1. Introduction

Poland is a medium size country (approx. 313 000 km² and 39 mil. inhabitants), having substantial resources of primary energy (mostly solid fuels: hard coal and lignite), while other resources are rather small as in case of natural gas or minimal in case of crude oil. Also, wood and other RES are of minimal significance in the energy balance of the country. Poland does not have uranium ore and nuclear power plants. Furthermore, water energy resources are also limited.

Polish continental and maritime climate results in differentiation of calculating temperature (from -16°C to -24°C) in the heating season, which usually lasts from the middle of October to May (approx. 210 days ±10%). Average temperature in the heating season equals approx. 0°C, and a number of degree-days ranges from 3 450 at the seaside to over 4 000 in the mountains.

Heat supply constitutes one of the most important sectors in the Polish energy economy, as approx. 50% of primary energy is utilised for heat production. Simultaneously, a space heating and domestic warm water constitute approx. 80% of energy consumption in housing sector. Heat production and distribution play an important role in energy balances of the cities. Approx. 70% of heat demands in towns is covered through DH networks supplied from CHP and heat only boilers (HOB). However in rural areas and small towns heat demands are covered mainly by local (often - individual) heat sources.

It is necessary to stress that DH system is in fact a heat carrier distribution system, because heat can be produced in different heat sources - using different technologies and fuels. Thus DH sub-sector is strongly connected with other energy sub-sectors like: power, gas, coal, oil as well as local energy resources such as geothermal energy, excess and waste heat from industry, refuses utilization etc. Domination of solid fuels in Polish energy balance has an essential meaning for substantial development of DH systems (since 1953).

2. DH Sector in Poland

Economic transformation caused that former 50 of state owned DH companies were divided into hundreds of small entities. Thus DH sector is nowadays dispersed and there is no completely statistics of the sector. Some data concerning licensed companies are available in head office of the President of Energy Regulatory Authority (PERA); more global data are available in Main Statistics Office.

2.1. DH Companies

The number of economic entities providing activity in heat supply field exceeds 3 000, but only approx. 850 of those is licensed \(^1\) by PERA. Greater part of DH companies is selling very small amount of heat (less than 1 MW of heat output ordered by the customers). Majority of not licensed companies operate very small heat sources but there are also some large industrial heat sources producing heat for needs of the factories and selling small amount of heat to the outside customers.

Ownership and organisational transformations in the heating sector are not finished yet. In some communes DH companies have not been transformed yet, and they continue operations on the basis of act on state-owned companies.

The majority of communes created its own economic entities in form of Ltd. Co. and Joint Stock Co. (100 % owned by the communes) or budgetary units, which operate DH system

\(^1\) According to the EL the license is not necessary if heat output ordered by customers is below 1 MW (excluding heat trade) or if heat is generated in industrial process as a “waste heat”.
(assets) taken over from the liquidated State owned companies. In several communes DH companies are privatised (with participation of national or foreign capital), and shares of a few companies are listed at the stock exchange. In some regions communes did not take over DH assets (owned by the State Treasury) and DH companies acting independently from the communes were established there.

Organisation of DH sector is very differentiated with reference to scope of the economic activity and size of DH companies. As earlier stated the statistics of DH sector are incompletely but the greater part of heat sale is recorded by PERA during process of heat tariffs approval.

Basing on that data it can be stated that greater part of DH companies is selling heat produced in their own heat sources and transmitted through their own DH networks. For instance among of all licensed DH companies, which in 2002 obtained heat tariff approval of PERA, heat producers only (mainly large CHP plants) compose 14 %, and heat distributors only (purchasing heat from producers) makes just only 10 % of all those DH companies.

The size of DH companies is very differentiated. Small and middle size DH companies constitute the largest part (about 90 %) of the licensed DH companies, but yearly sale of heat by those companies amounts to only approx. 30 % of the total heat sale by all licensed DH companies. The smallest DH companies (with yearly heat sale up to 100 TJ) constitute about 50 % of all licensed DH companies, but their yearly heat sale amounts approx. 4 % of the total heat sale by licensed DH companies. By contrast, the share of the biggest Warsaw DH Company in total yearly heat sale by licensed DH company’s amounts to approx. 15 %.

It is worth mentioning, that the territory of DH companies activity is also differentiated. The DH companies are usually operating heat sources and DH networks in one commune (town), but there are also DH companies operating heat sources and DH networks in more than one commune on the territory of one voivodeship (province). Several DH companies operate in many communes located on different voivodeship (province) territory.

Apart of that some Energy Service Companies (ESCO) has been established, which operate heat sources and installations belonging to different owners (e.g. hospitals, housing cooperatives and sometimes municipalities).

Another type of “ESCO” (Energy Saving Company) also is active in DH sector. This ESCO is offering a project of any heating installation modernisation (building, DH network, heat source or whole DH system) and realisation, including “financial engineering”. The warranted savings resulting from the project realisation have to secure profitability of its realisation (payback in agreed period with profit for ESCO).

The DH companies are organised in three main associations acting in DH sector:

- DH Chamber of Commerce – assembling over 200 DH companies representing approx. 85 % of total heat sale,
- Polish Association of the Utility CHP – assembling utility CHP selling approx. 80 % of heat (to DH companies and other customers),
- Association of Industrial CHP – assembling greater part of industrial CHP producing heat for technological needs and selling surplus heat to the municipal DH networks.

The above-mentioned associations of heat suppliers are acting separately (there is no permanent co-operation despite of common interest and problems to be solved). Quarrels occur sometimes between separate heat producer and distributor and sometimes one association has different opinion than other (mainly in provisions understanding).

There is only one DH Research & Development Centre (DHRDC) situated as an organisational unit of Warsaw’s DH Co. and is mainly working on technical problems arose in the
company. The DHRDC activities are financed by Warsaw’s DH Co. and entities, which ordered in that centre any R&D works.

Some research works and studies concerning DH sector are realised by several Technical Universities (Faculties, Institutes, Research Centres etc.). Those activities are mainly financed by entities that ordered realisation of R&D works; sometimes also grants are available from State budget. Sometimes particular Technical University participates in realisation of project financed from EU funds (usually as a “cheap labour force” working for foreign main releaser of the project).

2.2. DH customers

There are different types of heat users. The greater part of DH customers constitutes owners of multifamily blocks (mainly housing co-operatives) but there are also one family house’s owners as well as private buildings owners and new form of ownership – common ownership of multifamily block by flat owners. There are many different associations assembling house owners - mainly housing co-operatives in particular provinces or in whole country. Other house owners are not so consolidate like co-operatives having long tradition in Poland. House owner associations and particular house owners are usually “fighting” with DH companies and their associations and sometimes also with PERA’s decisions concerning heat tariffs etc.

Greater part of customers try to understand changes in socio-political system, market economy rules etc. A part of customers prefer “fighting” with DH company (mainly protesting against heat price increase) instead understanding of necessary changes in tariff calculation and billing system. However there are also customers who are reducing heat consumption owing to “thermo-modernisation” of building (improvement of thermal insulation, automatic control etc.). In some cases DH companies signed with customers additional contracts on maintenance of receiving installations etc.

2.3. Press and media

There are several technical magazines publishing a lot of interesting articles, news etc. concerning technological, economic and organisational aspects of DH sector and particular DH companies activity. Some of the DH companies issue own periodic magazine. Newspapers and media are only occasionally interested in publishing information concerning DH sector (mainly about quarrels, interruptions in heat supply and other “sensations”) but not in informing about real problems occurring in the sector development and restructuring.

2.4. Characteristic of DH systems

2.4.1. Heat sources

Heat sources can be divided as follows:
- large utility CHP,
- industrial CHP and HOB supplying both parent industrial factories and municipal DH networks,
- condensing power plants selling heat transported to the nearest cities,
- large HOB established as a first stage of utility CHP plant for large city which further development was later withdrawn,
- municipal CHP and HOB, which supply DH networks or local heating systems.

Thousands boilers of different type and size are operated in above mentioned heat sources by over 3000 of DH companies. The boilers are producing steam or hot water. Large steam and hot water boilers are installed in utility and industrial CHP plants and large HOB plants supplying DH networks in larger cities.
Smaller hot water boilers are installed in communal and industrial HOB plants supplying DH networks in smaller cities and very small hot water boilers are installed in local HOB directly supplying receiving installations in one or a few buildings.

