Intelligent Energy Europe

TRANS-SOLAR

CZECH REPUBLIC NATIONAL REPORT

CITYPLAN

January, 2009

Table of Contents

A. Introduction

1. Overview of the country

The Czech Republic was established in the year 1993 after the division form the Slovak Republic. It is located in the centre of Europe with area of 79 000 km² and 10,3 millions inhabitants (year 2007).

1.1. Climate of the Czech Republic

The climate of the Czech Republic is mild but varies according to the region and season. The main reason for the differences is the altitude above the sea level. Generally, higher elevations have lower temperatures and higher rainfall.. There are many other factors affecting the climate, such as frontier mountains that alter cloud movements further inland and therefore rainfall distribution.

Average air temperature is highly dependent on the altitude above sea level. While on the highest mountain of Czech Republic, Snezka (1602 m), it is only 0,4°C while in the south-eastern Moravia lowlands it is almost 10 °C. In Prague, the so-called „heat island“ with its municipal clime, there is the highest average air temperatures.

Table 1: Average temperatures in the Czech Republic (Source: [1,2])

Indicator	*Year*							
	1900	**1919**	**1937**	**1946**	**1956**	**1970**	**1990**	**2002**
Average annual temperature (°C)	9,6	8,6	9,7	9,4	7,8	8,8	10,7	10,7
The highest temperature (°C)	33,1	31,6	33,7	35,0	28,9	32,4	34,4	34,5
The lowest temperature (°C)	-14,7	-11,2	-10,8	-19,8	-26,5	-13,2	-13,5	-15,0
Total precipitation (mm)	502,9	570,8	478,9	638,3	417,6	526,7	316,5	625,3

1.2. Global radiation (Source: [22])

Solar radiation is characterized by considerable time and regional irregularity and especially by a relatively low energetic density. Approximately 75% of perennial global solar radiation lands during the summer. In addition, there are big differences depending on geographical position. Even within the Czech Republic there is a particular disparity between regions. The average number of peak solar hours is between1400 to 1700 hours per year. The shortest time can be found in the north-west area, and in the south-east. Locations vary on average about 10%; in areas with high pollution or higher cloudiness it is necessary to take into account a 5-10% decrease in solar radiation. Meanwhile, it is possible to take into account a 5% growth in solar radiation for areas with an altitude between 700 and 2000 metres. The solar energy per square meter is on average 950-1100 kWh per annum.

Table 2: Average time of solar radiation in the Czech Republic in selected areas (Source: [23])

	Month/number of hours per month												TOTAL
Town	***I.***	***II.***	***III.***	***IV.***	***V.***	***VI.***	***VII.***	***VIII.***	***IX.***	***X.***	***XI.***	***XII.***	***(h/year)***
Brno	*41*	*67*	*127*	*159*	*224*	*218*	*212*	*219*	*155*	*117*	*44*	*37*	*1 620*
České Budějovice	*41*	*60*	*124*	*137*	*195*	*197*	*181*	*199*	*138*	*97*	*55*	*43*	*1 467*
Hradec Králové	*31*	*61*	*120*	*149*	*217*	*206*	*192*	*211*	*153*	*107*	*45*	*29*	*1 521*
Karlovy Vary	*40*	*55*	*121*	*145*	*187*	*187*	*207*	*207*	*142*	*115*	*41*	*26*	*1 473*
Olomouc	*37*	*62*	*117*	*155*	*210*	*205*	*212*	*213*	*138*	*118*	*43*	*32*	*1 542*
Opava	*43*	*57*	*118*	*135*	*190*	*185*	*184*	*194*	*134*	*106*	*56*	*46*	*1 448*
Ostrava	*40*	*57*	*119*	*135*	*191*	*191*	*183*	*193*	*138*	*108*	*49*	*42*	*1 446*
Pardubice	*36*	*60*	*122*	*158*	*220*	*210*	*181*	*209*	*154*	*108*	*52*	*39*	*1 549*
Plzeň	*31*	*56*	*118*	*139*	*195*	*200*	*197*	*202*	*134*	*86*	*46*	*37*	*1 441*
Praha	*43*	*62*	*128*	*149*	*208*	*210*	*204*	*214*	*150*	*103*	*55*	*47*	*1 573*
Ústí nad Labem	*22*	*40*	*93*	*126*	*179*	*159*	*163*	*181*	*118*	*71*	*28*	*17*	*1 197*
Znojmo	*50*	*71*	*138*	*164*	*226*	*217*	*215*	*227*	*166*	*131*	*58*	*52*	*1 715*

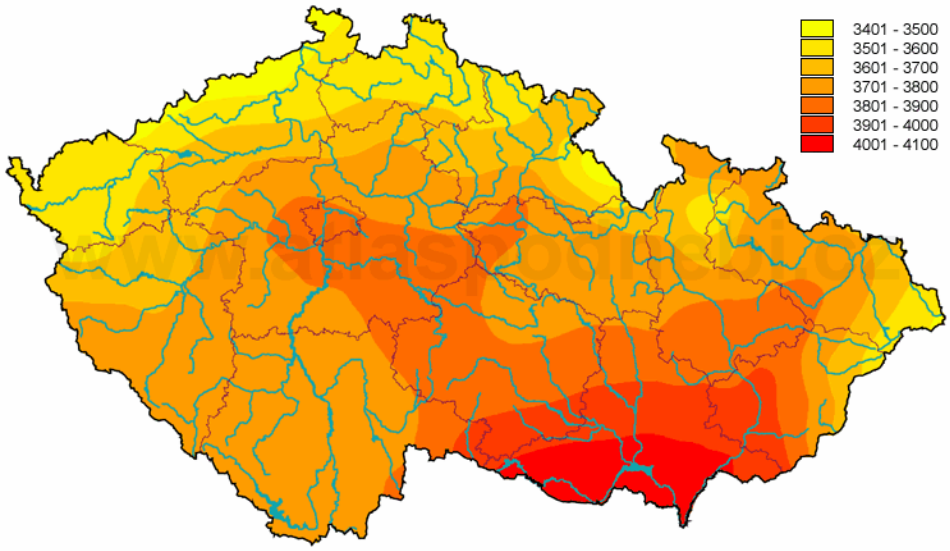


Figure 1: Yearly sum of global irradiation on horizontal surface in Czech Republic in MJ/m² (Source:23,24])

Between 3401 MJ/m² (=945 MWh/m²) and 4100 MJ/m² (= 1140 MWh/m²).of solar radiation falls on the Czech Republic annually.

1.3. Relief (Source: [25])

The relief of the Czech Republic is heterogeneous, especially due to the disparity between older Czech Highland on the West and the younger foothills of the Carpathian Mountains in the East. A relatively dense network of watercourses cuts through the border mountains as well as the tables and upland areas in the centre of the Bohemian basin. The median sea level altitude is 430m. Almost 67% of total territory lies at or beneath 500m, about 32% from 500m to 1000m and only 1% (827 km²) above 1000m. Predominantly coniferous forests cover 33% of the total area .

1.4. Population: evolution for the last 10 years, actual situation and forecast

The end of the 1990s withnessed the trend of a decreasing population because of growing standard of living outside the Czech Republic, along with a reduced birth rate and increased age of first-time mothers. The birth rate was much higher in the last years because the larger generation from the 1970s is nowadays beginning to have children. One of the reasons for this short-time deviation is the change of the political system (1989) with lots of other secondary factors. However, another period of birth rate decline is expected for the future. The last statistics show 10 381 130 inhabitants for the year 2007.

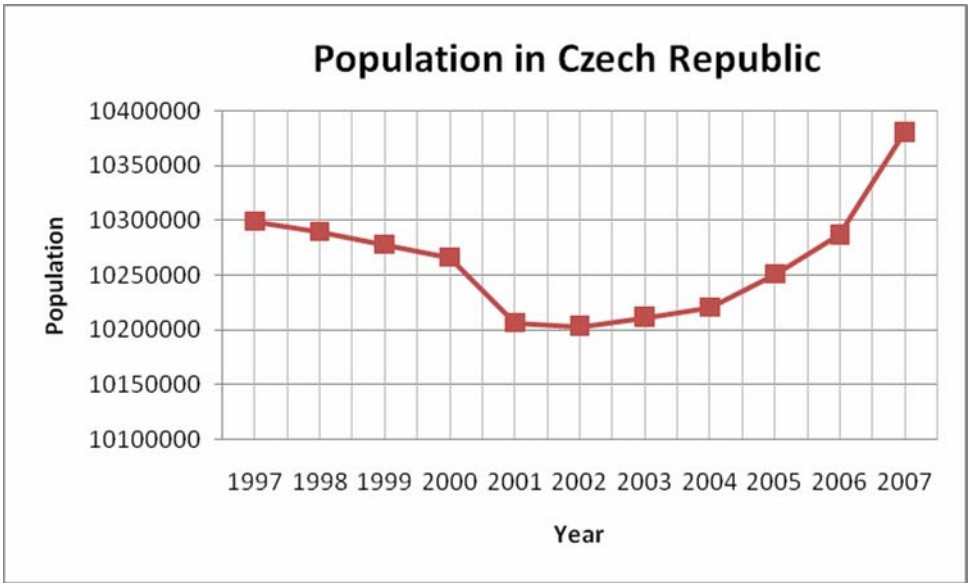


Figure 2: Population in the Czech Republic in the period 1997 – 2007 (Source: [24])

1.5. Additional available statistics – General and Economic

1.5.1. Inflation

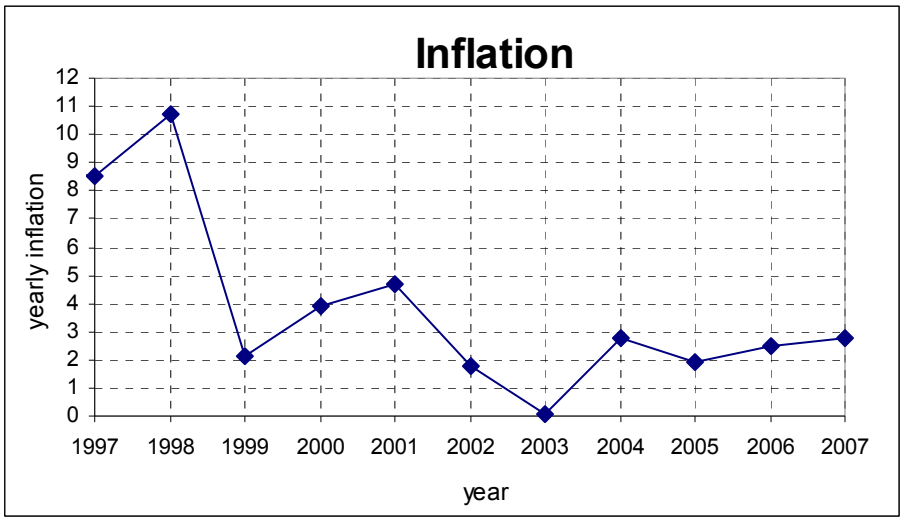


Figure 3: Trends of inflation in the period 1997 – 2007 (Source: [24])

In 1999 the rate of inflation reduced to 2,1% from 10,7% in 1998. Slowing down the deregulation of prices by the state combined with foodstuff price decline was the main reason for the decrease in inflation. Growth in the price of rent, electricity, gas, transport, telecommunications and foodstuff are the main contributors to rising inflation. 2004 had an average inter-year inflation rate of 2,8% against to year 2003 when the inflation rate was practically neutral. Increasing the VAT and consumer taxes of services affected the evolution of consumer prices. In 2007, the average inflation was 2,8% which is the same value as in the year 2003.

1.5.2. Salary

The highest growth of real wages was during the years 1994 – 1996. In 1997 it moderated and in 1998 real wages decreased as the consumer price index was higher than the nominal wages index. In the following years real wage growth continued due to moderating inflation.

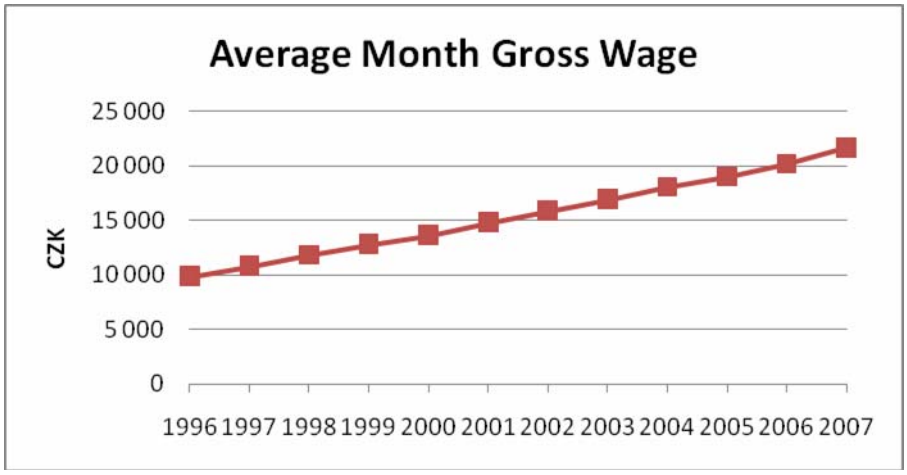


Figure 4: Average month gross wage 1996 – 2007 [CZK; 1€ = approx.25CZK] (Source: [24])

1.5.3. GDP (Source: [24])

The Czech economy went through significant structural adjustments during the years 1993-2006. In 1993, the beginning of the transformation from a centrally planned economy to a market economy began, accompanied by a 11,6% decrease in GDP. Despite continued economic growth, the Czech economy only reached 1989 levels in 2001.
Generally, agriculture's and industry's share of GDP has decreased, giving way to increases in the service sector's share. The evolution of GDP has been very satisfactory during the last years and this trend continues.

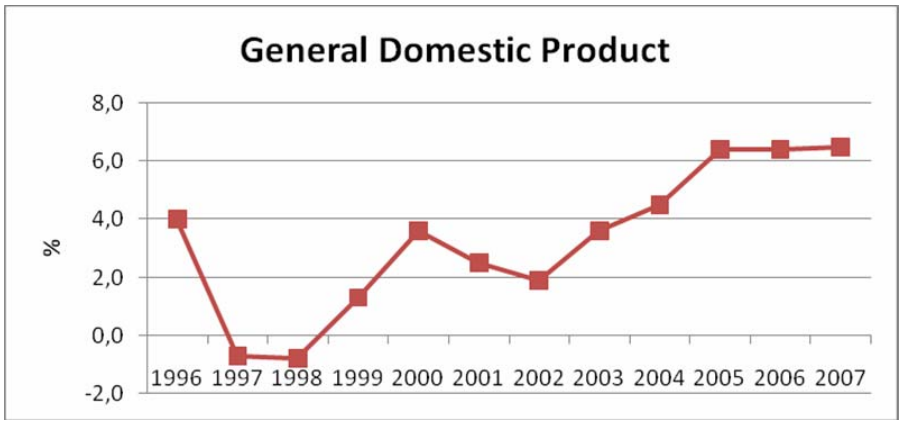


Figure 5: General domestic product 1996 – 2007 (Source:[24])

1.5.4. Price evolution (Source: [24])

Statistics show striking price cut in services and building while prices of agricultural producers increased dramatically. Export and import prices both declined. Prices of industrial products stay on the same level as the decade before. The figure below shows the relative change in prices in the form of indexes of the goods or services accordingly to the selected sectors.

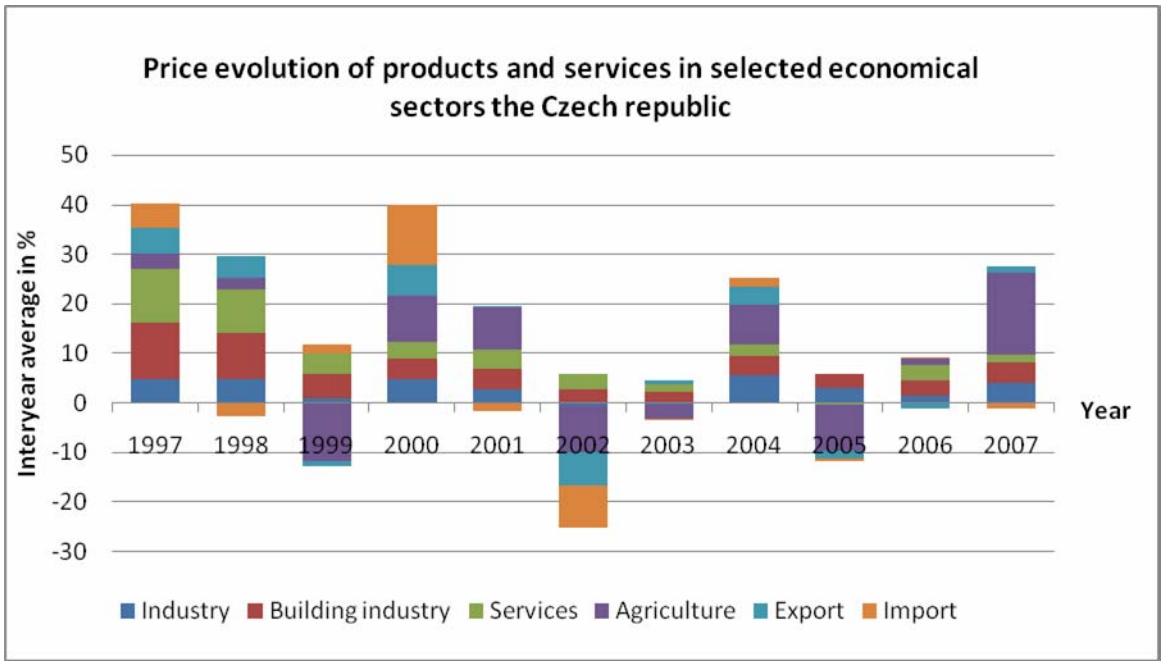


Figure 6: Price evolution of products and services in selected sectors (Source: [24])

Note: export, import – amount for the goods in total

1.6. Statistic data of energy consumption, dependency energy imports, price evolution, forecast energy consumption, CO_2 emissions

1.6.1. Primary energy resources consumption (Source: [3])

Energy balance diversified after year 2000 and is well balanced today but at the expense of growth in the imported fuels share.

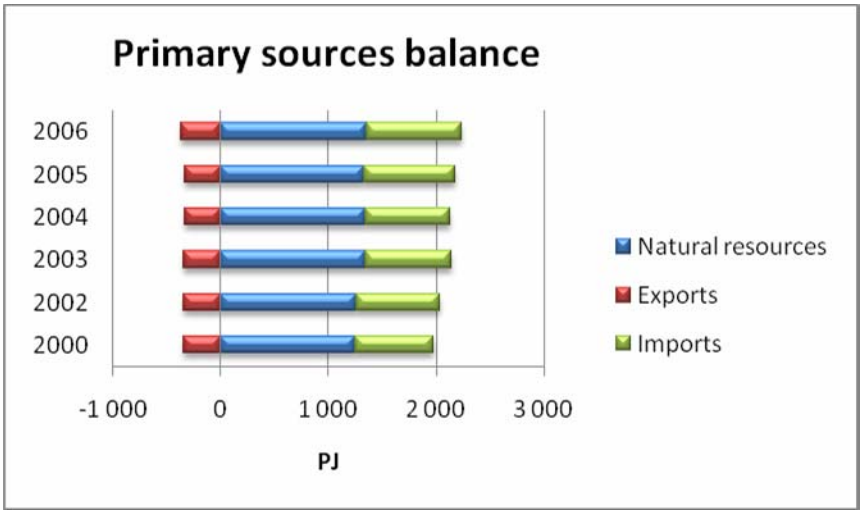


Figure 7: Primary energy sources balance 2000 – 2006 [PJ/year] (Source: [24])

Fast consumption growth of primary energy resources is linked with rapid growth in the economy and improved energy efficiency. Fast general consumption growth of primary energy signals a backlog in energy savings. It also means faster utilization of domestic fuels limited reserves growth of energy import dependencies.

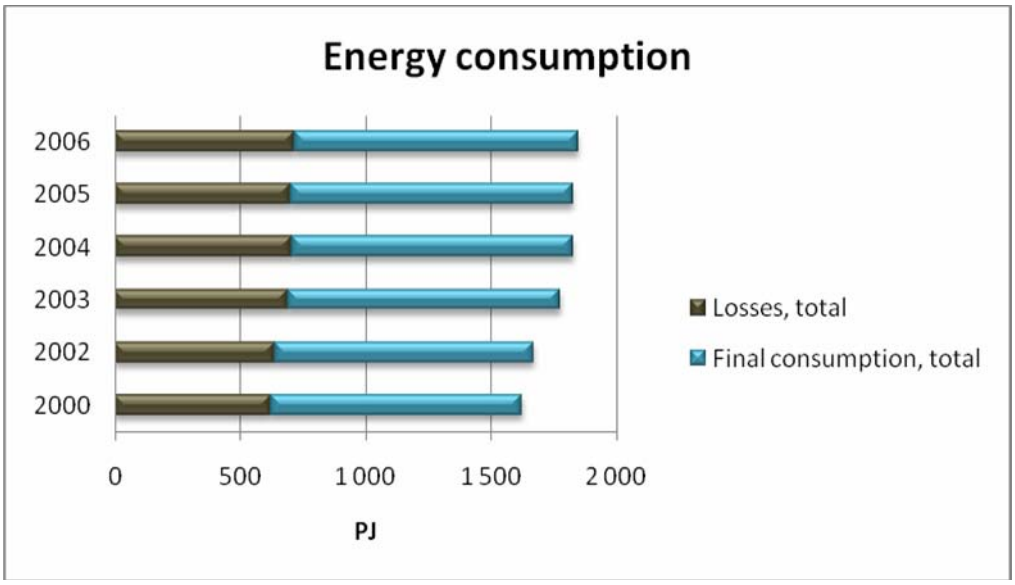


Figure 8: Energy consumption 2000 – 2006 [PJ/year] (Source: [24])

The energy consumption figure is related to the primary sources balance, where the amount of primary sources consists of the final consumption and losses.
Ministry of Industry and Trade (MIT) disposed of the state energy conception where „Green scenario – U“ is presented as most presumptive of the future. The new scenario accounts for increasing domestic energy resources availability (brown coal), energy efficiency, support for renewable energy, and possibilities of building new nuclear sources.

