

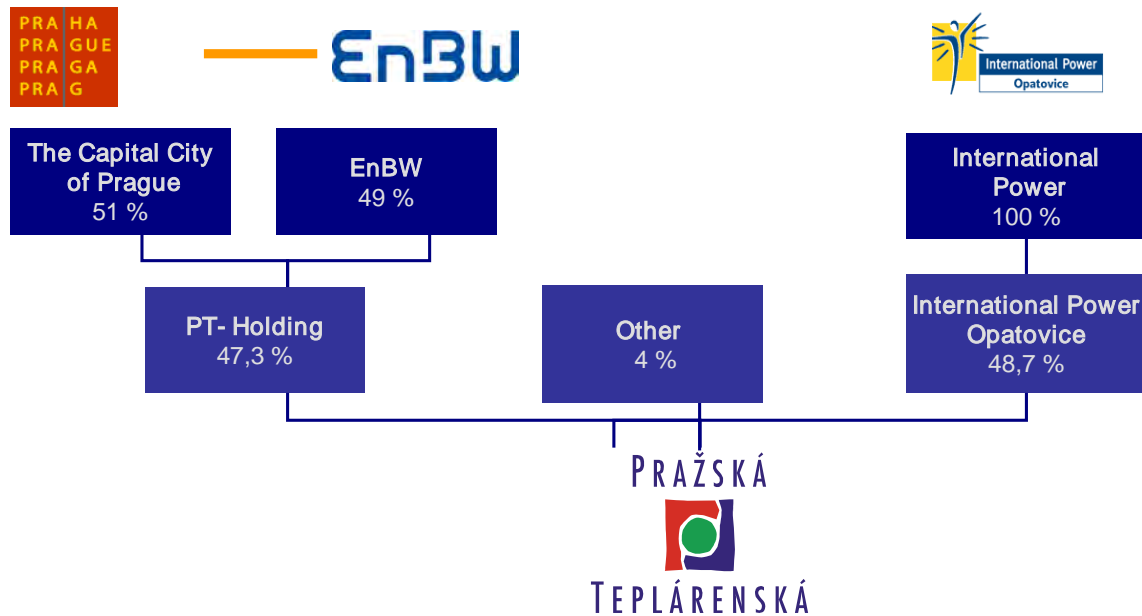


Prague District Heating System
Application for 1st Global District Energy
Climate Awards

September 2009

Basic Information and Contacts

Shareholder Structure



Location of the DH system: The City of Prague, Capital of the Czech Republic

Company address:

Pražská teplárenská a.s.
Partyzánská 1/7
170 00 Praha7, Czech Republic
www.ptas.cz

Contact person:

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Brief History

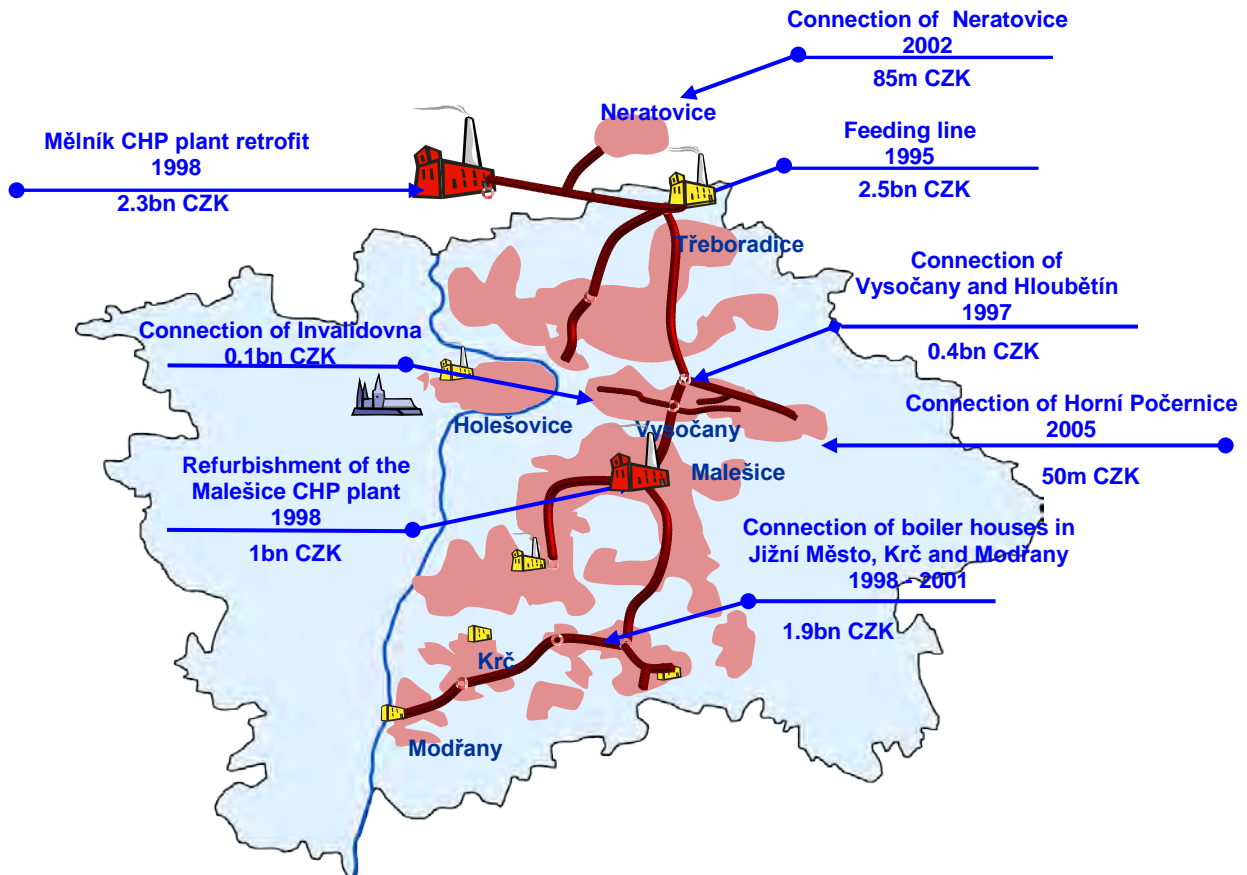
Pražská teplárenská a.s. (Prague district heating company) was established in 1992. Its tradition, however, dates back as far as 1 September 1897 when the Electric Company of the Royal City of Prague was founded. Foundations to what now forms Prague district heating system were laid in the 60s when new concrete blocks of flats started to grow in Prague and district heating was preferred as the most suitable way to provide heating to the newly constructed buildings. Several areas supplied with heat from district heating were formed in this way. Initially, these systems were based on domestic brown coal, later on heavy fuel oil and natural gas. In the 80s, poor air quality in the city gave rise to the idea to use waste heat generated in a power plant in the nearby town of Mělník and supply it as clean heat to Prague. The project was launched in 1987 and was interrupted by the fall of the communist regime in 1989.

Already privatized, Pražská teplárenská decided, together with the owner of the Mělník power plant – CEZ –, to go ahead with the project in the new environment of market economy. Heat supplies were no longer considered a social service and subsidies on heat prices were quickly cancelled. A special purpose company owned by the two entities, Energotrans, was established with the aim to implement the ambitious project. (Energotrans became 100 % subsidiary of Pražská teplárenská a.s. in 2002) The construction was finished in 1995, when first gigajoules of heat from Mělník arrived to Prague. The expansion of the Prague district heating system, however, was far from finished. During the 90s and in the beginning of the new millennium, several more areas, supplied with locally produced heat so far, were connected to the system, bringing the total length of the backbone pipeline from CHP plant in Mělník to Modřany to more than 60 km in 2001.