Utility CHP plants are equipped with large, high-pressure steam boilers (capacity over 100 t/h) and steam turbines as well as large hot water boilers. Boilers are mainly pulverized coal fired (there are also some oil fired boilers). Large hot water boilers are also installed in utility HOB plants (built in the past as a first step of a future CHP plant, but further investment was stopped).

Communal HOB plants are equipped with water heating boilers (mainly La Mont type). Boilers installed in communal heat sources are usually coal fired with moving grid and capacity from 1,5 to 29 MW, there are also some gas or oil fired boilers installed after change of socioeconomic system in Poland.

Industrial CHP and HOB plants are equipped with different type of steam boilers and water heating boilers. Greater part of industrial boilers is coal fired with moving grid and capacity up to 29 MW for hot water boilers and 64 t/h for steam boilers; there are also several larger hot water boilers with capacity from 45 to 160 MW (pulverized coal fired). Larger industrial’s CHP are equipped with similar boilers like utility CHP.

The boilers installed in utility CHP are rather old but their technical condition is not so bad owing to a permanent maintenance and upgrading. Generally age of industrial and communal boilers is very differentiated, greater part of boilers is old and their technical condition is pure. Modernization of existing boilers is realized in last period (after change of economic system). The scope of modernization is differentiated depending on needs and sometimes-financial possibilities. In last decade, especially after EL coming into force and implementation of new principles of tariff setting, an old coal fired local boilers are liquidated and replaced by modern fully automated boilers (usually gas fired, sometimes oil fired).

Heat is delivered from the heat sources directly to the customers and to the DH networks. Average energy efficiency of public (utility) CHP equals approx. 82%, and approx. 77% for industrial CHP. Efficiency of industrial and municipal boiler houses supplying DH networks amounts approx. 67%, but local HOB’s efficiency is very low (sometimes below 50 %).

There is no official statistics of heat sale (a lot of local HOB are producing heat without measurements). It can be estimated that in 2002 heat sale amounted approx. 350 000 TJ. It is worth to underline that heat sale is strongly depended on weather (atmospheric) conditions and can differ even 30-40 % between extreme “warm” and short heating season in comparison with cold and long ones.

2.4.2. DH networks

DH networks in majority were constructed under ground (in concrete ducts) with a use of outdated technology based on on-site assembly works (pipelines with anti-corrosive paint, fibrous material insulation, and asbestos-cement casing). Some part of the DH networks is laid down over the ground (approx. 10%) usually on low pillars. Since 1990 (after economic transformation) preinsulated pipes are available mainly for replacing old pipes and new customers connection. Also modern fittings and accessories are in use for DH networks modernisation. The total length of DH networks operated by licensed DH companies was approx. 17 000 km and heat losses composed less than 13 % of heat delivered to those networks.

The age of networks is differentiated; there are very old pipes (35 years and more) and quite new (1-2 years old).
Since 1990 a progress in DH networks replacement is observed owing to the World Bank loans (modernisation of 5 biggest DH networks) and permanent refurbishment of the networks in all DH systems. The modernisation of DH networks is mainly connected with old pipes replacement by pre-insulated (pre-fabricated) pipes. Simultaneously modern fittings and accessories are installed in modernised DH networks.

Apart from availability of capital (financial sources) there are no real barriers in realisation of investments connected with DH networks refurbishment.

2.4.3. Customer’s installations

Customer’s installations as a part of building are owned by building owners. Greater part of residential buildings is owned by housing co-operatives. During last years a new form of building ownership is developed in former municipal residential buildings. The flat owners in those building are obliged to establish a “housing collective” which represents all flat users (signing heat supply contract with DH company etc). Municipality usually owns public buildings (administrative buildings, schools, hospitals etc.).

Owner of building usually maintains internal installations in buildings (including heating and domestic warm water). In some cases owners of building are signed agreement with energy service company to maintain heat installations in buildings. In some cities that kind of services are offered by DH company (separate contract is signed).

There is no official statistics concerning billing system in housing sector. According to the Building Law (requirements for buildings construction) all new and modernised buildings connected to DH network have to be equipped with heat-meter in connection to the network (in substation) as well as “equipment giving possibility to divide cost of heat supplied to the building between particular flat users” and “regulating equipment” in heating installations. Existing buildings connected to the DH network are obligatory equipped with heat-meters, but installation of a rest of the “measuring equipment” depends on decision (mainly on financial possibilities) of the building owner (housing co-operative, “housing collective”, private company or person etc.).

There is a small amount of buildings with individual metering of heat supply to the flats. Installation of heat-meters in every flat is possible only in buildings with “horizontal” heating installations (one inlet in every flat). That type of installations is not developed yet, but there are some private housing estates where buildings are equipped with “horizontal” installations.

The greater part of existing buildings is equipped with “vertical” receiving installations (vertical pipeline is supplying radiators or taps on many floors) thus in those buildings only costs allocators and warm water-meters can be installed for individual flat users billing. It is necessary to stress that implementation of individual billing system in building needs installation of regulating valves in radiators (usually thermostatic radiator valves are installed). There are several service companies installing costs allocators and thermostatic radiator valves together with reading of costs allocators indications and implementation of computer programs for calculating of heat costs allocation between particular flat users.

2.4.4. Human Resources

Recently the staff of DH companies knows technical problems quite well but has no experience and knowledge of market oriented management and economic problems. The possible solutions are to employ high-qualified specialists in every DH company, or to change existing custom and employ high-qualified experts in specialized service companies (advisory, consulting, R&D etc.) supporting DH companies according to their needs in frames of commercial activity.
In my opinion the second solution is better and I hope cheaper. In that case support should be directed partly to the DH companies (marketing, knowledge of procedures, general knowledge of economic mechanisms and principles of financing from different sources etc.), as well as to the service companies (education of specialists, purchase of modern tools, computer programs etc.).

Restructuring and development of DH sector depends not only on qualifications of DH companies’ staff, but also on knowledge of authorities (on local, provincial and national level) responsible for energy policy and local energy planning.

The local authorities and other DH company’s owners, as well as supervisory board’s members have not knowledge of DH systems operation problems including technical and economic conditions. The local authorities are often seeking to support the municipal budget with revenues from DH company, irrespectively for the needs of maintenance and overhauling. Recently local authorities are selling DH assets with aim to support their budget instead to finance restructuring and modernization (rehabilitation) of heat supply system and develop local energy planning and optimization of energy supply costs.

In my opinion a broad training program should be established for all CEEC both in a form of training courses (national and international) and as a permanent education in schools, colleges and universities. The training program shall be designed for management, supervisory boards and staff of DH companies and above mentioned service companies as well as local authorities too.

One of the important factors influencing on understanding of DH company context is stability of legislation and rules defining frames and principles of DH company’s activities in market oriented economy. Frequent changes of primary and secondary legislation that unfortunately took place in Poland are one of the main obstacles in understanding of principles regulating DH company activity. Unclear provision concerns not only relationship between supplier and consumer, but also role of administration (Ministries, PERA, local authorities etc.) as well as “Antimonopoly Court” and civil courts in regulating of DH sector activity. The problem is connected with improvement of existing legislation described in DH Policy Report.

The important problem is connected with education of candidates for employment in DH companies and training of staff. Transformations of DH system are connected mainly with changes in mentality of all parties participating in heat production, distribution and trade as well as heat utilisation (it means suppliers and customers). Right understanding of the DH company and consumer’s activities from technical, operational and economic point of view is a basic condition for a good relationship between partners and/or competitors on the heat market. In my opinion there is no good atmosphere in relations between DH companies and consumers, because they do not try to understand their own and common interests as well as they prefer “fighting” instead of mutual understanding and co-operation. Thus probably most important is education (training) of DH company management and staff in improvement of relationships on heat market as well as public relations (including “socio-technical” methods).

Dispersion of DH sector and very small size of the greater part of DH companies is a factor which influence on a possibilities of high qualified specialists employment. Large companies are able to employ specialists with high salaries because scope of their activity is large enough. While small companies are usually not able employ high-educated professionals because of economic possibilities and limited scope of work. Thus for small companies and probably larger too will be more profitable to conclude agreement with specialised service company instead of high qualified specialists employment.

