



Ukrainian Heating Sector Review

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Summary

Ukrainian heating sector infrastructure was projected and built at Soviet Union times and its functioning at nowadays conditions causes major issues at all stages of heat generation process.

Both generation facilities and transmission infrastructure are badly in need of financial resources for upgrade and renovation let alone current repairs.

This situation is aggravated by double-side pressure from constantly increasing price of fuel for heat generation on one side and state tariffs regulations on the other.

Principles of heat generation in Ukraine

Due to its climate conditions Ukraine needs heating from 6 to 7 months a year. At Soviet Union times centers of population from small towns to large cities as well as large enterprises were provided with heat by large centralized heating systems. These systems allowed effective heat supply to the rapidly growing urban areas and industrial centres.

The main reason for it was that public utilities, including the natural gas used for heating apartments, were very cheap. At the time Ukraine was in a position to be generous as it produced 30.9% of the total gas output in the Soviet Union in 1960, although this share dropped to 12.4% in 1980. While Ukraine's own gas industry gradually dwindled away, the country became increasingly dependent on Russian gas, and at the same time its industries became more gas-intensive.

The arrival in 1991 of independence did not release the country from its heavy dependence on Ukraine's energy-rich neighbor - Russia. This relationship has taken on an increasingly overt political aspect as Ukraine attempts to assert itself on the international stage and steer an independent policy of Euro-Atlantic integration.

On average (depending on weather conditions) housing and communal services sector consumes 40% of natural gas burned in Ukraine out of this amount 11 to 14 bcm of gas is assigned for heating sector. This high level of gas consumption is explained by the fact that 76% to 80% of the fuel used by heating sector constitutes natural gas. Mazut is used for 15%-18% of heat production and the rest of heat is produced from coal. Increase in coal use for heating is currently seen as a major way to reduce energy dependence of the country.

Ukraine reached the maximum level of heat consumption at 1980th – beginning of 1990th, at 467 mln GCal per year, 60% of which was produced at large CHP and large boiler houses. For production of this amount of heat around 80 mln Tef was used.

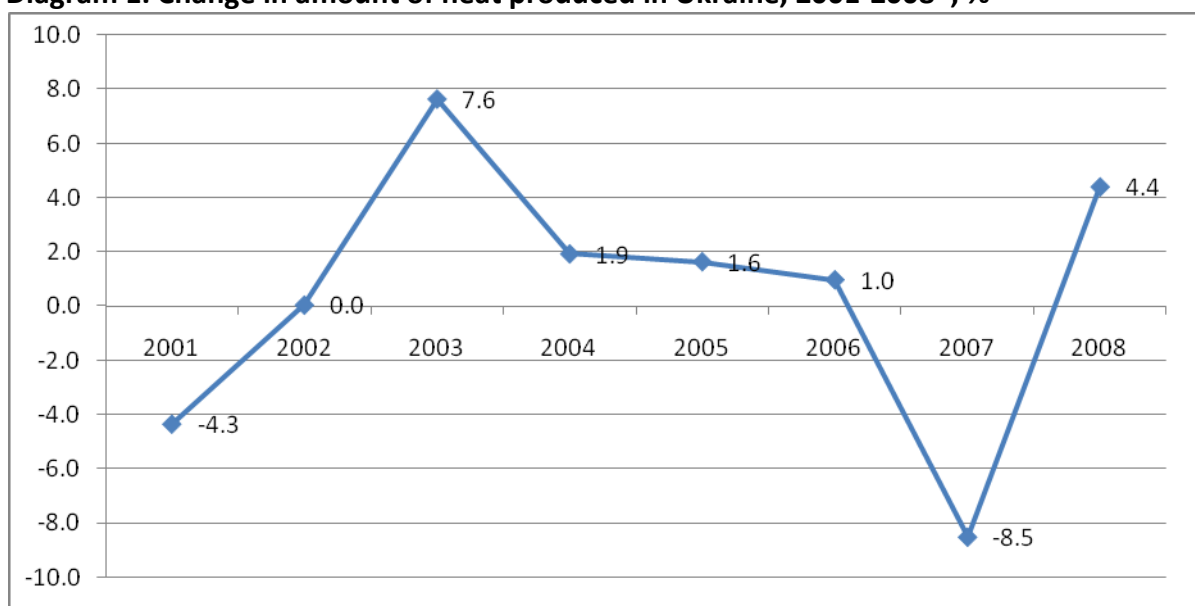
During 1991-1999 Ukrainian GDP was declining, while its energy intensity was growing. This tendency has influenced heating sector in several ways:

- Amount of heat produced declined;
- Amount of fuel spent on a heat unit increased;
- Possibilities to conduct on-time repairs fell significantly;
- Heat producing capacities utilisation decreased;
- Number of start-stop equipment cycles grew sharply;
- Heat transportation losses raised dramatically.

Currently heat production sector is the largest fuel consumer in Ukraine.

Amount of heat produced in Ukraine has been growing since 2002, with an only exception of 2007 when abnormally warm weather during the whole year conditioned decline in heat production by all kinds of generation by 8.5% (See diagram 1).

Diagram 1. Change in amount of heat produced in Ukraine, 2001-2008*, %



*Data for 2008 is given based on 6month over 6 month 2007
Source: Ministry of Fuel and Energy, CASE Ukraine estimates.

Generation facilities

Ukrainian heating sector is represented by 44 CHPs out of them 14 are major CHPs with production capacity of more than 1000 MWth. Table 1 provides total number of different units installed at Ukrainian CHPs.

Table 1. Number of major energy units installed at Ukrainian CHPs

Unit's capacity MWth	Number of units.
720-800	8
282-300	42
250 (cogeneration turbine)	5
175-210	43
150	6
Total	104

Source: CASE Ukraine compilation.

Major Heating plants are concentrated in Donbass region. Among them the largest are Uglegorskaya – 3.6mln kWt, Mironovskaya, Luganskaya, Starobeshevskaya – 2.4mln kWt each, Zuevskaya, Zuevskaya-2, Slavyanskaya, Kurahovskaya, Shterovskaya, etc. Major CHPs are also situated in Kyiv and near the capital, providing the city and its industry with heat and electricity they are known as CHP-3, CHP-4, CHP-5 and CHP-6.

Ukrainian heat generating facilities are ineffective for many reasons. The most important of them are as follows:

- technology used for heat generation is outdated and inefficient;
- key assets are heavily deteriorated;
- equipment is being used in a switching mode on unspecified fuel;
- delays and failures to carry out regular repairs.

According to the Ministry of fuel and energy, more than 90% of energy units have worked out their projected service life (100,000 hours), more than 60% have being in service

longer than 200,000 hours. Demounting and renovation of depreciated equipment requires capital investments greatly exceeding the budget financing of the sector, which makes topical private capital attraction into the sector. Moreover growing demand for electricity and heat power conditioned by economy growth will require new energy generating capacities installment, which also conditions necessity in investments.

In 2008 ministry of fuel and energy planned to repair 78 energy units with total capacity of 20,014 MWth. Out of them 7 units (2,270 MWth) are planned to undergo an extensive repairs, 23 (5,491 MWth) mid-life repair and 48 (12,253 MWth) routine maintenance. By results of the first half of the year extensive repairs were lagging behind the schedule with a merely 1 unit (185 MWth) repaired.

Transmission facilities

Currently almost 80% of urban housing is supplied with central heating delivered through extensive grids of hot water pipes. Centralized heating was organized on the principle of heat and electricity co-generation on giant CHPs, which allowed reducing fuel consumption and CO2 emission in comparison with separate generation. Central heat is largely nonexistent in small cities and rural areas.

Ukraine has 36,700 km (12,400km of them is used by industrial enterprises) of heating networks and as much as 5,400 km of this network is thought to be in critical condition. As in summer 2008 28% of the pipelines have been in use for more than 25 years, 43% more than 10 years and 29% considered to be relatively new being in use less than 10 years. Of the country's 65,400 operating water boilers, around 16,400 are in need of urgent replacement.

The country's aging and inefficient heating system experiences regular hot water cut-offs to allow for pipe and equipment check-ups as the systems struggle to cope. However even this system of regular checks and preventive measures does not succeed in guaranteeing a reasonable service, and frequent failures in the heating systems as a result of outdated equipment and poor funding are still common throughout the country.

