RESOURCE MANAGEMENT ASSOCIATES
of Madison, Inc.

SUBCONTRACTOR REPORT

HEAT TARIFFS

Prepared by
V. Miniskinis, Lithuanian Energy Institute
R. Stonys, Lithuanian State Power System
J. Ceponis, Lithuanian State Power System

Prepared for
RESOURCE MANAGEMENT ASSOCIATES OF MADISON, INC.

DECEMBER 1992

**USAID EMERGENCY ENERGY PROGRAM
FOR EASTERN AND CENTRAL EUROPE**

(USAID Contract #: EUR-0015-C-1006-00)

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PREFACE

The work in this report is being carried out within the framework of the U.S. Emergency Energy Program for Eastern and Central Europe and the Baltic Republics under a Resource Management Associates of Madison, Inc. (RMA) contract with the U.S. Agency for International Development. RMA, as Prime Contractor to USAID, is currently implementing the Energy Pricing Reform Project and the Industrial Energy Efficiency Project in Romania, Czechoslovakia and Lithuania. The report is one of a series describing the activities, results and recommendations of the projects.

The report, entitled "Heat Tariffs" is one of a series of four papers written by Lithuanian subcontractors. The study was done by Lithuanian energy analysts with limited guidance from the RMA. The authors are V. Miskinis, of the Lithuanian Energy Institute, R. Stonys and J. Ceponis, both of the Lithuanian State Power System.

The report demonstrates that Lithuanian energy analysts are well on their way to understanding modern market methods of determining cost-based energy tariffs and assigning those cost to the appropriate customer classes. The report is an interesting analysis of the current structure and possible evolution of the Lithuanian district heating system tariffs and operation.

This is a working document published informally by RMA. To present the results of the project with the least possible delay this report has not been prepared in accordance with procedures appropriate to our formally printed documents. The report was not edited and received only very light review by RMA. Comments were made on the first draft of the paper. RMA does not necessarily endorse the views expressed or the findings presented in the text. The document's subject matter warrants its distribution.

ABSTRACT

HEAT TARIFFS

by V. Minkinis, R. Stonys and J. Ceponis
December, 1992

The Lithuanian district heating system is composed of three heat distribution utilities, which generate heat in their own boilers, purchase heat from cogeneration power plants and distribute heat to individual end-users. Heat production costs are significantly different for each utility. In general the tariff receipts do not cover the utility's costs. Currently the major cost component is fuel (87 - 90% of total cost) followed by material costs (chemicals, water etc.).

A new heat tariff design is proposed with the goal of stimulating efficient energy use. This cost-based tariff structure sends the appropriate cost signals to the consumer, provides capital for future investments, abolishes privileged tariffs (residential consumers are cross subsidized by the industrial sector) and equalizes the prices paid by individual district heat consumers. The proposed tariff structure has two components, a usage charge and a capacity charge (dependent on energy demand at the system's peak). Applying these principles, heat tariffs were calculated for Lithuania's district heating utilities, using costs from the first and second quarters of 1992.

The authors recommend that the ownership of the heat distribution utilities be transferred from the state to local municipalities. They also recommend that subsidized thermal tariffs to residential consumers be eliminated and that all thermal tariffs be based on a two component system considering variable charges (primarily purchased energy) and fixed charges. This tariff system could be elaborated by considering additional factors, such as use of low-temperature heat. The lack of metering and control devices is the principle barrier to the adoption of cost-based tariffs. Finally, if continued residential subsidies are necessary for an interim period, as cost based-based tariffs are adopted, they should be paid directly to households, allowing the district heating system to adopt cost-based tariffs. This will encourage market behavior by consumers.

ERRATA

General:

1. Talonas and rubles are used interchangeably in the text of the report. Lithuanian currency was officially changed from the ruble to the talonas on October 1, 1992. In December 1992 the (selling) exchange rates in Lithuania were 284.2 rubles/ US$ and 0.8 talonas/ruble.

Table Specific:

Table(s)	Comment(s)
1-3, 5 & 6	Two columns of data are presented for each of the district heating utilities (tables 1, 2 and 3) and for each scenario (tables 5 and 6). The first column contains the production and distribution costs in rubles (probably 10^6 rubles) the second column is the cost in rubles/Gcal of thermal energy produced. The middle portion of each table shows the costs structure (in %).
1 and 2	The cost structure presented in the lower portions of columns 3 and 5 of both tables are incorrect.
5	The table shows three scenarios which exhibit the cost dependence on the share of natural gas being consumed. In columns 1 and 2, 90% of the fuel consumed is natural gas, in columns 3 and 4 to 70%, and in columns 5 and 6 15%.
6	The table shows three scenarios with varying natural gas shares (80, 65 and 75%) and which bring depreciation charges, wages, social insurance costs etc. closer in line with western norms.

Energy Price Reform Working Group
Government of Lithuania

HEAT TARIFFS

Prepared by
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Under contract with Resource Management Associates, Madison, Wisconsin, U.S.A.

Kaunas 1992

Reconstruction of the energy systems management is a very important task restructuring the Lithuanian economy. Heat tariffs must become an important tool stimulating efficient energy use and regulating relations between heat producers and consumers. Tariffs should also encourage development of heat production, transmission and distribution enterprises.

