

Assessment of heat losses in district heating network in Chisinau

13.03.2017

Objective

- The objective of the Project is to contribute to improved operational efficiency and financial viability of the Chisinau District Heating Company, Termoelectrica, SA, and to improve quality and reliability of heating services delivered to the population of Chisinau.

Project components

- The DHEIP supports priority investments aimed at optimizing and modernizing the heat distribution network, with the objective of reduced heat losses, improved service quality, and increased efficiency and security of supply of heat and hot water to end-user consumers.

Specifically, financing would be provided for:

- (a) modernization of selected pumping stations to reduce electricity consumption and provide for efficient variable flow operation mode of the DH system;
- (b) rehabilitation of selected segments of the distribution network to ensure continued secure DH service and reduction of losses of heat and hot water;
- (c) replacement of old and inefficient central heat substations (CHS) with modern fully-automated individual building level heat substations (IHS) for more efficient and secure heat supply to end-users; and
- (d) reconnection of about 40 public institutions, which were earlier disconnected, to the DH system to improve the usage of the DH system.

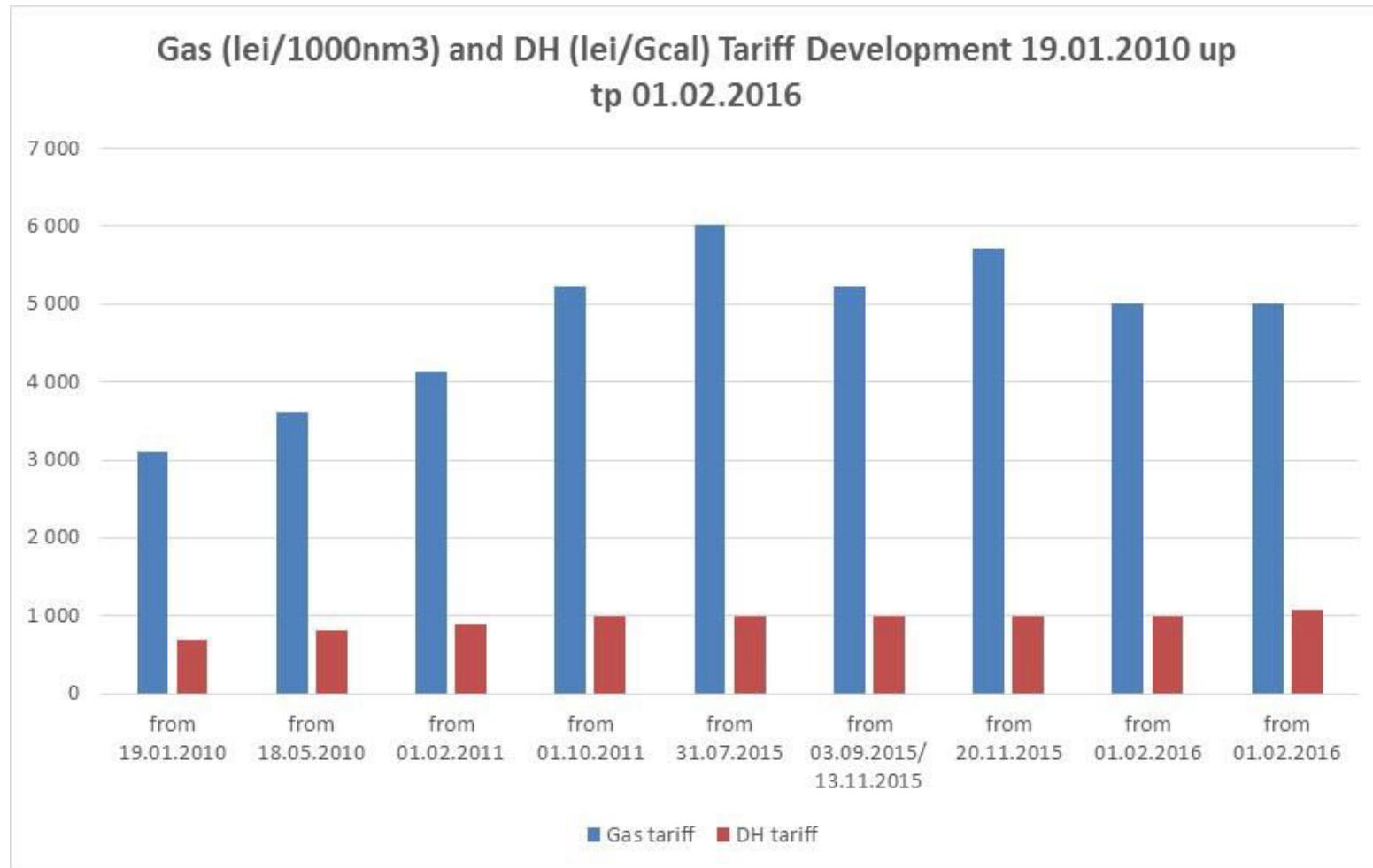
Assessment of heat losses in district heating network in Chisinau

