Annex to the Notice of the Minister of the Economy of 12 December 2007 (item 12)

PROGRESS REPORT ON INCREASING THE SHARE OF ELECTRICITY GENERATED IN HIGH-EFFICIENCY COGENERATION IN THE OVERALL NATIONAL PRODUCTION OF ELECTRICITY

Contents

1. Introduction

This Progress Report on increasing the share of electricity generated in high-efficiency cogeneration in the overall national production of electricity is complementary to the authorisation contained under Article 9n(1) of the *Energy Act* of 10 April 1997 (Journal of Laws 2006, No 89(625), as amended) in conjunction with Article 9 of the Act of 12 January 2007 on the amendment of the *Energy Act*, the Environment Protection Act and the Compliance Assessment System Act (Journal of Laws No 21(124)).

In the preamble to Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC (OJ L 52 of 21 February 2004, p. 50; OJ Special Polish Edition, Chapter 12(3)(3)) it is stated, among other things, that the potential of combined heat and electricity management as a means of saving energy is at present underused in the Community. Promotion of high-efficiency cogeneration based on a useful heat demand is a Community priority and carries with it potential benefits of cogeneration with regard to saving primary energy, avoiding network losses and reducing emissions, in particular of greenhouse gases.

Effective use of energy through cogeneration may also lead to improved security of energy supply and European Union competitiveness. The EU is extremely dependent on its external energy supplies currently accounting for 50% of requirements and projected to rise to 70% by 2030 if current trends persist. Appropriate steps should be taken in order to guarantee better use of the opportunities offered by cogeneration in the internal energy market. The preamble to Directive 2004/8/EC stresses that the use of cogeneration constitutes a manner of attaining considerable reductions in CO_2 emissions and complying with the Kyoto Protocol.

Furthermore, the preamble introduces the term “high-efficiency cogeneration”, indicating that relative primary energy savings of more than 10% qualify the use of this term for energy obtained through combined production. The general objective of the Directive, among other things, is to establish a harmonised method for the calculation of electricity from cogeneration and necessary guidelines for its implementation, taking into account methodologies such as those currently under development by European standardisation organisations.

Electricity produced in high-efficiency cogeneration is given a guarantee of origin.

Member States must establish an analysis of the potential for application of high-efficiency cogeneration and an analysis of the barriers for the development of combined generation. Progress of Member States in the application of cogeneration potential shall be monitored by the European Commission.

Member States should be encouraged to establish mechanisms necessary to guarantee stable economic and administrative bases which are important for investing in new cogeneration units. Support schemes spanning at least four years are used for this purpose. Combined production support schemes ought to concentrate on promoting cogeneration stemming from the economically justified demand for heat and cooling (useful heat). State aid for cogeneration should be consistent with the provisions of the Community guidelines on

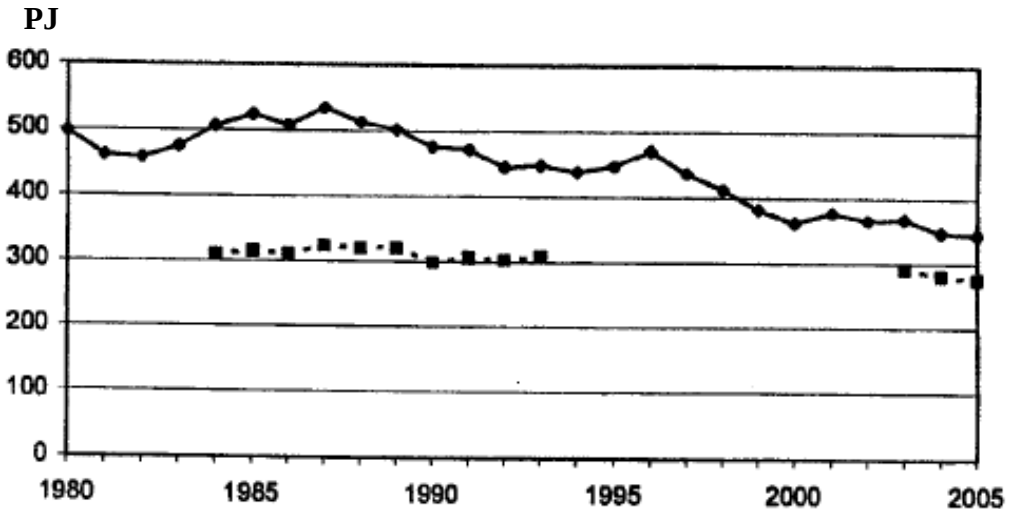
State aid for environmental protection (OJ C 37 of 03 February 2001, p. 3; OJ Special Polish edition, Chapter 8(2)(76)). Furthermore, Member States should ensure that the principle of gradual withdrawal is complied with under public aid systems. The Commission intends to monitor and collect experience gained whilst Member States apply the support schemes.

2. Information on hitherto combined heat and power production

In the Republic of Poland the development of combined heat and power production is primarily connected with the development of heat systems supplying municipal agglomerations with heating and useful hot water. The first such system was built in 1954 in Warsaw. Intensive development of these systems took place in the 1970s. It is estimated that the total length of heating networks in the Republic of Poland is around 18,000 km, with the Warsaw system of 1,550 km being the longest in the European Union. Unfortunately, in many heating systems particularly predestined to using cogeneration, heating is generated in boiler houses. It is these systems which demonstrate the greatest potential for the development of cogeneration. Figure 1[1)] depicts the level of heat production in network systems, combined heat included.

[1)] Historical statistical data used in the Report is taken from studies drawn up by Agencja Rynku Energii S.A. [an energy market agency].

Production of network heating in the Republic of Poland in 1980-2005



Produkcja ciep•a = Heat generation
Produkcja ciep•a w skojarzeniu = Combined heat generation

Fig. 1. The generation of network heat, including combined heat, in 1980-2005; for 1994-2005 there is no presentation of combined heat generation as for this period there is no available data on the level of combined production in industrial sources

The share of combined heat generation in the overall production of network heat grew systematically during the analysed period, which was primarily brought about by the decrease in heat demand.

Up to now two fundamental forms of promoting cogeneration were used i.e. the power industry had the obligation to purchase combined electricity at controlled prices or it had to have at its disposal an officially determined share of combined energy in the volume of electricity for sale.

The first form was used in 2004, in that up to 1989 the obligation to purchase should be treated as stipulated in the light of the planned economy and electricity deficit. Under the purchasing obligation the price of energy was defined in a variety of ways. Up to 1997 the price was official, whilst in the period 1998 – 2004 it was set by the manufacturer and subject to approval by the President of the Energy Regulatory Office [Urz•d Regulacji Energetyki].

Fig. 2 presents the level of combined electricity production in the light of total quantity of generated electricity.

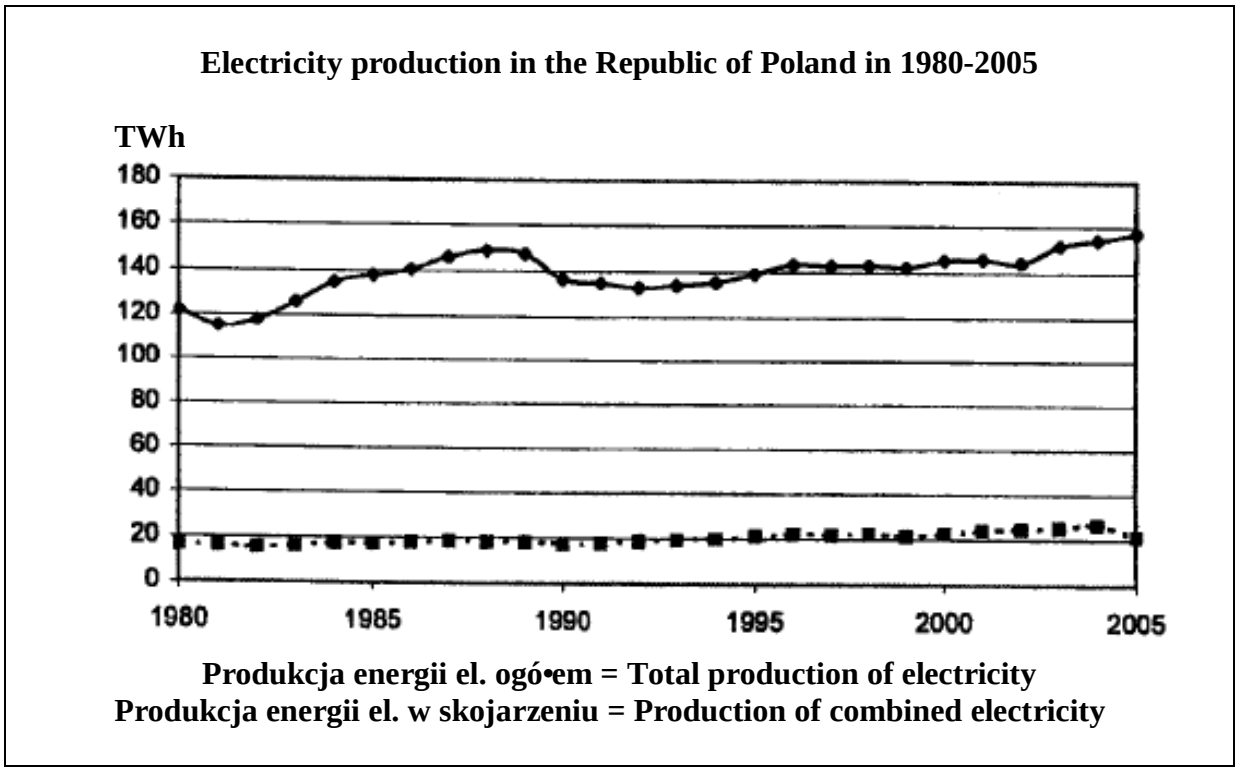


Fig. 2. Electricity production, combined electricity included, in 1980-2005

The systematic increase in the share of combined electricity which commenced in 1990, seemingly decreased in 2005 when the criterion for recognising combined electricity changed – there was an increase in the minimum efficiency of transforming the chemical energy of fuel into electricity and heat jointly from 65% to 70%.

The system of supporting combined sources, operating since 30 June 2007, was based on the obligation to purchase imposed on entities selling electricity to end users. These entities had the obligation to demonstrate that a given percentage of energy supplied by them to end users originated from combined sources. In the event of insufficient supply of combined energy on the market the above entities were exempted from the need to fully comply with the obligation. In this manner the level of obligation was automatically adapted to the changing supply of demand for combined energy on the market, and there was no need for these entities to bear the costs of e.g. substitute fees. Energy generated in sources whose overall efficiency was at least 70% was subject to the obligation to purchase.

The energy purchase price under this obligation was indirectly set by the President of the Energy Regulatory Office who, each year in the process of approving tariffs for distribution entities, determined the justified cost of purchase of combined electricity by these entities. Usually, the cost level of meeting the purchase obligation, approved by the President of the Energy Regulatory Office, exceeded forecast competitive market prices by a dozen or so zlotys.

The energy purchase price under this obligation was next negotiated under bi-lateral agreements. The average price under these agreements did not exceed the ex ante level determined by the President of the Energy Regulatory Office.

Access of combined sources to the transmission network is privileged. Electricity grid operators have an obligation to accept combined power. Furthermore, they must guarantee that this power has priority of transmission.

3. Implementation of Directive 2004/8/EC into the Polish legal system

On 12 January 2007 the Parliament of the Republic of Poland passed an Act on the *amendment of the Energy Act, the Environment Protection Act and the Compliance Assessment System Act*. This Act regulates the implementation of Directive 2004/8/EC. The Act came into force on 24 February 2007. The regulations introducing the new system of supporting high-efficiency cogeneration came into being on 1 July 2007; their purpose, in keeping with the Directive, is to promote cogeneration and to create beneficial conditions for the development of combined production in the Republic of Poland.

In the amended *Energy Act* there is a range of provisions which organise matters relating to cogeneration. Article 3, in keeping with the Directive, contains definitions of basic concepts referring to cogeneration, useful heat in cogeneration, the level of barrier values and high-efficiency cogeneration.

In keeping with Directive requirements the Act introduces a system of certification for high-efficiency cogeneration power. All producers with the appropriate licence and who have submitted an application and met the required formal and gauge requirements have the right to receive a certificate of origin from cogeneration, confirming the production of a given

quantity of high-efficiency power. The entity responsible for issuing certificates of origin is the President of the Energy Regulatory Office. Certificates of energy are obligatory for entities wishing to avail themselves of the new support system, binding from 1 July 2007.

The built-in control mechanisms mean that the requirements on precision, reliability and resistance of the system to corruption will be met.

The producer, after generating high-efficiency power, applies to the President of the Energy Regulatory Office for a certificate of origin for this power. Applications should refer to power generated during one or a number of consecutive months of a given calendar year. The quantity of produced high-efficiency cogeneration power during the year is calculated on the basis of planned average annual efficiency of transforming the chemical energy of fuel into electricity and heat. Each time that an application is submitted requesting the issue of a certificate of origin the production of a given volume of high-efficiency cogeneration power is approved by the corresponding electricity grid operator. Following the close of the given calendar year the producer must submit to the President of the Energy Regulatory Office a report on production during the year. In the calculations of the annual report, consideration is given to the real attained efficiency transformation of fuel energy into heat and power. Annual reports are verified by independent and competent units, accredited by the Polish Centre for Accreditation (Polskie Centrum Akredytacji). On the basis of the annual reports there is verification of the number of certificates of origin issued to a given producer (obligatory cancellation of part of the certificates of origin or issue of additional certificates). Irregularities appearing in the applications requesting a certificate of origin shall be penalised.

Entities which apply to the President of the Energy Regulatory Office requesting the issue of certificates of origin for power generated in 2007 must attach to the first application an opinion issued by an accredited unit, confirming ability and probable level of production of high-efficiency cogeneration power in 2007.

All high-efficiency cogeneration power comes under the new support system. Certificates of origin issued for this power carry with them the obligation to purchase. The obligation to purchase certificates was imposed on entities selling energy to end users. Each year undertakings must purchase a given number of certificates of origin, in proportion to the amount of power supplied to end users. This obligation may also be met through substitute fees.

Certificates of origin are issued separately for two groups of sources:
- fired with gaseous fuels or with total installed electrical capacity below 1 MW,
- remaining sources.

Each type of certificate contains a separate range of purchase obligations and a different level of substitute fee. The level of the substitute fee will be determined each year by the President of the Energy Regulatory Office in keeping with the Act as follows: 15%-110% of the average price of power on the competitive market for small and gaseous sources and 15%-40% of that price for remaining cogeneration sources.

Under the new system supporting cogeneration sources the hitherto binding obligation to purchase combined power has been withdrawn. Preferences for access to the electricity grid have been maintained.

In keeping with the approved amendment the new support system will remain in force until 31 March 2013.