The main aim of the new tariff system is: to prepare preconditions for a progressive heat charges system. This system should encourage a consumer to work in conditions that are most compatible with the energy system conditions. Privileged tariffs should be abolished, it will remove differences between individual heat consumers and customers of district heating systems.

Heat tariffs must consist of two components: 1) constant charge for a required heat capacity (in industrial enterprises) and for a heated area (in dwelling houses), 2) variable charge for energy consumed. This two-component tariff could be supplemented with a system of extracharges and discounts: 1) discounts for a longer heating period and short-period switch-off during the maximum load, 2) discount for a low-temperature heat and for energy consumed during night (adding to an energy charge), 3) extracharges for not-returned condensate. Such a charge system will enable to differentiate tariffs according to different consumers with different influence to the energy system.

When establishing the tariff system one finds differences between various energy generators. Economical and technical indicators of boiler-houses, cogeneration power plants are very different. Indicators of separate boiler-houses and heat distribution utilities also differ. The main indicators of district heating utilities (installed capacity, fuel consumption to produce a unit of heat, mixture of fuel burned, structure of production costs and so on) are also different. Hence, tariffs should reflect the real costs of operation and development. The well grounded heat tariffs system must be formed according to real production and distribution costs in different utilities.

Determining these tariffs we propose the following methodology.

1. Real production costs for 1992 should be determined by the

data from 1991, evaluating also changes in calculation of separate sections, determined by new laws and changes in economical relations with foreign countries.

2. The normal operation of energy utilities needs 10% profitability, including into costs a land tax, interests for bank loans, insurance and environment protection fund. Tariffs must help to accumulate investments for environment protection. According to various methodologies the rate of these investments could be 7% of fuel cost. These costs should be based on an evaluation of a real harm to the environment.

3. If there were planned discounts due to significant increase in fuel and energy prices, they must be allocated to consumers (as subsidies to residents or enterprises paying to energy producers and suppliers) but not to energy utilities. It will assure profitability of energy utilities. It will also help to abolish differences between production costs in centralised and individual heat consumers.

4. Thermal energy consumers should have a two component tariff (for energy consumed and for a required capacity). A charged required capacity during maximal load period will stimulate utilities to use energy more uniformly and it will enable to employ existing capacities more efficiently. But during this transitional period small consumers (first of all, residential) could temporarily pay by a simple tariff as its value is reviewed at least ones per quarter with changed fuel prices.

The unified methodology to determine heat tariffs will assure a stable development of the energy system. It will encourage a reduction of energy production, transmission and distribution losses and total production costs. Tariffs based on production costs are necessary both for the energy system as also for the Lithuanian economy.

According to these principles, heat production costs and corresponding tariffs were calculated for different heat utilities. Calculations are shown in tables 1, 2. There are presented various costs and spendings for the first 9 months of the year. There are 3 heat distribution utilities (HDU) selling heat produced not only in their own boilers but also purchased

from cogeneration power plants (CPP): the Vilnius HDU buys thermal energy from the Vilnius CPP, the Kaunas HDU - from the Kaunas HDU and the Siauliai HDU - from the Mazeikiai CPP.

Total costs and spendings of all the HDU, power plants and the Lithuanian State Power System (LSPS) are presented in table 3. The main part of costs are fuel costs, different fuel prices cause different tariffs. Prices of natural gas and heavy fuel oil also are different as they were constantly changed. Significant share of costs is a material cost - it consists of chemicals, water and other materials costs.

The total cost is calculated by

$$C = (F + D + N + T + M + O)/q \qquad (1)$$

where: F - fuel costs,
D - depreciation,
W - wages, salaries, insurance,
T - environmental, land, bank service taxes,
M - costs of materials,
O - other,
q - energy produced.

Simple (one component) tariff is calculated as follows:

$$T = C + P/q = C + 0.1\ K/q, \qquad (2)$$

where: P - profit of the utility confined by 10% of the total capital.

When calculating a two component tariff one needs to evaluate a constant and a variable (fuel) cost:

$$T_q = (F + k_2 P)/q, \qquad (3)$$

$$T_Q = (D + W + T + M + O)/Q + k_1 P/Q \qquad (4)$$

$$k_1 + k_2 = 1. \qquad (5)$$

where: Q - required heat capacity.

Values of the coefficients k_1 and k_2 are not settled. If a profit will be divided proportionally according to a variable and a constant cost, then

$$k_1 = (D + W + T + M + O)/(F + D + W + T + M + O) \quad (6)$$

Then value of k_1 in various utilities will be in the range from 0.2 to 0.3. In this case income will seriously depend on heat sold to customers. Therefore, at present it will be better to relate all the income to constant cost, i.e. $k_1 = 1$.

It will be useful to introduce a connection charge even to small consumers. Its value could be calculated according to the heated area (in sq. m).

In order to improve thermal tariffs one needs to evaluate different insulation of different dwelling houses. For example, heat losses caused by bad insulation of multifamily block houses could be compensated from special funds. It may be foreseen in future thermal tariffs.

Present thermal tariffs are given in table 4. As one can see tariffs for residential consumers, religion communities, artist studios are significantly lower than production costs. Heat demand of this consumers group is almost 48% but their share in total incomes is only 3%. Residents are cross-subsidized with increased tariffs to industrial consumers. Various institutions included into this group consume only 2% of total heat consumed in the system but their share in total income of HDL's equals to 3.6%. Fixed charge for industrial was halved having in ming a very hard economical situtaion in most of the industries. So an average charge for thermal energy consumed was increased correspondingly.

