CASE Ukraine
Center for Social and Economic Research

Overview of Heating Sector in Ukraine

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List of abbreviations

CHP	combined heat and power plant
IEA	International Energy Agency
NERC	National Electricity Regulation Commission
n/a	not applicable
n/d	no data
SPFU	State Property Fund of Ukraine
UAH	Hryvnia (Ukrainian currency); official exchange rate in the first half of 2007: 1 USD = 5.05 UAH
USD	United States dollar

Units

bln	billion (or 10^9)
bcm	billion cubic meters
GCal	gigacalorie (or 10^9 calorie)
GJ	gigajoule (or 10^9 joule)
kWh	kilowatt per hour (or 10^3 watt per hour)
MJ	megajoule (or 10^6 joule)
mm	millimetre (or 10^{-3} metre)
MW	megawatt (or 10^6 watt)
MWh	megawatt per hour (or 10^6 watt per hour)
PJ	petajoule (or 10^{15} joule)
tef	tons of equivalent fuel
TJ	terajoule (or 10^{12} joule)

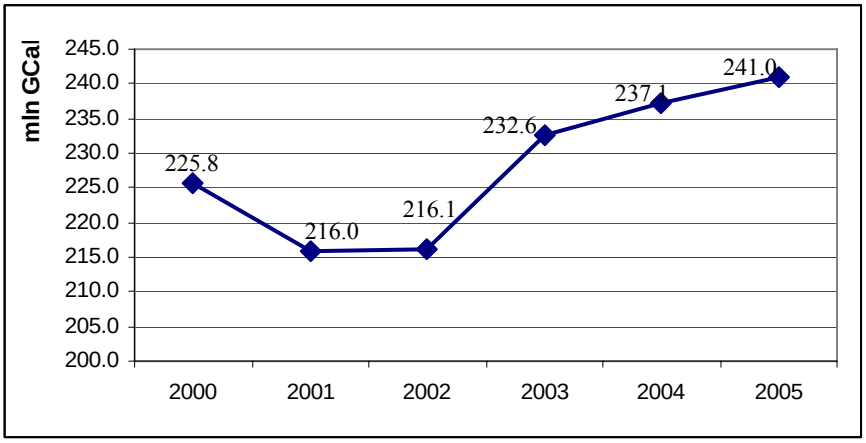
Contents

1. General information

1.1. Heat production

Heat is produced in Ukraine by thermal power plants, combined heat and power plants, nuclear power stations and boiler plants. In 2005 thermal power stations and CHPs accounted together for 22% of heat produced, boilers for 62%, individual generators for 10% and nuclear power stations for 0.01%. Secondary heat energy sources accounted for about 5%. Total heat production and consumption in Ukraine have dropped almost twice since 1990 (from about 400 mln GCal to 241 mln GCal in 2005). The major reason is decrease in industrial output. Besides, the constantly growing tariffs for heat and hot water prompted households to install meters and reduce consumption.

Figure 1. Total heat production, 2000-2005, mln GCal



Source: Energy Strategy of Ukraine till 2030

As of 2005, households (44%) and industry (35%) were the main heat consumers. The share of other sectors accounted for about 21%.

Heat production facilities are owned by the Ministry of Fuel and Energy, municipalities (they own mainly district heating companies (teplokomunenergo)) and industrial enterprises. Capital assets in Ukrainian heat sector are badly outdated. About 50-70% of them are depreciated. Old equipment causes often ruptures in centralized heating system, especially at winter time.

1.2. Fuel used for heat production

The basic resources for heat production in Ukraine are natural gas and coal; while a share of fuel oil is minor (see Table 1). There are also single cases of co-generation equipment, which use methane or biomass. Geothermal and solar thermal sources are not used at all.

Table 1. Structure of fuel used for heat production, 2005, %

Heat producing units	Coal	Natural gas	Fuel oil
Thermal power stations	57.8	47.4	0.8
CHPs	5-6	76-80	15-18
Boliers	27-36	52-58	12-15

Source: Energy Strategy of Ukraine till 2030

1.3. Heat networks

Ukraine has 24,300 km of transmission and distribution networks (excluding heat networks of industrial enterprises). Transmission pipelines are owned by the Ministry of Fuel and Energy of Ukraine and constitute about 3,500 km (pipes with diameter 125-1400 mm). Distribution pipelines (with diameter 50-800 mm) are owned by communal enterprises and constitute about 20,800 km. Heat networks badly need rehabilitation and reconstruction. More than 70% of them have been exploited for more than ten years.