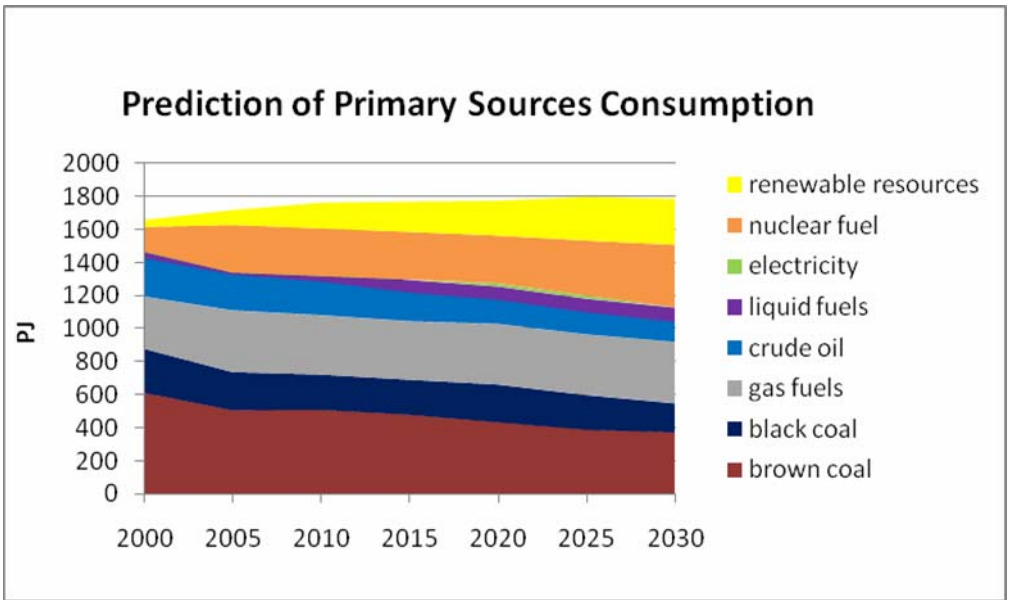


Figure 9: Prediction of primary energy sources consumption 2000 – 2030 [PJ/year] (Source: [26])

During the period of 2015 to 2020, the Czech Republic will be close to expected average EU level of GDP energy demand. Significant reductions in polluting emissions will continue. In all cases, the structure of primary energy sources will diversify more than in 2000. The highest growth rate will remain with renewable energy.

Brown coal will be the most significant primary energy source. It will be used first of all for production of electricity from clean coal technologies.

The black coal market will be reduced by more than 40% by 2030 and a more important role will be played by imports. Crude oil consumption should have declined by half. Liquid fuel consumption will rise slightly. By 2030 natural gas consumption will increase by less than fifth while nuclear energy will grow by 2,5 times and above all renewable resources will grow 6,4 times compared to the year 2000. Demand for imported energy will have almost doubled.

Electricity consumption will grow but the pace of growth will decline. After the year 2025 nuclear energy will be the most significant contributor to electricity production. Electricity production from renewable resources will rise notably.

Imports of energy sources will dramatically exceed exports. At the end of the period (2030), nuclear will dominate followed by natural gas, liquid fuels and black coal and coke.

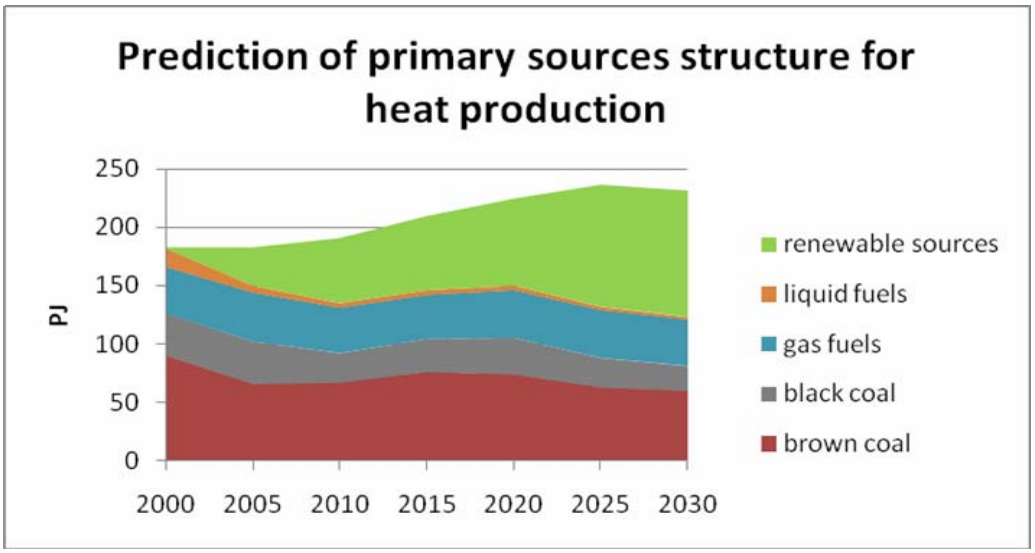


Figure 10: Prediction of primary energy sources in heat production (Source: [26])

Since 1989, energy and fuel prices have grown except for short-term falls. At first the growth was slow, mostly because of currency reforms. By1996 though the prices rose rapidly and after entering EU also even faster. Fuel and energy demand is growing faster than domestic demand because of increased exports to more developed EU nations. European sources of crude oil and natural gas will be exhausted by the year 2030. If they are not replaced by renewable sources, coal and nuclear energy, it will be necessary to import them from Russia and overseas.

Energy consumption continues to rise in the EU, including the Czech Republic, while energy production stagnates, despite the implementation of economic efficiency incentives for heating.

1.6.2. Price trends

In monitored period is a gentle grow of heat energy production perceptible. Heat energy from other fuels shows higher inter-year growth from 2005 to 2006. Price evolution of heat is influenced primarily by changing fuel prices and with possible growth of constant costs and profits.

In 2006 inter-year price growth of heat from coal was about 4,5% and from other fuels about 14%. Although during the last 6 year period the total amount of supplied heat energy has decreased about 12%, the price of heat has increased about 25%. In the same time the price of heat from coal has grown by 52 CZK/GJ and the price of heat from other fuels by 93 CZK/GJ.

In 2008, energy taxes increased from 5% to 9%. More data about prices are in chapter 11.

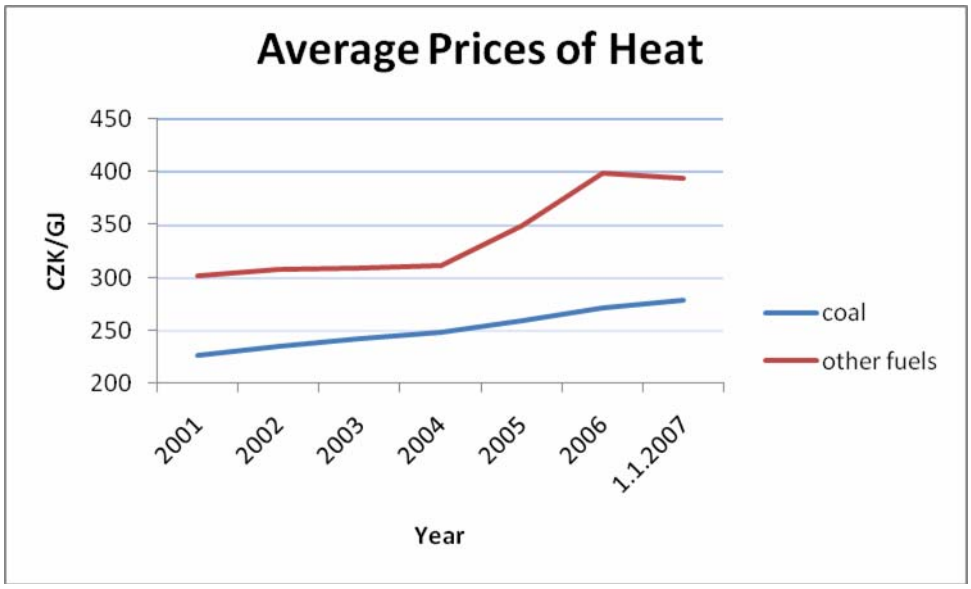


Figure 11: Evolution of average heat price 2001 – 2007 [CZK/GJ/rok] (Source: [27])

Note: From 1.1.2008 the VAT rate for heat was increased from 5 to 9%. At the same time other consumer energy taxes (ecological tax) came into effect.

1.6.3. Energy Regulatory Office (ERO) hypothesis of mark-up of heat according to fuel in 2008 (Source: [28])

The Heating Plant Industry Association made a prediction of the price evaluation on the basis of the date form Energy regulatory Office at the end of the year 2007:

1. Long-distance heat from coal

Increase of heat prices from coal will move according to Energy Regulatory Office (ERO) estimate 0-75 crowns. Fuel and other expenses will follow at about a third (25 crowns/GJ). Consumer tax and enhanced VAT may increase the price of heat by another 50 crowns/GJ.

However the majority of heat from coal (over 95%) is from combined production of electricity and heat so it should be freed from the VAT with heat from renewable sources. Therefore the price growth of the majority of long-distance heat from coal will rise to about 10%. The maximum price increase will concern just a small part of households, as a result of the highest consumer ecological tax.

2. Long-distance heat from gas

The consumer ecological tax for natural gas is half of that for coal but the price of natural gas is almost twice as much as that of coal. Therefore the price of heat from gas sources can rise as much as 75 Kc/GJ, just like coal. This heat tax will affect gas customers more than coal customers:

no more than 10% of heat from gas is made from combined production of heat and electricity and so it is not exempt from the ecological tax.

1.6.4. Further price evolution prediction until 2021 (Source: [CityPlan, 4])

The Czech Republic (CR) was incorporated into the European Union (EU) in 2004. Legislation of the CR is in harmony with EU legislation. Currency union and liberated common energy markets will contribute to progressive convergence of energy prices for industry as well as for households within the EU. All of these factors affect the prices of heat, with future trends assumed to be the same as in other EU member countries.

Prediction of future energy price trends has been performed on the basis of analyzed ratio indicators, world-wide crude oil price forecasts, liberalization impact modelling and estimation of macroeconomic and political trends by the year 2021. It assumes no significant devaluation of the Czech crown. After 2011 it assumes successful economic progress with the Czech Republic overtaking some of the poorest present EU member states and a standard of living in line with the middle EU member countries.

1.6.5. CO_2 emissions (Source: [24])

Emissions of the most significant greenhouse gas, CO_2, have decreased from 132,7 mil. tons in 1997 to 125,9 mil tons in 2005 (that makes 12,3 tons CO_2 per capita). Preliminary estimation of CO_2 emissions is 128,8 mil. tons in 2006. Overall national emissions do not include international air transport, as it is expressed separately.

An overall inventory of CO_2 sources and sinks are prepared according to IPCC methodologies (Intergovernmental Panel on Climate Change).

The figure below shows the long-term trend in production of CO_2 emissions.

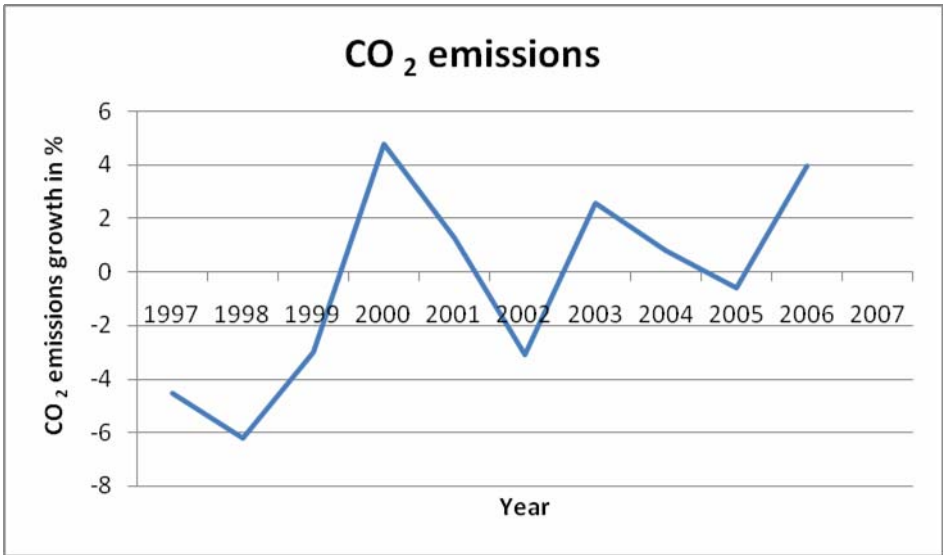


Figure 12: Evolution of CO2 emissions 1997 – 2007 [%/year] (Source: [24])

A high level of the energy demand is a weak part of Czech economic development. The value is still one of the highest in comparison with international data in the EU. High energy technologies and a high share of industry in the economy are the main causes of the total sum.

The energy demand factor decreased about 6,5% inter-yearly in 2005, the smallest decline from the year 2000. The energy demand factor rose slightly in 2006.

The energy demand factor is expressed by primary energy consumption sources. Primary energy sources include home fuels, water and wind electricity, nuclear heat, and export/import balance (figure below).

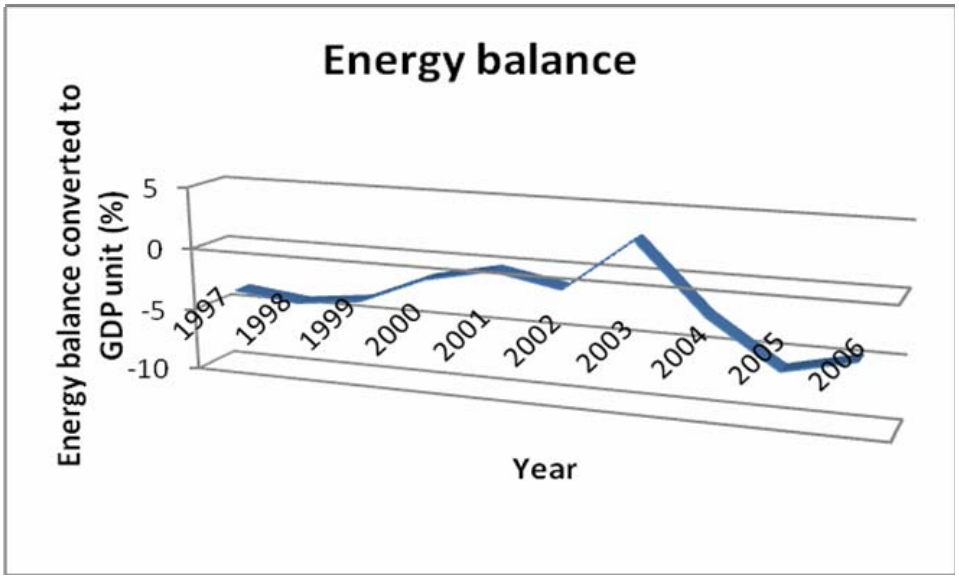


Figure 13: Energy balance in GDP per year 1997 – 2006 (Source: [24])

B. State of the Market

2. Overview of the market situation

2.1. Brief historic overview (Source: [5,6,7,8])

As a reaction to the world oil crisis in 1973 alternatives for the energy resources in the contemporary Czechoslovak republic were searched for. One of the first steps, according to solar energy, were solar collectors in the form of classic glazed collectors and unglazed absorbers. First collectors were made as the modified types of glazed flat radiators with elaborating new types and methods meanwhile. The used anti-freeze fluid was partly toxic and the problem was solved by using different water pressures in primary and secondary circuits. Another field of research consisted in automatic control systems - the first pumps were turned on manually.
The energetic research in the field of sun emissions, its features and characteristics were elaborated as well in the first programmes as EC 1010.

Information dissemination was the result of a wide range of individuals and organizations such as the Czechoslovak scientific-technological institute, ministries, and research centers. Lots of conferences and trade-fairs were held in that period.

The large systems for public and agriculture sector were supported by the contemporary government and embedded in the Act of Government n.247 (10.7.1980) which specified the use of solar systems and heat pumps. On the basis of another Act n.121 (1980) production of solar collectors should be 50 000m² by the year 1985 and 150 000m² by the year 1990. The plan included provisions for the plants for the production of 80 000m² per year in 1985. The national company Elektrosvit should have been the crucial producer.

The primary producers came from Kroměříž (The regional corporation of services), Žiar nad Hronom (Plant of Slovak national uprising) and Nové Zámky (Elektrosvit). Each of them came up with its own solar collector type. Another interested company was ČKD Dukla Praha where the production started (together with Kroměříž) in 1977.

One of the best known and largest installed systems for hot water was located in Kojetín and in Rusava u Holešova. The still functional Kojetin system was installed in 1974 and is made of 140 collectors of 120m² with 2 accumulators of 4000 liters. The solar system in Rusava has been renovated and reconstructed with new collectors.

One of the first systems to ensure the methods for the solar hot water systems was installation of 4 collectors in the beginning of the year 1978 in Třebíč (area of BOPO national corporation) that was enlarged to 20 collectors in May that year for the hot water for the cowhouse JZD Čechtín. There is a big amount of large-scale solar thermal systems that were installed till the 90´s but within the expected 15 years of lifetime these cannot be included in the current statistics.

The estimated total installation area within the period 1977-1992 is about 50 000m². Another presumption that count 100 000m² of hot water and 150 000m² of passive solar systems used for drying was made but not sufficient data was available. The majority of the systems were installed in industry and agriculture; for the households was installed the minimum contrary to the current situation. This is the result of the change of the political systems and energy strategy and priorities connected to the funding systems.

Table 3: The estimated sum of installed area [m²] (Source: [6])

	Flat plate	*Vacuum tube*	*Concentrated*	*Glazed - sum*	*Unglazed (absorbers)*	*Total*
2004	8 555	455	90	9 100	1 800	10 900
2003	8 152	430	18	8 600	1 700	10 300
1990-2002	30 150	1 615	535	32 300	6 500	38 800
Total	46 857	2 500	643	50 000	10 000	60 000

High expectations have followed other inauspicious periods of solar systems utilization in the later 80s. Some suspicions occurred within the lower energy results to those presented by other laboratories and researches and due to the early beginning of the arena there were technical embarrassments, for example used collectors of a good quality in the uncoordinated or low-class solar systems which includes lots of elements that should create the comprehensive system or non-automated regulatory systems, inadequate fluids etc.

One of the crucial reasons for a standstill/attenuation in solar collector dissemination in both the public and private sector was the low wholesale price and the absence of the overall renewable energy strategy within the context of the fuel-energy development strategy. Even if the large-scale systems were exceptional according to the current state-of-the-art in Europe, they were too large and ineffective as the result of non-economical social policy.

2.2. Problems encountered

One of the specific characteristics was the change of the political system that highly influenced the establishing of the solar systems in industry and agricultural. The overall state priorities including the energy sector were revised and brought lots of changes and focused on different fields so that nowadays the situations is contrary to the last period and the main sector installing the solar systems are the households and the minimum in the public sectors that are not obliged to prefer other types of energy sources that could follow the state policy.

The historically huge increase mirrors the needs and the strict government rules under the Acts listed above.

2.3. Reasons of success or failure

The high increase in the historical period, as it was said, was the reflection of the current political priorities in the energy sector to strengthen energy self-sufficiency.
The change of the political conditions and priorities put a decreased priority on the energy sector.
Another problem occurred due to the minimal experience and quality of equipment, there was. There is still prevailing distrust in the minority systems used, such as solar, compared to well known heating facilities such as kettles or boilers (coal, biomass, electricity and recently gas).

2.4. Demonstration projects of high visibility

The largest solar systems (solar thermal such as photovoltaic) are made visible thanks to the Solar league (www.solarniliga.cz). As in some other European countries this agenda is held in the form of competitions between towns. The evaluation and the results are presented yearly within the specific rules and point scheme. The towns with the highest share or increase of the solar systems are given the prize of the “Master of solar techniques” in the categories of thermal, photovoltaic or overall share.

2.5. Factors which affected the market during the last few years (Source: [CityPlan])

It could be stated that there are three main factors that influence trade – both the demands and the offers:

- Finance
- Environment
- Security and risk management

Obviously the most powerful factor to improve and increase the utilization of RES in general is the donation and every kind of fundraising – state, municipalities, and EU to make the systems economically effective and to minimize the amortization duration. The price of the solar systems within the trade market together with their quality and the energy prices in the countries will remain the major factor for the end-users and custumers.

Till the year 1999 there was no donation or state subsidies in the Czech Republic for the households. The financial subsidy covered the agriculture and selected kinds of industry till the 90's that was the result of set up aims of the state energy policy associated with the contemporary political system.

The pressure and the importance of the environmental arena started to increase subsequently as the second factor. The necessity of implementation of the environmental state objectives with the increasing interests and support of public, NGO's and state policies that claims the conservation connected with the natural areas that affected the options for the "non-problematic" exploitations of non-renewable sources and improvement the air quality together with the reduction of the emissions. The environmental knowledge and education started to be continuously supported and subsidized so that there is a visible increase in the public interests and awareness of the environmental values, tools and options for conservation and political public pressure. Also the information campaigns for RES utilization showing the pros and cons from different points of views and the requirements for installations supported the level of solar systems implementation.

Within the last years and as the future prospect become clear we can claim that security and risk management in the meaning of decentralization of energy systems and decreasing the energy dependence became more visible.

It could be said the environmental factor hand in hand with finance are the most important factors and nowadays the dependency is an additional factor for the local level but also of a high interests and importance at the national level. The environmental and security factor is mostly positive for the RES and the financial factor could be both the negative, decelerating (high capital costs, long duration of amortization/low energy prices, lack of transparent, low or uncertain subsidies) and positive (higher subsidies and energy prices) factor.