The expansion continued in 2002 when district heating system in the town of Neratovice was connected after devastating flood left the town without heat supply. Expedited by the flood in 2002, steam pipelines in the area of Invalidovna were completely replaced with hot water ones and connected to the Prague district heating system in 2004. The last two connected areas were Horní Počernice and Horní Měcholupy in 2005 and 2008 respectively. More than 50 natural-gas-fired boiler plants were decommissioned in the process so far. One larger plant was integrated into the system to cover peak demand in the heating season. The expansion of the Prague district heating system thus helped to decrease emissions in the heavily polluted city area while increasing total energy efficiency by means of growing share of heat from CHP on the total heat supply. Both coal-fired plants in Prague and in Mělník had to undergo complex retrofitting in order to fulfil new stringent air pollution requirements starting in 1998 as well.

The above described construction effort of the past more than two decades resulted in creation of one of the largest interconnected district heating systems in Europe. The system has been instrumental in abatement of air pollution while providing affordable and safe heat to more than 200 thousands of households and thousands of other customers from public as well as private sector in the city of Prague and nearby town of Neratovice. The system will be further expanding as connection of the Libuš area is under construction and expansion to Holešovice is being considered. District heating systems are sometimes perceived as remnants of collectivism of the communist era. In this context it is very interesting that - even though essentially conceived before revolution - the most of the development of Prague district heating system actually took place after 1990, under the conditions of market capitalism and without investment subsidy or grant of any kind.

The Major Projects and Basic Facts of Prague DH System



Heat transporting medium	hot water (in some parts of the system up to 140°C)
Rated pressure in the pipelines	2.45 MPa
Boiler capacity	1963 MW
Installed power capacity	480 MW
Available power capacity	350 MW
Length of the system	63.6 km (from the CHP plant in Mělník to Modřany)
Total length of the pipelines	1365.5 km
Total heat sales in 2008	10 PJ (2.8 TWh)
Share of CHP heat on total supply	83 %
CHP power production in 2008	966 GWh

Brief Description of the Main Plants

Mělník CHP plant

Number of boilers.....	6
Max. steam supply per boiler.....	230 t/h
Pressure.....	9.4 MPa
Steam temperature.....	540 ° C
Fuel	brown coal
Number of turbines	6
• Back pressure	2 x 60 MWe
• Extraction	2 x 60 MWe
• Condensation	2 x 56 MWe
Installed electrical capacity total.....	352 MWe

Note:

All 6 boilers are connected to a common steam bus enabling each boiler to supply steam to any turbine. Due to the flexibility of extraction and condensation turbines the plant is also able to supply ancillary services to the power system, thus improving its reliability while generating additional revenues.

Malešice II CHP plant

Number of boilers.....	2
Max. heat output per boiler.....	180 t/h
Pressure.....	13.6 MPa
Steam temperature.....	535 ° C
Fuel	low sulfur hard coal
Number of turbines	2
• Back pressure	2 x 55 MWe
Installed electrical capacity total.....	110 MWe

Note:

Only one turbine can be operated at a time due to the lack of steam. The plant also supplies steam to several industrial customers.

Michle III CHP plant

Number of boilers.....	2
Max. heat output per boiler.....	35.5 and 7.5 MW
Fuel	natural gas
Number of turbines	1
• Back pressure	6 MWe
Installed electrical capacity total.....	6 MWe

Besides the already mentioned facilities, hot water boilers using natural gas with the total output capacity of 525 MW are connected to the system. These boilers are used for covering peak load demand in the heating season and as a backup. There is also approximately 30 MW of heat output from municipal waste incineration plant used in the system.

