

# DEVELOPMENT OF ENERGY SOURCES IN INDUSTRIAL AND MUNICIPAL SECTOR ACCORDINGLY TO REGIONAL ENERGY POLICY OF CZECH REPUBLIC

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Special section Energy Devices and Technologies (EZT) together with the Regional Office of the Association of Energy Managers (AEM) for South Moravia (RK AEM JM) have arranged already in 2002 two seminars focused on current state and forthcoming perspective of development of medium and smaller energy sources in Czech Republic (Prague, April 4th 2002) and on the problematic of implementation of fluid combustion technologies in small sources (Brno, June 6th 2002). The seminar „Re-construction and Repairs of Energy Sources in the Czech Republic“ is being prepared in autumn.

In the Czech Republic, a large share of heat sources utilizes classic fossil fuels. Brown energy coal is more utilized, less utilized is black coal. Utilization of biomass for energetic purposes is still quite low. But the same situation is in other countries as well. A rapid growth of electricity production is presented by gas turbine combined cycle and pure coal energies (Fig.1).

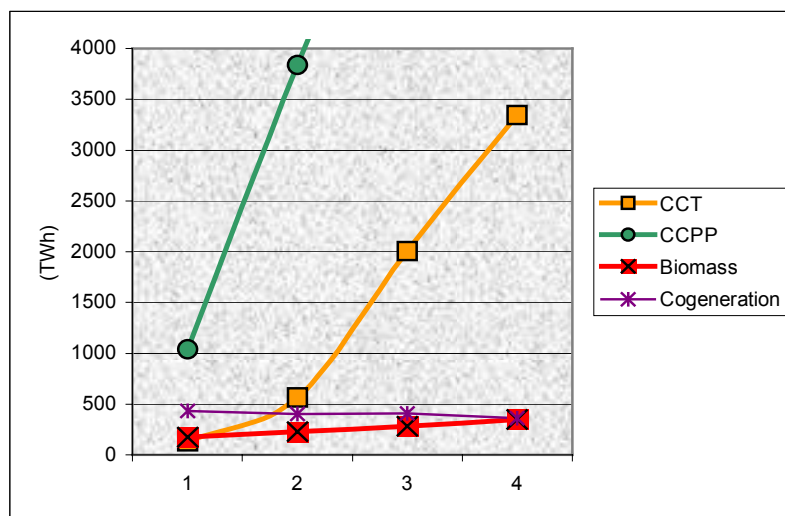


Fig.1 – Forecast of electricity production from World clean and efficient technologies.

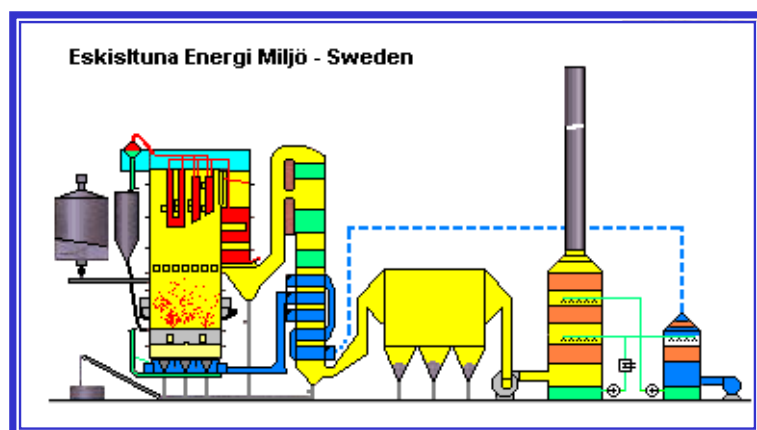
Until renovation and a construction of new heat sources in the Czech Republic from independent producers, it will be necessary to count fluid technologies to secure requested strict limits for harmful substances in combustion products. It will be necessary to increase also a share of energetic utilization of biomass in individual combustion process or in a combination of fluid combustion and biomass.

Interesting conclusions for applied fluid technologies of individual producers in steam and hot water boilers result from AEM seminar.

<b>Fortum Engineering: BioMAC – solid fluid layer (inert, Finland)</b>			
Hot water boiler	15 – 45 MW <sub>t</sub>	Steam	Calorific capacity
Steam boiler	25 – 100 MW <sub>t</sub>	5-9 MPa/450-510°C	5–20 MJ/kg
<b>Alstom Power: FI CIRC – bubbling fluid layer (USA)</b>			
Steam boiler	10 – 280 t/h	3,8-14 MPa/430-540°C	
<b>LURGI-SES: Fluid boiler (FK) with circulating fluid layer (SR)</b>			
125 t/h		9,6 MPa/540°C	12–30 MJ/kg

Another part of contributions was related to a possibility of combustion of biomass in fluid boilers. The lectures have been in all cases supplemented by experimental short-time as well as long-time tests in electricity company ČEZ, a.s. EHO and ČEZ, a.s. ETI (FK 1). Fluid boilers proved to be a suitable device for additional combustion. Up to the heat input circa 10%, no larger boiler adjustments are necessary and next investments are related on the fields of revenue, storage and transport of alternative fuel.

Boilers with fluid focus of lower outputs will be more suitable for additional combustion of alternative fuels adjusted from separated wastes. When additional



combustion is up to 10% of the boiler output, the relation of investment and operation costs is more suitable for smaller boilers than for boilers of high outputs.

