

Czech Republic

Country Profile

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1. Overview of Electricity Supply

The Czech Republic has transformed itself into a western-oriented market. The economic outlook is modestly positive, based on continued inflows of foreign investment and growing consumer demand, but more growth depends on higher demand in key export markets and completion of key reforms to keep the economy competitive.

There is a strong energy market in the Czech Republic. The 2003 total installed output in the country is at the level of 15,443 MW. 65 percent of generation capacity is owned by Czech Energy Works (CEZ), the country's monopoly electricity producer. The rest is owned by independent producers. The majority of installed capacity is based on coal (57 percent), shares of nuclear and hydro plants are 12 percent and 32 percent. The total energy consumption increased by 3.1 percent in 2003. In addition, the country exported 20.308 TWh.

Upon the dissolution of the former Soviet Union, Czechoslovakia peacefully obtained independence in 1989. Subsequently, in 1993, the nation peacefully split into the Czech Republic and Slovakia. Since its formation in 1993, the Czech Republic has aggressively pursued integration into world markets. In December 1995, the Czech Republic was the first post-communist country to become a member of the Organization for Economic Cooperation and Development (OECD). Additionally, in February of 1995, an Association Agreement with the EU was signed, with full membership anticipated for the 2003-05 time-frame. The Czech Republic also maintains membership in the following international organizations: Central European Free Trade Agreement (CEFTA); NATO; The World Trade Organization (WTO); the International Monetary Fund (IMF); the World Bank (WB); and the European Bank for Reconstruction and Development (EBRD).

The electricity sector in the Czech Republic is made up of coal-fired thermal, nuclear and hydroelectric power stations, and a small contribution from renewable sources.

Throughout the 1990's, investment in the power sector was aimed at reducing emissions, specifically sulfur, from coal fired power plants. This has been accomplished by decommissioning obsolete plants, while adding desulphurization equipment to some existing stations. The loss in generation from decommissioning plants was made up for with new nuclear and hydroelectric generation coming online in the later part of the decade.

Goals to fulfill the EU electricity target , GWh

	Generation in 2001	Generation in 2010
Wind	0.6	930
Small hydro	826	1 120
High hydro	1 165	1 165
Biomass	5.9	2 200
Geothermal	0	15
Photovoltaic	0	15
TOTAL	1 998	5 445

Czech Republic Country Summary Table

Demographical Information	
Population, millions (2003)	10.3
Land area, thousand Ha (2002)	7,887
Macroeconomic Information (2003)	
GDP, billion US\$	90.4
Real GDP growth rate, percent	3.72
Foreign direct investment (net), million US\$	1,895
Electricity sector	
Electricity tariff, US¢/kWh (2002)	9.0
Collection rate, percent (2002)	NA
Load utilization factor, percent (2000)	NA
Electricity disposition, billion kWh (2003)	
Generation	78.18
Consumption	56.50
Exports	26.30
Imports	10.10
Renewable Target (2010)	8%
Feed-In/ kWh (Euro)	0.086
Generation capacity, million kWh (2003)	
Nuclear	2.8
Thermal	11.5
Hydro	1.0
Other renewables	0.0
Total	15.3
<i>Sources: European Bank for Reconstruction and Development, U.S. Energy Information Administration, Food and Agriculture Organization of the United Nations.</i>	

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2. Energy Policy, Barriers and Incentives

The new State Energy Policy approved by the Government in March 2004 has as one of its highest priorities the increased use of renewables and sets measures to promote this aim. The State Energy Policy set targets of 15-16 percent contribution to TPES from renewables sources to be achieved by 2030 and 17 percent for the share of renewables in electricity consumption. The Policy envisions that biomass will play the most important role in the growth of renewables. It contains incentives and measures to be used for the promotion of renewables as described in the legal and policy acts above.

The Czech Republic does have a fixed price, 15 year Power Purchase Agreement policy. Projects in the Czech Republic qualify under "Joint Implementation" rules of the Kyoto Protocol. This allows investments from other industrialized countries to be made in the Czech Republic to meet goals of reducing greenhouse gas emissions.