2.6. Current situation (Source: [CityPlan,5,6,7,8,29,30])

Nowadays there is wide range and number of companies interested in solar thermal energy – importers, producers, installers, and authorized dealers – approximately over 200 companies with the highest growth among the importers. In the last few years the amount of collector types, especially from foreign countries, are increasing (China, Turkey, Greece). The amount of exporters is also increasing so from the point of variety of the involved companies the trade in the solar thermal industry in the Czech republic is sufficiently covered.
Due to the amount ,105 000m² (see the figure in the following chapter), of installed area in 2006 the energy production is estimated at 128TJ and the installed heat capacity at 74MW_t. The

proportional share of the energy benefit for the heat energy produced by the solar thermal systems is below the statistical deviation level.
During the period 1999-2003 1600 projects solar thermal systems were sponsored that included 7900 solar collectors with a total of 4800m² area; 60% was for households, 20% school facilities and 16% public buildings. The prevalent use of the school's installations composes of demonstrative project with debatable energy benefits. The prevailing collector type is Heliostar (Thermosolar, Slovakia; Heliostar, Czech Republic), TS (Thermosolar, Slovakia), collectors from Green One Tec and Ekostart Therma (Therma Solar, Slovak Republic). The vacuum tube collectors make up 16% of the total sum of installed collectors.
The problem of one of the most common collector types, Heliostar, is the origin – the original producer is Thermosolar which changed the trade mark to TS because the Czech company Heliostar which has the trade mark nowadays and is the only company that could sell the collectors named/identified Heliostar. Irregardless, most of the distributers and installers keep using the name Heliostar for Termosolar' s products.
Approximately 70% are used for HDW, 20% are used for house heating and 10% for the pool heating.
One of the largest and recently implemented solar thermal systems in the Czech Republic [29] is located in the hotel DUO in Prague. This extraordinary system was installed without any state or national funding and is used for the cooling system of 350 rooms. The collectors' surface area is 519m² and is made from the vacuum tube collectors, making it the largest area of this collector type.
The largest system is located in a bathing establishment in Rusava with 550m².

Table 4: Installations accordingly to the areas and applications in the year 2006 (Source: [8])

	Flat Plate	*Tube - Vacuum*	*Concentrated*	*Absorbers**	*Total*
Family house - DHW	1 836	91	0	0	1 927
Family house - DHW&heating	1 779	449	0	0	2 228
Dwelling - DHW	150	22	0	0	172
Dwelling - DHW&heating	57	0	0	0	57
Households - pools	132	0	0	1 733	1 865
Schools, student hostels	64	0	0	0	64
Hospitals, social services	189	0	0	0	189
Open air pools, sw.pools, spa	158	0	0	238	396
Other facilities	281	0	0	0	281
Others	153	0	0	0	153
Sum of selected installations	4 799	562	0	1 971	7 332

**The amount of the absorbers is based on the estimated quantity due to the lack of sufficient data*

The majority of the installed area occurs within the households in the form of the combined systems as well as for HDW (hot domestic water).

The international comparison shows that the Czech Republic is not one of the countries highly utilizing the thermal systems even if it had the largest systems in past decades.

Table 5: International comparison of the solar thermal park (Source: [6,7,8])

	Total	*Newly installed*							*presum. 2007*
	2006	**2002**	**2003**	**2004**	**2005**	**2006** sum	flat	vacuum	
Germany	8 054 000	540 000	720 000	750 000	950 000	1 500 000	1 350 000	150 000	1 500 000
Austria	2 611 627	153 050	166 920	182 594	23 470	292 669	289 745	2 924	350 000
Poland	167 520	18 000	26 220	28 900	27 700	41 400	35 100	6 300	52 000
Slovakia	72 750	4 500	5 000	5 500	7 500	8 500	7 700	800	12 000
CR	105 120	/	10 200	12 250	15 550	20 420	16 880	3 540	25 000

The prospects of the installation of the solar thermal systems in the subsequent decades are stated in the following chapters.

Table 6: The crucial/traditional producers/manufacturers in CR with their products (Source: [CityPlan])

Ekosolaris a.s.	flat plate: Ekostart THERMA BLUE, Ekostart THERMA II; Ekostar DOMA; Ekostar Therma
HELIOSTAR s.r.o.	flat plate: Heliostar T2 (new flat plate and other types under developing or testing phase)
ENVI s.r.o	concentrated: SOLARGLAS SG1
T.W.I s.r.o	flat plate: SunWig T2
Buderus s.r.o	flat plate: Logasol: SKE 2.0, SKN 3.0, SKS 4.0; tube vacuum: Vaciosol
Regulus s.r.o	flat plate: KPC2-BP, KPC1-BP, KPS1-ALP, KPS10 ALP, KPW2-C32HTF, KPW1-C20 AR; vacuum: KTU (10/15/16), ETC16
BMC KOVO s.r.o.	flat plate: Sokol 1
LÁF NEREZ s.r.o.	flat plate: SKVO4, SKV048
VK Technik s.r.o	flat plate: ALCU 225T, ALCU 201T
VacuSol s.r.o.	vacuum tube: Vacusol VS 10-T, VS 15-T
Strojírny Bohdalice a.s.	flat plate: EKS 3000
Propuls s.r.o.	flat plate: SUNTIME
VERMOS s.r.o	vacuum tube: VK6, VM6, VM12, VV8, VV8-F

s.r.o. – Ltd. Company; a.s.- joint-stock company

Most of the companies produce only one (or just a few types) of collectors but distribute together with more types to cover the needs and requirements of the Czech trade and end-users.
The most common collectors produced by the Czech companies are the flat plate collectors together with supplementary production of vacuum tube collectors that are characterized by higher effectiveness but also higher price. In the year 2006 there appeared few small producers that dont produce sufficient amount of collectors.
Most of the producers together with the exclusive agents, authorized dealers and project/consulting companies hold the trainings for manufacturers and installers that receive a kind of official certificate or confirmation of the ability of the course and work quality. One of the projects held in Czech Republic called Solarteur was focused on developing the skills and knowledge both for manufacturers and installers.
The total amount of collector import, overall supply and the installed area as well as the companies involved in this area are all increasing, especially the installers, importers, and dealers.

From the beginning of the year 2004 the Solar league project in progress under the aegis of LEA organization (League of ecological alternatives – NGO, www.solarniliga.cz). Its aim is to gather the data about the all registered solar energy projects, electricity as well as heat energy, while evaluating the amount and efforts in this specific arena in the Czech Republic and to disseminate the best practice information. This project is in process in other European countries as well; as a result the best and largest systems are awarded by another solar panel or collector from the sponsorship companies.
As was mentioned the most common collectors used are the flat plate collectors; unfortunately there are is detailed data available at this moment to say what kind of hydraulic schemes are used most. The results from the short project survey and regarding our experience are described in the following chapters. For example, the thermal energy is not used for district heating, the concentrated collectors are used in the minimum level, and the thermosyphons are not used at all (no known example of installation).

2.7. Imports / exports figures (Source: [5,6,7,8]

Figure below shows exported glazed collectors. Available data are just for years 1990-2005 (in total) and for year 2006.

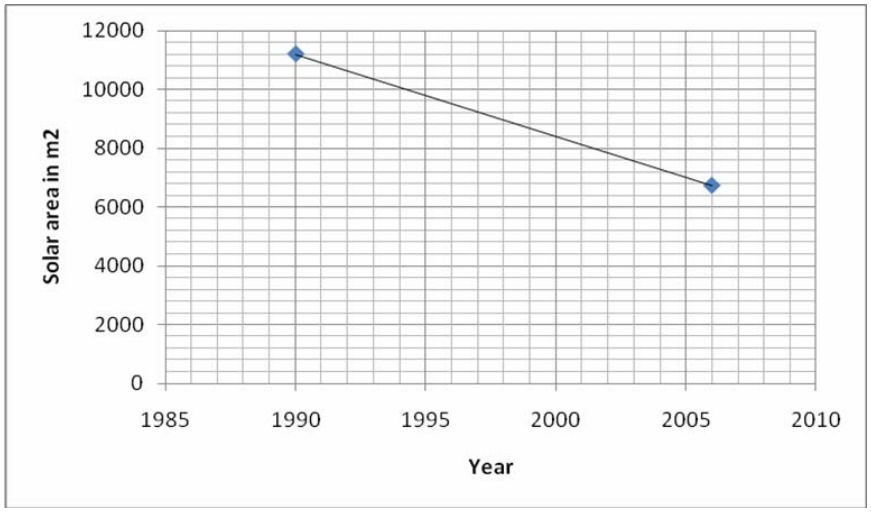
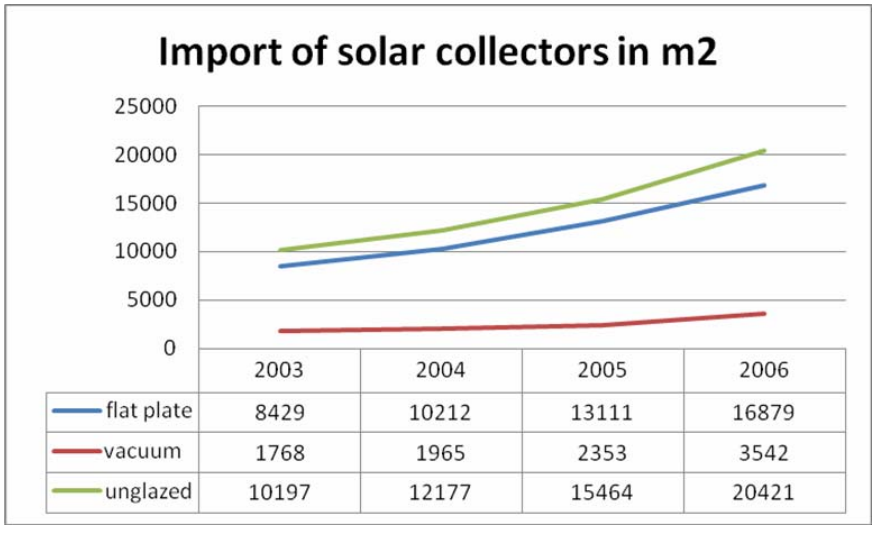


Figure 14: Export in years 1990-2006



	2003	2004	2005	2006
flat plate	8429	10212	13111	16879
vacuum	1768	1965	2353	3542
unglazed	10197	12177	15464	20421

Figure 15: Import of solar collectors (Source: [5,6,7,8])

2.8. Installers organization (Source: [37])

Table below contains a list of organizations dealing with installing of solar systems. It can be found as a part of Annex C as well.

Table 7: Installer organizations in Czech Republic

name	type	web
Eurosolar.cz	civil association	http://www.eurosolar.cz/
Centre Veronica Hostětín		http://hostetin.veronica.cz/programy.php?id=energie&at=200
Information Centre of RES-ISOZE	information centre	http://www.vukoz.cz/vuoz/biomass.nsf/pages/a.html
League of ecological Alternatives - LEA	civil association	http://lea.ecn.cz/
State Environmental Fund - SFŽP	state company	http://www.sfzp.cz/
Seven - The Energy efficiency Center	general beneficial corporation	http://www.svn.cz/cz/aktivity.htm
Engineering Test Institute	Ltd.	http://www.szutest.cz/
Energy Benefit o.p.s.	general beneficial corporation	http://www.energy-benefit.cz/
EnergyConsulting o.s.	NGO - civil association	http://www.e-c.cz/index.php?page=onas
CIRC - Czech Innovation Relay Centre		http://www.circ.cz/alternativni-energetika-detail/?id=133&referer=
Association of companies for utilization of energy sources SPVEZ	civil association	http://www.spvez.cz/
CZREA - Czech RE Agency	NGO, civil association	www.czrea.cz
Energy Centre České Budějovice	civil association	http://www.eccb.cz/index.php?sk1=21&sk2=0&sk3=0&interni=
The Czech Association of Energy Sector Employers	independent voluntary org.	www.csze.cz
Solar and ozone laboratory Hradec Králové		http://www.chmi.cz/meteo/ozon/hk.html
KV BIO	civil association	www.kv-bio.cz
Association for Environment Techniques	NGO	http://www.stpcr.cz/
Energy Agency Vysočina z. s.p.o.	NGO	http://www.eav.cz/
Regional Energy Agency Brno (KEA) s.r.o.	Ltd.	http://www.keabrno.cz/
South Bohemia Regional Energy Agency		http://www.keajc.cz/
Energy agency of the Zlin region o.p.s.	general beneficial corporation	http://www.eazk.cz/?language=cs+en
Moravian-Silesian Regional Energy Agency		
REC o.p.s. Valasske Mezirici - Regional Energy Centre	NGO	http://www.regec.cz/

Regional Energy Agency of the Usti Region Northern Bohemia Municipalities Association	general beneficial corporation	http://www.seso.cz/kea/
ZESO The Energy Association of West Bohemian Municipalities	general beneficial corporation	www.zeso.cz (not working)
Czech Association of Scientific and Technical Societies	civil association	www.csvts.cz
Czech Energy Community		www.csvts.cz/cenes
Czechoslovak Association for solar energy (ČSSE)	national ISES	
Research Institute of building constructions - the certified company Ltd.	Ltd.	www.vups.cz
ENKI o.p.s.	Ltd.	www.enki.cz
CALLA - Association for Preservation of the Environment	civil association	www.calla.cz
HNUTÍ DUHA - Friends of the Earth Czech Republic	civil association	www.hnutiduha.cz
Ekowatt		
WISE Brno - Energy info-service		http://wisebrno.cz/index.php?p=dokumenty&rub=15
Info system CEDR - Central Evidence of donation from state fund		http://cedr.mfcr.cz/cedr3i_internet_407/default.aspx?ico=506494
ARES- Administrative Register of Economical Subjects		http://wwwinfo.mfcr.cz/ares/ares.html.cz
Register of Economical Subject - CSU (Czech Statistical Office)		http://www.czso.cz/csu/redakce.nsf/i/registr_ekonomickych_subjektu
TZB info		www.tzb-info.cz
EPIA - European Photovoltaic Industry Association		
The accredited laboratories under Group CEZ		

2.9. Types of solar systems

DHW system with bivalent storage

Warmed heat carrier is lead from collector into inner heat exchanger in an accumulative tank in which thermal energy is transferred to water. In case that solar energy does not cover tank requirement for hot water treatment, an additional source that heats water in the upper (extraction) part of tank for required temperature. System is operated by differential regulator which compares temperature difference in storage and in collector and circulation pump is switched on according to this.

Collective DHW system with pre-heating tank

Principle of this system is similar to the previous case except that heating of warm water is located in separate storage. If hot water in solar storage does not reach sufficient temperature an

additional source of heat is switched on and water from solar storage is transferred into the heating storage.

2.9.1. Flat-plate collectors

Heat-carrying agent is heated in meander which is usually created by copper tube contact connected to lamellas of absorber that trap the solar radiation. The efficiency of the collector relies on the quality of construction of the connection between the meander and lamellas of absorber and the heat loss of the collector frame as well.

2.9.2. Liquid collectors

A heat-carrying agent is used: water or in case of yearly applications non-freezing mixture (propylenglykol + water). Incident solar radiation is trapped by collector of which absorber transfers thermal energy to transient heat-carrying agent. Heated heat-carrying agent is afterwards moved to the heat exchanger in which thermal energy is transferred to water in secondary cycle.

2.9.3. Air collectors

As a heat-carrying agent air is used. Constructional solution of air collectors can be similar to liquid collectors. Difference consists in fact that heat transfer does not realize inside of the absorber but on its surface. Disadvantage of air collectors in comparison with liquid collectors is lower specific heat capacity of air.

2.9.4. Evacuated-tube collectors

There are several types of such collectors. Principle of transfer of thermal energy is similar to flat-plate collectors. Difference is in location of absorber (individual lamellas) in vacuum tubes by which heat loss of collector are limited considerably. With bigger differences of temperature of heat-carrying agent a higher efficiency of transformation of solar radiation into a thermal energy is reached.

3. Solar collector production and sales

Figures below show the trade situation that is statistically monitored by the Ministry of Industry and Trade (MIT) and is also specially focused in the solar thermal arena; unfortunately not all the statistical features are monitored or available.

Table 8: Total installed area of active systems [m²] (Source:[5,6,7,8])

	Flat glazed	*Vacuum tube*	*Concentrated*	*Total*
2003	2 228	6 000	727	8 955
2004	60 657	7 768	745	69 170
2005	73 768	10 121	805	84 694
2006	90 647	13 663	805	105 115
Total	227 300	37 552	3 082	267 934

The computed energy production for the estimated area of 105 000m² active solar thermal systems is 128TJ according to the used coefficient of energy 350kWh/m²/year. The entire area of solar thermal systems including the period from 1970 – 2005 was 160 000m². The annual growth 20 420m² in the year 2006 made 25% growth! with the portion of 17% vacuum tube collectors (comparison to the amount of active systems – figure above).
In comparison with the number of inhabitants in the year 2006 (10 287 189) and the total installed area, there was approximately 0,01m² per capita.

Table 9: Production and sales of solar collectors [m²] – production&import (Source: [[5,6,7,8])

Year	Flat Plate Collectors				Vacuum Collectors				Unglazed Collectors in m²	Concentrated Collectors in m²
	Production and sales in m²				Production and sales in m²					
	A	B	C	D = A-B+C	A	B	C	D = A-B+C		
	Total national production	Exports	Imports	Total home market sales	Total national production	Exports	Imports	Total home market sales	Total home market sales	Import for Czech market
2004			10 212				1 965			90
2005			13 111				2 353			60
2006			16 879				3 542			0
Total			48 631				9 628			168

Note: all the numbers and the calculations are rounded and mostly based on estimated numbers

Regarding the MIE statistical monitoring and interview research, it was found out that approximately 124 000m² glazed collectors were produced from the year 1990 and 112 000m² were exported. 8 780m² of glazed collectors were produced in 2006 and 6 742m² were exported. The majority of products consist of flat plate collectors.

3.1. Estimated solar park in working order in 2007 (Source: [7,8])

Flat plate collectors in m² 90 647

Vacuum collectors in m² 13 663

Unglazed collectors in m² -[1)]

Total in m²104 310Unglazed collectors are very spread in the market. That's why we can't estimate the real amount of unglazed collectors in working order. The report made by Ministry of Industry and Trade in 2006 estimates that there is about 2 000 m² of unglazed absorbers installed in Czech Republic every year.

In comparison to the numbers stated in the former tables, the amount of concentrated collectors is not included in the calculations due to its specifics.

3.2. Estimated annual solar thermal energy production in 2007 (Source: [7,8])

Flat plate collectors = 90 647m² x 28 747 kWh/m²*year = 2 605 829 309

Vacuum collectors = 13 663 m² x 6 809 kWh/m²*year = 93 031 367

Unglazed collectors = - m² x - kWh/m²*year = -

Total 2 698 860 676 MWh/year

3.3. CO_2 emissions avoided in 2007 (Source: [7,8])

Flat plate collectors = 28 747 MWh/year x 0,26 tonnes/MWh = 7 474

Vacuum collectors = 6 809 MWh/year x 0,26 tonnes/MWh = 1 770

Unglazed collectors = - MWh/year x - tonnes/MWh = -

Total 9 244 tonnes/year

4. Product types and solar thermal applications

4.1. Product types

4.1.1. Unglazed collectors

Used in solar systems designed for seasonal applications:

- solar pool water heating system
- domestic hot water (DHW) systems

- many kinds of plastic and textile materials used for absorbers

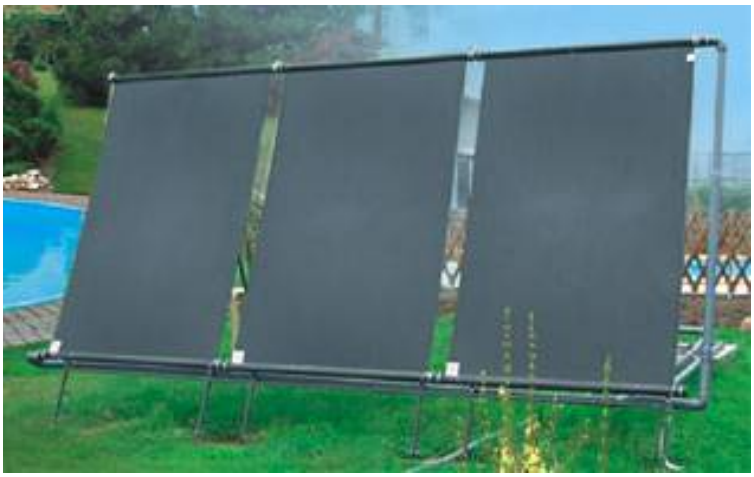


Figure 16: Unglazed collectors (Source: [31])

4.1.2. Flat plate collector

Most used collector:

- DHW systems
- Solar Combined systems
- Solar systems for space heating
- Combination of DHW and solar pool water heating system

- most used are modules with 2 m² absorption area
- absorbers with selective surface are usually made of copper or aluminum
- collector glazing is made of 4 mm thick safety glass

Examples of flat plate collectors (Source: [32])

Flat plate collector with parallel absorber

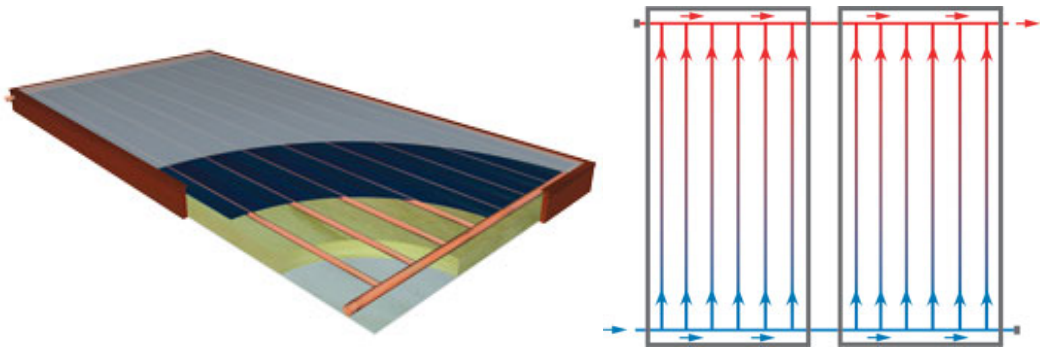


Figure 17: flat plate collector with parallel absorber

Flat plate collector with serpentine absorber

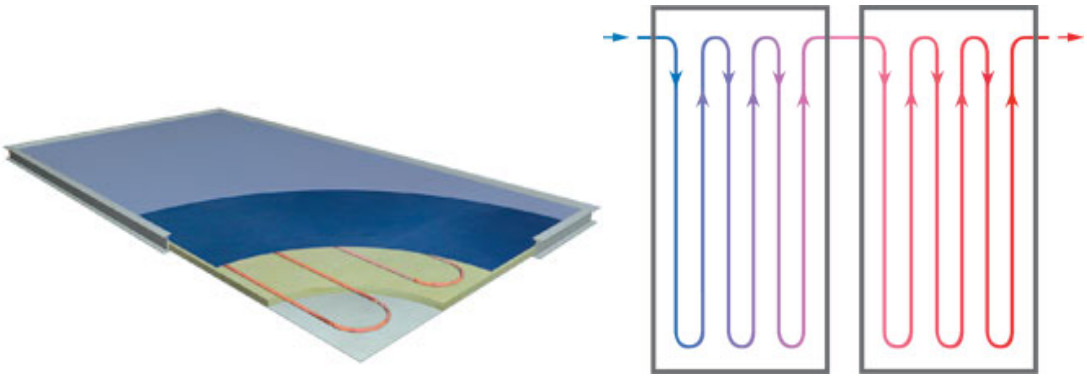


Figure 18: flat plate collector with serpentine absorber

Flat plate collector with double parallel absorber

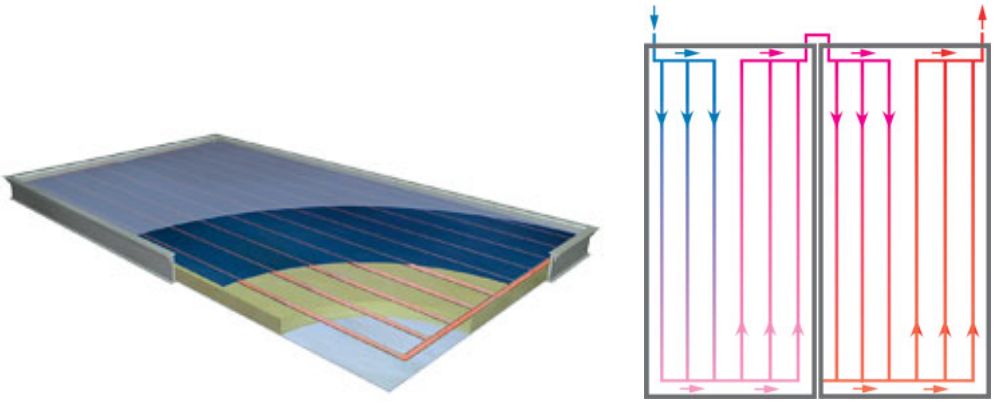


Figure 19: flat plate collector with double parallel absorber

4.1.3. Flat plate evacuated collector

Using of this collector is considerably lower on account of its higher price

- DHW systems
- Solar Combined systems
- Solar systems for space heating
- Combination of DHW and solar pool water heating system

