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ERÚ Energetický regulační úřad

Report on the Fulfilment of the Indicative Target for Electricity Production from Renewable Energy Sources for 2008

Pursuant to Article 7 of Act No. 180/2005 Coll. on the promotion of electricity production from renewable energy sources and amending certain acts (Act on Promotion of Use of Renewable Sources)

November 2009

CONTENTS

1. INTRODUCTION 3

2. INDICATIVE TARGET OF THE CZECH REPUBLIC FOR ELECTRICITY PRODUCTION FROM RES 4

3. DEVELOPMENT OF ELECTRICITY PRODUCTION FROM RENEWABLE ENERGY SOURCES 5

4. COSTS AND IMPACTS ON THE PRICE OF ELECTRICITY 19

5 PROMOTION OF ELECTRICITY PRODUCTION FROM RES 22

6. ASSUMPTIONS FOR FULFILMENT OF THE INDICATIVE TARGET 26

7. CONCLUSION 28

8. SOURCES USED 29

1. INTRODUCTION

As a European Union Member State, the Czech Republic has committed to increasing electricity production from renewable energy sources (RES). The stipulation of the potential of renewable sources, discussions about the actually achievable share and about the forms and amounts of support were important themes during the discussion of the State Energy Concept and amendment to the Energy Act in 2003 and 2004. Discussions lasting more than a year at the Chamber of Deputies of the Parliament of the Czech Republic resulted in the adoption of Act No. 180/2005 Coll. on the promotion of electricity production from renewable energy sources and amending certain acts (Act on Promotion of Use of Renewable Sources).

The Act created stable conditions for decision making by enterprises through defining a system of promotion based on fixed purchase prices or potentially financial amounts increasing the market prices of electricity. At the same time it guarantees the revenues per unit of electricity produced for a period of 15 years. The system for the promotion of RES, supplemented from 2004 with the possibility of support from EU structural funds, is contributing towards the fulfilment of the target of an 8% share of renewable sources in gross domestic consumption of electricity. Gross domestic consumption itself has a significant influence on the fulfilment of the stipulated share of renewable sources.

This report provides information on electricity production from renewable energy sources in 2008, outlines the prospects for the period from 2010 and introduces the assumptions for the fulfilment of the stipulated targets. As supplementary information it also contains a description of the basic programmes of promotion implemented by the Ministry of Industry and Trade, the Ministry of the Environment and the Ministry of Agriculture.

This report has been prepared by the Ministry of Industry and Trade in cooperation with the Ministry of the Environment and the Energy Regulatory Office.

Note on statistics:

This report contains statistical data collated by the Ministry of Industry and Trade within the framework of comprehensive national statistics for renewable sources. The statistical methodology has been significantly strengthened and refined since 2003. For reasons of data comparability, data from 2003 on is presented in this report. The statistical data was obtained through investigations by the MIT, from the databases of the Energy Regulatory Office, the Czech Statistic Office, the State Energy Inspection, the Czech Hydrometeorological Institute and the State Environment Fund. Detailed statistical information is given in the results of the statistical research “Renewable Energy Sources in 2008” published by the MIT in September 2009.

2. INDICATIVE TARGET OF THE CZECH REPUBLIC FOR ELECTRICITY PRODUCTION FROM RES

The indicative targets for the shares of RES for individual Member States are based around Directive 2001/77/EC on the promotion of electricity produced from RES in the internal electricity market. They are defined as percentage shares of electricity production in gross domestic energy consumption in each Member State. The Directive also defines the overall target for the European Community as 22.1%.

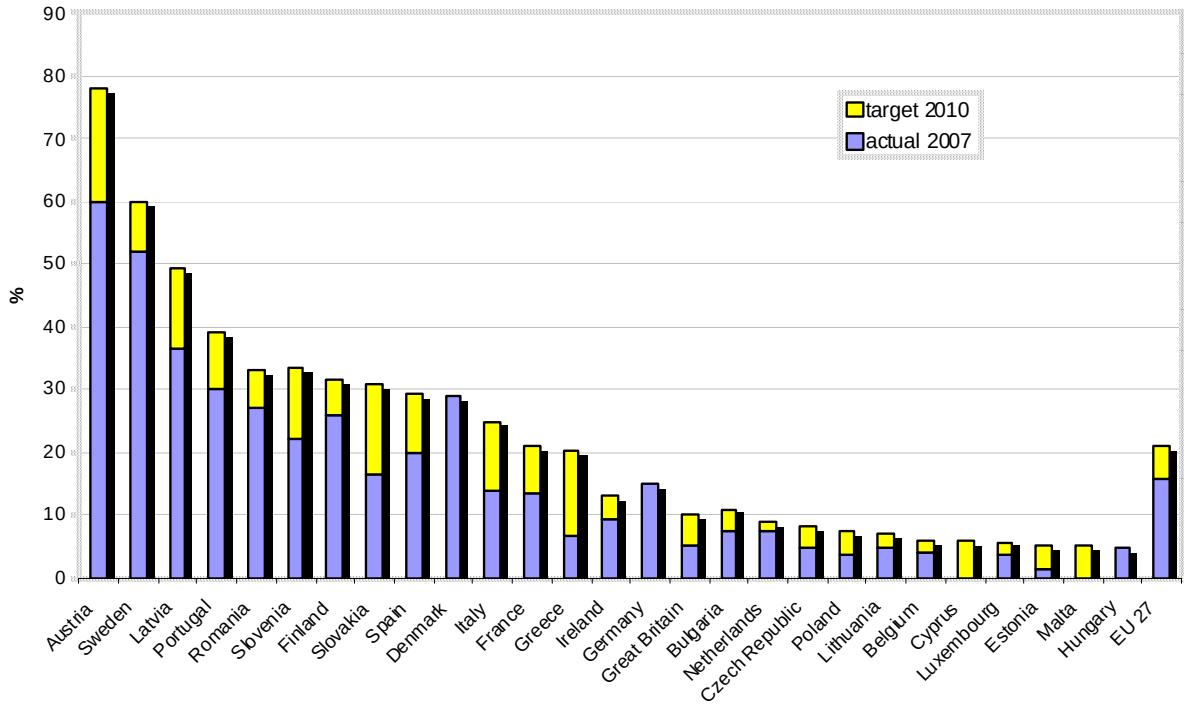
The Directive binds Member States to adopt measures and programmes of promotion that will lead to an increase in electricity production from renewable energy sources. The specific forms of the measures rest with the individual Member States, but must be in accordance with the rules for the internal electricity market and proportional to the indicative targets so that these are fulfilled in 2010.

In the Treaty of Accession (Accession Act in Annex No. II, chapter 12, A point 8a) the Czech Republic committed to fulfilling the indicative target of an 8% share of electricity from RES in gross domestic consumption in the Czech Republic in 2010.

The indicative target is part of Act No. 180/2005 Coll. on the promotion of electricity production from renewable energy sources and amending certain acts, through which the Directive was implemented into Czech law.

Indicative targets of EU Member States

Data on the share of electricity production from RES in the gross consumption of electricity in individual EU Member States has been taken from Eurostat statistics. Two new EU Member States are included for the first time: Bulgaria and Romania.



Source: Eurostat

Image 1 Indicative targets of EU Member States for electricity production from RES to 2010

3. DEVELOPMENT OF ELECTRICITY PRODUCTION FROM RENEWABLE ENERGY SOURCES

3.1. Energy mix in the Czech Republic in 2008

The Czech Republic mainly uses coal and nuclear energy to produce electricity. In comparison with 2007 the share of coal has slightly fallen, yet it still counts for almost 60% of the total production of electricity. The second most important source is nuclear energy with a share of over 30%.

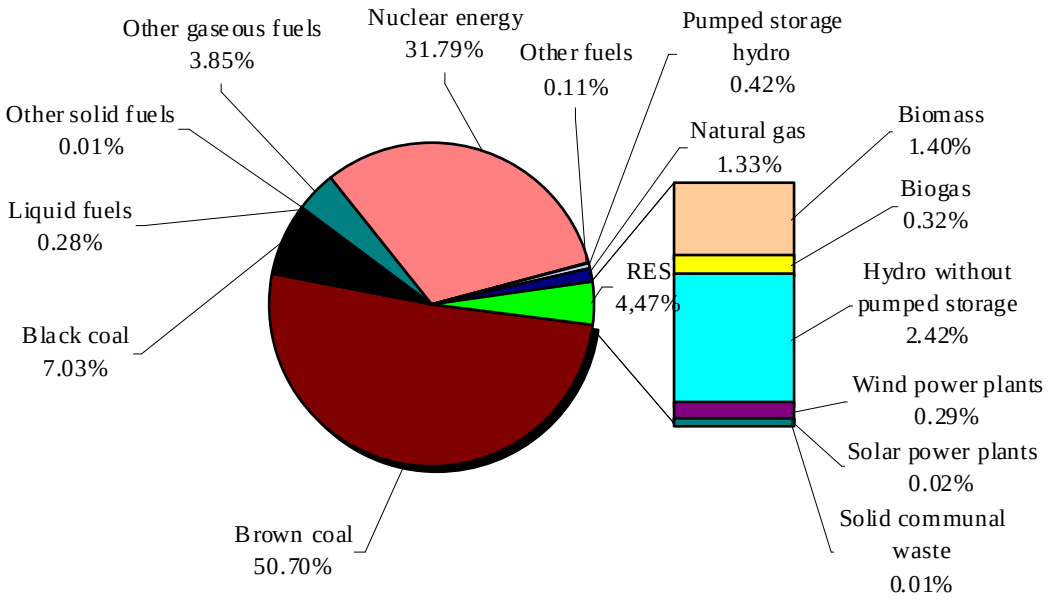


Image 2 Electricity production in the Czech Republic according to source in 2008 (Source: MIT, ERO)

The gross consumption of electricity compared to 2007 has risen by 0.01% to 72 049 GWh. The gross production of electricity has fallen by 5.31% to 83 517.9 GWh.

