

What is small-scale CHP?

There are many different definitions of small-scale CHP. Small-scale CHP units are run both as heating appliances, providing space heating and warm water in residential or commercial buildings like conventional boilers, and in industries that require heat for their processes. Unlike a boiler, small-scale CHP generates electricity together with the heat at very high efficiencies and therefore helps to save fuel, cut greenhouse gas emissions and reduce electricity costs. The European Cogeneration Directive defines small-scale CHP as all units with an electrical capacity of less than 1 MW. This factsheet will focus on units in this size range. These can be used to provide heating and electricity to district heating schemes, apartment buildings, commercial buildings and small industries. These products are already available commercially.

The COGEN Challenge project

The goal of the COGEN Challenge project is to facilitate the development of a significant number of small-scale and micro cogeneration projects in European cities and towns, as well as in residential areas and industries. COGEN Challenge has developed a broad range of support tools and structures to facilitate small-scale cogeneration projects. Through these, the project will build local capacity to successfully develop small-scale cogeneration projects. Regional facilitators will also offer guidance and help small-scale CHP investment projects materialise.

Country information



Poland covers over 312,000 square kilometres of mainly lowlands and holds a population of about 38.6 million people. Annual GDP growth in 2004 was 5.4 %, with industry accounting for 31.3 % of the total GDP. Main industries are machine building, iron and steel, coal mining, chemicals, shipbuilding, food processing, glass, beverages and textiles.

In 2003 over 21 % of the total electricity production in Poland was contributed by CHP. The biggest share among cogeneration systems was represented by commercial CHP plants with 7,800 MWe of installed capacity and almost 15 % of all produced electricity. It is estimated that 70 %

of the urban population receives space-heat from individual DH networks. Installed capacity of industrial CHP was estimated to be around 2,600 MWe with 8.1 TWh of produced electricity. The smallest share, 0.95 %, belonged to the autonomous CHP plants. Small and micro scale CHP plants started to be implemented in nineties. Their total installed capacity is assessed to be about 8 MWe.

Market Potential & Environmental Benefits

Polish CHP Association estimates that approximately 40 % of Poland's electricity could be derived from CHP. With full access to the power markets possible for small, independent generators, new regulatory context appears favourable in this respect. Furthermore, the increasing availability of natural gas is expected to support the growth of CHP as well, notably through gas turbine systems. There is also a very high potential for modernisation and/or replacement of old turbines. The most promising application fields for small and micro scale CHP are waste water plants and landfill sites, but there are no estimations on market potential available. In new residential planned areas, there is interest in small-scale biomass CHP schemes with local authorities investigating these systems as a way to increase sustainability.

Best Practice Example

A small town of Hel lies at the very end of the 35 kilometres long sand-bar peninsula separating Bay of Puck from the open Baltic Sea. Hosting a yacht marina town is a popular tourist destination.

In 2003 16 residential buildings were equipped with heat pumps for central heating and solar panels for

production of domestic hot water. Electricity, used for the operation of heat pumps, is produced in the CHP plant made up of 3 blocks consisting of gas engines with cooling water and flue gas heat exchangers. The total capacity of the CHP system is 469 kWe and 768 kWt.

Main contractual, technical and administrative requirements

With high investment and maintenance costs, low costs of electricity produced from coal, low fees for environment polluting, high prices of natural gas and low state grants for small and micro scale CHP, projects are not cost effective, which makes conditions for the implementation of CHP systems unfavourable.

Financial and regulatory support

Under the terms of the Polish Energy Law, electricity from cogeneration benefits from a purchase obligation if it is generated with at least 70 % overall efficiency.

Electricity distribution companies are obliged to purchase electrical energy from cogeneration and renewable energy sources. The share of electricity produced in CHP in the terms of the share in the annual turnover of a particular energy company is set as a minimum requirement for the purchase of electricity from cogeneration.

Electricity from renewables receives green certificates while electricity from cogeneration plants receives either *red certificates* (all installations with a rated capacity over 1 MWe) or *yellow certificates* (all natural gas-fired installations as well as installations below 1 MWe). The share of each category of certificates that have to be purchased by the distributors increases year upon year. As for CHP, the table below gives the planned evolution of the required shares.

	2007	2008	2009	2010	2011
Yellow certificates (in %)	2.5	2.6	2.8	3.0	3.5
Red certificates (in %)	16.5	17.0	17.5	19.0	19.5

The value of the certificates is indirectly set by the Polish energy regulator through the regulator's ability to set the penalty levels. These levels are set yearly and are in fact a convenient way for the regulator to keep CHP electricity prices at a rather low level (too low to bring about a rapid new wave of investments).