Environmental Benefits and Innovative Technological Solutions

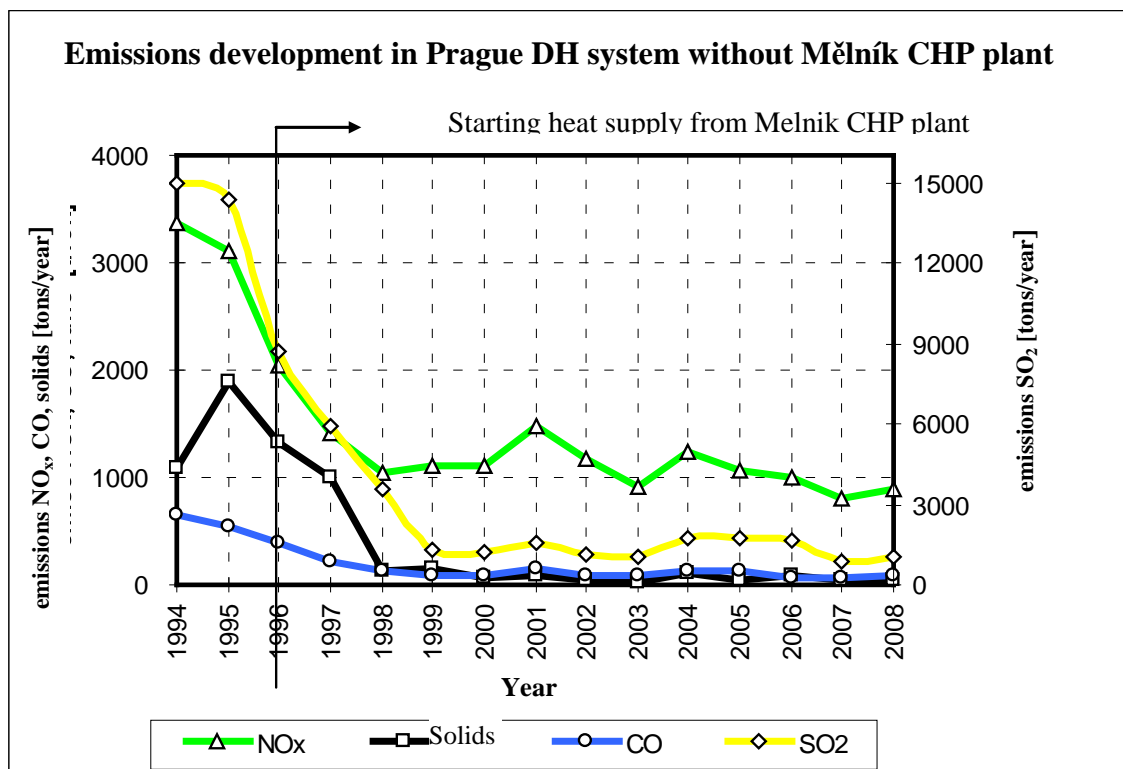
Decreased primary energy use and CO₂ emissions by means of cogeneration

By its very nature, district heating systems are ideal for combined heat and power production (CHP). As mentioned earlier, the Prague district heating system produces almost 1 TWh of electricity from high efficiency cogeneration (CHP) determined according to the methodology set out in the directive 2004/8/EC annually. Corresponding primary energy saving achieved in comparison with separate production of the same amount of heat and power amounts to 3,916 TJ. That represents 19 % of the total primary energy use for separate electricity and heat production. The saving was calculated by means of the methodology set out in the directive and efficiency reference values stipulated by the Commission Decision 2007/74/EC. For illustration, the primary energy saving achieved represents 93,528 tons of oil equivalent. Achieved saving of CO₂ emissions calculated under the assumption that the same fuels would have been used for separate electricity and heat production amounts to more than 360 thousand tons annually.