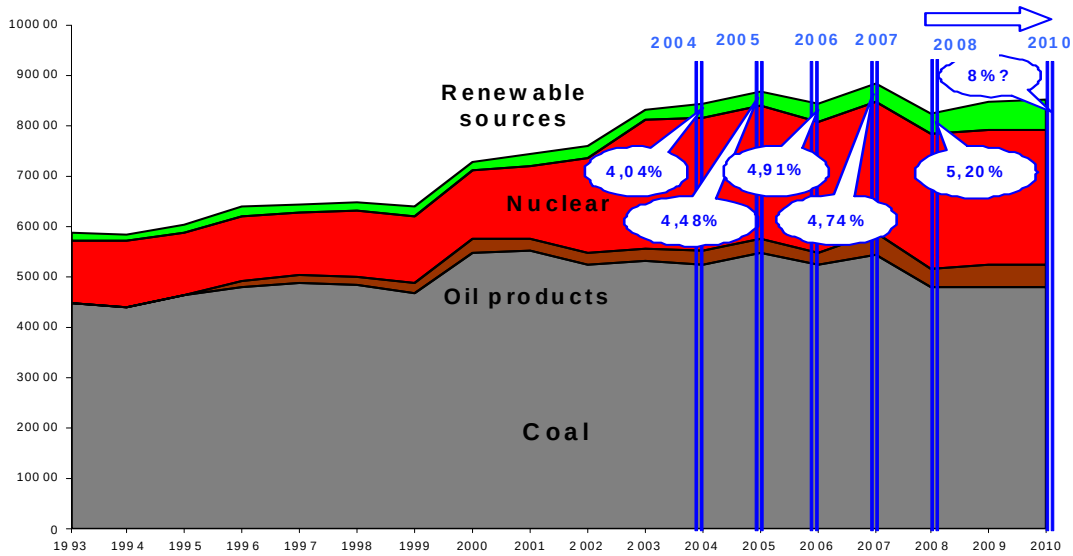


Image3 Electricity production in the Czech Republic according to source (1993 – 2008 with outlook to 2010)

Electricity production from renewable energy sources

Gross electricity production from renewable energy sources (RES) in 2008 made up 5.2% of domestic gross consumption of electricity. Gross electricity production from renewable energy sources made up 4.47% of total domestic gross production of electricity (including exports). The share of renewable energy in total primary consumption (PEZ) was 5.0% (Image 5).

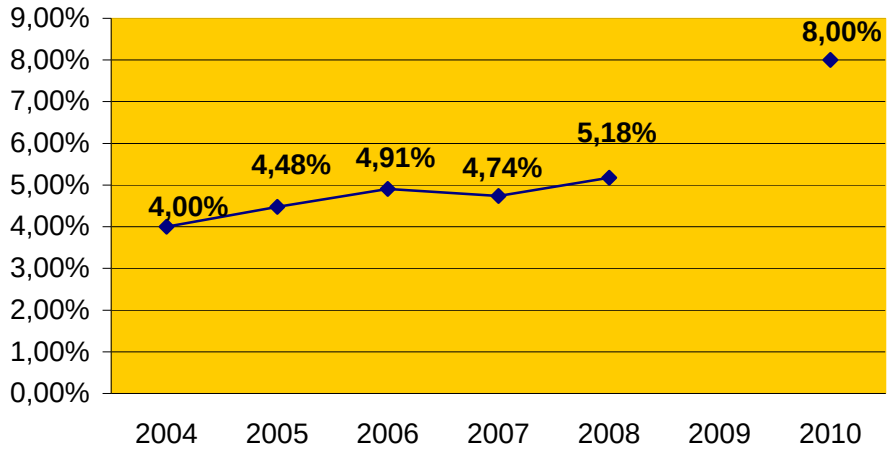


Image 4 Development of the share of electricity production from renewable energy sources in gross domestic electricity consumption

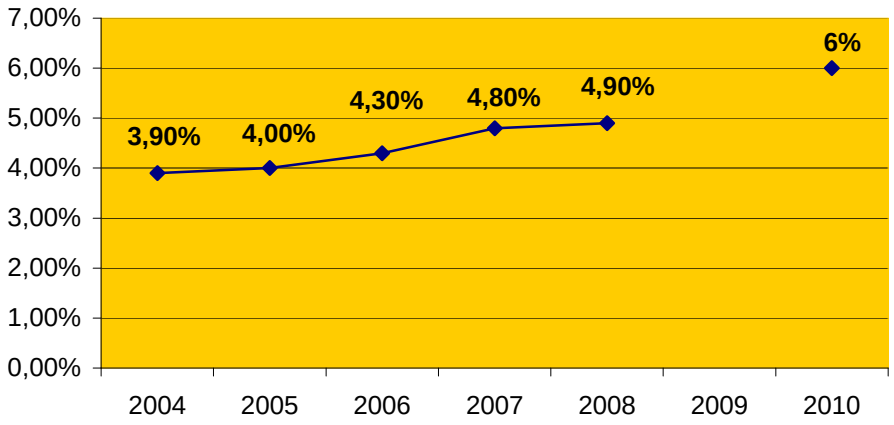


Image5 Development of the share of renewable resources in total primary consumption (PEZ)

The largest electricity production from RES in 2008 was from hydroelectric power plants (2 024 GWh). Compared to the year before production in hydroelectric power plants slightly fell (by 66 GWh or 3%). Biomass followed (1170 GWh) and recorded a rise of 202 GWh. The use of cellulosic ethanol to produce electricity was significant, where electricity produced in this way is consumed in the producers' manufacturing plants. We can still consider biogas (267 GWh) and wind power plants (245 GWh) as significant sources of electricity from renewable energy sources – they almost doubled their output compared to the year before. Waste incinerators (11.7 GWh) and photovoltaic systems, which posted a 6-fold increase in production (12.9 GWh), are still of only marginal importance.

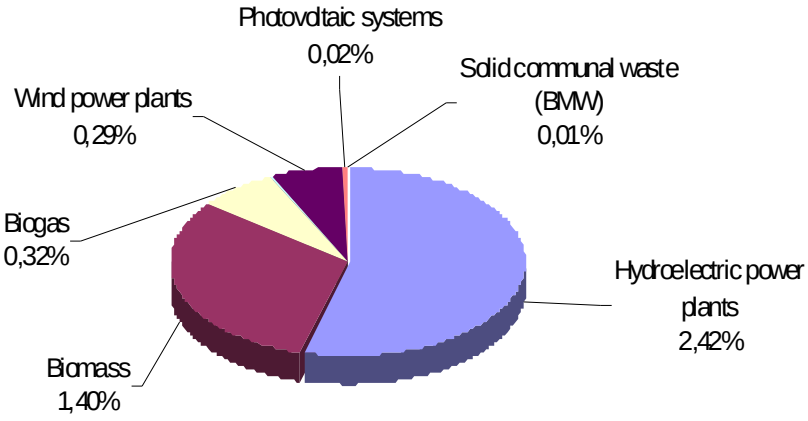


Image 6 *Share of individual RES in electricity production in the Czech Republic in 2008 (Source: MIT)*

Note: The pie chart indicates the percentage share of the individual RES categories in total domestic gross electricity production (including export), where the total sum is equal to 4.47% (see tab.1).

Tab. 1. Electricity production from RES in 2008

	Gross electricity production	Deliveries to the grid / net production	Share in green electricity	Share in gross domestic consum ption	Share in gross electricity production
	MWh	MWh	%	%	%
Hydroelectric power plants	**2 024 335.0**	**2 015 300.0**	**54.26%**	**2.81%**	**2.42%**
Small hydroelectric power plants up to 1 MW	492 281.0	n.d./*	13.19%	0.68%	0.59%
Small hydroelectric power plants from 1 to 10 MW	474 603.0	n.d.	12.72%	0.66%	0.57%
Large hydroelectric power plants over 10 MW	1 057 451.0	n.d.	28.34%	1.47%	1.27%
Biomass total	**1 170 527.4**	**581 328.8**	**31.37%**	**1.62%**	**1.40%**
Wood chips etc.	603 047.9	471 234.4	16.16%	0.84%	0.72%
Cellulosic ethanol	458 468.7	21 812.0	12.29%	0.64%	0.55%
Vegetal substances	23 085.2	20 363.0	0.62%	0.03%	0.03%
Pellets	84 535.6	66 529.4	2.27%	0.12%	0.10%
Other biomass	1 390.0	1 390.0	0.04%	0.00%	0.00%
Biogas total	**266 868.3**	**176 714.4**	**7.15%**	**0.37%**	**0.32%**
Municipal sewage treatment plant	74 036.3	14 723.8	1.98%	0.10%	0.09%
Industrial sewage treatment plant	4 016.4	840.0	0.11%	0.01%	0.00%
biogas plants	91 580.0	72 239.8	2.45%	0.13%	0.11%
Landfill gas	97 235.6	88 910.8	2.61%	0.13%	0.12%
Solid municipal waste (BMW)	**11 684.3**	**5 347.6**	**0.31%**	**0.02%**	**0.01%**
Wind power plants (over 100 kW)	**244 661.0**	**243 800.0**	**6.56%**	**0.34%**	**0.29%**
Photovoltaic systems	**12 937.0**	**12 937.0**	**0.35%**	**0.02%**	**0.02%**
Liquid biofuels	**0.0**	**0.0**	**0.00%**	**0.00%**	**0.00%**
Total	**3 731 013.0**	**3 035 427.8**	**100.00%**	**5.18%**	**4.47%**