Table 2. Structure of heat production in Ukraine

		Company
Generation	Thermal power stations	There are five companies in Ukraine that own and operate thermal power stations. Heat production by thermal power stations (together with co-generation facilities) accounted for about 22% in 2005.
	Nuclear power stations	There are four nuclear power stations in Ukraine, but heat production by them is insignificant and in 2005 accounted for only 0.01%.
	Combined heat power plants	There are about 250 CHPs in Ukraine. More than 200 of them are small heat plants incorporated in the property of industrial enterprises. Industrial enterprises produce heat for their own needs, and sell the rest of heat to households. About 30 CHPs are separate legal entities. They are large heat producers that supply heat to households and industry. Half of them are state owned and incorporated in NAC ECU structure. About 10 CHPs are owned by local communities and 5 of them are privately owned. We also distinguish between CHPs owners and those ones who exercise operational control (see Appendix 2).
	Boiler plants	There are about 100,000 boiler plants in Ukraine. They are installed at industrial enterprises and incorporated in enterprises property or installed in districts and cities and owned by district heating companies. The boiler plants may be used as peaking sources to supplement the production from CHPs or as the main heat source of the region in periods of low demand.
	Individual heat generators	Individual heat generators in 2005 produced about 10% of total heat. They include gas, liquid, solid fuel boilers, household furnaces etc.
	Renewable energy sources equipment	At present heat production on the base of renewable energy sources is not widely spread. There are single cases of heat production from biomas (wood, straw, peat, biogas).
Transmission		There are about 3,500 km heat transmission pipelines in Ukraine. They are owned by the Ministry of Fuel and Energy of Ukraine.
Distribution		There are about 20,800 km of heat distribution pipelined in Ukraine. They are owned by communal enterprises. The majority of heat networks are generally laid in underground non-accessible concrete ducts, although the networks are laid in tunnels and accessible ducts in some regions. All heat networks are insulated (usually with glass wool) regardless of heat carrier temperature, location (above or below ground), and accessibility.
Heat carrier	Water	Hot water is a typical method to transport heat to residential and commercial buildings.
	Steam	Steam is often used for industrial and manufacturing facilities.

Source: compiled by CASE Ukraine from Energy Strategy of Ukraine until 2030, Final Report on Inventory of Sectoral Greenhouse Gas Emissions (District Heating Sector of Ukraine), Pacific Northwest National Laboratory (USA), Agency for Rational Energy Use and Ecology (Ukraine), Kyiv, June 2002.

2. Heat supply systems

Heat supply systems can be classified into centralized and decentralized.

2.1. Centralized district heating

District heating is defined as heat supply to the consumers through a common heat network. District heat consumers include buildings in the residential and public sector, and industrial facilities. Public sector includes heat consumption in secondary schools and universities, health care institutions, sport and trade institutions, catering enterprises, nursery schools, hotels, military divisions etc. In addition to public sector belong heat consumption for the communal and cultural-households needs of all enterprises, institutions and organizations[1].

Centralized heating is used primarily in cities. Large cities are supplied by industrial heat sources and district heating companies. The heat supply systems of these cities are characterized by a few large energy sources (either CHPs or large heat-only boiler plants) and long heating networks (over 500 km). Smaller cities and municipalities are served by district heating companies owned either by the Ministry of Fuel and Energy or municipalities.

2.2. Decentralized heating

Decentralized heating is organized as individual heating (for a building) and private, or autonomous heating (for an apartment or a house). They use mainly gas equipment.

Decentralized heating is used mostly in rural areas but lately there have been some projects on private heating system installation in multi-storey buildings in the cities. At present there are many cases of switching from centralized to decentralized heating sources because of hard deterioration of centralized heat supply. It negatively affects centralized heat system and requires substantial costs to reconstruct engineering networks.

2.3. Comparative analysis of centralized heating, individual and autonomous heating

The efficiency of heating systems is defined on the base of production, transportation and environmental effect.

The systems of centralized heating are the most effective at the production stage; however, the substantial losses occur during heat transportation to a large number of consumers. For that reason centralized heating is appropriate when serving large residential districts.

Individual heating systems provide minimum transportation losses, but they require additional costs to install boilers in every building. They are convenient for private cottage areas. The drawbacks of individual heating systems are the increased gas emissions at residential area, and consequently increased environmental pollution. Sometimes individual heating is more preferable than rehabilitation of centralized heat pipelines, as rehabilitation takes too much money and efforts.

Autonomous heating in every apartment is the most favourable for consumers. They do not pay for heat and hot water but only for gas and cold water. In addition, they can regulate temperature in their apartments and do not suffer from overheating in spring and insufficient heating in winter. But sometimes it is impossible to install autonomous boilers in every apartment, because there is not enough space for heating equipment. In this case it would be appropriate to install one boiler for the whole building (several apartments) or several buildings. Another problem for individual and autonomous heating is that in case of gas supply interruption there is no reserve fuel resources to continue heating. Reserve fuel is provided only for centralized heating.

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[1] Source: Final Report on Inventory of Sectoral Greenhouse Gas Emissions (District Heating Sector of Ukraine), Pacific Northwest National Laboratory (USA), Agency for Rational Energy Use and Ecology (Ukraine), Kyiv, June 2002.