	Symbol	Unit of measure	Average annual tariff approved by Decision of ANRE No. 429 of 21.10.2011 (in force since 28.10.2011)		Proposed tariff S.A.Termoelectrica 2016		Proposed tariff of 2016 ANRE	
			Total	lei/Gcal	Total	lei/Gcal	Total	lei/Gcal
Energy Procured	EP	mii Gcal			0,60		0,60	
Energy produced	EPP	thou Gcal	1 801,48		1 606,04		1 583,20	
Technological Consumption		thou Gcal	3,90		2,83		2,28	
Heating Losses		thou Gcal	363,00		342,00		274,76	
		%	20 %		21,3 %		17,4 %	
Heating delivered to consumers	ETL	thou Gcal	1 434,58		1 261,81		1 306,76	
I. Total regulated Cost	CRT	thou lei	1 291 679,86	900,39	1 529 405,02	1 212,07	1 355 799,51	1 037,53
1.1. Cost of produced heating	CP	thou lei		0,00	316,39	0,25	316,52	0,24
1.2. Cost of produced heating	CPP	thou lei	1 037 485,89	723,20	1 154 075,98	914,62	1 092 816,43	836,28
1.3. Cost of delivery, including	CT	thou lei	254 193,97	177,19	375 012,65	297,20	262 666,57	201,01
1.3.1. Cost of regulated capital - amortization of immobilizations	CCR	thou lei	68 596,40	47,82	144 416,78	114,45	37 075,71	28,37
1.3.2. Regulated Operational expenditures	COR	thou lei	179 035,18	124,80	219 934,99	174,30	215 190,23	164,67
1.3.3. Other operational expenditures	CA	thou lei	6 562,39	4,57	10 660,88	8,45	10 400,62	7,96
II. Regulated Profit	P	thou lei	13 934,80	9,71	57 169,99	45,31	40 108,78	30,69
III. Total Regulated income		thou lei	1 305 614,66	910,10	1 586 575,01	1 257,38	1 395 908,29	1 068,22
IV. Financial Deviations		thou lei		0,00	0,00	0,00		0,00
V. Total regulated income with financial deviations		thou lei	1 305 614,66	910,10	1 586 575,01	1 257,38	1 395 908,29	1 068,22
Current tariff from 2011		lei/Gcal			987,00		987,00	
Change in tariff		lei/Gcal			270,38		81,22	
		%			27,4 %		8,2 %	
New Tariff		lei/Gcal			1 257,38		1 068,22	

- The National energy regulator, ANRE, announced on September 13, 2016 its decision to increase Termoelectrica’s heat tariffs by 8.2% (against a 27.4% increase requested by Termoelectrica). While ANRE’s decision could be considered a step in the right direction after 5 year lapse in tariff-adjustments, yet it also

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		%			27,4 %		8,2 %	
New Tariff		lei/Gcal	987,00		1 257,38		1 068,22	

- From a financial standpoint, the new heating tariff seems, based on current gas prices, sufficient to cover Termoelectrica’s current operating costs (not including depreciation of assets) and stay current on gas payment, but will leave limited free cash-flow to pay for new investments or meet debt service obligations.



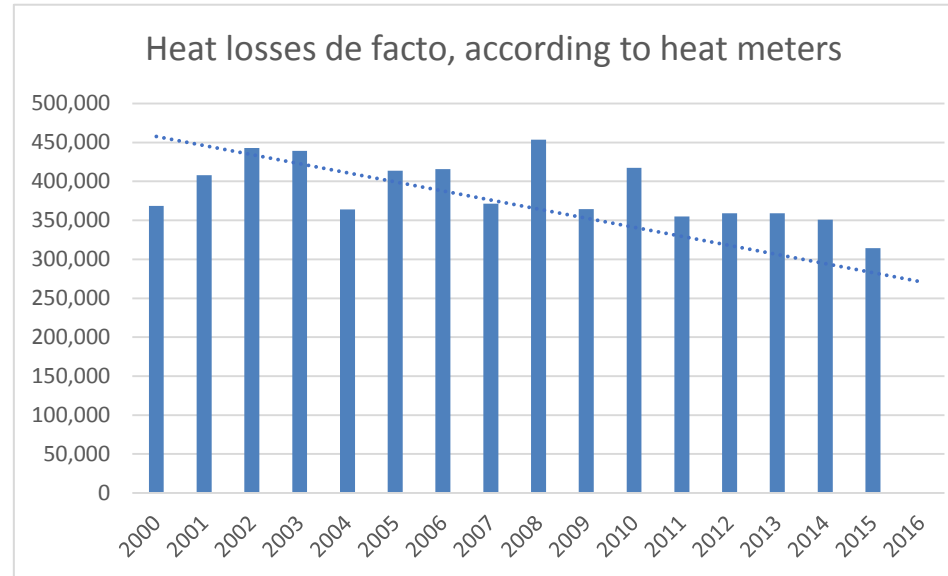
AMORTIZATION

- ANRE has accepted only 25,6 % of assets (9 895 items) proposed by Thermoelectrica. It is obvious that only amortization related to new investments are accepted.

Situation of fixed assets for the year 2016, of J.-S.C. "TERMOELECTRICA", activity regulated - Transport and Distribution								
No	description	Initial value on 01.01.2016	Amortization accumulated on 01.01.2016	Capitalization forecasted for 2016 (investment plan)	Capitalization forecasted for 2016 (project financed by EBRD)	Amortization planned for 2016 r.	Initial value on 31.12.2016	Amortization planned accumulated on 31.12.2016
	TOTAL 9895 items	1 388 238 590	307 781 978	7 927 617	13 237 897	142 934 587	1 766 563 048	449 621 300
	Contabil șef	Iurii Lobodiuc						

- Historical data on heat losses (2000 -2016)

Year	Heat losses, de facto*	Heat losses, calculated**	Heat losses, departmental consumers ***
2000	368 493	-	-
2001	408 012	-	-
2002	442 813	458 193	-
2003	439 339	458 193	-
2004	364 100	-	-
2005	413 761	-	-
2006	415 893	-	-
2007	371 267	-	-
2008	453 779	353 797	-
2009	364 648	-	-
2010	417 471	429 613	7 362
2011	355 159	418 405	5 997
2012	359 221	400 874	5 143
2013	358 955	414 130	4 739
2014	350 915	427 014	4 521
2015	314 118	415 450	4 973
2016	323 392	294 772	5 172