Note: for wind, hydroelectric and solar power plants net production is given according to ERO. *(Source: MIT, ERO)*

**/n.d.- no data*

Tab. 2. Time line of the development of gross electricity production

	Gross electricity production						Trend in gross electricity production from RES between 2007 and 2008
	2004	2005	2006	2007	2008	2009	
	GWh	GWh	GWh	GWh	GWh	GWh	%
Hydroelectric power plants	**2 019.40**	**2 380.91**	**2 550.70**	**2 089.6**	**2 024.3**		**-3.13%**
Small hydroelectric power plants up to 1 MW	286.10	343.98	333.00	520.5	492.3		-5.42%
Small hydroelectric power plants from 1 to 10 MW	617.40	728.73	631.40	491.6	474.6		-3.46%
Large hydroelectric power plants over 10 MW	1 116.90	**1 309.20**	1 586.30	1 077.5	1 057.5		-1.86%
Biomass total	**564.54**	**560.25**	**731.06**	**968.1**	**1 170.5**		**20.91%**
Wood chips etc.	265.27	222.5	272.72	427.5	603.0		41.05%
Cellulosic ethanol	272.82	280.58	350.03	474.5	458.5		-3.37%
Vegetal substances	20.82	53.77	84.46	26.4	23.1		-12.50%
Pellets and briquettes	2.62	4.44	23.85	39.2	84.5		115.56%
Other biomass		0	0	0	1.4		
Biogas total	**138.79**	**160.86**	**175.84**	**215.2**	**266.9**		**24.02%**
Municipal sewage treatment plant	63.51	71.44	67.66	70.8	74.0		4.52%
Industrial sewage treatment plant	2.00	2.87	2.07	3.3	4.0		21.21%
Agricultural biogas	7.13	8.24	19.21	43.2	91.6		112.04%
Landfill gas	66.07	78.29	86.90	97.8	97.2		-0.61%
Solid municipal waste (BMW)	**10.03**	**10.61**	**11.26**	**11.9**	**11.7**		**-1.68%**
Wind power plants (over 100 kW)	**9.87**	**21.44**	**49.40**	**125.1**	**244.7**		**95.60%**
Photovoltaic systems	**0.08**	**0.39**	**0.54**	**2.1**	**12.9**		**514.29%**
Liquid biofuels	**-**	**-**	**0.22**	**0.0**	**0.0**		
Total	**2 771.78**	**3 133.46**	**3 518.83**	**3 412.1**	**3 731.0**		**9.35%**
Share in gross consumption	**4.04%**	**4.48%**	**4.91%**	**4.74%**	**5.18%**		**0.44%**

(Source: MIT)

The year-on-year increase in electricity production from RES was 318.9 GWh. In spite of a slight fall in production from hydroelectric power plants, total production from RES rose by 9.35%. The most significant growth was posted for electricity production from biomass and wind power plants. Photovoltaic systems posted the highest percentage increase (514.29%), but in terms of the total volume of electricity this only meant an increase of 10.8 GWh.

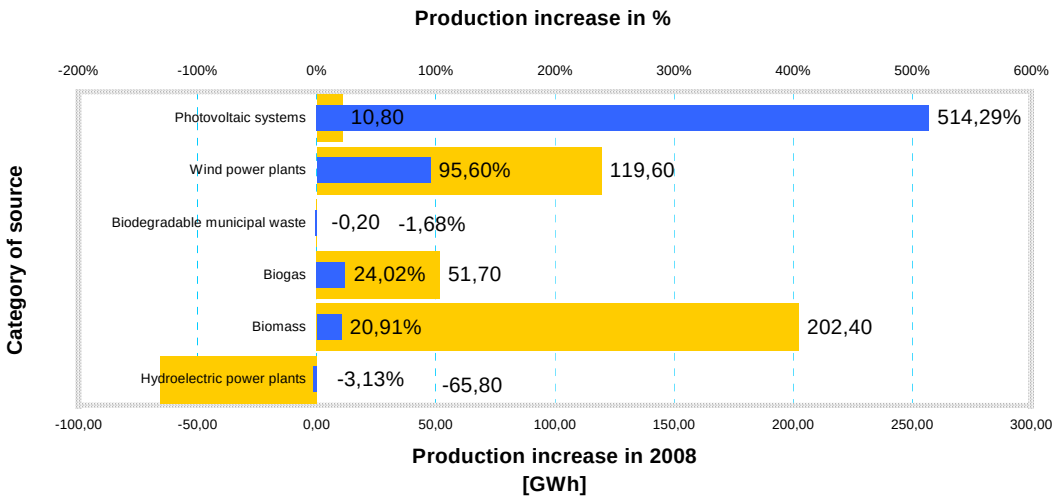


Image 7Increase in production between 2007 and 2008 according to RES category (Source: MIT)

3.2. Biomass

In the conditions in the Czech Republic, biomass has the greatest technically exploitable potential for both electricity and heat production from renewable energy sources. The use of biomass is traditional, in particular in heat production. Electricity produced from biomass does not suffer from problems related to the stability of supplies and stability can be further maximised through the concurrent use of biomass together with fossil fuels. However, biomass has its limits, in particular as regards transportation. Growing biomass for energy purposes is only effective within a range of 50 km from its intended location of use. In addition, biomass is limited in terms of area of land given by the so-called food safety regulations.

The use of biomass for energy is understood to mean the burning of wood or vegetal substances including cellulosic ethanol, either independently or together with fossil fuels, for the purpose of electricity and heat production. The following types of biomass were used for electricity production in 2008:

- **sawdust, bark, wood chips, wood waste**
- **vegetal substances (non-agglomerated)**
- **pellets**
- **cellulosic ethanol**

3.2.1. Sources using biomass operated in the Czech Republic in 2008

In 2008 a total of 1 171 GWh of electricity was produced from biomass, which is 20% more than in the year before (968 GWh).

Half of the electricity produced (49.66%) was supplied to the grid, while 50.34% of the electricity was recorded as being consumed by the producer itself (including losses). Direct deliveries to third parties fell to a minimum.

3.2.2. Electricity production from biomass in 2008

Tab. 3 Trend in the development of electricity production from biomass

Year	Gross electricity production (MWH)	Deliveries to the grid (MWh)
2003	372 972.40	17 383.30
2004	565 000.00	222 827.30
2005	560 251.90	210 379.20
2006	731 066.30	285 746.40
2007	968 062.90	403 706.10
2008	1 170 527.00	581 328.70
Difference 2007 - 2008	202 464.50	177 328.70
	20.91%	**44.00%**

(Source: MIT)

Traditional fuels – wood waste, sawdust and wood chips – posted a significant increase (176 000 tonnes) to a total of 579 000 tonnes, while cellulosic ethanol only slightly increased to 224 000 tonnes. 2008 also saw a fall in the consumption of non-agglomerated vegetal substances (from 16 000 tonnes to 15 000 tonnes). In contrast, the consumption of pellets and briquettes from vegetal substances significantly rose (from 24 000 to 45 000 tonnes). In 2008 the positive trend continued and a total of 865 000 tonnes of biomass was used for electricity production, meaning a rise of over 20% compared to 2007 (665 000 tonnes). Growth was recorded in particular for wood waste, sawdust and wood chips. The energy contained in the biomass consumed for electricity production was 7 358 428 GJ. In 2008 co-burning in the ECKG and Opatovice power plants was newly commenced, in addition a new

straw-burning source was put into operation in the Energy Centre in Jindřichův Hradec together with several small sources of wood gas. None of these facilities received support from the state programme.

Tab. 4. Electricity production from biomass according to type in 2008

	Number -	Electricity production MWh	Own consumption including losses MWh	Delivery to grid MWh	Direct deliveries MWh	Consumption of fuel t
Wood chips, waste	21	603 047.9	131 813.6	471 234.4	0.0	579 384.1
Cellulosic ethanol	2	458 468.7	436 656.7	21 812.0	0.0	224 342.2
Vegetal substances	7	23 085.2	2 722.2	20 363.0	0.0	15 120.4
Briquettes and pellets	7	84 535.6	18 006.2	66 529.4	0.0	44 924.6
Other biomass	1	1 390.0	0.0	1 390.0	0.0	1 345.0

(Source: MIT)

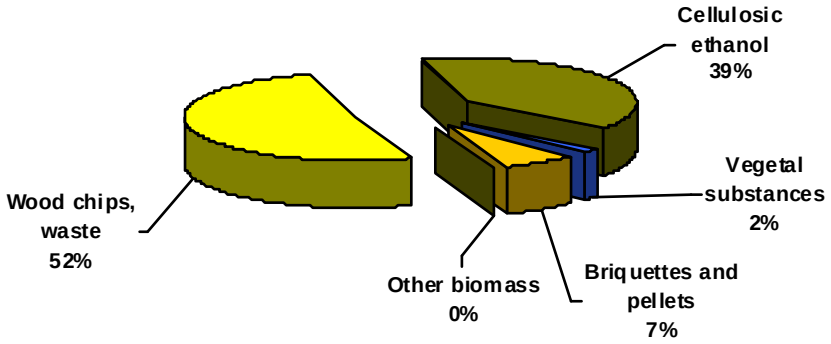


Image 8 Share of individual types of biomass in electricity production in 2008 (Source: MIT)

3.2.3. Comparison of electricity and heat production from RES in 2008

From a comparison of electricity and heat production from biomass it is evident that 70% of the biomass used for energy in the Czech Republic is used to produce heat. The great majority of this is waste biomass in the form of sawdust, wood chips and cellulosic ethanol, which posted a significant fall year-on-year. Part of the biomass that can be used for energy continued to be exported from the Czech Republic.