New energy policy to 2030 under preparation:

- Share of import in TPES will grow from 30 to 60-70 percent
- Reduction of energy intensity of GDP by 3 percent yearly
 - Share of renewable energy from 2,6 percent to 12-13 percent

- New Act on the promotion electricity and heat produced from renewable energy sources: Goal for 2010 – 8 percent in electricity consumption

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3. Wind

Wind energy has a long tradition in the Czech Republic. Records from 13th century mention a wind mill in the area of today's city of Prague. In the 18th and 19th century there were over 900 wind mills in the area of Czech Republic, a clear indicator of wind energy resources of the country.

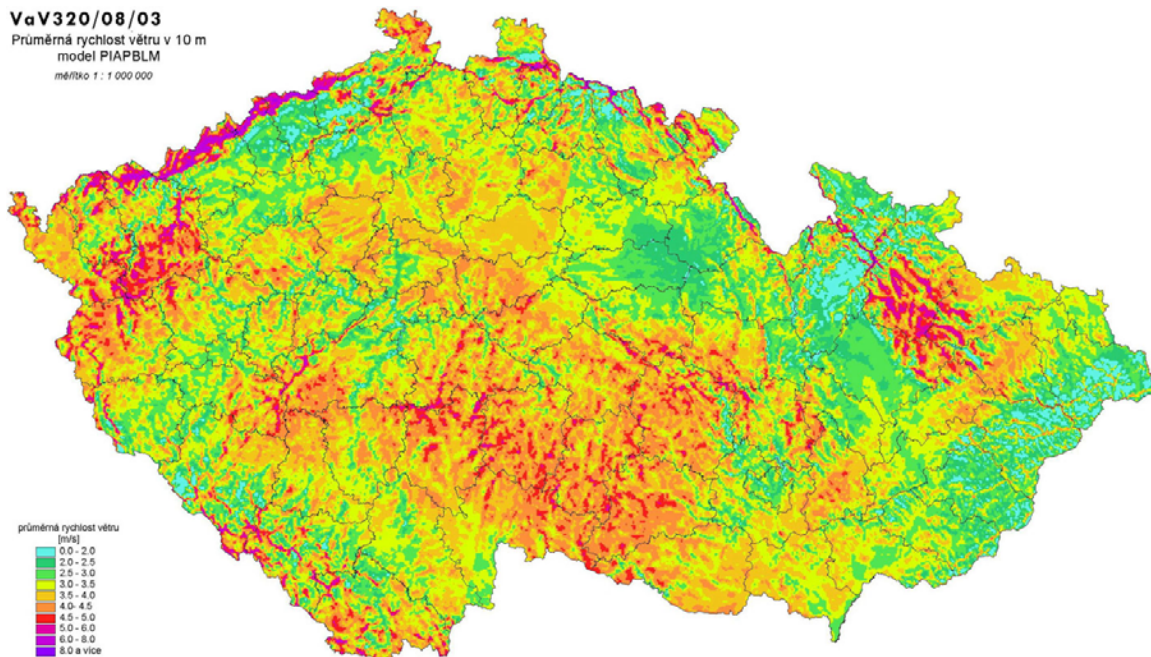
During the first half of the 1990s more than 8 MW of wind power, consisting of 23 turbines ranging from 75 - 500 kW were installed. Of these 9 were built by 3 different local manufacturers. Currently there are 28 MW of operational wind energy for electricity production in the Czech Republic.

The industry association of the country is the Czech Society for Wind Power. The Czech Republic has a good technical potential for wind energy development and local manufacturing.