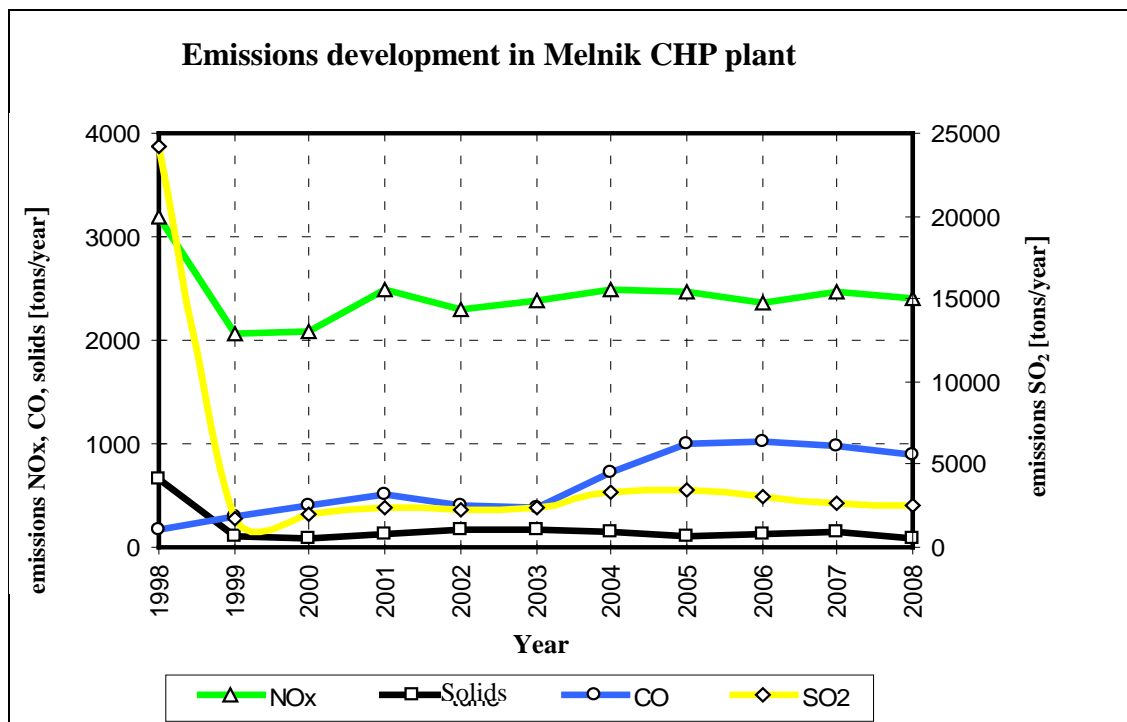
Abatement of classical emissions and utilization of produced waste

Emissions of classical pollutants from Pražská teplotárenská plants in Prague have decreased substantially since early 1990, resulting from implementation of, inter alia, the following measures:

- Brown coal incineration in Michle was replaced by natural gas
- Heavy-oil-fired operation in Třeboradice was abandoned
- The Malešice II CHP plant was modernized and switched from brown coal to low-sulphur hard coal
- Heat from the Mělník CHP plant was brought to Prague
- 49 natural-gas-fired boiler houses were shut down
- Natural-gas-fired boilers in Krč were equipped with low-NO_x burners



Emissions of solid particles for instance decreased 57 times, emissions of sulphur dioxide 16 times. Emissions from the Mělník CHP plant also decreased substantially after installation of wet sulphur scrubbers between 1996 and 1998.



All plants operated by Pražská teplotárenská a.s. and its subsidiary Energotrans, a.s. meet the emission limits and caps set by the existing regulation. In some cases the emissions actually achieved are much lower than required by the law. It should also be noted all these emissions are released from high stacks, in case of the Mělník CHP plant even outside the city. This improves air quality in the city centre in contrast to local heat generation emitting pollutants directly to low atmospheric layers. It is also much easier for local authorities to monitor and regulate emissions from a few large plants than from thousands of small boilers with questionable status and maintenance.

Fly ash from combustion of brown and hard coal was certified for further utilization in construction and is used for production of road and surface stabilizing mixtures and land reclamation. So-called energo-gips from sulphur scrubbers is utilized as additive to cement (regulation of solidification process). Energotrans managed to sell more than two thirds of its production of gips in 2008. Recycling of ash and gips helps to reduce amount of the waste that has to be disposed of as well as consumption of raw materials contributing to the protection of environment. The company also gets paid for sold raw material instead of paying for waste disposal, which further improves economy of the DH system.