Tab. 5. Use of biomass for energy in 2008 (tonnes)

Fuel	For electricity production	For heat production	Total
Wood waste, wood chips, sawdust etc.	579 384	1 023 816	1 603 200
Fuel wood	–	34 719	34 719
Vegetal substances	15 120	22 390	37 511
Briquettes and pellets	44 925	16 403	61 327
Cellulosic ethanol	224 342	787 471	1 011 814
Other biomass	1345	0	1 345
Total	**865 116**	**1 884 799**	**2 749 916**
Estimate of the consumption of wood in households			3 397 340
Exports of biomass suitable for energy purposes			719 503
Total biomass used for energy or exported			**6 866 759**

(Source: MIT)

3.2.4. Outlook for the period to 2010

In 2008 the increase in the consumption of energy material grown directly for this purpose and used for direct burning continued. Nevertheless co-burning will continue to represent a relatively simple, fast and low-risk solution for using biomass. Act No.180/2005 Coll. creates the conditions for the development of the use of energy crops for electricity production.

3.3. Hydroelectric energy

Hydroelectric energy is the most important renewable resource for electricity production, in particular thanks to its suitable parameters for the regulation of the power grid. The installed capacity of hydroelectric power plants in the Czech Republic is over 1 GW_e, and represents 8% of the total installed capacity of sources for electricity production. It had a share of 2.42% in the gross production of electricity last year. Its share in the production of green electricity is over 54%. The majority of the hydroelectric potential of the Czech Republic has already been used for a long period of time in particular to regulate the power grid. The disadvantage of this source is its dependence on hydrologic conditions in the assessed period. In view of the high share in green electricity of electricity produced in hydroelectric power plants, this dependence must create fluctuations in the total volume of green electricity produced in drier years.

3.3.1. Hydroelectric power plants operated in the Czech Republic in 2008

Gross electricity production in hydroelectric power plants reached 2 024.3 GWh in 2008. This represented a year-on-year fall of 3%, while this fall was caused by lower output in the large hydroelectric power plants as a consequence of unfavourable hydrologic conditions.

Tab. 6 Electricity production in hydroelectric power plants in 2008 according to installed capacity

	Gross electricity production MWh	**Net electricity production** MWh	**Installed capacity** MW
Hydroelectric power plants total	2 024 335	2 015 300	1 045.0
Up to 1 MW_e	492 281	n.d.	140.2
1–10 MW_e	474 603	n.d.	152.0
10 and over MW_e	1 057 451	n.d.	752.8

n.d.- no data *(Source: ERO)*

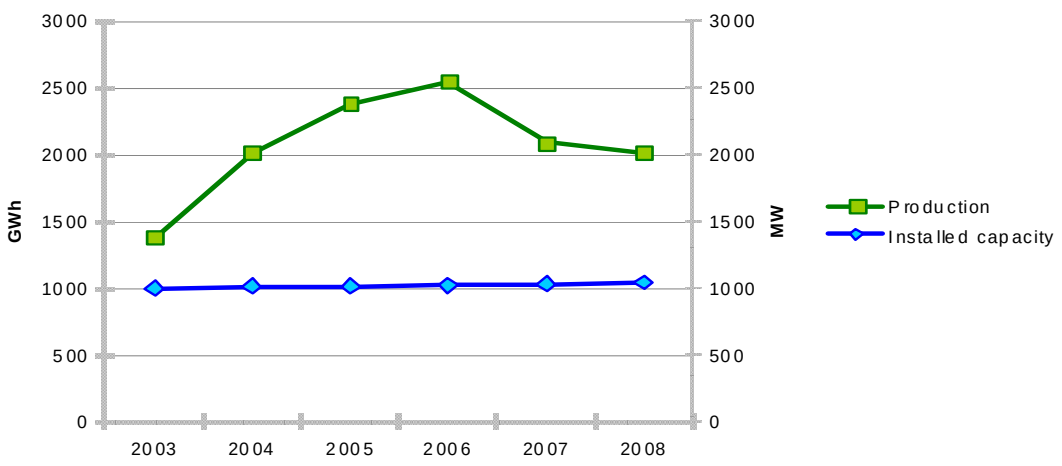


Image 9 Increase in electricity production and installed capacity of hydroelectric power plants (Source: MIT)

3.3.2. Electricity production in 2008

Tab. 7 Trend in electricity production in hydroelectric power plants

Year	Number of hydroelectric power plants	Installed capacity (kW)	Gross electricity production (MWh)	Delivery to grid (MWh)
2003	Around 1354*	1 004 260	1 383 467	1 106 774
2004		1 014 430	2 019 400	1 615 520
2005		1 019 500	2 379 910	2 370 300
2006		1 028 500	2 550 700	2 540 100
2007		1 029 080	2 089 600	2 080 800
2008		1 045 330	2 024 335	2 015 300
Difference 2007 - 2008	24	16 250	-65 265	-65 500
		1.58%	**-3.12%**	**-3.15%**

**) Number of hydroelectric power plants according to licence*
(Source: ERO)

Large hydroelectric power plants in particular participated in electricity production from hydroelectric energy. The trend of rising output has been suspended due to the influence of unfavourable hydrologic conditions.

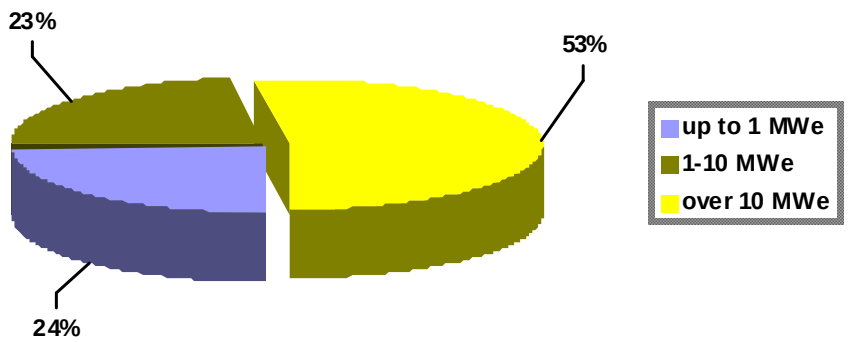


Image 10 Share of output categories of hydroelectric power plants in the gross production of electricity

In 2008 licences were granted to 24 operators of small hydroelectric power plants (SHEPP) with a total installed capacity of 3.44 MW.

Within the framework of the state programme Efekt, part A, 5 small hydroelectric power plant projects were promoted. The planned increase in the total installed capacity from these projects is 322 kW with an annual electricity output of 1 013 MWh. The total investment costs are CZK 22.3 million and the subsidy awarded is CZK 6.4 million.

Tab. 8 *New licensed small hydroelectric power plant operators in 2008*

Name of facility	Total installed capacity [MWe]
SHEPP SVATAVA	0.013
SHEPP Loket	0.11
SHEPP II - Dolní Dvůr - Kotelský potok	0.105
SHEPP Janovice nad Úhlavou "U Papírny"	0.07
SHEPP Pártlův mlýn	0.011
SHEPP Jarolímův mlýn	0.055
SHEPP Myšenec	0.022
SHEPP Domašov nad Bystřicí	0.03
SHEPP P & H, Paseky nad jizerou	0.36
Podhradní mlýn Hodkov	0.011
SHEPP II. Děčín - U Plovárny	0.13
SHEPP MOSKAVA	0.022
SHEPP Bukovec – Mlýn	0.54
SHEPP Bohuslavice nad Vláří	0.036
SHEPP Sopotnice	0.055
SHEPP Jizerní Vtelno	0.003
SHEPP Krásněves	0.018
SHEPP Rozkoš	0.675
Jez Lhotka	0.628
SHEPP Horka – new SHEPP	0.25
UV Vyšní Lhoty	0.132
SHEPP Železný Brod - Běliště	0.01
SHEPP Bohumilice	0.145
SHEPP - Mlýn "U Veselých"	0.008
Total	**3.439**

(Source: ERO)

3.3.3. Outlook for the period to 2010

Hydroelectric energy is an energy source that has already been used for a long period of time, and therefore the potential of water has been almost exhausted. The achievable potential is one tenth of the currently used output. The use of the remaining potential would equal the construction of around 100 MW of installed capacity in small hydroelectric power plants with a drop of 2 to 5m. The construction of small plants is dependent in particular on economic conditions and on the attitude of the administrators of the individual catchment areas towards the implementation of these projects.

3.4. Wind energy

The vast majority of wind energy is used in the Czech Republic to produce electricity intended for delivery to the grid. Electricity production in 2008

According to information from the Energy Regulatory Office, at the end of 2008 there was an installed capacity of 150.02 MW in wind power plants in the Czech Republic, which is 36.2 MW more than in 2007. The gross electricity production of these wind power plants was a total of 244.7 GWh in 2008 (this figure was 125.1 GWh the year before). The equipment newly put into operation in 2008 was not promoted from the state programme for the promotion of energy savings and renewable energy sources.