Map of Czech Republic Wind Projects, 1990-1995

VaV320/08/03
Průměrná rychlost větru v 10 m
model PIAPBLM
měřítko 1 : 1 000 000



Wind Resource Map

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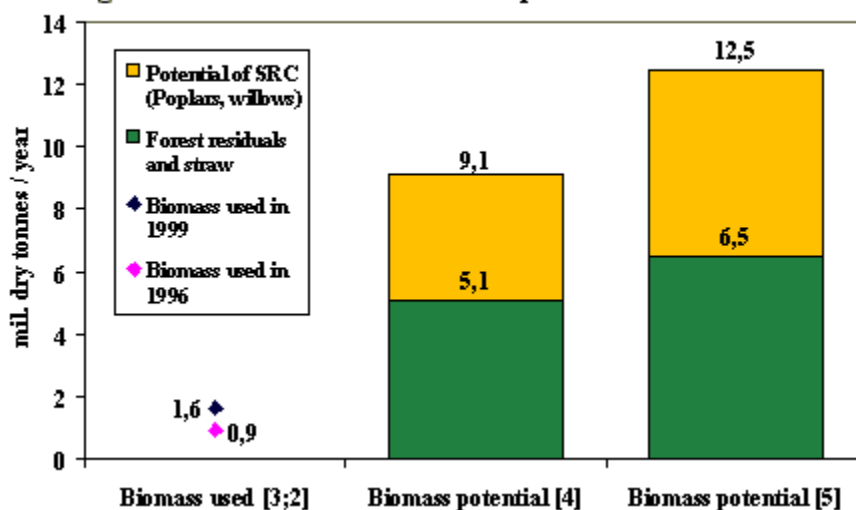
4. Biomass

The research work and studies of the real potential of renewable energy resources have concluded that biomass is the best exploitable renewable resource in the Czech Republic. As shown in below, only one-tenth of the potential of biomass is currently being used. In 1999 in the Czech Republic, about 1.6 million tons of dry biomass, largely wood and waste byproducts from woodworking were used for energy purposes. Biogas from wastewater plants and dumps came in second place. Straw use to date has been minimal, but farmers in some areas are starting to use it more.

The total area of agricultural land unsuitable for producing food goods is estimated to be more than 1.3 million hectares by the Ministry of Agriculture. Of this land, about 800,000 hectares was not used at all or was maintained with state subsidies. Of this at least 500,000 hectares could be used for biomass production. Another 35,000 hectares is available in devastated areas. This increases the estimation of available dry mass production by 6 or 7 million tons. Theoretically, if all these 0.5 mil ha would be used for biomass, biomass would make 18 percent of all energy sources. The more than 1 million tons of biomass available yearly from unused grasslands and unploughed arable soils is excellent material for producing biogas. So far biogas is not significantly utilized in the Czech Republic

Over the past ten years the growth in the percentage of renewable resources in the energy balance has been mainly from the use of biomass, including the use of rape seed to produce MERO. The total production of energy from biomass which was estimated at 3,200,000 MWh in 1995 (11.5 million GJ) grew in to 5,600,000 MWh in 1999(20,160,000 GJ). Even though this shows a great shift in a five-year period, it is far from utilizing the full potential of biomass.

Figure 1: Present utilization and potential of biomass



Solid biofuels have a ratio in the balance of domestic primary energy sources at the level of minimally 16 PJ. After adding liquid biofuels (biodiesel) - in the volume of about 50,000 tons/year (1,900,000 GJ/year) and gaseous biofuels (biogas) in the volume of about 4.5 million m³/year (about 1,000,000 GJ/year), the total share of biomass on primary energy resources in the Czech Republic is about 19 PJ.

Although the statistical data is sometimes insufficient and not complete, the low temperature heat markets shows to be the most important market for biomass. About 2/3 of bioenergy is consumed by households for that purpose, the rest in industry. More than 1.2 million dwellings currently heated by coal, coke and briquettes (as compared to only 49,000 heated with biomass) offer a challenging possibility for introducing biomass into this market, especially if supported by fiscal measures.

Another opportunity for biomass that already exists is for district heating plants (about 50 percent of all houses heated by district heat), mainly those fuelled with coal. Only about one third of them (based on the power installed) are equipped with cogeneration, leaving (theoretically) some 10,000 MW of district heat to be switched from coal to biomass.