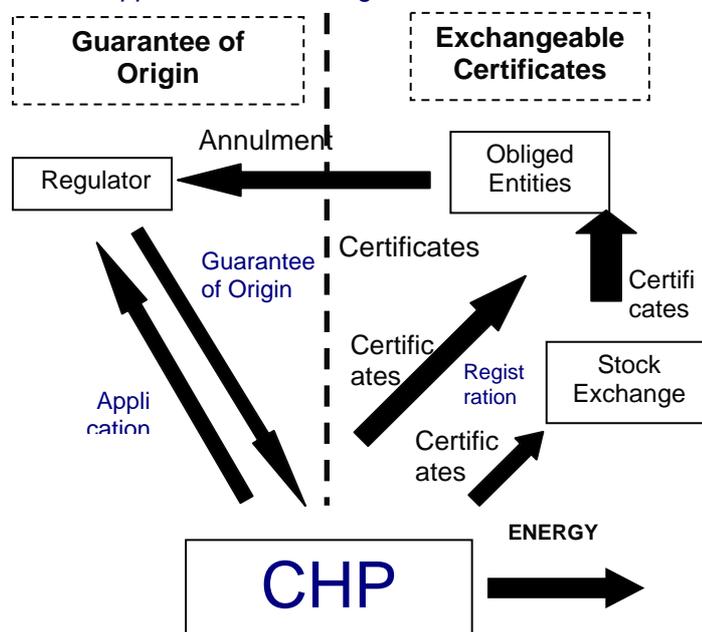
For yellow certificates, the legislation allows the regulator to set the premium at between +15% and +110% of the market price of electricity. For 2007 the regulator set the premium at 90%, or about 117 Zloty /MWh.

For red certificates, the range is of +15% to +40% and the regulator has set the premium at just under 18 Zloty /MWh. In effect this does not translate into additional support for coal-fired CHP electricity as while the current price of cogenerated electricity from coal is 140-142 Zloty, as of July 2007 the "market" price selected by the regulator is 120 Zloty, on top of which the cogeneration producer will get a maximum of 17/18 Zloty. This in effect signifies a price reduction!

There is still debate, even amongst the regulator's office, as to whether a biomass-based cogeneration system could receive both green and yellow/red certificates, despite the clear goal of the European Commission to promote both.

The support mechanisms that can help achieve this goal are among others (and most notably) the support scheme based on exchangeable certificates, which is presented in the picture below.

Polish support scheme for cogeneration:



At the end of the circle the certificates have to be redeemed and a fine has to be paid for each unredeemed certificate.

This system has been in place only for a couple of months and its influence on investments is not visible yet.

Quota obligation and tradeable Certificates of Origin are also used for renewable energy sources. Trading takes place at the Polish Power Exchange.

The price for *green* certificates varies around 238 Zloty per MWh (April 2007) and the maximum compensation for not fulfilling the quota is set at 240 Zloty per MWh. It has been observed that fine levels have direct influence on price levels of certificates.

Prices of the certificates can be found on the Polish Power Exchange: www.polpx.pl

The certificates for renewable energy were given to all hydropower plants. This does not favour biomass as it is only marginal compared to hydropower and the large amount of certificates pushes their price down.

In Poland there are several potential sources of finance for a CHP project, including banks, agencies, funds and similar. Some of the funds are:¹

- The National Fund for Environmental Protection and Water Management (http://www.nfosigw.gov.pl/site/index_en.php), which finances projects in the form of preferential credits, payment loans, remissions, subventions and subsidies;
- ECOFUND (<http://www.ekofundusz.org.pl/us/index.htm>, based on the department-for-environment-swap scheme, providing financial support for projects, which help to attain ecological goals;
- Environmental Protection Bank (http://www.bosbank.pl/i.php?i=!main_en), offering preferential credits and target oriented credits;
- Foundation of Assistance Programmes for Agriculture (<http://www.fapa.com.pl/>), offering financial assistant for economic development of rural areas.

European programmes are also an important potential source of financing in Poland, most notably the structural funds. There are also bilateral funds created with other countries, with many local projects being financed from these sources.²

When it comes to financing cogeneration installations – or for that matter power generation in general – Poland tends to focus primarily on large-scale installations, despite the fact that this kind of financing is harder to attract. In the meantime, small-scale installations with CAPEX under 10 million EUR have in theory little difficulty in attracting funding but do not seem to be appealing to project developers.

Contacts and useful Web links

- ▶ *Baltic Energy Conservation Agency - BAPE* (www.bape.com.pl)
Agency active in the field of energy efficiency and renewable energy sources
- ▶ *COGEN Europe* (www.cogeneurope.eu)
The European Association for the Promotion of Cogeneration
- ▶ *COGEN Challenge Project* (www.cogen-challenge.org)
Available tools and documents:
 - Guide to small-scale CHP
 - Simulation tools

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¹ Kalina, 2003

² Ibidem