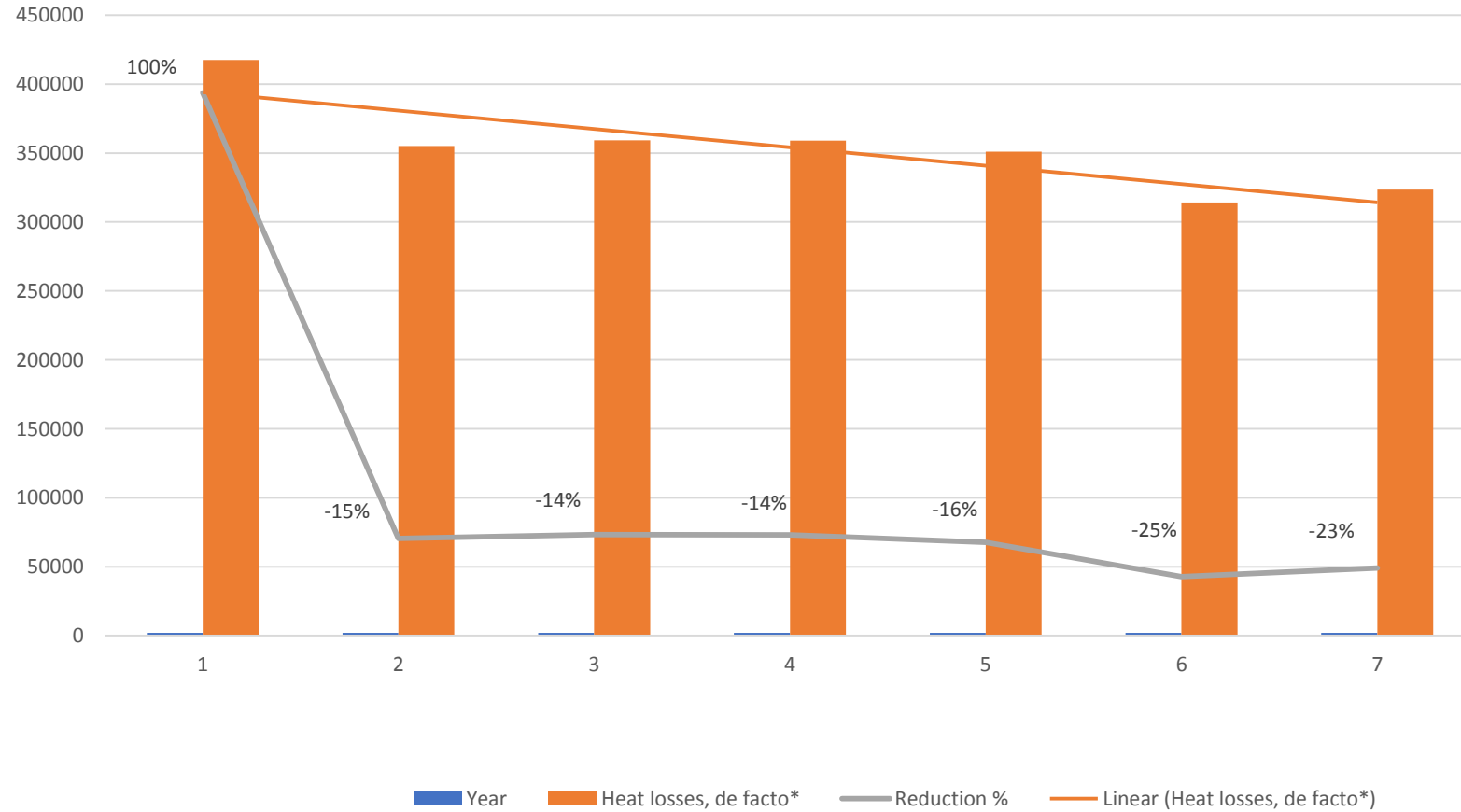
NOTE

* heat losses – determined as difference between the heat delivered to consumers, according to heat meters data, and the amount of heat sold/invoiced to consumers.

** heat losses - calculated in conformity with the methodologies for the determining of the amount of heat, heating agent (substance) and of the values of the normative indicators for the operation of heating networks, running on water.

*** heat losses – sold/invoiced to consumers, whose networks aren't on the balance of J.S.-C., „Termoelectrica”, determined in conformity with the methodologies for the determining of losses for the heat, for the heating agent (substance) and for the values of the normative indicators for the operation of heating networks, running on water.

Heat losses de facto



• INVESTMENTS / REDUCTION OF HEAT LOSSES

- Investments for the “reduction of heat losses implemented in 2010 -2016 (replacement of pipes, replacement of insulation, installing frequency converters, etc.)

N/o	586130	2010	2011	2012	2013	2014	2015	2016	Total
1.	Heating networks:								
	a) length, linear meters.	11 203,40	10 165,00	9 434,00	11 436,74	15 045,30	2 893,00	7 242,00	67 419,44
	b) total, thousand lei (no VAT)	12 387,2	11 488,00	23 069,30	29 904,8	34 590,60	12 313,00	41 150,3	164 903,20
2.	Heat insulation:								
	a) length, linear meters	42 486,3	34 526,00	32 003,00	29 934,3	41 736,00	16 966,00	19 052,30	216 703,90
	b) total, thousand lei (no VAT)	8 985,20	7 898,50	8 222,30	7 230,6	13 846,80	7 587,60	14 007,20	67 778,20
3.	Frequency converter:								
	a) units								79
	b) total, thousand lei (no VAT)								2 506,11

N/o	1172260	2010	2011	2012	2013	2014	2015	2016	Total
1.	Heating networks:								
	a) length, linear meters.	11 203,40	10 165,00	9 434,00	11 436,74	15 045,30	2 893,00	7 242,00	67 419,44
2.	Heat insulation:								
	a) length, linear meters	42 486,30	34 526,00	32 003,00	29 934,30	41 736,00	16 966,00	19 052,30	216 703,90
3.	Total								
	a) length, linear meters	53 689,70	44 691,00	41 437,00	41 371,04	56 781,30	19 859,00	26 294,30	284 123,34
	b) % of total network length	4,6 %	3,8 %	3,5 %	3,5 %	4,8 %	1,7 %	2,2 %	24,2 %

- Investments for the reduction of heat losses implemented in 2010 – 2016 have been **in average 3,5%** of network length, in comparison with **Scandinavian District Heating System 0,45% in average**, the investment made by Termoelectrica are significant.