Tab.9 Trend in electricity production from wind energy

Year	Number of facilities (installations over 100kW)	Installed capacity (kw)	Gross electricity production (MWh)	Delivery to grid (MWh)
2003	21	9 980	3 900	3 900
2004	30	14 380	9 871	9 743
2005	44	25 095	21 442	21 263
2006	51	43 500	49 400	49 100
2007	58	113 800	125 100	124 700
2008	66	150 020	244 661	243 800
Difference 2007 - 2008	8	36 220	119 561	119 100
		31.99%	**95.57%**	**95.51%**

(Source: ERO)

Tab 10 Facilities for producing electricity from wind energy put into operation in 2008

Name of power plant and operator	Installed capacity (MWe)	Gross annual electricity production (GWh)
Bantice WEB Větrná Energie s. r. o.	2	1.615
Trojmezí u Aše Farma Trojmezí a.s.	2.7	1.367
Nová Ves v Horách Větrné elektrárny Strážný vrch, a.s.	8	1.486
Anenská Studánka HT WIND s.r.o.	1.250	0.361
Anenská Studánka D6 S & M CZ s.r.o.	3.750	1.916
Pchery ČES s.r.o.	6	3.937
Potštát, Lipná WIND FINANCE a.s.	2	4.203
Maletín WIND FINANCE a.s.	2	2.900
TOTAL	**27.7**	**17.785**

Source: ERO

3.4.1. Outlook for the period to 2010

In the Czech Republic there have long existed a series of plans for the construction of wind power plants with a total output of around 2000 MW, nevertheless a more realistic figure would be the construction of around 350 wind power plants with a total installed capacity of 800 MW at most. The projects with the largest number of wind power plants are localised in the central part of the Krušné hory mountains, with others for example in the Vysočina region, South Moravia and in the Jizerské hory mountains. In view of experience to date with the relatively complicated negotiations relating to the location of the wind power plants, we can assume that many of the planned projects will not be implemented.

Another limiting factor for development is weak political support from regional self-administration units and also, in some cases, very strong resistance from residents to the construction of wind power plants near where they live.

From the perspective of technical and energy efficiency, wind power plants in continental conditions are more a source of problems than a competitive source of energy. Their construction leads to an increase in the need for reserve sources, to the origin of bottlenecks in the transmission system and to

local overloading of lines. For the above reasons we cannot expect massive support for the construction of wind power plants e.g. in the form of investment subsidies. Support in the form of purchase prices or green bonuses will, of course, remain.

3.5. Biogas

In the Czech Republic the use of biogas in general has a tradition in particular in relation to anaerobic fermentation as part of the technology used by municipal sewage treatment plants. Biogas produced here is mainly used for the plant's own operational needs. In recent years it has of course been recognised as a very promising use of landfill gases for electricity production in small plants with piston combustion motors. The construction of biogas plants is currently undergoing very dramatic development, which is even exceeding the development of the use of landfill gas, which held a dominant position especially in recent years.

In 2008 175.6 million m^3 of biogas was used for energy purposes, which is more than the year before (150.5 million m^3). The greatest contribution to this increase was from production from biogas plants, where the volume of biogas produced rose from 28 to 51 million m^3. The energy content of all the biogas used was 3.8 PJ.

3.5.1. Biogas facilities operated in 2008

During 2008 the number of facilities for electricity production in biogas plants processing waste from animal agricultural production more than doubled. In addition, the use of biogas from municipal and industrial sewage treatment plants as a product of anaerobic fermentation processes is widely spread. 81 such facilities for electricity production in the Czech Republic were in operation at the end of 2008. This biogas is used in boilers or cogeneration units with piston motors for electricity and heat production. 5 new facilities for the use of landfill gas were recorded.

Tab. 11 Electricity production from biogas in 2008

	Number	Number of facilities for electricity production	Installed electrical output (kW)	Electricity production (MWh)	Own consumption including losses (MWh)	Delivery to grid (MWh)	Direct deliveries (MWh)
Municipal sewage treatment plant	31	72	17 206	74 036.3	59 312.5	14 723.8	0.0
Industrial sewage treatment plant	6	9	1 029	4 016.4	3 176.4	840.0	0.0
Biogas plants	47	99	28 946	91 580.0	15 608.3	72 239.8	3 731.9
Landfill gas	24	80	23 850	97 235.6	8 324.8	88 910.8	0.0
Total	**108**	**260**	**71 031**	**266 868.3**	**86 422.0**	**176 714.4**	**3 731.9**

(Source: MIT)

3.5.2. Electricity production in 2008

Tab. 12 Trend in electricity production from biogas

Year	Number of facilities	Installed capacity (kw)	Gross electricity production (MWh)	Delivery to grid (MWh)
2003	81	24 985	107 856	11 868
2004	119	32 540	138 793	81 913
2005	135	36 271	160 857	93 413
2006	154	39 964	175 837	99 756
2007	198	49 913	215 223	138 485
2008	260	71 031	266 868	176 714
Difference 2007 - 2008	62	21 118	51 645	38 229
		42.31%	**24.00%**	**27.61%**

(Source: MIT)

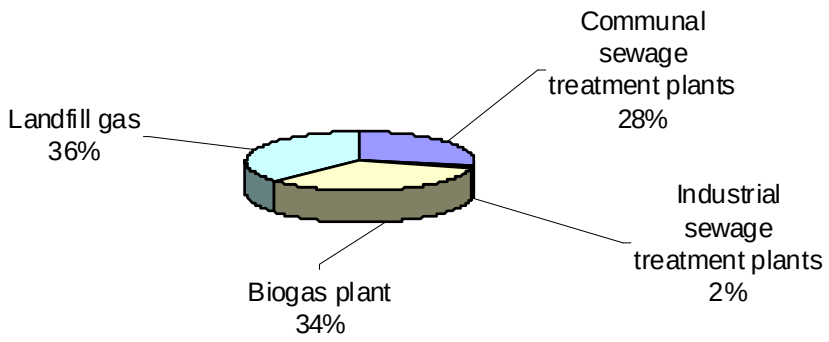


Image 11 Shares of the individual biogas categories in electricity production

3.5.3. Outlook for the period to 2010

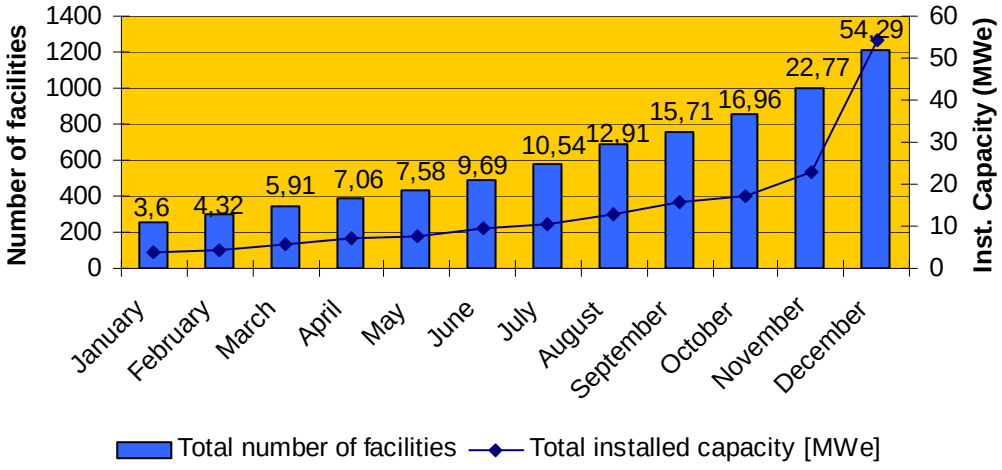
There are a series of plans for the use of landfill gas in the project stage. We can also assume the construction of additional biogas plants for electricity production with a total installed capacity of around 35 MW. The potential for the use of biogas from municipal sewage treatment plants is already to a large part exhausted and therefore we cannot expect any significant changes.

3.6. Solar energy

At the present time, from the perspective of electricity production, photovoltaic systems still have a negligible impact, but it is clear that the installed capacity is rising sharply and that since 2007 the majority of the total output has been connected to the grid. In 2008 the gross electricity production in licensed photovoltaic systems was 12.9 GWh, which represents an increase of over 500% compared to 2007.

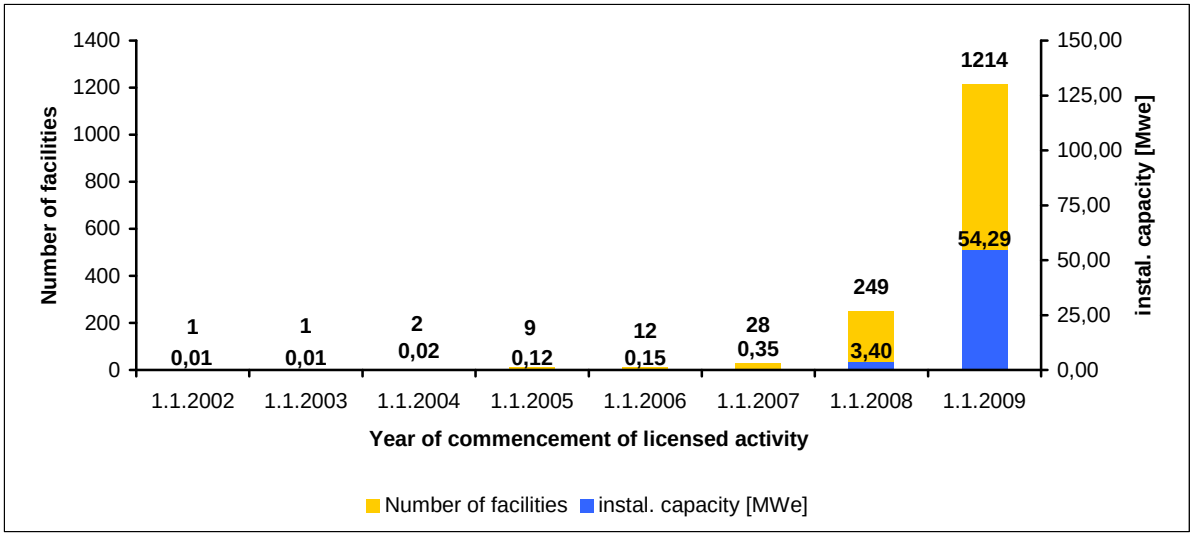
3.6.1. Photovoltaic systems operated in the Czech Republic in 2008

According to information from ERO at the end of 2008 over 1200 licences to produce electricity had been granted with a total installed capacity of over 54 MW_p. This represents a tenfold rise in installed capacity compared to 2007. These are most commonly systems up to 5 kW_p or 3 kW_p. The largest licence granted was for a system of over 3.3 MW_p. The largest photovoltaic installation that commenced operation in 2008 was the Dívčice power plan (2.9 MW_p), covering an area of 12 ha with a total of 40 000 panels. Annual production is estimated at 3 200 MWh.