- most used are modules with 2 m² absorption area
- absorbers with selective surface are usually made of copper or aluminum
- collector glazing is made of 4 mm thick safety glass
- glass is laid on stanchions which increase its endurance

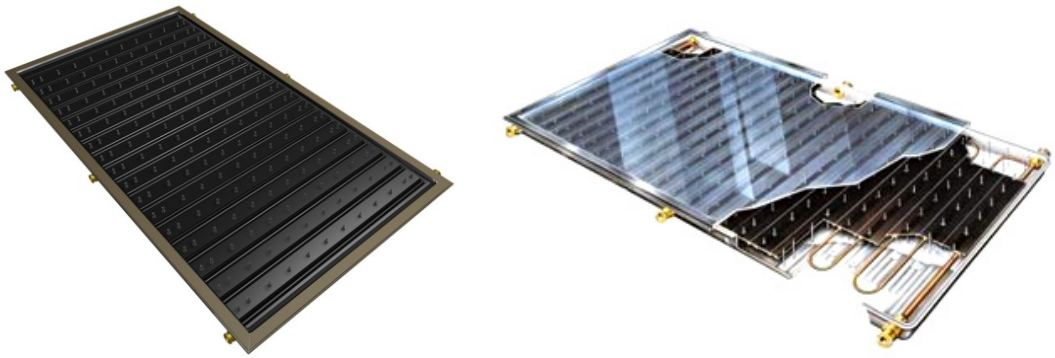


Figure 20: Flat plate evacuated collector with serpentine absorber (Source: [33])

4.1.4. Collector with evacuated tubes

- used in 20 % of installations
- wider application of this collector is limited by higher price
  - DHW systems
  - Solar Combined systems
  - Solar systems for space heating
  - Combination of DHW and solar pool water heating system
  - Solar process heat systems
- absorbers are usually made of copper or aluminum
- some collectors have a parabolic concentration plate behind the tubes

Examples of collectors with evacuated tubes / vacuum tube collectors

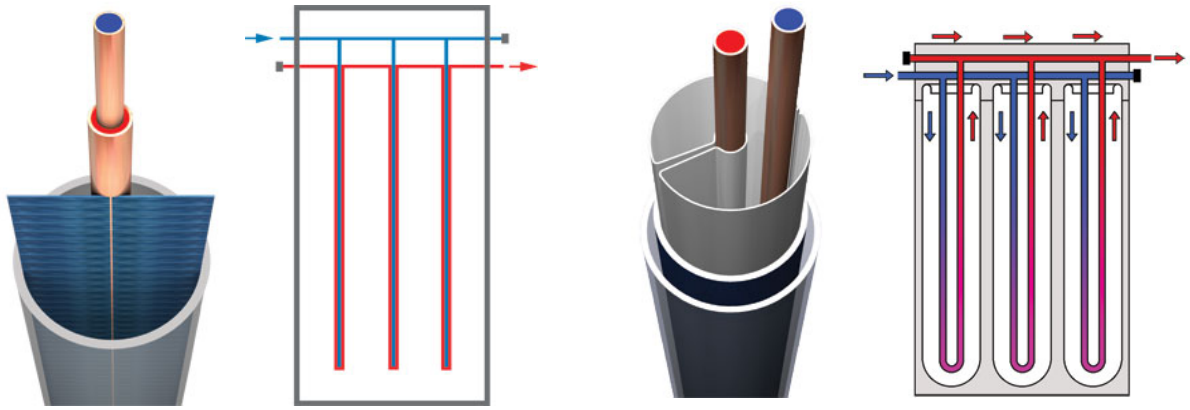


Figure 21: Examples of collectors with evacuated tubes / vacuum tube collectors (Source: [32])

4.1.5. Air collector

Only a few applications in working order in Czech Republic

- systems used for drying agriculturally products
- systems used for partial space heating

4.2. Applications (Source: [11,12,13,14])

Rising energy costs lead consumers to search for savings connected within their operation. One of most simple possibilities is solar preparation of hot water. Growth of installation number in family houses (DHW, Combined systems) is connected to possibilities for funds for solar systems from SFZP donation programmes and some municipal authorities. In the case of pool water heating a high percent of installations are for small seasonal systems with unglazed collectors, which are much expanded in our market and in hobby markets as well.

Table 10: Installation and application figures of selected sectors (Source: [7.8])

	2005	***2006***
Domestic hot water production	1101	2099
Large collective solar system	708	622
Combined systems (DHW + Space heating)	2729	2285
District heating	-	-
Air conditioning and industrial process heating	-	-
Solar pool water heating systems	692	1865

Figures of installed district heating systems, systems for air conditioning and systems producing process heat are not statistically monitored in Czech republic.

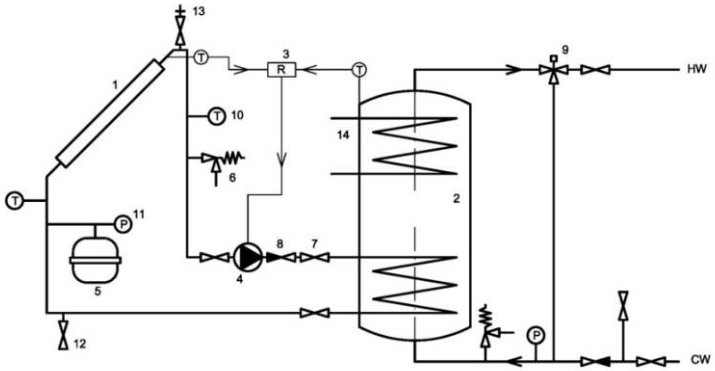


Figure 22: DHW system with bivalent storage

1 – Solar collector, 2 – Bivalent hot water storage, 3 – Differential regulator, 4 – Pump, 5 – Expansion tank, 6 – Relief valve, 7 – Stop valve, 8 – Backflow prevention device, 9 – Thermostatic mixing valve, 10 – Temperature sensor, 11 – Pressure sensor, 12 – Drain valve, 13 – Purge valve, 14 – Heat exchanges for additional heat source

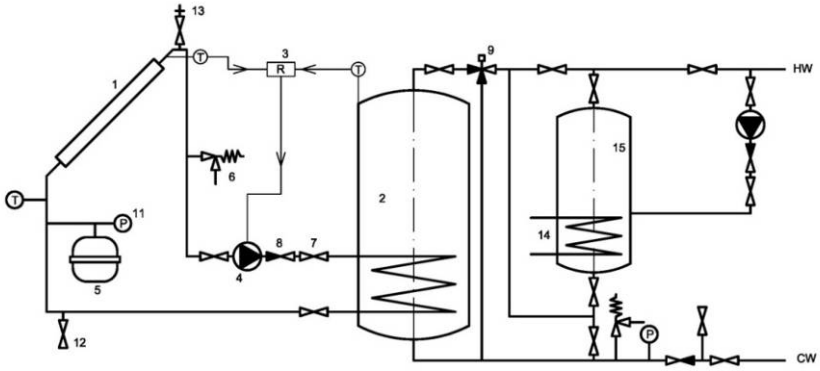


Figure 23: Collective DHW system with pre-heating tank

1 – Solar collector, 2 – Pre-heating tank, 3 – Differential regulator, 4 – Pump, 5 – Expansion tank, 6 – Relief valve, 7 – Stop valve, 8 – Backflow prevention device, 9 – Thermostatic mixing valve, 10 – Temperature sensor, 11 – Pressure sensor, 12 – Drain valve, 13 – Purge valve, 14 – Heat exchanger for additional heat source, 15 – Hot water tank

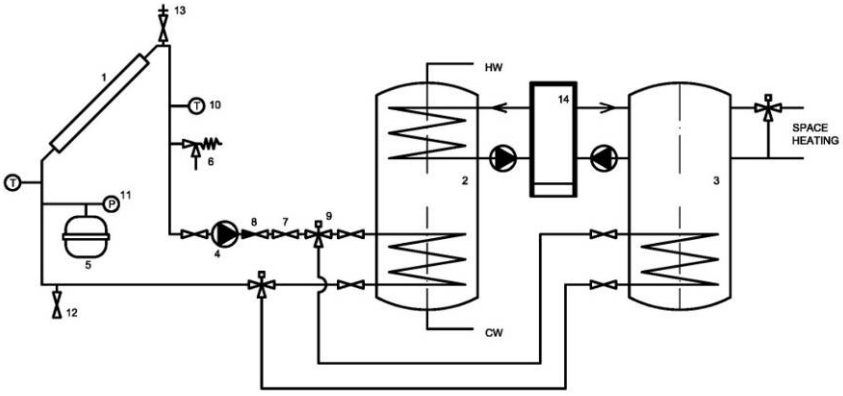


Figure 24: Solar combined system with compensatory tank

1 – Solar collector, 2 – Hot water storage, 3 – Compensatory tank, 4 – Pump, 5 – Expansion tank, 6 – Relief valve, 7 – Stop valve, 8 – Backflow prevention device, 9 – Thermostatic dividing valve, 10 – Temperature sensor, 11 – Pressure sensor, 12 – Drain valve, 13 – Purge valve, 14 – Additional heat source

5. Market share of major manufacturers

In appendix A is the list of major manufactures together with all relevant information available. Therein before the chapter you can find the list with the major producers with their products. Unfortunately the data for the market share are not available for this project. Due to the experience and the knowledge it could be said that traditional companies make up the majority (Thermosolar, GREEN one TEC, Ekosolaris, Regulus, Heliostar etc.) of the market share. It could be expected that within a few years or decades the Czech companies could become the majority instead of the high share of the foreign products. The level of the market share depends on the marketing strategies and quality standards together with product' prices and available services for the costumers.

6. Employment (Source: [9,34,35])

Most of the producers together with the exclusive agents, authorized dealers and project/consulting companies hold the training for manufacturers and installers that receive certification of their ability in the course and their work quality.

The categories of the certificates or confirmations could be as follows:

Main
- The official distributer/dealer/importer – exposed by the producer
- Authorized installer partner
- Certificated installer

Additional
- Participation in the seminars, especially for the installation and services for collector type or components, by the producer

The employment within the energy arena is monitored by the Czech Statistical Office and other statistical analysis and research according to employment is held by the national observatory. To gather the number of employees in the solar thermal sector is almost unachievable because the sector doesn´t fall just within the energy sector but mostly within the building sector and mainly in the industry sector as the companies producing the different types of components. Due to the standard classification it is possible to gather the data and the trends of employment within those sectors but it is not possible to presume the portion that is solar thermal. The other uncertainty is that many companies could be considered as the trade company focusing entirely in distribution, wholesales and trading which cannot occur in the statistics of the energy sector even if the analysis methods are trying to gather precise numbers and eliminate inaccuracies.

One of the results of the national observatory is the analysis *"Forecasting of Future Skill Needs in Energy Industry 2007-2011".* Even if the energy sector is considered crucial for the trade market and the development of the Czech Republic the employment is the minimum according to others; the portion of the energy sector is 1,5% (nowadays decreasing to 1%) in the long term.

The figure below shows the trend of the number of employees in the energy sector (category 40) regarding the data of Czech Statistical Office and the survey.

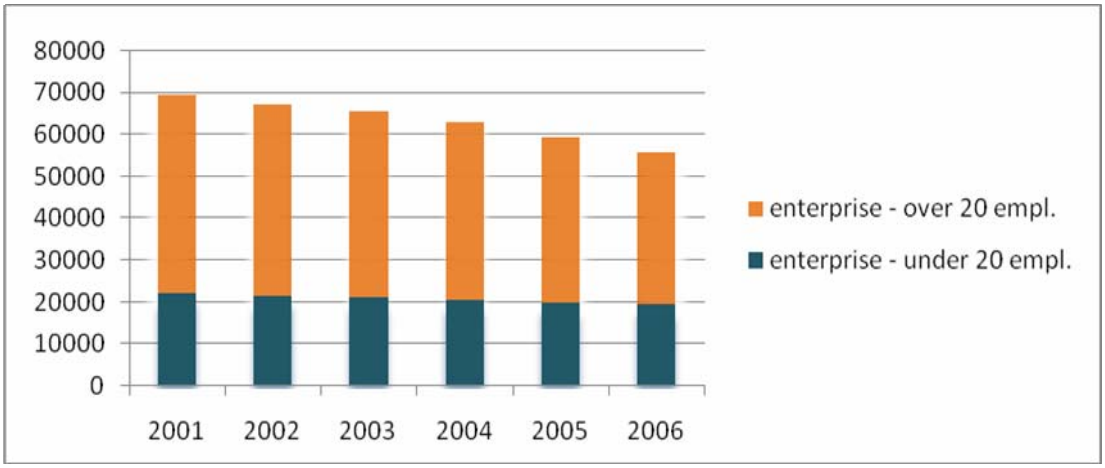


Figure 25: Number of employees – 2001-2006 (Source: [CityPlan, 9])

In the period 2000-2005, the number of employees decreased by over 13 200 employees (14,6% decrease), especially in small companies.
In 2006 started a project to focus on the education of installers and manufacturers in the RES field called Solarteur (NGO KV-BIO, EU funds). Within this project are held training courses for certification in various solar techniques.

Figure 26: Solarteur logo (Source: [30])

In the Czech trade, there are lots of consultancy companies and NGO´s focused on the energy sector in the field of RES. The testing and quality are set at universities and their laboratories. One of the greatest accredited test and certification bodies in the Czech Republic is the Engineering Test Institute that is interested in more categories than thermal systems.
The Czech Association of Energy Sector Employers (CZSE) undertakes a function to provide and enhance all the information and interests of its members (private, state energy companies, universities, high schools etc., see Annex C).

C. State of Production

7. Product technology and production methods

7.1. Product technology description

7.1.1. Collectors

- flat plate collectors with selective surface
- collectors with evacuated tubes

Table shows average collector area used in domestic hot water systems and solar combined systems [m²].

Table 11: Average collector surface area in 2005 – 2007 (Source: [6,7,8,])

	DHW systems	*Combined systems*
Flat plate collectors	5,8	11,5
Evacuated tube collectors	3,4	9,5

7.1.2. The common materials and technologies used in the Czech Republic (Source: [7,8,11])

Absorber material

- copper absorbers
- absorber consists of copper pipes with aluminum plates

Surface treatment

- selective layers - Black chromium, Sunselect (highly solar absorptive aluminium substrate with a selectively coated surface), TiNOx (copper substrate with good reflection + thin titanium carbide layer serves as adhesion layer + absorber layer of a titanium composition with oxygen and nitrogen)

Insulation

- casing insulation usually made of mineral wool
  - 20 mm on sides of casing
  - from 60 to 70 mm at the bottom of casing
- pipes and fittings are insulated with several types of insulation materials (for example Mirelon – polyetylene foam)

Transparent cover

- most collectors have a transparent cover made of 4 mm thick safety solar glass

Casing

- stampings made of aluminum alloys

Storage tanks

- in most of application hot water storages are used
- monovalent hot water storages are usually used in those cases where solar system is mounted into existing heating system
- bivalent hot water storages are used mostly in new applications (storage is prepared for additional heat source connection)
- volume of hot water storage is different depending on suggestion parameters and operating mode of solar system

Pump

- solar pump unit is usually used in solar systems: it consists of pump, fittings, manometer, thermometer and relief valve

Expansion tank

- there is a need to use expansion tanks which are resistant against chemical incidence of glycol (expansion tanks must have membrane made of nitrile or EPDM - ethylene propylene diene monomer)

***Heat* Exchangers**

- internal heat exchangers made of smooth or ribbed pipes integrated in storages
- plate and tube external heat exchangers

Additional* heat *source

- electrical heating element installed in the hot water storage
- additional heat source connected to heat exchanger (gas-fired boilers, gas-fired condensation boilers, solid fuel-fired boilers, biomass boilers)
- electrical or gas-fired flow through heaters

Specific solar gains in Czech Republic are between 350 and 600 kWh/m² year for systems using flat plate collectors and up to 700 kWh/m².year for systems using collectors with evacuated tubes. Values are dependent on location and functioning of each system.

7.2. Product technology description

The standards, certification, methods and the technologies are described in other chapters.

The companies involved in producing the collectors are listed in Annex A but the data about the production methods are not available. To monitor all companies interested in producing all the possible components was not achieved due to the large amount of the possible components and companies involved.

8. Breakdown of solar systems costs

Table 12: Prices of the solar collectors (Source: [CityPlan, 14])

Solar Systems Costs for Typically Sized Systems		
	6 m²	**15 m²**
Total costs (excl. VAT)	578 Euro/m²	550 Euro/m²
VAT (9 %)	52 Euro/m²	50 Euro/m²
Total cost (incl. VAT)	**630 Euro/m²**	**600 Euro/m²**

Table 13: Prices of the solar thermal systems and its components (Source: [CityPlan, 14])

	DHW *Euro/m²*	*Combi* *Euro/m²*	*DHW* *%*	*Combi* *%*
Raw material suply	-	-	-	-
Hot water storage seller	825	2 029	22	23
Fixtures and fittings for solar set	1 267	2 386	34	27
Colector seller	1 164	3 271	31	36
Wholesalers	-	-	-	-
Installers	524	1309	14	15
Total	**3 780**	**8 996**	**100**	**100**

Determination of costs for raw materials suppliers and manufacturers prices (collector, hot water storage) is impossible because margin of sellers aren't known to public.

9. Typical solar domestic hot water systems (Source: [36,37])

9.1. Characteristics of a typical DHW system for a single family house:

- System type: DHW
- Collector type: flat plate collector
- Collector area (m²): 6
- Collector area per person (m²/person):1,5
- Hot water storage (liters): 300
- Price per m² system costs (Euro): 634
- Amortization based on the present energy price: 17,8
- Eventual subsidies: without subsidy

9.2. Characteristics of a typical DHW system for a dwelling:

- System type: DHW
- Collector type: flat plate collector
- Collector area (m²): 35
- Collector area per person (m²/person): 0,34
- Collector area per dwelling (m²/dwelling): n.a.
- Hot water storage (liters): 1 600
- Price per m² system costs (Euro): 881
- Amortization based on the present energy price: n.a.
- Eventual subsidies: without subsidy

9.3. Characteristics of a typical DHW system for a hospital:

Adequate data were not available. During our research it was not possible to discover any solar system with relevant parameters.

9.4. Characteristics of a typical DHW system for a hotel:

Adequate data were not available. No concrete technical parameters were found. Those are not in any of used sources listed.

9.5. Characteristics of a typical DHW system for others (rest house):

System type: DHW
Collector type: flat plate collector
Collector area (m²): 17,3
Collector area per person (m²/person): n.a.
Hot water demand at 60°C: n.a.
Hot water storage (liters): n.a.
Price per m² system costs (Euro): 574
Amortization based on the present energy price: n.a.
Eventual subsidies (Euro): 4 209

9.6. Typical consumer motivation

The interview research hasn't run yet but from the experience and the public awareness it could be said the major motivation overall the Czech Republic seems to be the environment in the first place (family houses) and the alternative to the traditional heating systems – from the point of view of new technology hand in hand with the increasing tendency of energy prices. Some of the larger systems could be seem as the right investment from the long-term perspective, especially in hotels, hospitals or social establishments.
Lots of schools installed the systems due to a special programme that gave them the financial and knowledge support that leads to demonstration projects for school that got new and quality heating systems.
The customers usually think in long-term perspective what is not still common in CR

10. Typical solar combined systems for a single family house, a dwelling, a hospital, hotel (Source: [36,37])

10.1. Characteristics of a typical combined system in a single family house

System type: combined system
Collector type: flat plate collector
Collector area (m²): 12
Heat storage (liters): 300
Pump : n.a.
Expansion tank: n.a.
Heat exchanger: n.a.
Additional heating: n.a.
Collector area per heating load (m²/kW) : n.a.
Price per m² system costs (Euro): 2 002
Amortization based on the present energy price: n.a.
Eventual subsidies: without subsidies

10.2. Characteristics of a typical combined system in a dwelling

Adequate data were not available.

10.3. Characteristics of a typical combined system in a hospital

Adequate data were not available.