Table 3. Comparison of heat losses in different heat supply systems

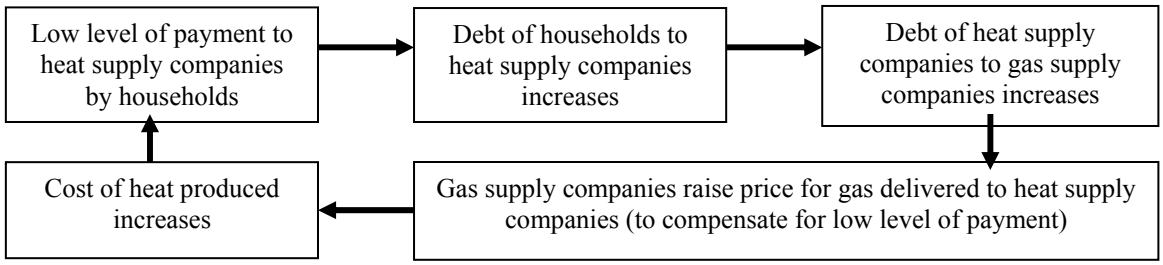
Heat supply systems	Heat consumption, GCal/m^2	Heat losses, % (GCal/m^2)	Heat consumption by heat production source (GCal/m^2)	Heat production, GCal/m^2
Individual (for an apartment)	0.139	0	0	0.139
Boiler for a block of buildings	0.139	6% (+0.0083)	2.2% (+0.0032)	0.1505
Boiler for a district	0.139	13% (+0.0181)	2.2% (+0.0035)	0.1606
CHP	0.139	13% (+0.0181)	2.2% (+0.0035)	0.1606

Source: Recommendations on the Restructuring of Centralized Heat Supply Systems, Aspects of Tariff Reform in Ukraine, 3rd issue, April 2004

3. Replacement of gas with alternative fuels

Gas accounts for 50-70% of heat costs in Ukraine. That is why the increase in gas price affects greatly the heat costs, thus causing debts and non-payments (see Figure 2).

Figure 2. Increase in gas price and debt of heat companies



Source: compiled by CASE Ukraine

High gas reliance makes the gas replacement with alternative fuels quite topical. Currently biomass is one of the most appropriate sources for gas replacement in Ukraine.

Biomass is a renewable energy resource derived from the carbonaceous waste of various human and natural activities. In energy production plant origin biomass is used as biofuel (wood, straw, plant remains of agricultural production, organic parts of solid domestic waste, peat etc.), and animal origin biomass is used for production of heat (manure from cows etc.). Biomass is a renewable energy source and relatively harmless to the environment.

Biogas, biodiesel and bioethanol are produced from biomass.

Today biomass ranks fourth among fuels used in the world. It accounts for about 14% of the world primary energy consumption. Moreover, in some developing countries biomass accounts to 30-50% of primary energy sources (India, Asian countries).

3.1. Wood, straw and peat

At present wood is the most popular biomass in Ukraine. About 1 million ton of equivalent fuel of wood is burned annually to heat private houses and more than 1,000 boilers at timber enterprises.

One of the most effective ways to use biomass in Ukraine is to install modern boilers based on straw, peat and wood. It takes little time and investments, which makes pay-back period very short (see Table 4).

Table 4. Potential of Ukrainian market of boilers that use biomass as fuel until 2015

Equipment	Fuel	Market capacity in Ukraine, units	Installed capacity, MW of heat produced	Operating period, hours per year	Fuel replace-ment, mln tef per year	Natural gas replace-ment, bcm per year	Decrease in CO2 emissions, mln ton per year	Invest ment, mln UAH
Heat boilers , 1 10 MW	Peat Wood	250.0	500.0	4,400.0	0.3	0.3	0.5	100.0
Industrial boilers, 0,1-5 MW	Wood	360.0	360.0	6,000.0	0.3	0.2	0.5	72.0
Domestic hot-water heaters, 10-50 kW	Wood	53,000.0	1,590.0	4,400.0	1.0	0.8	1.7	318.0
Farmer boilers 0,1-1 MW	Straw	15,900.0	3,180.0	4,400.0	1.9	1.7	3.3	954.0
Heat boilers 1-10 MW	Straw	1,400.0	2,800.0	4,400.0	1.7	1.5	2.9	840.0
Heat boilers, 0,5-1 MW	Peat	1,000.0	750.0	4,400.0	0.6	0.5	1.0	150.0
Total		**71,910.0**	**9,180.0**		**5.7**	**5.0**	**9.8**	**2,434.0**

Source: Options for the Replacement Natural Gas with Local Fuels in Ukraine, Energy Policy in Ukraine, No.3-4, 2006 www.epu.kiev.ua

The total installed capacity of the equipment is about 9,000 MW, and investment cost is UAH 2.4 bln. That will allow replacing about 5 bcm of natural gas by 2015, which would annually bring UAH 2.75 bln (UAH 550 per 1,000 cubic meters * 5 bcm per year). Therefore, annual cost reduction is even higher than total investment costs.

Biomass is much cheaper than natural gas (see Table 5).

Table 5. Comparison of fuel efficiency by heat cost

Fuel	Fuel cost, UAH per ton or cubic meter	Calorific value, MJ per kg	Cost of GJ, UAH
Straw	100	17	6
Wood	80	10-12	7
Natural gas	550	35	16

Source: Options for the Replacement Natural Gas with Local Fuels in Ukraine, Energy Policy in Ukraine, No.3-4, 2006 www.epu.kiev.ua

3.2. Biogas

Biogas refers to gas produced by the anaerobic digestion or fermentation of organic matter including manure, sewage sludge, municipal solid waste, biodegradable waste or any other biodegradable feedstock, under anaerobic conditions. Biogas is comprised primarily of methane and carbon dioxide[2].