Currently, a price of fillets is problematic in the Czech

Republic. The price related to a price of fuel (lignite) is two or two and half times higher. A problem arises there, how to find a supplier of separated fillet in reasonable price.

Specialists compare merits of classic grate boiler and a boiler with fluid layer. They mostly recommend applying the fluid one.

Municipal and industrial wastes mostly end in landfills. An objective is to minimize the amount of wastes in landfills. In accordance with VŠB-TU, the wastes production is 4500 kt/r in the Czech Republic. Along with recycling the paper, plastic, wastes for composting, circa 3000 kt of wastes is still available to be energetically utilized. Except for combusting the wastes in incinerators in a way of additional combustion in existing boilers, it's possible to use an additional combustion of alternative fuel adjusted from separate wastes together with coal.

Renewable sources and their development in the Czech Republic don't develop in accordance with visions of EU, as was stated by a representative of ČEZ, a.s. Also a look at results (February 2001) from the field of wind power stations is pretty poor. There was installed 8.22 MW capacity of wind power stations in the Czech Republic, out of which 5.85 MW was restrained or dismantled because of technical or economic reasons.

Very good, efficient and ecology asset to the field of smaller energy sources was a realization of the project CZT Děčín, where the coal source was replaced by a new cogeneration source utilizing the gas combusting engines, heat pumps and with utilization of geothermal drill hole in an area, where the source is located (in operation since 1998).

Already realized project of DH in Bystřice nad Pernštejnem shows us, how it is possible to utilize combustions of biomass and to supply the town inhabitants with heat.

For isolated zones and requests for backing up make the construction of container energy sources for combined heat and power production possible. Following a statement of PolyComp, a.s. company, it's possible to equip these container sources by a steam anti-pressure turbine from 100 kW as well as steam engines with electric output 20-120 kW. Big advantage of these units is a possible insular operation of the whole centre.

Cogeneration units with PSM are the most usual ones in the Czech Republic. Small cogeneration is offered in an output range from 22kW up to 5 MW. Following an opinion of a representative of TEDOM s.r.o. company, there is already installed 80 MW capacities of cogeneration with PSM. In last few years, cogeneration is being extended by a trigeneration unit (cogeneration unit is completed by an absorption heat converter, which enables a cool production – a tool of ventilation).

In February 2001, MTH Kolín, s.r.o. company has realized the first cogeneration unit in the Czech Republic with combustion micro-turbine with electric output 28 kW and heat output 60 kW<sub>t</sub> (in water with temperature 80/60°C). The producer of the turbine is an American company Capstone Turbine Corporation. Locality: Boiler room Jahodiště a side of Českého Brodu.

The first Czech company – PBS Velká Bíteš, a.s., enters the market with a cogeneration unit with combustion micro-turbine TE 100G with 100 kW of electric output.

Programs of biomass combustion are in the West European countries subvented by the state most of all because the price for an electric work unit is higher than in processing the classic fossil fuels.

State subvention is usual also in the area of municipal waste combustion, when the turbine works as an electric source for consumption of your own. Then the production of the electricity is much cheaper than to buy it from the network and this leads to much higher economic efficiency of the incinerator operation.

To keep energy units – cogeneration units with PSM and OZ, it is recommended to increase the purchasing prices of electricity. It is necessary to cover the increase from created state fund, which would be subvented by so called green cent. If we want the cogeneration unit to survive, a breakeven point in height of 1,50 Kč/kWh is set there.

For investments into cogeneration it is crucial, their payback period is in accordance with current criterion in 6, maximally 8 years horizon. For economic assessment, so-called breakeven point is implemented. For existing cogeneration units in conditions of the Czech Republic with output up to 1 MW, price of heat 350 Kč/GJ and 6000 yearly operation hours, the purchasing price should be circa 1,50 Kč/kWh along with requested investment pay-back period of 8 years.

For those sources, which were in operation, was the deregulation dated on January 2002 a step towards a change of tariff policy for purchase of electricity. Although the price resolution ERÚ No.1/2002 warrants a minimal price of electricity from cogeneration sources, it can also be a sign of decrease of average purchasing price in comparison with 2001 (liquidation of daily tariff zones and thereby also expedient supplies to the network in the top and high tariffs).

A look at the assessment of economic efficiency of energy projects:

- assessment from the aspect of operational efficiency – with utilization of many of operational-economic parameters
- assessment from the aspect of financial management of the project and a business plan
- economic assessment from the aspect of investment decision making process.

Preferring the smaller energy sources in the projects, which will enable to achieve good economic results:

In fossil fuels:

- use for covering the own electricity consumption with utilization of heat for domestic water and hot domestic water (in all objects of the state, municipal as well as private sector, where the year-long consumption of electricity and heat is requested).
- complex supplying the flats by energies (DH schemes for existing as well as new flat building).

In biogas, biomass:

- use of energy units with selling the part of electricity production to the network (waste water treatment plant, landfills for the waste, biogas stations).

Literature:

1. Energetické zdroje malých a středních výkonů v ČR, sborník semináře sekce EZT AEM, Praha-9.4.2002
  2. Aplikace fluidních technologií spalování v malých energetických zdrojích, sborník semináře RK AEM JM a sekce EZT, Brno. 20.6.2002.
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