- Heat losses de facto (Source Termoelectrica)

city+suburbia															
2016															
	T outside air	Temperature, heating agent, °C		Delivered heat,	Including: Delivered heat in hot water,	Including: Delivered heat in steam,	Losses		Including: Heat losses in hot water,	Including: Heat losses in steam,	Own needs,	Invoiced heat,	Including: Heat invoiced to consumers in hot water,	Including: Heat invoiced to consumers in steam,	Make-up water,
	°C	out	return	Gcal	Gcal	Gcal	Gcal	%	Gcal	Gcal	Gcal	Gcal	Gcal	Gcal	Gcal
January	-3,3	75,0	49,7	359 174,54	359 128,54	46,00	63 717,955	17,74 %	63 695,94	22,02	591,52	294 865,07	294 841,09	23,98	55 449,1
February	4,7	67,5	45,1	245 457,20	245 265,80	191,40	29 913,221	12,19 %	29 850,14	63,08	423,41	215 120,57	214 992,25	128,32	55 218,5
March	6,3	64,7	43,8	225 591,50	225 033,30	558,20	33 597,186	14,89 %	33 445,85	151,34	383,10	191 611,22	191 204,36	406,86	50 949,7
I quart.	2,57	69,07	46,20	830 223,24	829 427,64	795,60	127 228,362	15,32 %	126 991,92	236,44	1 398,03	701 596,85	701 037,69	559,16	161 617,3
April	13,1	63,4	43,1	44 180,10	43 929,10	251,00	17 753,961	40,19 %	17 633,52	120,44	59,16	26 366,98	26 236,42	130,56	38 786,9
May	15,8	63,9	44,0	35 977,00	35 728,00	249,00	17 457,396	48,52 %	17 338,23	119,17	35,93	18 483,67	18 353,84	129,83	43 963,0
June	21,3	63,8	45,1	30 403,00	30 107,00	296,00	15 351,668	50,49 %	15 210,12	141,55	25,95	15 025,39	14 870,94	154,45	43 976,0
II quart.	16,7	63,70	44,07	110 560,10	109 764,10	796,00	50 563,025	45,73 %	50 181,87	381,16	121,03	59 876,04	59 461,20	414,84	126 725,90
6 luni	9,7	66,38	45,13	940 783,34	939 191,74	1 591,60	177 791,387	18,90 %	177 173,79	617,60	1 519,06	761 472,89	760 498,89	974,00	288 343,20
July	23,4	61,4	46,9	21 552,70	21 533,70	19,00	11 183,189	51,89 %	11 174,02	9,17	20,05	10 349,46	10 339,63	9,83	44 977,0
August	23,1	60,4	46,5	22 445,20	22 445,20	0,00	11 393,351	50,76 %	11 393,35	0,00	17,44	11 034,41	11 034,41	0,00	43 050,0
September	19,2	59,8	45,7	24 601,40	24 597,40	4,00	9 370,424	38,09 %	9 368,61	1,81	24,20	15 206,78	15 204,59	2,19	42 735,0
III quart.	21,90	60,53	46,37	68 599,30	68 576,30	23,00	31 946,964	46,57 %	31 935,98	10,98	61,69	36 590,65	36 578,63	12,02	130 762,00
9 luni	13,73	64,43	45,54	1 009 382,64	1 007 768,04	1 614,60	209 738,351	20,78 %	209 109,77	628,58	1 580,74	798 063,55	797 077,52	986,02	419 105,20
October	7,9	62,20	44,90	119 997,60	119 683,60	314,00	41 136,202	34,3%	40 986,00	150,20	190,02	78 671,38	78 507,58	163,80	71 117,2
November	3,5	63,80	45,10	245 789,50	245 619,50	170,00	23 077,281	9,4%	22 996,04	81,24	331,32	222 380,90	222 292,14	88,76	49 576,7
December	-0,3	69,50	47,30	326 100,90	326 072,90	28,00	50 313,624	15,4%	50 300,26	13,36	463,40	275 323,88	275 309,24	14,64	46 330,4
IV quart.	3,70	65,17	45,77	691 888,00	691 376,00	512,00	114 527,107	16,6%	114 282,31	244,80	984,73	576 376,16	576 108,96	267,20	167 024,3
Total	11,2	64,6	45,6	1 701 270,64	1 699 144,04	2 126,60	324 265,458	19,1%	323 392,08	873,38	2 565,48	1 374 439,71	1 373 186,48	1 253,22	586 129,5

• Heat losses de facto 2016 (source Thermoelectrica)