In keeping with the *Energy Act* revenue from substitute fees, financial penalties will be paid into the account of the National Environmental Protection and Water Management Fund (Narodowy Fundusz Ochrony •rodowiska i Gospodarki Wodnej) and earmarked exclusively for supporting renewable sources of energy or high-efficiency cogeneration.

The entries of the above Act have been specified in the Regulation of the Minister of the Economy of 26 September 2007 relating to the manner of calculating data expressed in the application requesting the issue of a certificate of origin from cogeneration and the detailed scope of obligations of obtaining and presenting for cancellation of these certificates, the payments of substitute fees and the obligation to approve data on the amount of power produced through high-efficiency cogeneration (Journal of Laws No 185(1314)), which was preceded by the Regulation of the Minister of the Economy and Labour of 9 December 2004 relating to the detailed scope of obligations to purchase combined electrical power generated with heat (Journal of Laws No 267(2657)). The provisions of the Regulation implement the Guidelines for implementing Directive 2004/8/EC, as well as Commission Decision No 2007/74/EC of 21 December 2006 establishing harmonised efficiency reference values for separate production of electricity and heat in application of Directive 2004/8/EC of the European Parliament and of the Council (OJ L 32 of 6 February 2007, p. 183).

4. Total forecast cogeneration potential and the conditions of combined economic development in the Republic of Poland

4.1. Forecast demand for heat and electricity

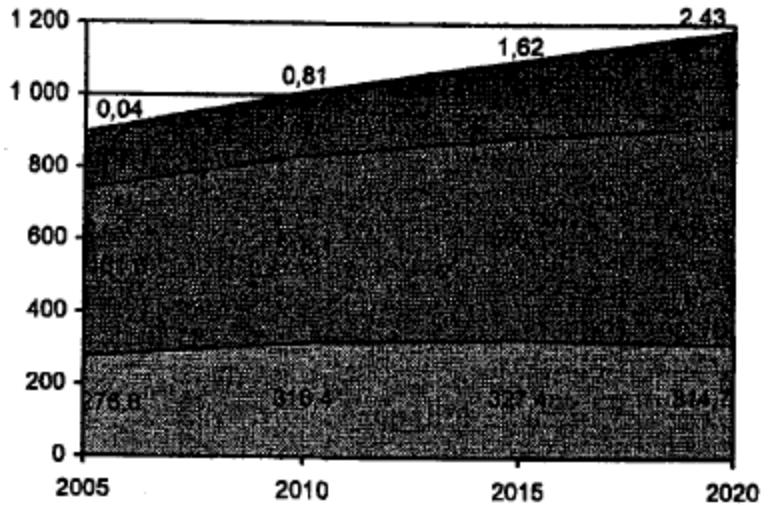
In accordance with Directive 2004/8/EC the potential for the development of cogeneration is connected with the level of demand for useful heat and cooling. Three research methods were used to draw up a demand forecast for heat:

- analysis (macroeconomic forecast) using macroeconomic models on the development of the power industry throughout the country,
- questionnaires directed to heat producers and users,
- comparative analysis, checking development tendencies in the Republic of Poland, including energy consumption of industry and identical demand indicators for various forms of energy, in comparison to other European Union countries.

The results of the forecast are presented in fig. 3. These results depict basic user trends i.e. industry, construction and agriculture, households, services and the generation of cooling.

Forecast demand for heat according to user trends in 2005-2020

PJ



Wytwarzanie ch•odu = Generation of cooling
Us•ugi = Services
Gosp. Domowe = Households
Przemys•, budownictwo o rolnictwo = Industry, construction and agriculture
NB. For percentage values change commas for points e.g. 0,04 = 0.04

Fig. 3. Forecast demand for heat in industry, construction and agriculture, households, services and the secondary generation of cooling

The forecast also defines the structure of generating heat assuming that there is continuation of earlier trends and State policy towards heat and power producers. Heat demand may be covered by centralised sources (network heat) and local sources. Concerning heat generated in centralised sources producers were divided into a number of categories, primarily heat and power plants and thermal power stations (boiler houses). The forecast for production in local and centralised sources is presented in fig. 4.

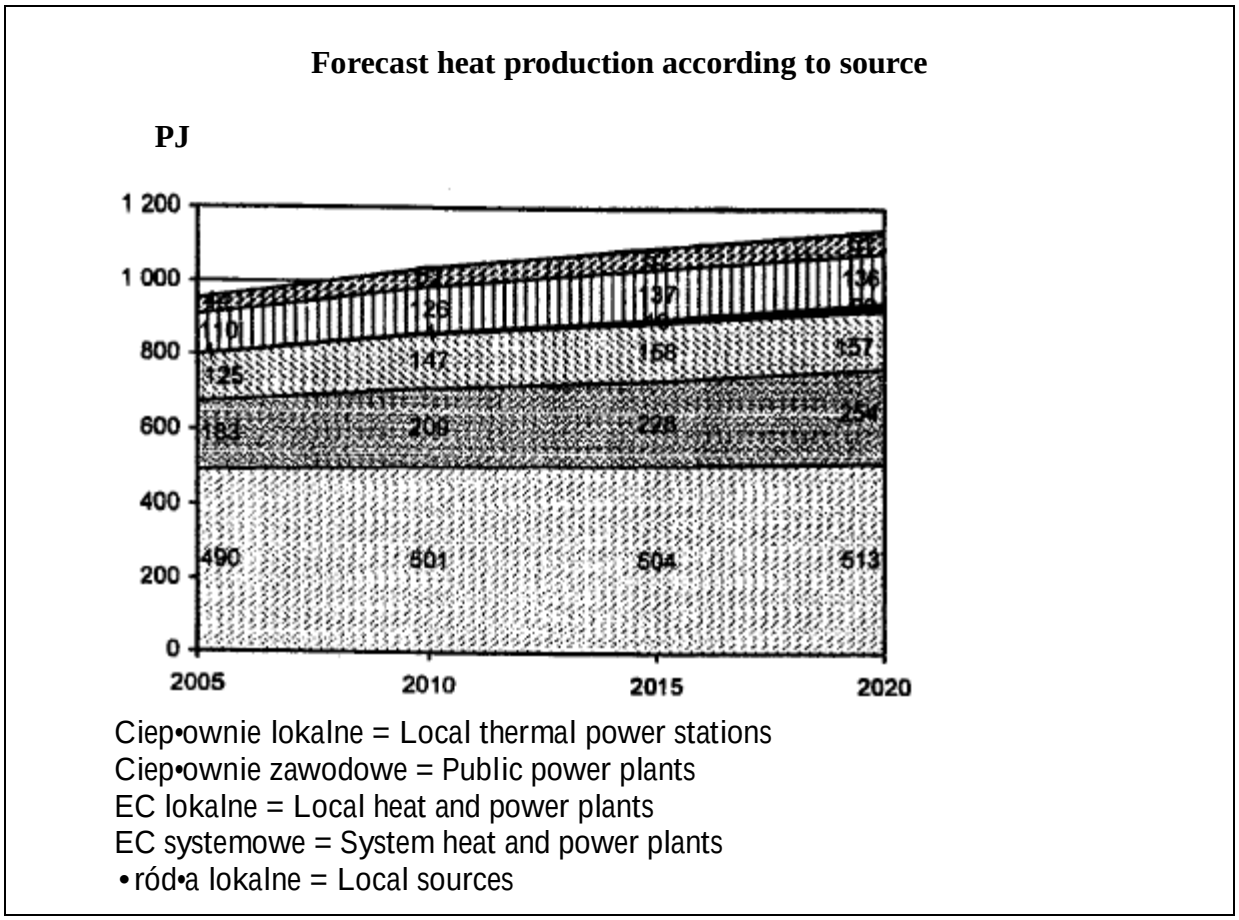


Fig. 4. Forecast heat production in local and centralised (network heat) sources with division into division groups (business as usual scenario)

For the development of cogeneration it is important that the electrical energy market develops, and it is for this reason that in the forecast an analysis has also been carried out on the demand for electricity. Analysis findings indicate the following:

- moderate growth in heat demand i.e. by about 30% by 2020,
- rapid growth in demand for final electrical power i.e. by about 50% by 2020.

The increase in heat demand differs for given ranges of use. Over a period of 15 it will constitute:

- 16% for technological heat,
- 21% for useful hot water,
- 40% for heating premises.

Such significant growth in demand for heating stems from the forecast and extremely intensive development in services and the housing industry. The forecast takes into account the hitherto trend in decreased demand for heat in existing buildings which have undergone thermomodernisation.

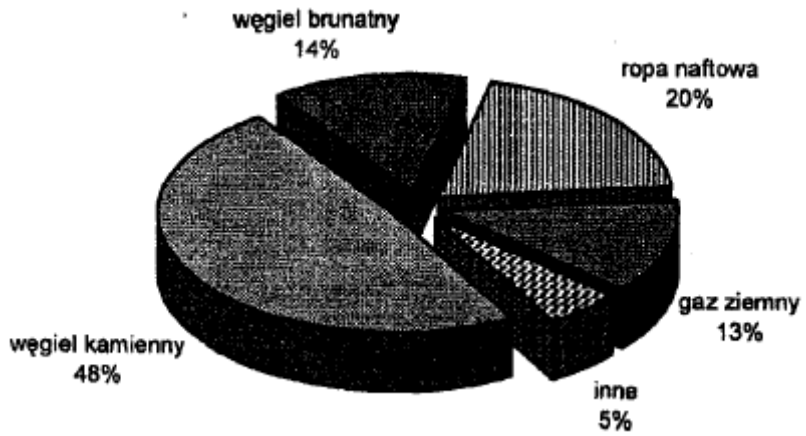
In adapting hitherto tendencies one may expect a small increase in combined electricity production, which will not lead to an increase in the share of combined electricity in overall national production.

4.2. Republic of Poland standing on fuels and the impact on the development of cogeneration

In 2005 total consumption of primary energy (fuels) amounted to 3,931.6 PJ. The consumption structure of given fuels is presented in figure 5. This structure clearly differs from that of other European Union countries. The main differences concern:

- coal share in national consumption more than four times greater (Republic of Poland - 62%, EU -15%),
- use of natural gas and liquid fuel almost two times less (Republic of Poland - 35%, EU - 63%),
- lack of nuclear energy in the structure of primary energy consumption in the Republic of Poland (16% in the EU).

Fuel consumption structure in the Republic of Poland in 2005

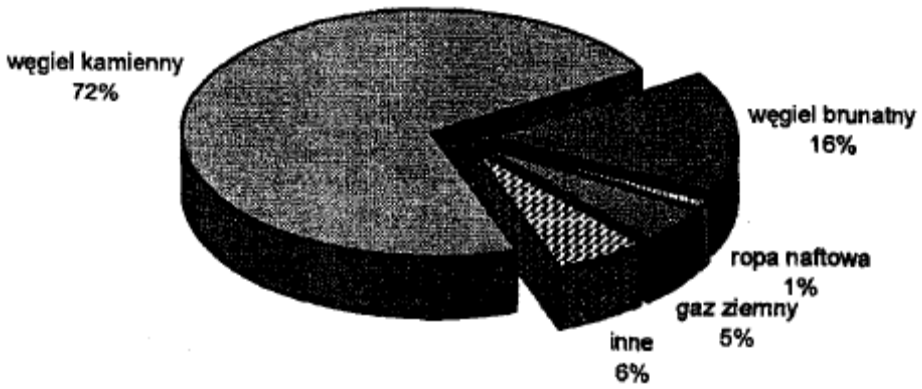


brown coal 14%
hard bituminous coal 48%
crude oil 20%
natural gas 13%
other 5%

Fig. 5 Fuel consumption structure in the Republic of Poland in 2005

National fuel consumption structure is to a large degree the result of access to fuel in the Republic of Poland. Considerable resources in hard bituminous coal and brown coal, with virtually no crude oil, means that almost 90% of obtained primary energy constitutes coal. The structure of obtaining primary energy in the Republic of Poland is presented in figure 6.

The structure of obtaining primary energy in the Republic of Poland in 2005



hard bituminous coal 72%
brown coal 16%
crude oil 1%
natural gas 5%
other 6%

Fig. 6 The structure of obtaining primary energy in the Republic of Poland in 2005

The relation between fuel prices, which may be used in cogeneration, is a consequence of the presented structure of obtaining primary energy. In 2005 prices were as follows:

- hard bituminous coal – PLN 10/GJ,
- natural gas – PLN 24/GJ,
- biomass – PLN 20/GJ.

These relations mean that natural gas does not offer a competitive price compared to hard bituminous coal.

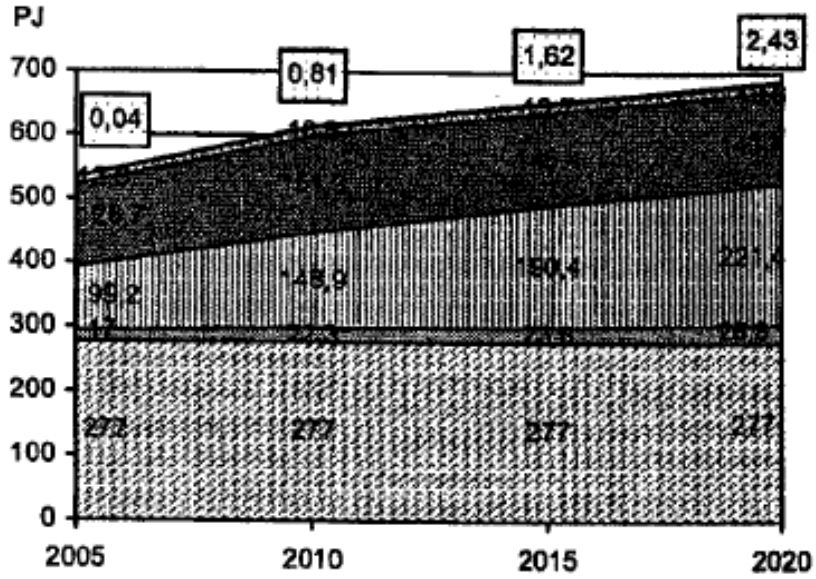
5. Technical potential of cogeneration

5.1. Level of technical potential

In keeping with the provisions of Directive 2004/8/EC the development of cogeneration should be based on the demand for useful heat. The technical potential of cogeneration for the needs of the analysis was understood as that part of useful heat which, at the present stage of power technology development may be, from a technical point of view, produced in cogeneration. Theoretically, in the light of the current technological development of generating heat and power, one may presume that the technical potential of cogeneration constitutes total demand for useful heat. However, in Poland about 25% of heat demand for the heating of premises is still met by using individual stoves. Therefore, one may presume that the existing residential properties which are not covered by the heating systems will only be connected to these systems sporadically and useful heat for such buildings will not be subject to combined production.

Part of technical potential is already being used – in 2005 277 PJ of heat was cogenerated. An area of interest in cogeneration should be the additional unused technical potential, illustrated by figure 7.