(*Source: ERO*)

Image 12 Development of the number of licensed facilities and total installed capacity in 2008



(Source: ERO)

Image 13 Development of the number of licensed facilities and total installed capacity 2002-2009

3.6.2. Outlook for the period to 2010

In a year-on-year comparison, 2007/2008 recorded an almost ten-fold rise in total (Off-grid and On-grid) installed capacity of photovoltaic systems in the Czech Republic. For 2009 and 2010 a growth of more than another 250 MW is anticipated. This huge increase was caused in particular by a significant fall in specific investment costs, in other words a fall in the prices of photovoltaic panels by over 40% and the retention of very favourable purchase prices.

The massive interest shown by investors in photovoltaic systems is already causing significant problems both in the form of disadvantaging the other categories of RES or the speculative blocking of connection capacities at grid level and also a significant increase in ancillary costs for RES, which are subsequently transferred to the final prices of electricity for consumers.

3.7. Solid biodegradable municipal waste (BMW)

The use of waste in the production of energy is understood to be the incineration of solid municipal, hospital and industrial waste or the use of so-called alternative fuels based on waste. Municipal waste in particular contains 50 – 65% of biodegradable components, which are also considered to be a renewable source. The Czech Republic in comparison with other countries makes only minimal use of municipal waste to produce energy, while the majority of such waste is put into landfills.

3.7.1. Facilities operated in the Czech Republic in 2008

At the present time 3 municipal waste incinerators are in operation in the Czech Republic, while electricity in produced by two of these.

3.7.2. Electricity production in 2008

In 2008 no new sources of electricity production from solid municipal waste were put into operation.

Tab. 13 Trend in electricity production from solid biodegradable municipal waste (BMW)

Year	Gross electricity production (MWh)	Delivery to grid (MWh)
2003	9 588.00	3 265.70
2004	10 031.00	3 421.20
2005	10 612.30	3 825.60
2006	11 264.40	4 435.60
2007	11 975.10	5 074.00
2008	11 684.30	5 347.60
Difference 2007 - 2008	-290.80	273.60
	-2.43%	**5.39%**

(Source: MIT)

3.7.3. Outlook for the period to 2010

In the period to 2010 we cannot anticipate any significant increase in electricity production from municipal waste. According to available information, however, there are several long-term projects for the construction of facilities to use waste as a source of energy. In the event these plans are implemented, the amount of waste that can be used for the production of energy is estimated to triple over the current situation with a corresponding impact on electricity production.

4. COSTS AND IMPACTS ON THE PRICE OF ELECTRICITY

4.1. Compulsory purchase of electricity from renewable energy sources in 2008

Act No. 180/2005 Coll. on the promotion of electricity production from renewable resources came into force in 2005. This act stipulates the basic framework for promotion of electricity production from RES and introduces a system for promotion in the form of purchase prices and green bonuses. The operator of the relevant regional distribution company is always obligated to purchase electricity from RES to cover losses in the system of purchase prices or to pay green bonuses. The purchase prices and green bonuses are stipulated through the applicable pricing decision of the Energy Regulatory Office on the promotion of renewable resources, combined electricity and heat production and secondary sources. The current pricing decision can be found on the ERO website at www.eru.cz.

To cover the ancillary costs for the promotion of electricity production from renewable energy sources, all end customers participate through nationwide unified prices to cover ancillary costs connected with the promotion for electricity from renewable energy sources, combined electricity and heat production and secondary sources.

The amount of the contribution is always stipulated by the Energy Regulatory Office for the subsequent calendar year. According to the quantity of purchases performed, funds are subsequently transferred between the individual distribution companies in such a way that no company that is obligated to purchase a larger quantity of electricity from RES (to which is connected a larger quantity of renewable resources) is at a disadvantage.

The total actual costs for the promotion of all promoted sources since 2002, when the amount of such promotion was stipulated for the first time, have already exceeded CZK 10 billion and these continue to rise quickly. The costs in the individual years are given in table No. 14 below.

Tab. 14 Actual ancillary costs for the promotion of RES (Source ERO)

Actual ancillary costs for the promotion of RES (CZK billion)						
2002	2003	2004	2005	2006	2007	2008
0.540	0.641	1.102	1.343	1.646	2.100	2.658

(Source: ERO)

The development of the price for the coverage of ancillary costs connected with the promotion of renewable resources, combined electricity and heat production and secondary sources is indicated by the following graph. It is apparent from the graph that thanks to the increase in the production of electricity from promoted sources this contribution is continually rising. The anticipated significant rise in the amount of this contribution for 2010 is in particular a result of the significant development of photovoltaic power plants at the current time.

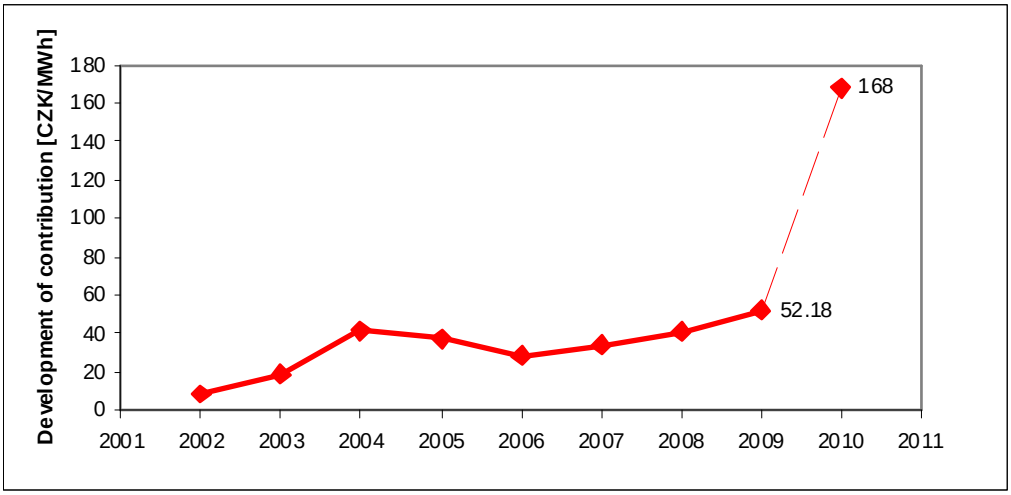
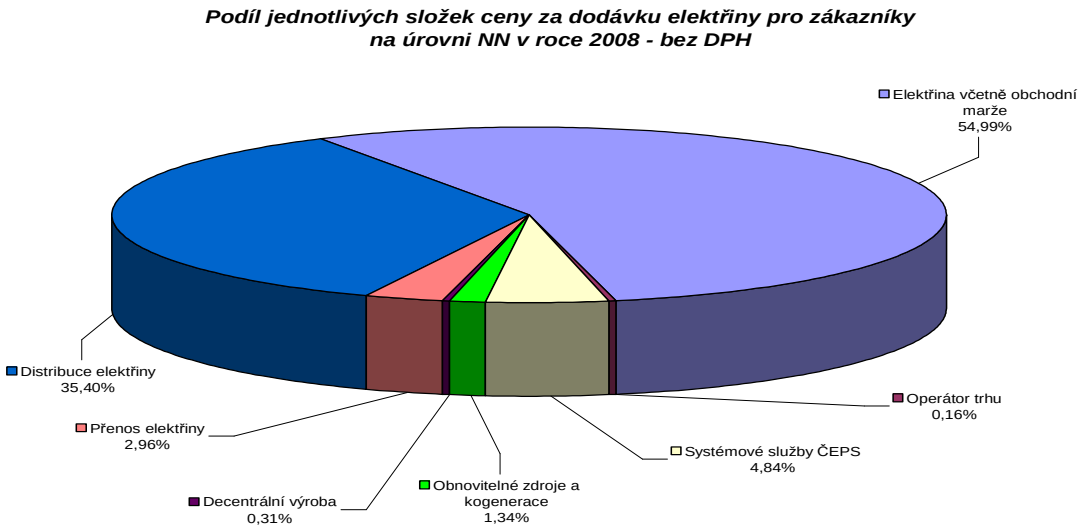


Image 13 Development of the price for the coverage of ancillary costs connected with promotion of electricity from renewable energy sources, combined electricity and heat production and secondary sources

Promotion of electricity production from RES, combined production of electricity and heat and secondary sources increased the total price for electricity for households by 1.34% in 2008. The anticipated rise in the contribution for 2010 will increase this to around 3%.



[image:
Share of the individual components of the price for electricity deliveries for customers at NN level in 2008 – without VAT

Electricity including margin 54.99%
Market operator 0.16%
CEPS system services 4.84%
Renewable sources and cogeneration 1.34%
Decentralised production 0.31%
Electricity transmission 2.96%
Electricity distribution 35.40%]

Image 14 Share of the individual components of the price for electricity deliveries for customers at NN level in 2008

4.2. Costs connected with the transmission of electricity and ensuring the operation of the national grid

The price of electricity for customers is composed of 2 main components. These are electricity actually consumed, where the price is stipulated by the market, and a regulated component stipulated by the state or ERO. Apart from the ancillary costs for promotion of electricity production from renewable energy sources (described in detail in chapter 4.1) the price of electricity also includes additional cost items listed as percentages in Image 14.