Nr. de ordin		January	February	March	April	mai	June	July	august	September	October	November	December	annual
	<i>I. Initial data</i>													
1	T outside air, °C	-3,3	4,7	6,3	13,1	15,8	21,3	23,4	23,1	19,2	7,9	3,5	-0,3	11,2
2	T ₁ , °C	75,0	67,5	64,7	63,4	63,9	63,8	61,4	60,4	59,8	62,2	63,8	69,5	64,6
3	T ₂ , °C	49,7	45,1	43,8	43,1	44,0	45,1	46,9	46,5	45,7	44,9	45,1	47,3	45,6
4	T cold w., °C	1,7	2,7	7,1	12,2	16,9	21,9	24,6	21,9	20,80	13,9	7,3	2,8	12,8
5	Tground(1.6 m) , °C	8,3	7,0	7,8	9,2	11,8	14,5	17,4	19,3	19,5	16,9	12,9	9,7	12,9
6	V cold w., m ³	534 480	494 590	555 876	494 575	509 089	425 867	307 574	321 788	438 547	424 630	543 417	522 588	5 573 021
7	q DHW, %	2,4	5,5	1,8	1,6	1,6	2,4	4,2	1,6	2,4	0,3	5,0	4,0	2,8
8	nr. h	744	696	744	720	744	720	744	744	720	744	720	744	8 784
	<i>II. Heat losses</i>													
1	Insulation, Gcal	57 640,13	24 986,49	30 170,51	15 750,84	15 393,28	13 507,79	9 636,00	9 896,68	7 656,64	37 147,25	18 524,46	45 656,46	285 966,5
2	Make-up, Gcal	3 206,17	2 808,08	2 297,1	1 594,8	1 628,8	1 357,76	1 141,9	1 328,4	1 346,0	2 719,7	2 234,2	2 454,7	24 117,6
3	Leaks DHW, Gcal	673,82	1 417,64	478,6	329,9	316,1	344,57	396,1	168,3	365,9	50,4	1 283,3	1 084,9	6 909,5
4	Total, Gcal	61 520,117	29 212,213	32 946,133	17 675,579	17 338,226	15 210,118	11 174,019	11 393,351	9 368,614	39 917,304	22 041,938	49 196,001	316 993,6
	Volume of Leaks DHW	12 642	27 106	9 991	7 709	8 297	10 410	13 029	5 084	10 700	1 226	26 903	20 783	153 880
	Specific enthalpy of water	0,0533	0,0523	0,0479	0,0428	0,0381	0,0331	0,0304	0,0331	0,0342	0,0411	0,0477	0,0522	0,0422
	Q pierderi cu Leaks DHW	673,8	1417,6	478,6	329,9	316,1	344,6	396,1	168,3	365,9	50,4	1283,3	1 084,9	6 909,5
	DHW	521 838	467 484	545 885	486 866	500 792	415 457	294 545	316 704	427 847	423 404	516 514	501 805	5 419 141
	Heat losses, de facto for 2016 SubCity													
	<i>III. Heat losses</i>	2 175,818	637,930	499,713	-42,058	0	0	0	0	0	1 068,698	954,10	1 104,26	6 398,5
II + III	Totale, Gcal	63 695,935	29 850,143	33 445,846	17 633,521	17 338,226	15 210,118	11 174,019	11 393,351	9 368,614	40 986,002	22 996,041	50 300,264	323 392,08

- **Heat losses estimated by the Consultant** using standard heat loss calculation tool created for project financed by International Financial Institutes
- Pipe type deviation

DN	Length supply km	Length return km	Total length km	2016				Check	Invest. km	2020				
				Pre-ins new km	SNIP good km	SNIP bad km	SNIP no km			Pre-ins new km	SNIP good km	SNIP bad km	SNIP no km	
				20	0,000	0,000	0,00			0,000	0,000			0,000
25	0,553	0,553	1,11	0,125	0,981			0,000	0,981	1,106				
32	0,551	0,551	1,10	0,379	0,723			0,000	0,723	1,102				
40	1,672	1,672	3,34	0,884	2,460			0,000	2,460	3,344				
50	11,780	11,780	23,56	10,056	13,503			0,000	13,503	23,559				
65	10,534	10,534	21,07	10,950	10,119			0,000	10,119	21,068				
80	11,205	11,205	22,41	8,605	13,806			0,000	13,806	22,411				
100	13,352	13,352	26,70	9,006	17,698			0,000	17,698	26,703				
125	4,816	4,816	9,63	2,921	6,710			0,000	6,710	9,631				
150	10,869	10,869	21,74	5,642	16,095			0,000	16,095	21,737				
200	5,469	5,469	10,94	3,500	7,438			0,000	7,438	10,939				
250	4,862	4,862	9,72	2,230	7,493			0,000	7,493	9,723				
300	3,177	3,177	6,35	1,401	4,954			0,000	4,954	6,354				
350	0,000	0,000	0,00	0,000	0,000			0,000	0,000	0,000				
400	2,198	2,198	4,40	0,050	4,345			0,000	4,345	4,395				
450	0,000	0,000	0,00	0,000	0,000			0,000	0,000	0,000				
500	3,793	3,793	7,59	0,136	7,449			0,000	7,449	7,585				
550	0,000	0,000	0,00	0,000	0,000			0,000	0,000	0,000				
600	1,993	1,993	3,99	0,125	3,860			0,000	3,860	3,985				
700	3,026	3,026	6,05	0,532	5,519			0,000	5,519	6,051				
800	9,875	9,875	19,75	0,319	19,430			0,000	19,430	19,749				
900	0,215	0,215	0,43	0,010	0,420			0,000	0,420	0,430				
1000	2,652	2,652	5,30	0,486	4,818			0,000	4,818	5,304				
1200	0,000	0,000	0,00	0,000	0,000			0,000	0,000	0,000				
Total	102,590	102,590	205,179	57,357	147,822	0,000	0,000	0,000	0,000	205,179	0,000	0,000	0,000	0,000