National technical potential of cogeneration in 2005-2020



Produkcja ch•odu = Production of cooling
Budynki wielkokubaturowe = Large cubic capacity buildings
Ciep•o dla celów przemys•owych = Heating for industrial purposes
Ciep•o do ogrzewania budynków = Heat for heating buildings
Ciep•a woda u•ytkowa = Useful hot water
Aktualna produkcja w skojarzeniu = Current combined production

NB. For percentage values change commas for points e.g. 0,04 = 0.04

Fig. 7. Technical potential of cogeneration equal to combined heat production in 2005 and additional technical potential in distinguished areas of use. The "large cubic capacity buildings" group also includes agriculture and sewage treatment plants

One may recognise that additional technical potential is connected with the introduction of cogeneration in heating systems which do not yet contain combined production, in industrial thermal power stations, combined heat and power stations at new industrial plants, new closed estates located in the proximity of existing heating systems and in large cubic capacity buildings (office blocks, hospitals, shopping centres etc).

5.2. Cogeneration technologies

In order to assess the economic potential of cogeneration a selection was made of a number of cogeneration technologies, offering prospects in the light of Polish conditions relating to fuel access and the currently applied technologies of heat production division. The specific situation of the Republic of Poland is connected with the considerable amount of coal resources and the high level of (unparalleled in other countries) production of useful heat in network systems with power ranging from tens to hundreds of MW in thermal power stations, without combined generation of power. The introduction of cogeneration in these systems

constitutes for the Republic of Poland the most important and easiest part of using national potential. For this reason, concerning the technologies under consideration, an important role is played by coal technologies with relatively high power. Table 1 contains a list of these technologies. The first column of this table contains technologies in ranking order, assessed for their economic effectiveness, separately for technologies using coal (W1-W5) and natural gas (G1-G6).

Each technology has its own PES fuel efficiency coefficient. The value of the PES coefficient forms the basis for assessing the social effectiveness of cogeneration, thus the justified level for supporting it. It has been assumed that in keeping with the recently introduced system, cogeneration is supported through certificates of origin (the so-called red certificates).

Table 1. List of technologies considered in the light of economic assessment of cogeneration potential

Ranking	Type of technology	Electricity [MW]	Annual heat production [TJ]	Type of fuel
W1	Exchanger on sluice of high power condensation turbine (heating of condensation turbine)	-	-	-
W2	Steam turbine with fluid boiler or grate furnace	3-10	100-500	hard bituminous coal
W3	Steam turbine with fluid boiler	60-120	2000-6200	hard bituminous coal
W4	Steam turbine with pulverised-fuel boiler	60-120	2000-6200	hard bituminous coal
W5	Steam turbine with fluid boiler	30-60	1000-3100	hard bituminous coal
G1	Gas engine	0.5-2	10-75	natural gas
G2	Gas-steam block	60-120	1000-3100	natural gas
G3	Gas-steam block	30-60	500-1600	natural gas
G4	Gas turbine with water boiler	3-10	70-350	natural gas
G5	Gas turbine with water boiler	1-3	20-100	natural gas
G6	Fuel cell (after 2010)	1-10	15-250	natural gas
	Oil combustion engine	0.05-0.2	1-7.5	heating oil
	Biomass thermal power station (steam turbine)	3-10	100-500	biomass
	Biogas thermal power station (engine)	0.1-0.5	2-15	biogas

6. Effective economic cogeneration potential

Because useful heat demand is described by cogeneration potential, in order to assess the level of economically effective potential an assumption was made, according to which in terms of potential investors, two solutions may be chosen:

- separate production of heat,
- combined production of heat and power.

From the investor's point of view in the analysis of the described situation of importance is the effectiveness of using additional investment resources, necessary for the building of heat and power stations. The IRR (Internal Rate of Return) is used as an economic effectiveness gauge. For all financial flows which are taken into account when calculating the IRR, differentiation has been made between combined and separate heat production.

It has been accepted that, in keeping with the binding legal environment, cogeneration is supported by granting transferable certificates of origin to electricity producers meeting the high-efficiency cogeneration requirement (defined in keeping with Directive 2004/8/EC). As part of the analyses an attempt was made to establish the minimum value of certificates of origin, in which the IRR exceeds 10%, regarded as the threshold value for investing in the cogeneration unit. Consideration was given to the time of using installation rated power between 7,200 hours/year, which corresponds to the production of useful hot water, and 4,600 hours/year, which is the average time of using installed power in case of generating heat for useful hot water and for heating. It has also been determined that the value of certificates cannot be higher than the value of avoided external costs. Concerning technologies which use coal as a fuel, consideration has been given to the reduction of external costs stemming from the saving of fuel, and concerning gas technology, from the saving of fuel and, additionally, from switching from coal to gas. On the basis of analyses it was determined that the minimum cost-effective time for using installation rated power should not be less than 6,000 hours/year, and the respective value of the certificate of origin:

- PLN 120/MWh for cogeneration units fired with gaseous fuels,
- PLN 50/MWh for remaining units (coal technologies).

Technology ranking is presented separately in Table 1 for both fuels. The order of the ranking indicates minimum certificate value, which leads to IRR value of above 10% being attained.

Taking into account the above border conditions, one may accept that in the technical potential of cogeneration to effective economic cogeneration potential the following may be included:

- heat generated for the needs of useful hot water,
- about 20% of heat for heating, in heating systems hitherto powered from the thermal power stations and 100% when the system may be powered by heat from the nearby heated condensation power station,
- heat generated for the needs of large cubic capacity buildings,
- heat generated in existing heat and power stations connected with the expanding market,
- 80% of heat generated for industrial purposes,
- heat generated for the generation of cooling during the summer season and corresponding heat for heating during the cold season.

The balance of effective economic cogeneration potential (economic potential) is presented in fig. 8.

Effective economic cogeneration potential

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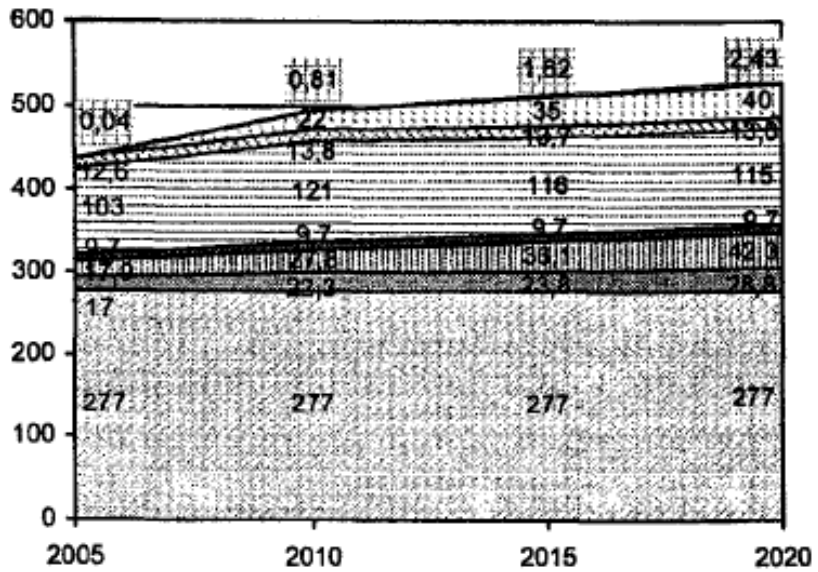

Produkcja ch•odu = Cold generation
Przyrost produkcji w istniej•cych Ec = Growth in production at existing heat and power stations
Budynki wielkokubatowe = Large cubic capacity buildings
Ciep•o dla celów przemys•owych = Heating for industrial purposes
Uciep•ownienie elektrowni = Heating of power station
Ciep•o do ogrzewania budynków = Heat for heating buildings
Ciep•a woda u•ytkowa = Useful hot water
Aktualna produkcja w skojarzeniu = Current combined production

NB. For percentage values change commas for points e.g. 0,04 = 0.04

Fig. 8. Effective economic cogeneration potential with distinction to heat use tendencies

Making use of effective economic cogeneration potential will lead to a considerable increase in the production of combined electricity. This level depends on the used technologies (coal or gas). It is for this reason that fig. 9 depicts the possible attainable level of combined production in two radically different cases, in the light of forecast total production of electricity in the Republic of Poland.

Production of combined electricity with full use of economic potential

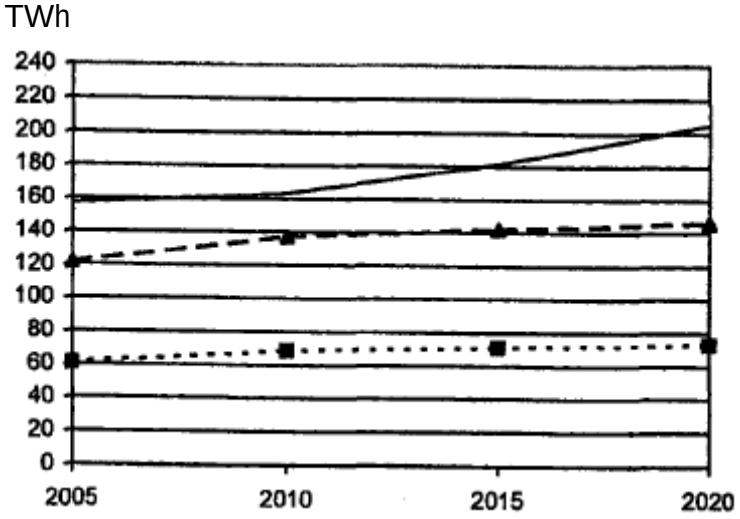

Fig. 9. Production of combined electricity with full use of economic potential, in the light of total electricity production in the Republic of Poland

In 2005 21.7 TWh of combined electricity was generated. This means that about 36% of effective economic cogeneration potential is used. Presuming that the strategic objective of developing cogeneration involves full use of economic potential, it would be necessary to introduce mechanisms which would lead to an increase in combined electricity production of 8.5% annually for coal technologies or 13.5% for gas technologies.

7. Attaining primary energy savings through the use of cogeneration

Depending on technology the combined production of heat and energy brings between 10% and 18% fuel savings (PES) in relation to separate production. As higher PES values are noted in installations with high power – these predominate in the Republic of Poland – one may assume that the average PES value in the Republic of Poland was around 15%. This permits the estimation of hypothetical fuel savings, which would be the result of full use of technical potential and economic cogeneration. These values are presented in fig. 10.

Fuel savings with full use of theoretical cogeneration potential

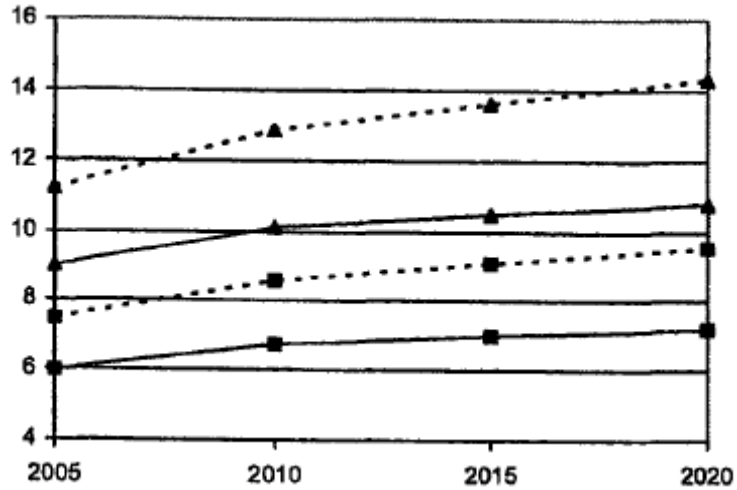

Fig. 10. Hypothetical reduction in fuel quantity (calculated as hard bituminous coal with heating value of 25 MJ/kg) earmarked for the production of power and heat in the event of full use of technical and economical cogeneration potential

The level of fuel savings in coal technologies is directly linked to the level of reduction of carbon dioxide emissions. Concerning gas technologies, which under Polish conditions means in the majority of cases changing fuel from coal in separate production to gas in combined production, reduction in emissions will be considerably higher. Change in fuel itself reduces emissions by about 300 kg/MWh when producing electricity and 30 kg/GJ when generating heat. The level of reductions in CO_2 emissions brought about by fuel savings when making use of the economical cogeneration potential and changing fuel from coal to natural gas is presented in table 2.

Table 2. Reduction in CO_2 levels as a result of using the economical cogeneration potential [MG million]

Reduction in CO_2 emissions	2005	2010	2015	2020
Coal technology	14.2	16.0	16.6	17.1
Change of fuel from coal to natural gas	49.5	56.0	58.0	59.6

One of the most important effects of introducing cogeneration is the reduction in external costs stemming from fuel combustion. Concerning coal technology, costs are avoided thanks to the product of saved fuel and the unit cost of external coal combustion. In keeping with assumptions the level of these costs has been established on the basis of ExternE programme findings. For coal consumption these costs stand at PLN 24/GJ. In the event of switching to gas one must additionally take into account reduction in costs resulting from lower external combustion of gas than coal. This difference amounts to about PLN 18/GJ in heat production and PLN 160/MWh in power production. The level of external costs avoided as a result of using the economical cogeneration potential is presented in table 3.

Table 3. Avoided external costs as a result of using the economical cogeneration potential [PLN billion/year]

Avoided external costs	2005	2010	2015	2020
Coal technology	3.58	4.04	4.19	4.31
Change of fuel from coal to natural gas	29.92	33.79	35.02	36.01

8. Barriers to the development of cogeneration

The indicated cogeneration potential is used insufficiently in the Republic of Poland in comparison to the potential benefits. In 2005 in the Republic of Poland 277 PJ of combined heat was produced and 21.7 TWh of power. At the same time the hitherto applied cogeneration technologies are often characterised by low level of combined indicator i.e. low

relation of power production to heat production. The reason for the insufficient development of cogeneration are economic (financial), legal, administrative and social barriers. At the present level of power technology development technical barriers are of virtually no importance.

8.1. Economic barriers

The fundamental barrier to the development of cogeneration is economic. The price of power and heat on the national competitive markets, in consideration of the balancing market, does not point towards investment in combined sources.

An important economic barrier is also the high cost of constructing heating networks and the high unit cost of low power installations, which could be applied in distributed cogeneration. The entity performing the building investment, apart from purchasing power from the electric power system, must guarantee that the premises are supplied with heat. The cost of the heating installation itself (water boiler, heat pump etc.) are so much lower than the cost of the cogeneration installation that combined sources are not constructed even in the event of lower operating costs in the future. This is particularly noticeable for developers who are keen to minimise building costs.

There is the risk of the introduced support system based exclusively on high-efficiency cogeneration power certificates of origin failing to create sufficient investment incentives. The level of the first substitute fees established on the basis of the Energy Act by the President of the Energy Regulatory Office is settled well below the price of certificates of origin used to estimate the potential of economic cogeneration.

Furthermore, the price of the certificate of origin may in practice turn out to be considerably lower than the established substitute fee. This stems from the limited market in certificates, whose size is determined through administrative means over a five-year period. In the event of excess authority occurring (too small market) these may reach a radical value of almost zero.