Important cost items are payments by the operators of the transmission system for the transmission of electricity and payments by the operators of the distribution system (DS) for the distribution of electricity. These payments include in particular costs for the development of the grid as a result of the connection of new consumers, increases by those already connected or the connection of new production sources. In recent years this payment has risen year-on-year by several percentage points.

In connection with the development of unstable RES categories (e.g. photovoltaic or wind systems) the demands for the connection of new production sources or increases in existing capacities are significantly reflected in the payments by the DS operator and subsequently are of course reflected in the end price for the customer. In a 2007/2008 year-on-year comparison, photovoltaic systems recorded a growth of almost 1500% in terms of installed capacity (see Image 12) and gross production exceeded 12.9 GWh. A detailed analysis of necessary investments into the DS in connection with the development of photovoltaic power plants has not been performed for 2008. Under the current conditions of the massive development of photovoltaic power plants and the related increase in demands on the development of the DS, there is a need to analyse the current and, most importantly, future investment costs.

Another cost item is payments for system services – the PS operator continuously maintains the grid system in a state where at any moment consumption equals production and vice versa.

The amount of the payment for this item is influenced by the ability to estimate in advance as precisely as possible the consumption of electricity at any moment and, on the other hand, at what moment production sources will be in operation and how much electricity they really produce (this applies in particular to renewable resources producing electricity from the sun and the wind). Recently this payment has not significantly changed year-on-year.

Some electricity is produced in small sources that are connected to lower voltage networks. These sources increase the security of the operation of the grid system, but at the same time result in increased costs that the consumer pays in the contribution towards decentralised production item.

5 PROMOTION OF ELECTRICITY PRODUCTION FROM RES

5.1. Act on the promotion of electricity production from renewable energy sources

Act No.180/2005 Coll. on the promotion of electricity production from renewable energy sources came into effect on 1.8.2005, bringing a guarantee of long-term and stable promotion necessary for decision-making by businesses. This act introduced, from 1.1.2006, a new system of promotion, the basic features of which are:

- The right to connect equipment for electricity production from RES to the grid system
- **A guarantee of revenues per unit of electricity produced for a period of 15 years from the date it is put into operation**
- **The possibility of choosing between two systems of promotion**
    - **Minimum purchase prices** – enables all electricity produced to be sold to the operator of the applicable transmission system
    - **Green bonuses (additional charges over the market price for electricity)** – enables the use of the electricity produced from renewable energy sources on the single market with electricity
- Support for electricity used pro other own consumption (not delivered to a grid system)
- Retention of the level of purchase prices for equipment already in operation for a period of 15 years
- A maximum year-on-year fall in purchase prices of electricity for new equipment of 5%

5.2. State programme for the promotion of energy efficiency and the use of renewable energy resources

State programme part A- EFEKT (MIT)

Investors in electricity production from RES have the possibility of obtaining promotion from the state programme for the promotion of energy efficiency and the use of RES. Subsidies from part A of the programme (under the responsibility of the MIT) were up to 40% of investment costs or a maximum of CZK 5 million in 2008. Part B of the state programme for the promotion of energy efficiency and the use of RES represents programmes of the Ministry of the Environment ensured through the State Environment Fund of the Czech Republic. In 2008 these programmes focused only on promotion for investments in the use of renewable energy resources for environmentally friendly heating. Projects supporting electricity production from RES were not promoted in 2008.

Tab 15 Investment promotion of electricity production from RES within the framework of the State Programme in 2008

Resort	Sub-programme	Costs (CZK thou)	Subsidy (CZK thou)	Heat production (GJ/year)	Electricity production (MWh/year)	Installed capacity (kW)
MIT	SHEPP	22 844	6 384	-	1 013	322
	Total resort	22 844	6 384	-	1 013	322
Total		**22 844**	**6 384**	**-**	**1 013**	**322**

(Source: MIT)

State Programme part B,(Ministry of the Environment)

In 2008 there were programmes focusing only on promotion for investment in the use of renewable energy resources to produce heat for natural persons (sub-programmes 1.A.a, 1.A.b, 1.A.c and 4.A). Programmes intended for non-commercial entities and enterprises were not listed within the framework of the State Programme in 2008.

Promotion for investment projects to use RES

1.A. Investment promotion for environmentally friendly methods of heating and producing hot water for apartments and family houses for natural persons.

1.A.a Boilers using biomass.
1.A.b Solar systems for year-round water heating.
1.A.c. Solar systems for heating and year-round water heating.

4.A. Investment promotion for heating apartments and family houses using heat exchangers for natural persons.

5.3. EU structural funds

In the 2007 to 2013 budget period, investors in electricity production from RES have the possibility of obtaining promotion from EU structural funds through two operational programmes.

5.3.1. Operational Programme Enterprise and Innovations (2007 –2013)

Part of the operational programme for 2008 was the **EKO-energie** subsidy programme**,** the aim of which is to stimulate the activity of enterprises in regard to reducing the energy demands of production and the consumption of fossil primary energy resources and to support new entrepreneurs in activities leading to a greater use of renewable and secondary energy sources. The promotion is focused, in addition to the use of renewable and secondary energy sources, on improving efficiency in the production, transmission and consumption of energy. The beneficiaries of the promotion will be in the majority small and medium-sized enterprises. The subsidy can be up to 50% of the investment costs, but a maximum of CZK 100 million.

Within the framework of the 1st call, completed applications were accepted between 1. 11. 2007 and 29. 2. 2008. 434 registration applications for Use of Renewable and Secondary Energy Sources and 145 registration applications for Improving Efficiency in Production, Transmission and Consumption of Energy totalling around CZK 10.2 billion / EUR 386 656 000 were accepted. The allocation for this call was CZK 1.7 billion / EUR 64 442 000.

A more detailed overview of the approved projects and the subsidy amounts is given in Table No.16 below.

On 1 October 2008 the Ministry of Industry and Trade announced the 2nd call to submit projects within the framework of the EKO—ENERGIE promotion programme in the form of a round-based, time limited acceptance of applications. The acceptance of electronic registration applications for the provision of a subsidy was commenced on 14.11.2008 and ended on 6.3.2009.

Tab 16 Approved projects within the framework of the Eko-energie programme (1st call, as of 31.12.08)

Priority	Number of projects	Subsidy amount (CZK)
Energy savings	**68**	**485 757 000**
Total RES	**84**	**1 414 478 700**
Biomass other	3	159 793 000
Biogas organic waste other	17	327 107 000
Biogas organic waste – use of heat from cogeneration	10	254 033 700
Biogas landfill	1	1 470 000
SHEPP reconstruction	16	209 314 000
SHEPP peak	2	30 295 000
SHEPP new	35	432 466 000

(Source: Czechinvest)

5.3.2. Operational Programme Environment (2007 –2013)

Investment promotion of electricity production in a non-commercial sphere is part of priority axis 3 – Sustainable use of energy sources, or subarea 3.1.2 Construction and reconstruction of electricity sources using RES (PV, SHEPP, biomass power plants, wind power plants, heat exchangers) and subarea 3.1.3 Construction and reconstruction of sources for the combined production of electricity and heat from RES (cogeneration – biogas, sewage gas, landfill gas including the construction of facilities to obtain gas; cogeneration – solid biomass – steam cycle, ORC, gasification).

Subsidy amount:

Subarea 3.1.2 Construction and reconstruction of electricity sources using RES (SHEPP - 40%, wind power plants, heat exchangers, photovoltaic – 30%)

Subarea 3.1.3 Construction and reconstruction of sources for the combined production of electricity and heat from RES (40%, up a maximum of 100 million)

In view of the fact that the acceptance of applications for a subsidy from Operational Programme Environment is running for individual subareas on a gradual basis in separate calls and in 2008 there was no call for measures promoted within the framework of subareas 3.1.2. and 3.1.3., no projects were promoted in 2008. The first announcement of the call for this area was in the period from 4.5.2009 to 30.6.2009. The results of this call have not yet been assessed and will appear in the report for 2009.

5.4. Support for growing energy crops in the agricultural sector (Ministry of Agriculture)

DT - 1.U.

In the field of national aid the Czech Republic must remain within the boundaries defined by EU legislation which, apart from other things, does not permit duplicate aid. In practice this means that if aid through the EU exists for a given segment, no additional promotion at national level is permitted. The Czech Republic therefore in particular applies European subsidies to the maximum possible extent, for which it is creating a framework of legal regulations at national level. In 2008 in the Czech Republic national support for growing energy crops was therefore no longer applied – subsidy title 1.U., which was cancelled due to incompatibility with EU legal regulations without any possible alternative (see the duplicity mentioned above).

C-credit

Support for growing energy crops, the so-called carbon credit, is based on Council Regulation (EC) No. 1782/2003 and is provided in all EU Member States to the amount of EUR 45/ha for any crops to be used for energy. The conditions of the support are regulated through Government Decree No. 80 of 11 April 2007 on the stipulation of some conditions for the provision of payments for growing energy crops and its amendment government Decree No. 333/2007. A continuous area of arable land covering a minimum of 1 ha must be used for the growing of crops for energy purposes. The energy crops must be grown on the land in the year in question as the main crops.

The only direct promotion for growing energy crops per land area available to our famers in 2008 was the support available throughout the European Union, the so-called "carbon credit" or "C-credit". Compared to 2007, when this subsidy was introduced in the Czech Republic for the first time, in 2008 there was a reduction in the total area of land for which farmers applied for this subsidy by around 30%. 675 applications were submitted for land covering 41 278.27 ha.