Utilization of secondary and renewable energy sources

Almost 11 % of the annual heat consumption in the Prague district heating system comes from the municipal waste incineration plant operated by the municipal company Pražské služby a.s. If not incinerated, the waste would be dumped on landfills, further damaging the environment around the city and potentially releasing large amounts of methane into the atmosphere. According to detailed studies, approximately 50 % of the energy content of solid municipal waste is formed by biodegradable waste. This biodegradable portion of solid municipal waste is regarded as biomass according to the directives 2001/77/EC and

2009/28/EC. Its energy content is thus renewable energy which is considered to be CO₂ neutral. Already more than 5 % of the heat in the Prague district heating system comes therefore from renewable sources of energy and another 5 % from secondary energy sources. This is quite a significant achievement, taking into account total magnitude of the system and limited availability of renewable energy sources in the Czech Republic, especially in Prague surroundings. There is, however, still a number of options to utilize renewable energy which is not possible to use in individual houses or buildings (especially in the context of large city) such as waste biomass, sewage treatment sludge, landfill gas, etc. Some of these options are currently under consideration by the company management.



Waste-to-energy plant in Malešice

Innovative technological solutions

District heating is relatively matured industry compared to e.g. telecommunications and therefore substantial innovations occur less frequently. One of the most important innovations in the past two decades was introduction of pre-insulated pipelines. This technology which is now almost exclusively applied to all new construction and refurbishment projects in Pražská teplotárenská brings about low heat losses while decreasing investment cost and extending useful life of the distribution network. The sector is also benefiting from innovations brought about from other industries such as improved communication, controls and regulation. Ultimately, most of the implemented innovative solutions are aimed at improving energy efficiency of the district heating system even though they may be generated by very different approaches. Company management has always been supportive of introduction of innovative ideas wherever those were economically justified or brought about improved comfort or safety to the customers or company employees. A few examples of such projects follow:

- *Real time regulation of Prague district heating system*

A software tool enables real-time modelling of the Prague district heating system and predicting development of its status based on outside temperature and taking into account factors such as heat accumulation in the system and centrally managed change of the heat supply to different areas by means of remote access into control systems of the heat exchanger stations. The result is optimal distribution of total load among different plants connected to the system which brings about substantial economic as well as environmental savings.

- *Installation of gamma ash meters in CHP plant Malešice*

The device enables real-time analysis of ash content of hard coal being supplied to a boiler. The data from metering are used by automatic regulation and control system in order to optimise operation of boilers with regard to changing characteristics of fuel. This highly innovative technology contributes to improved energy efficiency and therefore economy of the boiler operation while reducing emissions of pollutants into the atmosphere.

- *Infrared imaging survey of heat distribution network*

Pražská teplárenská has had carried out aerial infrared imaging survey of its heat distribution networks in Prague for the first time in 2009. The results of the survey were used for improved maintenance during the summer months and helped to check overall status of insulation and heat losses in different parts of the system. They are also utilized for improving the accuracy of the system's mapping which can be used to expedite and cheapen planned repairs as well as fixing of pipeline disruptions in the future.

- *Modernization of pumping devices*

Most of the circulation as well as boiler feeding pumps in Prague district heating system were already quipped with frequency convertors reducing substantially electricity consumption. Frequency controlled pumps are also introduced to heat exchanger stations.

- *Remote monitoring and control of heat exchange stations*

Remote control of heat exchange stations enables operators to automatically monitor and set parameters of heating in heat exchange stations which improves efficiency as well as reliability of the system operation and reduces response time when dealing with disruptions of malfunction of the equipment. More than 50 % of 2109 heat exchanger stations owned by Pražská teplárenská enabled either remote monitoring or control in 2008 and the share is expected to rise considerably in the future.

- *Remote reading of heat meters*

Pražská teplárenská is operating more than 9500 heat meters and must provide for regular reading. Remote reading of heat meters by means of data transfer and centralized processing brings about cost savings as well as improved accuracy of invoices while improving customers comfort. More than 100 remote metering sets were installed in 2008 bringing total share of remotely read meters to 39 %.