10.4. Characteristics of a typical combined system in a hotel

System type: cooling + DHW
Collector type: evacuated tube collector
Collector area (m²): 519
Heat storage (liters): 15 300
Pump: n.a.
Expansion tank: n.a.
Heat exchanger: plate heat exchanger
Additional heating: gas-fired boiler, district heating
Collector area per heating load (m²/kW) : n.a.
Energy demand for hot water/heating: n.a.
Price per m² system costs (Euro): 694
Amortization based on the present energy price: 15
Eventual subsidies: without subsidies

10.5. Characteristics of a typical combined system for other purposes (rest house)

System type: combined system
Collector type: flat plate collector
Collector area (m²): 126,7
Heat storage (liters): 7 460
Pump: n.a.
Expansion tank: n.a.
Heat exchanger: n.a.
Additional heating: n.a.
Collector area per heating load (m²/kW) : n.a.
Energy demand for hot water/heating: n.a.
Price per m² system costs (Euro): 1 047
Amortization based on the present energy price: 9,5
Eventual subsidies: 70 070

Characteristics of systems which aren't in the list are not available in any of the public databases.

10.6. Typical consumer motivation

As it was investigated there is no big amount of combined systems used in the Czech Republic. When the system is installed there are more or less the same motivation purposes as in the DHW systems with the difference of the end user. First of all it is the environment and the interests in the RES of the owner most of the time. The effectiveness and the advantages of the combined systems are usually seen as the second motivation by the same type of consumers in case of installation of new installation systems. The crucial problem is the age and the technical state of the current systems that are not suitable for all year utilisation of collectors for heating. The technical parameters are not adequate in all current buildings. The cost of investment is too high and ineffective for most of the consumers.
The awareness of the advantages of DHW and also combined systems are likely to increase in conjunction with the trend of energy price growth but there is still not sufficient statistical proof of an increase in the number of installations due to the problems listed above.

11. Conventional water heating and energy prices

Table 14: Energy prices in CR (Source: [37,38])

Conventional Energy Prices		
Date: 2007	**Housing** VAT incl.	**Collective** VAT incl.
Electricity - normal Electricity - low rate	Euro/ kWh Euro/ kWh	0,177 Euro/ kWh 0,086 Euro/ kWh
Fuel - Oil	Euro/ kWh	0,048 Euro/ kWh
Bottled gas Natural gas	Euro/ kWh Euro/ kWh	0,064 Euro/ kWh 0,040 Euro/ kWh
District heating	Euro/ kWh	0,058 Euro/ kWh
Other – wood pellets	Euro/ kWh	0,035 Euro/ kWh

** Specific prices of natural gas and electrical energy are dependent on chosen tariff, spent amount and maximal daily spent amount*

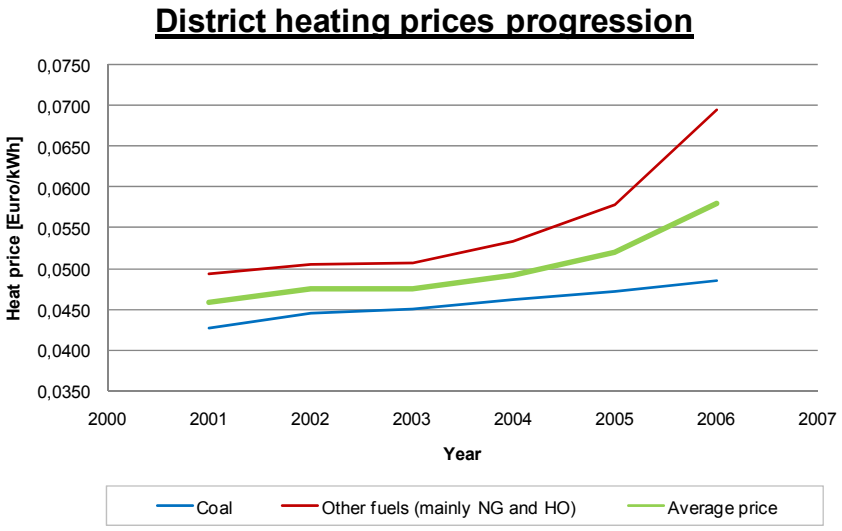


Figure 27: Evolution of heat prices in 2000 – 2007 (Source: [www.eru.cz])

12. Standards and codes of practice

Regarding the Act n.22/1997: Technical requirement for products (§10) are collectors certified for the conformity of product features with requirements of the Czech – European standards ČSN 06 0830, ČSN 06 0009, ČSN EN 12975 or EN 12976 in accordance with the Act n.163/2002 Technical requirements for selected construction products.
As many companies distribute the foreign types of collectors certification must be applied in a standard way; the other set of requirements is for the new types of collectors produced by Czech companies.
The Solar Keymark as a qualitative standard is not used in the Czech Republic but is considered to have good potential to improve customer orientation in the wide range of solar collectors offered in the Czech trade; possibly, another trade mark could be developed.
The certification is made by the Engineering Test Institute in Brno and in this moment is one the only in the country (there are few other authorized laboratories or laboratories at the universities).
Under the Act n. 363/2007 and the Law n.426/2005 are given the conditions for the license for entrepreneurship in the energy sector.

13. Level of R & D (Source: [38])

The main types of research that could be held under the state funding (Grant Agency of the Czech Republic) or European funding schemes. The private sector is not a typical actor but could participate in the Research & Development as a partner within the state or European donation projects. One type of untypical support is from the CEZ Group which fund a few projects every year. Another types are the educational establishments that have many experts and laboratories. One known state institution is the Technological Centre of Science Academy of the Czech Republic. Another known laboratory which is focused especially in solar energy research under the Czech Technical University is the SoLab.

13.1. State funding of R&D (Source:[39])

- Grant Agency of the Czech Republic
- National Programme of Oriented Research and Development

This program manages Ministry of Education, Youth and Sports. Government has taken note of its proposal by Decree no. 517 in 2002.

Thematic subareas:

IV. Thematic programme 4 – Energy for Economy and Society (TP4)

IV.3. Subprogramme Rational energy utilization and RES (TP4-DP3)

Among the priorities are, for instance, progressive technologies for energy production, RES utilization and energy storage, and energy of solar radiation.

Some selected projects within the framework of National Programme of Research and Development:

- Integration of elements using RES in the buildings structure
  http://aplikace.isvav.cvut.cz/projectDetail.do?rowId=SN%2F3%2F173%2F05
- Research of synergic bindings in RES applications
  http://aplikace.isvav.cvut.cz/projectDetail.do?rowId=SN%2F3%2F174%2F05
- Research of the use of waste low potential heat from power plants cooled in the cooling towers
  http://aplikace.isvav.cvut.cz/projectDetail.do?rowId=SN%2F300%2F4%2F03

13.2. European funding of R&D

The Czech Republic uses opportunities by the EU provided within the framework of the 6th framework programme for research and technological development and The Intelligent Energy - Europe Programme to ensure R&D supply.

13.3. Specific programs (Source: [40])

Examples of specific programmes:

- Solar league - www.solarniliga.cz, is a project hold under the NGO – LEA (League of ecological alternatives) and is focused in RES – mainly in solar energy.
- Solarteur – www.solarteur.cz is a project focused on supplementing education of solar techniques.
- Project under the Technological Centre of Science Academy of the CR: www.tc.cz, www.circ.cz, www.cett.cz
- R&D study funded by the Grant Agency: Applications of Solar Thermal Systems in the Czech Republic

13.4. Role of government (national, regional) (Source: [10)

In the Czech Republic there are two options to get financial support (institutional or purpose) direct and indirect. The ratio of government and university sector is the same in total and public expenses on R&D.
Institutional support is intended for basic and applied research (except industrial), which provides scientific development for a certain field. Both scientific institutions and private companies can request institutional support. Purpose financing is focused on supporting solutions for a particular project. This subvention can cover project programme, grant project or public contract in R&D.
Indirect support is mostly tax relief of outcomes connected with the research or donation for the project.
Comparing the Czech Republic and other EU members, we can say that CR spends little financial resources on R&D in the long term in general for all types of R&D. However, positive trends in total expenses growth on R&D from public resources is evident; share of total expenses on R&D to universities is low compared with EU-15.
The Prague district and its surroundings have a dominant position in R&D because of a high proportion of universities and research centers.

13.5. Role of institutes and universities

The science or research centers are sometimes managed under the universities or other educational establishments. The academic sector is represented by the technical universities where the experts work as the professors external lecturers or experts for projects under the universities. Universities, centers and also NGOs focused in RES are often the project leaders or partners funded by the state or EU (with donations from the operational programmes). The level of financing by industry and public funds (EU incl.) is very low.

D. State of Marketing

14. Distribution and marketing methods

The overview of the marketing methods according to the solar thermal market were not fully available and could be the object of further data collecting and research for this or similar projects.
Nowadays there is no visible marketing scheme focusing on solar thermal in the mass media. The only kinds of related advertising were made for the energy savings by the state, half-state or private companies and their branches focused in RES.
A special type of “advertising” for RES in general are the Operational and National donation programmes that are linked to the state energy policy and legislation with one of its main objective to increase the amount of RES.
Together with seminars, conferences and trades held in the Czech Republic as well as in other countries, one of the discussed themes is the utilization of RES in the energy sector and it is widely disseminated both in public and expert sessions. Solar energy and biomass are said to be two kinds of RES with the strongest potential in the CR.

15. Incentives and financing methods

15.1. Overview

As for R&D the kinds of financial support for the solar systems would most likely be from the state and EU. The funding could be achieved from all levels – national, regional or local. The most known and used is the national level in the meaning of the National and Operational Programmes. The regional level could be directly linked to the specific National Programmes which follows the schemes and priorities in the underlying level or there are special Operational Programmes covering the selected regions. Exceptionally, there could be found funding at the local level (Prague, Litoměřice, Kladno, Plzeň etc.).

15.2. What kind of financial incentives have been used in the past and are used presently and at what level

Operational Programme Infrastructure and Operational Programme Business and Industry have been used as financing methods for renewable energy during 2004-2006. They have been already enclosed. Resources can be utilized according to the rule “n+2”, at most two years after closing donation period.
From 1994 there exists a donation programme in Prague which motivates households to change the original heat systems to renewable heat sources.
Currently there are many opportunities to get financial help for modernizing the heat system, up to 50% of total costs. Prague itself offers donations for changing heat systems to renewable, e.g. hot water warming by solar systems.

Table 15: Main sources of financial support of solar thermal collectors in national level (Source: [26,41,42])

Title of support	Description	Priority	Specification of projects	Height of donation	Institution
EFEKT 2008	State program for energy savings supply and renewable sources utilization in 2008 – part A	C.2	Heat pumps in combination with solar thermal systems – bivalent resources	40% Max. 2000000,- CZK	MIT
	Specific pilot projects published as tenders	I.2	Energy savings and RES projects	100% 3000000,- CZK	MIT
Operational Programme Business and Inovation 2007–2013	"Eko-Energie" Programme shall stimulate activities especially of small and medium enterprisers to decrease the energy demand of production and primary energy source consumption and heighten utilization of renewables and secondary energy sources as well as their sustainability.	3	Building, reconstruction, modernization, waste energy utilization, raising energy efficiency.	**Max. 60%** Max. 100 mil. CZK	MIT
Operational Programme Environment 2007–2013	Building of new facilities and reconstruction of current ones in order to raise RES utilization for heat and electricity production or combined production	3.1.	Building of new utilizations and reconstruction of local or central heat sources from RES for heating, cooling and hot water	**max. 90%**	SEF
Donations for households for ecological heating	SEF donation for persons within the national Programme for energy savings and RES utilization 2006-2009	1.A.b	Solar systems for whole year hot water warming	**50%** max. 50 000,- CZK	SEF
		1.A.c	Solar systems for co-heating and whole year hot water warming	**50%** max. 60 000,- CZK	SEF

MIT – Ministry of Industry and Trade, SEF – State Environmental Fund

Programme EFEKT 2008 offers 70 mil. CZK, for OP Environment is allocated 776 mil. EUR for 2007-2013. No other relevant information have been found to this issue.
Opportunities of financial support for solar system are in all levels - national, regional and local as well. At national level is e.g. National Program for energy savings supply and renewable sources utilization in 2008. Regional level represents Regional Operational Programme of Central Bohemia (Central Moravia as well) and the others. Some cities or towns (Donation Programme of Prague the capital, the town Litoměřice, Plzeň, Náchod, Kladno etc.) represent local level with the municipality donation that is not so common nowadays yet but there are some attempts and projects to enhance this important level in the direct support of individuals.
It is possible to gain some finances from programmes at international level as Programme of cross-border cooperation between Czech Republic - Poland or Czech Rep.- Slovak Rep. or Norway programmes funds.

15.2.1. Electricity production by using solar energy and Green Bonuses

In the case of electricity production from RES, operators of regional distribution systems or transport systems have a duty to buy up all amount of produced electricity from operators of renewable source. The green bonus is extra pay on top of market prices resulting from Act no.180 of 31 March 2005 on support for the electricity production from renewable energy source – a measure to reach the indicated share of RES in electricity consumption.
According to §6 Act no.180 of 31 March 2005 have been set prices of electricity produced from RES to ensure a fifteen year economic return within the life time of facilities for "green" electricity production. Green bonuses consider heightened risk connected with opportunity of enforcing in the market. That is why they have an advantage in comparison to stable redemption prices.
Unfortunately these green bonuses were still not established also for "green" heat production from RES but there are attempts for them to be embedded in the Act.

15.3. Public supports for investments

Ministry of Environment cooperates with State Environmental Fund in support for installations of renewable and unconventional energy sources with financial donations. Donations usually target facilities for energy from RES production and heat savings.

15.4. Third party financing

CEZ Group aims to increasing RES utilization with support of building and reconstruction of facilities for electricity and heat production. Up to 1 million CZK (approx.40 000€) can get even facilities using waste heat for electricity and heat production. Projects have to be socially and economically useful and help to improve the environment.

15.5. Other incentives

State Environmental Fund provides direct donations, loans for RES and unconventional realization as well. Ministry of Environment releases new direction for financing from State environmental Fund every year.
CEZ Group (major owner is Czech country) intends to significantly increase its use of renewable sources in the upcoming years, investing over 1 billion euro over the next 15 years. Of that, approximately 700 million will fund the construction of new wind power plants. CEZ Group consolidated all activities dealing with renewable energy, apart from those utilizing biomass, under ČEZ Obnovitelné zdroje, s. r. o.

15.6. Bank loan at preferential conditions

GE Money is a part of worldwide initiative General Electric Ecomagination Group which supports environmental improvements and RES all over the world so as in Czech Republic.

TOP Energy Programme is an investment loan provided by Česká spořitelna for innovative energy projects preparation and realization. This is related to the field of energy savings and energy production from RES.

E. Future Prospects

16. National energy policy (Source: [26])

Since the year 2000, the Czech economy has grown as well as primary energy consumption, total energy consumption and electricity consumption. One of the main targets remains valuation of energy consumption (PES, electricity) by value added and energy savings. Maximization of energy efficiency continues to be the most important goal of SEP (State Energy Policy).
Despite attained development, energy demand of GDP is almost double compared with the EU average. Transport, industry and construction show high energy demand in particular.
The Czech Republic initiated standard system measures while fulfilling the goals of previous energy policies in conditions of energy efficiency growth. The National Programme for the Energy Efficiency and the Utilization Renewable has been introduced.
According to the Directive 2001/77/ES, the support of RES electricity in the internal market EU and for reaching targets of SEP will be supported with new rules:

- Conserve up to now the principles of renewable heat energy purchased according to valid energy law
- Initiate incentives for building and reconstruction of sources for heat energy production to ensure supply
- Initiate incentives for new buildings and changes of finished buildings to ensure part of the heat energy consumption is from renewable resources

The State Energy Policy's vision defines the basic priorities for creating the long-term development framework of the energy sector in the Czech Republic.

16.1. The basic priorities of the State Energy Policy

Maximum independence

- Independence from foreign energy sources
- Independence from energy sources from risky regions
- Independence from reliability of supplies from foreign sources

Safety

- Reliable supplies for all kinds of energy
- Reasonable decentralization of all energy systems

Sustainable development

- Environmental protection
- Economic and social development

16.2. State Energy Policy – goals (Source: [3])

The State Energy Policy's goals are focused on the fulfillment of its vision and they work out the basic priorities into a more specific form. Four main goals have been defined while each contains several partial objectives. The goals are ranked by their importance. One of them is ensuring the effective amount and structure of primary energy consumption.
The second goal helps fulfill the priorities of independence, safety and sustainable development within a sufficiently diversified and permanently stable structure of primary energy sources and electricity generation.

Partial objectives:

- Promotion of electricity and heat produced from renewable energy sources
- Current and newly applied State Energy Policy measures
- Renewable energy sources
- Support for electricity production from renewable energy sources
- Promotion for heat production from renewable energy sources

16.3. National Programme for the Energy Efficiency and the Utilization RES (Source: [15,16,17,18])

National Programme for the period 2006 - 2009 is a mid-term document for achievement of objectives of **National environmental policy of the Czech Republic**. General priorities:

- Maximization of energy efficiency
- higher utilization of renewable and secondary energy sources
- higher utilization of alternative fuels in the transport sector

The years 1995-2005 witnessed gradual energy consumption changes favouring more eco-friendly energy sources at a reduction of solid fuel consumption. Natural gas and electricity are on the increase. Shares of renewable resources grows slowly.
Final energy consumption includes a significant portion of crude oil. Its consumption grows from 2001 and it reached an unprecendented 8 mil. tons in 2006. however, in the long-term, demand of GDP on crude oil consumption declines.

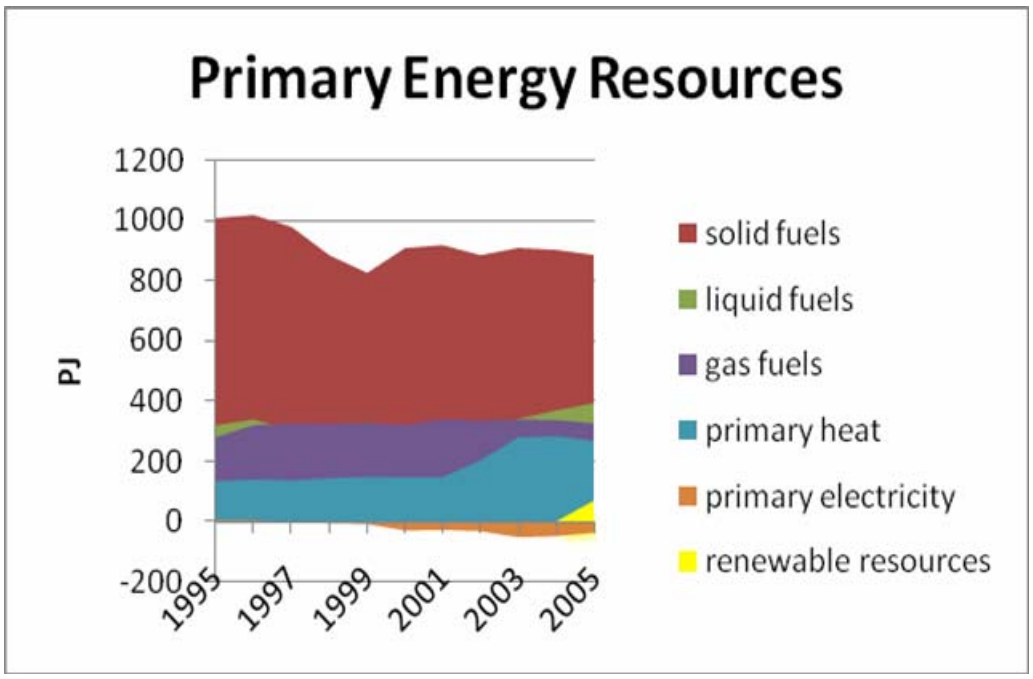


Figure 28: Primary Energy Resources 1995 – 2005 [PJ/year] (Source: [CityPlan, 26])

Note: Primary energy resources are entirety of domestic or imported energy sources expressed as energy unit. Primary heat is heat produced in nuclear reactors. Primary electricity is produced in water power plants together with balance of import and export. Negative rate means higher export.

Share of renewable resources on total electricity consumption increased to 4,3% in 2006. (It is 0,9% annual growth compared with 2005).
In 2006 solar thermal collectors has a share of 0,16% on the home energy market. The share of solar collectors in heat production from RES is insignificant compared to biomass, with shares of 91%.

State Environmental Policy of the Czech Republic sets the following targets and measures:

- Achieve a 6% share of RES (renewable energy sources) in total consumption of primary energy sources by 2010 and 20% by 2020
- Achieve at least 8% of electricity from RES in gross electricity consumption by 2010
- Promote investments in to the use of thermal energy produced from RES
- Ensure approval and subsequent implementation of the Act on Promotion of Production of Electricity and Thermal Energy from RES
- Create clear rules for the relationship between the use of RES and nature conservation and protection of the landscape, so that none of these areas is discriminated against.

National Programme for the Energy Efficiency and the RES Utilization is compatible with the EU's and supports the realization of EU guideline requirements:

- Energy efficiency (Directive 2003/8/ES support of the cogeneration electricity and heat)
- Renewable energy sources utilization (Directive 2001/77/ES support of the electricity from RES in the internal market EU)
- Alternative fuels in transportation (Directive 2003/30/ES support of alternative fuels)

The Czech Renewable Energy Agency adopted a Joint Declaration for a European Directive to promote renewable heating and cooling, which aims to produce 25% of the EU's heating and cooling supply from renewables by 2020. It is said that Europe needs to develop stronger policies and a directive to promote renewable heating and cooling.

The basic driving forces of energy policy are:

1. Maximum energy independence
2. Safety
3. Sustainable development & environment

As it was said in the first chapters of the national report the energy independency and the environment should be the strongest forces of the last decades but nowadays the energy safety link these two within the public discourse and have a strong role in the national energy policy.

16.4. National, regional, local policies

The policies related to RES are made within the energy, environment and sustainability, and lately also the safety and security sectors.
Czech law requires strategic documents at the national level. The energy policies have to be adopted at the regional and local level (county boroughs).
The environmental and sustainable policies are made in the regional level. The theme of RES could also occur in linked environmental/energy/air quality strategies.

16.5. State Environmental Policy (SEP) of the Czech Republic (Source: [17])

Utilization of Renewable Energy Resources

This target is related to the maximum possible replacement of non-renewable resources (material and energy) by renewable resources. In the materials area, this consists in the utilization of biotechnology and biomass (especially technical crops and wood). Under conditions in the Czech Republic, the most important renewable energy sources are primarily: biomass energy (wood, straw, various biological waste, shaped and treated biofuels – briquettes, pellets, etc.), the energy of direct solar radiation – thermosolar systems and photovoltaic panels, the energy of water (where

the only environmentally sound means of utilizing this energy consists in hydroelectric plants with an installed output to 10 MW, which are considered to be renewable resources that can be supported from public sources according to EU legislation), the energy of the environment (geothermal , ground and surface waters, and atmospheric energy), wind energy and fuel from renewable resources in transportation. Together with energy savings, renewable energy sources are currently the only available inexhaustible energy source. These sources provide a realistic potential to provide the energy requirements of human beings in the coming centuries - they are not a source of greenhouse gases, mostly produce a significantly lower amount of other emissions and practically do not produce waste. They contribute to the energy independence of the country and region and permit decentralization of energy sources. The use of RES creates new job opportunities (especially in rural areas) and thus contributes to decreasing unemployment.

