

# SECOND CHAPNET NETWORK CONFERENCE

## COGENERATION IN CEE

**Ryszard Krochmalski**

**EPC Poland**

**Brussels, November 9th 2004**

## COGENERATION IN CEE

### Contents:

- 1. New EU Member States**
- 2. CEE activity in CHAPNET**
- 3. Cogeneration in Poland**
- 4. Cogeneration in Estonia**
- 5. Cogeneration in Slovakia**
- 6. Cogeneration in Slovenia**
- 7. General remarks and conclusions**

## COGENERATION IN CEE

### NEW EU MEMBERS from CEE

On 1<sup>st</sup> May 2004 10 countries joined the EU : Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Slovenia, Cyprus and Malta.

8 countries from Central and Eastern Europe - significant industrial and economic reforms, and restructuring

Several EU policies and directives - a driving force for the development of efficient power generation technologies – February 2004 CHP Directive

3

## COGENERATION IN CEE

### CEE - New Members of EU

- large potential to develop cogeneration
- major political and economic reforms
- industry restructuring and privatization
- specific legislative and regulatory policies
- each country - unique socioeconomic context, variation in the transition process and different privatization schemes
- energy and environment sectors require a significant capital investment in energy sector to comply with EU energy and environmental directives

4

## COGENERATION IN CEE



### CEE activity in CHAPNET

**EPC S.A., Poland - partner and coordinator of CEE Countries activity in project CHAPNET.**

**Members :**

**EPHA, Estonia – the Estonian Power and Heat Association,**

**SENES, Slovakia– Slovak Energy Agency,**

**Institute Josef Stefan, Slovenia – Energy Efficiency Center.**

5

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN CEE



**Exchange of information: CHAPNET activities, administrative issues, research and some data**

**Data base of research, education and industrial centers as well as of experts active in cogeneration area**

**Progress Reports - activity, current state of the country cogeneration sector, legal condition, statistical data and forecasts**

**International and internal conferences – information distribution about CHAPNET: Poland- Kazimierz – REE, Nałęczów – REC, Slovakia – Komarno, Ukraina - Lwów**

6

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN CEE - POLAND

Several big professional CHP plants (each having above 50 MW capacity) and several smaller CHP plants having overall electrical capacity around 5000 Mwe.

177 industrial cogeneration plants (autoproducers) have overall electrical capacity around 2600 MW. 15 have capacity above 50 MW, around 90 are in the division from 5 to 50 MW.

New group of independent CHP plants 300 MW of electrical capacity.

7

## COGENERATION IN CEE – POLAND 2002

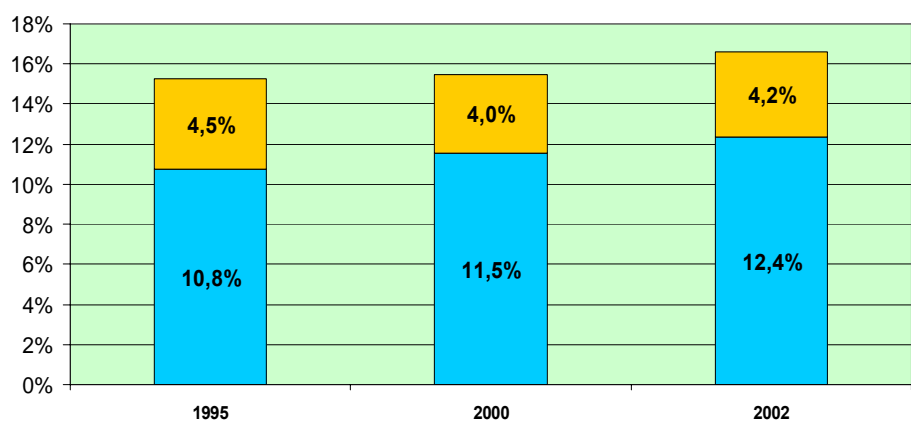
	CHP Plants numbers	Capacity MWe	Production GWh
Professional CHP	36	5 010	17 572
- Independent CHP	19	287	534
Industrial CHP	177	2 665	6 040
<b>Total cogeneration</b>	<b>232</b>	<b>7 952</b>	<b>24 046</b>

8

## COGENERATION IN CEE – POLAND 2002



Share [%] of electrical energy production in cogeneration in total production in Poland '2002 – Blue - Prof..CHP.  
Yellow- Industr.CHP



9

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN POLAND



*Obligation to purchase the energy produced in cogeneration '2003*

**The new Ordinance of the Minister of Economy July 2003 replaced Ordinance from 15 December 2000 and:**

↗ increased threshold of overall efficiency from **65% to 70%** since 2004

↗ obligation of purchase is fulfilled if the share of electricity produced in cogeneration in the all yearly sales by energy distribution company to its customers is not less then **12,4%** in 2003 and 2004 and in the next years is increasing till **16%** in 2010