- Heat losses deviation

0,15	January														
	MWh/ year/ m	MWh/ year/ m	MWh/ year/ m	MWh/ year/ m	New pipes		SNIP good		SNIP bad		SNIP no		DH data		
DN	New pipes	Snip good	SNIP bad	SNIP no	MWh/m Supply	MWh/m Return	MWh/m Supply	MWh/m Return	MWh/m Supply	MWh/m Return	MWh/m Supply	MWh/m Return	oC Supply	oC Return	oC Out t
20	0,095	0,188	0,188	0,554	0,008	0,005	0,015	0,009	0,015	0,009	0,044	0,028	74,78	46,08	-3,3
25	0,111	0,175	0,175	0,665	0,009	0,006	0,014	0,009	0,014	0,009	0,053	0,034	74,78	46,08	-3,3
32	0,122	0,199	0,199	0,795	0,010	0,006	0,016	0,010	0,016	0,010	0,064	0,040	74,78	46,08	-3,3
40	0,137	0,215	0,215	0,877	0,011	0,007	0,017	0,011	0,017	0,011	0,070	0,044	74,78	46,08	-3,3
50	0,149	0,210	0,210	1,029	0,012	0,008	0,017	0,011	0,017	0,011	0,082	0,052	74,78	46,08	-3,3
65	0,169	0,241	0,241	1,205	0,014	0,009	0,019	0,012	0,019	0,012	0,096	0,061	74,78	46,08	-3,3
80	0,181	0,267	0,267	1,333	0,014	0,009	0,021	0,013	0,021	0,013	0,107	0,067	74,78	46,08	-3,3
100	0,188	0,315	0,315	1,555	0,015	0,009	0,025	0,016	0,025	0,016	0,124	0,079	74,78	46,08	-3,3
125	0,212	0,363	0,363	1,747	0,017	0,011	0,029	0,018	0,029	0,018	0,140	0,088	74,78	46,08	-3,3
150	0,238	0,358	0,358	1,935	0,019	0,012	0,029	0,018	0,029	0,018	0,155	0,098	74,78	46,08	-3,3
200	0,250	0,435	0,435	2,222	0,020	0,013	0,035	0,022	0,035	0,022	0,178	0,112	74,78	46,08	-3,3
250	0,301	0,516	0,516	2,480	0,024	0,015	0,041	0,026	0,041	0,026	0,198	0,125	74,78	46,08	-3,3
300	0,353	0,592	0,592	2,694	0,028	0,018	0,047	0,030	0,047	0,030	0,215	0,136	74,78	46,08	-3,3
350	0,338	0,640	0,640	2,819	0,027	0,017	0,051	0,032	0,051	0,032	0,225	0,142	74,78	46,08	-3,3
400	0,350	0,620	0,620	3,001	0,028	0,018	0,050	0,031	0,050	0,031	0,240	0,152	74,78	46,08	-3,3
450	0,486	0,684	0,684	3,174	0,039	0,025	0,055	0,035	0,055	0,035	0,254	0,160	74,78	46,08	-3,3
500	0,468	0,747	0,747	3,337	0,037	0,024	0,060	0,038	0,060	0,038	0,267	0,169	74,78	46,08	-3,3
550	0,669	0,810	0,810	3,486	0,053	0,034	0,065	0,041	0,065	0,041	0,279	0,176	74,78	46,08	-3,3
600	0,587	0,874	0,874	3,634	0,047	0,030	0,070	0,044	0,070	0,044	0,290	0,184	74,78	46,08	-3,3
700	0,659	0,999	0,999	3,904	0,053	0,033	0,080	0,050	0,080	0,050	0,312	0,197	74,78	46,08	-3,3
800	0,742	1,106	1,106	4,156	0,059	0,037	0,088	0,056	0,088	0,056	0,332	0,210	74,78	46,08	-3,3
900	0,825	1,230	1,230	4,393	0,066	0,042	0,098	0,062	0,098	0,062	0,351	0,222	74,78	46,08	-3,3
1000	0,896	1,354	1,354	4,618	0,072	0,045	0,108	0,068	0,108	0,068	0,369	0,233	74,78	46,08	-3,3
1200	1,062	1,602	1,602	5,037	0,085	0,054	0,128	0,081	0,128	0,081	0,403	0,255	74,78	46,08	-3,3

- Total heat losses without DHW heat losses, assuming the condition of insulation is perfect

Thermal energy losses through district heating pipelines			
	unit	today	preins
Pipelines above ground	MWh/year	54 746	43 397
Pipelines under ground	MWh/year	261 237	159 137
Heat losses	Gcal/year	271 697	174 148
Total Heat losses including valves etc	Gcal/year	285 282	182 856
Water leakages			
	unit	today	preins
Total volume of the network/above ground	m ³	22 117	22 117
Total volume of the network/under ground	m ³	34 541	34 541
Total volume of the DH network	m ³	56 658	56 658
Total leakages	m³	586 130	113 317
Total leakages	1/volume	10,3	2,0
Length of DH pipes			
	unit	before	after
Length of DH pipes	km	508,77	508,77

Heat losses in DH Network		before	after
Heat losses in DH network	Gcal/year	285 282	182 856
Reduction of heat losses	Gcal/year		102 426
			36 %
Water savings (leakages)		before	after
Water leakages / DH	m3	586 130	113 317
	Gcal/year	26 493	5 122
Water leakages / DHW	m3	153 880	15 388
	Gcal/year	7 158	716
Total leakages	m3	740 010	128 705
Energy in water leakages	Gcal/year	33 652	5 838
Reduction of leakages	m3		611 305
	Gcal/year		27 814
		1	
Total heat losses		before	after
Total heat losses	Gcal/year	318 933	188 693

It is obvious that ANRE calculation is based on assumption : The existing insulation of the District Heating Network is according SNIP requirements