Biogas can be used in industry and energy production, though under an adapted technology. Introduction of biogas equipment will allow saving about 1.36 bcm of natural gas with biogas by 2020 (see Table 6).

Table 6. Potential of biogas production in Ukraine by 2020

Equipment	Approximate capacity of Ukrainian market, units	Installed capacity, MW (heat + energy produced)	Operating period, hours per year	Fuel replace-ment, mln tef per year	Natural gas replace-ment, bcm per year	Decrease in CO2 emissions, mln ton per year	Investment, mln UAH
Large biogas equipment	2,903.0	711 + 325	8,360.0	1.3	1.2	22.4	1,465.0
Small biogas power stations	90.0	20 + 80	8,360.0	0.2	0.2	3.3	404.0
Total	**2,993.0**	**731 + 405**	**-**	**1.6**	**1.4**	**25.6**	**1,869.0**

Source: Options for the Replacement Natural Gas with Local Fuels in Ukraine, Energy Policy in Ukraine, No.3-4, 2006 www.epu.kiev.ua

Currently there is only one biogas installation at pig farm Agro-Oven in Dnipropetrovsk region that produces electricity.

On 25 September, 2006 Western Ukrainian Resource Center started the project "Biogas is the Energy of Future". The project is supported by Eurasia Fund and USAID. The main task of the project is to install biogas equipment in farms of Ivano-Frankivsk, Ternopil and Lviv regions[3].

3.3. Biodiesel and bioethanol

Biodiesel and bioethanol are referred to as biofuels, i.e. liquid fuels produced from biomass. Biodiesel is made from vegetable oils, like rapeseed oil, and bioethanol is ethanol derived from crops. In previous years the production of liquid biofuels was constrained by the fact that price for liquid fuels was much higher than the price for gasoline. But as the prices for gasoline grew in Ukraine, in 2005 the costs of gasoline and biofuels became equal.

Biofuels are already produced in Ukraine. In January 2007 Bioenergeticheskaya Companiya launched a pilot project on the production of biofuel marked as BIO-100 at Lokhvytsya distillery (Poltava region). BIO-100, which is produced from bioethanol, is already sold at six filling stations in Kyiv, Dnipropetrovsk, Odessa and Chernivtsi region. At the same time Biodiesel-Bessarabia (Odessa region) started to produce biodiesel from sunflower and rapeseed oil. The projected capacity of the plant is 7,000 ton of biodiesel per year. In addition, several companies announced their plans to start the construction of plants on biofuel production in Ukraine.

Despite the attractiveness of the biofuels market, the legislative framework is still not developed, which makes the producers to use European standards. In January 2006 the Cabinet of Ministers approved the Program for Biodiesel Production Development by 2010, but no preferences to biodiesel producers and consumers were suggested. According to this Program, it is supposed to

[2] http://en.wikipedia.org/wiki/Biogas
[3] http://www.civicua.org/news/view.html?q=866664

spend UAH 8.9 bln for biodiesel production development until 2011 (UAH 69.7 mln will come from the budget, and the rest from the other sources)[4].

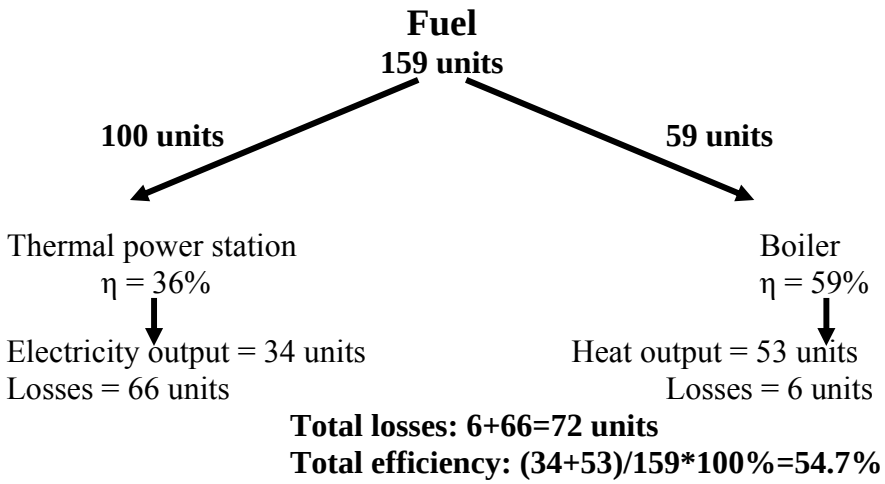
In January 2007 First Vice-Premier Mr. A. Kluyev declared in Brussels that Ukraine initiates decrease in import duties and excise tax on the equipment for bioethanol production. According to his estimates, Ukraine may start the industrial production of bioethanol in 1.5-2 years[5].

