlation with the targets, and their values increase every year. The market energy has dispatching mechanisms that give priority to sales of electricity from renewable sources.

The Romanian mechanism for promoting the production of electricity from renewable sources covers the electricity produced by companies authorised by the National Energy Regulatory Authority (ANRE) and delivered to the public grid, as follows: hydro-energy produced by power stations with installed power of up to 10 MW, put in operation or updated in 2004 or later, wind energy, solar energy, geothermal energy, biomass, biogas, landfill gas and sewage treatment plant gas.

Every month the transport and system operator, Transelectrica SA, issues green certificates for the electricity produced from renewable sources and delivered to the grid, on the basis of data collected through metering.

The producers of electricity from renewable sources can sell their green certificates on the domestic market for green certificates.

In Romania the market for green certificates became operational in 2005. The electricity market operator, SC Opcom SA, manages a centralised market for green certificates, based on monthly auctions.

The trading price of green certificates has both a floor and a ceiling established by law, to protect both investors (who receive minimum price guarantees) and consumers (maximum price guarantees).

Sales of energy produced from renewable sources have priority on the electricity market, including on the Day Ahead Market run by Opcom SA.

Besides the legal instruments indicated above, we would also like to mention other instruments that are part of the legal framework promoting the renewable energy sources.

- Act No 13/2007 on electricity;
- Government Decision (HG) No 219/2007 on promoting cogeneration based on the demand for useful thermal energy;
- Government Decision (HG) No 750/2008 approving the regional state aid scheme for developing the renewable energy sources, Official Gazette No 543 of 18 July 2008;
- Order No 2228/2008 approving the list of eligible expenses for projects financed under the major intervention measure 4.2 “Developing the renewable energy resources to produce green energy”, priority axis 4 “Enhancing the energy efficiency and security of supply in the

context of the fight against climate change” of the Sectoral Operational Programme - Increasing Economic Competitiveness - POS CCE 2007-2013;

- Act No 220/2008 establishing the mechanism for promoting the production of energy from renewable sources, Official Gazette No 743 of 3 November 2008;
- Government Decision No 1461/2008 approving the procedure for issuing guarantees of origin for electricity from high efficiency cogeneration;
- Government Decision (HG) No 1538/2008 amending Section 4(2) of Government Decision (HG) No 1892/2004 establishing the mechanism for promoting the production of electricity from renewable energy sources;
- Government Decision (HG) No 1661/2008 approving the National Programme for increasing energy efficiency and the use of renewable energy in the public sector, for 2009-2010;
- Government Order (OG) No 22/2008 on energy efficiency and promoting renewable energy sources for end-use consumption;
- Government Decision (HG) No 409/2009 approving the method of applying Government Order (OG) No 22/2008, Official Gazette No 263 of 22 April 2009;
- Government Decision (HG) No 90/2008 - Regulation on connecting users to the public grid;
- ANRE Order No 129/2008 - Regulation on defining solutions for connecting users to the public grid;
- ANRE Order No 51/2009 - Technical requirements for connecting wind power stations to the public grid - Technical specifications.

The institutional framework associated with promoting the renewable energy sources includes:

- Ministry of the Economy, responsible for applying the Government's energy policy, including in the field of renewable resources;
- Ministry of the Environment;
- Ministry of the Interior and Administrative Reform (MIRA), for local government;

- Ministry of Transport (MT), for the transport sector;
- The National Energy Regulatory Authority (ANRE) is responsible for drafting specific secondary legislation, issuing guarantees of origin at the request of producers of electricity from renewable sources and checking supplier compliance with the mandatory quotas;
- The transport and system operator (OTS), Transelectrica SA, issues green certificates for producers of electricity from renewable sources;
- The electricity market operator (Opcom SA) manages the centralised market for green certificates.

2. National overall target for the share of energy from renewable sources in gross final consumption of energy in 2020 and indicative trajectory

Annex 1 to Directive 2009/28/EC indicates that for Romania the target for 2020 is 24%. The indicative trajectory is outlined in Table 1.