8.2. Legal barriers

The system of CO_2 emissions trading rights introduced in the European Union may turn out to be an unexpected barrier in the development of cogeneration. In the event of high prices on rights revenue from their sale may considerably exceed revenue from the sale of power and certificates of origin. In such situations it will be possible to transfer the production of heat to water boilers and to abandon combined production at heat and power stations.

An additional barrier in the development of cogeneration, particularly for existing heat and power stations, is the expected change in the definition of source of combustion in the provisions defining permissible standards on emissions of sulphur dioxide, nitrogen oxide and dust. Under hitherto national provisions the level of the standard was dependent on boiler power. Changes which make the standard dependent on the total power of boilers connected to one stack will mean that heat and power stations will have to carry the cost of considerable investment outlay for constructing emissions controls installations.

8.3. Administrative and social barriers

The amended Energy Act introduced a range of administrative obligations concerning economic activities in combined energy production, such as: the obligation to obtain a licence or the need to conduct an audit, which may prove to be a hindrance for mini- and micro-source operators.

The basis of gmina [small administrative districts] operations relating to heat supplies, in keeping with the Energy Act, is the elaboration at gmina level of the "Assumptions to the Heat, Power and Gas Fuel Supply Plan". The above Act imposes on the gmina the obligation to elaborate the mentioned assumptions, but does not anticipate sanctions for the lack of these. As a result, most gminas in the Republic of Poland are not in possession of the corresponding documentation. Frequently the "Assumptions" are drawn up on the basis of tenders with costs being minimised and insufficient care to reliable performance. On the other hand, gminas which do hold the "Assumptions" often do not have appropriate controls in implementing them. This state of affairs is due to the lack of formal rigour and competent power specialists within the gmina authorities. It is frequently the case that gmina authorities see no need to employ specialists in this field.

There are also social barriers to the development of cogeneration which are connected with the common perception that centralised heating is worse i.e. less user friendly as opposed to individual boiler installations. These views are rooted in the period prior to 1990 when, as a result of the lack of market mechanisms, there were practices which imposed on recipients heating terms and conditions established by suppliers in an arbitrary manner. Unfortunately, this behaviour has not yet been fully eliminated.

Furthermore, the possible level of support for cogenerated sources depends on social acceptance. Excessive substitute fees and prices for cogenerated power certificates of origin could lead to unfavourable electricity prices for end users.

9. Conclusions

1. Combined production of heat and power is a technology which permits far more effective use of fuels than separate production. As a result it leads to a reduction in the level of pollution, primarily carbon dioxide, and reduces the external cost of generating heat and power. This technology, however, in consideration of market prices for heat and power, is less cost-effective than divided production and its development requires financial support.

2. Cogeneration potential is determined by the level of demand for useful heat. In the Republic of Poland currently about 900 PJ of heat is used for heating premises, preparing useful hot water and as technological heat in the form of steam and hot water. By 2020 demand will increase to almost 1,200 PJ. The theoretical potential of cogeneration is therefore significant and its full use would correspond to the level of electricity production equal to annual national demand for this power.

3. It is not possible to fully use the theoretical potential of cogeneration for technical and economical reasons – too high and socially unacceptable cost of production. In the Republic of Poland in 2005 as much as 25% of buildings were stove heated, an equivalent of heat demand of about 95 PJ.

There is also considerable demand for heat in areas with scattered buildings. Modern and available small power cogeneration technologies are also known; these may be used in dispersed housing. In consideration of the high level of investment costs it was assumed in the analyses on Poland that technical potential should not include heat for heating and the preparation of useful hot water in areas with dispersed residential properties where there is no heating network. However, approximately 530 PJ of heat in 2005 may be recognised as technical potential. In 2020 this will increase to about 680 PJ.

4. The level of economic potential, in other words the level of useful heat whose production through cogeneration is worthwhile from the investor's point of view, depends on the system and level of cogeneration support. It has been accepted that in the Republic of Poland application will be made of the support system based on transferable certificates of origin of combined power. The findings of analyses have demonstrated that under current conditions, in order to guarantee cost-effectiveness of investing in cogeneration units, the value of these certificates should be PLN 50/MWh for technologies using coal as fuel and PLN 120/MWh for technologies using gas fuel. With this kind of support cogeneration economic potential amounts to approximately 430 PJ in 2005 and approximately 530 PJ in 2020.

5. In 2005 in the Republic of Poland 277 PJ of combined heat was produced, which means that use is made of only 64% of potential recognised as economic. This permits the assumption that the hitherto applied cogeneration mechanisms in Poland were insufficient. Cogeneration development was limited by economic, legal, administrative and social barriers.

6. The currently applied cogeneration technologies in the Republic of Poland are characterised by the low level of combined indicator i.e. low relation of power production to heat production. In 2005 only 21.7 TWh of combined electricity was generated, which constitutes about 36% of power which could be generated when applying full economic potential. Therefore, it is necessary to start replacing equipment at existing heat and power stations. Replacement is also necessary because the installations have already been used so much.

7. Use of the economical cogeneration potential will bring notable results. For example, in 2020 it will be possible to save 7-11 million Mg of coal, to reduce CO_2 emissions by 17-60 million Mg and to reduce external costs by PLN 4-36 billion. Extreme levels of divisions concern cases of cogeneration involving 100% use of coal or natural gas.

8. The elaboration and implementation of high-efficiency cogeneration development strategy in Poland, in keeping with Directive 2004/8/EC, should lead to the removal of barriers preventing the development of combined production. The development of cogeneration may be one of the most important ways in which the Republic of Poland meets European Union energy policy anticipating significant limits on CO_2 emissions and increasing the effective use of energy.

1037

NOTICE OF THE MINISTER OF THE ECONOMY [1)]

of 15 November 2007

concerning the Report on the findings of supervision of the safe supply of electricity

Pursuant to Article 15b(4) of the Energy Act of 10 April 1997 (Journal of Laws 2006, No 89(625) as amended [2)]) in the Annex to this Notice the Report on the findings of supervision of the safe supply of electricity in 2005 and 2006 is announced.

Minister of the Economy: *P. G. Wo•niak*

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[1] The Minister of the Economy manages the government administrative section on the economy, pursuant to § 1(2) of the Regulation of the Prime Minister of 18 July 2006 concerning the specific scope of activities of the Minister of the Economy (Journal of Laws No 131(909) and of 2007 No 135(954).

2) Amendments to the consolidated text of the referred to Act were announced in Journal of Laws 2006, No 104(708), No 158(1123), No 170(1217) and of 2007, No 21(124) , No 52(343), No 115(790) and No 130(905).

Annex to the Notice of the Minister of the Economy of 15 November 2007 (1037)

REPORT ON THE FINDINGS OF SUPERVISION OF THE SAFE SUPPLY OF ELECTRICITY

WARSAW, 2007

CONTENTS

Introduction

The legal basis for drawing up this Report is the provision under Article 15b(1) of the Energy Act of 10 April 1997 (Journal of Laws 2006, No 89(625), as amended), which places an obligation on the Minister of the Economy to draw up a Report on the findings of supervision of the safe supply of electricity. Supervision of State energy security is carried out by the competent Minister of the Economy – in keeping with the provisions of the *Energy Act* and of the *Government Administration Sections Act* of 4 September 1997 (Journal of Laws 2007, No 65(437) as amended).

The Report contains information on 2005 and 2006.

The subject of this Report covers in particular the following:

- characteristics of the Polish electricity sector in terms of assessing capacity to supply recipients with electricity, with consideration to the manner of supplying the energy, which also includes national generating sources,
- mutual relations between demand and supply of electricity,
- characteristics of the technical condition of undertakings active in the electrical power sector,
- level of existing electricity reserves and level of fuel supplies used for the generation of electricity,
- economic situation of the electricity industry and assessment of its impact on the environment,
- volume of anticipated long-term electricity demand.

The level of security of electricity supplies depends on a wide range of different factors and circumstances, including, in particular, the effective management of electrical energy system operations, the technical condition of production assets, as well as the efficiency of devices and of transmission and distribution system installations, appropriate production capacity reserves and corresponding level of transmission capacity, including cross-border capacity.

Security in electricity supply constitutes one of the main pillars of State electricity security, defined under the *Energy Policy for Poland until 2025* document, approved by the Council of Ministers.

Principle abbreviations and symbols:

ARE S.A.	–	Agencja Rynku Energii S.A. (an energy market agency)
CEER	–	Council of European Energy Regulators
EC	–	European Commission
EP	–	Grupa Energetyczna Po•udnie (an energy group)
EU	–	European Union
GWh	–	gigawatt hour
HV	–	high voltage
IRiESP	–	Instruction on Transmission Network Movement and Use
JWCD	–	Centrally Managed Generating Unit
KDT	–	long-term contracts (long-term agreements for the sale of electrical energy and power concluded between PSE S.A. and electricity producers)
KSE	–	National Power System
kV	–	kilovolt
kWh	–	kilowatt hour
LV	–	low voltage
MV	–	mean voltage
MW	–	megawatt
MWh	–	megawatt hour
OECD	–	Organization for Economic Co-operation and Development
OSD	–	Distribution System Operator
OSP	–	Transmission System Operator
OZE	–	renewable sources of energy
PGE	–	Polska Grupa Energetyczna (Polish Energy Group)
PO	–	trade undertaking
PSE S.A.	–	Polskie Sieci Elekroenergetyczne S.A. (Polish power networks)
SD	–	distribution undertaking
TPA	–	third party access
TWh	–	terawatt hour
UCTE	–	Union for the Co-ordination of Transmission of Electricity
UHV	–	ultra high voltage
URE	–	Energy Regulatory Office

1. Information on safe supply of electricity

National energy security on electricity supply depends on:

- the level of national market supply of electricity through national sources and import,
- technical capacity to meet electricity demand,
- the condition of technical infrastructure used in the supply of electricity.

1.1. Electricity supply and demand

Electricity supply on the national market is provided by public power plants and heat and power stations, industrial heat and power stations and undertakings importing electricity. Demand for electricity depends on the level of national consumption of this type of energy by end users and the amount of electricity earmarked for export.

In 2005-2006 electricity production in Poland met national demand for electricity. There was also considerable export. At the time Poland was one of the largest exporters of electricity in Europe.

Economic development in Poland in recent years has led to growth in electricity demand. An additional factor influencing increased demand for electricity in 2006 was the cold winter and hot summer.

Gross electricity production in Poland in 2006 amounted to 161 692 GWh and was higher by 3.03% in comparison to 2005, whilst national consumption was 150 706 GWh, constituting 3.40% higher consumption than in 2005.

Table 1. National electrical energy balance for 2005-2006

Detail	2005	2006	Dynamics
	GWh		%
REVENUE (SUPPLY)	**161 938**	**166 481**	**102.81**
of which:			
Total production	156 936	161 692	103.03
Import (collection)	5 002	4 789	95.74
DISBURSEMENT (DEMAND)	**161 938**	**166 481**	**102.81**
for:			
National consumption	145 750	150 706	103.40
including: electricity needs	12 266	12 774	104.14
Export (return)	16 188	15 775	97.45

Source: ARE S.A. data

Increase in electricity production was possible because of power reserve at KSE. In 2005-2006 surplus power attained in excess of demand on the day of maximum demand, amounted to 32.3% and 28.8% respectively.

In the analysed period there was a clear advantage of electricity export over import. In 2006 the international exchange balance amounted to 10 986 GWh.

1.2. Sources and means of supplying the national economy in electricity and possibility of making use of these sources

Sources of supply

The source of demand of the national economy for electricity in 2006 was, above all, its production from own sources and to a small degree through import.

The level of electricity supply was clearly influenced by production levels at public heat and power stations, operating on national coal resources, whose share in the market in 2006 was almost 93%. In comparison to 2005 the share of energy production by power stations using hard bituminous coal increased at the expense of energy from power stations using brown coal. The production of electricity at heat and power stations decreased. As a result of the State applying preferential principles for energy generated in renewable sources, production of this energy increased from 3 842.8 GWh in 2005 to 4 203.7 GWh in 2006 i.e. an increase of 9.4%.

Table 2. Structure of electricity production in 2005 and 2006

Detail	Production			Production structure	
	2005	2006	Dynamics	2005	2006
	GWh		%	%	
National production	156 936	161 692	103.03	100.00	100.00
of which:					
Public power plants	148 427	153 016	103.09	94.58	94.63
heat	144 899	150 246	103.69	92.33	92.92
hard bituminous coal	86 315	93 060	107.81	55.00	57.55
including: heat and power stations	22 613	22 089	97.68	14.41	13.66
brown coal	54 865	53 464	97.45	34.96	33.07
gas	2 944	2 570	87.30	1.88	1.59
biomass co-combustion	774	1 151	148.71	0.49	0.71
water	3 528	2 770	78.51	2.25	1.71
Industrial power stations	8 019	8 060	100.51	5.11	4.98
Others	490	616	125.71	0.31	0.38

Source: ARE S.A. data

In 2006, in comparison to 2005, there was a decrease in electricity imports to Poland of 23%. In 2005 this amounted to 3 119 GWh, whilst in 2006 it was 2 420 GWh.

Means of supplying the wholesale market

Electricity produced by public power plants and heat and power stations was sold on the wholesale market. Industrial thermal power stations mainly met the energy needs of domestic industrial plants.

The wholesale trade of electricity on the national market took place primarily in the form of bilateral contracts: long-term contracts concluded between power stations/industrial thermal power stations and PSE S.A., short- and mid-term contracts concluded between power stations/heat and power stations and distribution companies and trade undertakings. On the other hand the sale of energy by manufacturers on the stock market was marginal and constituted only 0.2% of overall sales.

The considerable diversification in the manner in which electricity is supplied by power stations and heat and power plants is evidence that the wholesale market is developing.

Table 3. Sale of electricity by manufacturers on the wholesale market

Detail	Total	Sale of electricity					
		On the wholesale market by public power plants and heat and power stations	of this the following to:				
			PSE S.A.	Balancing market	SD	PO	Stock market
		GWh					
2005	143 773.4	143 641.3	33.91	8.70	20.29	36.34	0.75
2006	146 432.9	144 474.6	38.17	5.64	19.44	36.54	0.21

Source: ARE S.A. data

In 2006 there was a clear growth in the sale of electricity through long-term contracts (12.7%). Part of the energy purchased from manufacturers by PSE S.A., trade companies and distribution companies was mainly sold to Germany, as well as to the Czech Republic and Slovakia, as part of historical contracts. In 2006, in comparison to 2005, there was a fall in export of electricity by 6% – in 2005 this amounted to 14 290 GWh, and in 2006 – 13 434 GWh.

Manner of supplying the retail market

Electricity purchased on the wholesale market was sold by distribution companies and trade companies on the retail market to end users and to recipients availing themselves of the right of choice of seller (in keeping with the TPA principle – *third party access*).