16.6. Legislative background

Since 2000 the Czech Republic regulates energy consumption for heating and ventilation in buildings. The building owner's duty is to meet the minimum energy requirements for heating that are stipulated by the Energy Management Act No 406/2000 Coll. which entered into effect on 1 January 2000. The minimum requirements and the way in which the owner of the new building or owner of a building undergoing the major reconstruction are stipulated in the Decree No. 291/2001 Coll., (substituted by 148/2007 Coll. from 07/2007, Decree of the Ministry of Industry and Trade laying down Energy intensity of buildings); issued pursuant to this act. The Decree determines the particular energy efficiency values for heating and ventilation to be met and also a methodology for calculating the energy consumption and relevant Czech technical standards.

16.6.1. Legislative tools for the support of National programme (Source: [17])

- Energy act no. 458 of 28th November 2000 on Business Conditions and Public Administration in the Energy Sectors – prioritize the purchase, transfer and distribution of electricity from RES and cogeneration; obligatory purchase of heat from RES
- Act no. 406 of 25th October on 2000 Energy management: support cogeneration, RES in local energy planning, and requirement of new EU guidelines
- Emissions Allowance Act no. 695 of 2004: limitation of emissions from greenhouse gases and market with allowance units
- Act no.180 of 31 March 2005: support for electricity production from renewable energy sources – a measure to reach the indicated objective for the share of RES in electricity consumption

The entire list of the Acts is attached as Annex B to this national report.

17. Local bodies, prescribers, certification

There is a wide range and amount of companies, NGOs and institutions focused in energy sector. There have been also a solar association that is going to be re-established this year – the Czechoslovakia Association for Solar Energy.
The solar laboratories and test centres are set up under universities or other educational establishments – for example SOLab – laboratory under the Czech Technical University in Prague. Other research centre is Technological Centre of Science Academy.
The crucial certification body for the collectors is the Engineering Test Institute (the standards for the certification are listed in chapter 12).
The technical offices specialized in the energy sector are under the MIT, ME (Ministry of Environment), few regional Energy Agencies, NGOs and Czech Renewable Energy Agency. The official Energy Agency of the Czech republic was abandoned.
The training and education is held by the universities, high schools, colleges and the special training is usually arranged by the producer companies or by their exclusive agents and dealers with long-term experience and installation certification.

The producer company VERMOS Ltd. has developed together in collaboration with Mr. Jaromír Sum an educational tool called SOLIS for demonstration of solar radiation and energy to disseminate the RES to the general public and students. There were two variations developed – one is SOLIS I for photo-thermal energy conversion and the second is SOLIS II for showing photo-thermal and photo-voltaic energy conversion.

SOLIS I SOLIS II

Figure 29: The educational equipment SOLIS (Source: [46])

In the last few years producers started to incorporate renewable energy systems in their offers as a standard choice for the customer. There are few associations that are connected to solar thermal energy, i.e. the heating associations, general energy agencies and so on.
The largest number of collectors is imported from Slovakia (Thermosolar), Austria and Germany. Nowadays the market is seeing increasing numbers of Chinese and Turkish collectors but in tandem with developing the domestic producers.

The list of the main players interested in energy sector is in Annex A (the private companies) and in Annex C (education, NGOs, institutions, associations).

18. Objectives for the solar industry / market

18.1. Brief introduction

The national objectives in the energy sector are embedded in the government declaration, state energy – environmental – sustainable policy and the Czech legislation

18.1.1. Extract from government programme declaration 2007 (Source: [19])

The Czech government will support renewable sources utilization for heat production so that price differences will not be markedly higher than presently. It will simplify permission action for facilities using RES.
The Czech government will approve obligatory standards of energy efficiency for new and reconstructed energy source authorization. Those will correspond to European criteria for best available technologies (BAT). Furthermore, new national standards for energy efficiency of electrical appliances will be suggested.
Concrete plan of measurements to cut emissions of greenhouse gases in the Czech Republic will be created.

18.1.2. Individual targets and measures of State Energy Policy

- Promote investments in the use of thermal energy produced from renewable sources.
- Achieve a level of financial support from public budgets of at least 0.1% GDP.
- Approve and implement a concept of environmental tax reform.
- Implement the Directive on taxation of energy, 96/2003/EC.
- Simplify the permit issuing procedure in construction of installations for the use of renewable energy sources.
- Create clear rules for the relationship between the use of renewable energy sources and nature conservation and protection the landscape, so that none of these areas are discriminated.

18.1.3. Long-term objectives (Source: [3])

- To fulfill obligatory EU emission standards in 2010 (SO_2 265 ths. tons, NO_x 286 ths. tons, VOC 220 ths. tons)
- Fulfillment of international obligations rising from Kyoto protocol and from other agreements linked to it
- Create conditions for higher use of RES – determination and filling of national goals for electricity from RES for crude consumption of electricity (8% in 2010)
- According to EU targets: reduce GHG gases about 20% and heighten share of RES on total energy consumption to about 20% on average for all Europe by 2020.

18.2. Prospects for market development by sector (Source: [7])

The portion of the energy production made by the solar collectors (with 103 TJ) was in 2005 0,14% within RES and 0,01% PES. Due to the non-essential portion of the energy the increasing amount of heat from solar thermal systems is not crucial in the short-term perspective but in the long-term perspective together with other RES.
The heat consumption is currently about 349 PJ/year in which 13% is produced by the RES. The heat consumption in fuels is about 530 PJ/year with 12% of RES (made by the biomass, biogas).

At the beginning of 2008 an environmental tax for fossil fuels was implemented. Therefore the RES disadvantage connected with higher pricing has been eliminated and conditions for market development had been improved.

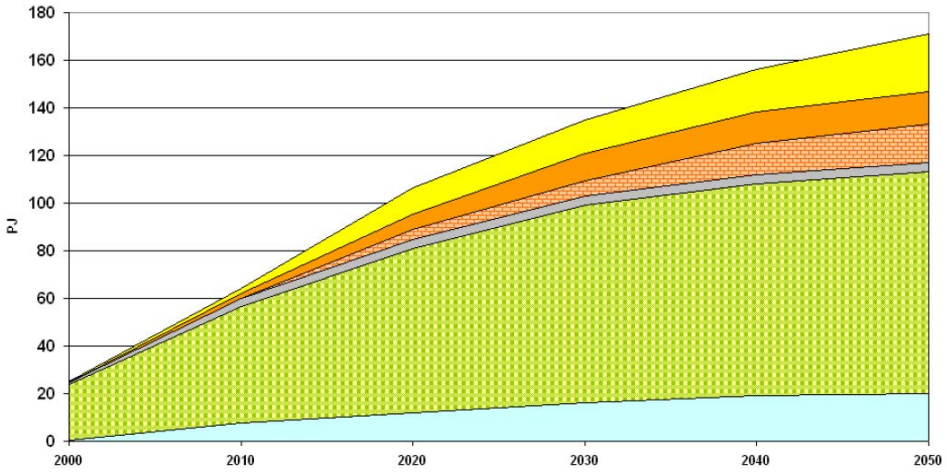


Figure 30: Presumed growth of heat and cool production from RES by the year 2050 (Source: [20])

Note: yellow – solar energy, orange – heat pumps, range texture – geothermal energy, grey – biological waste, green texture – biomass, blue - biogas

Overall potential for renewable resources for heat energy shows also the figure below.

Table 16: The simplified potential of the major RES for production of heat energy until 2050 in the Czech Republic (Source: [21])

PJ	2007	2010	2020	2030	2040	2050
Biomass	50	62	93	103	112	117
Geothermal	1	2	10	18	26	30
Solar	0,1	0,3	2	14	18	24
Total	52	65	106	135	156	171

**numbers are rounded*

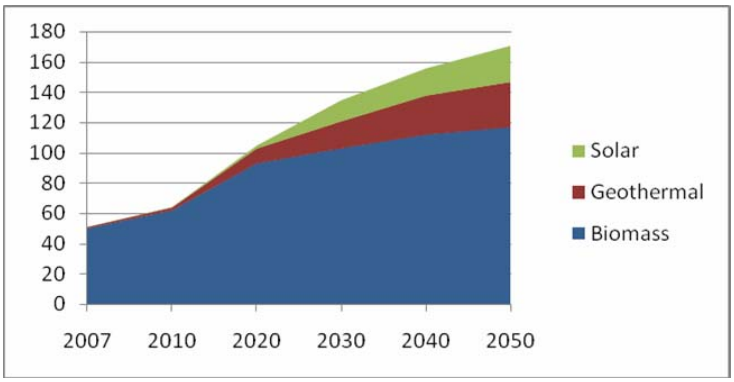


Figure 31: The potential of major RES in CR 2007- 2050 (Source: [21])

Utilization of solar energy potential depends on the level of demand for low potential heat. Technical possibilities of technology placement (solar collectors) are given by the availability of suitable oriented surface. Connection of solar collectors with current and new heating systems is easily feasible. At present the solar energy industry is making considerable progress to developing solar system technologies that have apparent potential. Those are developed in such a way that there is no problem to use them.

18.3. Potential of thermal solar energy utilization

Table 17: Solar energy utilization

	Total surface(m²)	Production (TJ/year)
Technical potential	13 000 000	25 000
Accessible potential	9 000 000	17 000

Table 18: Main prospects and limits of market development (Source: [45])

Main prospects and limits of market development	
+ use throughout the year (year production app. 500 kWh/m²) + accessible and proven solution (easy installation) + operating costs are very low + long lifetime (> 20 years)	– at present total production costs are quite high

Table 19: The presumed evaluation of total solar collector – housing & total (Source: [21])

	Total Solar Collector Surface Ares [m²]			*Annual Solar Energy Supply TJ*		
	2010	**2020**	**2030**	**2010**	**2020**	**2030**
Domestic hot water production	809 756	1 758 048	3 448 756	1458	3 164	6 208
Total	**1 037 756**	**2 214 048**	**4 132 456**	**1868**	**3 985**	**7 439**

Showed the Scenario B – 30% of theoretical consumption of low-potential heat will be utilized

Attempts to set up, besides the Renewable energy Act focusing in production of electricity from RES, the Act to focus on production of heat energy from RES was brought by NGO´s interested in the energy sector; also pressure was placed on the government to create the direct donation for households and implement other additional instruments to improve and increase the utilization of RES in the arena of heat production.

19. Strategy to overcome the barriers to market development (Source: [44])

In this phase of the Transolar project, summarizing data from statistical databases together with the interviews of experts and other available data was made. The interview research of another target group – private companies - will follow in the next phase so that the objectives in the selected trade sectors will be assured.
In the year 2007 a commission was set up under the Ministry of Environment to survey the eco-barriers for enhancing the utilization of RES.

19.1. Description of major barriers by category

- Technical
  - Inadequate and lacking projects (wrong predictions about the potential of systems as well as the economics calculations – the presumption of energy prices, the property contracts etc.)
  - Inadequate education of installers in the overall spatial relationships (property, spatial planning, etc.)
  - Local requirements – spatial/territorial/strategic plans and its regulations
  - Risk of implementing new technologies
  - Requirement of an additional energy source, preferably for the winter season
- Institutional
  - Despite the energy policies there is no strength and systematic support from local bodies – no strategic or conceptual long-term planning
  - Lack of databases within the RES sector – no adequate data available
  - Non-linked strategic documents – poor obligations in relation to RES, energy savings etc.
  - The lack of the legislative transparency – the competences
  - Administrative barriers – long-term processes to get the permission, time and administrative finicalities. The different approvals needed must be applied for one by one, not simultaneously

- Economic
  - Lack of financing
  - Limited concept projects
  - Large investments and slow amortization
  - Long and difficult administrative to get state/EU funding
  - No adequate transparency and assurance of the amount of the donation for the RES system
  - The duty to scheduled redemption price of the electricity and subsequently to heat from RES is the burden for distributing companies – it doesn´t represent the advantage for the producers or compensate for the disadvantages
  - Constantly low prices of the traditional energy sources (fossil fuels and other primary sources – nowadays increasing tendencies) limits the competitiveness of RES – the prices could be under the trade price but not the investments
  - The traditional energy sources don't include environmental or carbon taxes (or the tax of exploitation the non-renewable source)
  - Non-systematic approach within private companies – no long-term loans or donation budgets
  - Risk in use of new technologies
    - Risk of bad wrong economical analysis
- Cultural
  - The efforts and pressure of individual housing with individual requirements
  - Unstable awareness of RES needs
  - RES are still not a common part of daily life (The usage of solar systems is not common for the inhabitants and, as for other European countries, they are not used to trusting new systems)
  - Tenant dilemma, loss of motivation
- Educative
  - Environmental factors are not crucial for the investors but the benefits and donation
  - The lack of knowledge about the prediction, calculation of the real potential and benefits of RES, the donation possibilities, and the practice by public sector
  - Not enough experts nor adequate equipment for the research and development of new technologies
  - Big pressure by the private companies that can present their systems as the best without giving additional information about other possibilities
- Quality
  - Not enough testing and R&D laboratories and institutions
  - The RES sector is not a common component part of the educational system (not just in the educational establishments focused in energy sector)

19.2. Description of main measures needed to extend the solar thermal market by category

- Technical
  - Include all requirements and long-term objectives in project preparation
- Institutional
  - Systematic support for utilization of RES
  - The project and policies feedback from the local level to local, regional and national energy, environmental, sustainable and spatial strategies
  - Support RES utilization by improving public awareness of RES in general and its benefits
  - More knowledge support, information of RES and donation from all levels, preferably the local levels
- Economic
  - Internalization of externalities to include the environmental and social impacts in the energy price
  - scheduled objectives in emission reduction and increasing the RES utilization (already set in the Energy and Environmental Policies)
  - develop marketing methods
- Educative
  - Implement the energy and RES sector into the educational scheme
  - Enhance the education of professionals and companies – installers, manufacturers
- Quality
  - Set up a scheme for the R&D in solar thermal energy
  - Enhance the creation of unified standards of quality or use the Solar Keymark

19.3. Suggestions from key actors for contribution of the TRANS SOLAR project

This part will be further elaborated during the TRANSOLAR project. The suggestions stated below are made up on the basis of the experience, overall knowledge, expert interview survey and other research made during the project (see the references).

- Technical
  - Focusing in industry sector
  - Create a transparent DB of domestic products and the quality
  - Possible to unify and create the certification of products as well as the producer or installation companies
- Institutional
  - The policy should \ enhance the energy savings and the custumers' behavior that would lead in a decline of the total consumption and increasing the RES utilization
  - Better coordination and linkage of activities
  - Should give the options and consultancy support to recommend the systems
  - The lack of the National Energy Agency – to set up new associations
- Economic

- Focus on complex systems, not just a few components within projects, as well as on the donation systems
- Lower the taxes (VAT) for the products
- New economical models for donation (car-leasing) to lower the time of amortization/economic return

- Cultural
  - To show the sustainable way of development and change consumer behavior; to mitigate the amount of the consumption and other increasing trends that are not necessary
  - The political sector is enhancing the RES without giving their personal example
  - To promote solar thermal systems as a standard feature of new houses by the building companies
- Educative
  - There is no special institution or educational establishment; that should be set up
  - The Czechoslovak Association for Solar Energy should cover special training of an excellent quality
  - Information campaigns presenting examples of best practices
  - Enhancement of marketing and media coverage
- Quality
  - To unify the certification of collectors to make the quality products visible and recognizable
  - Set up an association for the producers of solar thermal systems
  - More quality testing

20. Concluding remarks

Due to the large amount of companies interested in solar thermal energy as distributors or installers in majority and a wide range of collectors and absorbers available in the market, it is very difficult to give the very objective view on the wide range of the Czech trade. Together with this factor there is still not any kind of association gathering the detailed data about the number and interests of the companies or the physical entities or the duty to be inscribed in the Chamber of Commerce. The Czech National Energy Agency was abandoned.
The data available from the Ministry of Industry and Trade are most of the times not in accordance with other databases. The methods of monitoring differ as well as the range of the detailed data. Solar collectors and the components of the systems are also not a separate economical or trade product within the current systems of classification and also the services and all the economical activities (installers, manufacturers etc.). Some basic data are, due to this fact, unavailable, such as the number of collectors (components) produced, imported or exported and the portion of the participation of the companies in the Czech trade. There is a database of the systems installed but there is again no duty to get inscribed into the systems and to give the information about the heat production or other such details.
Despite the fact that there are lots of companies, there were not any special marketing strategies observed and there are not any visible attempts to address the varieties and possibilities to the overall public. There are two certification testing centres but there is not any educational establishment focused exclusively in renewable energy sources leaving alone some kind of systematic educational programme for the primary, secondary schools or colleges, which should incorporate the theme of RES into the standard schedule as well.

The donation and fundraising of RES are available and achievable in Czech Republic but the systems are administratively very data and labour-intensive as well as time consuming, while the assurance of the donation amount that is accessible from the national and local level is not standardized.
The barriers to enhancing the trade could be probably be improved by the systematic approach in all fields connected to the market of solar thermal energy, in all levels and economical, institutional, educational and research sector.

References

LITERATURE

1. Statistical yearbook 1920, 1925, 1957, 1971, 2003 of the Czech Statistical Office *in http://www.czso.cz/csu/redakce.nsf/itisk/820040B6DD; 29.5.2008*
2. Historical statistical yearbook, 1985 of the Czech Statistical Office *in http://www.czso.cz/csu/redakce.nsf/itisk/820040B6DD; 29.5.2008*
3. Ministry of Industry and Trade, 2004 : *State Energy Policy*. Ministry of Industry and Trade: Prague. http://www.mpo.cz/dokument5903.html, 29.5.2008.
4. CityPlan, 2007. *Analysis of energy price trends (1988-2006) and preface of the further development till the year 2021.* CityPlan:Prague
5. Ministry of Industry and Trade, 2006. Solar collectors for water heating in former Czechoslovakia 1977-1992. MIT: Prague. *In http://www.mpo.cz*
6. Ministry of Industry and Trade, 2005. Solar collectors in the year 2004. MIT: Prague. *In http://www.tzb-info.cz*
7. Ministry of Industry and Trade, 2006. Solar collectors in the year 2005. MIT: Prague. *In http://www.mpo.cz*
8. Ministry of Industry and Trade, 2007. Solar collectors in the year 2006. MIT: Prague. *In http://www.mpo.cz*
9. Czech enterprise office, 2006. NOZV: *Forecasting of Future Skill Needs in Energy Industry 2007-2011*. NOZV: Prague..
10. Ministry of Education, Youth and Sports, 2004: *Proposal of National Research Program II,* Ministry of Education, Youth and Sports, Prague. *In http://www.vyzkum.cz/storage/att/2AC072A125D19F00757B5E3C733ED0C6/npv_p1.pdf*
11. Matuška, T., 2006. *Solar thermal techniques*. ČVUT: Prague.
12. Brož, K. Šourek, B., 2003. *Renewable energy sources*. ČVUT: Prague.
13. Matuška, T., Šourek, B., 2007. *Designs and balance of solar systems*. Společnost pro techniku prostředí: Prague.
14. Regulus, 2007. *Thermal techniques – catalogue of products*. Regulus: Prague.
15. Government of Czech Republic, 2006. *National Programme for the Energy Efficiency and Utilization of Renewable Energy Sources*. Government of Czech Republic, Prague.
16. Czech environmental information Agency, 2007: *Summary of Environmental Condition in Czech Republic in 2006*. Czech environmental information Agency, Prague.
17. Ministry of the Environment of the Czech Republic, 2004. *State Environmental Policy of the Czech Republic.* Ministry of the Environment of the Czech Republic, Prague.
18. European Renewable Energy Council, 2005. *Joint Declaration for the European Directive to promote renewable heating and cooling*. European Renewable Energy Council, Brussels.
19. Government of Czech Republic, 2007. *Government Programme Declaration*. Government of Czech Republic, Prague. In http://www.vyzkum.cz/FrontClanek.aspx?idsekce=665, 29.5.2008.
20. Motlík, J., 2008. *The potential of energy sources for heat production* – seminar presentation. In http://www.hnutiduha.cz/index.php?cat=programy&art=slozka&id_prace=13&id=89
21. Motlík et all., 2008. *Green heat: Untapped Potential*. Association for utilization of renewable energy sources, Prague.