Table 1:

Year	Share of energy from renewable sources in gross final consumption (%)
2005	17.80
2011 – 2012	19.04
2013 – 2014	19.66
2015 – 2016	20.59
2017 – 2018	21.83
2020	24.00

3. Gross final energy consumption and consumption of energy from renewable sources

Under Article 2 of Directive 2009/28/EC, “gross final energy consumption” refers to:

- Final consumption of energy in sectors of end-user consumption (industry, transport, households, etc.);

- Consumption of electricity and thermal energy in the production of electricity;
- Electricity and thermal energy lost in the distribution and transport system.

Table 2 shows gross final energy consumption in Romania between 2004 and 2008.

Table 2:

Indicator	Unit	Year				
		2004	2005	2006	2007	2008
1. Final energy consumption	thousand toe	25 498	24 678	24 768	24 022	25 303
2. Gross final energy consumption	thousand toe	27 970	27 041	27 246	26 486	27 673
3. Energy from renewable sources	thousand toe	4 479	4 921	4 635	4 658	5 279
4. Share of renewable sources in the total	%	16.01	18.20	17.01	17.59	19.08

Source: Eurostat, for years 2004 to 2007;
National Institute of Statistics (INS), for 2008.

The table also outlines the consumption of energy from renewable sources and its share of gross final consumption. Note the relatively significant year-on-year variation caused by climate conditions and other factors. It is also possible to see that the share of renewable sources is rising.

Table 3 outlines the gross final energy consumption during the same period.

Table 3:

Indicator	Unit	Year				
		2004	2005	2006	2007	2008
1. Final electricity consumption	thousand toe	3 331	3 337	3 518	3 519	3 592
2. Gross final energy consumption	thousand toe	4 755	4 839	5 018	5 103	5 152

Indicator	Unit	Year				
		2004	2005	2006	2007	2008
3. Energy from renewable sources	thousand toe	1 420	1 738	1 579	1 376	1 479
4. Share of electricity from renewable sources in the total	%	29.86	35.92	31.47	26.96	28.71

Tables A2 and A5 in the annex contain the primary data underlying the values indicated in Table 3.

An important aspect is that in 2005, the year chosen as reference year for defining the targets, favourable climate conditions resulted in a record production of hydro energy.

Table 4 outlines gross final energy consumption in transport. The “Petrol and diesel” row also includes gas and LPG consumption. In line with the Directive, kerosene consumption has not been included.

Table 4:

	Unit	2004	2005	2006	2007	2008
Electricity	GW-h	1 578	1 562	1 298	1 417	1 401
	thousand toe	136	134	112	122	120
Petrol and diesel (including gas)	thousand toe	4 880	3 946	4 088	4 320	4 871
Total	thousand toe	5 016	4 080	4 200	4 442	4 991

In the period under analysis the transport sector did not use biofuels. The share of energy from renewable sources in the energy consumed in transport is defined by the consumption of electricity in this sector.

Table 5 outlines gross final energy consumption for heating and cooling.

Table 5:

	2004	2005	2006	2007	2008
Consumption (thousand toe)	18 194	18 144	17 999	16 881	17 428
Consumption from renewable energy sources (thousand toe)	3 059	3 183	3 056	3 282	3 800
Share of the renewable energy sources (%)	16.81	17.54	16.98	19.44	21.80

After 2006 there has been an ascending trend that reached a peak in the last year of the period under analysis (21.8% in 2008).

Please note the following in relation to Table 2 and subsequent tables:

- the data for the years 2004 to 2007 are data published by Eurostat;
- the data for 2008 are data published by the National Institute of Statistics (INS) because Eurostat has not yet published the data for 2008;
- for the period 2004 to 2007, there are both Eurostat and INS data; the Eurostat data have been given priority because they are used by the European Commission.

Annex 1 outlines the calculation method.

The energy from renewable sources and its share in gross final consumption have been calculated in accordance with Article 5(1) of the Directive:

“Gross final consumption of energy from renewable sources in each Member State shall be calculated as the sum of:

(a) gross final consumption of electricity from renewable energy sources;

(b) gross final consumption of energy from renewable sources for heating and cooling;

and

(c) final consumption of energy from renewable sources in transport.”