In my opinion scope of DH company’s management and appointed personnel training should include following spheres:
• marketing methods, public relations etc.,
• tender’s procedures and projects planning (technical, environmental and economic requirements, principles of economic analysis and evaluation etc.),
• financing from different sources (requirements, conditions, necessary guaranties etc.),
• supervision of projects realisation (monitoring and evaluation of technical and economic effects, profitability etc.).

Additionally, educational programs of professional schools, colleges and universities should cover above-mentioned spheres.

2.5. Heat Market

There lack of completely statistics concerns not only DH sector but also whole energy sector (especially heat supply/consumption and liquid fuels use are not fully covered by statistic reporting). Thus the exact data concerning heat market are not available. Approximate share of different heat supply systems in heat market (without heat sources covering auxiliary consumption of parent industrial plants) can be presented (estimated data) as follows ²:

→ DH networks supplied by CHP and HOB plants 53.0 %
→ local coal-fired and coke-fired HOB 17.4 %
→ local oil-fired and gas-fired HOB 3.0 %
→ electric thermal-storage heaters 0.7 %
→ coal-fired furnaces 25.9 %

Domination of solid fuels in national energy balance has essential importance for the structure of heat market presented above. The table below shows structure of fuel use in various heat sources during the last decade ³:

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Share of the fuels in total fuel consumption for heat production (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Utility heat sources ¹</td>
</tr>
<tr>
<td>Solid</td>
<td>95.3</td>
</tr>
<tr>
<td>Oil</td>
<td>4.3</td>
</tr>
<tr>
<td>Gas</td>
<td>0.2</td>
</tr>
<tr>
<td>Others</td>
<td>0.2</td>
</tr>
</tbody>
</table>

1) all plants supplying heat to the DH networks;
2) combined heat and power plants;
3) heat only boiler plants.

Presented above data show that a slow decrease of solid fuels share in heat production can be observed, simultaneously with increase of gas use for this purpose.

Permanent decrease of heat production in different heat sources is observed since 1980, because of the national economy collapse in 80’es and restructuring of the industrial sector as well as rationalisation of heat use in the last decade. Simultaneously share of co-generated heat in total heat production in CHP plants increased during last decade ³:

<table>
<thead>
<tr>
<th>Kind of heat source</th>
<th>Share of heat production in cogeneration cycle [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility CHP</td>
<td>58.2</td>
</tr>
<tr>
<td>Industrial CHP</td>
<td>63.1</td>
</tr>
</tbody>
</table>

² Source: W. Cherubin – WEC Zakopane 2000
³ Source: W. Cherubin – ENERGY SUMMIT 98, EMA November 2001
In the same time share of electricity produced in CHP cycle in total electricity production decreased in industrial plants (from 4.7 % in 1990 to 4 % in 2000) while in utility plants increased from 8.2 % in 1990 to 11.5 % in 2000. 44

Decrease of heat production during last decade is shown in the table below 3:

<table>
<thead>
<tr>
<th>Year</th>
<th>Communal HOB 1)</th>
<th>Industrial HOB 2)</th>
<th>Industrial CHP 3)</th>
<th>Utility Plants 3)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>122 000</td>
<td>162 000</td>
<td>249 400</td>
<td>242 300</td>
<td>775 700</td>
</tr>
<tr>
<td>1995</td>
<td>118 600</td>
<td>155 800</td>
<td>207 700</td>
<td>240 000</td>
<td>722 100</td>
</tr>
<tr>
<td>1996</td>
<td>130 100</td>
<td>162 700</td>
<td>205 700</td>
<td>257 300</td>
<td>755 800</td>
</tr>
<tr>
<td>1997</td>
<td>134 700</td>
<td>138 900</td>
<td>205 500</td>
<td>229 700</td>
<td>708 800</td>
</tr>
<tr>
<td>1998</td>
<td>122 200</td>
<td>121 500</td>
<td>194 500</td>
<td>217 600</td>
<td>655 800</td>
</tr>
<tr>
<td>1999</td>
<td>121 500</td>
<td>98 000</td>
<td>179 300</td>
<td>201 500</td>
<td>600 300</td>
</tr>
<tr>
<td>2000</td>
<td>108 200</td>
<td>102 700</td>
<td>174 300</td>
<td>187 100</td>
<td>572 300</td>
</tr>
</tbody>
</table>

1) Heat Only Boilers supplying DH network.
2) Heat Only Boilers supplying factory and often other consumers.
3) CHP plants supplying factory and often other consumers.
4) Heat produced in utility CHP plants, power plants and utility HOB.

Also heat production in CHP cycle decreased, mainly in industrial CHP plant. Decrease of co-generated heat during last decade is shown in the table below 4:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total production of heat [TJ]</th>
<th>Heat production in cogeneration with electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Industrial plants</td>
<td>Utility plants</td>
</tr>
<tr>
<td></td>
<td>TJ %</td>
<td>TJ %</td>
</tr>
<tr>
<td>1990</td>
<td>775 700</td>
<td>157 300</td>
</tr>
<tr>
<td>1995</td>
<td>722 100</td>
<td>147 500</td>
</tr>
<tr>
<td>1996</td>
<td>755 800</td>
<td>158 049</td>
</tr>
<tr>
<td>1997</td>
<td>708 800</td>
<td>150 698</td>
</tr>
<tr>
<td>1998</td>
<td>655 800</td>
<td>142 234</td>
</tr>
<tr>
<td>1999</td>
<td>600 300</td>
<td>130 998</td>
</tr>
<tr>
<td>2000</td>
<td>572 300</td>
<td>125 963</td>
</tr>
</tbody>
</table>

The above presented data show that situation on the heat market is slowly changing in fuels structure. The main reasons of leisurely process of heat market restructuring have economic nature – mainly connected with high investment costs and socio-political obstacles in market forces introduction in energy sector. It causes lack of real competition between fuels. The problem of competition in energy sector and especially in heat supply sphere is connected with local energy and physical (spatial) planning as well as socio-political matters; these problems are described below.

3. Legal and Policy Framework

Fundamental changes started in the entire national economy, including the energy sector and DH systems in 1990, when the Parliament issued important acts, created a legal base for ownership changes in the DH sector, shifting the responsibility for heat supply to local authorities.

Energy sector transformation has been introduced in response to national and international conditions. The most important national conditions include three main documents: ‘Strategy for Poland’, ‘Industrial policy’ and ‘Policy of housing development’ adopted by the Parliament.

4 Source: W. Cherubin – ENERGY SUMMIT 98, EMA November 2001
In 1995, Parliament adopted two basic documents determining the framework for restructuring specific energy sectors: ‘Assumptions to the energy policy till 2010’ (ASEP 2010) and ‘Assumptions to the state policy in the rationalization of energy use in housing and communal sector’. There were also a number of international obligations. The most important ones include the European Energy Charter and European Energy Charter Treaty, as well as bilateral agreements with different countries regarding the purchase and transmission of energy carriers, joint energy investments etc. Additionally it is required to achieve conformity of national legislation with EU standards before Poland’s accession to the UE.

Unfortunately, till 1997, energy sector activity remained regulated by “old” legislation, issued in the former economic system and inadequate in the new social and economic situation. This was a serious obstacle for energy sector transformation. Nevertheless, the transfer of ownership and changes in the organization of heat supply began in the majority of cities.

It is necessary to stress that particular elements of Polish DH systems are owned by different entities and that heat is produced in different heat sources. Thus the restructuring of the DH sector is quite a complex process and its implementation needed change of existed legislation in favor of a market oriented economic framework. It was initiated by the Energy Law of 1997 (EL), which deals with security of national energy supplies, efficient and rational use of energy and fuels, utilization of renewable energy, promotion of competition, protection of customer interests and minimization of costs. It has to be underlined, however, that the implementation of the EL into practice was possible only after several ordinances had been issued in the years 1998-2002. The most important ordinances concerning DH sector are listed below:

- Ordinance of 1998 (replaced by Ordinance of 2000) on detailed conditions of subjects connection to DH network, trade of heat, transmission services, network dispatching and operation, as well as quality standards of customers service,
- Ordinance of 1998 (replaced by Ordinance of 2000) on detailed principles of heat tariffs forming and calculation, as well as principles of accounting with customers,
- Ordinance of 2000 (replaced by Ordinance of 2003) on detailed scope of obligation to purchase electricity from renewable energy sources and produced in cogeneration with heat, as well as heat from renewable energy sources,
- Ordinance of 2000 on carrying of supervision by energy enterprises,
- Ordinance of 2001 on the requirements of the energy efficiency.