In 2005-2006 progress in terms of liberalisation of the electricity market measured by volume of energy sold to recipients availing themselves of the right of choice of seller stood at a low level. In 2006 the joint share of these groups of recipients in the total sale of electricity to end users on the retail market amounted to 11.8%, whilst in 2005 it was 11.6%.

Tariff recipients of distribution companies are divided into four basic groups:
- recipients supplied by high voltage electrical power networks (tariff group A),
- recipients supplied by mean voltage electrical power networks (tariff group B),
- recipients supplied by low voltage electrical power networks (tariff group C),
- households and other communal recipients supplied by electrical power networks of any voltage (tariff group G).

Table 4. Sale of electricity to end users on the retail market

Detail	Total[1)]	Of which:							
		SD tariff recipients	Tariff recipients = 100				SD end users avail themselves of TPA	Power station end users[1)]	Trade company end users
			A	B	C	G			
2005 GWh	108 036	95 536	14 311	33 397	19 807	27 990	3 168	5 363	3 969
%	100	88.43	14.98	34.96	20.73	29.30	2.93	4.96	3.67
2006 GWh	113 153	99.788	15 098	34 906	20 826	28 919	5 121	4 064	4 180
%	100	88.19	15.13	34.98	20.87	28.98	4.53	3.59	3.69
Dynamics 2005 =100	104.74	104.45	105.50	104.52	105.14	103.32	161.61	75.78	105.33

[1)] Does not include sales to end users of industrial thermal power stations
Source: ARE S.A. data

The increase in electricity sales on the retail market in 2006 was strongly influenced by the high rate of economic development in Poland and the cold winter and hot summer.

As a result of the high rate of production growth in 2006 the fall in the purchase of energy by large recipients connected to the high voltage network was halted. In 2006 the purchase dynamics of energy by recipients in tariff group A, not availing themselves of the right to choose the seller, was higher than in other tariff groups. The increase in the purchase of electricity in tariff groups B and C was the result of the development of services and production in the small and medium enterprise group.

Growth in electricity demand by households stemmed from the ever improving equipping of property with modern household appliances, audiovisual equipment and computers. In 2006 tariff G recipients used almost 29% of the energy sold to recipients not availing themselves of the right to choose the seller; these constituted 90% of the total number of tariff recipients.

There was an increase in the sale of electricity by distribution companies (with application of the TPA principle) from 2.93% in 2005 to 4.53% in 2006. Full liberation of the market from 1 July 2007 should influence further growth in sales to the group of recipients availing themselves of the right to choose the seller.

The greatest demand for electricity was demonstrated by the following regions: Silesia, Mazovia, Wielkopolska and Lower Silesia.

Electricity supplies were mainly directed to towns and cities (approx. 74%). In towns and cities tariff groups A and B displayed a higher share than the rural areas, whilst there was a lower share of recipients in tariff group G.

1.3. Technical infrastructure in the electrical power sector

Technical infrastructure of the electrical power sector was created by undertakings active in generating, transmitting and distributing electrical energy.

Generating electrical power

Electricity was mainly generated by public energy undertakings (92% of installed power) and industrial heat and power stations (7%).

Power station generating capacity at the end of 2006 amounted to 35 715 MW, of which 32 897 MW belonged to public power plants.

Table 5. Electricity generating capacity at the end of the year

Detail	2005	2006	Dynamics
	MW		%
Public power plants	32 655	32 897	100. 74
heat	30 476	30 713	100.78
hard bituminous coal	20 413	20 629	101.06
including: heat and power stations	5 227	5 303	101.45
brown coal	9 216	9 216	100.00
gas	847	847	100.00
water	2 179	2 184	100.23
Industrial power stations	2 522	2 535	100.52
Others	227	283	124.67
TOTAL	**35 404**	**35 715**	**100.88**

Source: ARE S.A. data

During the period covering the Report there was a predominance of power plants which generated electricity through hard bituminous coal and brown combustion.

In comparison with 2005 there was a minimum increase in KSE generating capacity (1%). Increase in this type of power was noted in all groups of power stations and heat and power plants (with the exception of brown coal power stations – where there was stabilisation). Highest dynamics, however, were demonstrated by sources of renewable energy.

The fixed assets of power stations and heat and power plants are to a large degree used up, technically and economically exhausted. In 2006 at public power stations and heat and power plants depreciation of machines and devices amounted to 69.9% and 64% of structures. The age of 64.9% of boilers and 62.4% of turbine sets was more than 25 years.

In keeping with the Electrical Power Programme – approved by the Council of Ministers on 28 March 2006 – hereinafter referred to as the "Programme", with the more than 30 000 MW of generating power currently existing in Poland and a lifespan of 30-35 years for generating installations, each year there should be around 800-1 000 MW of new capacity in order to rebuild the installations which will no longer be in service. The implementation of the Programme will have an impact on the increase in investment outlay in the electrical power generating sector.

Necessary resources for investment may be obtained, in keeping with the Programme, through vertical and horizontal consolidation of energy undertakings and through privatising these undertakings.

It will be necessary to improve the efficiency of generating electricity. In many EU countries generation devices attain 45% efficiency. In comparable conventional situations average efficiency of national energy blocks does not exceed 37%. This is an indication of the

considerable technological advantage of these countries and in the future this may lead to an increase in the cost of generating electricity, and by this virtue decrease the competitiveness of national energy producers.

In 2005-2006 investment outlay on public power stations and heat and power plants amounted to PLN 2-2.2 billion. In 2006 these increased in comparison with 2005 by about 10%.

With the purpose of increasing production capacity construction work was carried out on the P•tnów II power station (460 MW block). In 2006 work was started on the building of the 460 MW Elektrownia •agisz S.A. power station. In that year there was also preparatory work carried out on the construction of the 860 MW Elektrownia Be•chatów II.

Transmission network

Business activities relating to the transmission of electricity is carried out by PSE-Operator S.A. (spun off from PSE S.A. on 1 July 2004), designated by the President of URE to act as Transmission System Operator. Transmission assets have not yet been transferred to the undertaking.

At year-end 2006 the composition of network infrastructure constituting the ownership of PSE S.A. included 232 lines with a total length of 12 975 km, including:

- 1 line with voltage of 750 kV and length of 114 km (withdrawn from use),
- 66 lines with voltage of 400 kV and length of 4 919 km,
- 165 lines with voltage of 220 kV and length of 8 140 km,

and 98 ultra high voltage energy stations and 168 transformers. A considerable number of structures, in particular with voltage of 220 kV, was characterised by a considerable level of depreciation.

The KSE contains intersystem connections with Sweden via connection of 450 kV of direct current, with Belarus via a 220 kV line, with the Ukraine via 220 kV and 750 kV lines, with Slovakia via a two-track 400 kV line, with the Czech Republic via 220 kV and 400 kV lines and with Germany via 220 kV and 400 kV lines.

Limits in transmission capacity for the export of electricity constituted an important barrier hindering the exchange of this type of energy with foreign countries. This may be of considerable importance in terms of supplying the country with electricity in the event of a deficit arising on the national market:

In 2006 the following investments were carried out which helped increase intersystem exchange transmission capacity and power security of the country:

- the Krosno-Lemesany 400 kV line was modernised,
- transmission capacity of the 220kV Krajnik-Vierraden transmission line was increased.

In 2005-2006 investment outlay on the transmission network was higher than in previous years and amounted to PLN 474.9 million and PLN 415.8 million respectively.

Concerning extension of the transmission system and of cross-border connections the appropriate technical analyses were carried out in cooperation with the EU and third countries. PSE-Operator S.A. is engaged in negotiations with operators from Germany, the Czech Republic and Slovakia concerning the development of cross-border connections. Depending on the outcome of negotiations with Lithuania it is anticipated that a power bridge connecting the energy systems of Lithuania and Poland will be constructed.

Distribution

In 2006 economic activities relating to the distribution of electricity were carried out by 14 electrical energy undertakings with licences granted to them by the President of the URE. Their tasks involved the distribution of electrical energy by means of the 110kV network, the average and low voltage network. During this period the undertakings held:

- 232 km of overhead lines with voltage of 220 kV,
- 32 369 km of overhead lines with voltage of 110 kV,
- 283 656 km of lines with mean voltage,
- 409 191 km of lines with low voltage.

The number of transformer stations with upper voltage of 110 kV was 1 351, whilst 231 960 were with mean voltage.

The distribution network, in particular the rural network, requires expansion and thorough repairs. This leads to greater investment outlay. In 2006 the level of depreciation of assets belonging to distribution undertakings amounted to 50%. 60 thousand km of mean voltage network, 237 thousand km of low voltage network and 67.5 thousand MV/LV transformers required modernisation. The total amount of expenditure required to modernise the distribution networks is estimated at EUR 9.5 billion[1].

In 2005-2006 investment outlay in distribution undertakings had a slight tendency towards increasing and amounted to PLN 2.4 billion and PLN 2.5 billion respectively.

Structural changes in the electrical power sector

In 2006, in keeping with the Programme, measures were taken with the purpose of introducing transformations to the structure of the electrical energy sector. These measures will increase significantly investment capacity in this sector, and this will improve things such as national energy security in terms of electricity supplies.

[1] Data of the Polish Transmission and Electricity Distribution Association

In 2006 the following came into being: the holding Grupa Energetyczna Po•udnie (EP), created by the State Treasury, and Enion S.A., Energia Pro S.A. and Elektrownia Stalowa Wola S.A.

In May 2007 the State Treasury contributed 85% of shares of Po•udniowy Koncern Energetyczny S.A., and of three remaining entities, to Energetyka Po•udnie S.A. with registered office in Katowice. There was also completion of stage II involving the consolidation of undertakings within the formed Polska Grupa Energetyczna (PGE), on the basis of BOT Górnictwo i Energetyka S.A., Zespó• Elektrowni Dolna Odra S.A., assets rising from the spinning off from PSE S.A. of Operator System Przesy•owy and estate, distribution undertakings belonging to groups L-2[2], L-5[3] and Rzeszowski Zak•ad Energetyczny.

PGE came into being through the contribution of an 85% block of shares of PGE entities – Energia and BOT Górnictwo i Energetyka S.A. to PSE S.A. in exchange for the takeover by the State Treasury of a new emission with raised capital in PSE S.A. The name of the company PSE S.A. was changed to PGE Polska Grupa Energetyczna Spó•ka Akcyjna. The next step will be to privatise PGE and EP.

In June 2007 a third energy group came into being – ENERGA, with assets of PLN 8.5 billion. The holding (share packages of 85%) comprised Koncern Energetyczny Energa S.A. and Zespó• Elektrowni Ostro••ka. On 23 July 2007 a decision was taken to consolidate Grupa Energetyczna Centrum, composed of Elektrownia Kozienice S.A. and the distribution undertaking ENEA S.A. The State Treasury contributed 100% shares of Elektrownia Kozienice S.A. in order to increase initial capital of ENEA S.A., with registered office in Pozna•, in exchange for the takeover of the new emission of shares in the raised initial capital of this undertaking. In June 2007 the Minister of State Treasury took the decision to exclude from the consolidation plans, in Grupa Centrum, Kopalnia W•gla Kamiennego Bogdanka S.A. The ENEA-Centrum Group, in keeping with the plans of the Minister of State Treasury, will be the first group to be privatised on the stock exchange.

The creation of vertically consolidated energy groups will improve the capacity for investment of power industry undertakings and will also help them to compete on the common European electrical energy market.

[2] •ódzki Zak•ad Energetyczny S.A., Zak•ad Energetyczny •ód•-Teren S.A.

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1.4. Impact of the electrical power sector on the environment

The electrical power sector belongs to those sections of the economy which have a significant impact on polluting the industry, primarily through the emission of dangerous substances into the atmosphere.

The public electricity power sector accounts for approx. 55% of national SO_2 emissions, 30% of NO_x emissions, 10% of dust and approx. 45% of CO_2 emissions.

Table 6. Emission of pollutants into the atmosphere by the public electrical energy sector in 2005-2006

Detail		2005	2006*	2005/2006 change
Dust emissions	’000s tonnes	42	40	-4.77%
SO_2 emissions	’000s tonnes	641.6	680	-4.50%
NO_x emissions	’000s tonnes	246.5	246	-1.6%
CO_2 emissions	’000s tonnes	150	147	-2%

** Estimated data*

Source: ARE S.A. databases and data from the Report of the Republic of Poland on the implementation in Poland of Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants (Warsaw, August 2007).

Environmental protection in the electrical energy sector is connected with specific costs incurred by undertakings constructing dust extraction and desulphurization installations which, because of the complex and modern technologies involved, are very expensive, but also relatively inexpensive when compared to the level of penalties which undertakings would have to pay in their absence. Active environmental protection policy impacts the cost of producing electricity, but this increase is justified by the need to protect the environment and to improve the quality of life of citizens.

Environmental protection measures in the electrical energy sector are defined both for government authorities and businesses by national law and EU Regulations, in particular by the provisions of Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants (the so-called LCP Directive), whose objective is to limit the emission of SO_2, NO_x and dust from combustion plants exceeding 50 MW. The Directive defines the permitted standards of emissions, which are binding on existing structures from 2008. New sources should meet requirements defined in the Directive. These are more lenient for structures which were granted building permits before 1 August 1997 and more restrictive for new sources.

Poland has been granted an exemption from meeting individual SO_2 and NO_x emission norms specifically named in the list of boilers in the Treaty of Accession. This list was implemented into Polish law on the strength of the Regulation of the Minister of the

Environment on 20 December 2005 relating to installations emissions standards (OJ, No 260(2181, as amended)).

Poland, as the only EU Member State, in addition to the requirements of Directive 2001/80/EC, was given under the Treaty of Accession of the Republic of Poland to the European Union, a summary limit for SO_2 and NO_x emissions in 2008, 2010 and 2012 for installations bound by regulations of the Directive, which in practical terms signifies an increase in obligations over and above the regulations of Directive 2001/80/EC and renders impossible the implementation of the derogations.

In February 2007 the government of the Republic of Poland submitted to the European Commission a concept for implementing Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants and the provisions of the Treaty of Accession of the Republic of Poland to the European Union, creating a real chance for the Republic of Poland to implement the obligations under the Treaty of Accession and to attain the emission levels contained in it.

The meeting of obligations relating to the emission of pollutants, stemming from the Treaty of Accession and the Directive is not possible without incurring considerable investment outlay for the construction of installations limiting the emission of pollutants and limiting production in existing national power stations and heat and power plants.

Measures taken by the government of the Republic of Poland in 1999-2006 led to a considerable improvement in SO_2 reductions. In this period SO_2 emissions by power stations using brown coal were reduced by more than 35%. Emissions were also reduced in power stations using hard bituminous coal. The main measure taken by power stations in order to reduce SO_2 emissions was the construction of installations for desulphurisation of waste gas. The number of installations in given system power stations and heat and power plants is as follows:

- in public power stations with a total of 100 turbine sets with total rated power of 29 210 MW there are 148 dust extraction installations and 57 desulphurisation installations,

- in public heat and power plants with a total of 27 turbine sets with total rated power of 1 670.7 MW there are 56 dust extraction installations and 11 desulphurisation installations.