In 2007 the total of all applications within the framework of the EU exceeded the maximum guaranteed area of 2 000 000 ha for which the maximum level of promotion (45 €/ha) is guaranteed by almost 850 000 ha. As a consequence the level of promotion was reduced using a coefficient of 0.70337 and promotion was adjusted to only 31.65 €/ha. Last year's season, however, showed a significant drop in interest in the C-credit. The total for the Union reached 1 562 000 ha, the guaranteed area was not exceeded and therefore the level of promotion was not reduced.

Although last year in the Czech Republic there was, in comparison with the previous season, a significant reduction in the C-credit area, in a Union-wide comparison the Czech Republic paradoxically "improved" by 1%. It obtained a share of around 3% of the total package. It is worth remarking that in an overall comparison the situation in France and Germany remained almost unchanged in spite of an almost 50% fall in applications compared to 2007– the areas included in applications in France and Germany in total made up around half of all the applications in the EU.

For Czech applicants, however, the most important aspect was the retention of the notified amount of promotion at the full level of 45 €/ha. Although the converted rate was worse in comparison with two years ago thanks to the strong Czech crown, the real value of the promotion paid out rose to CZK 1 109.70 / ha (meaning around CZK 240 / ha more than in 2007).

5.5. Rural Development Programme

The Rural Development Programme (RDP) is successfully continuing from the preceding programme documents: OP Rural Development and Multifunctional Agriculture in the Czech Republic, the Horizontal Rural Development Plan of the Czech Republic for 2004 - 2006, SAPARD and Leader Czech Republic.

RDP is split into 4 priority axes that more precisely define the measures for the allocation of funds from the European Agricultural Fund for Rural Development (EAFRD).

Within the framework of axis 3 – ***Quality of Life in Rural Areas and Diversification of Rural Economy****, Group of measures III.1 – Measures for the Diversification of Rural Economy, subarea III.1.2 Support for the Establishment of Enterprises and their Development* is focused on the diversification of the activities of agricultural entities towards non-agricultural activities and also on the construction of decentralised facilities for the processing and use of renewable energy resources with the aim of making rural areas self-sufficient in terms of energy and of fulfilling the commitment of the Czech Republic to achieve an 8% share in electricity production from renewable energy sources in gross domestic energy consumption. The use of existing buildings and areas and the implementation of innovative methods is promoted as a priority.

In 2008 within the framework of the Rural Development Programme 25 biogas plants (BGP) were approved for co-financing with subsidies totalling around CZK 588 million and so far 1 BGP has been financed with a subsidy of CZK 22.08 million.

At the current time (since 2007) 79 BGP have been approved within the framework of the RDP with subsidies of CZK 1.6 billion and 16 BGP actually financed with subsidies of CZK 371 million.

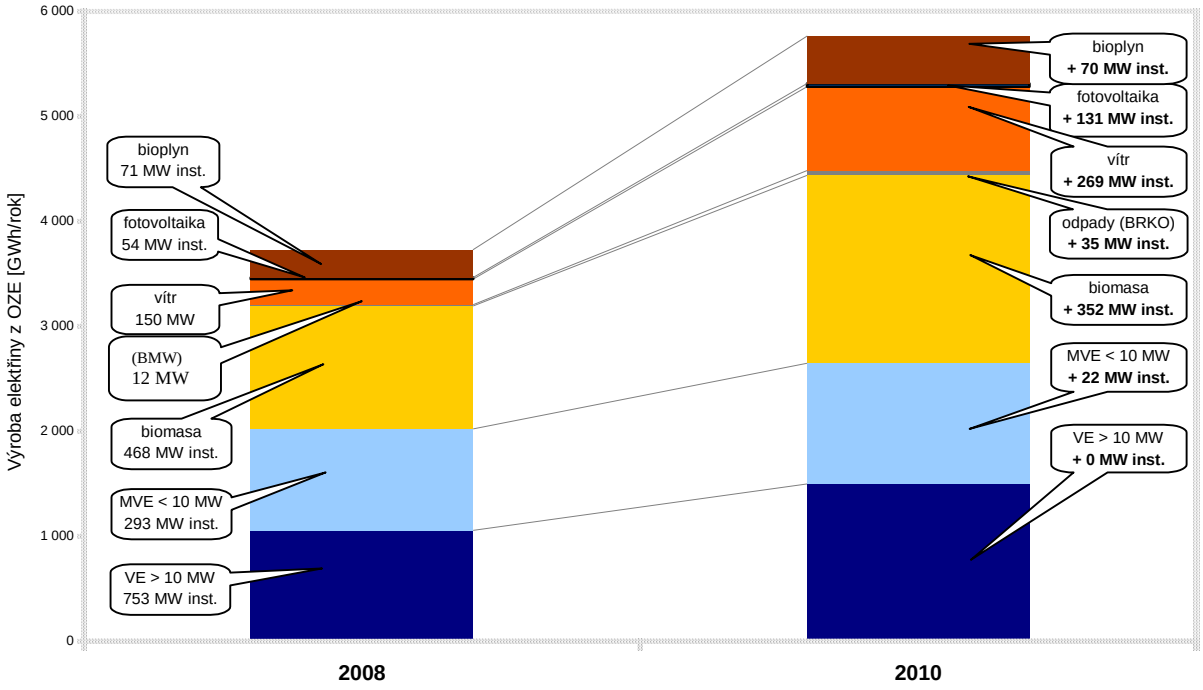
6. ASSUMPTIONS FOR FULFILMENT OF THE INDICATIVE TARGET

Assuming the continuation of the current level of gross domestic consumption of electricity, in order to achieve the target of an 8% share of electricity from renewable energy sources it will be necessary to increase the production by 2.03 TWh. If the long-term trend of rising consumption of electricity continues, this requirement could increase by a further 76 GWh.

Assumptions for increasing production

- Retaining the production of large hydroelectric power plants at a level of 1.6 TWh
- Maximising the use of existing capacities for the co-burning of biomass – production 0.5 TWh
- Construction of new capacities to be put into operation in 2009 – 2010

In view of the availability of usable energy potential, the construction of installed capacity in biomass (around 352 MW), wind (around 269 MW), photovoltaics (around 131 MW) and biogas (around 70 MW) is of key importance for the fulfilment of the indicative target The potential of other renewable sources is either exhausted or it would be very difficult to put them into use within the given time frame.



[image:Electricity production from RES [GWh/year]
Biogas
Photovoltaic
Wind
Waste (BMW)
Biomass
Small hydro < 10MW
Wind energy > 10MW]

Image 15 Estimate of the share of individual RES in the fulfilment of the indicative target

The construction of new facilities for electricity production from renewable energy sources is mainly limited by the competitiveness of the output in the market with electricity, or the economic return on investment in the implementation of the projects. The feasibility of investment in this area is impacted mainly by:

- The high specific investment costs for the construction of facilities
- The need for long-term planning in view of the length of the preparatory phase of the project including administrative barriers (building permit procedure)
- The negative stance of regional self-administration to the construction of wind power plants

The following conditions are assumed to ensure the economic attractiveness of investment:

- The retention of the current levels of purchase prices
- No restriction on promotion for economically realistic methods of use of RES (in particular co-burning)
- Investment support at a level of 30% of the investment costs
- Stability of the support in the agriculture sector

6. CONCLUSION

The share of electricity from renewable energy sources in the gross consumption of electricity in the Czech Republic in 2008 was 5.18%. This share was 0.44% higher than in 2007.

The year-on-year increase in electricity production from RES was 318.9 GWh. In spite of the slight fall in production from hydroelectric power plants, total production from RES rose by 9.35%. The most significant growth was recorded for electricity production from biomass and for wind power. The highest percentage growth was recorded in photovoltaic systems (514.29%), yet this represented an increase in the total production of electricity of only 10.8 GWh.

Tab. 17 Summary of production from RES in 2008

	Gross electricity production	***Share in gross domestic consumption***	***Share in the gross production of electricity***
	MWh	*%*	*%*
Hydroelectric power plants	**2 024 335.0**	**2.81%**	**2.42%**
Biomass total	**1 170 272.4**	**1.62%**	**1.40%**
Biogas total	**266 868.3**	**0.37%**	**0.32%**
Solid municipal waste (BMW)	**11 684.3**	**0.02%**	**0.01%**
Wind power plants (over 100 kW)	**244 661.0**	**0.34%**	**0.29%**
Photovoltaic systems	**12 937.0**	**0.02%**	**0.02%**
Liquid biofuels	**0.0**	**0.00%**	**0.00%**
Total	**3 731 013.0**	**5.18%**	**4.47%**

(Source: MIT)

The indicative target for electricity production from RES for 2010 will probably not be met as the remaining time frame is not sufficient for the implementation of a sufficient number of projects. Although electricity production from RES in recent years continues to rise, these increases are not sufficiently large to meet the target. Hydroelectric power plants have the main share in electricity production from RES, yet their installed capacity has only marginally increased. The second main reason is that at the time of the stipulation of the indicative target great hopes were placed on the development of the market with biomass for energy purposes, the theoretical potential of which is significant. This market has still however not fully developed due to its low level of economic attractiveness, and so a lack of specially grown energy biomass on the market is preventing further development of the installations that use biomass.

The main reasons leading to missing the indicative target are thus:

- There is not a sufficiently developed market with specially grown energy biomass, in particular due to the unwillingness of the agricultural sector to transfer to other than traditional crops.
- The indicative target was overambitious.

7. SOURCES USED

Ministry of Industry and Trade

- **Renewable Energy Sources in 2008**

Energy Regulatory Office

- **Annual Report on ES Operation in the Czech Republic 2008, ERO 2009.**
- **ERO Report on Electricity Production from RES (2009)**