These ordinances determined detailed rules for energy company operations in a market oriented economy, conditions for connection to networks, transmission service rules as well as principles of tariff setting, settlements with customer’s etc. Since 1997, the EL has been changed several times; either to improve a specific provision or to adjust a provision to some modified economic or organizational conditions (and sometimes-political needs). The amendment of the EL in 2000 caused a necessity of replacing several ordinances by new ones and issuing an ordinance regulating principles of obligatory electricity and heat purchase from renewable sources, and electricity produced in cogeneration with heat. However amendment of 2002 was connected with achieving conformity of the EL with EU legislation.

Apart of the above mentioned legislation exist also another Acts, which have influence on DH companies activity, like for instance: the Civil Code, the Commercial Code, the Act on Physical Planning, the Act on Protection and Forming of the Natural Environment, the Act on Support for Thermo-Modernisation Investments and others.

In my opinion the EL with its secondary legislation gives some possibilities to manage (regulate) energy sector activity in Poland, but there are some regulations, which are not adequate to the present and continuously changing situation.
The main “error” of the EL is, that the same provisions regulate matters concerning three different energy sub-sectors (electricity, gas and heat supply). It causes imperfections in particular provision formulation and sometimes is resulting in difficulties in right understanding of the provision. The unclear EL provisions and different understanding of particular regulations by consumers and suppliers leads to the quarrels, which have to be arbitrated by PERA or judged by civil court. Sometimes “common” provisions are even not adequate to a specific character of the particular energy sub-sector. For instance provisions concerning international trade (export/import) and TPA principles regulate in the same way management and operation of the local DH networks as well as national power grid or gas networks, having international connections. Thus - in my opinion - the common provisions of the EL should regulate general matters like energy policy; tasks of administration, energy strategy and energy supply planning etc. Instead provisions concerning power sector, gas sector and DH sector should be collected in separate chapter (or separate Act), because of differences and specific character of electricity, gas or heat supply.  

One of the serious obstacles in transformation of DH sector (especially privatisation of DH companies) are unclear provisions regulating principles of heat tariffs setting and particularly possibility to secure profit for company’s owners (including “strategic investors” buying shares of the DH company and financing rehabilitation of DH system).

Also provisions concerning local energy planning are not clear, because only companies operating grid or network are obliged to work out a plan of heat, electricity and gas supply development, while local authorities are obliged to prepare assumptions to the plan of heat, electricity and gas supply. Great part of communes up today do not prepare the assumptions, because EL does not define any time limit (dead-line) for that. Moreover company’s development plans of electricity or gas supply are supervised by PERA, however assumptions to the local energy plans prepared by local authorities dealing with heat, electricity and gas supply have to be consulted with provincial authorities. It causes in some case lack of investment coordination (especially modernisation of particular elements of DH systems), resulting sometimes in increase of energy supply costs and disturbances in DH system work.

Existing legislation does not meet (in my opinion) economic challenges and does not consider the full impact and synergy between DH sector and the rest of the energy sector. Sometimes it causes lack of rational local energy policy (probably local authorities believe that “invisible market hand” should solve problem of energy supply costs optimisation). There are cases when new gas pipelines are constructed to connect new shopping centres, housing estates etc. in areas supplied with quite cheap heat from existing DH network (after connection of new customers the heat price would be even lower). In other cases existing buildings are disconnected from DH network and connected to the gas network. Unclear are also principles of tariffs setting for heat and electricity produced in cogeneration – it mainly concerns unclear methodology of electricity price calculation. It is connected with also unclear provisions concerning obligatory purchase of electricity produced in cogeneration with heat, as well as lack of full conformity between provisions regulating principles of tariffs setting for heat, electricity and gas.

There is no dedicated program or action plan referring to DH/CHP sub-sector development, also future political priorities are uncertain.

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5 E.g. principal difference between transmission and distribution of electricity, different gaseous fuels and different heat carriers through power grid, gas network and DH steam or hot water networks with different parameters of transported heat carrier.
In my opinion the “network/grid” sub-sector’s development should be rather a matter of rational planning connected with optimisation of total energy supply costs, than a subject of market forces only and sometimes political decisions.

### 3.1. Energy Policies and Laws

As stated earlier in point 3, the Parliament adopted in 1995 documents forming energy policy and determining framework for restructuring specific energy sub-sectors. Main energy policy objectives determined in these documents combine:

- accelerating rate of economic growth and Polish competitiveness in the international market by securing supplies of possibly inexpensive primary energy with the right structure, its effective transformation into final energy and rational utilisation of fuels and energy,
- stability of economic development due to reliability of energy supplies, on one hand through domestic primary energy productions, and on the other hand through participation in international markets, as unilateral domestic market does not assure coverage of all needs. At the same time share of imports should result mainly from economic circumstances, as well as from important political circumstances in relation to state energy security,
- lowering social costs of transformation and improving public welfare, especially within the scope of pricing and fiscal policies, with maximum operations of market and competitive forces, and objective regulation of prices and relations between supplier and customer by the independent authority wherever market forces do not function due to natural monopoly conditions,
- creating stable bases for development and reconstruction of energy sector on the grounds of forecast of energy situation in the country and around the world, and analysis of decisions’ results, and especially legal regulation changes in scope of finance in order to increase confidence of private capital and encourage it to invest in energy sector,
- assuring decrease in natural environment pollution by the energy sector through realisation of eco-development principle and appropriate structural changes within the scope of energy carrier’s generation, as well as rationalisation of utilisation and decrease in energy usage, taking into consideration costs of environmental protection in prices of energy carriers.

In February 2000 the Council of Ministers adopted new “Assumptions to the Energy Policy in Poland till 2020” (ASEP 2020) in which main above mentioned social and political objectives of energy policy remained in force. These objectives are determined as “creating conditions of sustainable development of the country, assuring energy security, economical and rational utilisation of fuels and energy, development of competition, counteracting negative effects of natural monopolies, considering environmental protection requirements and obligations stemming from international agreements, protection of customer interests, and minimisation of costs.”

At the time of elaborating macroeconomic state development scenarios determined in this document, it was endeavoured to follow similarity with scenarios prepared by experts of the European Commission (European Energy to 2020: a scenario approach and European Union Energy Outlook to 2020). Assumptions of energy policy determined on these bases, within the scope of heat supply, are as follows:

- higher standards of thermal protection (insulation) for new buildings and thermal modernisation of existing ones will lead to moderate decreasing tendency in heat supply, however, substantial increase in combined heat and power generation is foreseen, especially in small scale sources, what will bring essential improvement in efficiency of usage of fuels chemical energy, and decrease in pollution emissions into environment,
decentralisation of energy systems will follow, as well as assistance to self-governments in determining local heat, power and gas fuels supply plans, aimed at:

- development of small scale dispersed sources producing power and heat in co-generation,
- accelerated utilisation of local RES (biomass, geothermal energy) and waste as well as gas from small non-system deposits,
- development of local energy markets (creation of multi-utility energy companies) and services in these markets (financial and consulting institutions, performance of works etc.),
- co-operation of self-governments with energy companies and division of competencies and responsibilities of self-governments and energy companies in the process of realisation of company plans and energy planning by the communes,

- determination of realisation principles of state policy on rational utilisation of energy, co-generation, RES, as well as introduction of obligatory purchase of electricity from CHP and RES and heat from RES, and also unification of criteria and rules of conducting tariff policy taking into consideration a necessity of conducting by the energy companies current activities and development planning according to least costs principle.

The ASEP 2020 stated, that European Energy Charter Treaty will be ratified, and participation in the EU programs will be continued, as well as that Polish energy policy will be in compliance with the EU energy policy before EU accession.

The document defines also the integrated energy and environment management and strategic direction of the country’s activity. The integrated “eco-energy” strategy should be executed on the base of co-operation between the MELSP and the Ministry of Environment (ME). The State’s environment goals are formulated in the Ecological Policy of Poland. The ME, responsible for environment protection should co-operate with the MELSP in the area of matters referring to the energy sector.