Heat pipelines were built in underground subways and crawlways as well as on over ground trestles. On average more than 12% of pipelines in the country are regularly flooded by underground or surface water, in some cities the figure reaches 70%. Poor condition of heat and hydraulic insulation of the pipelines, tear and wear coupled with unsatisfactory assemblage quality increase breakdown rate dramatically. Thus 90% of breakdowns happens on delivery pipelines and 10% on return pipelines, 65% of them caused by external corrosion and 15% by assemblage defects. Operational consumption of electricity on heat carrier pumping constitutes 6-10% of the final heat price while chemical treatment reaches 15-25%

An extremely deleterious outcome of the protracted compression of energy tariffs has been the deterioration of the network infrastructure. The level of technical losses (the amount of energy that is lost in transmission) is far greater than it was projected. Operation of the system leads to heat losses from cooling of 12-20% (allowable loss is 5%) and heat carrier losses of 5-20% (allowable loss is 0.5%). This is especially true for the central heating networks.

A program to redress this deterioration is sorely needed. A critical component of such a plan should be the establishment of a rate structure that recognizes the full cost of operations and maintenance. This could result in a further increase in tariffs over and above that needed to pass through the costs of imported energy.

Tariffs

There are three distinct paradigms for energy use, depending on whether a household lives in a large city, a smaller city or a rural area. These paradigms are based on the primary fuel used for heating—central heating in large cities, natural gas in small cities and LPG, coal and wood in rural areas. Because the structure of consumption varies so starkly according to location, so does the level of spending and vulnerability to price increase. The most dependent are those using central heating.

According to the Law of Ukraine “On Heat Supply”¹, heat tariffs for them are defined as a sum of 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.

In January 2007, import prices for Russian gas increased by 35%. This was followed by a further 38% rise in January 2008. In order to prevent these price rises causing a financial crisis, tariffs for population and heat generating companies were kept artificially low which created a significant challenge for the latter. This has resulted in debt accumulation among heating companies. (See table 2). Operators complain that these low tariffs have created conditions in which gas distributors are increasingly failing to service and maintain their networks properly.