During this transitional period thermal tariffs were prepared evaluating total production costs of the LSPS. Due to rather significant differences of various costs in different utilities the average tariff doesn't cover total costs. So even now some municipalities purchasing fuel themselves are forced to correct their tariffs. Furthermore, utilities purchase heat also from CPP with extra payment caused by some profit required by CPP. So total cost given in table 3 calculated by adding all the production

costs in utilities, including purchased energy, are higher than sum of all the costs in power plants and boiler houses. Future thermal tariffs must correspond to real production costs.

At present stage in preparation of thermal tariffs the most important is to determine their trends. The main influence on production costs will cause fuel prices. It will be also important an impact of different natural gas and heavy fuel oil prices. For example, in October, 1992 price of heavy fuel oil was 1.3 times higher than natural gas price (calculating for the same calorific value). So share of natural gas in heat production is significantly influencing production costs and corresponding tariffs (table 5).

Fuel prices practically reached the world level in Lithuania. Their future variation will depend on variation of exchange rate (rouble, litas and dollar). Calculating long term tariffs one needs to evaluate all the production costs (water, materials, wages, operation etc.).

Table 6 gives some thermal tariffs forecasts with assumption that fuel cost will be diminished to 50% of the total cost as it was in 1991.

Some influence to thermal tariffs will cause also a possible reevaluation (under discussion now) of thermal and electric energy production costs when they are produced at a CPP. At present all the energy savings are prescribed to power production. It is assumed that the same amount of fuel is needed to produce heat at a heat-only boiler or at a CPP. If fuel consumption to produce electricity in a CPP was the the same as in thermal power plant, fuel consumption to produce heat in a CPP was significantly lower. So thermal tariff could be reduced.

In order to cover the heat production costs tariffs were changed four times per year in 1991. Consumers are paying for energy consumption according to an average tariff, it causes a serious problem - reallocation of income between different HDL. It seems that solution of the problem could be reached by changing ownership of all the HDU - from the state to municipalities of towns and cities.

The other serious problem - fair relations between producers

and residential consumers. Privileges to residential energy consumers cause increased tariffs for industrial consumers and consequently higher prices of manufacturing goods and services. It causes also different conditions in different towns with different shares of residential and industrial heat consumers. On the other hand, it's obvious that residential consumers aren't able to pay for heat consumed according to tariff covering all the costs with fuel purchased in international prices. Lack of heat consumption metering and controlling devices, a very low heat resistance of buildings doesn't encourage to lower heat consumption. During a transitional period state subsidies for residential consumers are inavoidable. Of course, better if they were given to heat consumers but not to the suppliers.

At present, with changing structure and levels of industrial production one more problem arises - the two-component tariff becomes rather inefficient, as consumers required capacity could be significantly changed. This required capacity is calculated as a projected heat capacity which could be significantly higher.

Table 1

Heat production costs in the district heating utilities, I-III quarter of 1992

	Klaipeda	Klaip.	Vilnius	Vilnius	Kaunas	Kaunas	Panevezys	Panevezys
Energy prod.and distribution costs	585.00	cost rb/Gcal	698.78	cost rb/Gcal	330.51	cost rb/Gcal	621.52	cost rb/Gcal
incl.fuel	457.42	408.41	526.43	184.07	190.46	88.18	450.60	391.33
depreciation	10.35	9.24	19.28	6.74	11.38	5.27	9.24	8.03
wages	41.59	37.13	46.22	16.16	49.48	22.91	41.78	36.33
social insurance	12.58	11.23	16.85	5.89	15.85	7.34	12.53	10.90
environm.costs	1.47	1.31	.29	.10	.17	.08	1.09	.95
interest on credit	10.85	9.69	.00	.00	.00	.00	12.36	10.75
taxes for roads	3.25	2.90	2.54	.89	3.97	1.84	1.61	1.40
taxes to banks	.19	.17	.00	.00	.51	.24	.30	.26
materials	47.30	42.23	85.83	30.01	55.17	25.54	91.48	79.55
other	.00	.00	1.36	.48	3.41	1.58	.86	.75
Purchased energy	.00	.00	765.59	495.51	855.20	492.29		
Total with purch.en.	585.00	524.38	1,464.37	512.30	1,185.71	549.04	621.52	541.72
Fuel consump.,th.t c.e	204.16		237.00		78.48		211.34	
Energy sold to network, th.Gcal	1,224.80		3,160.40		2,407.50		1,271.20	
Useful heat, th.Gcal	1,115.60		2,858.40		2,159.60		1,147.30	
incl.purch.en.			1,545.06		1,737.19			
Structure of cost	%	%	%	%	%	%	%	%
fuel	78.19	78.19	35.95	75.34	16.06	57.63	72.50	72.50
depreciation	1.77	1.77	1.32	2.76	.96	3.44	1.49	1.49
wages	7.11	7.11	3.16	6.61	4.17	14.97	6.72	6.72
social insurance	2.15	2.15	1.15	2.41	1.34	4.80	2.02	2.02
environm.costs	.25	.25	.02	.04	.01	.05	.18	.18
interest on credit	1.85	1.85	.00	.00	.00	.00	1.99	1.99
taxes for roads	.56	.56	.17	.36	.33	1.20	.26	.26
taxes to banks	.03	.03	.00	.00	.04	.15	.00	.00
materials	8.09	8.09	5.86	12.28	4.65	16.69	14.72	14.72
other	.00	.00	.09	.19	.29	1.03	.14	.14
purchased energy	.00	-	52.28	-	72.13	-		
Total cost	100.00	100.00	100.00	99.99	99.98	99.96	100.02	100.02
Profit	28.36		79.90		50.85		25.32	
Tariff, rb/Gcal	549.80	549.80	540.26	540.26	572.59	572.59	563.79	563.79
Two component tariff:								
Tariff, rb/Gcal	410.02		363.45		420.79		392.75	
Tariff, th.rb/Gcal/h	272.62		350.97		280.19		316.52	
Variable costs	457.42	457.42	526.43	1,038.88	190.46	908.74	450.60	450.60
Constant costs	127.58	127.58	172.35	425.49	140.05	276.97	170.92	170.92
Power, Gcal/h	572.00		1,440.00		1,170.90		620.90	
Heavy fuel oil, rb/t	1,944.00		39.81		363.90		2,500.00	
Natural gas, rb/th.m3	3,447.00		2,558.00		2,851.00		2,680.00	