4. Forecasts of gross final energy consumption

Forecasting the production and consumption of energy is an ongoing activity that informs the main energy policy decisions adopted in Romania. Forecasts are drafted primarily by the National Forecasting Committee (a governmental institution established in 2003 by reorganising the former Ministry of Development and Forecasting). The Ministry of the Economy also cooperates with specialised institutes with experience in the field of energy forecasting.

In 2007 the Government drafted "Romania's Energy Strategy for 2007-2020", approved by Government Decision (HG) No 1069/2007. The main aspects of the energy forecast informing the strategy are outlined in Tables 6 and 7:

Forecast of economic development and final energy consumption

Table 6:

Indicator	Unit	2005	2010	2015	2020
GDP	EUR billion 2005	79.50	108.30	142.20	186.00
Final energy intensity	toe/EUR thousand 2005	0.32	0.25	0.21	0.17
Final energy consumption	thousand toe	25 280	27 075	29 860	31 620
Gross final energy consumption	thousand toe	27 710	29 674	32 697	34 624

Forecast of electricity consumption

Table 7:

Indicator	Unit	2005	2010	2015	2020
Gross electricity consumption	TW-h	56.48	66.10	74.50	85.00
Production of electricity from renewable sources	TW-h	17.75	21.70	26.00	32.50
Share of renewable	%	31.43	32.83	34.90	38.24

sources in consumption					
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There have also been other forecasts (including some drafted with the assistance of foreign consultants) but now their value is mainly historical.

The global economic crisis that broke out in 2008 has had a deep impact on Romania, including on the levels of present and future energy consumption. The Ministry of the Economy initiated and coordinated new forecasts on energy consumption that take into account the impact of the crisis.

The National Forecasting Committee (CNP) made a long-term forecast on economic development and final energy consumption reflecting the new context and the results were published in November 2009. The main results are presented in Table 8.

Table 8:

Indicator	Unit	2005	2010	2015	2020
GDP	EUR billion 2005	79.747	90.710	11.980	143.726
Final energy intensity	toe/EUR thousand 2005	0.317	0.255	0.229	0.198
Final energy consumption	thousand toe	25 200	23 105	25 696	28 514
Gross final energy consumption	thousand toe	27 500	25 300	28 140	31 220

The CNP forecast does not include detailed data on energy consumption in the following fields:

- electricity;
- transport;
- heating and cooling.

The comparative analysis of the values in Tables 6 (the 2007 forecast) and 8 (the 2009 forecast) shows that the current economic crisis has dampened the initial optimism concerning Romania's

long-term economic development. In this context, the 2009 forecast value for gross final energy consumption is only 31.22 million toe, compared with the 2007 forecast value of 34.62 million toe.

Table 9 contains the forecast on energy consumption in the most likely economic development scenario (the CNP scenario) and taking into account energy efficiency measures.

Table 9:

Indicator	Unit	2010	2015	2020
Final energy consumption	thousand toe	23 056	25 537	28 507
Gross final energy consumption	thousand toe	25 246	27 966	31 212
Gross final electricity consumption	GW-h	56 336	61 813	71 525
	thousand toe	4 844	5 315	6 150
Final energy consumption in transport	thousand toe	4 665	5 196	5 546
Gross final consumption for heating and cooling	thousand toe	15 737	17 455	19 516

5. Forecast of gross final consumption of energy from renewable sources

Taking into account the forecast on national energy consumption and the trajectory established for Romania under the Directive (Table 1), the gross final consumption of energy from renewable sources has to reach the values indicated in Table 10.

Table 10:

Indicator	Unit	2010	2015	2020
Gross final energy consumption	thousand toe	25 246	27 966	31 212

Share of renewable sources	%	19.04	20.59	24.00
Consumption of energy from renewable sources	thousand toe	4 807	5 758	7 491

Achieving the values indicated in the above-mentioned forecast while complying with the trajectory established under the Directive is possible only by developing all renewable energy sources.