Table 2. Arrears of Heating Companies for the gas consumed, end of August 2008

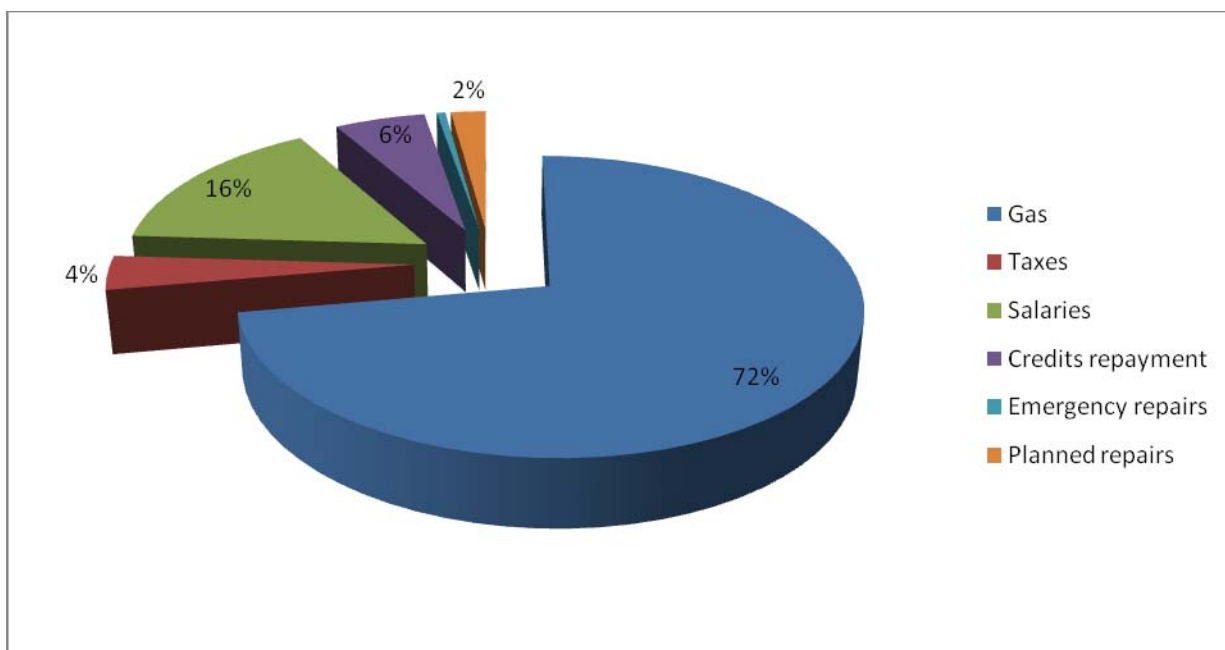
#	Region, city	Natural gas consumption, mcm	Level of payments, %	Arrear for gas consumed, mln UAH
1	Vinnyska oblast	96.2	54	35.80
2	Volynska oblast	81.1	59	25.64
3	Dnipropetrovska oblast	663.4	53	256.35
4	Donetska oblast	806.9	54	277.27
5	Zhytomyrska oblast	100.3	61	32.54
6	Zakarpatska oblast	29.6	44	14.06
7	Zaporizhska oblast	298.3	69	75.49
8	Ivano-Frankivska oblast	69.2	63	21.70
9	Kyiv City	150.0	83	17.84
10	Kyivska oblast	196.0	76	38.35
11	Kirovohradska oblast	68.4	47	30.65
12	Autonomous Republic of Crimea	195.4	51	76.65
13	Luhanska oblast	288.5	36	143.63
14	Lvivska oblast	255.8	58	83.46
15	Mykolayivska oblast	87.6	80	13.37
16	Odessa oblast	271.8	93	14.80
17	Poltavska oblast	202.4	84	25.30
18	Rivnenska oblast	86.7	57	32.00
19	Sevastopol City	83.1	55	27.68
20	Sumska oblast	141.4	79	23.95
21	Ternopil'ska oblast	62.2	79	10.63
22	Kharkivska oblast	632.9	37	312.01
23	Khersonska oblast	78.0	52	30.49
24	Khmelnitska oblast	134.9	85	16.93
25	Cherkasska oblast	159.7	58	39.69
26	Chernivetska oblast	30.0	47	13.05
27	Chernihivska oblast	153.1	59	42.89
	Total	5423	60	1732.21

¹ Law of Ukraine “On Heat Supply” No. 2633-IV as of 2 June, 2005

Source: Ministry of Fuel and Energy.

While subsidized heavily by the government energy companies struggle for both payments from final consumers and subventions from government authorities. At the same time they are not allowed to change tariffs and payments for gas exceed 70% of their expenditures (see Diagram 2).

Diagram 2. Approximate structure of expenditures of a heat generating company on the example of “KyivEnergo”, 2007



Source: Joint Stock Company “Kyivenergo”, CASE Ukraine estimates.

Thus, to pay in full for consumed natural gas in 2007 the largest energy company of Ukraine – KyivEnergo had to borrow UAH491 mln. Interest paid on this credit exceeded UAH42 mln, which is more than the sum spent on planned repairs. The deficit of financial resources leads to underinvestment in reconstruction and modernization of infrastructure network.

Legally, local authorities that establish tariffs for population lower than the cost-coverage level have to compensate the difference to energy-generating companies. In practice the compensation is not always paid in full which leads to arrears accumulation and aggravates financial state of heat-generators. The procedure of heat tariffs increase is rather complicated, as well as time consuming.

Official sources say that due to low heat tariffs for CHPs 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 than 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 Ukraine² adopted in April 2006, heat producers (CHPs and renewable sources power plants are not allowed to cross-subsidy heat production to cover losses from heat production at the cost of electricity production or other activity).

² NERC’s 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

Abbreviations

bcm – billion cubic meters

CHP combined heat and power stations

GCal – giga calories

mcm - million cubic meters

MWth - megawatt thermal

NERC – National Electricity Regulation Commission

Tef – tons of equivalent fuel