It can be stated, that in a “theory” (reading provisions and above described documents) there are political priorities to reduce environment pollution and develop CHP and DH sub-sector. Unfortunately in practice those priorities are not so obvious, and their realisation is rather not effective, because of particular interest of some “strong” parties on the local and national energy market. It can be stated; that the main result received up today is increase of gas use for heating purposes and decrease of heat sale from DH network.

Rehabilitation of DH systems has a high priority only for management of several companies, but it is not a real priority on national level. The Act on Support for Thermo-Modernization Investment creates a base for energy saving projects in housing and public buildings. In theory these investments can concern also heat sources up to 11.6 MWth, DH networks and buildings connected to these networks. According to the Act an expert institution must positively evaluate an investment project. The base of investment financing is commercial credit (max. 7 years payback period) repaid by savings resulting from the project. Energy audit, completion of the project on time and repayment of 75% of the credit allows to obtain the remaining 25% of the credit as an incentive premium. But in practice bureaucratic procedures and high economic requirements cause that the commercial credit is not available for DH companies and also a great part of building owners.

Energy policy is in fact dominated by socio-economic factors, because subsidies and cross subsidising still exist in energy sector.

The increase of different energy carriers price is regulated not only from economic point of view, but also a political aspects have to be taken into account. It causes that real competition
between different heat sources (CHP, HOB) and fuels (coal, gas, oil, renewables etc.) are not possible in actual circumstances. There is also a kind of misconception concerning heat supply.

A part of politicians (in Parliament as well as national and local authorities) and many customers (people without economic knowledge) treat heat supply as a public service, in contrary DH company’s management as well as other politicians and customers understand heat supply as an economic activity (means business).

3.1.1. Electricity

As earlier stated in point 3, there is no separate Electricity Law/Act. The only one “common” EL regulates whole energy sector activity in Poland. There is no priorities concerning CHP/DH in the EL, only provisions defining scope of assumptions for the commune’s plan of heat, electricity and gaseous fuels supply are listing possibility of combined heat and power production as a solution which (among others) should be taken into account in the assumptions. In my opinion it is not a real priority but something like guidelines or recommendation.

An obligatory purchase of electricity produced in cogeneration with heat (CHP electricity) was introduced by Ordinance of 2000 given by the Minister of Economy (according to the EL order) but it was not unconstitutional. Thus in 2002 a basic provisions concerning obligatory purchase of CHP electricity have been inserted into EL as an amendment. According to the EL provisions all operators of distribution system (dealing with electricity trade) are obliged to purchase offered CHP electricity produced in sources located in Poland and connected to the grid, owned by the operators.

The methodology of cost allocation in combined heat and electricity production is defined in two separate ordinances regulating principles of heat and electricity prices calculation. Those provisions are unclear, because the electricity price calculation is based on average price of electricity produced in all condensing plants in previous year. The heat price calculation is based on heat sale in a previous year as well as a difference between total costs of heat and electricity production in a plant, and income from electricity sale in a previous year. The average price of electricity produced in condensing plants is low because greater part of the plants is old and depreciated (low fixed costs). The result of that is low profitability of new CHP plants (high prices of heat produced in new CHP plants - because of low income from electricity sale). Thus potential investors are not very interested in financing of CHP plants development. In my opinion it is a matter of energy policy, because much better solution would be “avoided costs” methodology based on comparison of real costs of cogeneration and separate production of heat and electricity. There is also possibility to increase profitability of CHP plants owing to construction of heat accumulators and larger electricity production during a “peak time” (a few hours at morning and evening) as well as utilise gas turbines in CHP plants as a “regulating sources” for power system.

3.1.2. Heat / Heat Supply Planning

As earlier stated in point 3, there is no separate Heat Law/DH Law. The only one “common” EL regulates whole energy sector activity in Poland. It causes a lot of misunderstandings because the same provisions concern different energy sub-sector without taking into account specific conditions of the sub-sectors activity.

6 See information in point 2.
7 Higher price and larger sale of electricity to the power grid from CHP plant working as a “regulating source” will make increase of income from electricity sale and decrease of heat price (reduction of costs ascribed to a heat production).
The existing legislation concerning energy planning is very general (\textit{EL} provisions only), also legislation dealing with physical (spatial) planning is concentrated on general principles of commune’s (city’s) development planning (directions and structure of buildings, roads and transport planning etc.).

There is no detailed regulations concerning energy supply like rational planning of power grid as well as DH or gas networks location taking into account economic and environmental aspects. Local energy planning is formally regulated in \textit{EL} (heat, gas and electricity) but in fact does not exist. The lack of legislation defining details connected with rational energy planning taking into account optimisation of energy supply costs concerns both commune’s and company’s planning. There is also no protection against “competition” between two natural monopolies (gas and DH networks). Proposals of zoning implementation between DH and gas networks development planning are treated as an “old” practice of the former “centrally planned” economic system.

There are no regulations (legislation) dedicated to the disconnection and re-connection matters. At the beginning of the socio-economic transformation some people understood that the “democracy” means “anarchy” because in their mind all “old” provisions (issued in former economic system) are not valid and “they can do what they want” without taking into account legislation, technical requirements and even another people needs. It resulted in several disconnections of separate rooms (flats, offices, shops, workshops etc. - in multi-story blocks) by room’s users (owners) from the existing central heating and domestic warm water installations, and of course non-payment for heat supplied to the buildings. The problem of that kind of “freedom” was solved by Supreme Court resolution of 1997, which stated that the central heating and domestic warm water installations are in fact a part of the whole building construction and joint ownership of all rooms (flats etc.) owners. Recently disconnection of separate room (flat etc.) from the common installation is practically impossible. It is necessary to stress, that heat is penetrating through walls and individual measurements in particular rooms are not adequate to real heat delivery (utilisation). Apart of that disconnection causes disturbances in the installation operation as well as heating and warm water supply for another rooms (flats etc.) owners. Thus permission given by building owner and all another rooms (flats etc.) owners is required for that kind of disconnection.

In contrary disconnection of a building from DH network depends only on building owner’s decision. Usually it is realised by termination of heat supply contract, according to the conditions defined in the contract. Usually termination is possible after notice with 3-6 months anticipation. In some cases termination of the contract is possible after earlier notice and payment of fixed charges (according to ordered heat output) to the end of the specified period (the terms and specified periods are defined in the contracts).

3.1.3. Renewable Energy Sources (RES)

According to the ASEP 2020 the integrated energy and environment management strategy should be executed on the base of co-operation between the MELSP and the ME. The \textit{Ecological Policy of Poland} formulates environment goals and the ME (responsible for environment protection) should co-operate with the MELSP in the area of matters referring to the energy sector. Unfortunately this co-operation is rather formal and not effective, also some conflicts between those ministers occurred. In 1999 first Ordinance on obligatory purchase of heat and electricity from non-conventional and renewable energy sources came into force, but power sector was not interested in realisation of that obligation, because of higher prices of electricity from RES. Also purchase of heat from RES cased increase of heat prices. Recently the Ordinance of 2003 is in force.

As stated earlier there is no specific priorities concerning CHP and DH systems development and rehabilitation in the national RES strategy. There is also no specific RES Act.
The *EL* and ordinance concerning those matters separately regulate the obligatory purchase of heat and electricity from RES and CHP electricity. Provisions of the ordinance introduced limit of heat price increase concerning RES only (but not gas or oil fired boilers).

In my opinion, instead of priority for development of renewables utilisation for heat production, it creates serious economic barrier for possibility of heat sale from RES. Similar obstacles concern also electricity prices both produced in RES and CHP.

### 3.1.4. Energy Efficiency

There is no dedicated program or action plan referring to energy efficiency, but the mechanisms of rational energy conversion and utilizations are included in the ASEP 2020 as one of the issues of energy policy. The promotion of energy efficient technologies and equipment is listed as an instrument for implementing this strategy. The promotion of modern, highly effective equipment and technologies should form an important element of the energy efficiency improvement strategy. According to the *EL*, energy labelling of selected groups of household appliances is regulated (labels must comply with EU regulations).  