4. Co-generation vs separate heat and power production

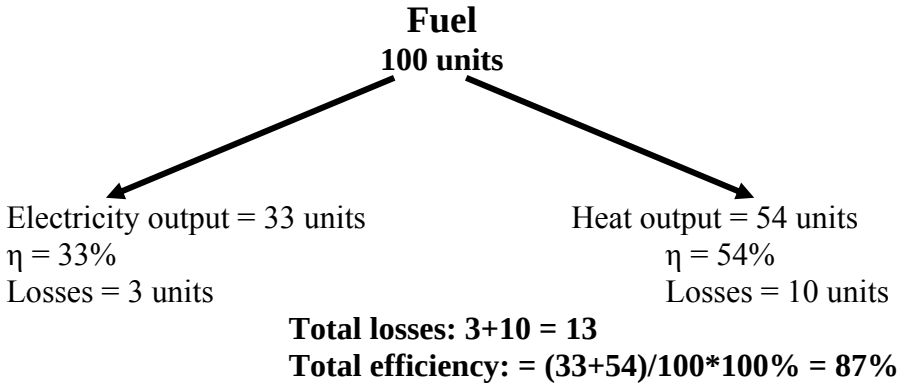
Co-generation is much more effective than separate heat and power production. According to different estimates, the efficiency of co-generation is about 30% higher than that one of separate heat and power production (see Figure 3).

Figure 3. Efficiency analysis of fuel input for heat and power production

a) separate heat and power production



b) co-generation



Source: Recommendations on the Restructuring of Centralized Heat Supply Systems, Aspects of Tariff Reform in Ukraine, 3 issue, April 2004

[4] "Program for Biodiesel Production Development in Ukraine", Cabinet of Ministers' Decree No. 1774 as of 22 December, 2006

[5] TEK Daily Monitoring, 31.07.2007

The cost of electricity produced in co-generation is three times lower than in separate heat and electricity production (see Table 7).

Table 7. Comparison of fuel input in co-generation and separate heat and electricity production

Source	Efficiency, %	Production unit	Fuel input, kg of equivalent fuel	Total fuel input, kg of equivalent fuel	Cost of electricity, UAH
Thermal power station	36	Electricity, 1 MWh	350.0	508.7	0.3
Boiler	90	Heat, 1 GCal	158.7		
CHP (co-generation)	87	Electricity, 1 MWh	148.0	306.7	0.1
		Heat, 1 GCal	158.7		

Source: Recommendations on the Restructuring of Centralized Heat Supply Systems, Aspects of Tariff Reform in Ukraine, 3 issue, April 2004

Additional advantage of co-generation is that environmental pollution is lower than in separate production.

5. Regulating bodies and tariffs

5.1. Regulating bodies

Administration in heat supply sector is provided at two levels:

- State level – the Cabinet of Ministers of Ukraine, central bodies of executive power (the Ministry of Fuel and Energy, the Ministry of Construction and Housing and Communal Services, the National Electricity Regulation Commission (NERC).
- Local level – local state administrations, the Ministers Council (the Rada) of the Autonomous Republic of Crimea.

The Cabinet of Ministers defines the general state policy in heat supply, organizes supervision and coordinates the ministries' activity in development of state and regional heat supply programs and tariffs setting, and defines the bodies of power which are entitled to issue licenses.

The central body of executive power in heat supply exercises general regulation in heat supply for all the agents excluding co-generation and alternative or renewable energy production. The body is responsible for the implementation of state policy and the development of guidelines in heat supply sector, coordinates and controls the activity of local bodies of power.

NERC provides general supervision and administration for the agents in co-generation and alternative or renewable energy productions. The Commission regulates tariffs for heat produced by CHPs, thermal and nuclear power stations, co-generation and alternative or renewable energy facilities. Besides, NERC issues licenses for heat relating activities in the abovementioned sphere.

The local bodies of power regulate the activity in heat supply sector of the region under their jurisdiction. The main function of the local bodies of power is to approve the tariffs for heat produced by communal enterprises excluding co-generation and alternative or renewable energy production[6].

[6] The Law of Ukraine "On Heat Supply"

5.2. Licensing of heat production and transportation

Until 2005 it was difficult to define heat producers because heat production, transportation and supply activities were not licensed. In 2005 the Law "On Heat Supply" was adopted and it provided for obligatory licensing of heat relating activities[7].

Heat producers must obtain license from NERC[8].

Heat transportation and supply companies must obtain licenses from the Ministry of Construction and Housing and Communal Services. Currently the Ministry is developing the respective procedures.

5.3. Heat tariffs setting

Heat tariff for final consumers is defined as a sum of tariffs for production, transportation and supply.

Tariffs for heat that is produced by CHPs, co-generation or alternative/renewable energy sources are set by NERC but they should not be higher than heat produces by other sources.

Tariffs for heat production, transportation and supply other than CHPs, co-generation or alternative/renewable energy sources are approved by local governments. Due to that the tariffs differ much across the territory of Ukraine.