In addition ANRE has included heat losses in DHW distribution system

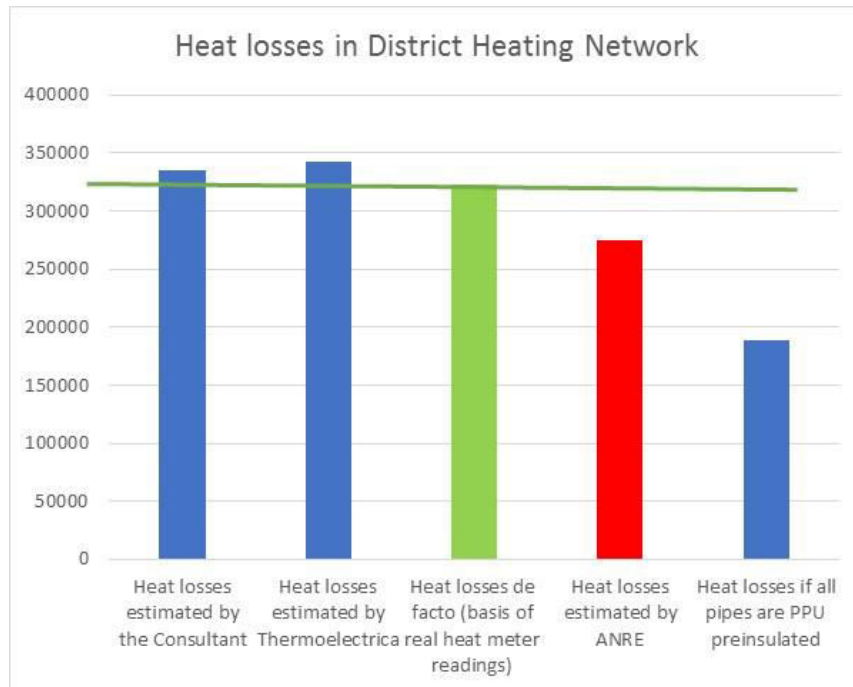
- Total heat losses assuming the condition of insulation is deteriorated due to moisture. The Consultant’s experience from other similar DH systems is : deterioration in insulation effectiveness is wakening insulation ability in average 10%. Basis of that:

Heat losses in DH Network		before	after
Heat losses in DH network	Gcal/year	301 627	182 856
Reduction of heat losses	Gcal/year		118 771
			39 %
Water savings (leakages)		before	after
Water leakages / DH	m3	586 130	113 317
	Gcal/year	26 493	5 122
Water leakages / DHW	m3	153 880	15 388
	Gcal/year	7 158	716
Total leakages	m3	740 010	128 705
Energy in water leakages	Gcal/year	33 652	5 838
Reduction of leakages	m3		611 305
	Gcal/year		27 814
		1	
Total heat losses		before	after
Total heat losses	Gcal/year	335 278	188 693

- The calculation method support Thermoelectricas statement ” heat losses de facto”
 - Thermoelectrica 342 000 Gcal
 - Consultant estimation 335 278 Gcal

Summary:

- Heat losses de facto (basis of real heat meter readings) 323 392 Gcal/year
- Heat losses estimated by ANRE 274 760Gcal/year
- Heat losses estimated by Thermoelectrica 342 000 Gcal/year
- Heat losses estimated by the Consultant 335 278 Gcal/year
- Heat losses if all pipes are PPU preinsulated 188 693 Gcal/year



Assessment of heat losses in district heating network in Chisinau

Capital investments realized from the Capital Investments Plan, characteristics of the investments objects, objectives realized in the year 2013								
Nr. de ord	Name of investment chapters and objects (with indicating the place)	Capital investments realized from the Capital Investments Plan, aprobat de Agenție, characteristics of the investments objects, objectives realized					Suma uzurii, thousand lei	
		measuring units	quantity	unit price, thousand lei	Investment value no VAT, thousand lei	expected result	reflected in the accounting books in the year of launch into operation	annual
1	2	8	9	10	11	12	16	17
a) Investments into the development of heating networks (construction of new heating networks, central heating points, individual heating points etc)								
1. Development of heating networks								
	Total				933,29			46,664
2. individual heating points (PTI)								
	Total				1 900,84		8,996	237,605
	Total chapter				2 834,13		9,00	284,27
b) Investments into existing heating networks (reconstruction, renovation, modernization, capitalized renovations,								
1. Heating networks (reconstruction)								
	Total				28 467,21		87,37	1 423,36
2. Heating networks (capitalization)								
	Total				12 025,35		1030,796	2958,071
3. Capital renovation of the thermal insulation of the heating networks								
	Total		12 676,25		3 878,36		287,47	780,35
4. Mounting spherical taps/valves								
	Total		1 545,00		2 718,32		306,47	923,60
5. Investments for the modernization of the equipment of heating networks								
a) Compensators								
	Total		19,00		189,59		20,91	46,21
b) pumps								
	Total		27,00		855,01		35,023	114,731
c) Pressure regulators								
	Total		4,00		31,52		0,00	7,88
d) other equipment								
	Total				1 492,24		142,51	371,92
	Total equipment				2 568,36		163,42	426,01
	Total chapter				49 657,61		1 875,53	6 511,38

Assessment of heat losses in district heating network in Chisinau

c) Investments în mijloace de transport							
Total chapter				129,28		20,29	45,13
d) Investments into buildings and constructions							
1. Administrative building from str. Tudor Vladimirescu,6							
Total				436,40		4,36	13,21
2. Capital renovation of roofs							
Total				1 320,00		29,09	94,38
3. Constructions' consolidation works							
Total				2 820,53		71,21	191,83
Total chapter				4 576,93		104,66	299,43
e) Investments into IT equipment							
Total chapter				70,28		33,52	50,72
g) Other Investments related to the heat supply activity							
1. Investments to Heating Plants							
<i>Heating Plant Sud/South :</i>							
Total CT Sud/South				2 699,53		110,68	356,92
<i>Heating Plant Vest/West:</i>							
Total CT Vest/West						103,403	302,762
Total CT Vest/West				1 909,16		206,81	605,52
<i>Suburban Heating Plants :</i>							
Total CT(HP) Suburban				2 074,80		26,53	207,71
Total Heating Plants				6 683,49		344,02	1 170,15
2. Investments related to the modernization of the heat recording and metering equipment at consumers							
Total			1047,000		3 203,87	211,063	1005,001
3. Implementation of measures related to the modernization of the electrical equipment							
Total				276,01		28,423	69,357
4. Other Investments							
Total				80,62		4,88	15,92
Total chapter				10 243,98		588,38	2 260,43
TOTAL				67 512,21		2 631,37	9 451,36