ELECTRONIC SOURCES

22. Environmental web: *http://www.enviweb.cz/?env=energie_archiv_ghjha/Slunecni_energie.html*
23. Czech Hydrometeorological Insitute: www.chmu.cz
24. Czech Statistical Office: www.czso.cz
25. Physical Geography of the Czech Republic: http://www.herber.kvalitne.cz/FG_CR/geomorfologie.html#C1
26. Ministry of Industry and Trade: www.mpo.cz
27. Energy regulatory Office: www.eru.cz
28. Heating Plant Industry Association of Czech Republic: http://www.tscr.cz/index.php?pg=4#
29. Solar league: www.solarniliga.cz
30. Project Solarteur: www.solarteur.cz
31. Private company: *www.bazenydiamant.cz*
32. Private company: www.regulus.cz
33. Private company: www.thermosolar.cz
34. National education fond: www.nvf.cz
35. The Czech Association of Energy Sector Employers: www.czse.cz
36. Calla - Association for Preservation of the Environment: www.calla.cz/atlas
37. Techniques, equipment, buildings info server: www.tzb-info.cz
38. CEZ Group: www.cez.cz
39. Research DB: http://www.vyzkum.cz/storage/att/2AC072A125D19F00757B5E3C733ED0C6/npv_p1.pdf
40. Research DB at Czech Technical University: http://aplikace.isvav.cvut.cz/resultDetail.do;jsessionid=1556AF9FA819D70475C1D5EF545AAA20?rowId=RIV%2F49777513%3A23220%2F06%3A00000045!RIV07-GA0-23220___GAČR
41. State Environmental Fund: www.sfzp.cz
42. Operational Programmes: www.strukturalni-fondy.cz
43. European Solar Thermal Industry: www.estif.org
44. Ekowatt : www.ekowatt.cz
45. Ministry of Environment: www.env.cz
46. Private company: www.vermos.cz

List of Abbreviations

CSO Czech Statistical Office

CR Czech Republic

ERO Energy Regulatory Office

MIT Ministry of Industry and Trade

ME Ministry of Environment

PES Primary Energy Sources

RES Renewable Energy Sources

SEP State Environmental Policy of the Czech Republic

TJ tera joule (10^{12})

List of Figures

List of Tables

Annex A: Solar Thermal Directory

List of firms producers, suppliers and installers of solar thermal systems in Czech Republic

No	Name	Address	Telephone/Fax	E-mail	website	Services	Origin of solar collectors:
1	Eusolar Ltd.	Euslar Ltd., org.složka Havířská 2003, 470001 Česká Lípa	+420 608 270 579; +420 724 780 000	eusolar@email.cz	http://www.www.energie-ze-slunce.cz/	distributer, installer, installation regional partners	
2	SOLAR POWER	SOLAR POWER CZ, s.r.o., Biskupský Dvůr 2095/8, 110 00 Prague, lots of regional offices - Brněnská 681/5, Hodonín	+420 518 321 158/ +420 608 741 635 / +420 518 321 158/ 518 355 038	office@solarpower.cz	www.solarpower.cz	installer, distributer, service, commercial agent of SONNENKRAFT	
3	VacuSol s.r.o.	Dolní Rožínka 74, 592 51 Dolní Rožínka	420 602 551 902 / +420 566 56 531	vacusol@vacusolar.cz	http://www.vacusol.cz/	distributer/ installer/ producer (the overall equipment for solar systems - not solar collectors)	
4	Jiří Hrádek, JH SOLAR	Plavsko 88; 378 02 Stráž nad Nežárkou; okres Jindřichův Hradec; IČ: 280 64 275; DIČ: CZ28064275	384 390 967	jhsolar@jhsolar.cz	http://www.jhsolar.cz/	importer, distributer	
5	Solární energie	Solární energie s.r.o., Provozní 5492/1, 722 00 Ostrava – Třebovice	Tel.: +420 596 964 668; Mob.: +420 603 450 199	info@solarnienergie.cz	http://www.solarnienergie.cz/	distributer/commercial agent (of one of the biggest producer of solar thermal collectors) HELIOAKMI A.S. in the Central and Eastern Europe	
6	RWE SCHOTT GmbH - Německo - RWE SCHOTT Solar CR	SHOTT CR, a.s. Zašovská 850, 75701 Valašské Meziříčí	tel +420 571 686 111 / fax +420 571 686 194	info.cz@schott.com	http://www.schott.com/czech/index.html	production of collectors in ČR - Valašské Meziříčí	

No	Name	Address	Telephone/Fax	E-mail	website	Services	Origin of solar collectors:
7	ROTO building element s.r.o. (Roto Frank)	Strašnická 43, 102 00 Praha 10	420 272 651 428 / 420 271 750 187	roto.cz@roto-frank.com	http://www.roto-frank.cz/www/cze/product/solar-rsk.html	Ltd., commercial agent of ROTO Franck - solar systems, collectors, PV, roof components and constructions; installer, donation adviser etc.	
8	Strojírny Bohdalice a.s.	683 41 Bohdalice	420 517 326 621 / 420 517 326 650	sales@bohdalice.cz	http://www.bohdalice.cz/editor.php?kategorie=1023&sekce=1008	producer/manufacturer	
9	PROPULS s.r.o.	S.K.Neumanna 2708, 530 02 Pardubice	420 777 770 986 / 420 464 625 903	propuls@propuls.cz		Ltd., producer, installer	
10	VERMOS s.r.o.	residence :gen.Svobody 1197/3, 767 01 Kroměříž; commercail esth. Havlíčkova 3057/147, 767 01 Kroměříž	tel +420 573 331 661 / tel/fax +420 573 339 110	j.vlk@vermos.cz	http://www.vermos.cz/?q=node/79	Ltd., producer, installer, delivery, service	
11	HELIOSTAR, s.r.o.	Cornova 729/10, 618 Brno, factory: Našiměřice 18, 671 76	+420 548 531 318/ +420 776 047 369	heliostar@heliostar.cz	www.heliostar.cz	Ltd., producer, installer, consultancy, donation adviser, projects, development	
12	REMER s.r.o.	ul.Hřbitovní 429, 739 61 Třinec	head +420 558 533 456 / 558 533 456		http://www.hegas.cz/www_remer/pg_kontakt0_cs.htm; www.remer.cz	Projects/installer,service	
13	EMTEST spol. s r.o.	Dvořákova2, 737 01 Český Těšín	420 558 712 129 / 558 731 080	emtest@emtesteng.cz	http://www.emtest.eu/	Projects/installer,service	
14	REVOLT s.r.o.	Oldřichovice 738, Třinec 739 61	558332882; 775 326 319 / 558 338 437	info@fachmani.cz	http://www.fachmani.cz/		
15	ENVI	Dukelská 145, 379 82, Třeboň	384 706 111 / 384706112/174	envi@envi.cz; frantisek.hrubec@envi.cz ; vladimir.kuceravy@envi.cz	http://www.envi.cz/	producer, installer of thermal collectors and also PV	
16	I.G.B. Holding, a.s.	Stodolní 4, 702 00 Moravská Ostrava	596 125 152/596 112 773/ 596 112 775/ 596 123 281 / 596 123 281	info@igb.cz	http://www.igb.cz/	project, delivery, installer	

No	Name	Address	Telephone/Fax	E-mail	website	Services	Origin of solar collectors:
17	Ing. Miloslav Mužík - MMM - Solar	Na Milířích 584/76, 725 27 Ostrava - Plesná	596 935 070 / 596 935 107	solarnitechnika@seznam.cz	www.solarnitechnika.cz	installer, distributer, service	
18	TDO clima s.r.o.	17.listopadu 1790, 708 00 Ostrava - Poruba	597 374 044/ 596 920 155 / 596 920 155	balek@tdo-clima.cz	ww.tdo-clima.cz	installer, distributer?	
19	SEKOM HS spol. s r.o.	Žitavská 135/52, 460 01 Liberec 1	485 101 196 / 485 104 135	sekom.lbc@tiscali.cz	http://www.sekom-hs.cz/	installer, projects	
20	TM Blatná spol. s r.o.	Chlum 51, 388 01 Blatná	383 423 235 / 383 423 235	ktl.blatna@tiscali.cz, josef.tuhacek@tiscali.cz	http://www.teploslunce.cz/	distributor and installer of Solar Power collectors	
21	Josef Adámek SSP - ADÁMEK - MÍKA	Svatovítské náměstí 123, 393 01 Pelhřimov	602 249 609 / 565 322 292	adamek-mika@post.cz	http://www.adamek-mika.wz.cz/	distributer, installer - complex delivery products from Junkres, AMK Solac, Buderus	
22	Jaroslav Utíkal UNEGO užití netradiční energie	Na Nivách 16, 779 00 Samotíšky u Olomouce	602 402 816 / 585 383 301	unego@unego.cz	http://www.unego.cz/	installer of Heliostar (Thermosolar), Vacusol; consultancy	
23	Karel Gec - TOPINSTAL	Vrátkov 30, 282 01 Český Brod	314 000 940 / 314 000 940	topinstal@topinstal.cz	http://www.topinstal.cz/	plumber and heating engineering - also solar collectors, distributer, installer of Buderus and Regulus	
24	Stanislav Hanuš VOTOP	V Sadě 197, 507 Mlázovice	493 697 208, 603 748 740 / 420 493 697 208	votop@seznam.cz		installer	
25	Ing. Pavel Bačík	Na stráni 8, 742 35 Odry	420556730459/777 097 750 / 420 556 730 459	pbacik@sendme.cz	www.bacik-ts.cz	physical entity not inscribed in trade register	

No	Name	Address	Telephone/Fax	E-mail	website	Services	Origin of solar collectors:
26	AP SIMKO s.r.o.	Raisova 137, 538 21 Slatiňany	420 469 062/608 222 827	info@apsimko.cz	www.apsimko.cz	Ltd., wide range of activities - irrigation, air-conditioning systems, recuperation, heat pumps, etc.	
27	Jiří Veselský	Jívavská 7, 785 01 Šternberk	420 585 012 820 / 420 585 012 846	mechanika@istrade.cz	www.mechanika-sternberk.cz	physical entity not inscribed in trade register ; projects, delivery, installer	
28	CHYPA s.r.o.	Slavice 80, 674 01 Třebíč	420 568 845 366 / 420 568 845 366	chypa@volny.cz	www.chypa.cz	Ltd., installer of kettles, also for solar systems	
29	Josef Gernat INSTALA	Vřesová 3114, 47001 Česká Lípa	+ 420 487 524 225/420 602 451 287 / 420 487 524 225	instala.gernat@svarov.org info@instala.cz	http://www.instala.cz	physical entity not inscribed in trade register , delivery, installer of collectors	
30	SOLAR NET s.r.o.	Brněnská 65, 586 01 Jihlava	420 732 433 886	jihlava@solarnet.cz	http://www.solarnet.cz	Ltd. - projects, installer, consultancy, donation support adviser, service	
31	Jiří Vik - TEPELNÁ TECHNIKA	Kubelíkova 467, 500 03 Hradec Králové	+420 495 407 311/ +420 777 716 783 / 420 495 407 312	jiri.vik@vik.cz	http://www.vik.cz	physical entity not inscribed in trade register, projects, installation, service, wholesale - solar heating	
32	Vodník Promat s.r.o.	Masarykovo náměstí 16/15, 789 01 Zábřeh na Moravě	420 583 414 416 / 420 583 414 316	info@vodnikpromat.cz	http://www.vodnikpromat.cz	Ltd., projects, distributer, delivery, installation, support donation adviser	
33	Milan Grék -voda-topení-montáž-údržba-opravy	Liliová 441, 383 01 Prachatice	+420 388 316 119/+420 775 552 301 / 420 388 316 119	grek.milan@quick.cz		physical entity not inscribed in trade register	
34	LÁF NEREZ s.r.o.	Kotíkova 193, 509 01 Nová Paka, ČR	+420 493 721 123, +420 493 721 121 / 420 493 721 921	info@laf.cz	www.laf.cz	Ltd., producer, installation	

No	Name	Address	Telephone/Fax	E-mail	website	Services	Origin of solar collectors:
35	Ladislav Němec - WARM	Dr. Holubce 1051/14, 674 01 Třebíč	420568228966/ +420 777 793 391 / 420 568 228 966	warm@trnet.cz	www.warm.cz	physical entity not inscribed in trade register ;trade area - buildings, equipment, solar distributer, installation, service	
36	Zdeněk Hruška	Zámecká 143, 747 57 Slavkov	+420 553 797 200/ +420 774 737 995 / 420 553 797 200	hruska.zdenek@tiscali.cz		physical entity not inscribed in trade register ; plumber and heating engineering - also solar collectors	
37	GRANZ KOLÍN s.r.o.	Havlíčkova 231, 280 00 Kolín	420 321 727 744 / 420 321 726 167	info@granz.cz; frydrych@granz.cz	www.granz.cz	Ltd.- sale, services, installation of refrigerator and conditioning / environment engineering - solar collectors for HDW	
38	EKO-TOP Jiří Pančocha	Neradice 2273, 688 01 Uherský Brod - shop Předbranská 415, Uherský Brod	420572630930/ +420 774 635 748 / 420 572 630 930	ekotop@c-box.cz	http://ekotop.wz.cz	physical entity not inscribed in trade register ; distributing heating systems (hearths) - kettles "Verner" for biomass, solar systems Ekosolaris	
39	TENET CZ s.r.o.	Pálená 228 (Střítežská 584), 572 01 Polička	420 461 721 554	tenetcz@tenetcz.cz	http://www.tenetcz.cz	Ltd. - distributer of solar and heating systems, bathrooms, etc.	
40	Jiří Kotleš - Pohoda	Obec Hory 4, 362 11 Jenišov U Karlových Varů	420 353 223 035 / 420 353 228 487	pohodajk@telecom.cz	http://www.pohodajk.cz	physical entity not inscribed in trade register - roof reconstruction, delivery and installation of solar systems,etc.	
41	EKOMONT DC s.r.o.	Vítězství 95, 407 11 Děčín	420 412 547 650 / 420 412 547 650	info@ekomontdc.cz	http://www.ekomontdc.cz	Ltd, solar systems for DHW and heating form the beginning	
42	JUMING s.r.o.	Barákova 426, 538 03 Heřmanův Městec	420 466 972 601 / 420 466 952 394	juming@juming.cz	www.juming.cz	Ltd, installation of pools, saunas, solar systems	
43	VK TECHNIK, v.o.s.	Na Pěšince 436, 58813 Polná, ČR	420567212330/ +420 736 613 836 / 420 567 212 330	vktechnik@vktechnik.cz	www.vktechnik.cz	development, producer, installation of solar systems (within the existence installed over 1000m²)	

No	Name	Address	Telephone/Fax	E-mail	website	Services	Origin of solar collectors:
44	BMC KOVO s.r.o.	Kovařovicova 1950/56, 616 00 Brno, CR - web: Kaštanova 127, areál Destily, 620 00 Brno	420 541 260 462 / 420 541 218 696	info@bmckovo.cz	www.bmckovo.cz	producer, installation	
45	EKOSOLARIS a.s.	Kotojedská 2381, 767 01 Kroměříž - web:Jožky Silného 2684, 767 01 Kroměříž	420 573 330 344 / 420 573 330 343	info@ekosolaris.cz	www.ekosolaris.cz	producer, installation, donation adviser, PV	
46	4T , a.s.	residence: Průmyslová 566/5, 108 00 Prague 10; commercial establishment: Vančurova 113, 277 13 Kostelec n/L	tel/fax +420 326 734 965	info@4T.cz	http://www.4t.cz/solarni_technika_kolektory.php	instalation, projects; focused in RES, mainly in heating	
47	M-SOLAR.TOP	store: Jiráskova 96, Tovačov	420581731209/ 777 225 516/ 777 115 516 / 420 581 299 933	e-mail-info@msolartop.cz	http://www.msolartop.cz/sluzby.php	distributer, installer, service	
48	Bohemia Solar s.r.o.	Broumovská 28, 547 01 Náchod - Malé Poříčí	tel/fax +420 491 420 281 / gsm +420 731 475 535	solarka@bohemia-solar.cz	http://solarka.bohemia-solar.cz/sluzby/montaz.htm	distributer, installer, service, projects	
49	web PROFISTAVBA	Anenská 22, 602 00 Brno		bravura@bravura.cz		e-shop by the Bravura Ltd.	
50	Stehlík, solární systémy	Jandova 6, Praha 9	+420 775 999 222/ +420 777 742 771 / 420 284 814 087	info@solarnisystemy.cz	www.solarnisystemy.cz	Installer	
51	Stiebel Eltron	K Hájům 946, 155 00 Praha 5	420 251 116 130/ 111 420 235 512 122	info@stiebel-eltron.cz	http://www.stiebel-eltron.cz/?page=se_solarni		
52	SOLAR IN		+420 737 913 186/ +420 731 512 400	solar.in@seznam.cz	www.solarin.wz.cz	Ltd., installer, consultancy	
53	AB COM SHOP s.r.o.	Konstantinova 147, Praha 11	420 605 582 221 / 420 272 942 350	abcom@nextra.cz	www.abcomshop.cz	Ltd., exclusive importer SIGMA s.a.(Greece) from 2001, owner of Greek factory in Volos	

No	Name	Address	Telephone/Fax	E-mail	website	Services	Origin of solar collectors:
54	ALTERM spol. s r.o.	U Trati 40a, Praha 10	420 274 783 211 / 420 274 780 965	alterm@alterm.cz	www.alterm.cz	Ltd., distributer, installer	
55	ATON CENTRUM s.r.o.	Kounická 50, Praha 10	420 274 811 750 / 420 274 811 750	aton@czn.cz	www.aton.cz	Ltd., consultancy, projects, installation	
56	Energetická zařízení s.r.o.	Mejstříkova 614/12, Praha 4	420 241 721 836 / 420 241 721 836	enza@enza@cz	www.enza.cz	td., project, installation, delivery	
57	Výkonné sluneční kolektory - ESL, a.s. Brno	Dukelská 69/71, Brno	420 545 212 418 / 420 545 212 418	info@esl.cz	www.esl.cz	producer of heat exchangers, distributing solar systems	
58	Ing.Antonín Hrabec - Varmexin sluneční dodávky	Na Bařině 238, Borkovany	420 519 419 384 / 420 519 419 384	solar@varmexin.cz	www.varmexin.cz	focused in solar energy before setting up the company, consultancy, projects, delivery, installation	
59	Intersekce s.r.o.	Soukenická 5, Plzeň 1	420 377 235 235 / 420 377 237 777	energo@intersekce.cz	www.intersekce.cz	Ltd., projects, installation, service, distributer	
60	Jiří Janků - Agentura IRIS	Bieblova 296, Hradec Králové	420 495 545 398 / 420 495 406 790	info@agenturairis.cz	web.redbox.cz/jhsolar	distributer, installer, projects	
61	MEIBES s.r.o.	V domově 22, Praha 3	+420 284 01 081 / 420 284 001 080	meibes@meibes.cz	www.meibes.cz	Ltd., producer of components	
62	Oldřich Šlor - ROKOV	Nám. 9.května 199, Rosice nad Labem	420 466 413 420 / 420 466 413 322	info@slunecnikolektory.cz	www.slunecnikolektory.cz	producer of radiators for sw.pools, regulatory storage equip.	
63	Petr Nimmrichter - KONEX	Boženy Němcové 10, Šumperk	420 583 212 050 / 420 583 212 050	konex.solar@atlas.cz	http://www.solarobchod.cz	owner Petr Nimmrichter 777 121 043	
64	R.I.P.	Vojanova 83/28, 405 02 Děčín 8 - Březová 372/83	420 412 528 875 / 420 412 528 900	info@rip.cz	www.rip.cz	producer, development of heat and solar systems (PV, collectors, heat)	

No	Name	Address	Telephone/Fax	E-mail	website	Services	Origin of solar collectors:
65	Stanislav Nožička - topení, voda, plyn, solarní systémy	Kmochova 576, Hradec Králové	42 495 263 893	s.noha@seznam.cz	www.mujweb.cz/obchod/stanislav.nozicka	projects, installation	
66	TIZ, V.O.S.	Výhonkovec 1242, Rychvald u Kraviné	420 596 512 871 / 420 596 512 871	tiz@tiz.cz	www.tiz.cz	import, distribution	
67	VACUSOLAR s.r.o.	Jílkova 203, Brno	420 548 212 925 / 420 548 212 925		www.vacusolar.cz	consultancy, projects, installer, distributer	
68	Antonín Struhár Solar - Therm	Masarykova 68, Břeclav - Ladná 691 46	608 772 776	kovis@bv.anet.cz			
69	ENKI o.p.s.	Dukelská 145, 379 01 Třeboň	420 384 706 117 / 420 384 724 346	jirka@enki.cz	www.enki.cz	projects, research	
70	ATEG TEPELNÁ TECHNIKA s.r.o.	Květnového vítězství 283, 149 00 Praha-Háje	420 225 340 224 / 420 225 340 224	info@ateg.cz	www.ateg.cz	Ltd., exclusive agent for AEG systems for Czech and Slovak Republic (heat pumps, solar systems, air-conditioning&recuparation); trainings, consultancy, service, distributer (wholesale) , installation	
71	BUDERUS	Pod Višňovkou 1661/35, 140 00 Praha; obchodní divize Praha - Průmyslová 372/1, 108 00 Praha10 Štěrboholy	420 272 191 111 / 420 272 700 618	info@buderus.cz	http://www.buderus.cz/katalog-cenik/	production, dealer, joining the company Tepelná technika Praha and other foreign partners today Bosh Termotechnika	
72	JUNKERS	Bosh Termotechnika s.r.o., trade division Junkers, PodVišňovkou 35/1661, 140 00 Praha 4	420 261 300 461 / 420 261 300 516	junkres.cz@bosh.com	http://www.junkers.cz/vyrobky/solarni-systemy/detaily/	distributer, installer, consultancy	
73	REFLEX CZ s.r.o.	Administrative uilfing PREFA, Průmyslová 5, 180 00 Praha 10 - Štěrboholy	420 272 090 311 / 420 272 090 308	reflex@reflexcz.cz	http://www.reflexcz.cz/	Ltd., agent of the producer factory Reflex Winkelmann BmbH (Ahlen, Germany) - distributors Brno, Trutnov	

No	Name	Address	Telephone/Fax	E-mail	website	Services	Origin of solar collectors:
74	REGULUS spol. s r.o.	Do Koutů 1897/3, 143 00 Praha 4 - slovenská pobočka Pešov	241764506, obch.odd.: 241 762 726 / 241 763 976	regulus@regulus.cz; obchod@regulus.cz	http://www.regulus.cz/	Ltd., producer, distributer, installer, educational trainings	
75	T.W.I	Vrbno pod Pradědem, část Mnichov			http://www.twisro.cz/CZ_Solary/CZ_solarni_systemy_FF_768.htm		
76	Viessmann	dealership in CR: Chrášťany 189, 252 19 Rudná/ Slavonínská 61A, 779 00 Olomouc	Prague +420 257 090 900/ Olomouc +420 585 411 834 / Prague +420 257 950 306/ Olomouc +420 585 418 848	viessmann@viessmann.cz	www.viessmann.cz/cs	educational trainings for installers and services	
77	VIPS Solar	Na Bělidle 1135, 460 06 Liberec 6	420485108041, 485 103 186 / 420485133307, 485 102 004		www.vipsgas.cz	focused on boilers - partners such as Immergas etc. , maybe producer	
78	Apex Euro	Rokycanova 12, 615 00 Brno - pobočka Praha - Boloňská 307, 109 00 Praha 10	Brno: +420 548 214 695/ 724 131 303 - Praha: +420 274 771 309/+420 739 201 723 / Brno +420548214696/ Praha +420 274 771 309	apexeuro@apexeuro.cz / Praha: hlous@apexeuro.cz	http://www.apexeuro.cz/certifikaty.php	Ltd., delivery, installation; exclusive agent Teufel & Swarz company for Czech and Slovak Republic; unification of product brand TiSun in 2006 and exclusive agent for the Eastern Europe	
79	ACE SOLAR	Rybova 17, 278 01 Kralupy nad Vltavou	420 327 323 120 / 420327323120	info@acesolar.cz; acesolar@acesolar.cz		Ltd. - project, delivery, installation, service	

No	Name	Address	Telephone/Fax	E-mail	website	Services	Origin of solar collectors:
80	Svoboda a spol., v.o.s.	Vrchlického 1230, 500 02 Hradec Králové	+420 495 752/ +420 777 240 363 / 420 495 531 751	svobodaaspol@seznam.cz	http://www.svobodaaspol.cz/		
81	SANY s.r.o.	Rožmitálská 163, 261 02 Příbram Vi	tel/fax: +420 318 637 480	info@sany.cz	www.sany.cz	Ltd., solar systems, PV, heat pumps, plumber and heating eng., etc.	
82	SOLAR Systems	Na SLunci 592, 250 64 Hovorčovice/ Prague Office Beranových 65, 199 00 Praha 9 letňany			http://www.solarsystems.cz/	Ltd., consultancy, projects, donation adviser, installation, delivery, service; RES - solar systems, PV, heat pumps, UR panels, financial consultancy	
83	Instalsolar	Petr Ducháček, Severní 1020 Brno-Modřice	420 722 562 001	info@instalsolar.cz	www.instalsolar.cz	e-shop	

Annex B: List of major legislative documents

List of major legislative documents in Czech Republic

- Energy Management Act (406/2001 Coll.), amended by the Act 177/2006 Coll., this amendment implemented the requirements of EPBD into the national legislation
- Act of January 2001, the new Energy Management Act and related Decrees established a basic legal framework for promotion of the energy efficiency
- Directive on energy audits and other regulatory directives (213/2001 Coll., 148/2007 Coll. Etc.)
- Energy Act (458/2000 Coll.) 670 Act of 30 December 2004, changing the Act 458 Act of 28th November 2000 on Business Conditions and Public Administration in the Energy Sectors and on Amendment to Other Laws (the "Energy Act")¨
- Act on support of the use of renewable sources of energy (Act No. 180/2005 Coll.)