The electrical energy sector also accounts for the emission of about 80% of total greenhouse gas emissions.

The EC, acting under Directive 2001/81/EC, covering the period 2005-2007, granted Poland carbon dioxide emission limits of 239.1 million tonnes. This limit was sufficient for 2005-2006 and it appears to be sufficient for 2007. A different situation may occur in 2008-2013 as Poland, in the Second National Plan for the Allocation of Carbon Dioxide Emissions Rights (KPRU 2), applied for the right to emit 284 million tonnes of CO_2 annually. The EC decided to reduce the limit proposed by the government of the Republic of Poland by 76 million tonnes annually, to the level of 208.6 million tonnes, which is below the 2005-2006 level. The government of the Republic of Poland appealed against this decision, requesting that the limits be increased. If Poland's request is not taken into account this may halt growth of the national economy, impair the economic situation of the energy sector and may translate into higher electricity prices (as energy undertakings will be forced to purchase additional CO_2 emissions rights).

The development of renewable sources of energy is one of the ways of protecting the environment. It also ensures security of national electricity supply. Poland is trying to develop this branch of obtaining energy by increasing systematically its share in the overall amount of generated energy in the country. The generating potential of renewable sources of energy (without taking into account combined combustion) on the basis of granted licences binding until 31 December 2006 is presented below:

Table 7. The generating potential of renewable sources of energy as at 31 December 2006

Type of renewed source of energy	Generating capacity (MW)	Number of installations (items)
Biomass power stations	238.79	6
Biogas power stations	36.76	74
Wind power plants	152.56	104
Hydro-electric power stations	1 081.43	684
Total	1 307.54	868

Source: URE data

The development of generating energy from renewable sources of energy is a requirement stemming from approved obligations. In Directive 2001/77/EC the share of electricity generated from renewable sources of energy in national gross electricity consumption for Poland in 2010 has been determined at 7.5%. The construction of power

stations based on renewable sources of energy is to be favoured by appropriate legal regulations.

Binding provisions in 2005-2006 permitted wider support for renewable sources of energy. A measure aimed at supporting the development of renewable sources was the introduction, on the strength of the Act of 4 March 2005 on the amendment of the Energy Act and the Environmental Protection Act (OJ, No 62(552) as amended), of asset rights stemming from certificates of origin of electricity generated in renewable sources. The provisions of this Act were drawn up on the basis of experience connected with the functioning of the national certificates of origin system and the experience of EU Member States. The purpose of these certificates is the effective and efficient promotion of renewable sources of energy on the assumption that the basis of support is the obligation to hold them or to apply a substitute fee. The regulations contained in the above Act introduced not only a new system of meeting and settling the obligation to purchase, but also brought about changes in the system of issuing and cancelling certificates of origin. The most important outcome of the solutions approved in the Act on the amendment of the Energy Act and the Environmental Protection Act was the division of revenue from the sale of energy generated in renewable sources into two streams:

- revenue from the sale of physical electrical energy which is ensured by directly guaranteed renewable source income (the manufacturer receives payment for sold energy at the price of conventional energy),
- revenue from the sale of asset rights stemming from the certificates of origin (the manufacturer receives payment when the interested entity acquires asset rights, stemming from the certificates of origin inscribed on the manufacturer's account managed by Towarowa Gie•da Energii).

The above mechanisms of generating and trading electricity from renewable sources of energy are consolidated by a system of penalties imposed on energy undertakings which fail to meet the above obligations. Means obtained through substitute payments and penalties are paid into the account of the National Fund for the Protection of the Environment and Water Management (Narodowy Fundusz Ochrony •rodowiska i Gospodarki Wodnej) and are earmarked exclusively for financing investments connected with renewable sources of energy.

The expected share of electricity generated through renewable sources of energy in the Republic of Poland, in national electricity consumption in 2005-2014, was defined in the "Report Determining Objectives Relating to Electricity Generated through Renewable Sources of Energy in the Republic of Poland in 2005-2014", constituting an Annex to the Notice of the Minister of the Economy and Labour of 31 August 2005 concerning the announcement of the Report defining the objectives of electricity generated through renewable sources of energy in the Republic of Poland, in national electricity consumption in 2005-2014 (M.P., No 53(731)).

The government of the Republic of Poland also took measures with the purpose of bringing about a positive impact on the natural environment, aimed at reducing pollution whilst generating combined energy (cogeneration) on the basis of demand for useful heat on the internal market. The development of combined production of heat and energy helps increase energy effectiveness and reduce the negative impact of energy on the environment. This is a way of simultaneously using various fuels for the production of heat and energy with high efficiency and low levels of pollution. The principles concerning the production of combined energy, binding within the EU, are contained in Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC. Despite the fact that since 2000 Poland has been actively promoting the production of combined electricity the results which have been attained remain unsatisfactory. In 2000-2006 there was permanent insufficient supply in relation to indicative energy targets. In 2006 the share of this type of energy in sales to end users amounted to approx. 12% as opposed to the requirement of 15%. For this reason it is necessary to take additional steps in order to increase the share of combined electricity in the overall amount of generated electricity.

1.5. Economic situation of power industry undertakings, including electricity price competition

Situation of power industry undertakings

2006 was another year in which the electricity energy sector noted an increase in the sale of electricity. Net profit was PLN 5 404 million, an increase of 44% in relation to 2005. Similar high growth dynamics in results were noted for 2004/2003 (dynamics of 136%). In the period 2005/2004 growth was somewhat slower (7.6%). Revenue on electricity activities grew in relation to 2005 by 6.7%.

Growth in energy activities results were noted in all sub-sectors. Highest profit was noted by generating undertakings, in that PLN 360 million was the profit on the remaining energy activities (including the sale of asset rights to certificates of origin for energy obtained through combined combustion). A considerable cost item for manufacturers was

excise duty – amounting to PLN 2 700 million – which is close to 13% of the cost of generating revenue. Financial costs incurred in 2006 amounted to PLN 843 million – which constitutes 4.1% of the cost of generating revenue. The situation in given manufacturing units was varied, with 20 out of 55 noting losses in energy activities amounting to between PLN 0.1 to more than PLN 54 million (in total 252.5 million).

The growth in revenue translated into investments in the sector, which in 2006 – in comparison to 2005 – grew by about 10%.

Table 8. Total result on energy activities

Detail	2005	2006	Dynamics
	PLN million		%
Manufacturers	**1 508.4**	**2 176.8**	**144.3**
including: thermal power plants using brown coal	171.3	314.2	183.4
thermal power plants using hard bituminous coal	910.5	1 126.0	123.7
heat and power plants	330.5	706.3	213.7
Transmission	**838.6**	**1 515.7**	**180.7**
Distribution	**1 320.4**	**1 608.4**	**121.8**
Including: trade	296.5	179.2	60.4
Distribution	681.2	1 199.2	176.0
Trade undertakings	**83.9**	**103.0**	**122.8**
Total	**3 751.3**	**5 403.9**	**144.1**

Source: ARE S.A. data

In the distribution sub-sector undertakings noted a profit in electricity activities. Notably better results were obtained in distribution activities – only one entity noted a loss. Concerning trade activities six distribution undertakings noted a loss and the results were almost six times lower than in the case of distribution activities. One of the reasons for the more favourable results of distribution activities was brought about by the possibility, since 2002, to gradually include return of exposed capital in eligible costs on regulated activities. In 2007 full return of exposed capital in costs will be included for the first time.

In 2006 trade undertakings purchased 117 028 GWh of energy, which constitutes an increase of 35% in comparison to 2005. These operate mainly on the wholesale market and their participation in meeting end user demand is only 3.7%. These undertakings have generated a small profit on energy activities and their profitability ratio in subsequent years has not been more than 1%. Profitability in the sector is improving each year. Profitability of energy activities in the generating sub-sector attained in 2006 8.1%, with 5.5% for the distribution sub-sector and 9.9% for the transmission sub-sector. There was also a clear improvement in equity and assets indicators. In comparison to 2005 the financial liquidity of given sub-sectors also improved slightly.

Table 9. Chosen economic indicators

Detail	Dynamics (year)	Distribution sub-sector	Transmission	Generation sub-sector
Net trade profitability indicator (%)	2005	3.63	3.41	4.41
	2006	4.00	8.60	6.99
	%	*110.19*	*252.20*	*158.50*
Equity profitability indicator (%)	2005	4.57	16.64	5.75
	2006	5.77	31.79	8.62
	%	*126.26*	*191.05*	*149.91*
Current liquidity (multiplicity)	2005	0.63	0.98	1.06
	2006	0.69	1.35	1.10
	%	*109.52*	*137.76*	*107.55*
Rate of internal investment financing (%)	2005	135.47	243.42	191.35
	2006	131.74	549.77	185.92
	%	*97.25*	*225.85*	*97.16*
Long-term debt indicator (%)	2005	1.11	16.64	52.29
	2006	0.99	6.03	42.26
	%	*89.19*	*36.24*	*80.82*
Investment/sales (%)	2005	7.79	2.30	7.66
	2006	8.04	2.04	8.44
	%	*103.21*	*88.70*	*110.18*

Source: ARE S.A. data

The level of debt in the generating sub-sector is far greater than in the transmission and distribution sub-sectors because of repayment of loans taken out for modernisation and regeneration investments under KDT.

The ageing of power rating and power lines constitute an important problem for the undertakings in the sector as, among other things, security of electricity supply depends on the state of the technical infrastructure. The rate of depreciation of fixed assets in 2006 in the generating sub-sector was 66.25% and 50.1% in the distribution sub-sector.

In 2006 the scale of investment both in the generating and distribution sub-sectors was below the level of demand – investments in the generating sub-sector accounted for about 8% of sales revenue and only 2% in the transmission sub-sector. Considerable differences in level of investment were noted at various generating undertakings, ranging from 0.1% to 23.8% of the level of revenue from sales (at four undertakings this was more than 14%); this difference was considerably lower amongst distribution undertakings – standing between 4.7% and 12.7%. In the distribution sub-sector the level of investment outlay (approx. PLN 2 500 million) was more than 20% higher than in the generating sub-sector. It was only in four generating undertakings that the resources (net profit together with depreciation) were insufficient to cover incurred investment outlay.

The President of the URE - as of 3 February 2006 - granted 1 210 licences permitting generation, transmission, distribution and electricity trading activities.

Table 10. Number of licences granted by the President of the URE as of 3 February 2006

Detail	Granted licence	Issued promises
Generation (WEE)	702	54
Transmission and distribution (PEE)	182	4
Trade (OEE)	308	4
Distribution (DEE)	18	2
Total	**1210**	**64**

Source: ARE S.A. data

Electricity price competition

Pursuant to Article 23 of the Energy Act of 10 April 1997 the scope of activities of the President of the URE includes, among other things, approving electricity tariffs and controlling that they are adopted. The statutory criterion for price regulation includes the covering of legitimate costs, protecting the interests of recipients against unjustified price levels and the elimination of cross-subsidising. In 2005-2006 it was the obligation of the President of the URE to approve prices and tariffs employed by distribution undertakings. The remaining participants on the energy market (manufacturers, trade undertakings, stock market), pursuant to Article 49 of the Energy Act of 10 April 1997, were exempted from the obligation to submit electricity tariffs for approval, as the President of the URE recognised the market on which these undertakings are active as competitive.

Wholesale market

Average sales prices of electricity on the wholesale market, depending on the manner of sales, are presented in the table below.

Table 11. Electricity prices on the wholesale market (PLN/MWh)

Detail		Average weighted price*)	Manner of sales		
			SD	PO	Stock market
Manufacturers	**2005**	140.7	124.8	111.8	117.4
	2006	142.1	127.5	116.9	138.6
	dynamics (%)	*101.00*	*102.14*	*104.64*	*118.04*
Trade undertakings	**2005**	115.2	114.7	116.3	117.7
	2006	121.0	122.6	119.4	126.0
	dynamics (%)	*105.04*	*106.89*	*102.67*	*107.05*

*) Prices also take into account the sale of electricity under KDT.

In 2006 the average weighted price of energy sold by manufacturers increased by 1% in comparison to 2005. The highest prices related to the sale of electricity to PSE S.A., mainly in the form of long-term contracts (non-competitive market). The average price of sale of

electricity in areas subject to competition increased by 3.6% and amounted to PLN 120.65/MWh. Analyses of energy prices, depending on the type of fuel, demonstrated that prices for energy generated at power stations using hard bituminous coal were 16% higher than those of energy sold from power stations using brown coal. In 2005 this difference was even greater (24.3%).

Competition on the direct contracts market was limited by obligations imposed on energy suppliers relating to the need to purchase more expensive energy produced through cogeneration or stemming from renewable sources (purchase of asset rights stemming from certificates of origin or the payment of substitute fees). In 2006 the share of this energy in SD purchase structure accounted for about 14%, whilst in the case of trade undertakings it was 2.03%. Long-term contracts accounted for significant limitation in competition on the electricity market.

Retail market

During the analysed period the sale of electricity on the retail market was mainly carried out by distribution undertakings. The share of the remaining market participants constituted less than 8%. The increase in energy prices to end users was brought about by the following factors: the need to finance the growing share of energy from renewable sources and cogeneration, the need to gradually ensure remuneration for network undertakings exposing their assets in licensed activities, as well as the need to ensure generating entities the possibility of financing modernisation and development investments.

More than 88% of energy sold to end users in 2006 was energy which was sold to the tariff recipients of distribution undertakings (regulated prices). The prices and the terms of applying them had to be included in the tariffs of undertakings and were subject to approval by the President of the URE. Binding provisions[4] in 2006 defined the permitted ceiling for price increases for subsidised tariff groups (providing that the protection of user interests requires the subsidising of certain tariff groups or increase in prices is the effect of eliminating cross subsidising). These prices could increase at the most 3% above the level of inflation in 2005.

Table 12. Average weighted prices of electricity sold to end users (PLN/MWh)

Detail	Dynamics (year)	SD (tariff)		SD (TPA)		Power station and Heat and power plant (TPA)	PO (TPA)
		electricity	transmission	electricity	transmission	electricity	
HV	2005	120.8	73.2	119.3	54.4	119.0	121.3
	2006	124.9	74.4	126.0	59.0	125.2	122.8
	%	*103.4*	*101.6*	*105.6*	*108.5*	*105.2*	*101.2*
MV	2005	125.7	101.4	119.8	92.7	-	120.0
	2006	127.7	104.0	130.1	100.1	-	124.0
	%	*101.6*	*102.6*	*108.7*	*108.0*	-	*103.3*
LV(in SD group C)	2005	138.2	199.6	-	-	-	306.6
	2006	137.1	204.4	135.3	163.0	-	159.2
	%	*99.2*	*102.4*	-	-	-	*57.1*
Households and farms (SD tariff)	2005	144.0	176.3	-	-	-	-
	2006	146.0	187.9	-	-	-	-
	%	*101.4*	*106.6*	-	-	-	-
Average price	**2005**	**133.0**	**139.5**	**119.3**	**58.3**	**119.0**	**121.1**
	2006	**134.5**	**144.8**	**126.0**	**65.6**	**125.2**	**124.0**
	%	***101.1***	***103.8***	***105.6***	***112.5***	***105.2***	***102.4***

Prices do not include VAT. Source ARE S.A.