Customer and Public Relations

Pražská teplárenská serves about 11,000 customers from residential, commercial as well as public sector who require reliable and safe heat supplies at a competitive price. In residential sector, customers include housing associations as well as associations of flat owners because heat is supplied to buildings rather than individual flats. Number of households using the heat from Prague district heating system can, nevertheless, be estimated at 200 thousands. The company aims at building up long-term, balanced relations with all its customers.

Customer satisfaction

Continual improvement of customer satisfaction forms together with safety of the heat supply, occupational safety and protection of environment one of the corner stones of its policy. Pražská teplárenská tries to increase customer satisfaction though speedy claim handling, providing for heat supplies outside the heating season on customer request, through bringing the duration of shutdown periods in summer to the minimum, easing the administrative burden or checking hot water quality. It also participates in the “Together for Prague” project implemented under the auspices of the Capital City of Prague. The project is aimed at improving services for Prague residents, facilitating access to services and their gradual unification among main utilities of Prague.

Pražská teplárenská implemented a system which regularly monitors and evaluates customer satisfaction as well as analyzes claims and/or complaints received from customers. In general, the surveys reveal our customers are satisfied with the service provided. Suggestions for further improvement of services such as better lucidity of invoices and price lists that came out of the survey recently are taken seriously and appropriate measures are under preparation. Customer relations department had to deal with 16 complaints on noise in the heating systems in 2008. Most of these cases were caused by unprofessional intervention into heating system which was carried out without consultation with heat supplier – usually installation of thermostatic valves. Pražská teplárenská is following very flexible approach in these cases as indicated by letter from one of the customers – see Appendix 3.

As ultimate indicator of customer satisfaction can serve rate of disconnections to newly connected customers. While there were only 24 disconnections in 2008, caused mostly by demolitions or changes in the use of the buildings or premises, the company was able to commence heat supplies to 56 new customers with total capacity of 36 MW.

Communication and marketing activities

Pražská teplárenská issues Zpravodaj Pražské teplárenské, a quarterly bulletin wherein customers can find sector news, heating-related advice, including information as to how to save heat through efficient heating, as well as Pražská teplárenská news. Customers can also find information from the bulletin as well as that about the company, heat prices, summer shut down periods as well as district heating in general on the company web pages. Pražská teplárenská regularly organizes seminars on heat supplies for customer representatives as well as heating design engineers. The lectures on seminars are delivered both by the staff of Pražská teplárenská as well as independent experts in the field.



Social activities

Given its size and area of business, Pražská teplárenská is tightly linked to the Capital City of Prague has been following a good citizen policy for years. It is in the very interest of the company to help improve the life of Prague residents, which is why it supports various charity (health care, youth and elderly support), sports and cultural projects and events. Besides these activities, Pražská teplárenská provided rooms in the premises of its headquarters to the Czech National Disability Council.

QESMS

Pražská teplárenská has introduced an integrated quality, environment and OHS systems compliant with international norms ISO 9001, ISO 14001 and OHSAS 18001 and is entitled to use following quality marks as well as title “Safe enterprise” awarded by the Ministry of Labor and Social Affairs to companies maintaining high standard in the field of occupational health and safety.



Prizes and awards

Pražská teplárenská was awarded the title “Project of the year in the district heating and cooling” in the competition organized by the Association for District Heating of the Czech Republic twice in 2004 and 2005. The title is awarded to selected projects improving energy efficiency, conserving fossil fuels and providing for efficient supply of energy. The honored projects of Pražská teplárenská were connection of Prague 8 – Invalidovna and Horní Počernice area to Prague district heating system. More information can be found in Appendix number 3.