Taking into account the trajectory established under “Romania’s Energy Strategy for 2007-2020”, gross electricity consumption from renewable sources has to reach the values indicated in Table 11.

Table 11:

Indicator	Unit	2010	2015	2020
Gross final electricity consumption	thousand toe	4 844	5 315	6 150
Share of renewable sources	%	33	35	38
Consumption of electricity from renewable sources	thousand toe	1 599	1 860	2 337

The consumption of energy from renewable sources in transport is indicated in Table A8. To achieve the target of 10% from renewable sources in transport, in 2020 the consumption of biofuels has to reach the values indicated in Table 12.

Table 12:

Indicator	Unit	2010	2015	2020
Petrol and diesel consumption	thousand toe	4 388	4 813	5 139

Biofuel consumption	thousand toe			472
Share of biofuels	%			9.18

6. Romania's RES Potential

Several studies of Romania's RES potential have been made by specialised institutes from Romania and foreign consultants. Table 13 presents values taken from the "Strategy for developing the renewable energy sources (Government Decision (HG) No 1535/2003)".

Table 13:

The potential of renewable energy sources in Romania

Renewable energy source	Annual energy potential	Energy savings equivalent (thousand toe)	Application
Solar energy:			
- thermal	60×10^6 GJ	<i>1 433.0</i>	Thermal energy
- photovoltaic	1 200 GW-h	<i>103.2</i>	Electricity
Wind energy	23 000 GW-h	<i>1 978.0</i>	Electricity
Hydro energy, of which: under 10 MW	40 000 GW-h 6 000 GW-h	<i>516.0</i>	Electricity
Biomass	318×10^6 GJ	<i>7 597.0</i>	Thermal energy
Geothermal energy	7×10^6 GJ	<i>167.0</i>	Thermal energy

Comparing the data in Table 10 with the data in Table 13 shows that to achieve the 2020 target Romania must develop 63.5% of the total potential of its renewable energy sources. This percentage value is considerable, in our opinion, and illustrates the magnitude of the national effort necessary for achieving the target.

7. Conclusions

Directive No 2009/28/EC established the percentage of 24% as Romania's overall national target for the share of energy from renewable sources in gross final consumption.

The recent forecasts conducted in Romania by specialised organisations have shown that in 2020 gross final energy consumption will (probably) be 31 212 thousand toe. Achieving the overall national target implies a consumption of energy from renewable sources of 7 491 thousand toe.

Therefore, Romania has to develop approximately two thirds of the total potential of its renewable energy sources. Also taking into account the economic and environmental constraints, we consider that it will not be possible to use more than these two thirds of the total potential of the renewable sources. The evaluation of the economic and environmental potential of the renewable energy sources is under way.

Currently, Romania uses significant quantities of energy from renewable sources. In recent years, the consumption of energy from renewable sources has been rising, reaching over 5 000 thousand toe in 2008. The most important part came from firewood, the form of renewable energy that is the easiest to obtain and use. Another important part came from sources of hydro energy.

In the future Romania will have to make significant efforts to reach higher levels of efficiency in using biomass (including firewood) and also develop other renewable sources (including wind energy and other sources).

The legal framework has been improved and important projects have already been initiated, especially in relation to the development of the wind potential.

Romania considers that it can just reach the overall target by relying exclusively on domestic production, without taking recourse to transfers from other member states.

Having regard to:

- **the necessity of reaching the 2020 national target;**
- **the relatively long periods of time required by investments in new production capacities for renewable sources;**

We consider that the production of energy from renewable sources will follow the established indicative trajectory, without surpluses that could be used at the European level.

In regard to common projects, at present we are analysing the possibility of building a new hydro-electrical power station on the Danube, in cooperation with partners from the Republic of Bulgaria.

