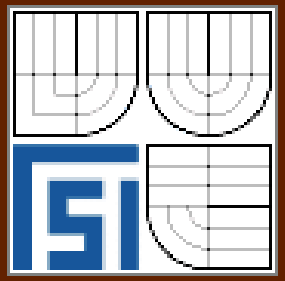

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ALTERNATIVE SOURCES OF ENERGY IN THE CZECH ENERGY MIX

SOURCES ALTERNATIVES DANS LE MIX ENERGETIQUE TCHEQUE

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Introduction – Czech energy strategy:

Long-term Czech energy strategy has been defined in the State Energy Policy (SEP) adopted in 2004, updated in 2009. The outlined strategy is compatible with those of other EU member countries and promotes implementation of EU directives focused on:

a) Energy efficiency (Directive 2004/8/EC on the promotion of cogeneration, Regulation (EC) No. 2422/2001 of the European Parliament and of the Council on Energy Star),

b) Renewable energy sources utilization (Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market);

c) Use of alternative fuels in transportation (Directive 2003/30/EC of the European Parliament and the Council on the promotion of the use of biofuels or other renewable fuels in transport).

SEP envisages a growth to a 13 per cent share of energy generated from renewable energy sources (RES) by 2010, to 17 per cent by 2030 and to as much as 23 per cent by 2050.

Power production in the CR:

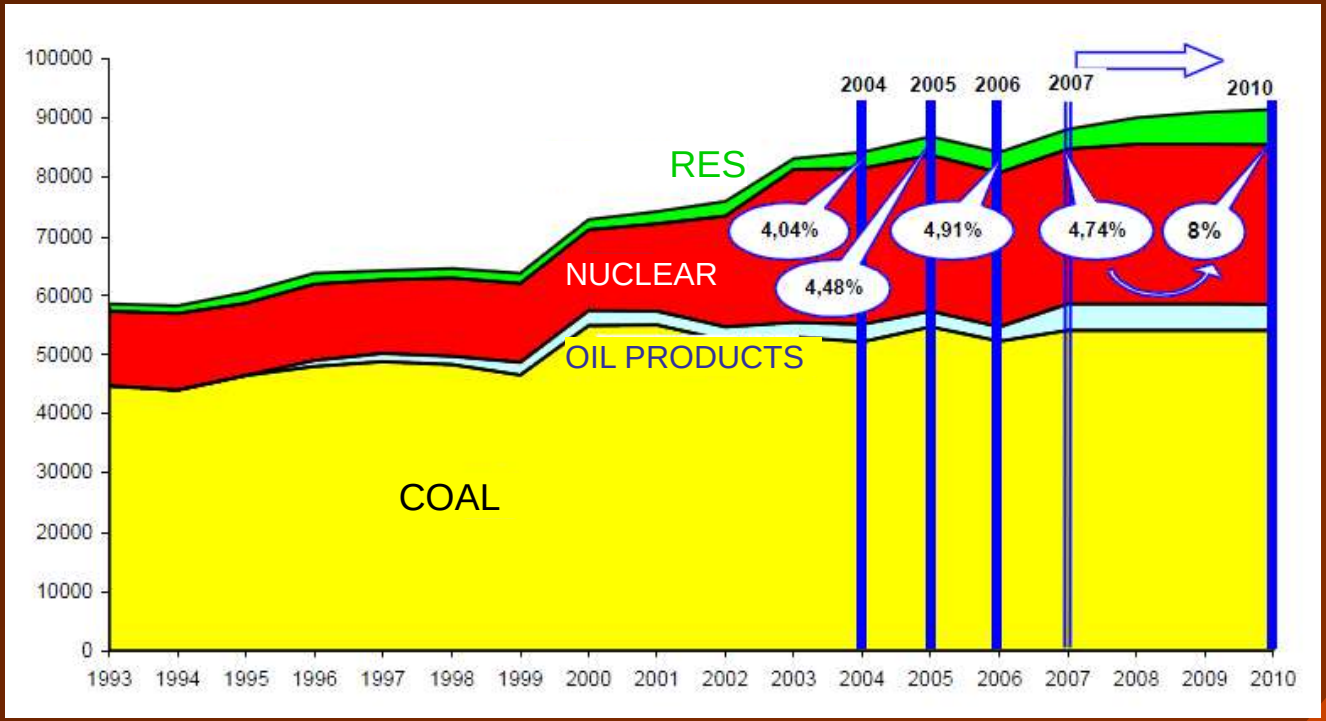


Figure Power production in the CR by sources from 1993 till 2007 with trajectory till 2010
Graphique Sources de l'énergie produite en Rép.ue tchèque en 1993-2007 avec prévision jusqu'à 2010

Aim for 2010 - 8 per cent share of energy from RES- will not be accomplished.

SEP envisages a growth to a 13 per cent share of energy generated from RES by 2020, to 17 per cent by 2030 and to as much as 23 per cent by 2050.