Annex C: List of major educational establishments, energy NGOs, associations, institutions

LIST OF EDUCATIONAL ESTABLISHMENTS (Source:[www.czse.cz, www.vyssiodborneskoly.com, individual internet research])

name	description	address	telephone/fax	email	web
Czech Technical University	Faculty of electrical technology, electrical technology department	Technická 2, 166 27 Praha 6 - Dejvice	tel +420 224 353 477	wolfp1@fel.cvut.cz	http://www.fel.cvut.cz/vv/tymy/fotovoltaika.html
	Faculty of building, department of building construction	Thákurova 7, 166 29 Praha 6 - Dejvice	tel +420 224 354 682/ fax +420 233 339 987	marek.zenka@fsv.cvut.cz	http://kps.fsv.cvut.cz/
	Faculty of mechanical engineering	Technická 4, 166 07 Praha 6 - Dejvice	tel +420 224 352 880/ fax +420 233 331 261	Jiri.Zapotocky@fs.cvut.cz	http://www3.fs.cvut.cz/web/
	Department (Institution) of environment engineering	Technická 4, 166 07 Praha 6 - Dejvice	tel +420 224 352 481/ fax +420 224 355 606	broz@fsid.cvut.cz	http://www3.fs.cvut.cz/web/index.php?id=u12107
	SOLab - solar laboratory	Technická 4, 166 07 Praha 6	tel +420 224 352 482/ fax +420 224 355 607	tomas.matuska@fs.cvut.cz	http://solab.fs.cvut.cz/
Technical University Liberec	Faculty of mechanical engineering, department of power engineering equipment	Studentská 2, 461 17 Liberec 1	tel +420 485 353 411/ fax +420 485 353 644	pavel.peukert@tul.cz	http://www.kez.tul.cz/web/hlavni/hlavni.php?co=okatedre&typ=uvod&lang=cz
	LOZE Lab - Laboratory of renewable resources				http://www.kez.vslib.cz/web/hlavni/hlavni.php?co=laborator&lang=cz
University of Technology Brno	The Faculty of Electrical Engineering and Communication	Údolní 53, 602 00 Brno	tel +420 541 146 191/ fax +420 541 146 147	kazelle@feec.vutbr.cz	http://www.feec.vutbr.cz/fakulta/home.php.cz?net=ext
	Department of Electrical Power Engineering	Technická 2848/8, 616 00 Brno	tel +420 541 149 231/ fax +420 541 149 246	toman@feec.vutbr.cz	http://www.ueen.feec.vutbr.cz/cz/index.html
	Faculty of Mechanical Engineering				http://www.fme.vutbr.cz/
	Energy Institute - Department of Thermodynamics and Environmental Engineering		tel +420 541 143 271/ fax +420 541 143 365	jicha@fme.vutbr.cz	http://www.fme.vutbr.cz/ustav.html?ustav=13300&lang=0

	Energy Institute - Department of Power Engineering		tel +420 541 142 574	fiedler@fme.vutbr.cz	http://www.fme.vutbr.cz/ustav.html?ustav=13300
	Institute of process and environmental engineering		tel +420 541 142 367	dvorak.r@fme.vutbr.cz	http://www.upei.fme.vutbr.cz/cs/index/
Technical University of Ostrava	Faculty of mechanical engineering, RES energy department	17. listopadu 15, 708 33 Ostrava-Poruba	tel +420 596 915 315/ fax +420 596 918 308	jaroslav.kaminsky@vsb.cz	http://www.vsb.cz/ke
	Research Energy Centre TU Ostrava	Studentská 1, Ostrava-Poruba	tel +420 597 323 846	michal.zidek@vsb.cz	http://profily.vsb.cz/?ou=740
The University of West Bohemia in Pilsner	Faculty of mechanical engineering	Univerzitní 22, 306 14 Plzeň	tel +420 377 638 100/ fax +420 377 638 102	polansky@kke.zcu.cz	http://www.fel.zcu.cz/
	Faculty of Electrical Engineering	Univerzitní 22, 306 14 Plzeň	tel +420 377 638 134/ fax +420 377 638 102	konasp@kke.zcu.cz	http://www.kke.zcu.cz/
Secondary training college (educational establishment) of electrotechnics		Vejprnická 56, 318 02 Plzeň	tel +420 377 308 100/ fax +420 377 387 464	soue@inplus.cz	http://www.souepl.cz/portal
Secondary Vocational Electrotechnical school (The Center of Professional Training)		Zvolenovská 537; 373 41 Hluboká nad Vltavou	tel +420 387 924 201/ fax +420 387 924 289	stanek@sosehl.cz	http://www.sosehl.cz/rs_cz/index.php
Secondary School - The Center of Professional Training in Technology and Economics		Poděbradská 1/179; 190 00 Praha 9	tel. +420 266 039 035/ fax +420 266 038 988	lezal@copth.cz	http://www.copth.cz/information.htm
College and Secondary industry school Varnsdorf		Mariánská 1100; 407 47 Varnsdorf	tel +420412 315 023/ fax +420 412 372 174	info@vosvdf.cz	www.vosvdf.cz
Secondary Electrotechnics school of Ostrava		Na Jízdárně 30/423, 702 00 Ostrava 2	tel +420 596 621 691/ fax +420 596 633 687	tom.fuhrer@seznam.cz	http://www.iss-najizdarne.cz/
Secondary Energetic and Building school		Na Průhoně 4800, 430 11 Chomutov	tel +420 474 629 954/ fax +420 474 626 057	mares@issecv.cz	http://www.issecv.cz/
Integrated secondary school of Sokolnice		Sokolnice 496, 664 52 Sokolnice	tel +420 544 224 634/ fax +420 544 224 631	zivotsky@iss-sokolnice.cz	http://www.iss-sokolnice.cz/
Secondary Vocational school and training centre		Hradební 1029, 500 03 Hradec Králové	tel +420 495 511 518/ fax +420 495 511 518	machek@hradebni.cz	http://www.hradebni.cz/
Secondary Vocational school and training centre of Dubno		Dubno 100, 261 01 Příbram	tel +420 318 679 040/ fax +420 318	reditel@dubno.cz	http://www.dubno.cz/

		679 059		
College and Secondary school of electrotechnics Františka Křižíka	Na Příkopě 16, Praha 1	tel +420 224 210 585/ fax +420 224 094 460	hildebrand@vosaspsekrizik.cz	http://www.vosaspsekrizik.cz/cs/kontakty.ep/
Institute of Thermomechanics AS (Academy of Science) CR	Dolejškova 1402/5, 182 00 Praha 8	tel +420 266 053 022/ fax +420 286 584 695	marsik@it.cas.cz	http://www3.it.cas.cz/index.php?id=uvodni_cz&lang=cz&dept=1
Society of environmental engineering	Novotneho lavka 5, 116 68 Prague	tel +420 221 082 353/ fax +420 221 082 201	stp@stpcr.cz	http://www.stpcr.cz/?page=en,
Engineering Test Institute	head of department - product certification Brno	tel +420 541 120 111/ fax +420 541 211 225	szu@szutest.cz	http://www.szutest.cz/nabidka-sluzeb/zkusebny-brno/mechanickych-zarizeni/
Engineering Test Institute	head of department - product certification Jablonec n.N.	tel +420 483 348 111/ fax +420 483 710 768	info@szutest.cz	http://www.szutest.cz/nabidka-sluzeb/zkusebny-jablonec-nad-nisou/zkusebna-spotrebniho-zbozi/

LIST OF NGO´S AND ORGANIZATIONS INTERESTED IN RES (Source: [http://www.managenergy.net/actors/A2339.htm, individual internet research])

name	type	description	contact	Web
Eurosolar.cz	civil association	Czech solar info server - national section of the European RES Association	Truhlářská 11 110 00 Praha1; tel +420 222 314 564 info@eusolar.cz; chairman Milan Smrž - milan.smrz@eurosolar.cz	http://www.eurosolar.cz/
Centre Veronica Hostětín		educational centre, demonstration projects, trainings, conferences; professional courses	ZO ČSOP Veronica | Centrum Veronica Hostětín; Hostětín 86 | CZ 687 71 Bojkovice; tel. +420 572 641 855, +420 572 630 670; fax +420 572 630 413; hostetin@veronica.cz | www.hostetin.veronica.cz; Panská 9 | CZ 602 00 Brno; tel. +420 542 422 750; veronica@veronica.cz | www.veronica.cz	http://hostetin.veronica.cz/programy.php?id=energie&at=200
Information Centre of RES-ISOZE	information centre	research projects, more focused in biomass - The Information Centre (ISOZE) started its work in 1996. At present it is an operative part of the Department of Phytoenergy of RILOG (Silva Tarouca Research Institute for Landscape and Ornametal Gardening) in Pruhonice, Czech Republic.	VUKOZ - RILOG, 252 43 Pruhonice; ph: +420-296 528 267/+420-2-96 528 327, Fx: +420-2-677 50 440, weger@vukoz.cz, havlickova@vukoz.cz	http://www.vukoz.cz/vuoz/biomass.nsf/pages/a.html
League of ecological Alternatives - LEA	civil association	Solar league project, currently focused preferably in solar energy	Chlumova 17, 130 00 Praha 3; +420 222 782 315/ +420 606 453 892; lea@ecn.cz	http://lea.ecn.cz/
State Environmental Fund - SFŽP	state company	state funding	Kaplanova 1931/1, 148 00 Praha 11 Chodov, tel +420 267 994 300/ fax +420 272 936 597	http://www.sfzp.cz/
Seven - The Energy efficiency Center	general beneficial corporation	private consultancy and project company; protect environment and support economic development by encouraging the more efficient use of energy, helps with directing energy agencies, seminars, conferences; project EKIS	Americká 17, 120 56 Praha 2; tel +420 224 252 115/fax: +420 224 247 597; seven@svn.cz	http://www.svn.cz/cz/aktivity.htm

Engineering Test Institute	Ltd.	one of the greatest accredited test and certification bodies in the Czech Republic. The Institute is oriented on its customers, their needs and problems connected with overcoming of technical trade barriers. We offer you services as Notified Body 1015 of the European Community and as Authorized Body 202 of the Czech Republic	Headquarters: STROJIRENSKY ZKUSEBNI USTAV, s.p. Hudcova 56b, 621 00 BRNO tel: +420 541 120 111/ fax: +420 541 211 225 szu@szutest.cz; Branch Jablonec nad Nisou: STROJIRENSKY ZKUSEBNI USTAV, s.p., Tovarni 5, 466 21 JABLONEC nad Nisou; tel: +420 483 348 111/ fax +420 483 710 768; info@szutest.cz	http://www.szutest.cz/
Energy Benefit o.p.s.	general beneficial corporation	Centre for consultancy and education: energy savings, utilization of RES, EU and state donation	Energy Benefit Centre o.p.s.; Stavitelská 6; 160 00 Praha 6; tel.: 233 081 148; kontakt@energy-benefit.cz	http://www.energy-benefit.cz/
EnergyConsulting o.s.	NGO - civil association	to improve and enhance the energy savings, RES utilization - to disseminate the information and to offer the professional consultancy; Interests: energy audits etc. , CEERES - not focused strictly to RES and thermal energy	Alešova 21, České Budějovice 370 01; tel: +420 386 351778, info@e-c.cz; chairman (energy auditor) Ing. Roman Šubrt +420 777 196 154 roman@e-c.cz	http://www.e-c.cz/index.php?page=onas
CIRC - Czech Innovation Relay Centre		under the Technological Centre of Academy of Science, established 1997 - TC AS member of IRC (international transfer of innovative technologies)	postal address: TC AV CR - Rozvojová 135, 165 02 Praha 6, workplace: Ve Struhách 26, Praha 6; head of project CIRC - Ing. Eva Kudrnová +420 234 06 134, kudrnova@tc.cz, alternative energy Ing.Bc. Ondřej Šimek simek@tc.cz	http://www.circ.cz/alternativni-energetika-detail/?id=133&referer=
Association of companies for utilization of energy sources SPVEZ	civil association	under Ministry of Home Affairs, to protect the interests of the enterprises in the RES sector - the organizational body is the Agency for heat conservation	Na Mlejnku 2/781, 147 00 Praha 4; tel: +420 244 467 062/+420 244 468 129, fax+420 244 463 687; info@spvez.cz	http://www.spvez.cz/
CZREA - Czech RE Agency	NGO, civil association	public service for RES enhancement, member of : ISES (International Solar Energy Society), AEM (Association of Energy Managers), Zelený kruh (platform of NNO), The European Technical Platform for photovoltaic Platform of Business sector for Foreign Development Cooperation	Prague Office - Vinohradech, Czech RE Agency, o.p.s. Americká 17, 120 00 Praha 2, Tel: +420 222 512 764; Fax:+420 222 512 774; info@czrea.org	www.czrea.cz

Energy Centre České Budějovice	civil association	Consultancy Centre focusing in The South Bohemian Region - efficient energy utilization and raising the portion of RES in energy consumption - enhancing the public awareness and interests	Energy Centre České Budějovice; Nám. Přemysla Otakara II. 87/25; 370 01 České Budějovice; Telefon: 387 312 580; Fax: 387 312 581; E-mail: eccb@eccb.cz	http://www.eccb.cz/index.php?sk1=21&sk2=0&sk3=0&interni=
The Czech Association of Energy Sector Employers	independent voluntary org.	voluntary and independent organization of employers and entrepreneurs with common interest in the field of power generation, transmission and distribution, heat generation and distribution, power and heat trading, and other entities operating in the power and heat sectors, as well as high schools and universities specializing in this area, established in 1991; negotiation with trade unions, members of both chambers of Parliament, central government and regional authorities, influence the economic and social policies	Partyzánská 7, 170 00 Praha 7; tel +420 266 753 585/ +420 266 753 586/ fax: +420 266 753 579; czse@czse.cz	www.csze.cz
Solar and ozone laboratory Hradec Králové		under the Czech Hydro meteorological Institute	Hvězdárna 456, 500 08 Hradec Králové 8, tel: +420 495 260 352/ fax: +420 495 264 127; obshk@chmi.cz	http://www.chmi.cz/meteo/ozon/hk.html
KV BIO	civil association	conservation, dissemination of RES in Karlovarsko region		www.kv-bio.cz
Association for Environment Techniques	NGO	established 1990, it incorporates the professionals from the sector of building techniques and environment engineering - projects, education, implementation, research&development, experience etc.	Novotného lávka 5, 116 68 Praha 1; Ing. Petr Mádr, Iva Baťová - stp@stpcr.cz, tel: +420 221 082 353/ +420 221 082 201	http://www.stpcr.cz/
Energy Agency Vysočina z. s.p.o.	NGO	established in 2001 with the support of SAVE programme, energy and waste management n the Vysočina Region - coordination of energy programmes and projects with the aim of effective energy planning, preparation of waste management projects - cooperation with other institutions, organizations and enterprises	Jiráskova 65, 586 01 Jihlava; tel: +420 567 303 322/fax: +420 567 303 033; eav@eavysociny.cz	http://www.eav.cz/

Regional Energy Agency Brno (KEA) s.r.o.	Ltd.	activities connected with the Energy Acts and the donations, funding systems	Šámalova 48, 615 00 Brno, tel: +420 545 222 602/fax: +420 548 212 583; kuklinkova@keabrno.cz, kabes@keabrno.cz	http://www.keabrno.cz/
South Bohemia Regional Energy Agency		established in 2003, in the accordance with the State Programme for supporting the energy savings, under the Regional Office for the energy sector as the professional institution; activities for public sector - support of projects improving the environment, economical efficiency - information and motivation activities, expert consultancy	SEVEn, o.p.s. +420 387 718 204/fax: +420 386350 370, kea@svn.cz	http://www.keajc.cz/
Energy agency of the Zlin region o.p.s.	general beneficial corporation	public service: energy consultancy, dissemination of a good practice examples, analytical and conceptual work, energy projects - initiation and design, support of energy management of the municipalities, international cooperation	Ing.Miroslava Knotková, ředitelka 577 043 940, miroslava.knotkova@eazk.cz	http://www.eazk.cz/?language=cs+en
			Ing. Hana Buršíková,energetik 577 043 943, hana.bursikova@eazk.cz	
Moravian-Silesian Regional Energy Agency			contacts not available	
REC o.p.s. Valasske Mezirici - Regional Energy Centre	NGO	established in 1999, educational and information activities - energy savings, RES, energy audits	Vsetínská 78,757 01 Valašské Meziříčí;732 381 428, rec@regec.cz	http://www.regec.cz/
			Libor Lenza, project manager 777 696 694 libor.lenza@regec.cz	
Regional Energy Agency of the Usti Region Northern Bohemia Municipalities Association	general beneficial corporation	independent section of Association of the North Bohemian municipalities - continuing the work of regional energy agency (2002/3)	Velká Hradební 48, 400 01 Ústí nad Labem; +420 475 657 500, kea@seso.cz	http://www.seso.cz/kea/
			Ing.Petr Honskus, ředitel +420 606 686 997; honskus@spfgroup.org	
			Ing.Jaroslav Kreuz, project manager +420 776 245 307; jaroslav.kreuz@centrum.cz	
ZESO The Energy Association of West Bohemian Municipalities	general beneficial corporation		Divadelní 105/3, CZ 301 21 Plzeň, +420 378 035 951; Erich Benes, chairman of the Board; prochazkova@mmp.plzen-city.cz	www.zeso.cz (not working)

Czech Association of Scientific and Technical Societies	civil association	established in 1990, voluntary organization - 69 independent scientific and technical Societies, altogether 200 000 individual members - organizing and holding international conferences, seminars, educational and professional activities, professional branches etc.	CSVTS - Novotného lávka 5, 116 68 Prague 1; president Doc.Ing. Daniel Hanus, CSc.EURING. +420 224 097 183 hanus@csvts.cz	www.csvts.cz
Czech Energy Community			tel +420 221 082 398/ fax +420 221 082 393; Ing. Karel Nanauer cenes@csvts.cz	www.csvts.cz/cenes
Czechoslovak Association for solar energy (ČSSE)	national ISES	in preparation stage to be renewed		
Research Institute of building constructions - the certified company Ltd.	Ltd.	continuing the tradition from 1982 - certification and standards	Pražská 810/8, 102 21 Praha 10 Hostivař; tel:271751148, fax: 281 017 241; ao227@vups.cz	www.vups.cz
ENKI o.p.s.	Ltd.	partners in universities, agencies, associations ; projects, research	Dukelská 145, 379 01 Třeboň; tel 420384706117/ fax 420384724346 - director RNDr. Jan Pokorný, CSc. (solar energy) - pokorny@enki.cz; jirka@enki.cz	www.enki.cz
CALLA - Association for Preservation of the Environment	civil association	eco-consulting, Atlas of renewables	Postal address: P.O. BOX 223, 370 04 České Budějovice, Czech Republic; Office address: Fráni Šrámka 35, České Budějovice, Czech Republic; Phone, fax, answering machine: + 420 387 310 166 / phone : + 420 387 311 381; E-mail: calla@calla.cz	www.calla.cz
HNUTÍ DUHA - Friends of the Earth Czech Republic	civil association	ecological solutions, projects, research, publishing, consultancy, e-shop	Bratislavská 31, 602 00 Brno; tel +420 545 214 431/fax +420 214 429; info@hnutiduha.cz	www.hnutiduha.cz
Ekowatt		Centre for RES, energy savings - information dissemination, educational publishing, seminars, education	Švábky 2, 180 00 Praha 8, tel: +420 266 710 247/ fax: +420 266 710 248, info@ekowatt.cz/ Žižkova 1, 370 01 České Budějovice, tel: +420 389 211; cb@ekowatt.cz	
WISE Brno - Energy info-service		consultancy and information server	Chytálky 24, Újezd u Tišnova, 594 55 Dolní Loučky, info@wisebrno.cz	http://wisebrno.cz/index.php?p=dokumenty&rub=15

Info system CEDR - Central Evidence of donation from state fund				http://cedr.mfcr.cz/cedr3i_internet_407/default.aspx?ico=506494
ARES- Administrative Register of Economical Subjects				http://wwwinfo.mfcr.cz/ares/ares.html.cz
Register of Economical Subject - CSU (Czech Statistical Office)				http://www.czso.cz/csu/redakce.nsf/i/registr_ekonomickych_subjektu
TZB info		technical building equipment - environment engineering; information disseminations - seminars, statistics, trade, calculation, trends and news in energy sector		www.tzb-info.cz
EPIA - European Photovoltaic Industry Association				
The accredited laboratories under Group CEZ				