10

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN POLAND

**In case the CHP plant does not meet the requirement to get the overall efficiency ( $\eta_{sk}$ ) of 70% the obligation to purchase electrical energy does not work, and the pricing of electrical energy follows basing on the cost algorithm (the price is equal to the total of specific fixed cost and variable cost of production)**

11

## COGENERATION IN POLAND

**In Poland there are conditions for further development of cogeneration**

**The share of cogenerated energy based on gas increased during last four years**

**Cogeneration is going to diverse fuels and use the renewables and gas from landfill sites**

**The dispersed generation, based on microturbines, gas turbines and engines is in phase of development and has big potential in future**

**New Polish regulation should encourage producers to increase efficiency of energy production**

12

## COGENERATION IN ESTONIA

The share of CHP heat in total heat production is 30%. During years 1998-2001 electricity produced in Estonia by cogeneration constituted 12-14 % of total produced electricity.

There are big CHP stations: Balti, Iru, Kohtla-Järve and Ahtme, where the total electrical capacity is 460 MW. The Eesti Energia owns these stations, therefore there are no problems related to the sales of the produced electricity to the grid. Heat consumers are the DH-networks and industry. The problem is the small heat consumption in the summer periods.

13

## COGENERATION IN ESTONIA

In Estonia there are also some small local CHP stations. The total electrical capacity is 28 MW. As the CHP stations are working on the base load of the electrical system, the optimal total electrical capacity of CHP-s should not exceed 700 MW. So in the Estonian electricity market there would be space for new CHP-s with the total electrical capacity approximately 150 – 200 MW.

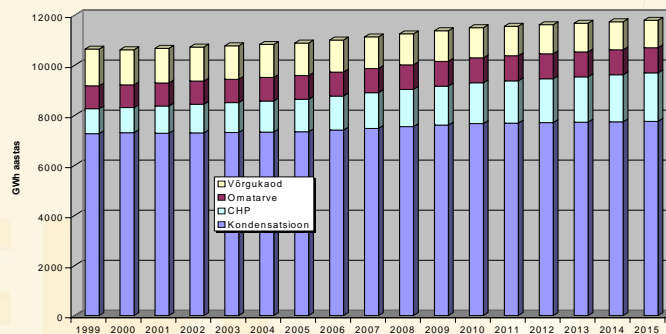
The potential for introducing CHP is primarily related to physical locations where there is an already existing DH network, and/or next to large industrial sites, which have a demand for heat and electricity.

14

## COGENERATION IN ESTONIA



**Scenario (future trends) for electricity production, station's self consumption and network losses until 2015, prepared by the Estonian Energy Research Institute**



15

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN ESTONIA



**There are some restrictions for development of CHP-s:**

- Restricted or expensive connection to the grid
- Complex process for getting the license to produce energy
- The tax system (fuels and pollution) which does not estimate the high efficiencies of CHP stations

The Energy Act does not make any major stipulations regarding co-generation of heat and electricity. There is only an indirect provision, which concerns smaller CHP plants up to 10 MW - *right to sell electric power directly to user*

16

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN SLOVAKIA



Cogeneration technologies of all types represent the share of power production in rate around 16,5%. The most part of that is represented by conventional steam heat and power plants, which are installed in industry and district heating systems. Estimated number of them is around 50. Total installed capacity accounts 8300 MWt and 778 MWe.

The next type of cogeneration is represented by gas turbine combined cycle plants. Up to this time there were installed projects on 5 sites with total installed capacity 260 MWe and 262 MWt. Next projects of GTCC are planned but construction is delayed for financial reasons.

17

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN SLOVAKIA



Cogeneration of small and mid scale outputs is represented by around 80 completed projects equipped by cogeneration units with internal combustion. Total installed capacity of them is over 15 MWe and 20 MWt. In this category of cogeneration the units manufactured by Czech company TEDOM are largely used. Very good experience was achieved by product TEDOM 22, implemented in hotels, public buildings and hospitals. Relation between power and thermal outputs (20 kWe, 30 kWt) gives good conditions for autonomous operation.

18

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN SLOVAKIA



In scope of project TECS (or Cogen future) in 2001 the analysis of the next development in Slovakia there were elaborated. In accordance to this analysis the technical potential of cogeneration expansion at level 1500 MWe was estimated. However, after taking into consideration the economic criterion, price and tariff policy, market conditions etc., that value was reduced to level 690 MWe.

There is no obligation to purchase electricity from cogeneration. There is however, an obligation to purchase electricity and heat from renewable energy sources.