Annex 1

Table A1: Gross final energy consumption (thousand toe)

	2004	2005	2006	2007	2008
Final consumption	25 498	24 678	24 768	24 022	25 303
Electricity consumption in the energy sector	904	999	940	1 024	940
Thermal energy consumption in the energy sector	420	261	380	335	319
Losses in the power grid	521	502	560	560	620
Losses in the thermal energy networks	628	601	598	545	489
Gross final consumption	27 970	27 042	27 246	26 486	27 671

Table A2: Gross final electricity consumption

Indicator	Unit	Year				
		2004	2005	2006	2007	2008
Final electricity consumption	GW-h	38 736	38 811	40 916	40 928	41 775
	thousand toe	3 331	3 337	3 518	3 519	3 592
Electricity consumption in the energy sector	GW-h	10 508	11 619	10 930	11 904	10 936
	thousand toe	904	999	940	1 024	940
Losses of electricity in the power grid	GW-h	6 056	5 844	6 510	6 516	7 209
	thousand toe	521	502	560	560	620
Gross final electricity consumption	GW-h	55 300	56 274	58 356	59 348	59 920
	thousand toe	4 755	4 839	5 018	5 103	5 152

Table A3: Gross final energy consumption in transport

	Unit	2004	2005	2006	2007	2008
Electricity	GW-h	1 578	1 562	1 298	1 417	1 401
	thousand toe	136	134	112	122	120
Petrol	thousand toe	2 376	1 628	1 513	1 549	1 561
Diesel and gas	thousand toe	2 504	2 318	2 575	2 771	3 310
Total 1	thousand toe	5 016	4 080	4 200	4 442	4 991
Kerosene	thousand toe	141	113	141	182	220
Total 2	thousand toe	5 157	4 193	4 341	4 624	5 211

Table A4: Final energy consumption for heating and cooling (thousand toe)

	2004	2005	2006	2007	2008
Consumption	18 194	18 144	17 999	16 881	17 428

Table A5: Electricity from renewable sources

Indicator	Unit	Year				
		2004	2005	2006	2007	2008
Hydro	GW-h	16 513.00 0	20 207.00 0	18 356.00 0	15 966.00 0	17 195.00 0
	thousand toe	1 420.000	1 737.000	1 578.000	1 373.000	1 479.000
Wind	GW-h	0.000	0.000	1.000	3.000	5.000
	thousand toe	0.000	0.000	0.086	0.258	0.430
Biomass	GW-h	4.000	6.000	4.000	36.000	0.000
	thousand toe	0.344	0.516	0.344	3.095	0.000
Total	GW-h	16 517.00 0	20 213.00 0	18 361.00 0	16 005.00 0	17 200.00 0

	thousand toe	1 420.000	1 738.000	1 579.000	1 376.000	1 479.000
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Table A6: Final consumption of energy from renewable sources for heating and cooling

(thousand toe)

	2004	2005	2006	2007	2008
Wood and wood waste	3 047	3 166	3 042	3 215	3 782
Biogas	0	0	0	1	0
Geothermal energy	12	17	13	26	18
Total	3 059	3 183	3 056	3 282	3 800

Table A7: Final consumption of energy from renewable sources

(thousand toe)

	2004	2005	2006	2007	2008
Heating and cooling	3 059	3 183	3 056	3 282	3 800
Electricity	1 420	1 738	1 579	1 376	1 479
Transport (excluding electricity)	0	0	0	0	0
Total	4 479	4 921	4 635	4 658	5 279

Table A8: Consumption of energy from renewable sources in transport - forecast

Indicator	Unit	2010	2015	2020
Final energy consumption in transport	thousand toe	4 665	5 196	5 546
Kerosene	thousand toe	135	230	250
Final energy consumption in transport (excluding	thousand toe	4 530	4 966	5 296

kerosene)				
Share of renewable energy sources in transport	%			10
Final consumption of energy from renewable sources in transport	thousand toe			530
Electricity consumption in transport	thousand toe	142	153	157
Consumption of electricity from renewable sources in transport	thousand toe	44	52	58
Petrol and diesel consumption	thousand toe	4 388	4 813	5 139
Consumption of petrol and diesel from renewable sources	thousand toe			472
Share of renewable sources in the consumption of petrol and diesel	%			9.18