Assessment of heat losses in district heating network in Chisinau

Realization of the Investments Plan for the year 2014 by J.-S.C. "TERMOELECTRICA"										
(11 months 2014- by J.-S.C.Termocom and December 2014 - by J.-S.C.TERMOELECTRICA)										
Type of investments	Investments accepted for the year 2014, (thousand lei)	Initial value of investments, thousand lei			Wear, sum, thousand lei					
		December 20014	Termocom SA 2014 (11 months 2014)	Total	joulu.14		11 months 2014		Total	
					reflects the accounting books the year of launch into operation	anual	reflects the accounting books the year of launch into operation	anual	reflects the accounting books the year of launch into operation	anual
1	2	3	4	5	6	7	8	9	10	11
<i>a) Investments into development of heating networks (construction of new networks, central heating points, individual heating points etc.)</i>	17,753.89	0,00	16 692,46	16 692,46	0,00	0,00	5,73	2 199,24	5,73	2 199,24
<i>b) Investments into existing heating networks (reconstruction, renovation, modernization, capital renovations, procurements of fixed assets)</i>	39,510.87	863,01	65 310,84	66 173,85	0,00	286,11	1 901,43	10 182,14	1 901,43	10 468,24
<i>c) Investments in transportation means</i>	2,680.10	0,00	122,45	122,45	0,00	0,00	46,50	191,87	46,50	191,87
<i>d) Investments into buildings and constructions</i>	3,272.32	12,75	2 358,13	2 370,88	0,00	1,17	59,20	196,92	59,20	198,09
<i>e) Investments into ICT equipment</i>	1,892.74	0,00	154,04	154,04	0,00	0,00	14,75	88,86	14,75	88,86
<i>f) Investments into intangible assets (software, systems, licenses, etc.)</i>	35.92	0,00	36,33	36,33	0,00	0,00	0,61	1,82	0,61	1,82
<i>g) Other Investments related to the activity of heat supply</i>	7,971.94	350,23	3 867,27	4 217,50	0,00	74,57	320,79	1 746,75	320,79	1 821,33
Total	73,117.78	1 225,99	88 541,50	89 767,50	0,00	361,85	2 349,00	14 607,61	2 349,00	14 969,45

**Capital Investments, real, for the year 2015 J.-
S.C."TERMOELECTRICA", source production,
distribution, supply**

Nr., inventor y	Name of asset	Sum
	Total: Central Heat Points renovation	4 477 112,48
	Total anul 2015	33 329 208,94

33 329 208,94

INVESTMENT PLAN
Of J.-S.C. "TERMOELECTRICA" for the year 2017

No.	Name	Unit of measure	Sum
1.	Investment plan for distribution and supply of heat	lei	94 524 320
2.	Investment plan for the production of heat and electricity	lei	46 440 000
3.	Investment plan in conformity of the Loan agreement ratified by Law no.148 from 30.07.2015	lei	382 800 000
Total	Summary works and investments for J.-S.C."Termoelectrica"	lei	523 764320

- Investment plan in SACET, in conformity with the Loan Agreement ratified by Law no.148 from 30.07.2015

No.	No. of contract	Description of the contract	Estimated Costs, mln USD	Contract ending	Remarks	
1.	C1.3	Reconnection of public institutions to SACET, including the installing of new PTI (HPs) and the installing of the related heating networks (PTI0)	4,4	2016-2017		
2.	C1.5	Construction of a new heating network, from SP13 to the Source 1, Mesterul manole, 3	1,3	2016-2017		
3.	C1.6	Installation of Individual Heat Substations and reconstruction of the related heating networks	Lot 1. Installing ≥ 180 new PTI (HPs) and the reconstruction of the related heating networks in the region CT Vest/West (PTI1)	2,7	2017- 2018	Priority IHSs. Additional advantages: Will enable extended periods of operation of West circuit from CHP-2 without starting HOB-West.
			Lot 2. Installing ≥ 60 new PTI (HPs) and the reconstruction of the related heating networks in the region CT Sud/South(PTI2)	2,6	2017-2018	Priority IHSs. Additional advantages: Will enable extended periods of operation of South circuit from CHP-2 without starting HOB-South.
4.	C1.7	Reconstruction of the heating network between SPRR no.19 and C-319 in the region CT Sud/South(RT1a, former C 1.5)	1,9	2017		
5.	C1.8	Replacement of DH pipes from the area of HOB West towards the Pumping Stations no.3 (on str. Neculce) and no.10 (on str. Calarasi) in the West circuit (HP2)	2	2017		
6.	C1.1.1	Replacement of the interconnecting DH pipes from the chamber CT-217 to the valves' unit PV-2, between CHP-1 and CHP-2 circuits (continuation of the interconnecting pipes installed under C1.1 up to the area of CHP-2)	2,5	2017		
Total mil.dollars SUA			17,4			
Total mil.lei (1 \$=22 lei)			382,8			

Recommendation

- It is recommended that ANRE will accept **”Heat losses de facto = Heat losses basis of Heat Meter readings”** for Tariff calculation for year 2017.
- It is recommended that Thermoelectrica will invest to “Remote Heat Meter reading system” to avoid imprecise data collection due to manual work
- It is recommended that Thermoelectrica in cooperation with ANRE will create long term investment (up to 2022) and financing plan to achieve the common level of acceptable heat losses in district heating system.