Table 2

Heat production costs in the district heating utilities, I-III quarter of 1992

	Alytus	Alytus	Siauliai	Siauliai	Netw.util.	Netw.util.
Energy prod. and distribution costs	658.53	cost rb/Gcal	393.02	cost rb/Gcal	3,237.36	cost rb/Gcal
incl.fuel	498.08	389.13	210.78	179.32	2,393.77	237.48
depreciation	7.40	5.78	6.71	4.44	64.36	6.38
wages	44.70	34.92	38.11	25.24	261.88	25.98
social insurance	14.82	11.58	11.58	7.67	84.21	8.35
environm.costs	1.05	.82	.91	.60	4.97	.49
interest on credit	15.39	12.02	6.37	4.22	44.96	4.46
taxes for roads	3.01	2.35	2.99	1.98	17.36	1.72
taxes to banks	.50	.39	.09	.06	1.30	.13
materials	71.88	56.16	54.27	35.94	406.00	40.28
other	1.72	1.34	1.21	.80	8.55	.85
Purchased energy			410.04	581.60	2,030.82	506.54
Total with purch.en.	658.53	513.63	803.06	530.70	5,318.18	527.80
Fuel consump.,th.c.e.	227.01		136.21		1,097.65	
Energy sold to network, th.Gcal	1,369.60		1,595.80		11,029.30	
Useful heat, th.Gcal	1,282.10		1,513.20		10,076.20	
incl.purch.en.			705.02		4,009.18	
Structure of cost	%	%	%		%	%
fuel	75.64	75.64	33.72	68.90	45.01	72.82
depreciation	1.12	1.12	.84	1.71	1.21	1.96
wages	6.79	6.79	4.75	9.70	4.92	7.97
social insurance	2.25	2.25	1.44	2.95	1.58	2.56
environm.costs	.16	.16	.11	.23	.09	.15
interest on credit	2.34	2.34	.79	1.62	.85	1.37
taxes for roads	.46	.46	.37	.02	.33	.53
taxes to banks	.08	.08	.01	13.81	.02	.04
materials	10.92	10.92	6.76	13.81	7.63	12.35
other	.26	.26	.15	.31	.16	.26
purchased energy			51.06		38.19	
Total costs	100.02	100.02	100.00	100.00	99.99	100.01
Profit	20.28		32.82		241.31	
Tariff, rb/Gcal	529.45	529.45	552.39	552.39	551.74	551.74
Two component tariff						
Tariff, rb/Gcal	388.49		404.71		393.61	
Tariff,rb/Gcal/h	305.29		335.56		224.29	
Variable costs	498.08	498.08	270.78	612.40	2,393.77	3,966.11
Constant costs	160.45	160.45	122.24	190.66	893.59	1,352.07
Power, Gcal/h	592.00		666.00		5,060.00	
Heavy fuel oil, rb/t	2,275.00		1,649.00		2,117.00	
Natural gas, rb/th.m3	3,110.00		2,384.00		2,861.00	