Czech Electricity Generation by RES:

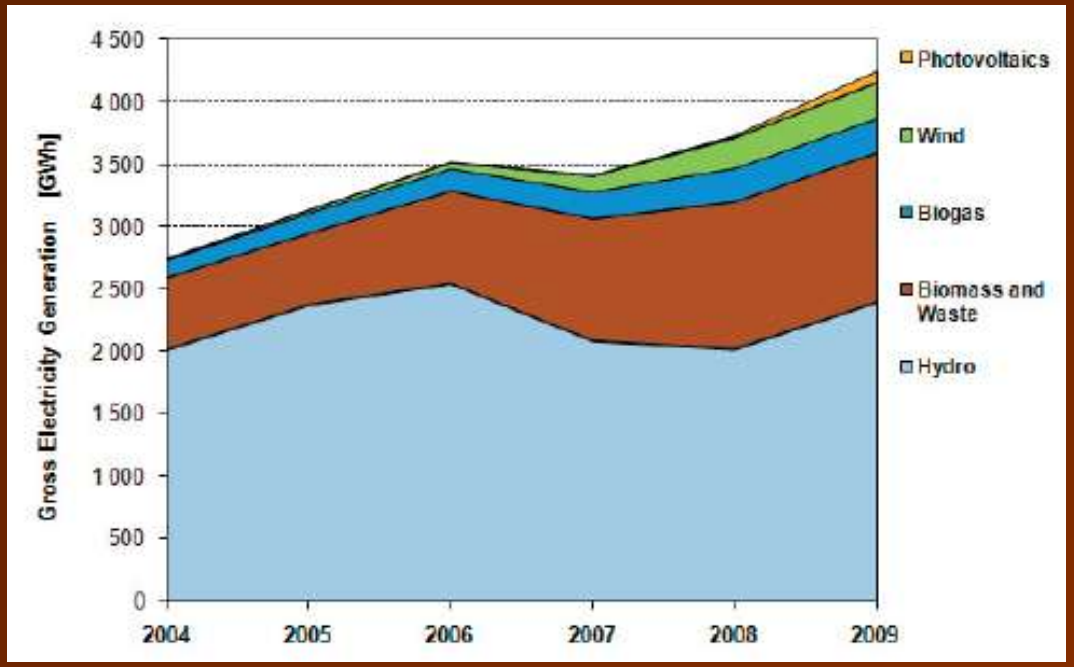


Figure Czech Electricity Generation from Renewable Energy Sources
Data source: www.wec.cz

Instal output of fotovoltaic plants		
	Number of plants	Output
	-	MWe
2005	12	0.15
2006	28	0.35
2007	249	3.4
2008	1475	65.8
2009	6032	462
August 1st 2010	9600	621

Data source: www.eru.cz

Geographic and climatic conditions determine the use of individual forms of renewable energy. The greatest energy potential in the CR is that of biomass.

Potencial of wind and hydro energy was almost accomplished.

Progressive expansion of fotovoltaic plants has taken place in the CR since 2008.

Microcogeneration:

• The highest growth potential in the structure of the Czech energy mix based on RES is that of biomass and waste:

- undisputed benefit of biomass is its ability to accumulate solar energy;
- biomass cultivation has impact on landscape shaping and promotes agricultural production.

- It is necessary to process these fuels by cogeneration technologies so that the use is financially efficient.

- Power generation in cogeneration based on biomass and waste creates heat which is hard to utilize. It is therefore advantageous to build small output units:

-these units are built near fuel sources;

- these units are beneficial due to fuel transport costs, which, at greater distances, may negatively affect operational cost-effectiveness of these units.

- The research activities of the Brno University of Technology have focused on research of these units.

Cogeneration with Gasification:

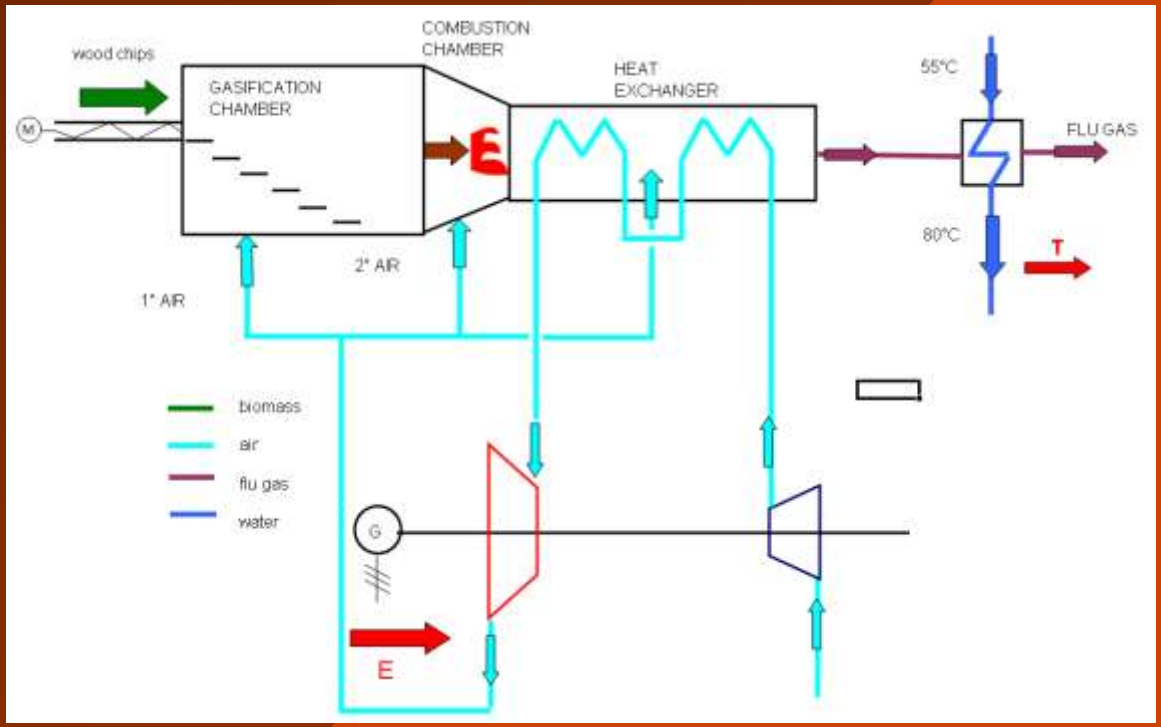
- From 2000 BUT has been dealing with the development of gasification.
- Starting from 2008, BUT has been taking part in project development dealing with the design and manufacture of a prototype of a conceptually new cogeneration unit.
- Design consists of a gasifier, combustion chamber, exchanger and single-shaft turbo-set.

Designed energy output of the system: 75 -300 kWe.

A great benefit of the turbo-set:

positive impact on its lifecycle.

A pilot unit will be built by 2010, and tested at wood chips and a selected municipal waste landfill.



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Research of Stirling engine:

• the development of a small Stirling engine was in progress between 2002 and 2005 and was brought to a close by assembling a prototype with output of 6 kWe. Working gas was – helium, fuel – natural gas

– a considerable advantage of Stirling engine in contrast with other low-power heat engines: a very simple design, has no valves and therefore its operation is much quieter and reliable

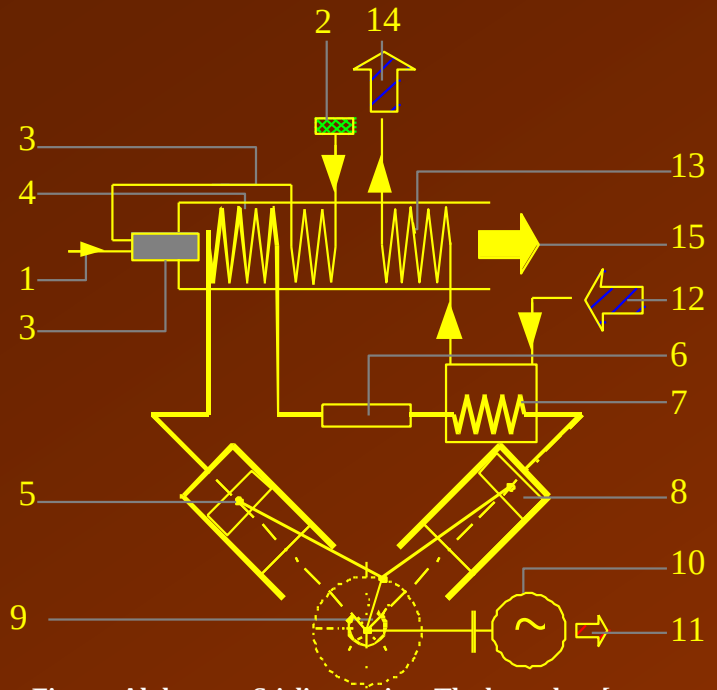

Figure Alpha type Stirling engine: The heat chart[

1 fuel, 2 air filter, 3preheated air, 4 heater, 5 hot- end piston, 6 regenerator, 7cooler, 8 cool-end piston, 9 crankshaft, 10 rotating generator, 11 power, 12cool water, 13heat exchanger fuel gas/water, 14 hot water, 15 chilled flue gas.

• a prototype of a single-cylinder steam engine with output of 10 - 30 kW was built in co-operation with industrial partners.

-the engine runs on saturated steam

- pressures range from 0.5 to 1.3 MPa.

- it operates on low-power heat with temperature ranging from 150°C to 200°C.

- overall efficiency of power generation is from 10 to 15 %.

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Summary:

• The present paper sums up the situation in the area of energy production in the Czech Republic with focus on expectations of development in the years to come.

•The second part discusses main areas of research carried out at the Energy Institute, FME BUT, in the area of micro-cogeneration:

- research into the technologies of gasification
- research into the development of micro-cogeneration engines, the steam and the Stirling ones.

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