Demand side management (DSM) is mainly developed by owners of buildings supported by Act on Support for Thermo-Modernization Investment (ASTMI). In previous years thermo-modernization investments realised by housing cooperatives have been supported from State budget, recently support realised in frames of the ASTMI is not as effective as direct grants or subsidies for housing cooperatives in the past. Apart of that result of DSM is considerable and systematic decrease of ordered heat output and heat sale is observed in DH systems. DSM is recently connected with improvement of thermal insulation of buildings as well as implementation of automatic control of heat utilisation for heating purposes as well as heat costs allocation in multi-storage buildings.

Improvement of energy efficiency in DH systems is realised by DH companies, but is not supported in similar way like DSM. Investment costs of DH systems modernisation are very high and this process is rather slow but is continuously carrying into effect.

Transmission and distribution systems modernisation is connected with implementation of modern technologies and constructions (pre-insulated pipes etc.) and modern fittings and accessories with lower heat and energy carrier losses and better reliability. In several DH networks electronic systems of leakage’s and damages identification are implemented, as well as remote measurements and remote control equipment is installed. Substations are equipped with modern plate heat exchangers, valves, expansion tanks etc. „Compact” fully automated substations often replace old equipment. Implementation of new tariff system caused, that recently all substations are equipped with heat-meters.

Improvement of energy efficiency in heat sources is recently connected with closing down of low efficient HOB and connection consumers to the DH network or replaces coal-fired boilers by modern gas or oil fired boilers with automatic control of heat supply. In larger plants optimization of combustion processes take place by use of automatic control of the process together with boilers modernization. Development of CHP plants is rather slow, but there are some heat sources where gas turbines were installed or combined steam-gas cycle was implemented. Construction of new small cogeneration units (gas turbines or engines) also took place mainly in industrial plants. Automatic control of heat supply to the substations is connected with necessity of variable speed pumps installation in heat sources. Modernization of heat sources is also connected with reduction of pollution emission but it is often very expensive and needs outside support.

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*It is regulated in Ordinance on the requirements of the energy efficiency.*
Unfortunately there is no nationally implemented measures supported energy efficiency increase in DH/CHP sub-sector. Also least cost energy planning principles are not in use, especially it concerns local energy planning but also plans prepared by companies.

3.1.5. Approximation to EU Directives and Policies
According to the negotiations on EU accession Polish legislation should be conformable with EU directives and policies. As stated in point 3, in 2002 Parliament adopted amendment to the EL, which was connected with achieving conformity with EU legislation in force. Recently electricity and gas directives are in force and CHP directive and RES directive is discussed. It means that in coming year(s) further new amendments to the EL and other Polish legislation will be necessary, when new EU directives will come into force.

3.2. Environmental Policies (of relevance for DH/CHP)
As earlier stated, the Ecological Policy of Poland formulates environment goals and the ME (responsible for environment protection) should co-operate with the MELSP in the area of matters referring to the energy sector (including CHP/DH sub-sector). There are no specific priorities concerning CHP and DH sub-sector.

Activity of ME is not concentrated on energy sector matters, and co-operation between MELSP and ME is rather ineffective. Thus (in my opinion) work on achieving conformity of Polish legislation with EU environmental directives will be concentrated more on a formalities (contents, formulations etc.) instead of necessary real co-operation in implementation of the UE directives in energy sector, especially from economic point of view. The result of that is among other slow progress in negotiations on several “memorandums of understanding” concerning JI projects.

3.3. Spatial Planning Law
As earlier stated, the Physical (Spatial) Planning Law is concentrated on general regulations concerning commune’s development but not on details concerning energy supply planning and optimising of energy supply costs. Also provisions of the EL concerning energy planning are very general. Thus in my opinion it is a serious problem and a regulations defining principles of local energy planning (as a part of physical planning) should be prepared (including zoning of gas and DH networks development).

3.4. Privatisation Policies / Ownership
After change of the socio-political system, the Parliament adopted 2 Acts defining territorial self-government competencies and tasks as well as Act on privatisation of state-owned companies. Those acts have created legal bases for transformation of the state-owned companies into entities acting on the grounds of the Commercial Code. The territorial self-government Acts determined among others own tasks of the communes (including heat supply), communalisation of state owned DH companies assets together with commune’s councils decision on a choice of the organisational and legal forms of an economic activities conducting within the scope of heat supply. The Act on privatisation of state-owned companies determined principles of commercialisation and privatisation of enterprises owned by the State. It concerned among others companies in power sector (including utility CHP plants) and industrial heat sources.

According to the general principles of economic transformation, restructuring of majority of companies aims first at market activity, then privatisation and creation of competition conditions wherever it is possible and economically justified.
At the beginning, restructuring of the energy sector was impeded because binding rules were not adjusted to economic changes occurring in Poland. Specifically, they were not adapted to transformation to the market economy and to overtaking by the communes of an obligation of heat supply.

Process of ownership and organisational transformations in the DH sub-sector is slow and has not been finished yet.

Majority of communes has already taken over the DH system assets and created its own organisational units (in the form of Ltd. Co., Joint Stock Co. or budgetary entity). In some communes DH companies were privatised (with participation of national or foreign capital), and shares of a few companies are listed at the stock exchange. However, there are also communes where companies have not been transformed yet, and they continue operations on the basis of act on state-owned companies. In some cases communes did not take over of the DH assets (these assets are owned by the State Treasury) and DH companies acting independently from the communes were established there. In power sub-sector the first step was establishing joint-stock companies owned by the State Treasury (it concerns also a greater part of utility CHP plants). Recently progressive privatisation is realised as the next step of transformation. The process of industrial plants transformation is similar like in power sector. Recently industrial heat sources are privatised together with a whole factory (as a part of it), but in several cases an industrial heat source is separated from a “mother factory” and privatised as a self-dependent entity.

3.5. Institutional Energy Sector Organisation

The EL defines tasks of governmental bodies and local authorities in sphere of energy sector management and energy policy.

The Council of Ministers (the Government) defines “Assumptions of the State Energy Policy” (ASEP) which are published in official Law Gazette “Monitor Polski”. The Government should every 2 years submit to the Parliament evaluation of ASEP realisation together with proposals of its correction (if needed) and short-term prognosis of energy sector development. The Government defines principles and procedure of limitation in liquid and solid fuels sale as well as limitation in supply and consumption of electricity, gaseous fuels and heat in case of impedances defined in EL (energy security of State, long-term deficit etc.).

The Minister dealing with economy affairs (MELSP) ⁹ is the main governmental organ proper for energy policy. He is recommended by the Premier Minister and nominated by the President. The MELSP’s tasks include among others:

- preparing in consultation with other ministers an ASEP and co-ordination of its realisation,
- preparing secondary legislation to the EL,
- superintendence of the national systems of energy and fuel supply operation,
- co-operation with provincial and local authorities in planning and realisation of energy and fuel supply systems,
- every 2 years preparing in consultation with Minister of Finance an evaluation of ASEP realisation together with proposals of its correction (if needed) and short-term prognosis (up to 5 years),
- defining particular conditions for planning and operation of energy and fuel supply systems, according to EL provisions,

⁹ Since Energy Law coming into force, the name of the Minister has been several times changed (Minister of Industry and Trade, Minister of Economy and actually Minister of Economy, Labour and Social Policy), thus different names of the Minister are used in different Acts and secondary legislation (ordinances etc.).
informing European Commission about investments (projects) being matter of interest of the Commission (after Poland’s accession to the UE).

The President of the Energy Regulatory Authority (PERA) is a central governmental organ recommended by the MELSP and nominated by the Premier Minister for 5 years cadence. The PERA’s main tasks are energy economy regulation and promotion of competition in energy sector. His tasks are performed through head office and 9 regional offices. The PERA’s competencies and duties include (among others):

- licensing of trade as well as producers and distributors of heat, electricity and gaseous fuels,
- approval and supervision of tariffs for heat, electricity and gaseous fuels,
- supervision of power grid and gas networks development planning by companies which operate transmission or distribution grids (networks),
- arbitration of quarrels defined in EL.

The PERA’s activity concerning power sector and licensing of gas oil and petrol trade is performed by head office, while regional offices are dealing with heat and gaseous fuels.

The local authorities (municipalities, communes) are among others responsible for physical planning as well as heat, electricity and gaseous fuels supply. According to the EL the communes obligatory tasks include in particular planning and organisation of heat, electricity and gaseous fuels supply, as well as planning of public places and roads lighting on the commune’s territory.