[4] § 27 of the Regulation of the Minister of the Economy, Labour and Social Policy of 23 April 2004 relating to the detailed principles of forming and calculating electricity tariffs and settlements (OJ, No 105(1114)).

Electricity prices for tariff end users of distribution undertakings grew more slowly (by 1.1%) than in the case of transmission services for the same group of recipients (by 3.8%). The highest growth was for electricity prices for HV end users (by 3.4%) and transmission fees for households and farms (by 6.6%). National fiscal obligations also impact the level of prices for end users. The cost of electricity production was increased by excise duty of PLN 20/MWh, introduced in 2002. The next burden is 22% VAT which is one of the highest in Europe.

Table 13. Fiscal obligations relating to electricity in the EU

Country	Households with annual consumption of 3.5 MWh		Industry with annual consumption of 50 GWh	
	Excise	VAT	Excise	VAT
	Euro/MWh	%	Euro/MWh	%
France	12.5	16	-	-
Spain	5.2	16	3.5	16
Holland	43.0	19	2.4	19
Great Britain	0	5	1.3	18
Italy	45.9	10	22.8	10
Germany	20.5	19	12.3	19
Belgium	7.8	21	3.9	21
Ireland	-	13	-	13
Poland	**5.1**	**22**	**5.1**	**22**

Source: Prepared by ARE S.A. (2006 according to EUROSTAT data).

Excise duty and VAT in 2006 accounted for 22.4% of the price of electricity for households (with average annual consumption of 3.5 MW), whilst e.g. in Great Britain this value was only 4.8%. In the group of large recipients this share constituted 26.13% in Poland, 12.95% in Ireland and 16.36% in Great Britain.

Table 14. Electricity prices in the EU

Country	Households	Industry (VAT excluded)
	Euro/MWh	
Austria	143.9	87.5
Czech Republic	98.4	75.6
Finland	105.1	-
France	115.6	40.7
Spain	209.0	-
Holland	157.1	107.0
Portugal	146.6	87.7
Slovakia	124.1	81.8
Hungary	126.7	88.6
Great Britain	163.9	-
Poland	**107.9**	**59.9**

Source: Prepared by ARE S.A. (Q4 2006 according to OECD data).

Electricity prices in Poland, compared to other EU countries, appeared to be low. In comparing these prices, however, it is necessary to eliminate the price differences between the given countries. In defining prices according to the purchasing power standard, in 2006 the price of electricity in Poland belonged to one of the highest in the EU. In households the share of expenditure on fuel and energy was 2.5 times higher than in those countries with similar climates[5], which signifies that the cost of energy accounts for a considerable burden on households in Poland.

Competitiveness of electricity prices in Poland, in relation to other energy carriers, is presented in the tables below.

[5] Source: URE materials

Table 15. Energy carrier prices for households (VAT excluded)

Name of energy carrier	Q4 2005		Q4 2006		Dynamics	
	PLN/GJ	Euro/GJ	PLN/GJ	Euro/GJ	(%)	
Electricity	97.31	25.40	113.67	29.24	116.81	115.10
Natural gas	34.77	9.08	42.72	10.99	122.86	121.08
Light heating fuel	57.64	15.05	55.53	14.29	96.34	94.97
Hard bituminous coal	14.98	3.91	17.44	4.49	116.42	114.82

Source: Prepared by ARE S.A.

Table 16. Energy carrier prices for industry (VAT excluded)

Name of energy carrier	Q4 2005		Q4 2006		Dynamics	
	PLN/GJ	Euro/GJ	PLN/GJ	Euro/GJ	(%)	
HV electricity	54.97	14.35	56.26	14.48	102.35	100.91
MV electricity	66.00	17.23	65.17	16.77	98.74	97.33
Natural gas (large recipients)	22.77	5.94	24.86	6.40	109.18	107.67
Light heating fuel	52.55	13.72	57.01	14.67	108.49	106.94
Hard bituminous coal	8.73	2.28	8,78	2.26	100.57	99.12

Source: Prepared by ARE S.A.

The presented information clearly indicates that the prices of electricity for households in Poland are far higher than the prices of the remaining carriers. Only for HV recipients in 2006 was the price of electricity somewhat lower than heating oil.

1.6. Level of fuel reserves used for generating electricity

The structure of generating electricity is historically very strongly dependent on access to the national resources of given types of fuel. The power industry mainly uses hard bituminous coal and brown coal, which are the basis for generating about 93% of energy in the country. This type of generating structure leads to State energy self-sufficiency in terms of electricity supply.

Energy security depends on the level of fuel supplies sufficient to maintain production and continuity of supplies to recipients. Regulations contained in the Energy Act serve the purpose of guaranteeing this kind of security. The Act imposes on undertakings generating heat and power the obligation to maintain fuel reserves sufficient to guarantee continuation of electricity and heat supplies to recipients. The level of reserves is defined in the Regulation of the Minister of the Economy, Labour and Social Policy of 12 February 2003 relating to fuel reserves in energy undertakings (OJ, No 39(338)). The provisions under this Regulation guarantee that in the event of disruption in the supply of fuels from primary sources the level of reserves will permit to maintain continuity of production of electricity and heat to recipients. The Regulation determines the level of supplies for hard bituminous coal as follows:

- the reserves must correspond to at least a 3-day (24 hours) consumption period, if the coal is supplied from the mine exclusively by means of belt conveyor flight and at the same time the mine maintains for the needs of the manufacturer of heat or energy supplies of at least 14 days,
- the reserves must correspond to at least a 20-day (24 hours) consumption period, if the coal is supplied by any means of transport (rail, vehicle, belt conveyor flight), but the distance of the manufacturer of heat or energy is not more than 50 km from the mines which supply jointly at least 70% of the amount of consumed coal,
- the reserves must correspond to at least a 30-day (24 hours) consumption period in remaining cases.

Concerning brown coal the reserves must correspond to at least a 20-day period of consumption, in that this amount may include reserves maintained by the mine for the manufacturer of electricity and/or heat. The mine may also regard coal which has not been extracted, but which is in the seam prepared for excavation, as a reserve.

The extraction of hard bituminous coal in Poland in 2006 amounted to 94.3 million tonnes, of which public energy undertakings producing electricity purchased 44.6 million tonnes. The level of hard bituminous coal reserves in mines at year-end 2005 was 3.5 million tonnes, and this amount increased in 2006 to 7.7 million tonnes.

The level of solid fuels reserve indicator guarantees maintenance of State energy security.

Long-term forecasts on fuel and energy demand indicate that hard bituminous coal and brown coal will continue being the dominant raw material in electricity production for the coming years – until 2025 (forecast of the Ministry of the Economy).

1.7. Taking of measures relating to the safe supply of electricity

1.7.1. Measures aimed at meeting peak demand for electricity and procedure in the event of insufficient supply

Legal regulations

Supervision of the security of electricity supplies is carried out by the competent Minister of the Economy, whilst the monitoring of the functioning of the electrical energy system concerning, among other things, the safe supply of electricity, is managed by the President of the URE.

The legal act lying down the continued security of electricity supplies is the Energy Act, accompanied by executive acts. The Act places on the given energy institutions and undertakings a range of obligations and imposes on the operator of the transmission system and distribution system operators the obligation to take specific measures in the event of threat to the national electrical energy system or of insufficient supply of electricity to recipients. The legal act which regulates the safe and reliable functioning of the electrical energy system and which defines the requirements on constructing and appropriately using the network, devices and installations, as well as the quality parameters of electricity and the quality standards of rendering services to recipients, is the Regulation of the Minister of the Economy of 4 May 2007 relating to the detailed conditions of functioning of the electrical energy system (OJ, No 93(623)), which cancels the Regulation of the Minister of the Economy and Labour, binding in 2005-2006, of 20 December 2004, relating to the detailed conditions of connecting entities to the electrical energy networks, movement and the operating of these networks (Journal of Laws 2005, No 2(6)).

In the event of the possibility of a threat to the security of State energy involving lack of balance on the fuel and energy market, application is made of the appropriate procedures on the introduction of limits in the supply and collection of electricity. These procedures are defined in the Regulation of the Council of Ministers of 23 July 2007 concerning the detailed principles and manner of introducing limits in the sale of solid fuels and the supply and collection of electricity or heat (OJ, No 133(924)). In 2005-2006 the binding document was the Regulation of the Council of Ministers of 11 March 2003 concerning the detailed principles and manner of introducing limits in the sale of solid or liquid fuels and the supply and collection of gas fuels, electricity or heat (OJ, no 59(518) as amended), which lost binding force on 20 March 2007 on the strength of Article 3 of the Act of 21 July 2006 on the amendment of the Energy Act (OJ, No 158(1123)). Concerning electricity the OSP and OSD, supervised by the President of the URE, are responsible for the above measures.

In 2006 appropriate agreements were made on the updating of the plan to introduce limits in the supply and collection of electricity, and procedures were established on measures to be taken in emergencies. By Decision of 29 August 2006 the President of the URE approved the updating of the plan to introduce limits on the supply and collection of electricity. The updated plan remained binding between 1 September 2006 and 31 August 2007.

The retention of a given level of fuel reserves in quantities guaranteeing continuity of electricity supplies to recipients stems from the Regulation of the Minister of the Economy, Labour and Social Policy of 12 February 2003 relating to fuel reserves in energy undertakings (OJ, No 39(338)).

The Energy Act also contains regulations which permit the organising of tenders for the construction of new electricity generating capacities or the implementation of ventures reducing the demand for energy in the event of the competent Minister of the Economy stating that the existing electricity generating structures and those under construction, as well as ventures aimed at rationalising their consumption, do not guarantee long-term supply of energy. These tenders, in consideration of the hitherto high level of security in terms of long-term supply of electricity in Poland, were not organised.

Basic risk factors for the safe supply of electricity over the next five years

Significant threats to system operations are as follows:

- reduction in power caused by public and moderate repairs and conditions of transmission network operations,
- increased demand for wattless power, creating additional difficulties in maintaining the required levels of transmission network voltage,
- limits on the rights to emissions into the atmosphere of greenhouse gases, as indicated in the legal regulations and conditions on managing these rights.

High temperatures and hot weather were the indirect cause of KSE breakdown in June 2006, which covered the central part of Poland, as well as the danger of balance obligation failure in July and August 2006. In order to avoid similar breakdowns occurring in the future, the range of tasks was defined as follows:

1) in the nearest future – the following, amongst others, is anticipated:
- the start of short-term network investments involving the installation of condenser batteries,
- increasing the range of monitored threats to KSE operations,
- consolidation of coordinating functions in the closed 400/220/110 kV network,
- increasing the range of intervention operations of generating sources,
- training of the operations services;

2) in the more distant future – it is anticipated, amongst others, to introduce amendments to the Energy Act, as well as to the executive acts and the IRiESP.

Furthermore, the fundamental risk factors for the secure supply of electricity are structural in character. Over the next five years these will be:

- higher than planned growth in electricity demand,
- limited capacity to construct new transmission lines,
- absence of expected growth tendency of summary attainable power of national generating sources.

In the event of considerable growth in demand for electricity the presented PSE-Operator S.A. measures may turn out to be insufficient in the future in terms of effective minimisation of threats. It will be necessary to take extraordinary steps, beyond the competence of the OSP. These measures should concentrate on minimising the risk of threat and on equipping the operator with the necessary instruments, permitting effective action in the event of a threat arising.

Increased demand for electricity

In the coming years the expected rapid growth in economic development will lead to growth in national consumption of electricity stemming both from the needs of the developing economy as well as households. The growth in electricity demand is important in terms of security of supplies. Currently registered data[6] indicates a growth tendency – approx. 5% annually. A new phenomenon was the far higher and above average growth in demand during the summer and its concentration in the Warsaw agglomeration. In 2005-2006 an almost 20% increase in demand for power was noted during the summer season.

[6] *"Security of Electricity Supplies Over the Next Five Years"* – PSE-Operator S.A., May 2007

Limited capacity to construct new transmission lines

The possibilities of constructing new transmission lines were described in the PSE S.A. investment plan. These take into account the long-term investment process, including the long period required for obtaining building permission. Current experience points at systematic lengthening of the investment cycle (up to a dozen years or so). In keeping with the PSE S.A. investment plan, over the next five years the only new transmission lines will be:

- the P•tnów-Plewiska 400kV line,
- the Plewiska-Ostrów 400kV line,
- the Ostrów-Br•szecin 400kV line.

During this period it is not possible to construct, in terms of significant security of supplies, any new centre-north connections, new lines supplying the Warsaw agglomeration and to guarantee reverse supply from the Narew station. An additional outcome of the lack of these connections will be increased limitations, during the summer period, on the movement of power from certain power stations (e.g. Be•chatów, Kozienice). The lack of transmission lines has often led to modernisation on transmission networks being rendered impossible – e.g. modernisation of the Pasikurowice-Dobrze• 400 kV line which is significant in terms of supplying the Wroc•aw agglomeration. It will be possible to modernise this line once the Plewiska-Ostrów 400kV line is released for use.

Decreasing surpluses of power in the National Power System (KSE)

Expected growth in national demand for electricity is not sufficiently compensated through new generating sources. The only new planned sources of production of significant meaning to the national balance of power, covering the next five years, are three investments with total net generating capacity of 1 753 MW. The start-up of new generating units in this period will be accompanied by long-term withdrawal of operating generating units with the purpose of carrying out repair work and closing down certain units. There is a lack of new locations in the northern part of the country.

The planned balances of power for 2005-2009 demonstrate a systematic fall in surplus of power available to the OSP. Particularly worrying is the considerably faster fall of this surplus during the summer period in connection with the repair campaign and limitations in transferring power out of certain power stations as a result of the decrease in the permitted load of transmission lines during high temperatures. The transmission system operator has limited influence on changes to schedules concerning repair work on blocks announced by power stations. Furthermore, during the summer reduction in electricity production is noted by heat and power plants which were accompanied by reduced capacity to make use of the power plant for the production of wattless power.

In exceptional situations which could cause a serious breakdown (similar to the one which took place in the KSE during the summer of 2006), electrical energy security involving the immediate import of energy from abroad may, to a limited degree, be guaranteed by synchronic integration of the national electrical energy system with connected electrical energy systems of the EU countries under the UCTE. Any shortages in national generating

capacity cannot be effectively substituted by importing electricity through inter-system connections. The reason for this are the ever increasing circular flows caused by wind power plants located in the northern part of Germany. An important barrier are the extremely high prices for electricity in the neighbouring EU countries (particularly in Germany) which in the event of the need to import energy during threat situations would not be accepted by society.

Risk limiting measures

Measures taken by PSE-Operator S.A.