Table 3

Heat product. costs in the district heating util., I-III quarter of 1992

	P.station	P.station cost rb/Gcal	Netw.util.	Netw.util. cost rb/Gcal	Total	Total cost rb/Gcal
Energy prod. and distribution costs	1,852.70		3,287.36		5,140.06	
incl.fuel	1,572.34	392.10	2,393.77	394.55	3,966.09	393.61
depreciation	23.71	5.91	64.36	10.61	88.07	8.74
wages	91.70	22.87	261.88	43.16	353.58	35.09
social insurance	27.86	6.95	84.21	13.88	112.07	11.12
environm.costs	3.27	.82	4.97	.82	8.24	.82
interest on credit	28.20	7.03	44.96	7.41	73.16	7.26
taxes for roads	.00	.00	17.36	2.86	17.36	1.72
taxes to banks	.10	.02	1.30	.21	1.40	.14
materials	102.08	25.46	406.00	66.92	508.08	50.42
other	3.45	.86	8.55	1.41	12.01	1.19
Purchased energy			.00	.00	.00	
Total with purch.en.	1,852.70	462.11	3,287.36	541.84	5,140.06	510.12
Fuel consump.,th.c.e.	750.25		1,097.65		1,848.76	
Energy sold to network, th.Gcal	4,388.41		6,640.89		11,029.30	
Useful heat, th.Gcal	4,309.18		6,067.02		10,076.20	
incl.purch.en.			.00			
Structure of cost	%	%	%	%	%	
fuel	84.87	84.87	72.82	72.82	77.16	
depreciation	1.28	1.28	1.96	1.96	1.71	
wages	4.95	4.95	7.97	7.97	6.88	
social insurance	1.50	1.50	2.56	2.56	2.18	
environm.costs	.18	.18	.15	.15	.16	
interest on credit	1.52	1.52	1.37	1.37	1.42	
taxes for roads	.00	.00	.53	.53	.34	
taxes to banks	.01	.01	.04	.04	.03	
materials	5.51	5.51	12.35	12.35	9.88	
other	.19	.19	.26	.26	.23	
purchased energy			.00			
Total costs	100.01	100.01	100.01	100.01	99.99	
Profit	64.96		241.31		241.31	
Tariff, rb/Gcal	478.32	478.32	581.62	581.62	534.07	
Two component tariff						
Tariff, rb/Gcal	392.18		394.55		393.61	
Tariff, rb/Gcal/h	171.52		398.35		243.37	
Variable costs	1,572.34	1,572.34	2,393.77	2,393.77	3,966.09	
Constant costs	280.36	280.36	893.59	893.59	1,173.97	
Power, Gcal/h	2,013.30		2,849.00		5,815.30	
Heavy fuel oil, rb/t	2,210.78		2,117.90		2,164.80	
Natural gas, rb/th.m3	2,842.86		2,861.00		2,850.96	

Table 1

Heat tariffs, IV quarter of 1992

Consumers	Tariff		Energy Tcal	Total income mln. tal.
	tal / Mcal/h	tal/Gcal		
1. Residential		300	1490	447
2. Industrial				
simple tariff		8500	80	310
two-component tariff				
a) energy		8400	1564	13138
b) capacity	32			161
Total		4578	3114	14256

Total costs	14256 mln. tal.
incl. fuel	12197 mln. tal.
Prices of fuel	
Natural gas	23080 tal./th. m3
Heavy fuel oil	33760 tal./t

Table 5

Heat product. costs in the district heating utilities. IV quarter of 1992

	Total	Total	Total	Total	Total	Total
Energy prod. and distribution costs	14,236.89	cost tal/Gcal	15,227.56	cost tal/Gcal	18,431.56	cost tal/Gcal
incl.fuel	12,470.06	4,009.67	13,460.73	4,322.65	16,664.73	5,351.55
depreciation	146.78	47.20	146.78	47.14	146.78	47.14
wages	471.44	151.59	471.44	151.39	471.44	151.39
social insurance	149.43	48.05	149.43	47.99	149.43	47.99
environm.costs	8.24	2.65	8.24	2.65	8.24	2.65
interest on credit	121.93	39.21	121.93	39.16	121.93	39.16
taxes for roads	17.36	5.58	17.36	5.57	17.36	5.57
taxes to banks	1.40	.45	1.40	.45	1.40	.45
materials	846.80	272.28	846.80	271.93	846.80	271.93
other	3.45	1.11	3.45	1.11	3.45	1.11
Purchased energy			.00	.00	.00	
Total with purch.en.	14,236.89	4,571.90	15,227.56	4,890.03	18,431.56	5,918.93
Fuel consump.,th.c.e.	513.81		513.81		513.81	
Energy sold to network, th.Gcal	3,408.55		3,408.55		3,408.55	
Useful heat, th.Gcal	3,114.00		3,114.00		3,114.00	
incl.purch.en.			.00			
Structure of cost	%	%	%	%	%	
fuel	87.59	87.59	88.40	88.40	90.41	
depreciation	1.03	1.03	.96	.96	.80	
wages	3.31	3.31	3.10	3.10	2.56	
social insurance	1.05	1.05	.98	.98	.81	
environm.costs	.06	.06	.05	.05	.04	
interest on credit	.86	.86	.80	.80	.66	
taxes for roads	.12	.12	.11	.11	.09	
taxes to banks	.01	.01	.01	.01	.01	
materials	5.95	5.95	5.56	5.56	4.59	
other	.02	.02	.02	.02	.02	
purchased energy			.00			
Total costs	100.00	100.00	99.99	99.99	99.99	
Profit	241.31		241.31		241.31	
Tariff, talon./Gcal	4,649.39	4,649.39	4,967.52	4,967.52	5,996.43	
Two component tariff						
Tariff. talonas/Gcal	4,004.52		4,322.65		5,351.55	
Tariff,th.tal./Gcal/h	396.87		396.87		396.87	
Variable costs	12,470.06	12,470.06	13,460.73	13,460.73	16,664.73	
Constant costs	1,766.83	1,766.83	1,766.83	1,766.83	1,766.83	
Capacity, Gcal/h	5,060.00		5,060.00		5,060.00	
Heavy fuel oil, tal/t	33,760.00		33,760.00		33,760.00	
Natural gas, tal/th.m3	23,080.00		23,080.00		23,080.00	
Chare of nat.gas	90%		70%		15%	