The EL imposes an obligation on municipalities to determine assumptions for the local plan of energy (heat, power and gas) supply, as well as in some cases plan based on the approved assumptions.

The provincial authorities (voivode and provincial self-government) are obliged to coordinate commune’s local energy supply planning by controlling accordance of local assumptions to energy supply plan with ASEP and commune’s co-operation in local energy planning.

Existing organisation is in my opinion not adequate to the task of administration, taking into account continuous process of transformation and changing situation in the energy sector as well as changes resulting from Poland’s accession to the EU.

Authorities do not possess the necessary resources. It concerns mainly local and provincial authorities, which have no experience in local energy planning and co-ordination of energy supply. There is lack of qualified staff with necessary knowledge about energy planning, also commune’s budget is insufficient to cover necessary investment costs connected with rehabilitation of energy systems owned by communes (mainly heat sources and networks with connected buildings). In last time communes are selling DH assets to the private investors (foreign or national). It often leads to the rapid increase of heat prices and final customers protest.

Also MELSP’s human resources are in my opinion not sufficient to perform all tasks defined in EL, because only one small Department of Energy Security is working on all matters concerning whole (large) energy sector (including coal, lignite, gas, liquid fuels, electricity, heat etc.).

Human resources are in my opinion sufficient only to perform PERA’s tasks (high qualified staff with necessary knowledge and experience), but power of the “regulator” is very limited. He is able only to supervise compliance of licensed company’s activities with provisions of

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10 EL defines limits for production, transformation, storage, transmission and distribution as well as trade, for which a license is required.
the EL and secondary legislation, but is not able to enforce necessary changes in legislation (often arising from regulatory practice).

The strengths of institutional set up are in my opinion regulation of the energy sector by one regulator (PERA) and establishing 9 regional offices regulating heat and gas sector, being near to the local authorities and customers than central headquarter.

The weaknesses are above-mentioned imperfections in organisation and human resources, rather poor co-operation between different administrative bodies on central, provincial and local level (including unclear delegation of powers within administration), as well as unclear provisions of the EL and secondary legislation.

4. Price Regulation and Taxation

To the end of 1997, the heat price level did not depend on local conditions and heat supply costs. The Minister of Finance (MF) determined the official heat prices for housing sector as standard price for the whole country. Simultaneously, till the end of 1998, different forms of administrative limitations on contracted prices existed, which meant that these prices were also under control of the MF or Council of Ministries. In that time, the development and modernization of DH systems could be financed exclusively by net profit and depreciation allowances, which was not sufficient to finance the necessary investments. As a result, investments in the DH sub-sector have been financed mainly by the State and local budgets including subsidies for DH companies (later for housing co-operatives). It had a direct influence on technical and economic conditions of the companies.

A similar situation prevailed in other energy sub-sectors, because the State fixed low prices of coal, electricity and gas and subsidized energy enterprises or whole branches (e.g. coal industry). From 1989/90, prices of heat and other energy carriers were systematically increasing. In the years 1995-1997, assets were re-evaluated, but this did not lead to cost-covering prices.

After the EL coming into force, the principles of electricity, gas and heat prices calculation changed completely, giving possibility to include into a price not only justified running costs, but also costs connected with development, modernization and environmental protection financing. Unfortunately, major obstacles for implementation of that principle are the low purchasing power of the population and the necessity of adapting fuels and energy prices to the general economic conditions of the country. It is necessary to stress that low revenues of the Polish families have to be taken into consideration in pricing policy, because the share of energy costs in household budgets is much more higher than in EU countries (average share in Poland is about 11 % against approx. 4 % in EU).

During transition period from 1990 up today different paths of prices increase and regulation have been adopted for the coal, oil, power, gas and heat. Today, market forces regulate only liquid fuels prices. In coal mining, a special program of restructuring is implemented and coal prices get closer and closer to cost-reflecting prices. However, this process is connected with many economic, social and political problems, since coal was in the past the “Polish gold” characterized by high costs of mining and low price both for domestic use and export.

Since 1999 PERA regulates electricity and heat prices as well as gas prices from 2000. According to the secondary legislation to the EL, the first tariffs for gas, electricity and heat protected consumers against high prices. Charges for gas could not increase by more than 12.5%, and similarly, the increase of electricity prices was limited to 13% for households. In DH sub-sector, in theory, market prices have been introduced, but for the first tariff, the increase of the heat price was limited to 15% (excluding companies with apparent losses in heat sale).
In the past, fixed charges determined even 70% of total customer charges; thus consumers had no economic incentive for rational energy use. According to the Ordinance of 1998 on heat tariffs setting, the total cost of heat production have to be divided into smaller part (up to 30 %) as a base for “fixed” price calculation (remaining costs are a base for “variable” price calculation). However charges for heat transmission services was calculated as a “fixed” charge (share of fixed costs in total cost of heat transmission services exceeds 70 %). In 2000, some changes in the provisions concerning heat tariffs setting were adopted. According to the amendments of the EL, fixed charges for heat transmission services may constitute only 30% of total services charges.

Procedure of heat tariff approval by PERA is connected with analysing and verifying of costs submitted by DH company as a justified cost of heat production, distribution etc. Usually the effect of the cost verification is decrease of prices or charges proposed by the company.

It is possible to appeal from PERA decisions (concerning licensing, tariffs etc.) to the special department of the District Court of Warsaw (Consumers and Competition Protection Court – former Antimonopoly Court).

The heat tariffs and billing system is based on measurements of heat supply. Since 1994 secondary legislation to the Construction Law is in force that introduced obligatory heat metering in new multi-floor houses connected to the DH network. Heat-meter has to be installed in substation (connection to the DH network) as well as radiator thermostatic valves together with costs allocators and warm water-meters in all rooms (flats).

According to the secondary legislation to the Energy Law, since 1999 heat delivery from DH network is obligatory measured in substations. Heat tariffs have to be approved by the PERA (for licensed companies) or by consumers (for other heat suppliers). Many house owners signed contracts with specialised companies installing costs allocators and warm water-meters together with billing system. Sometimes DH companies are billing heat supply to the flats according to the separate agreement signed with house owner.

The heat tariff of heat producer consists of following prices:
- price of heat output [PLN/MW],
- price of heat [PLN/GJ],
- price of heat carrier [PLN/ton of steam or PLN/m³ of water].

The heat distributor’s tariff includes following charges:
- fixed charge for transmission services [PLN/MW],
- variable charge for transmission services [PLN/GJ],
- subscription charge [PLN per measurement point],
- connection fee [PLN/meter of connection].

A part of DH companies did not collect connection fees, and costs of the connection construction are included into costs of DH network development and modernization (sometimes to the DH network are connecting customers earlier supplied from liquidated local boilers). That policy is resulting from over-sizing of existing DH sources and networks.

The value-added tax (VAT) is 22 % for all above mentioned prices and charges. For connection fee VAT is lower because up today 7 % VAT is for building works (DH networks and connections construction) but 22 % VAT for that fee will be in use after accession to the EU.

Recently, the problem of heat price increase affected the activities of foreign investors. In several places these investors offered the rehabilitation of municipal DH systems as an ESCO company. Usually oil or gas fired boilers were fitted, which sometimes caused a rapid rise in
heat prices (even doubling). Conflicts arose between municipalities and consumers who were not able to pay. Sometimes investors interrupted heat supply and quarrels have to be judged by ERA or civil courts. It shows, that the problem of pricing in energy sector, especially in DH sub-sector, is one of the most sensitive factors (in economic and socio-political aspects) in the process of transition from centrally planned to market oriented economy.

Business relations between customer and supplier are defined in heat supply contract, transmission services contract and for new customers in a connection contract. The Energy Law (EL) defines main principles of those contracts concluding and secondary legislation regulates those matters more detailed.

Sometimes quarrel arose between customer and supplier, which in some cases (defined in the EL) are arbitrated by PERA, in other judged by civil court. The PERA is obliged to balance interest of customer (justified price level) and supplier (covering justified costs) according to the EL and secondary legislation provisions.

The share of non-payment in DH systems is very differentiated, depending on the city and especially on unemployment ratio in the region. There are housing estates where non-payment is rather small (up to 10 %) but there are also regions where non-payment exceeds 30 %. There are no data giving possibility to evaluate an average non-payment in DH systems.