During the coming years, in consideration of the lack of significant development of the transmission network and actual stabilisation of summary attainable power of national generating sources, it will be necessary for PSE-Operator S.A. to take measures in order to minimise the threat to supply security. The most important of these include:

- the organisation of tenders for OSP operating reserves,
- the installation of additional sources of wattless power,
- the development of transmission networks,
- the start-up of additional transformers operating in UHV networks (UHV/110 kV),
- the increase in technical capacity to import through UCTE connected systems.

Other measures

Security in supplying electricity may also be improved by:

- changing the provisions permitting swifter management of network investments (this concerns in particular projects which are important for the supply of electricity),
- transferring network assets to the OSP (this will help improve the transmission network investment process).

Necessary extraordinary measures

In the event of considerable increase in demand for electricity, when measures taken by PSE-Operator S.A. are insufficient, in order to effectively minimise threat up to the time of starting up new transmission lines and releasing for use new generating capacities, extraordinary measures should be taken by the authorities responsible for the safe supply of electricity. These include both measures aimed at minimising the occurrence of the risk of threats occurring and equipping the operator with the necessary instruments in case of threat. The most important extraordinary measures are as follows:

- installation of intervention generation sources,
- increasing import capacity on the eastern border,
- introducing limits in the collection of electricity

1.7.2. Effectiveness of decisions

Measures which should be implemented in the nearest future in order to ensure security of supplying electricity are defined in the Programme for Electrical Energy. The Programme plans the following:

- introducing market mechanisms, stimulating the development of investment in sources of generating electricity,
- promoting new, economically effective technologies of production based on national fuels,
- developing network connections with neighbouring electrical energy systems,
- cooperating in the creation of a regional and European electrical energy market with neighbouring countries and on the European Commission forum,
- taking measures aimed at improving the effectiveness of generating, transmitting and distributing electricity,
- wider use of and support for investment in renewable sources of energy.

Under competitive market implementation conditions the growth in the security of supplying electricity and the reliability of electricity supplies to recipients may take place as the result of restructuring and modernising technology and organisational changes in the electrical energy sector. This growth may be ensured by creating and constructing appropriately strong organisational structures in electrical energy sector undertakings, capable of bearing necessary investment outlays in generating, transmission and distribution capacities, as well as thanks to the implementation of measures aimed at improving energy effectiveness in the economy.

The application of market mechanisms in the electricity sector may cause unforeseeable situations (an example may be the breakdowns in the electrical energy systems of certain European countries in past years), posing a threat to the reliable functioning of these systems. These threats cannot be eliminated merely by introducing provisions of the law and regulations. It is particularly important to establish new principles of monitoring and coordinating actions, guaranteeing secure supply of electricity over long periods of time. One of these mechanisms is active international cooperation and participation in the work of organisations coordinating work ensuring security of the connected systems. Poland is guaranteed this role by participating in the UCTE, which is working on the so-called *Operational Handbook*, in other words a complex document defining technical standards and

procedures necessary for the safe working of systems under liberal energy market conditions and division of integrated undertakings into generation, transmission and distribution activities. The monitoring of the safe functioning of electrical energy systems belongs to the obligations of regulators grouped around the CEER, as well as to the President of the URE. This is an important measure which permits the President of the URE to engage in organised and long-term observation of the procedures and mechanisms of ensuring security and of the meeting of informational obligations by transmission and distribution system operators.

In 2006, under the supervision of the President of the URE:

- there was ongoing updating of the informational database on energy sector undertakings, in particular of data on generating capacity in generating sources and peak demand for power, obtained from the OSP and other sources e.g. ARE S.A. and UCTE,
- observations were carried out on the functioning of the electrical energy system, with particular attention being paid to implementing the decision of the President of the URE to designate PSE-Operator S.A. the operator of the electrical energy transmission system. During procedure information was obtained, amongst others, on the implementation of measures relating to the management of the system and transmission capacity of cross-border connections, confirming appropriate operator behaviour in ensuring reliability and quality of electrical energy supplies,
- there was agreement on the updating of the plan to introduce limits in the supply and collection of electricity, thanks to which during crises it will be possible to maintain security at a basic level,
- during controls carried out on compliance of the level of fuel supplies necessary for maintaining continuity of electricity supplies to recipients, with levels defined in the Regulation of the Minister of the Economy, Labour and Social Policy of 12 February 2003 relating to fuel reserves in energy undertakings, confirmation was obtained that there is no threat to the security of electricity supplies.
- use was also made of the manner of procedure concerning the approval of the IRiESP referring to the balancing of the system and managing system limitations, in particular to the principles of establishing the price of electricity in forced production.

Improved State energy stability and security is ensured by Poland's participation in the planned investments to take place in the Baltic region States. In December 2006 in Vilnius an agreement was signed on the cross-border connection of the electrical energy systems of Poland and Lithuania, whilst in the first half of 2007 cyclical meetings took place with the participation of Poland, Lithuania, Latvia and Estonia on the construction of new electrical energy blocks in the nuclear power station in Ignalin in Lithuania. New capacity will be the answer to the growing demand for electricity and will ensure cheaper energy than other sources. The above will lead to energy security in the region, including also the north-east part of Poland.

Information submitted from the electricity wholesale market may constitute the bases for new investment in generating capacity. If the investments are not started the Energy Act anticipates the President of the URE organising a tender for the construction of new generating capacities. Improvement in conditions ensuring appropriate level of generating capacity should take place after the implementation of Directive 2005/89/EC of the European Parliament and of the Council of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment.

In keeping with the Energy Act tenders for new electricity generating capacity should be conducted if the energy competition market does not ensure appropriate investment supply in new sources of electricity. Tenders will be announced in those situations where procedures in reference to new generating capacities or measures taken to ensure security of supplies are not sufficient and cannot meet the objective. Pursuant to Article 16a(1) of the Energy Act of 10 April 1997, in the event of possible insufficient long-term supply of electricity, once the competent Minister of the Economy ascertains that hitherto measures do not guarantee long-term security in the supply of energy, the President of the URE announces, organises and conducts a tender.

In order to introduce solutions aimed at improving electricity security it is necessary to take the following measures:

- elaborate system solutions removing the barriers preventing the development of network infrastructure,
- identify the possibilities of obtaining EU funding and to elaborate methods of effectively absorbing funding for the development of networks and cross-border connections,
- implement the Directive on the security of electricity supplies and the development of infrastructure, including cross-border transmission infrastructure,
- obtain EU resources in order to carry out feasibility studies on the construction of electrical energy lines guaranteeing alternative ways of supplying electricity,
- support the extension of electrical energy distribution networks.

It is also anticipated to limit energy losses in the national electrical energy system by increasing the capacity of electrical energy lines, improving the division of energy and limiting the transmission of energy by means of 110 kV lines over long distances. It is also planned to extend connections with neighbouring countries in order to increase energy transmission capacity. Increasing the transmission capacity of the electrical energy network

and decreasing losses in transmission constitute an important element towards the creation of a competitive energy market.

1.8. Expected demand for electricity[7]

It is estimated that the forecast demand for final electricity in the national economy in 2006-2030 will increase by about 109%, in that the greatest increase in the sectors of the economy is forecast for the services sector (by 176%) and households (by 110%), with the lowest being for transport – by 56%.

Table 17. Demand for final electricity in various sectors of the economy (TWh)

Sector	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Industry	25.1	27.87	31.39	36.16	43.99	52.72
Transport	41.25	47.33	49.43	56.59	65.06	70.44
Agriculture	4.41	4.41	4.38	5.28	6.19	6.91
Services	1.50	2.27	2.49	2.88	2.86	2.91
Households	26.99	33.47	42.15	47.91	61.10	74.58
TOTAL	**99.25**	**115.35**	**130.38**	**148.82**	**179.20**	**207.56**

[7] Drawn up on the basis of the ARE S.A. document entitled: *"Updating of the long-term forecast for fuel and energy demand and determination of the probable level of energy needs by the economy until 2030"* – Warsaw, August 2007 (basic variant).

Demand for final electrical energy will continue growing until 2030 at an average level of 3.0% and by 2030 will stand at approx. 208 TWh.

1.9. Planned or under construction new electrical energy capacities

In the 1990s the long-term contracts (KDT) for the purchase by PSE S.A. of electricity from chosen producers made investment possible; these were aimed at improving the effectiveness of generating electricity and protecting the environment. The KDTs gave secured investments of around PLN 30 billion. These involved 18 130 MW, which constituted about 52% of generating capacity in the national energy sector in 2006. The total value of loans taken out by manufacturers for regeneration and modernisation investments, calculated according to current prices, was PLN 20 billion. By 2006 producers had repaid 50% of the debt. The longest KDT will expire in 2027. The Act of 29 June 2007 on the principles of covering costs generated by producers in connection with earlier termination of long-term contracts for the sale of power and electricity (OJ, No 130(905)) introduced mechanisms permitting the voluntary termination of KDTs and regulated the manner of covering costs connected with early termination of these KDTs.

Table 18. Investments in generating units at energy undertakings, completed in 2005-2006

Name of undertaking	Date of signing and period of obligation of the contract	Task/no. of generating unit
BOT El elektrownia Be•chatów	01.08.1997 – 31.12.2005	Modernisation of blocks 1-12
Po•udniowy Koncern Energetyczny		
Elektrownia • agisza (PKE)	13.05.1996-31.12.2006	Modernisation of blocks 6-7 and building of IOS
Elektrownia • aziska	25.07.1995- 31.12.2005	Heating installation for block 7 Modernisation and building of semi-dry IOS at blocks 1-2
Elektrownia Jaworzno III	12.04.1995-31.12.2006	Modernisation of blocks 1-6 and building of IOS at four blocks
Electrabel Po•aniec	26.03.1996-31.12.2006	Modernisation of blocks 5-8 with wet IOS
Dalkia Pozna• Zespó• EC	09.10.1996-31.12.2006	Completion of combined block 3 at EC Pozna• -Karolin

KDTs facilitated the modernisation of more than 50% of generating capacity in the public energy sector. The application of modern technology reduced the emission of dangerous substances into the environment, in particular dust by more than 60% and sulphur dioxide by about 40%. The effectiveness of generating electricity also improved by 3-4%.

Many national generating units are technologically out-of-date. Large investments are required in order to regenerate their capacity and to modernise them. New generating capacities are also necessary in order to satisfy growing electricity demand in terms of the ever stricter environmental protection requirements.

Currently three investments have been determined relating to the construction of new system generating sources:

- Block – 464 MW at Elektrownia P•tnów II,
- Block – 833 MW at Elektrownia Be•chatów
- Block – 460 MW at Elektrownia • agisz

As it stems form long-term development strategies, developed by generating undertakings, it is planned to build new generating capacities. The size of the potential generating units and their location are the subject of current analyses of these undertakings, the transmission system operator and the contractors of these investments. The final decision to invest, apart from the current economic, social and ecological conditions, will undoubtedly, amongst others, be influenced by:

- European and national climate policy,
- Poland's energy policy in relation to primary fuels and nuclear energy,
- the development of cross-border and the 400 kV national network,

- inspection of Directives relevant to the functioning of the energy sector,
- the need to obtain certificates for the whole of "colour" energy.

2. Conclusions stemming from the analysis of the safe supply of electricity

1. In 2005-2006 use of the existing KSE reserves permitted the increased demand for electricity to be satisfied through national production of electricity, despite the short-lived threats which were, among other things, the result of extreme weather conditions. The production potential also permitted considerable export of electricity. In 2006 the margin of power amounted to 32%, which in the short-term means that there is no greater danger to electricity supplies.
2. In connection with further anticipated growth in the demand for electricity, the successive drop in power reserves and considerable consumption of production assets, in order to improve the energy security of the country it is necessary to construct new capacities, to develop and modernise transmission and distribution networks and cross-border connections, permitting in case of need for greater international exchange (import) of electricity. The building of inter-system connections (apart from consolidation within KSE) should also be coordinated at given State borders. Coordinated development of cross-border connections is the best way of ensuring security of electricity supply and permits use of Poland's transit location.
3. Fixed assets both in the generating sub-sector and in distribution are to a large degree depreciated and require considerable regeneration and development outlay. Investments carried out by the national electricity generation sub-sector to a large degree boil down to the unsatisfactory regeneration (based on the same low-efficiency technologies) of depreciated generating capacities. Considering the progress of EU countries in terms of increased efficiency in generating electricity this places our electrical energy sector in a difficult market position in comparison to other EU States. In the long-term this situation could lead to problems in meeting electricity demand.
4. Measures anticipated in the *Electrical Power Programme* approved by the Council of Ministers in March 2006 relating to the creation of consolidated energy groups, are currently being brought into force. The creation of large and strong energy companies is an important objective of State energy policy, aimed at retaining the security of electricity supplies and the possibility of financing necessary investments. This is particularly important in the context of the forecast growth of 109% in the consumption of final electricity by 2030.
5. The passing of the Act of 29 June 2007 on the principles of covering costs generated by producers in connection with earlier termination of long-term contracts for the sale of power and electricity, terminating the KDT, provides an opportunity to speed up the development of the competitive electricity market in Poland and will ensure stable financial standing of electrical energy producing undertakings.
6. Economic and financial analyses demonstrate improvement in the profitability of electrical energy sub-sectors, best seen in the generation and transmission sub-sectors. The level of revenue attained in the sector undoubtedly has an impact on the lower level of the sales profitability indicator in distribution. In given undertakings net sales profitability is from -10.2% to 17.39% which clearly indicated the range of diversity.
7. The scale of growth (approx. 1%) of average electricity prices in wholesale trade by producers was similar to the growth dynamics of the average price of electricity for end users of tariff distribution companies which in 2006 constituted almost 89% of

end users of public electricity undertakings. There was clear increase, however, in transmission fees (3.8%). It must be remembered that electricity prices in Poland, according to the purchasing power standard, belong to the highest in the EU.

8. The security of electricity supplies to recipients in the next few years should be guaranteed by the current surplus of generating power in the KSE and the large reserves of basic fuel used in the electricity sector i.e. hard bituminous coal and brown coal. In order to guarantee sufficiency in the generating sub-sector it will be necessary to construct new sources of generation in the future. The necessary investments must be started today. Otherwise, it is possible that tenders will be announced for the construction of generating capacity in keeping with the provisions of the *Energy Act*.
9. In order to guarantee security of electricity supplies it is necessary to take measures to retain the stable, secure and reliable work of the national electrical energy system. With this purpose in mind it is necessary, among other things, to speed up the building of new transmission lines by simplifying the “right of way” and by ensuring the construction of intervention sources of energy, if the threats cannot be removed by developing, within the required period of time, the transmission network.

10. It is necessary to accept solutions concerning the development of the KSE balancing mechanism based on integrating the process of balancing energy and the operational reserve, taking into account future location aspects. PSE-Operator S.A. should be made to draw up and organise consultations with interested entities and to present, for approval, to the President of the URE the appropriate amendments relating to the KSE balancing mechanism.