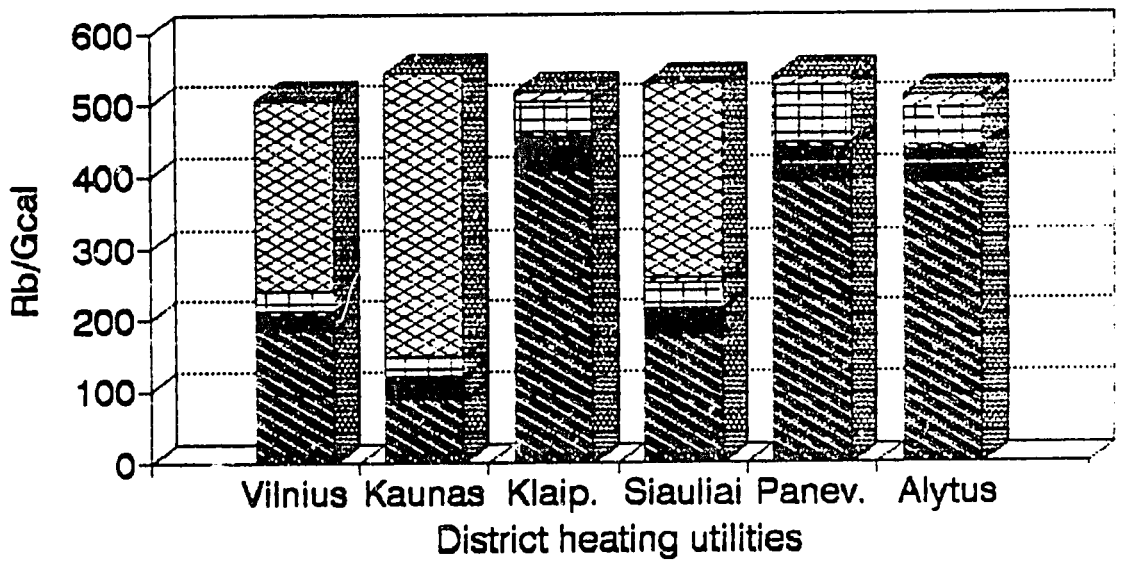
Table 3

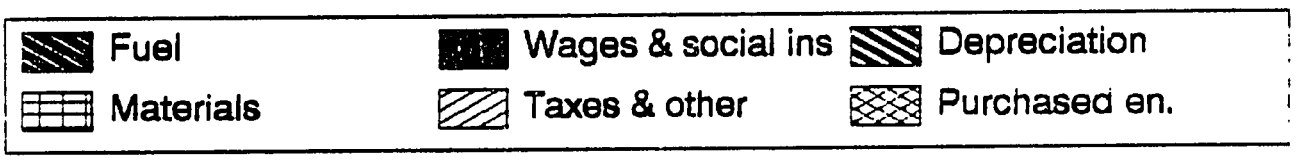
Heat product. costs in the district heating utilities, for future

	Total	Total	Total	Total	Total	Total
Energy prod. and distribution costs	79,030.84	cost tal/Gcal	100,545.64	cost tal/Gcal	132,387.59	cost tal/Gcal
incl.fuel	71,139.34	4,680.22	75,202.84	4,947.56	72,887.59	4,795.24
depreciation	724.00	47.63	1,467.80	96.57	16,500.00	1,085.53
wages	2,626.00	172.89	7,065.00	464.80	17,400.00	1,144.74
social insurance	789.00	51.91	2,235.00	147.04	4,750.00	312.50
environm.costs	316.00	20.92	95.00	6.59	1,120.00	73.68
interest on credit	405.00	26.64	1,215.00	79.93	2,450.00	161.15
taxes for roads	125.00	8.22	250.00	16.45	1,750.00	115.13
taxes to banks	85.00	5.59	75.00	4.93	280.00	18.42
materials	2,611.00	194.93	12,100.00	796.05	12,300.00	822.37
other	6.50	.43	750.00	49.34	2,750.00	180.92
Purchased energy			.00	.00	.00	
Total with purch.en.	79,030.84	5,199.40	100,545.64	6,614.84	132 387.59	8,709.71
Fuel consumo.,th.c.e.	2,538.40		2,538.40		2,538.40	
Energy sold to network, th.Gcal	16,637.80		16,637.80		16,637.80	
Useful heat, th.Gcal	15,200.00		15,200.00		15,200.00	
incl.purch.en.			.00			
Structure of cost	%	%	%	%	%	
fuel	90.01	90.01	74.79	74.79	55.06	
depreciation	.92	.92	1.46	1.46	12.46	
wages	3.33	3.33	7.03	7.03	13.14	
social insurance	1.00	1.00	2.22	2.22	3.59	
environm.costs	.40	.40	.08	.08	.85	
interest on credit	.51	.51	1.21	1.21	1.85	
taxes for roads	.16	.16	.25	.25	1.32	
taxes to banks	.11	.11	.07	.07	.21	
materials	3.36	3.56	12.03	12.03	9.44	
other	.01	.01	.75	.75	2.08	
purchased energy			.00			
Total costs	100.01	100.01	99.99	99.99	100.00	
Profit	903.30		2,420.00		3,540.30	
Tariff, talon./Gcal	5,259.81	5,259.81	6,774.06	6,774.06	8,942.80	
Two component tariff						
Tariff, talonas/Gcal	4,680.22		4,947.56		4,795.24	
Tariff,th.tal./Gcal/h	1,813.30		5,724.29		12,997.94	
Variable costs	71,139.34	71,139.34	75,202.84	75,202.84	72,887.59	
Constant costs	7,891.50	7,891.50	25,342.80	25,342.80	59,500.00	
Capacity, Gcal/h	4,850.00		4,850.00		4,850.00	
Heavy fuel oil,tal/t	35,800.00		35,800.00		35,800.00	
Natural gas,tal/th.m3	26,350.00		26,350.00		26,350.00	
Share of nat.gas	80%		65%		75%	