5. Support and Promotion Mechanisms

It is rather difficult to obtain grant for DH/CHP investments both from national and foreign funds. Sometimes grants are available for investments concerning reduction of environment pollution. Usually combined financing model is in use based on different financial sources. DH companies own financial sources are rather small (depreciation and profit necessary for new investments financing) because of necessity to regulate heat price increase (consumer’s protection against rapid increase of price).

Support from EU funds is available after long procedure and negotiations both with local/national authorities (communes, provinces, ministries etc.) and with EU Commission. Thus DH companies usually try to get grant from national environmental funds or participate in foreign grant (e.g. World Bank grant) and to borrow money in a commercial bank.

The typical conditions to get bank’s commercial loan are among others: good financial standing, approx. 20 % share of own payment. If the bank’s knowledge about DH company economic status is not good, a guarantee is necessary (sometimes from municipality, sometimes as a long-term contract).

Usually large DH company can obtain bank loan easier than small one. Apart of that large DHC assets value is higher and it gives possibility for self-financing several investments (especially for refurbishment) using depreciation and profit (according to the secondary legislation to the Energy Law profit can be included into heat price if is necessary to cover justified investment costs). Similar situation will be in case of application for financial support from EU funds, because several “paths” of financing are closed for small size projects and entities (e.g. Joint Implementation projects).

There are several “channel” of supporting CHP/DH projects mainly based on preferential loans and in same cases subsidies or grants (for investments connected with environment protection and management of water resources). Financial sources are both national and foreign (international financing institutions and banks).

5.1. National support

The introduction of the new tariff system in 1999 was supported by the Act on housing economy and rental allowances (since 2001 Act on rental allowances). The Act regulates matters
connected with a social support for poor households to cover costs of the apartment. The Act (together with secondary legislation) defines principles and procedures of calculating and granting rental allowances, as well as the responsibility and right of the authorities on local, provincial (voivodeship) and central levels (decision making, grants dividing etc.).

The Act states that the social support for poor households is an own task of the local authorities (communes), which are receiving subsidies from the State budget, which are defined every year by the Parliament. The President of State Office for Housing and Towns Development is dividing that fund between voivodships (provinces). The voivodes are transferring subsidies to the local authorities (communes) proportionally to the commune’s application for subsidy on rental allowances.

Every poor household can be granted with a rental allowance if the conditions specified by law are satisfied. The average income per one person, living in a common household, is a basic condition to obtain a grant from the commune for covering household expenses (rent charge, electricity, gas, heat, cold and warm water etc.). It concerns not only flat users in multifamily blocks but also one family house owners, too. The rental allowance is allocated for a 6 month period and is paid not to the flat user but to the multifamily block administrator (only one-family house owners are paid cash). All formalities connected with rental allowances are handled by the Social Support Centres existing in communes as specialised units of the local authority.

National support for CHP/DH sub-sector (DH Companies) is mainly connected with environment protection. Following institutions financing environmental protection projects can support CHP/DH projects:

**The National Fund of Environment Protection and Water Resources Management (NFEP)** is the largest institution financing environmental protection projects in Poland. Special attention is given to ecological activities adapting Poland to the EU standards. Through subsidies and preferential loans the NFEP provides financial support for undertakings of a national or interregional scale. The Provincial Founds of Environmental Protection and Water Resources Management (PFEP) primary aim is pollution reduction. These funds are financed from emission fees and fines as well as charges for “mineral use” licences, collected on local and provincial level. Grants compose greater part of NFEP and PFEP support.

The loans cover up to 50% of total project costs (for communes up to 70%). In the last time those funds supported installation of gas turbines in existing CHP plants (steam-gas blocks).

**The Environment Protection Bank (EPB)** is a commercial Bank specialising in activities connected with environment protection and water resources management. The EPB is 40% owned by the NFEP and is a banking partner providing commercial finance to invest with NFEP money. Loans are available for local authorities and companies, regardless of their nature or specific kind of business, but soft loans are available only for environmental projects. Many of these projects regard to DH sector (e.g. local coal fired boilers replacing by gas fired boilers). Main areas of EPB activity are loans for project concerning among others realisation of RES, utilisation of waste products and improvement of household energy efficiency.

**ECOFUND** is a foundation established in 1992 for effective management of funds obtained through the conversion of a part of Polish foreign debt with the aim of environment protection supporting. The ECOFUND is co-financing environment protection-related projects and best technologies transfer from donor countries to Poland. Financial support is available as preferential loans and/or non-refundable grants - mainly for projects aiming to air and climate protection (reduction of pollutants emission) as well as water protection. ECOFUND supports projects related to energy saving and promotes RES development. It concerns among others improvement of coal incineration technologies in energy sources, energy saving in DH systems, utilisation of „waste” energy from industrial processes etc. ECOFUND provides grants from 10 to 30% of the total project costs (up
to 50% for municipalities). In the last time ECOFUND supported installation of gas turbines and steam-gas blocks in communal, industrial and utility CHP plants.

**The Bank of National Economy** (BNE) is providing commercial financing energy saving projects in housing and public buildings supported according to the Act on Support for Thermo-Modernisation Investment.

**Another financing possibilities:**
- third party financing by the ESCO companies (investment repayment through achieved savings and income allocation between owner and “ESCO” company),
- leasing of equipment and appliances for heat supply sector.

### 5.2. EU pre-accession funds

EU supports Polish economy transformation among others in form of different projects financing from pre-accession funds.

Restructuring of DH/CHP sub-sector, which usually is strongly connected with environment protection, is supported from different UE funds or programs like PHARE program, ISPA, SAPARD, INTERREG, THERMIE, SAVE etc.

The EU is financing mainly research & development works and studies performed by foreign companies and concerning general matters and so called “pilot projects” which can support/direct further investments in DH/CHP sub-sector.

### 5.3. EU Structural Funds / Cohesion Funds

The Structural and Cohesion Funds will be available after accession to the EU, and recently is difficult to say how those funds will be utilised in different spheres of national economy.

#### 5.3.1. EU Structural Funds (ERDF)

The structural funds are dedicated mainly to the local authorities, which up today are not very interested in solving of energy supply problems, mainly because of lack of money. Probably those funds will support commune’s effort to restructure district energy sub-sectors development with aim of energy supply costs optimisation. Recently there is a discussion about small financial possibilities of communes to cover obligatory part of investment costs, thus more detailed information concerning budget allocation and specified projects will be available later.

#### 5.3.2. EU Environmental Funds (ISPA / Cohesion)

Also EU environmental funds will support communes activity in field of environment protection, but those funds will be available not only for CHP/DH projects connected with air protection (reduction of pollutants emission) but also for other projects connected e.g. with water protection and water resources management. Thus detailed information concerning budget allocation and specified projects will be available later.

### 5.4. Joint Implementation

As earlier stated, negotiations concerning Joint Implementation memorandums of understanding are slowly provided by the Government (ME) with several partners. More detailed information concerning JI projects will be available after signing of those documents.

### 5.5. Another financing possibilities

**The World Bank** (WB) is the international financing institution (The International Bank for Reconstruction and Development) providing extensive financial and technical support to the
government's economic transformation efforts. Cumulative commitments of over 5.4 billion USD have financed 37 operations including among others: DH Networks Rehabilitation Loan for 5 large DH companies, 2 Geothermal DH and Environment Project Loans, Krakow Energy Efficiency Project Loan (energy efficiency improvement in the heating systems), 2 Hard Coal Sector Restructuring Loans etc. Apart of that the ME signed agreement with the WB on 25 Mil. USD grant for 30 DH projects prepared by Project Bureau GEF (Global Environmental Facility Fond). Greater part of those projects is at present finally constructed.

The European Bank for Reconstruction and Development (EBRD) is the European international financing institution promoting environmentally friendly and sustainable development.

The EBRD and its co-lender, BRE Bank of Warsaw, would make a long-term loan facility available to FE Poland 11 to finance the restructuring of small DH companies in Poland and Slovakia. The EBRD is an investor in the Fund, whose purpose is to make energy efficiency-driven investments. It also aims to generate tradable emissions reduction units as envisaged by the Kyoto Protocol.

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11 FE Poland is a holding company owned by the Dexia / Fond Electric Energy Efficiency and Emissions Reduction Fund/.