According to the Law of Ukraine "On Heat Supply"[9], heat tariffs should cover all the economically sound expenses for heat production, transportation and supply. Tariffs should include full costs of heat production and provide for marginal profitability level that is not lower than the level defined by the Cabinet of Ministers on the base of calculations by the central body of executive power in heat supply.

If heat tariffs do not cover the cost of heat and marginal profitability level, the body that has set the tariff should provide for the compensation according to effective legislation. That is, if the tariffs for heat from thermal power station and boilers that are approved by local government on the base of heat producer calculation, and they are lower than economically sound cost including marginal profitability level, the local governments must compensate the losses from the local budgets.

Meanwhile, the Ministry of Economy elaborated the draft that specifies binding of the household services tariffs to energy prices. First of all, it means heat, hot water and gas supply to households. The current system of tariffs setting does not allow saving energy sources and reduces the competitiveness of Ukrainian industry, since industry is forces to compensate for low households tariffs.

The procedure of heat tariffs increase is rather complicated, as well as time consuming. It is as follows:

1. The district heat supply company receives official notification from NERC on gas price increase. Only after that the company may start developing the proposal on the heat tariffs increase.
2. The new heat tariffs have to be approved by the following authorities:
    - Commissions of the Municipal Council (mis'krada)
    - regional council (oblrada)

[7] According to the Law "On Heat Supply", article 17
[8] NERC defined the procedure of licensing with Decrees No.540 and No.541 (registered in the Ministry of Justice on 17 May this year)
[9] Law of Ukraine "On Heat Supply" No. 2633-IV as of 2 June, 2005

- trade unions
- Antimonopoly Committee
- Department for Price Administration
- Department for the Protection of Consumer Rights
- public hearings

3. Municipal Executive Committee (misk'vykonkom) approves the new heat tariffs.
4. The tariffs changes are publicized via official mass media of Municipal or Regional Council. And if during a month there are no official protests from the Office of Public Prosecutor, the company is entitled to apply the new tariffs.

5.4. Cross-subsidizing

The question of cross-subsidizing is applicable to combined heat and power production (CHPs). There are different points of view on cross-subsidizing in heat and electricity production. Official sources say that for CHPs due to low heat tariffs heat production is subsidized by the cost of electricity production. But the unofficial sources assert that CHPs may charge heat tariffs that are even higher that heat production cost to cover losses from electricity production because electricity tariffs are set only by NERC while heat tariffs are set by heat production companies with the approval of local bodies of power.

According to the Law of Ukraine[10] adopted in April 2006, heat producers (CHPs and renewable sources power plants) are not allowed to cross-subsidy heat production, i.e. to cover losses from heat production at the cost of electricity production or other activity).

5.5. State subsidies to compensate for low heat tariffs

During the last years heat tariffs did not cover the heat production costs and heat production business was unprofitable. For example, from the cost structure of Kievenergo we can see that heat production costs were higher than average heat tariff (see Table 7). At that time fuel accounted for about 48% in heat production cost structure. That is considered to be acceptable. But in 2006 after gas price increase fuel component grew and Vinnitsa Teplomerezhi stated that as of May 2006 fuel reached 76% in costs structure[11].

[10] NERC Decree "On Ratifying Terms and Regulations (Licensing Terms) of Carrying Activity on Heat Production by Combined Heat and Power Plants and Non-Conventional and Renewable Power Sources Plants" No. 540 as of 26 April, 2006

[11] Dzerkalo Tyzhnya, 13-19 May 2006, No.18 (597)

Table 8. The structure of Kyivenergo heat costs, 2002-2005

		2002		2003		2004		2005	
		UAH	%	UAH	%	UAH	%	UAH	%
1	I. Average tariff	53.67		58.10		58.12		59.28	
2	II. Cost, incl:	64.51		65.86		70.01		65.45	
3	Fuel	31.16	48.30	30.72	46.64	30.45	43.49	31.59	48.27
4	Non-fuel inputs	6.31	9.78	6.31	9.58	6.90	9.86	8.18	12.50
5	Payroll expenses *	6.35	9.84	7.18	10.90	8.76	12.51	10.53	16.09
6	Social expenses	2.32	3.60	2.56	3.89	3.22	4.60	4.05	6.19
7	Depreciation	2.75	4.26	2.63	3.99	2.87	4.10	3.48	5.32
8	Energy purchasing	0.02	0.03	0.04	0.06	0.13	0.19	0.00	0.00
9	Other expenses**	15.60	24.18	16.42	24.93	17.68	25.25	7.62	11.64
10	III. Total income (1-2)	-10.84		-7.76		-11.89		-6.17	

* Increase in 'payroll expenses' happened because several heat supply units were included in company's assets
** Decrease in 'other expenses' is due to decrease in bad debt recovery charges according to the National Accounting Standards, 10 'Payables'

Source: Kyivenergo, heat tariffs section, http://www.me-press.kiev.ua/heattariffs.php, CASE Ukraine estimates