Czech Republic Biomass Resource Data

Biomass resource type	Total production	Production density
Percent of total land area covered by		
Forests	22%	
Shrublands, savanna, and grasslands	0%	
Cropland and crop/natural vegetation mosaic	76%	
Urban and built-up areas	1%	
Sparse or barren vegetation; snow and ice	0%	
Wetlands and water bodies	0%	
Primary crop production, tonne	(avg. 1999-2001, tonne)	(tonne /1000 Ha)
Total primary crops (rank among COO)	33,672,065 (7)	4,357 (1)
Top 10 primary crops		
Maize for Forage & Silage	7,463,343	966
Mixed Grasses, Legumes	5,344,000	692
Wheat	4,219,369	546
Clover for Forage & Silage	3,525,000	456
Alfalfa for Forage & Silage	3,428,400	444
Sugar Beets	3,005,786	389
Barley	1,928,259	250
Potatoes	1,490,958	193
Rapeseed	920,315	119
Maize	304,801	39
Animal units, number	(number)	(number / 1000 Ha)
Cattle	1,615,434	209
Poultry	13,018,000	1,685
Pigs	3,844,344	497
Equivalent animal units	3,283,352	425
Annual roundwood production	(1996-98, 000 m ³)	(m ³ / Ha)
Total	13291	1719.8
Fuel	646	83.6
Industrial	12645	1636.3
Wood-based panels	939	121.5
	(1996-98, 000 metric tons)	(metric tons / Ha)
Paper and paperboard	782	101.2
Recovered paper	335	43.3

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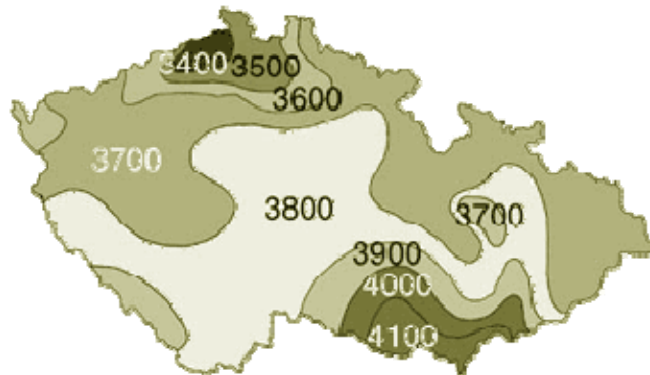
5. Solar

The Czech Republic has the potential of a maximum area of 100,000 m² of solar collectors in operation. For the total operated area of solar collectors of 100,000 m² and the average annual yield of 400 kWh from 1 m², an estimated annual production is 40,000 MWh (0.144 PJ) of thermal energy.

The annual solar radiation on a horizontal surface in the Czech Republic varies between 1,050 and 1,259 kWh/m²; the average solar radiation is about 1,150 kWh/m² per annum. 75 percent of this amount falls in the 6 summer months (from April to September). Given a surface inclination of 40°, which is the average inclination of a pitched roof, and a south or south-west

facing orientation, the annual solar radiation amounts to 1,265 kWh/m²/year. An angle of collector inclination of 30°-45° is ideal for solar applications with year-round usage.

The present use of solar photovoltaic systems in the Czech republic is very limited. The photovoltaic solar systems are used as decentralized sources of electric energy. The only exception is grid connected testing photovoltaic power plant of CEZ a.s. at Mravenecník with a power output of 5 kW.



The annual quantity of solar energy striking the Czech Republic.

Solar photovoltaic systems use in near future is limited for demonstration applications and for off-grid applications like in holiday homes, caravans, telecommunication equipment, traffic signs etc. and their potential and possible contribution compared with other renewable energy sources is assumed to be negligible.