Heat production & distribution costs

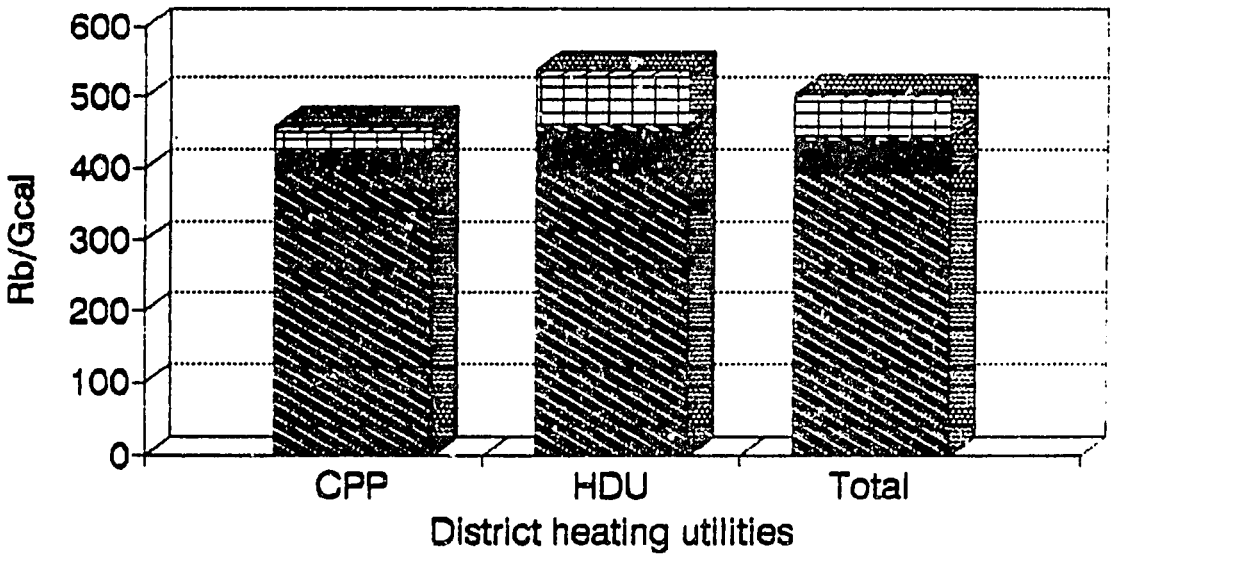
I-III quarter of 1992



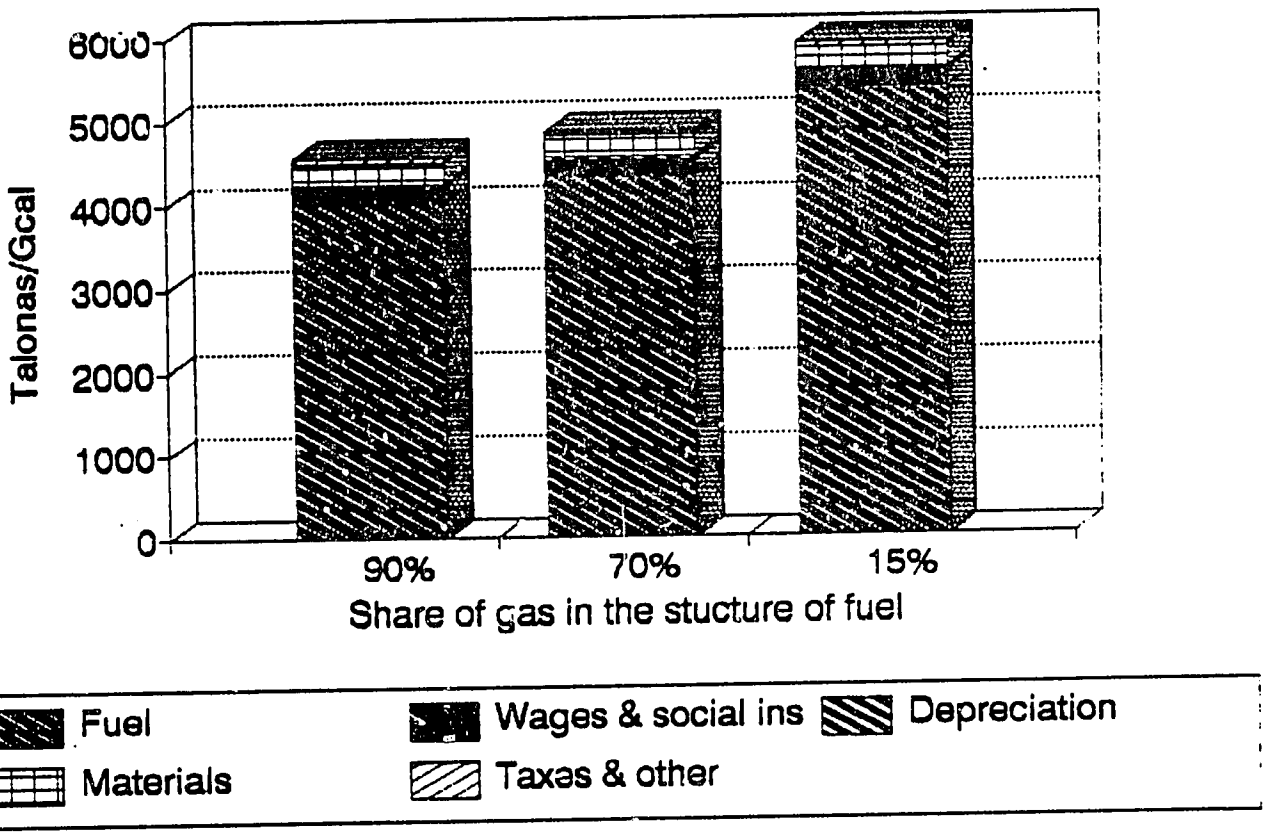


Heat production & distribution costs

I-III quarter of 1992