Table 9. Gas and electricity price increase in 2006

Date of increase	Substance	Current tariffs	Tariffs before increase
1 January, 2006	Gas for district heating companies by 26%	263.0-304.5 UAH per 1,000 cubic meters	* - 241.5 UAH per 1,000 cubic meters
1 May, 2006	Gas for households by 25%	0.22-0.24 UAH per cubic meter (incl. VAT)	0.175-0.19 UAH per cubic meter (incl. VAT)
	Gas for district heating companies by 25%	329-383.4 UAH per 1,000 cubic meters	263.0-304.0 UAH per 1,000 cubic meters
	Electricity for households by 25%	0.195 UAH per 1 kWh	0.156 UAH per 1 kWh
1 July, 2006	Gas for households by 85%	0.407 – 0.444 UAH per cubic meter (incl. VAT)	0.220-0.240 UAH per cubic meter (incl. VAT)
	Gas for district heating companies by 78%	585.6-686.00 UAH per 1,000 cubic meters	329.0-383.4 UAH per 1,000 cubic meters
1 September, 2006	Electricity for households by 25%	0.2436 UAH per 1 kWh	0.195 UAH per 1 kWh

Source: Ukrainian legislation, CASE Ukraine estimates

There are legislative provisions for compensation to local budgets from state budget for low heat tariffs.

In 2004 the Law of Ukraine "On Housing Services"[12] was adopted. It outlines that "if central bodies of power exercise prices/tariffs changes, which caused unforeseen expenses of producers/executives, central bodies of power must fully reimburse for the losses during the effective financial year before the approval of the new budget". But no compensations took place.

In 2006 the Cabinet of Minister's Decree[13] defined the mechanism of transferring subvention from the state budget to local budgets to cover the debt caused by disparity in tariffs for heat, water supply and sewerage and actual costs for the services. The funds are aimed at compensating for debt accumulated during 2000-2004.

[12] Law of Ukraine "On Housing Services" No. 1875-IVas of 26 June, 2004, article 31, paragraph 8
[13] Cabinet of Ministers' Decree No. 705 as of 22 May, 2006 "On Approving the Procedure of Transferring in 2006 the Subvention from State Budget to Local Budgets to Pay Off an Accumulated Debt Arising from Difference in Tariffs for Heat Energy, Water Supply and Sewerage Services for Households"

5.6. Stimulating heat supply companies to introduce energy saving technologies

Article 54 of the state budget of Ukraine for 2006 and the Cabinet of Minister's Decree No.207 of 9 March, 2006 stipulate for subsidies from the state budget to local budgets. No less than 75% of the subvention must be directed to energy saving in heat, water supply and sewerage. But according to monitoring results, the funds are allocated at other purposes. Only four regions used the funds for energy saving. Other regions used from 7% to 40% to energy saving[14].

Other measures of energy saving that would be appropriate include:

- replacement or reconstruction of steam and gas boilers with efficiency that is lower than 89%;
- improvement of heat pipes insulation to decrease losses in transmission pipelines;
- installation of heat meters;
- installation of co-generation equipment[15].

Another stimulus for companies to introduce energy saving technologies is outlined in the Law of Ukraine "On Heat Supply". According to the Article 8, "in case heat supply or heat transportation companies introduce energy saving measures that result in saving energy resources or decrease of heat losses in transportation, the body of executive power that is entitled to regulate heat tariffs according to the Law, for the following three years leaves the tariffs at the level that was before the introduction of the energy saving measures".

6. Key problems of Ukrainian heating sector

1. District heating suffers from inefficiency and low level of investment. The major impediments for investment include the unclear pricing policy, unregulated management and ownership conditions, the accumulated debt of heat producers.
2. The outdated heat generation and transmission capacities undermine the stability of centralized district heating system.
3. The absence of comprehensive system of data collection on heat production and consumption creates difficulties in decision making.
4. High gas reliance incurs the risks for continuous heat supply. It highlights the necessity to reduce gas consumption by improving efficiency of heat producing companies and replacing gas with alternative fuels.
5. In some regions of Ukraine heat tariffs are below the cost coverage level, which results in debt accumulation of heat producers to the creditors (fuel supply companies, staff etc.).
6. It is necessary to elaborate a transparent policy framework for tariffs setting and define the authorities and responsibilities of local and central bodies of power.

[14] Source: Report to All-Ukrainian Conference of Managers of Communal Heat Supply Companies "On the Results of Work of Communal Heat Supply Companies at Autumn-Winter 2005-2006 and Tasks on Preparation of Communal Service to Sustainable Heating Season of 2006-2007"

[15] Source: Report to All-Ukrainian Conference of Managers of Communal Heat Supply Companies "On the Results of Work of Communal Heat Supply Companies at Autumn-Winter 2005-2006 and Tasks on Preparation of Communal Service to Sustainable Heating Season of 2006-2007"

Appendix 1. Total heat production and district heating production in Ukraine in 1992-2005, PJ

Year	1992	1994	1996	1998	2000	2001	2002	2003	2004	2005
IEA data										
District heating, gross production*	1464.4	1204.0	1010.9	870.6	746.8	761.7	777.0	721.2	702.7	n/d
District heating production level, compared to 1992 (%)	100	82	69	60	51	52	53	49	48	n/d
Ukrainian data										
Total heat production	n/d	n/d	n/d	n/d	945.4	904.3	904.7	973.8	992.7	1,009.0
District heating production	n/d	n/d	n/d	n/d	517.9	507.7	497.5	546.8	536.8	532.7