19

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN SLOVAKIA



The figures of market potential indicate chances of implementation from point of global view following

- 1000 – 2000 cogeneration units of small scale outputs
- 80 – 100 gas turbines of small or medium outputs.

expansion of centralized system (large power station blocs and next transformer and transmission system) will be too expensive. At present in Slovakia there are unfavourable conditions for this.

- At current transition period from government side must be reinforced all promotional incentives for projects of energy efficiency.

20

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN SLOVENIA



The share of electric power produced by cogeneration in Slovenia is currently 8 %. The total number of installed cogeneration plants is 40 and the total number of cogeneration units exceeds 50.

The total installed capacity of decentralised cogeneration is 220 Mwe. The installed capacity of cogeneration in the district heating systems is 117 Mwe, they generate about 900 GWh, of which industrial cogeneration plants accounted for 400 GWh.

21

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN SLOVENIA



The development of cogeneration was noticeable in the last five years. In that time a number of new gas turbines and gas engines in district heating, industrial and commercial sector was installed.

- 4 installation of gas engines in industry with capacities of 1,9 MWe,
- 3 installation of gas turbines and gas engines for district heating with capacities of 15 MWe,
- 6 installation of gas engines in commercial sector (including land fill gas) with capacities of 4,5 MWe.

22

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN SLOVENIA



The electricity distribution systems operators are obliged to buy all the electricity from cogeneration units. The Government sets the price for electricity from cogeneration in district heating systems and also from small industrial cogeneration (under 1 MWe).

Estimates of the potential of cogeneration in Slovenia agree that the overall potential for new capacity is about 600 MWe

23

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN SLOVENIA



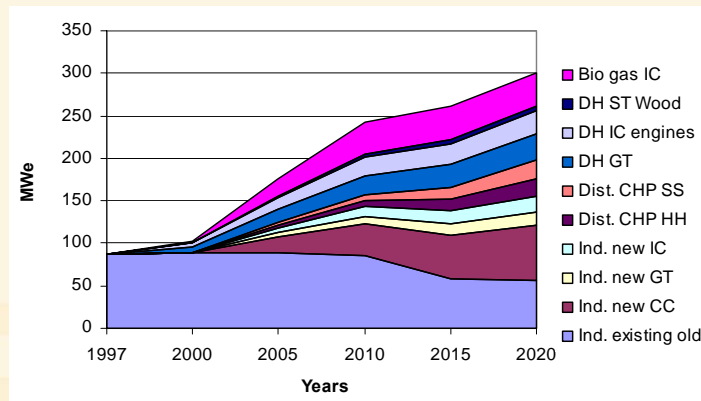
The technical potential for small-scale cogeneration e.g. in public buildings still needs to be assessed.

There are numerous small-scale opportunities and even a few major projects that are under preparation, notably a 100 or 200 MWe CHP plant project for district heating in Ljubljana.

24

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN SLOVENIA



25

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN SLOVENIA



**Cogeneration and district heating are well-established industries in Slovenia. Cogeneration is promoting by subsidising of 50% of feasibility studies total costs by government.**

**Potential for new gas fired cogeneration due to expansion of the natural gas networks.**

**Potential for some new district heating schemes in areas not serviced by the gas network.**

26

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN CEE



### General remarks and conclusions

Increased use of cogeneration important part of package of measures to comply with Kyoto Protocol

An analysis of the national potential for the application of high efficiency cogeneration including high-efficiency micro-cogeneration (types of fuels, technologies, construction, modernization etc.) - timeframes 2010, 2015, 2020 with cost estimates

Separate analysis of barriers to cogeneration

27

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN CEE



Measures taken to ensure the reliability of the guarantee system – origin of electricity produced from high-efficiency cogeneration can be guaranteed

Public support schemes for promoting cogeneration - existing and future units - based on economically justifiable demand for heat and cooling

The need for stable economical and administrative environment for investment in new cogeneration installations

28

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN CEE



**Facilitate access to the grid system of electricity produced from high efficiency cogeneration from small scale and micro cogeneration units**

**Evaluate the existing legislative and regulatory framework applicable to high-efficiency cogeneration units**

**Transposition - Bring into force the laws, regulations and administrative provisions necessary to comply with CHP Directive (not later than 21.02.2006)**

29

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

## COGENERATION IN CEE



**CEE countries - different state, conditions and some variations regarding fuels and technologies used by cogeneration**

**Comparatively high potential for future cogeneration development.**

**Potential of research, scientific and education centres**

**Cogeneration equipment producers - representatives**

**Continuation of Project CHAPNET**

**-many possibilities for cooperation**

**-implementation of CHP Directive requirements**

30

Prelegent: Ryszard Krochmalski, tel. (48-22) 3213-163, e-mail: r.krochmalski@epc.pl, www.epc.pl

Thank you for your attention



*many ideas*  
**one solution**