Tariff's dependence upon share of gas



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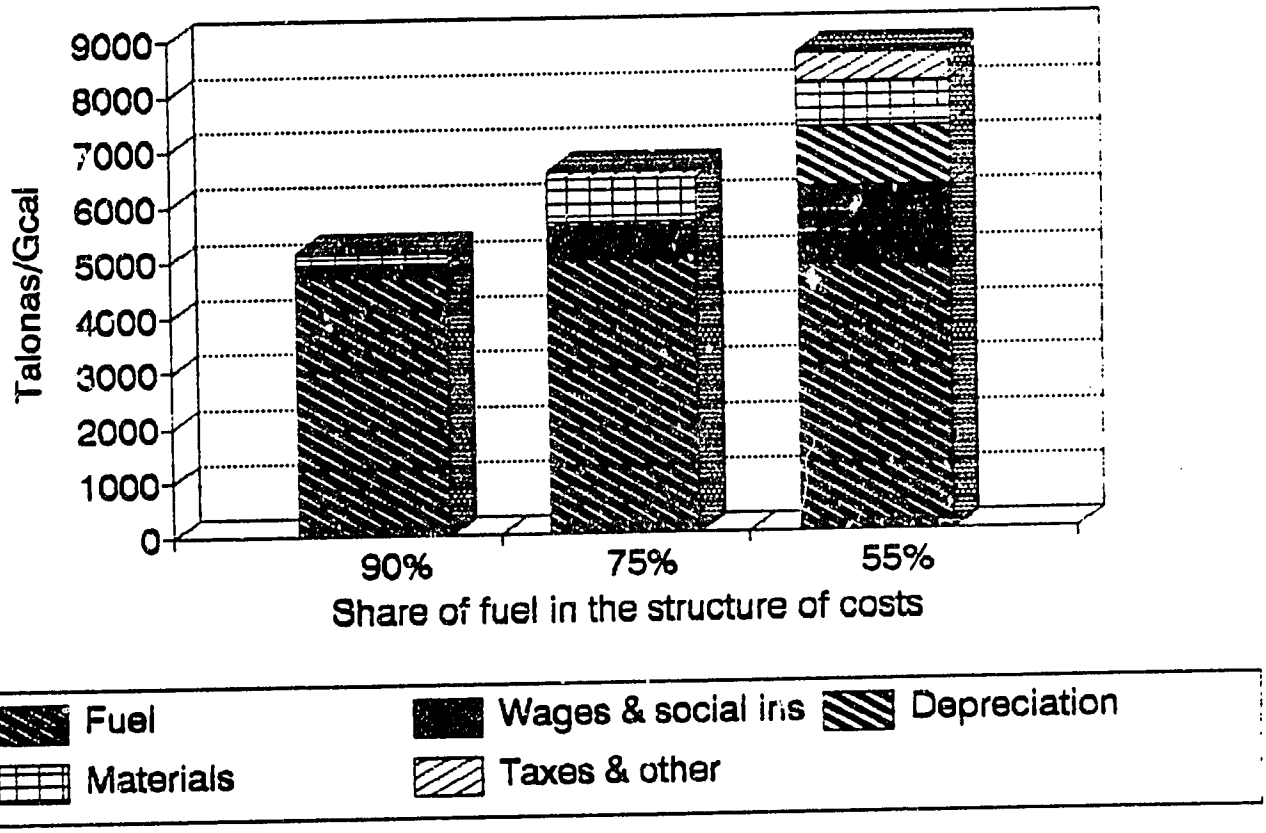
Tariff's dependence upon share of fuel



Structure of consumers in 1991