* - distribution losses in district heating networks are estimated at about 25% of gross production. Own use of heat at electricity plants, CHPs and heat plants is estimated at about 1% of gross production

Note: 1 PJ = 238.8 Pcal or 238.8 million GCal

Source: Ukraine: Energy Policy Review,2006, IEA

Appendix 2. CHPs ownership structure as of August 2006

No. total	No. in group	Company	% state shares	% privately owned shares	Ownership (state, private, local community)	Operational control (state, private, local community)
		State ownership (100%) and state operational control				
1	1	Dniprodzerzhynska CHP, OJSC	100% NAC ECU	-	State, NAC ECU	State, NAC ECU
2	2	Mykolaivska CHP, OJSC	100% NAC ECU	-	State, NAC ECU	State, NAC ECU
3	3	Khersonska CHP, OJSC	100% NAC ECU	-	State, NAC ECU	State, NAC ECU
4	4	Kharkivska CHP, OJSC	100% NAC ECU	-	State, NAC ECU	State, NAC ECU
5	5	Odes'ka CHP, OJSC	100% NAC ECU	-	State, NAC ECU	State, NAC ECU
6	6	Lysychanska CHP, SE		n/a	State, NAC ECU	State, no data
7	7	Zuivska Eksperymentalna CHP, SE		n/a	State, NAC ECU	State, no data
8	8	Kharkivska CHP-2 "Eshar", SE		n/a	State, NAC ECU	State, no data
9	9	Severodonetskaya CHP, SE		n/a	State, NAC ECU	State, no data
10	10	Kyivska CHP-5		-	State, a part of Kyivenergo	State, Kyivenergo
11	11	Kyivska CHP-6		-	State, a part of Kyivenergo	State, Kyivenergo
		State ownership (under NAC ECU jurisdiction) and private operational control				
		Krymsky gereyuchi systemy, SE		n/a		
12	1	Simferopolska CHP		-	State, NAC ECU	Private, Krymkommunenergocentral, LLC
13	2	Sevastopolska CHP		-	State, NAC ECU	Private, SGS, LLC
14	3	Sakska CHP		-	State, NAC ECU	Private, Krymkommunenergocentral, LLC
15	4	Cherkaska CHP, SE		n/a	State, no data	Private, Cherkaske Himvolokno, OJSC
16	5	Kryvorizka CHP, SE			State, no data	n/d
		Local community ownership and private operational control				
17	1	Chernigivska CHP, CEGE		n/a	Local community	Private, TehNova, OJSC (Nasha Ukraina)
	2	Kramatorska CHP, LLC		n/a	Local community	Private, TD "Megaresurs" (ISD), Energoholding, LLC
18	3	Kalus'ka CHP, SE		n/a	Local community	Private, Oriana, OJSC
19	4	Kharkivska CHP-3, CJSC		no data	Local community	Private, Basis, OJSB

No. total	No. in group	Company	% state shares	% privately owned shares	Ownership (state, private, local community)	Operational control (state, private, local community)
20	5	**Private ownership and private operational control**				
21	1	Darnytska CHP (ZAT "EK "Ukr-Kan-Power")	34.3 - SPFU	14.7 - employees 24.46 – Introstyle Consult Ltd. (Great Britain) 24.46 – Markshell Enterprises Ltd. (Britain Virgin Islands) 1.127 – "Oksident"	Private control shareholding State block shareholding	Private
22	2	Bilotserkivska CHP, CJSC	no data	no data	Private, Naftohimimpex, LLC (Finance and Credit)	Private, Naftohimimpex, LLC (Finance and Credit)
23	3	Sumska CHP (LLC "Sumy TEKo")		n/a	Private, Sumyteploenergo, LLC	Private, Sumyteploenergo, LLC
24	4	Kremenchutska CHP, SE		n/a	Private, Poltavaoblenergo, OJSC	Private, Poltavaoblenergo, OJSC, Private Group
25	5	CHP of Okhtyrski Teplovi Merezhi		n/a	Private, Pravex concern	Private, Pravex concern
26	6	Kamyshburunska CHP	no data	no data	no data	Private, Krymteplocentral, LLC (under long-term leasing – 49 years)
		Local community ownership and local community operational control				
27	1	Kirovogradska CHP, CC		n/a	Local community	Local community
28	2	Lvivska CHP-1		n/a	Local community, Lvivteploenergo, LMCC	Local community
29	3	Lvivska CHP-2		n/a	Local community, Lvivteploenergo, LMCC	Local community
30	4	Shostkinska CHP (LLC "Sumy TEKo)		n/a	Local community	Local community
31	5	Kamyanets-Podilska CHP, CC		n/a	Local community	Local community
32	6	Odes'ka CHP-2		n/a	Local community	Local community

n/a – not applicable

Source: compiled by CASE Ukraine