Membership in professional organizations

Pražská teplotárenská is a member of the following professional organizations:

- Association for District Heating of the Czech Republic
- Association of Energy Managers,
- Czech Association of Energy Sector Employers

Appendix 1 The Prague District Heating System in Pictures



Mělník CHP Plant



Turbine Hall in Mělník CHP Plant



Central Control Room in Mělník CHP Plant



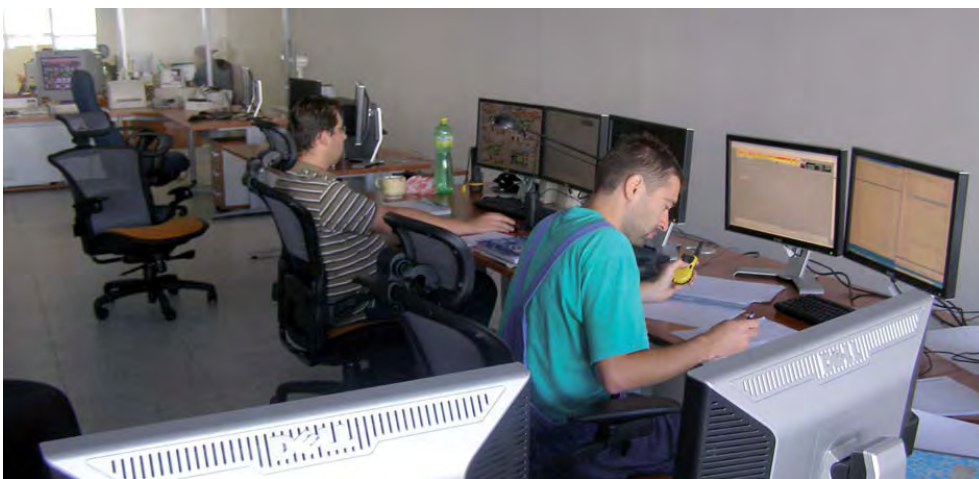
Backbone Feeder from Mělník CHP Plant (2 x DN 1200)



Třeboradice Plant



Malešice CHP Plant



Control Room in Malešice CHP Plant



Michle CHP plant



Pražská teplárenská Headquarters – Catastrophic Flood in 2002

Appendix 2 – Awards Received



“Project of the year” in the district heating and cooling systems in the Czech Republic 2004 – received for project of the connection of Prague 8 – Invalidovna area to Prague district heating system.



“Project of the year” in the district heating and cooling systems in the Czech Republic 2005 – received for project of the connection of Horní Počernice area to Prague district heating system.

Appendix 3 – Letter from Customer

Mr. Petr Kusebauch
Head of Customer Care Department
Pražská teplotárenská a.s.
Partyzánská 1/7
170 00 Praha 7

Prague, 18 February 2009

Dear Mr. Kusebauch

Thank you for your information on the measures you have taken to eliminate noise of the heating system in our building. We are sorry for the malpractice of the engineer who designed the regulation. We assumed that the thermal regulation of our building, which was carried out by a specialized company on the basis of a decree, had been discussed with you. We really appreciate your attitude. Only few suppliers are so helpful.

Thank you for handling the issue.

Best regards

Association of Flat Owners
Krč 1193 – 1199, 1201 – 1205
Na strži 1202/45
140 00 Prague 4
IN: 26 70 88 17

SVJ
K R Č
1193 až 1199, 1201 až 1205

04/19-02-2009 /461

Pan
ing. Petr Kusebauch CIA
vedoucí odboru péče o zákazníky
Pražská teplotárenská, a.s.
Partyzánská 1/7
170 00 Praha 7
V Praze dne 18.2.2009

Vážený pane inženýre,,

děkujeme Vám za Vaši zprávu o opatřeních, která jste provedli k odstranění hluchnosti tepelné soustavy našeho objektu. Omlouváme se za pochybení projektanta regulace. Předpokládali jsme, že termoregulace našeho objektu provedená odbornou firmou na základě vyhlášky byla s Vámi projednána.

Vážíme se Vašeho postupu, je opravdu málo takových vstřícných dodavatelů.

Děkujeme Vám za vyřízení a jsme s pozdravem

Společenství vlastníků jednotek
Krč 1193 až 1199, 1201 až 1205
Na strži 1202/45, 140 00 Praha 4
IČ 26708817

Děkava *Petr Kusebauch*