The theoretical potential of the solar thermal energy use is considerably high-given the usage of currently available solar heating systems with fluid collectors, more than 35,500 TWh (127,700 PJ) of thermal energy per annum can be received on the Czech Republic's overall area (78,802 km²). The estimated available potential of solar energy includes active solar systems for domestic hot water heating and solar systems assisting to heating systems in family houses as well as in apartment blocks, solar systems for heating of swimming pools, solar-assisted district heating units and hot air solar systems. The available potential of solar energy amounts about 8-10 million m² of collector area with a yearly production of 11,500-14,400 TJ of thermal energy.

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6. Geothermal

The installed capacity of thermal output to thermal water - water heat pumps, which use low-potential geothermal heat and the heat of the environment, was about 240 at the beginning of 1998, with the total thermal output of about 3,000 kW. Their total energy yield, when considering the average annual use of 3,000 hours/year, is 9.3 GWh, or 33.5 TJ per year.

Geothermal heat is used for domestic and swimming- pool heating, and for some small industries. The most famous spa use is at Karlovy Vary (Karlsbad) and Mariánské Lázně (Marienbad), along with five others (28-72°C water) in the western part of the country, with an estimated 4.5 MWt capacity and 90 TJ/year of utilization. About 390 geothermal heat

pumps have been installed, with a total capacity of 7.95 MWt and an estimated 38.2 TJ/year (350 vertical and 10 horizontal ground-coupled, and 30 water source installations).

The small-scale private installations are typically used for heating family houses (output less than 20 kW), hotels, accommodation facilities, swimming pools and small businesses (20-100 kW) as well as three water-treatment plants that use heat pumps with an output of more than 100 kW each.

The total theoretical geothermal potential assessed for the entire territory of the Czech Republic on the basis of the heat flows is 4,641MW. The exploitable potential in the depths up to 100-120m below ground level ranges from 2,500 to 3,000 MW, resulting to an installed heat capacity of about 3,750-4,500 MW. The net contribution of heat pumps could range between 27 to 32,4 PJ.

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7. Hydroelectric

In the 1930s there were 12,000 small hydro stations generating power in the Czech Republic. Due to lack of investment, the number of operating plants declined to 259 (22MW) in 1986. Recently, the Czech Republic has begun dealing more with small hydro and the number of plants has increased considerably over the years. Small hydro plants are once again a significant source of energy for the Czech Republic, with 1,230 small hydro stations producing 2,653 TJ/year. The installed capacity of small hydro plants at the end of 1999 was 283 MW, equivalent to about 31 percent of the Czech Republic's hydro capacity. Actual generation from small-scale hydro in 1999 accounted for 37 to 40 percent of hydro output.

The hydropower potential in the Czech Republic from a technical point of view amounts to about 3,380 to 3980 GWh/year depending on different sources, with the hydropower potential from small hydro power stations around 1,570 GWh/year.

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8. Relevant Links

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9. References

- Ministry of the Environment of the Czech Republic, State Environmental Policy ISBN 80-7212-171-5, Prague, 2001.
- Ministry of the Environment of the Czech Republic, State Environmental Policy, Prague, 1999.
- UN Food and Agriculture Organization, FAOSTAT Database [Accessed July-August 2002], <http://apps.fao.org/default.htm>.

- J.W.Lund and D.H. Freeston , "World-wide direct uses of geothermal energy 2000", *Geothermics*, Vol. 30, no.1 (2001).
- US Department of Energy, "International Energy Outlook 2002: Hydroelectricity and Other Renewable Resources," 26 March 2002, <http://www.eia.doe.gov/oiaf/ieo/hydro.html>.
- The Renewable and Energy Savings Center, <http://www.ekowatt.cz>
- The National Energy Efficiency Study, Czech Ministry of Industry and Trade, 2000.
- Wind Power Monthly, various issues
- Stillstand seit 1995, Windkraft-Nutzung in Teschechien braucht dringend neue Impulse, Kurin, Petr; Neue Energie, 8/2000
- Wind Power Potential in the Czech Republic, J. F. Rimal, Czech Technical University of Prague, Czech Republic. 14 October 1994

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10. Country Contacts

Contacts made in the preparation of this assessment are gratefully thanked for their contribution to this report. Contacts include: