

ISSUE 2000/800:

*Recommendations for
improving the centralized
heat supply system
of Chisinau (CHSSC)*

The study was implemented
by the Independent Think-Tank IDIS “Viitorul”
with the support of the World Jewish Relief (WJR).
Opinions expressed in this publication
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Acronyms

CHSS	Centralized Heat Supply System
CHSSC	Centralized Heat Supply System in Chisinau
CHU	Central Heating Units
CPA	Central Public Administration
DHW	Domestic Hot Water
EE	Energy Efficiency
EU	European Union
EUR	Euro
GD	Governmental Decision
HA	Homeowners Associations
IHU	Individual Heating Units
LPA	Local Public Administration
NAER	National Agency for Energy Regulation
NEEAP	National Energy Efficiency Action Plan
RM	Republic of Moldova
SIDA	Swedish Agency for International Development

Executive summary

We have investigate the centralized heat supply system in Chisinau from a two-fold perspective: that of the production/supply part and the one from the consumer/demand side, in order to identify possible solutions for the diminishing of the actual heat tariff (conditionally noted as 2000, representing the heating bill received by many tenants), which is incommensurable high compared to the purchasing power of a big part of Chisinau inhabitants, especially the social-vulnerable categories of population (conditionally noted as 800, representing the pension of many elder people). Also, the investigation was aimed at elaborating recommendations for the main stakeholders (the government, municipal authorities, regulators, supplier, homeowner association, donors, etc.), in order to alleviate the problem.

The two-fold perspective of the analysis was conditioned by the double character of the problem: on the one hand, the production/supply of heat in Chisinau suffer from inefficiencies due to physical and moral depreciation of equipment and networks in operation since the Soviet period (that causes losses up to 22%, included in the tariff), huge debts accumulated by the main supplier of heat, Termocom JSC, to its own suppliers, mainly before 2010, which has caused Termocom's bankruptcy and restructuration. On the other hand, the customers' side suffers of even greater inefficiencies. They lay the in rigid and inflexible delivery systems of heat to final consumers, which do not offer the latter any possibility, reasons or incentives to reduce consumption. Both the heat distribution up to the buildings and inside the blocks is to be changed/modernized (installation of IHU instead of CHU, replacement of the internal vertical heat networks with horizontal ones, installation of individual meters and heat regulators, etc.), to make the system geared to the needs and purchasing power of consumers.

The modernization of heat production/supply to the final consumers has the potential to reduce losses, included in the tariff, and improve the quality of the heat supplied, but is connected with huge investments and cannot be achieved in the short and medium terms. Investments for the modernization of the heat production/supply and distribution up to the blocks are planned by the government and Termocom gradually until 2020 and are estimated at 4951.64 million lei (approx. €280 million), and these are only a fraction of the needed investments. However, the supplier's technical and technological modernization has the potential to reduce the heat tariff, by our calculations, with only 11% or 110 lei, to 877 MDL /Gcal from the actual 987 MDL /Gcal. Some assistance to the government and Termocom for the modernization and restructuring of the CHSSC is provided by the World Bank and SIDA.

The biggest reserves for the reduction of the heat tariff, according to our investigation, lay on the consumers' side. However, most part of the needed works is also connected with huge investments. So, recent estimates of IDIS Viitorul show that the thermal rehabilitation of all multi-storey blocks in Chisinau, with the insulation of buildings, installation of IHU and horizontal heat distribution systems in flats, require approx. €662 million. At the same time, they have the potential to reduce the tariff with an estimated 23-30% (23% or 225 lei per Gcal, according to our estimations; 30% - according to the government's estimations). But, evidence from new blocks connected to the CHSSC (wholly insulated, with IHU, horizontal internal heat delivery systems and individual meters) shows that saving to the heating bills can be between 40-50%, or even more, due to individual regulation in each apartment of heat consumption.

As in the case of rehabilitation of the CHSSC production/supply side, efficiency measures on the consumers' side will be difficult to achieve in the short to medium term. And this is not only because of the huge investments required. The embryonic stage of the Homeowners Associations, the reduced capacity of these associations to implement projects for thermal rehabilitation of blocks of flats, insufficient awareness of the problem by individual residents, legal and institutional drawbacks, the lack of financial mechanisms and incentives for the implementation of such measures by individual owners or associations are serious hindrances to diminishing the heat consumption and correspondingly, the tariff for heat. However, because of greater reserves for tariff reduction for end-users, the complexity of problems and the possibility

to implement solutions gradually, on a step by step basis, ***on this segment we see the main area of intervention for donors, Moldovan authorities and other stakeholders with immediate actions.*** In our opinion, the main barriers that prevent the implementation of energy efficiency measures in the residential sector include:

- Limited knowledge and awareness of residential consumers about energy efficiency measures;
- Undeveloped institutional framework in the management of the housing sector, lack of practice and procedures for common property management;
- Deficiencies in housing legislation;
- Low households income and lack of financial support for low-income people for the maintenance and implementation of energy saving solutions in apartment blocks;
- Poor realization by a large number of residents of their responsibility for the maintenance of apartments and apartment blocks;
- Lack of funding and incentives for implementing energy efficiency measures in the residential sector;
- The absence of state projects and programs with real objectives, robust mechanisms for implementation and real results;
- Weak managerial and financial capacities of key actors in the residential sector, including HA, condominiums and municipal enterprise of housing maintenance.

These are also the areas of intervention that will require less financial efforts from the stakeholders, but have the potential to generate bigger impact, because of the mobilizing and capacity generation effects, that would facilitate the finding of solutions and mobilization of funds for the more complex, costly and long-term solutions: capital repairs and thermal insulation of buildings, replacement of the rigid and cost-inefficient internal vertical heating networks with horizontal ones that would permit individual metering and regulation of heat consumption. Below, we summarize the main recommendations for different stakeholders for addressing the above issues, which would contribute also to the alleviation of the “200/800” problem for Chisinau residents:

Recommendations	Stakeholders
Develop a concept and a comprehensive viable program to improve energy efficiency of buildings in Chisinau.	Chisinau City Hall, the Government (with eventual assistance from donors)
Organize information and promotion campaigns among citizens regarding the benefits of and modalities to increase energy efficiency in buildings in Chisinau.	Chisinau City Hall, the Government, donors, NGOs
Assess the needs to amend the legal framework, simplify procedures for creating and registering condominium owners associations, improve regulations on establishment and operation of condominium owners associations.	The Government of Moldova
Strengthen the capacities of homeowners associations, condominiums, housing maintenance enterprises in the management of the housing sector and implementation of building energy efficiency measures.	Moldovan Government, City Hall, homeowners associations, donors
With the support from donors, create a center for the consolidation of capacities, training and education in property management. This center would provide training, information and other capacity building support for housing associations (condominiums) in the management of the housing sector.	Chisinau City Hall, donors, NGOs
Issue a specialized guide to inform the presidents of associations and private owners of apartments on opportunities for energy efficiency in apartment blocks, familiarizing them with potential energy efficiency technologies that can be used, ways to finance the work, steps to follow, etc.	Chisinau City Hall, donors, NGOs
Implement, with donor support, a few pilot projects for energy efficiency of existing residential blocks to serve as an example/ model or benchmark for owners' associations willing to implement such works.	Donors, investors, Chisinau City Hall
Impose obligation on owners to contribute to a fund for repairs and energy efficiency of buildings.	Chisinau City Hall, the Government
Develop programs that would provide subsidies to low-income homeowners for their contributions to capital repairs, modernization and increasing energy efficiency of residential buildings, decided upon by joint owners associations	Chisinau City Hall, the Government
Support the development of private housing management businesses; liberalize the pricing of housing services.	Chisinau City Hall, the Government, investors
Institute the obligation for all newly constructed apartment buildings (including mansards to the existing buildings) in the regions covered by CHSSC to be necessarily connected to CHSSC.	Chisinau City Hall

Reconnect to CHSSC the public buildings (Government House, the Parliament, State Universities, etc.).	Termocom, the Government of Moldova
Initiate an information and promotional campaign for the attraction of new consumers to the CHSSC.	Chisinau City Hall, Termocom
Upgrade existing systems in buildings by installing thermostatic radiator valves and heat allocators, which measure heat transferred by each radiator separately.	Termocom, the Government, homeowners associations, donors
Study similar experience of other countries and introduce a separate heating tariff for socially vulnerable population.	The Government of Moldova, NAER
Create a system of tax relief and incentives for individual apartment owners and homeowners associations, for measures to raise energy efficiency in buildings.	The Government of Moldova
Provide incentives in legislation to implement energy efficiency measures by public institutions and the possibility to use the energy savings achieved by them in the interest of these institutions.	The Government of Moldova
Introduce legislative provisions on loans for residential sector energy efficiency projects and flexible funding mechanisms that would encourage implementation of energy efficiency measures in the residential sector.	The Government of Moldova, donors
Identify funding opportunities and installing individual heating units instead of central ones.	Termocom, the Government, homeowners associations, investors, donors

The applied methodology

The issues of the centralized heat supply system in Chisinau are mostly connected to two central issues: those related to production side and those, concerning consumption. In order to solve these problems it is first of all necessary to carefully examine the correlation between supply (production) and demand (consumption) and to analyze the complexity of solutions for each of the issues raised by socio-economic and financial terms.

Based on these arguments, research in this study focused on the following dimensions:

- (i) The study of the central heat supply system (CHSS) and of the purchasing power of consumers, especially those from the vulnerable category.
- (ii) Formulating recommendations for short and long terms, concerning the concept, regulations and policies for turning CHSS into an efficient system directed by consumption that would strengthen the ability of the resident sector to pay bills for central heating depending on actual consumption.

In order to achieve the general goal, the IDIS „Viitorul” team of authors has oriented its activities in the following directions:

- A. *Analysis of the existing legal and regulatory framework in the thermal energy field***
- B. *Analysis of the socio-economic and financial CHSSC functioning, the role of RM Government and local public administration of Chisinau concerning the efficient management of CHSS.***
- C. *Formulating recommendations on improving management mechanisms at central and local levels, treatment and solving of technical and economic issues.***

An important role in the project activities was played by *generalizing the experience of other countries that have solved similar problems* in the field of thermal energy.

The main tools used by IDIS Viitorul were:

1. The analysis of the actual legislation of the Republic of Moldova

This method has allowed to identify legislative and normative acts that regulate the field in question, as well as the drawbacks of the actual legislation, gaps and discrepancies that exist in the field under discussion.

2. Collecting normative acts and relevant documents related to the activity of CHSS

Collection and analysis of relevant documents, was one of the important tools and sources of information in this research. The documents that were developed and adopted allowed appreciating the de facto situation – the real one, which is essential in terms of an effective functional analysis, and conclusions and recommendations to be developed.

Besides, **other documents relevant to the field (organizational charts, job descriptions, activity reports, summaries of local budgets, etc.) have been requested from LPA and Termocom JSC for analysis.**

3. In-depth interview method

In-depth interviews were a key element of the project methodology. Interviews have been structured in series depending on the category of stakeholders interviewed (authorities, donors and NGOs, heat suppliers and heat consumers). For the in-depth interviews, only respondents with relevant experience and sufficient grasp of understanding of the investigated issues have been selected. A more comprehensive investigation in the form of focus-group discussions concern the group of consumers represented by presidents/ members of the homeowners associations.

4. One roundtable and four in-depth interview series with representatives of different relevant stakeholders were conducted

Discussions held a thematic nature and concerned specific areas: current state of the CHSSC and reserves to reduce heating tariff on the production side; the management of the residential sector by HA and their potential

to implement EE measures that would reduce the heating bills; donors involvement in EE projects in the residential sector, their experience and intended projects; relations of Chisinau City Hall to Termocom JSC; the role of RM Government in managing CHSS; restructuring of Termocom JSC; the methodology applied by the National Agency for Energy Regulation in pricing; public opinion against the work of the Chisinau City Hall regarding compensations for heat consumption; etc.

Applying the methods as well as materializing the whole report of problem evaluation have been conducted and implemented in such a way, that they managed the sensibilities and sensitivities that could occur under different circumstances of the activity.

As a result of the study a series of suggestions concerning ways to increase the efficiency of the central heat system and areas for intervention by different stakeholders (Government, City Hall, Chisinau heat supplier, homeowners associations, donors) have been developed so that the tariff for thermal power becomes more affordable for consumers, especially those from vulnerable categories.

We hope that this study will contribute considerably to ensuring the necessary support for solving one of Chisinau most complex problems.

1. Introduction

The central heat supply system of the Republic of Moldova has had an unstable evolution from being a model system in the ex-soviet space, to the present bankruptcy line. Until the independence of RM centralized heat supply systems, were scattered throughout the country covering virtually every city. With the economic downturn, caused primarily by the shutdown of industrial enterprises, which were the largest consumers, they gradually disappeared. Thus, the centralized heat supply is still operational in Chisinau, Balti and Comrat, as well as in the districts Anenii Noi, Cahul, Calarasi, Cimislia, Criuleni, Edinet, Glodeni, Orhei, Stefan Voda and Ungheni. Of these, only 8 provide power to households. Heating networks of the regions / cities mentioned have met the same fate over time. The main problems encountered were lack of national and local policies for maintaining and developing these systems, and lack of investment to ensure the quality of heat supply. As a result, after removing a significant number of industrial consumers followed the constant disconnection of households.

Besides the fact that quality of assurance with heating decreased with the growing weary of the thermal power installations, which resulted in a decreasing number of consumers, the tariffs for heating were growing. The increase of the tariffs for heating has several reasons. First, the increasing price of fuels used to produce heat energy, especially natural gas, and consumer disconnection from the system, which causes transfer of tariff burden onto consumers who remain, connected to the system.

It is interesting to follow the evolution of thermal energy systems in terms of ownership and setting tariffs. Until the establishment of the National Agency for Energy Regulation (NAER), in 1997, thermal power systems (generation, transmission and distribution) were owned by the government,

which set tariffs for heat. Subsequently, this responsibility was transferred to NAER, but only for a short period. After a series of consecutive increases in the tariff for heat, caused, in fact by the increase in purchase price of natural gas in the years 1997-1999, the pricing responsibility was transferred to the Local Public Authorities (LPA) in 1999. Moreover, heating systems have also been transferred to LPA possession. These changes were regulated by the Law on Local Public Administration Nr. 186-WIV of 6 November 1998.

Due to lack of capacity to manage LPA thermal power systems properly and the politicization of tariffs, other issues have come to extreme - CHSS enormous accumulation of debts to suppliers. During the years 2000-2010 the price for natural gas has increased at a rapid pace at the same time the difference between the real price of heating and the tariff approved by local governments has also grown, a situation that explains the accumulation of debt. This situation continued until 2010 when the responsibility for approving tariffs was transferred to NAER again. This change has solved the politicization of tariffs, but made way for the emergence of other issues, namely the inability of a significant part of consumers to face tariff shocks that followed in several steps and the accumulation of consumer debt to suppliers of heat. The largest debts were accrued for Termocom JSC, which is the main supplier of heat in Chisinau. These debts have led to other debts to the main heating suppliers, CET-1 JSC and CET-2 JSC, which in turn formed about 2.5 billion lei of debt to gas supplier Moldovagaz JSC at the end of 2012. To address the problem of the created debt, a new restructuring plan for the heating sector in Chisinau was developed.

The sharp increase in prices was felt differently in places where the centralized system operated/operates, but the effect was the same - the increasing number of disconnections from the centralized heat supply system and debt accumulation. The difference in consumption from one centralized system to another, as well as its type (thermoelectric or thermal plant) has led to a significant difference between the tariffs for end consumers. The tariff for consumers in Chisinau is the lowest in the country, 987 lei / Gcal and the highest price for heat delivered to consumers is from "Criuleni heating networks" JV, in the amount of 2870 lei / Gcal (excluding VAT). The dramatic increase in heat tariffs caused a situation where much of the population, even if it wishes, cannot pay for heat consumption. Thus, in Chisinau alone more than 80% of people encounter difficulties paying their bill for heat. Meanwhile, only 10% of households receive allowances to pay heat, covering only 40% of the bill value.

2. The main problems related to the metering of heat consumption and paying according to its actual consumption

2.1. General Description of the problem

Chisinau, like many other cities in ex-socialist states, inherited a centralized heat supply system (CHSS) with numerous technical, finance and management issues. In general, CHSS Chisinau problems, like those of any other thermal energy system, can be classified into two types: those related to _ production (supply) and those caused by _ consumption (demand). Both sets of problems require major investments to overcome them. At the same time, the complexity of financial solutions for each of them varies. Thus when it comes to demand, they are connected to the implementation of technical solutions for CHSSC to become a consumer driven system, not production driven, as it was inherited. That transformation will be possible by creating the possibility for consumers to regulate and to count heat consumption, depending on individual needs and financial possibilities. At the same time, when it comes to production, solutions are related to the renovation and increasing efficiency of the power generation and heat supply to consumers. Also, providers must reshape consumer service practices, as well as technical and financial management.

The greatest challenge for CHSSC, in this context, is the residential sector, where residents are deprived of the ability to adjust the heat consumption individually and pay the heating bills depending on actual consumption. The inability of the system to provide these possibilities caused numerous disconnections from CHSSC over the years, particularly in favor of individual heating solutions. In Chisinau, about 20,500 apartments have been disconnected from the centralized heating system (which is approx. 11.4% of the total number of apartments connected to CHSSC). The number of those who want to disconnect is growing, but due to limitations mainly

related to the technical capacity of gas networks, not all those who want to be disconnected from CHSS and to install autonomous heating systems, can do it. Therefore, the number of disconnections from CHSSC decreased in the last years. The reason that the residential sector is a major challenge of CHSSC is the fact that this is the main consumer, about 78% of the total heat in Chisinau and approx. 76% for the whole country:

TABLE 1: Delivery of heat by consumer categories in 2011

Suppliers of heat	Domestic consumers		Public institutions		Economic agents		Total heat supplied
	Thousands Gcal	%	Thousands Gcal	%	Thousands Gcal	%	Thousands Gcal
Termocom JSC (Chisinau)	1 105,73	78,1	190,70	13,5	119,35	8,4	1 415,7
Total thermal power for Moldova	1 268,72	75,8	257,45	15,4	146,74	8,8	1 672,8

Source: Regulatory Impact Analysis (RIA) of the Draft Law on Heat, February 2013

This challenge is even greater, as the residential sector has proven to be extremely vulnerable to price increases that have occurred steadily over the years, without households benefiting from alternative possibilities. Thus, since 1994, the heat price for households in Chisinau increased almost 52 times, from 19 lei per 1 Gcal up to 987 lei / Gcal presently.

The residential sector is also characterized by a number of inefficiencies, great heat and hot water losses starting with due to theft and leakage from the system, and ending with heat loss in poorly insulated and sealed buildings. Losses in consumption (apartment building) often reach 30-50% and sometimes even reach 70%. Most buildings in the RM are included in the energy efficiency class C or D, respectively consuming 3-4 times more energy than those in the EU. These losses create real difficulties for the vendor because

**AREAS OF
FURTHER
RESEARCH /
INTERVENTION:**

assessing opportunities for intervention from various stakeholders (government, investors, donors) with programs targeted to raise energy efficiency in residential buildings

its technical (transportation) capacities, in addition to the fact that they are in a poor state of repair, are not sufficient to meet consumption load, especially during very cold periods. In this case, reduction of heat consumption is beneficiary not only to the consumers, but also to the provider. However, energy efficiency projects in the residential sector are almost absent, except for projects funded by external donors, or some isolated attempts of a few block administrators.

The main barriers that prevent the implementation of energy efficiency measures in the residential sector include:

- Limited knowledge and awareness of residential consumers about energy efficiency measures;
- Undeveloped institutional framework in the management of the housing sector, lack of practice and procedures for common property management;
- Deficiencies in housing legislation;
- Low households income and lack of financial support for low-income people for the maintenance and implementation of energy saving solutions in apartment blocks;
- Poor realization by a large number of residents of their responsibility for the maintenance of apartments and apartment block;
- Lack of funding and incentives for implementing energy efficiency measures in the residential sector;
- The absence of state projects and programs with real objectives, robust mechanisms for implementation and real results;
- Weak managerial and financial capacities of key actors in the residential sector, including HA, condominiums and municipal enterprise of housing maintenance.
- We will refer in more detail to the problems and solutions for the residential sector in chapter 7.

**AREAS OF
FURTHER
RESEARCH/
INTERVENTION:**

Assessment of the HA ability to manage the housing sector and to intervene with measures to increase the energy efficiency of buildings.
Identification of measures to increase HA capacities and assistance that can be provided by different stakeholders in the process

2.2 The current heat consumption metering

Currently, consumer billing is done by the Municipal Enterprise “Infocom” JLC. Housing managers (municipal enterprises of housing management, homeowners associations of privatized housing, housing construction cooperatives) deal with the management of centralized heating systems in apartment buildings, and proportionate sharing of consumption values to each block. In total, “Termocom” JSC supplies heat to about 180,000 apartments and domestic hot water to 112,000 apartments. Of the 2773 residential buildings connected to the centralized heating system, only 1550 use domestic hot water¹.

According to the Concept of corporate, financial and institutional restructuring of the centralized heat supply in Chisinau, drawn up by the Government in 2010, more than 80% of Chisinau residents had difficulties in paying their bills for heat. Although they wanted to pay the bills, they could not pay them because of lack of money. Meanwhile, only 10% of households received benefits for paying heat. In this context, the authors of the Concept recognize that increasing heating costs alone will not ensure full financial viability of “Termocom” JSC and the risk of non-recovery of debts increases whenever tariffs increase.²

According to the Regulation on the manner of delivery and payment of communal and non-communal housing commodities, metering flats and conditions of disconnection / reconnection to the heating systems and water supply, approved by Government Decision no. 191 of 19 February 2002, prices for energy sources (natural gas, electricity and public services of heat supply in centralized systems) are established by NAER. Payment for heating is calculated per square meter of heated area of the apartment. In the event that heaters are installed on the balcony or lodge, surfaces thereof are added to the heated surface of the flat, and the payment for their heating is calculated by applying the quotient 1.2. If additional radiators or their sections were installed in the apartment and this resulted in disturbing heating in apartments connected to the same column, the payment for heating in apartments with additionally installed radiators (sections) shall be increased as calculated by the manager, reducing, respectively, the payment for heating

¹ Igor Zănoaga energy efficiency of buildings in Chisinau, IDIS Viitorul 2012

² The concept of corporate, financial and institutional restructuring of the centralized heat supply in Chisinau, approved by Government Decision (GD) 983 of 22.12.2011

in apartments where the heating was disturbed. In practice, however, the application of these provisions is difficult or even impossible due to lack of reliable information about apartments that have additional radiators (sections) installed, or the number of radiators (sections) installed.

The amount of heat paid by the population is determined according to heat meters installed in residential buildings and in their absence – according to the average cost for heating of 1 m² of heated surface in the homes of all blocks without meters. In the event that the housing block is metered, monthly payment for heating in apartments that are not metered individually is calculated as follows:

$$C_{\text{heat}} = T_{\text{heat}} \times Q_i = T_{\text{heat}} \times \frac{Q - (Q_{\text{cm}} + Q_{\text{ar}} + Q_{\text{loss}})}{F_i} \times f_i,$$

Where:

C_{heat} – monthly payment for heating in apartments that are not metered individually

T_{heat} – tariff for heat, lei/Gcal

Q – heat consumption registered by the common meter of the housing block, Gcal;

Q_i – monthly consumption of thermal energy for heating the apartment, Gcal;

Q_{cm} – Monthly heat consumption recorded by meters in metered apartments, Gcal;

Q_{ar} – monthly consumption of thermal energy for heating uninhabitable rooms, Gcal;

f_i – heated area of the apartment, m²

F_i – heated surface of the apartments, where heat meters are not installed, m²;

Q_{loss} – monthly losses caused by heat leakage and those that occur through uninsulated areas of internal block heater systems (Gcal)

The amount of heat energy used per month is confirmed by an act signed by the provider and the manager. Payment for heating during the heating season must be paid by 1 August of the reporting year. During the heating season, the minimum monthly payment paid by the consumer for heating

must be at least 40% of the monthly bill. In reality, people pay monthly from 53% to 69% of the bills during the heating season, by August this figure rising to the level of 82% (season 2011-2012). The level of payments for heat by the population and the degree of compensation from state subsidies in the latest heating season (2012-2013) are given in the table below:

TABLE 2:

The monthly payments of the population in 2012-2013 heating season

Month	Bills calculated, thousands of lei	Bills paid, thousands of lei	Including compensations for heat, thousands of lei	% compensations	% payments
November 2012	127959,5	67385,2	5944,4	4,6%	52,7%
December 2012	215589,7	134897,0	11754,8	5,5%	62,6%
January 2013	202236,6	126652,8	12434,1	6,1%	62,6%
February 2013	169288,8	116547,4	10481,7	6,2%	68,8%

Source: Ministry of Economy

Partial disconnection of the apartment from the centralized block heating is not allowed. Full disconnection is only allowed if another heating source is installed in order to maintain a constant temperature of at least +18 °C.

If the apartment is fully disconnected from the centralized heating system, the consumer must pay for the heating worth 20% of the thermal energy calculated per square meter of the apartment. Payment in the amount of 20% shall be distributed by the housing fund manager or provider to reduce payments for consumers connected to the centralized heat supply. Heating payments are received from the residents in basis of accounts (vouchers) per month issued by providers, administrators, and service providers.

2.3. Possible solutions for solving the problem

This sector shall be adjusted to the realities imposed by the market to meet the challenges mentioned. CHSSC requires adjustment measures on both the supply side (production) and on the demand side (consumers) so that it can become truly the cheapest and safest solution for household heating. To keep CHSSC the most attractive heating solution for consumers and the internal infrastructure of buildings and that of CHSSC must be replaced with equipment that would allow metering and regulating heat consumption in each apartment. The old vertical Soviet Heating system for multi-storey buildings

makes adjustment and heat metering for individual apartments complicated. This in turn affects the quality of the heating service to consumers, the collection of payments and makes it impossible to disconnect non-payers, etc.

Although metering is highly developed when it comes to full blocks, separate households have no incentives to thermally insulate the apartments or undertake energy efficiency measures to cut heating bills in the absence of metering and the possibility to control heat consumption in each apartment. In addition to these measures for final consumption, internal and external CHSSC networks are obsolete (pipes were not changed for about 40-50 years, with an operating period of only 25 years) and cause losses (of approx. 22% compared to approx. 5% losses for similar systems in the EU).

There are several initiatives designed to allow installation of meters and regulate heat consumption in apartments. The best solution for both the provider and for the consumers is to replace the old vertical heating system with the horizontal one, which allows each user to adjust consumption and have a meter in the apartment³. Another argument in favor of this solution is that most internal heating systems in buildings are more than 30-40 years old and need to be replaced anyway. Another option for metering and regulating heat consumption for individual consumers concerns the installation of thermostatic valves and heat allocators for every radiator. This option, however, has a number of drawbacks:

- it is impossible to disconnect from the system
- consumers are likely to distort (defraud) the indications of heat allocators
- the complicated procedure and limited transparency in collecting / reading indicated allocators
- regular need to balance the heating system in order to enable the uniform distribution of heat inside the building.

New buildings use technologies where consumption metering and control is made in each apartment. While most developers of new buildings have opted for individual heating systems in each apartment, some new buildings have boilers throughout the building; with the possibility of adjustment of consumption within each apartment (they usually use the horizontal heat distribution system). It is estimated that as compared with the first option,

³ “Urban heating in Moldova: Experience from the transition and future directions”, Alliance to Save Energy, 2006

the second provides a savings of about 40%. Meanwhile, some new buildings have opted for the centralized heating system (Termocom), but their internal networks are horizontal and allow adjustment and metering for each apartment.

Provided that their construction complies with the rules on effective insulation of the building, the economy when paying the bill for heating in these buildings reaches approx. 50%. A classic example of this is Chisinau block of flats on Maria Dragan no. 38/2. The block was designed and built in accordance with the practice of horizontal distribution of heat. According to this, common pipes transit the stairs each floor and not apartments, in each apartment thermostatic valves that allow adjusting heat consumption are mounted and boxes on each floor which accommodate heat meters for each apartment are installed. Besides the horizontal distribution, an Individual Heating Unit acquired under a grant from the Swedish International Development Agency (SIDA) has been installed in that apartment block. Due to these technical measures, as well as thermal insulation with expanded polystyrene, expanded polyurethane pre-insulated pipes (which provide low heat losses), residents pay heating bills by almost 50% smaller than residents from blocks connected to the CHSSC vertical heating system.

While The concept of the Government, which we referred to above, sets the overall restructuring and development of CHSSC (in Chapter 6 we will refer in more detail to the provisions of the Concept), the National Energy Efficiency Action Plan (NEEAP) for 2012-2015, provides specific measures and investments in these CHSSC restructuring measures as follows:

- 1) modernization and reconstruction of 69 km of main heating and distribution (207 km by 2020);
- 2) modernization of 26 km of heat networks within neighborhoods from own sources and 235 km from foreign investment (86 km from own sources and 725 km from foreign investment by 2020);
- 3) changing thermal insulation for 18 km of underground heating systems and passageways (39.0 km by 2020);
- 4) installation of closing ball valves for main heating networks and within neighborhoods;
- 5) modernization of pumping stations in main heating networks (1.52 million), of which 0.32 million - own sources of Termocom JSC;
- 6) installation of 1643 IHU (143 from Termocom JSC sources) for housing in Chisinau for the duration of the Plan (Total - 4928 by 2020, of which

428 from supplier's own sources. This requires the removal of 364 central heating units and 204 km of domestic hot water network by 2020;

7) automation of the heat supply system.

All these activities, according to NEEAP, will require a total investment of 4951.64 million, of which: in 2013-2015 - 1741.45 million, in 2015-2016 - 1087.04 million, in 2016-2020 - 2123.29 million. These investments will be covered by Termocom's own sources - 406.54 million (8.21% of the total investment required), World Bank loan - 320 million (€ 20 million) - 6.46%. Given that all sources of funding for these activities were not identified, NEEAP recognizes that this moment is a risk to the implementation of the plan. Also it is mentioned that IHU will help reduce costs for heating by at least 5-10%, and as a result of the integration with the internal system of horizontal heat supply and of thermal rehabilitation of buildings - over 30%. Meanwhile, officially, no investment needs were identified on the consumer side, respectively, nor is there any specific action plan on implementation of building energy efficiency measures from the household sector.

**AREAS OF
FURTHER
RESEARCH/
INTERVENTION:**

assessment of needs of the residential sector in implementing energy efficiency measures and the development of specific action plans in this direction in Chisinau or in the whole country

On the other hand, promoting system efficiency measures on the demand / consumption side, which would allow consumers to adjust consumption and keep records individually, could solve many of the problems, including:

- 1) It would increase the rate of collection of payments for heat consumption;
- 2) Low-income consumers would be able to adjust their consumption according to the ability to pay (allowances received);
- 3) Residents would have real incentives to implement energy efficiency measures;
- 4) Residents' tensions and discontent about the distribution of payments for heat would disappear.

Measures that can be implemented on the demand / consumption side vary depending on the object and the funds available, and include:

- insulation of walls;
- roof insulation;
- replacing / lining windows and entrance doors;

- replacement of internal heating and domestic hot water systems;
- installation of thermostatic adjustment valves to radiators

According to some calculations⁴, the cost of modernization of the inner heating system for an apartment is on average EUR 1820. This upgrade requires replacing the existing system with the two-pipe system, a complete change of radiators, equipping them with thermostatic valves, mounting columns on staircases and equipping each apartment with ultrasonic heat meters. This sum also includes the automated monitoring of consumption and billing. Based on these calculations, the modernization of the 2773 residential buildings in Chisinau the total investment amount will be EUR 661 700 000. The total investment includes the amount for performing thermal insulation of the building envelope of EUR 399.4 million, replacing heating networks within blocks - EUR 238.7 million and installation of individual heat units estimated at EUR 23.6 million. The total investment required for an apartment is around 3641 EUR. The costs of energy modernization of residential buildings in Chisinau are presented in the table below:

TABLE 3: Estimated costs of the energy efficiency modernization of apartment blocks in Chisinau

Item of rehabilitation	Surface, m ²	Apartments/ blocks	Unit costs excluding VAT, EUR	Costs without VAT EUR
Facade part opaque	5 312 796		31	164 696 690
Facade part glazed (4-16-4 double insulating glass, low-E, argon)	1 663 726		95	158 053 936
Roof above the basement	1 384 650		13	18 000 450
Roof over the top floor	1 629 000		36	58 644 000
Internal heating by the number of apartments	168 131	1 420	238 746 020	
IHU (by number of blocks)	2,773	8 500	23,570,500	
TOTAL in Chisinau				661,711,596
The average investment for an apartment				3 641

Source: Igor Zănoaga, *Energy efficiency of buildings in Chisinau*, IDIS Viitorul 2012

⁴ Igor Zănoaga, *Energy efficiency of buildings in Chisinau*, IDIS Viitorul 2012

3. Technical and organizational solutions to provide heating services and their impact on heat consumption

3.1 Predominant current solution: vertical heating (in multi-storey buildings)

In Chisinau, the buildings are connected to central heating largely directly by elevator nodes without adjustment possibilities. Domestic hot water (DHW) is produced in central heating units (CHU) and to blocks is distributed through pipes, without recirculation, leading to losses for both the supplier and for consumers. There are a large number of blocks, which do not use DHW, which causes additional losses in the system, especially during summer. Heating systems of the buildings - managed by the consumers - is the primary cause of consumers' dissatisfaction and of disconnection of from the centralized system apartments. Vertical heating with a pipe, without adjustment possibilities, is inflexible and creates interdependencies between apartments.

Attempts to decrease consumption "with the valve in the basement", by reducing the flow at the level of the block, lead to inequity in the distribution of heat among apartments, causing conflicts. In the existing systems with a vertical pipe, radiators are connected in series, each radiator temperature drop increases with flow reduction, and if for the first consumer the temperature may be sufficient, the others may become too cold. For these reasons, although at the entry into the block - the boundary between provider and consumer - the parameters of the thermal agent are in order, in different apartments it may be too hot or too cold, which creates dissatisfaction for individual consumers.

The lack of direct dependence between heat consumption of apartments and the size of payment for the consumer, as already mentioned above, does not stimulate consumption efficiency measures by installing thermostatic valves at radiators and heat conservation - reducing losses through windows and walls. As a result, *bills paid by each an individual apartment in the absence of metering*

system cannot be affected by such measures. Another shortcoming is the inability of the system heat startup and shutdown at individual consumers' desire. CHSSC heat delivery to consumers is only during "heating season" (beginning and end of the "season" is determined by order of the mayor of Chisinau). Some solutions for modernization of heating systems in buildings can be identified.

Solutions to modernize vertical heating

- *Simple solution* - modernization of existing buildings by installing thermostatic radiator taps and eventually cost allocators, which measure heat transferred by each radiator separately.

- *Advanced solution*, but that can compete directly with autonomous heating and ensure efficiency, maximum flexibility and independence of consumption:

- installation of vertical columns of distribution pipelines in the common area of the building;

- installation by tenants of horizontal heating systems in apartments, with thermostatic valves at each radiator, and connecting them to the pipelines column by heat meter for cost sharing.

There is also the solution of installing IHU in apartments, connected to the system, instead of IHU in the block, but this solution is costly.

Complex measures - installing IHU in the building, upgrading heating systems and achieving energy conservation measures (installation of efficient windows, insulation of walls) can reduce heat consumption in old buildings by 40-50% and even more.

To realize the high potential of increasing efficiency by installing IHU to customers and modernization of the blocks' systems ***it is necessary to develop funding programs and mechanisms.*** In fact, a significant potential of funding already resides in exaggerated expenses for services, which can be reduced through investment in modernization. ***The difficulty is that at least some of the works falls within the common area of the building, and the ability to work together and achieve their financing is not developed in residents associations.*** In this respect, it is necessary to involve the authorities with some well-established programs, and inform the public on the modernization solutions and their benefits. A particular

solution of modernization, subject to which applies to *blocks with mansards* would be to stimulate the installation of IHU in the block for heating and DHW needs of the mansard, as well as the whole the block - during the construction of the mansard. In addition, new columns installed in the common area of the building that connect the mansard to the IHU can be calculated to allow gradual individual connection of apartments on existing floors.

3.2. Prospects for IHU installation

In the developed systems, automated equipment - individual heating units, IHU - is installed as an interface between the heating system and the consumer.

Individual Heating Units (IHU):

- provides hydraulic isolation and automatic adjustment of temperature in the heating system of the building, depending on the outside air temperature / consumer needs.
- provides DHW production using cold water and heat in the system. At the same time, increase the quality and availability of DHW. Consequently, it can significantly increase the number of consumers of DHW. This will increase the efficiency of the heating system, especially in the summer.
- contains a control panel, which allows adjusting the parameters, including the interdependence between the temperature of outdoor air and supplied temperature of the heating system, hot water temperature (for institutions, enterprises) scheduling regimes of automatic temperature reduction at night and on weekends, etc.
- allow metering heat and cold water consumption. IHU help to reduce heat consumption by up to 20-25% and even more.
- allow optimization of the centralized heat supply system and thereby reduce network losses. It also eliminates the costs of CHU and DHW networks, losses for DHW networks disappear.

In the total there are 364 CHU in Chisinau and about 195 km of network of neighborhood DHW that can be removed after system upgrade by switching to IHU. Old CHU buildings can be sold on the market, and the resources obtained can be used in the modernization process. In Chisinau there are some

neighborhoods where modern IHU were installed in buildings, purchased from funds provided by the Swedish International Development Agency (SIDA). In these neighborhoods networks were completely rebuilt using pre-insulated pipes from the main to buildings, avoiding the old CHU. In total, so far, from various sources IHU were installed in approx. 6-8% of all apartment buildings. It is estimated that at the current pace, the installation of IHU in all the blocks in Chisinau will take 20-30 years⁵. The cost to equip an apartment building with IHU, based on Termocom JSC experience, averages about 8500 EUR including the mounting work. ***It is, however, required to have a strategy / program of switching to IHU, which would be a top priority in the development of the central heating system.*** In West a market for prefabricated modular IHU with different capacities has already formed - from private homes or apartments, to large multi-storey blocks systems. Their price is lower than the one of IHU with an individual project and assembled on site.

AREAS OF FURTHER RESEARCH/ INTERVENTION:

Evaluation of the impact of the mode of organization and rendering of heat provision service on the individual consumption of thermal energy and the amount of the bill.

3.3. Regulation of tariffs for heat delivered to consumers from the point of view of sustainability

In Moldova, as with most post-socialist countries heat is delivered to consumers based on cost-plus approach, the methodology for determining, approving and implementing tariffs for thermal energy delivered to consumers being developed by the National Agency for Energy Regulation. Under this methodology, by the end of November, operators who provide annual heat supply present the authority in charge of the tariffs approval (National Agency for Energy Regulation) the tariff calculation for the next year, conducted in accordance with the approved methodology. The authority empowered to approve tariffs examines the materials submitted and in the case of substantiated reasons, approves the tariffs.

AREAS OF FURTHER RESEARCH/ INTERVENTION:

assessing the appropriateness of determining the tariff for heat energy based on modern approaches that stimulate saving heat consumption by consumers and increase heating service quality and differentiate tariffs for vulnerable consumers

⁵ Igor Zănoaga, Energy efficiency of buildings in Chisinau, IDIS Viitorul 2012

Rates are approved for 1 Gcal of heat energy delivered to consumers at the average for the entire calendar year, and do not include VAT. To avoid discriminating consumers, tariffs rates are approved as unique to all consumers. As a result of the current methodology of tariff setting, the heat supplier does not have incentives to make efforts to streamline costs.

4. Reserves of reducing the heating bills through energy efficiency measures

4.1 Technical condition of the heating system in Chisinau

The centralized heat supply system in Chisinau consists of the manufacture segment and supply segment. The production of the thermal agent in Chisinau is provided at approximately 76% by the state owned enterprises CET-1 JSC and CET-2 JSC, whose administration is provided by the Ministry of Economy. The remaining approximately 24% of the heat is provided by from Termocom JSC through its West, South and suburban thermal plants, as well as thermal plants of Apa-Canal JSC. Of particular importance are CET-1 and CET-2, which, in fact, are plants of combined heat and power, which gives them a national importance. Both power plants use gas as the main fuel and have oil stocks that would ensure functionality for a period of several weeks in the case the main fuel supply interruption.

CET 1 was built between 1951 to 1961 with an installed capacity of 66 MW and the available of approximately 40 MW. The wear is about 60%.

CET 2 was constructed in the period 1976 to 1980 with a capacity of 240 MW and 210 MW available, the degree of wear is about 50%.

The high degree of wear of thermal power plants directly impacts the cost of heat and power products. CET-1 JSC is the oldest plant that produces electricity that is with 80% more expensive than the imported electricity when heat is only 10% cheaper than heat produced by thermal Termocom power plants. "CET-1" has a thermal efficiency of about 61% which implies high costs for both heat and electricity consumers. For these reasons the experts in the field support the shutdown of the plant.

In the case of CET-2 JSC, electricity is 32% more expensive than the

imported electricity when heat is 26% cheaper than heat produced by thermal Termocom power plants.⁶ Heat supply in Chisinau is performed by Termocom, which is currently administered by the Chisinau Municipal Council. Heat supply is provided through 224 km of main pipelines, 265 km of pipelines of heat supply networks between sectors of Chisinau, 214 km of hot water supply systems, 9173 km of underground insulated and polyurethane pipeline and 491 central heating units.⁷

4.2 Reserves of reducing tariff for heat on transportation, production and supply side

In order to identify any reserves of reducing heating tariffs to end users, it is important to analyze the components of the current tariff separately. According to the tariff approved by NAER on 04.02.2011, based on the methodology applied in that period, the main components are:

No	TARIFF COMPONENT	MDL/Gcal	%
1	The cost of transportation and supply	176	19.6
2	Cost of heat within the network	694	77.3
2.1	The cost of produced heat	203	22.6
2.2	The cost of purchased heat	492	54.7
3	Previous year financial deviations (financial loss)	10	1.1
4	Profit	18	2.0
Total	Tariff for heat supplied to consumers	898	100%

From the table it is seen that the largest share of the tariff belongs to **the cost of transportation and supply services - 19.6% along with the cost of heat entering the network - 77.3%**. This indicates specificity of the current methodology which has an approach based on costs which explains the sensitivity of tariff to final consumers to increased costs, particularly for fuel. Next, we analyze the elements of the basic components above to identify any reservations of optimizing which would reduce the tariff to final consumers. *The cost of transportation and supply* in turn consists of other costs in the table below.

⁶ Decision no. 983 of 22.12.2011 on corporate, financial and institutional restructuring of centralized heat supply in Chisinau

⁷ From the study: „Republic of Moldova: National Energy Policy Information for Regional Analysis”.

No	TARIFF COMPONENT	MDL/Gcal	%
1	The cost of transportation and supply	176	19.58
1.1	Fuel	4	0.40
1.2	Added water	6	0.63
1.3	Electricity	25	2.77
1.4	Equipment	4	0.40
1.5	Reparation expenses	10	1.08
1.6	Depreciation of fixed assets	45	5.05
1.7	Labor remuneration	54	5.97
1.8	Social security and health premiums	14	1.58
1.9	Interest for EBRD loan	0.0	0.00
1.10	Maintenance of meters	0.3	0.03
1.11	Banking services	2	0.26
1.12	The working capital	7	0.80
1.13	Other expenses	5	0.60

The table shows that the elements with the largest share of the *Cost of transportation and supply* component of the final price belongs to *labor remuneration, depreciation of fixed assets, electricity*. Of these, there is a real possibility for reducing energy costs.

Given the status of the currently used equipment and energy efficiency solutions, through the necessary investments, these costs could be reduced by about 20%, which would reduce the tariff by 5 MDL / Gcal.

The next tariff component that deserves to be considered is the cost of heat entering the network formed in turn by *the cost of heat produced (22.6%) and the cost of purchased thermal energy (54.7%)*. The main elements of the *Cost of produced heat* and their share in the final tariff are shown in the table below.

No	TARIFF COMPONENT	MDL/Gcal	%
2.1	The cost of produced heat	203	22.56
2.1.1	Fuel	172	19.17
2.1.2	Electricity	13	1.48
2.1.3	Labor remuneration	8	0.92
2.1.4	Social security and health premiums	2	0.24
2.1.5	Depreciation of fixed assets	4	0.50
2.1.6	Other expenses	2	0.26

Analyzing the data in the table above we see that the largest share of the final tariff belong to fuel costs - 19.17% and expenses for electricity consumed in the production process - 1.48%. Fuel costs, which have the largest share, depend on the gas purchase tariff which on short and medium term does not show signs of significant decrease as well as the efficiency of the production process where there are reserves to reduce costs.

In the current situation of Termocom production units, we can estimate a possibility of increasing energy efficiency by 10% ensuring the necessary investments. This reduction can be translated into a reduction in the basic tariff to around 17 MDL / Gcal. Another reduction of about 2 MDL / Gcal can be obtained by improving the energy consumption in the production process if adequate funds are provided and the degree of efficiency is also estimated as 20% as in the case of costs of transport and supply.

A higher share of the heat tariff for final consumers belongs to *Purchased heat cost* (54.7%).

No	TARIFF COMPONENT	MDL/Gcal	%
2.2	Purchased heat cost	492	54.8%
2.2.1	CET-1	97	10.8%
2.2.1	CET-2	395	44.0%

As described above, the technical condition of JSC CET-1 and CET-2 JSC is quite poor, with a high degree of wear. Both the experts in the field, and major national and international institutions proposed the shutdown of CET-1, so for this analysis it is relevant to treat CET -1 JSC separately from CET-2 JSC.

Based on existing studies and expert opinion in the field, a total potential of the energy efficiency of natural gas consumption and electricity component of about 15% can be assumed for CET-1 JSC and 7% for CET-2 JSC. Therefore, in the tariff structure that would imply a reduction of about 14 MDL / Gcal for CET-1 JSC and 27 MDL / Gcal for CET-2 JSC.

In addition to potential tariff reduction for heat to final consumers through energy efficiency measures implemented during generation, transportation and supply that requires considerable investments, savings can also be obtained at some small and medium-cost.

By implementing organizational , administrative and technical measures, which have not been described above, but require small investments, a reduction by another 5% of the tariff can be assumed so that per Gcal unit consumed it would be possible to get a decrease of 45 MDL.

According to the results of the analysis given in the paragraph, provided that there are investments of tens of millions of Euro in the system of production and supply of CHSSC thermal energy, energy savings can be achieved that would reduce the current tariff by approximately 11% or by 110 lei to 877 MDL / Gcal. Given the scale of investment required, this option will be difficult to achieve on short and medium term.

4.3 Reserves of reducing heating tariffs on consumer segment

The segment of consumers connected to the centralized heat supply in Chisinau is represented by multi-storey residential buildings, for the most part, and public buildings. According to recent studies conducted by IDIS Viitorul, about 2773 residential blocks are connected to the centralized heat supply that consumes annually about 1,157,941 Gcal. Most multi-storey residential buildings in Chisinau were built in the 60's-70's without the application of energy efficiency standards. According to energy rehabilitation projects already completed at some residential buildings in Chisinau, but also based on studies assessing the potential for energy efficiency in residential buildings, only for the component of thermal energy, savings in this sector may amount to 25 -30%. Measures taken into consideration to achieve this level of savings are:

- Thermal insulation of the building envelope
- Replacement of existing windows with new ones
- Installation of Individual Heating Units
- Rehabilitation of the internal heat supply system

Considering a reduction of heat consumption in residential buildings connected to the centralized heat supply system by about 25%, we obtain the total annual heat savings of approximately 347,382 Gcal. Referred to a Gcal unit that would imply a reduction in the current tariff of about 225 MDL / Gcal.

Implementation of energy conservation measures on the consumer segment, as already mentioned in Chapter 1, as in the case of the generation, transmission and supply side, requires huge investments of hundreds of millions of Euros, which makes achieving this option on short and medium term pessimistic.

Conclusions:

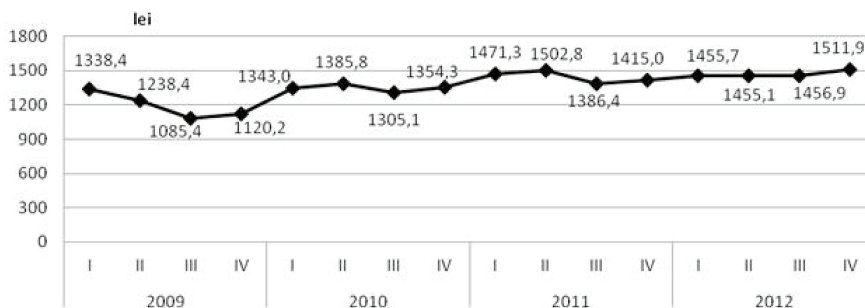
- The current tariff of heating to the final consumers is one for all customers and is based on costs. Because the ability of consumers to pay according to the current tariff differs depending on their income and the low-income population group is large, ***it is advisable to examine the practice of many European countries of introducing a separate charge for socially vulnerable population.***
- Energy efficiency measures can help reduce heating tariff to end users, but require huge investments, which can only be achieved over the medium and long term. Because of the continuous trend of increasing energy import prices, even if the necessary investments had a shorter recovery period, consumers would not feel / receive any reduction in the final tariff for heat.
- ***In order to start energy conservation projects in the residential buildings it is necessary to achieve a concept of rehabilitation of residential buildings in Chisinau.***
- In order to identify cost optimization reserves included with the current tariff for heat, further deeper analysis is required.
- To ensure the modernization of centralized heat supply system in Chisinau in a sustainable manner, it is necessary that any financial savings are reinvested or returned to potential sponsors. Therefore, end users would not be able to feel this reduction on short and medium term. In the medium term, the result of these actions can be translated into a damping tariff increase to end users, even if energy prices continue to rise.
- It should be noted that in order to identify other tariff components' cost optimization reserves, more complex analyzes are required.
- The summary of the estimated energy savings per a Gcal unit are shown in the table below.
- The approach used to estimate these savings was technical, to take into account other economic indicators deeper analysis is required.

No	Suggested measures	Savings	Savings
		%	MDL/Gcal
1	Increasing energy efficiency of the transport and supply process (electricity)	0.55	5
2	Increasing energy efficiency of the Termocom production process (fuel and electricity)	2.11	19
3	Increasing energy efficiency of the CET-1 JSC production process	1.55	14
4	Increasing energy efficiency of the CET-2 JSC production process	3.00	27
5	Other energy savings on generation, transmission and supply side	5.01	45
6	Increasing energy efficiency on the household segment	25	225
	Total	37.22	335

5. Financial stability and accessibility of centralized heat supply

Financial stability related to heating service is mostly associated with the ability of consumers to pay the price of heat consumption. In January 2012, the owners of 102 000 apartments paid up to 1,000 lei for heat used, those of other 21 thousand apartments - up to 2,000 lei, and the bills of more than two thousand lei were paid by 4,039 families. According to the National Bureau of Statistics, the fourth quarter of 2012 the subsistence minimum amount averaged 1511.9 lei per person.

Figure 1: Quarterly subsistence minimum evolution in 2009-2012



Source: www.statistica.md

For the urban population subsistence minimum was on average 1630.6 lei or by 14.3% more than in rural areas - 1426.8 lei. By categories of population, the maximum subsistence minimum is attributed to the working age population - 1591.3 lei, especially men - 1676.8 lei. For pensioners the subsistence minimum was 1303.2 lei and represents 86.2% of the average for the total population. The average monthly pension on 1 January 2013 amounted to lei 957.6. The correlation between the average salary and the average cost of living for the population of working age differs depending on

economic activities. The maximum subsistence minimum coverage for the working population was achieved by employees in the financial sector - by 4.5 times, and the minimum is for employees in fishing, whose salaries cover the subsistence minimum at a rate of 131, 4% (see Annex 2).

TABLE 4: The correlation between household income and the subsistence minimum in the fourth quarter 2009-2012

	2009	2010	2011	2012
Subsistence minimum, monthly average per person, lei	1120,2	1354,3	1415,0	1511,9
Disposable income, monthly average, per person, lei	1228,0	1308,2	1520,2	1572,5
The average salary of one employee in the economy, lei	2815,6	3075,0	3365,6	3631,3
The average amount of monthly pension, lei	775,5	810,9	874,1	957,6
The correlation between monthly average income per person and the average subsistence minimum in %	109,6	96,6	107,4	104,0
The correlation between average monthly salary of an employee in the economy and the average cost of living for the population of working age	2, 4 times	2,1 times	2,3 times	2,3 times
The correlation between the average amount of monthly pension and the average subsistence minimum for pensioners, in%	80,7	69,9	71,6	73,5

Source: www.statistica.md

The data presented lead to the conclusion about the critical situation, in particular of the pensioners not only to pay for bills, but also to meet the subsistence minimum.

TABLE 5: Consumer price indices for housing services

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total	109,6	105,2	111,6	112,4	111,9	112,7	112,3	112,7	100,0	107,4
Housing	108,0	105,9	109,4	108,1	102,8	120,5	121,7	123,2	115,1	115,5
- electricity	108,0	107,1	106,6	120,0	100,0	100,0	112,7	125,5	107,0	120,1
- water and sewage	129,0	134,1	134,7	124,3	106,8	116,6	121,6	153,4	129,4	112,3
- gas in the network	109,0	97,2	112,9	116,5	101,4	168,8	138,6	115,8	108,6	111,0
- domestic hot water	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,1
- central heating	101,0	105,0	101,8	100,0	100,0	102,0	103,7	119,9	154,7	119,9
- rent	100,0	100,0	106,4	106,2	112,2	122,2	119,6	126,1	111,8	111,3

Source: http://www.statistica.md/public/files/publicatii_electronice/Preturi/Preturi_RM_2001_2010.pdf

Meanwhile, consumer price indices for utilities since 2006 exceed the total consumer price indices. Since 2009, consumer price indices for central heating exceed the consumer price indices for utilities. We note in this context that the growth rate of consumer price indices exceeds the monthly salary and pension increase.

**AREAS OF FURTHER
RESEARCH/
INTERVENTION:**

assessing the ability of different categories of population, especially the disadvantaged, to cope with the price for heating services

TABLE 6: Allocation of compensations from Chisinau municipal budget for disadvantaged people to pay energy resources bills

SEASON	THE NUMBER OF FAMILIES THAT HAVE BENEFITED FROM COMPENSATION	AMOUNT ALLOCATED, LEI	AVERAGE PER FAMILY, LEI
2008 – 2009	19398	22850975,86	1178,01
2009 – 2010	30136	40933433,30	1358,29
2010 – 2011	37085	67518031,06	1820,63
2011 – 2012	38199	77093307,04	2018,20
2012 – 2013 (March)	33889	68665751,06	2026,20

Source: Information obtained from Chisinau Municipal Council, Directorate General for Housing and Planning

The process of granting compensations from Chisinau municipal budget is regulated by the *Regulation on compensation for disadvantaged people for the payment of energy resources bills*, issued by the Chisinau Municipal Council. Under this *Regulation*, beneficiaries of compensations for payments for energy resources are disadvantaged people from Chisinau, with global revenues amounting to 1,450 lei for one person, they are to pay 60% of the monthly bill for heat and gas consumed and will submit the application for the allowance until the end of the heating season.

**AREAS OF FURTHER
RESEARCH/
INTERVENTION:**

evaluating the efficiency of compensation allocated to disadvantaged people, including thermoenergetic resources

6. The role of Government and the City Hall in administrating CHSSC enterprises

6.1. The functions and duties of public administration

The administration is provided by the Ministry of Economy and Local authorities in Chisinau, as follows:

- 1) The Ministry of Economy provides corporate administration of state owned “CET-1” JSC and “CET-2” JSC, by providing control and monitoring activity, including through administrative boards of these companies.
- 2) Local public authorities - Chisinau Municipal Council and Chisinau City Hall provide corporate management of Termocom JSC.

Until 2010 the Chisinau Municipal Council was responsible for setting tariffs for heat energy delivered to consumers in the CHSSC by “Termocom”. The main failure attributed to that period was setting tariffs below cost recovery, which did not allow recovery of operating costs, which subsequently led to the accumulation of considerable debt to the main suppliers: “CET-1” JSC and “CET-2” JSC.

Chisinau municipal council plays a less important role in the thermal power sector, amounting only to the corporate management of “Termocom”. In turn, the institutions under the management of the Chisinau City Hall are significant consumers of heat. Also Chisinau Municipal Council and Chisinau City Hall establish and administer on their own initiative, the system of subsidies / grants for the population of Chisinau. Currently, in compliance with the subsidy Program, Chisinau City Hall covers debts for heating supplied by “Termocom” used by consumers in this Program. But this can create difficulties if the demand for subsidies increases and heat tariffs are increased further. In such conditions, the accumulation of new debt from the Chisinau Municipal Council and “Termocom” will be inevitable.

2.1 Municipal Council

According to the Law on Local Public Administration, no. 436-XVI from 26.12.2006 Municipal Council has the right of initiative and decision, under the law, in all matters of local interest, except those pertaining to other public authorities. Thus, the **organization of central heating** is the responsibility of the Municipal Council. Chisinau Municipal Council approves the expenditure that will be allocated from the municipal budget for the operation and development of public utility services, and charges for public services, except the tariffs for heat. A specialized advisory committee „**Committee for energy, technical services, transportation and communication.**” is constituted and operates within the Chisinau Municipal Council.

2.2 General Mayor

According to the current system of public administration in Chisinau, the executive authorities are the Mayor and the City Hall. As the leader and coordinator of public services, the mayor has the following rights and responsibilities in CHSSC:

- 1) *appoints, establishes the powers and ceases employment relationships with the Head of Termocom JSC;*
- 2) *according to the municipal budget approved by Municipal Council, distributes funds for operation of public services, including the provision of heat to Chisinau;*
- 3) *proposes the local council the organizational chart and conditions of supply of public utility services, ensures the proper functioning of the respective municipal service, including the provision of heat;*
- 4) *determines the start and end of the heating season, issuing a provision to that effect;*
- 5) *requests relevant information from the heat provider in order to control its activity and evaluate its requirements;*
- 6) *requests and insists on the audit of the financial and economic situation the heat supplier;*
- 7) *establishes joint committees and working groups with the supplier to identify appropriate and mutually beneficial solutions in the field of thermal energy;*

- 8) *provides assessment and internal and / or external expertise, as appropriate, of provider information data and requirements;*

2.3 Deputy mayors

Chisinau has four deputy mayors. Deputy Mayors exercise the tasks established by the Mayor and are liable under the law. Deputy Mayors' tasks are established on areas of responsibility. Based on the purpose of the study, we note that a deputy mayor is responsible for the proper functioning of the thermal energy complex, technical systems and engineering networks of Chisinau, the exploitation of green spaces.

2.4 Subdivisions of the Chisinau Municipal Council

Subdivisions of the Chisinau Municipal Council are constituted in accordance with the structure and staff of halls of villages (communes), towns (municipalities), approved by Government Decision no. 688 of 10.06.2003, as divisions and sections.

Thus, in the administration of housing, **Directorate General for Housing and planning (DGHP) is directly involved in the heating sector.** Directorate DGHP is a body of local government exerting the policies of the Chisinau Municipal Council and mayor of Chisinau in local fund management, city planning and sanitation, energy, communications, water and gas under the general program of work and development of Chisinau. The main tasks of the Directorate General for housing and planning are:

1. Repair, modernization, renovation and management, recording and distribution of the existing housing stock;
2. Spatial planning and sanitation;
3. Municipal thermal energy complex;
4. Develops and promotes municipal programs regarding the maintenance, household development and planning, including Chisinau Strategy on housing policy.

In order to ensure the functioning of municipal household during the cold period the heating season is generally opened by mayor decision. According to regulations the heating season begins when the average temperature of outdoor air stands at plus 8 ° C during 3 days, and begins between 15-30

October. Closure of the heating season is done by the mayor decision when the average temperature of outdoor air stands at plus 8 ° C during 3 days. Yearly the Chisinau Municipal Council examines totals of municipal household operation in winter and approves preparatory measures for the next year autumn-winter season.

2.5 Energy modernization of blocks of flats: costs and benefits

Currently, as it was already mentioned at the beginning of this report, in Chisinau there are about 3,500 housing units, of which 2773 are connected to the centralized heat supply. We will further refer to the results of the study **“Energy modernization of blocks of flats: costs and benefits“**, developed by Igor Zănoagă, IDIS “Viitorul” expert.

The initial data for the calculation of necessary investments were obtained by extrapolation based on heating thermal loads of data on the opaque and windowed side surface, obtained by interviewing the 23 Municipal enterprises for housing management from Chisinau (total of 1710 residential buildings). Given the lack of a database of genuine and well-structured residential blocks in the city, the extrapolation was the only method of obtaining data with a tolerance of $\pm 10\%$ about the feasibility of upgrading their heating.

Heat (energy) modernization of blocks of flats must contain:

- Thermal insulation of the building envelope (opaque and windowed side surfaces, basement roof and last floor roof)
- Replacement of the internal heating system with the implementation of the two-pipe system, metering each apartment, ensuring the possibility for temperature control in each room by need and the purchasing power of the residents
- Implementation for each residential block of automated Individual Heating Units (IHU) to ensure compliance of the heat parameters with outdoor temperature and consumer needs

Feasibility calculations were made based on the following initial data which relates only to blocks of flats connected to CHSSC.

nr.	Feature / parameters	U. M.	Value 2010
1	Opaque surface	m ²	5 312 796
2	Windowed surface	m ²	1 663 726

3	Basement roof	m ²	1 628 800
4	Top floor roof	m ²	1 628 800
5	Number of apartments	un.	168 131
6	Number of apartment blocks	un.	2 773
7	Total energy consumption from CHSSC	Gcal	1 157 941
7.1	including heating	Gcal	916 968
7.2	including DHW	Gcal	240 973

In order to calculate the costs of works for thermal rehabilitation of residential buildings, data from the Romanian normative document **The standard of cost. Thermal rehabilitation of residential blocks SCOST-04-01/MDRT** was taken as a reference:

Item of rehabilitation	Minimal demands	Thickness, cm	Cost without VAT, EUR/m ² .
Opaque side surface	$R'_{\min} \geq 1,8 \text{ m}^2\text{K/W}$	10	31
Windowed side surface (double insulating glass 4-16-4, low-E, argon)	$R'_{\min} \geq 0,77 \text{ m}^2\text{K/W}$		95
Basement roof	$R'_{\min} \geq 2,9 \text{ m}^2\text{K/W}$	10	13
Top floor roof	$R'_{\min} \geq 5,0 \text{ m}^2\text{K/W}$	16	36

The cost to equip an apartment building with IHU is estimated based on the experience of Termocom JSC and is on average about 8 500 EUR installation work included. The cost of heat meters was not included because the existing equipment can be used.

The cost of the inside heating system modernization on average per apartment are estimated to be 1 820 EUR. This measure provides for replacement of the existing system with the two-pipe one, a complete change of radiators, which will be equipped with thermostatic valves and heads, mounting the staircase columns and provision of ultrasonic heat meters for each apartment. This amount includes the automated monitoring of consumption and billing.

So upgrading of the 2773 residential buildings will need a total investment of about 661.7 million Euros. The total investment includes the work on thermal insulation of the building

AREAS OF FURTHER RESEARCH/ INTERVENTION:

analyzing the possibility of intervention / contribution of each stakeholder in the energy upgrading of blocks of flats

envelope of 399.4 million Euros, replacing heating networks within blocks - the amount of 238.7 million Euros, and installation of individual heating units estimated at 23.6 million Euro.

The investment required for an apartment will be around 3641 Euro.

6.2 Normative framework

The heating system is being addressed in a number of acts and strategies of Moldova. The main objectives set out in national strategies with reference to the thermal power sector relate to: the promotion of energy efficiency measures for supply / production through restructuring and modernization of thermal power plants, optimization of existing production capacities and distribution of thermal energy, promoting cogeneration, harmonization of the legal framework with that of the EU, promoting energy efficiency measures for consumption etc.

List of legislative acts relevant to the sector of thermal power

Nr.	Name of the document	Number of the document
LAWS		
L1	The housing code, (amended and supplemented)	Nr. 306 of 03.06.1983
L2	Law on privatization of the housing stock, (amended and supplemented)	Nr. 1324 of 10.03.1993
L3	Energy law	Nr.1525 of 19.02.1998
L4	Condominium and Community Associations law	Nr. 913 of 30.03.2000
L5	Energy efficiency law	Nr. 142 of 02.07.2010
L6	Law on construction quality assurance	Nr. 721 of 02.02.1996
GOVERNMENT DECISIONS		
G1	Charter Model of housing cooperative development in the Moldavian SSR approved by the Council of Ministers	Nr. 338 of 08.10.1984
G2	Regulation on the provision and use of heat	Nr. 434 of 09.04.1998
G3	Regulation on the manner of delivery and payment of housing, utilities and other fees for the housing stock, metering flats and conditions of disconnection / reconnection to heating and power systems"	Nr. 191of 19.02.2002

G4	National Energy Efficiency Program 2011 – 2020	Nr. 833 of 10.11.2011
G5	Concept of corporate, institutional and financial restructuring of the centralized heat supply system in Chisinau	Nr. 983 of 22.12.2011
G6	Energy Strategy of the Republic of Moldova until 2030	Nr.102 of 05.02. 2013
G7	National Energy Efficiency Action Plan (NEEAP) for 2013-2015	Nr. 113 of 07.02.2013

The Concept of corporate, institutional and financial restructuring of the centralized heat supply system in Chisinau, approved by Government Decision (GD) no. 983 of 22.12.2011, is the main document that determines the directions of development of the heat supply sector in Chisinau and provides for the plan of restructuring the heating sector in Chisinau. The concept refers to the steps necessary to supplement the legal framework of the sector, measures to restructure the main heat supply companies in Chisinau: “Termocom” JSC, “CET-1” JSC and “CET-2” JSC, as well as measures on the consumer side. These include:

A. Improving the legal framework of the sector activity through:

1. Adoption of the Law on heat (the draft of this law has been developed);
2. Adoption of the law on housing (the draft of this law has been developed);
3. Adoption of the Law on the Energy Performance of Buildings (completed draft law);
4. Approval of a Regulation on the manner of delivery and payment of housing, utilities and other fees for the housing stock, metering flats and conditions of disconnection / reconnection to the heating systems and water supply;
5. Amendment of the Law on privatization of the housing stock no. 1324-XII of 10 March 1993, Condominium and Community Associations law no. 913-XIV of 30 March 2000 Regulation on the provision and use of heat, approved by Government Decision 434 of April 9, 1998, the Government Decision no. 267 of 12 March 2003 “On the optimization of the procedure of installation of gas boilers in apartments, private houses and social facilities”;

The A measures are to be implemented according to the Concept by the end of quarter II, 2013

- B.** Corporate and institutional reform of CHSS provides for a re-organization of “CET-1” JSC, “CET-2” JSC, and “Termocom” JSC through merger and creating a new enterprise based on assets of three companies;

The B measures are to be implemented according to the Concept by the end of quarter III, 2013

- C.** Financial reform of the supplying companies, through debt settlement of the newly created company to natural gas suppliers;

The C measures are to be implemented according to the Concept by the end of quarter I, 2014

- D.** Increasing the efficiency of enterprise operation from the technical and technological point of view (for supply / production) by: attracting investments for the modernization of equipment for generating electricity and heat with modern facilities with high efficiency and minimum fuel consumption; rehabilitation and modernization of the heating network by implementing pre-insulated pipes, the gradual transition to two-pipe heating networks and replacing the thermal plants with individual heating units, equipped with automatic control systems; optimization of the scheme and the configuration of transmission networks and distribution lines of CHSS, implementation of the computerized information system.

The D measures are to be implemented according to the Concept by 2017

- E.** Thermal rehabilitation of buildings (on the demand / consumption side), including replacement of windows, optimizing spatial, architectural and construction building solutions, modernization of engineering internal systems of heat supply, installation of heat meters (cost distributors) and billing based on actual consumption of heat.

The E measures are to be carried out according to annual plans, but from discussions with the Ministry of Economy, we understand that there are currently no plans developed for the consumption side.

Detailed analysis of the legal framework for the heating sector is contained in the extended version of the report. Here we present only the main drawback of the legal and regulatory framework for the formulation of recommendations for action for different stakeholders.

6.3 The shortcomings of the current legislation

The general principles of the state policy in the field of energy efficiency (EE), including the heating sector contained in the laws of the Republic of Moldova, as well as strategies and programs approved by the Government are largely similar to those in the EU. But the major drawback of the legislative acts in Moldova is their declarative and general character without embodiments of enforcement mechanisms. During about 15 years many provisions of these acts were not enforced. ***Chronic gaps are evident in the development of institutional system and financial mechanisms*** for the implementation of the provisions of these acts.

There are disparities between the extents to which the legal system responds to the real needs of EE:

- the regulatory system in the operation of buildings and provision of utilities, local government involvement in housing management control do not meet the requirements;
- institutional framework and legislative support for the promotion of EE at the level of final consumers, to encourage the raise of EE, are not sufficiently developed;
- Moldovan legislation requires the development and approval of national plans for EE, including EE in buildings. But such plans that explicitly indicate the specific objectives, measurable in terms of implementation and funding, do not exist;
- Legal provisions often are general and declarative and are not accompanied by financial support;
- Often primary legislation is not accompanied by adequate secondary legislation, to ensure the implementation of the first, or drafting secondary legislation is delayed;
- Another drawback is the fact that current legislation does not provide incentives for public administrations and institutions to save energy;
- Similarly, there is no financial mechanism in force which would encourage energy efficiency in the residential sector, except for projects implemented with the support of external donors (MoREFF). Although many laws stated the need for financial incentives to raise EE actions, they do not establish any requirements in this regard for the construction industry and building owners;

- The concept of building energy performance (BEP) is not defined in the technical regulations in Moldova. There is no approved methodology for calculating the BEP, the development and implementation in Moldova of BEP calculation methodology which meets the requirements of EU Directives and the *National Energy Efficiency Program 2011-2020* is difficult because of differences between European standards and technical regulations in Moldova;
- Lack of measures on public consultation and information regarding the implementation of building energy performance measures. It is expected that such measures are to be provided in the new *law on energy efficiency in buildings*, currently only at the design stage.

7. The residential sector and fields of intervention for reducing heat consumption and heating bills

7.1 The problems of the residential sector - the main consumer of heat

As a result of the analysis we established that the greatest reserves for reducing heating bills are on the consumption part of CHSSC. Following the implementation of energy efficiency measures in buildings, reserves for reducing heat cost by 23% can be achieved. Along with the installation of individual meters in each apartment, as practice of buildings where such meters have been installed shows, heating bills for end-users can be reduced by almost 50% or even more. Next, we make a brief assessment of this segment to identify possible areas of intervention for all stakeholders interested in solving the problem of disproportionately high rates compared to the income of consumers, especially vulnerable groups, and to come with some specific proposals for action.

As we have already mentioned in Chapter 1, Chisinau households use about 78% of all the heat delivered by CHSSC. It is logical therefore, and it was demonstrated in this analysis, that the main reserves for reducing the consumption of heat and, consequently, the reserves for reducing the cost for heat, are also found in the residential sector. Also, in the preceding chapters we have presented the possible solutions for reducing the heat consumption on this part, as well as preliminary costs for each solution. Now, however, we will try to identify how these solutions can be implemented, and what could be the contribution of each stakeholder in the process. Any solutions to optimize energy consumption, and, consecutively, to reduce the size of the bills for heat consumption can only be implemented by homeowners and owners of common areas in apartment buildings. In this context, it is useful to look at the ownership of housing in Chisinau and how it is managed.

As mentioned in previous chapters, in Chisinau there are about 3,500 housing units, of which 2773 are connected to the centralized heat supply

system (CHSSC). Most of these blocks (about 54%) are between 20 and 40 years old, approx. 30% are 40-50 years old, 11% are older than 50 years and only approx. 5% are relatively new (10-20 years). The absolute majority of the blocks are characterized by a low thermal insulation and advanced wear. Before privatization of the housing sector (1993), most of the housing was managed by the state, by means of municipal housing management enterprises (MHME) as well as housing construction cooperatives (HCC), for homes built through cooperation of tenants. After the privatization of the housing stock in 1993, homeowners have become responsible for the maintenance and repair of their property and were forced to create associations of owners of housing (AO) to manage their properties. State ownership claimed approx. 50 % of the common area of blocks; however, it is to be transferred to the property of residents, once they form associations. In 2000 the Law of Condominiums came into force. According to this, all homeowners had to become members of the association of owners of privatized housing (AOPH) for the common management, maintenance and operation of the condominium. Subsequently, AOPH were replaced in the law by condominium owners associations (COA). All previous forms of homeowners associations (AO, HCC, AOPH), have to be reorganized into COA.

Although about 97% of the apartments are privately owned, over 60% of apartment buildings continue to be managed by municipal enterprises (MHME) and not the COA as required by law. Currently there are only 367 AOPH, 299 COA and 276 HCC operating in Chisinau. The causes of this situation lie in both the legislative and institutional shortcomings that make the association of tenants into COAs complicated, but especially in individual apartment owners' unwillingness to associate to manage their blocks. In such circumstances, the individual apartment owners virtually do not participate in making decisions about the management and maintenance of the common property of their blocks. This in turn feeds the widespread perception of homeowners that building maintenance, improvements in the distribution system of heat and energy efficiency of buildings is the responsibility of the State and that such costs should be covered by the state, not by homeowners.

In general, Moldova lacks contractual procedures to regulate property management. This lack is spreading throughout the system from service delivery to distributing costs among homeowners. Also, there are no standard procedures for property management and those who are responsible for

property management are left to their own devices⁸. Homeowners do not take collective decisions on the structure and amount of payments for maintenance and repair of the common property. Private providers of maintenance service for residential buildings are missing. Basically, these services, including for blocks managed by AOPH, COA or HCC are provided almost exclusively by MHME. Prices for services are set by local authorities (municipal council), which, due to political pressure or fear of provoking discontent of the population, are below the actual costs incurred by MHME. COA, AOPH or HCC usually establish operation and maintenance charges for blocks managed by them, equal to the ones in the blocks managed by MHME. Aside from the fact that these rates do not cover the actual cost of maintenance, not all residents pay the full bill for the maintenance and servicing of residential blocks: either because of low income, especially if vulnerable, or because there is no mechanism that would compel them to do so, or because of distrust to the amounts included in the bill. Similarly, there is no state subsidy scheme for such payments for the vulnerable. In such circumstances, MHMEs recorded higher debts from tenants who cannot pay and HCC, AOPH and COA are in the debt to MHME for the same reason. As a result of these situations, the funds accumulated from tenants are barely enough to carry out repairs and routine maintenance, let alone serious repairs and energy efficiency measures in such circumstances.

As result, the state of housing in Chisinau continues to worsen, threatening to degrade substantially in the medium term. According to information from the Chisinau City Hall⁹, already a quarter of a million citizens of Chisinau live in apartment buildings whose physical condition is damaged: the operating time of over 450 blocks has reached the operational deadline, and more than ½ of the apartment buildings aged over 35 have never undergone major repairs (the average wear more than 65%). 1/3 of the roofs and 60% of internal engineering networks require urgent repairs. The lack of investment in renovation of housing is a consequence of the deficit of funds and the ineffective or inexistent management of these blocks. These deficiencies contribute indirectly to the generation of huge losses related to the delivery

⁸ Republic of Moldova: Study on improving the energy efficiency of residential buildings, Citrus Partners, 2011

⁹ Concept of management reform of residential buildings in Chisinau (Draft), Chisinau City Hall, 2010

of heat into blocks (annual losses caused by the lack of thermal insulation of residential buildings in Chisinau is estimated at over 0.4 million Gcal) and make it difficult to implement any measures of energy efficiency of buildings, which according to our estimations, have the potential to reduce heating bills by 23-50% or more.

According to the draft Concept of management reform of housing blocks in Chisinau the main barriers that prevent the formation of residents association for effective management and maintenance of their housing blocks are legal and institutional. To these, however, we would add financial deficiencies, which often overlap with the legislative and institutional ones. The main financial constraints are:

- Due to the maintenance tariffs that don't cover the incurred costs, and because of high rates of non-payment for these services, funds accumulated by associations are not enough to perform efficient maintenance and reparations in buildings, which in turn, undermines the confidence of tenants in the associations;
- The lack of any subsidy mechanism for low-income people in paying for the maintenance services also de-motivates many of them to associate for the management of the housing block;
- Owners, who have old debts to suppliers of utilities and maintenance, cannot take over the management of common property in blocks;
- The municipal housing management enterprises (MHME) can benefit from state budget (state) money to perform some of their operations, which puts homeowner association into disadvantageous position compared to MHME (see also the institutional constraints below);
- There are no funds for the capital repair/rehabilitation of blocks, or for the thermal insulation of blocks. Tenants are not stimulated, nor compelled to contribute to such funds.

Among most notable legislative constraints are:

- Excessive bureaucratization, confusing and complicated administrative procedures in creating COA (difficulties in the creation and registration of condominiums, mainly due to deficiencies of condominium law, the inconsistency with other laws; legislative confusion regulating the rights and responsibilities concerning the management and maintenance of

- residential buildings, legislative inconsistencies in the process of creation and activity of condominium owners associations);
- Legislative barriers for the development of market economy mechanisms in the sector (there are no prerequisites for the emergence and development of private management of housing funds, lack of levers of influence on apartment owners who evade the responsibility for management and maintenance of common property);
 - Lack of incentives for private investment in housing (the legal frame contains multiple rules that de-motivate homeowners to finance the management and maintenance of residential buildings, the legislation does not include any action that would encourage homeowners to invest in repairing privatized housing block, the existing legal framework does not contain any measures to help disadvantaged homeowners to cover the cost of repairs to buildings);
 - According to the actual legislation, in order for a meeting of HA to be valid, 66% of the individual apartment owners have to be present. To adopt decisions, including for the thermal rehabilitation of buildings, HA have to gather 51% of the votes of owners. These high percentages might often be barriers to the adoption of such decisions. According to our investigations, the average percentage of owners that HA manage to mobilize for undertaking common works in buildings is 38%. If for any reasons, homeowners don't participate in meetings or don't vote, HA cannot mobilize for such kind of works. And this is a real threat; as according to estimations, in Chisinau up to 20% of individual apartment owners live abroad and cannot take part in HA meetings.

The main institutional barriers refer to:

- Public authorities do not ensure the control of the state of blocks of flats;
- Owners of privatized housing are not sufficiently informed about the necessity and advantages of creating associations of co-owners, their work, operating principles, and so on;
- Unlike the blocks managed by municipal enterprises, associations cannot benefit from the budgetary (state) money for land planning and emergency technical maintenance;

- Associations that manage apartment buildings independently do not also benefit from the budgetary (state) money for the repair or replacement of engineering systems;
- Lack of private alternative concerning apartment buildings management has a negative influence on the creation of COAs, as it limits their opportunities to ensure appropriate management;
- The accounting of the associations quite often is not transparent, which leads to the lack of confidence in the management of housing blocks by associations. Billing is not transparent, which leads to cross-subsidizing among individual tenants. Often, associations comprise several blocks and different types of properties, a situation that leads to conflict of interest among individual owners.

7.2 The problems of the residential sector as viewed by the Associations of tenants

To assess how the heating sector problem is tackled by consumers, as well as what are the solutions in the residential sector, as viewed by and at the level of the associations of tenants, we used several tools: telephone surveys and focus groups involving presidents of Associations of tenants (Condominium Associations and Privatized Housing Associations) from 4 sectors of Chisinau: Centre, Botanica, Rascani and Ciocana that manage blocks of 4-17 levels, built of cut stone or concrete panels, all connected to the centralized heating system. The investigation was aimed at estimating and analyzing the problems in the residential sector from the point of view of condominiums which manage blocks connected to the centralized heating system, and at identifying possible solutions to the problems. Also, consumers' necessities, attitudes and behavior have been studied. All the interviewed persons stated that they have encountered problems with heating their blocks/apartments. The main identified problems are:

a. The high level of wear of buildings

100% of participants mentioned the need to change the heating system pipes, change windows in common areas, doors at the entrance to the stairs, insulate blocks, and 50% mentioned the need to change the roof.

b. The existence of non-payers

On average, half of the tenants do not pay their bills on time. This is a major impediment for the assurance of continuity of service provision, especially when

connecting blocks at the beginning of the heating season. Overdue bills are transferred from year to the next year on, without being paid. The reasons for non-payment of debts may be different in different population groups: from small incomes – for vulnerable categories, to the refusal to pay, because of discontents with the quality of the heating received, disagreement with the heating bill, or other reasons.

c. Termocom and inequity in accessing the heating service

Technical difficulties related to Termocom were not mentioned. However, the presidents of associations have referred to the problem of heat billing per separate household. Heating supply contracts are concluded between housing associations and Termocom. Termocom refuses to conclude individual contracts with final consumers, i.e. each apartment owner individually. Thus, if there are non-payers with large debts, Termocom refuses to connect heat in winter to the whole block, depriving of heat all the tenants, including to those who diligently paid their bills. So people who pay bills on time remain further de-motivated to fulfill their obligations diligently.

d. Non-transparent bills and inequitable distribution of costs

100% of people surveyed said that heating bills are calculated based on the area of apartments, not on the actual heat received, i.e. the amount of bills do not correspond to the quantity and quality of services rendered. The inequity occurs for the following reasons:

- Insulated apartments consume less heat than un-insulated ones. However bills calculated per square meter are equal.
- 100% of participants said that the residents of the building they manage have temperatures different from those of their neighbors and are not satisfied with the temperatures that they have in the apartment.
- In 75% of the blocks covered by our survey there are owners who have extended heating surfaces illegally (adding sections to the radiators or extending heating to balcony and other surfaces in the apartment), in which case the bill doesn't include the extended surfaces and remains the same as the one of those that did not make such an extension. This also leads to the subsequent apartments receiving less heat, but paying the same bill.
- In the case of flat owners from the middle floors or those who are at the beginning of the thermal route there was a change to a smaller diameter of pipes, which leads to lower heat output to subsequent apartments, which was reported by 10% of participants.

e. Weak capacity of the population to associate to implement common project for the benefit of the condominium

As we have already mentioned, the average number of tenants that would associate for the implementation of energy efficiency activities in their buildings, as estimated by the interviewed presidents of the associations, was 38%. According to the interviewed, some of the tenants cannot contribute to such common projects because of financial reasons. Some are unwilling to contribute because of the lack of trust or lack of awareness about the benefits of such kind of enterprises. For example, none of the interviewed representatives of associations knew about the alternative for the installation of individual meters and heat regulators in each apartment. And a third part of tenants usually work or live permanently abroad.

7.3 Solutions of implementing energy efficiency measures in the residential sector

Some of the solutions we've identified in the residential sector that would facilitate the implementation of energy efficiency measures on this side, which in turn have the potential to substantially reduce the heating bills (by the already stated, according to our investigation, 23-50%) are:

- Assess the needs to amend the legal framework, simplify procedures for creating and registering condominium owners associations, improve regulations on establishment and operation of condominium owners associations;
- Raise awareness and accountability of apartment owners on required maintenance, modernization and energy efficiency of residential buildings by informational, methodological and organizational support in housing management:
 - Implement information programs/promotional campaigns for the awareness rising of the population on the benefits of energy efficiency improvement in residential buildings;
 - Develop educational materials and provide training in the field (maintenance, modernization and energy efficiency of residential buildings), by launching specialized education and training programs for the condominium/housing associations;
 - Provide advice and consultation in managing housing to

- condominium/housing owners associations, including for the implementation of thermal rehabilitation and energy efficiency measures in residential buildings;
- With the support from donors, create a center for the consolidation of capacities, training and education in property management. This center would coordinate the efforts in the residential sector of all stakeholders, support housing associations in the consolidation of their capacities;
 - Elaborate a specialized guide to inform the presidents of associations and private owners of apartments on benefits and opportunities for energy efficiency in apartment blocks, familiarizing them with potential energy efficiency technologies that can be used, ways to finance the work, etc.;
 - Promote energy efficiency through other education and training activities, community information programs, capacity building and ability increasing activities in the management of the residential sector;
- Develop legal instruments (including subsidies, tax reliefs, etc.) and programs that would stimulate homeowners to invest in capital repairs, modernization and energy efficiency of residential buildings;
 - Develop programs and legal instruments that would provide subsidies to low-income homeowners for their contributions to capital repairs, modernization and increasing energy efficiency of residential buildings, decided upon by joint owners associations;
 - Support the development of private housing management businesses; liberalize the pricing of housing services;
 - Impose the obligation on owners to contribute to a fund for repairs and energy efficiency of buildings;
 - Implement, with donor support, pilot projects for energy efficiency of existing residential blocks to serve as an example/model or benchmark for owners' associations wishing to implement such projects;

The full list of recommendations for solving the “2000/800” problem, including recommendations for each of the stakeholders involved, will follow in the next chapter (conclusions and recommendations).

8. Donors and Investors of the HD sector of Moldova

8.1. Finance and Investment for Improvements in District Heating in Moldova

As usual, Moldovan governments and district heating enterprises declare that the lack of financing is one of the major problems in the heating sector, and there are many reasons why financing for district heating investments is not readily available. Three basic problems constraining investment are:

- (i) lack of equity;
- (i) lack of customer finance;
- (iii) lack of access to capital markets

Access to finance depends on the credit worthiness of the borrower, the financial parameters of the project and mechanisms for credit enhancement, such as collateral and loan guarantees.

The experience of such countries as Bulgaria, Poland, Hungary and Baltic countries demonstrates that the interest of investors in heating district systems is ensured by two essential conditions - meaningful prices that motivate improvements and hard budget constraints. Moldova, as other CSI countries, can no longer realistically provide sovereign guarantees to back loans and investments in district energy and customer HD systems because of the huge transaction costs imposed on local authorities to undertake them. Moreover, multi-lateral development banks can finance only a tiny fraction of the country's needs.

The majority of the financing needs of the district heating sector of Moldova, if any, must be provided by the private sector. However vendors usually are unwilling to finance customers' purchases, and lenders usually are unwilling to finance transactions without a guarantee of repayment. As it was demonstrated

in different researches¹⁰ these problems are part of the “small project” problem when transaction costs can make the deals unattractive, compared to profitable projects in the oil and power industries. “Therefore, the cost of developing a \$5 million municipal district heating project or a \$15 million industrial cogeneration project may be financially attractive, but the up-front costs are likely to be the same as for a \$100 million power plant or \$1 billion gas or oil deal. The risk-to-reward ratio tends to be high enough to send financiers looking elsewhere for investments. Local banks are not stimulated to make loans to help their customers, including municipalities. However, there are numerous possibilities for co-financing and pooling the financial resources from the state and municipal funds with the bank loans, IFI resources and residents”.

A number of donors, including the World Bank, USAID, SIDA, EBRD and others, have all concluded that a number of basic policy measures that fit the country’s transition strategy are needed in Moldova. According to them these needs, including establishing or providing, are:

- Comprehensive energy policy based on either market competition or independent regulation of short-term political goals, with full cost recovery, and least-cost planning principles
- Tariff structures which reward efficiency and quality of service, not higher costs, in energy transformation, delivery, and use.
- Unbiased, fair, and unsubsidized competition, independent and separate social safety-net support programs.
- Programs to promote demand-side energy efficiency, with metering, control, and weatherization, and with billing for actual consumption.
- Mechanisms to enforce payment discipline
- Transparency in formulating and administering laws, regulations, tariffs, energy plans, and heating services.

These recommendations are directed towards ensuring that consumers have fair and equitable access to heating services and that service providers have the means of making reasonable profits. These goals can conflict even in the most stable economies, and regional transition strategies and political development can intensify the difficulties.

¹⁰ Urban Heating in Transition Economies: Key problems and Remedies, International District Energy Association, 2010

In fact, Moldova reiterates what many others countries have found earlier. There must be metered as opposed to estimated heat consumption. Payment discipline must be imposed. Ownership of assets can be public (national, regional, or local), private, or mixed, but hard budget constraints, price rationalization and provision of market-like incentives must prevail or privatization and competition cannot be expected to function soon. These factors are changing all the time and yet they influence and interact with one another. Subsidies and cross subsidies on gas or electricity can influence the method used to calculate the tariff for district heat.

8.2. Moldovan EE Donors Portfolio and Impact of Past Donor Programs

Moldova went through a dramatic economic transformation, which leads to a traumatic economic shock. The role of international assistance in the economic transition process cannot be overestimated. The heat sector in planned economies was managed by the government and by the time the planned economic formation was abolished, the heat sector was in a state of major technical and economic decay. After the stabilization following the initial crisis, and with the help of international technical assistance, Moldovan authorities realized that the only way to attract investments into this declining sector was through fundamental changes in policy, regulation, management and operation of the heat sector, along with the rest of the public utilities.

International aid agencies and financiers have played a major role through promoting policy reform with the integration of incentive-based market mechanisms, cost-effectiveness, environmental consciousness and private sector participation.

The achievements in the heat sector reform process promoted by development agencies and IFIs included a step-by-step: (i) legal reform, (ii) tariff and regulatory reform and (iii) commercialization. While it was more smoothly carried out in the electricity sector, the heat sector also had to go through the same process.

The technical assistance programs and the reform were aimed at creating the right market conditions for improving the economic performance of the heat sector and the components that worked most effectively included the following:

- improving general utility accounting and audit practices for conducting effective business and gaining investor confidence;
- unbundling tariff and setting cost-recovery, consumption-based tariffs, combined with the introduction of metering and control aimed at raising collections;
- gradually eliminating subsidies and switching to addressed social assistance schemes, opening up the heat sector for private sector participation and promoting public-private partnerships;
- helping to improve the country investment climate through banking sector reforms and working with the borrowers to help build credit-worthiness and design bankable investment projects;
- helping to design technical norms and efficiency standards to accelerate the market for energy efficiency investments;
- designing and implementing hundreds of pilot projects with invaluable lessons and replicable institutional, technical and financial models of restructuring and improving the efficiency of heat and hot water supply;
- developing financing mechanisms for heating modernization projects and sharing investment risk in the heat sector through credit guarantees;
- raising public awareness about the costs and benefits of various heating options, commercialization of the utility service, tariff structure, potential savings, consumer rights and responsibilities, etc;
- strengthening the capacity of national and local government, utilities and housing associations for effectively carrying out their respective roles in reforming the heating sector; helping enhance energy security and environmental conservation through fuel conservation, combined generation, effective decentralization, and fuel switching;
- developing targeted reports and case studies to evaluate the feasibility of different legal, institutional arrangements and investment projects;
- leveraging additional credit and grant financing from host-country governments, other IFIs, local banks, vendors, private entities, and public funds.

The international donor programs in Moldova were quite successful in introducing the privatization of energy assets, establishing and training independent energy regulators, providing technical assistance in development of laws, producing sectoral assessment reports, feasibility studies and offering credit mechanisms.

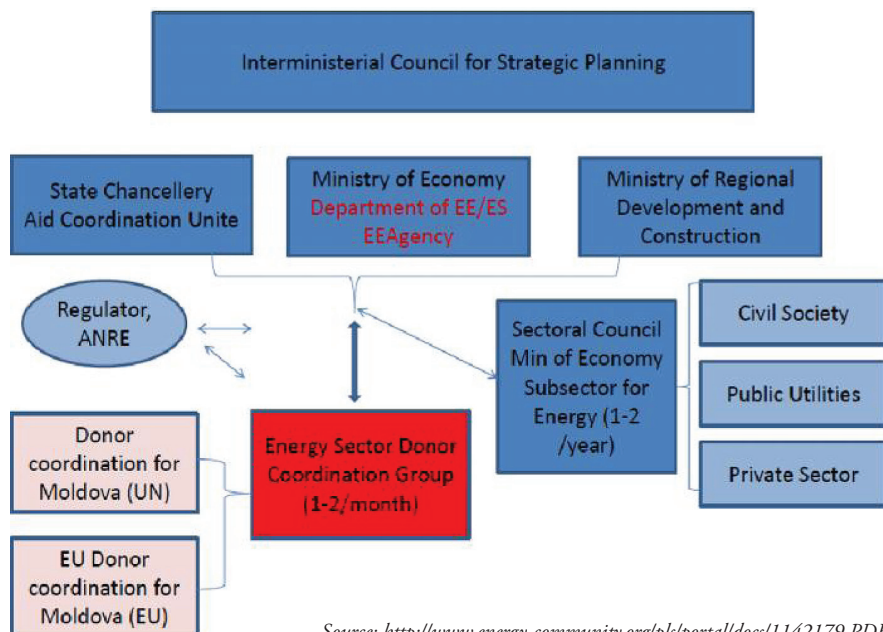
Less has been achieved and continued donor assistance is necessary in other areas such as:

- training municipal and national officials, as well as DH company managers in better planning and management,
- encouraging the use of local fuels and boosting energy security,
- updating construction norms and energy efficiency standards,
- promoting local production of efficient equipment,
- integration of energy issues into the local sustainable development agenda,
- **integration of residential energy efficiency and social safety mechanisms for better affordability of utility services,**
- raising public awareness
- utilizing the knowledge of local and regional experts in restructuring programs.

The largest donors are the European Commission (European Aid and the European Investment Bank), Sweden Government and Sweden Development International Agency (SIDA), European Bank for Reconstruction & Development (EBRD), USA (through the Millennium Challenge Corporation and USAID), World Bank Group, United Nations Development Programme (and other specialized UN agencies such as the World Health Organization), Germany Government (through GIZ).

The UK no longer gives bilateral aid to Moldova (DFID terminated in 2011), but is a significant contributor to the programmes funded by the European Commission, World Bank, United Nations and EBRD. UK companies can tender for programmes funded by all the donors with the exception of USAID (unless they have a company registered in the USA).

FIGURE 2: Donor Coordination in Support of Moldova Energy Sector Reforms



Source: <http://www.energy-community.org/pls/portal/docs/1142179.PDF>

I. EU Technical Assistance¹¹

1.1. EU technical assistance for the implementation of the sector policy support programme (SPSP) "Support to Reform of the Energy Sector"

Sector: Energy policy and administrative management

EU Contribution: € 40,000,000.00 (100% of total).

Implementing organization: Republic of Moldova

Duration: from 12/2011 to 12/2014

Description: The overall objective is to support the reform of the energy sector and to facilitate technical improvements in its operation. This will be achieved through the support of interventions that are set out in the policy matrix, as well as technical assistance and policy dialogue.

Location: Republic of Moldova

¹¹ <http://www.ncu.moldova.md/print.php?l=en&idc=549&id=1640>; http://www.ncu.moldova.md/public/files/oct_2013/2009-2013_sectoare_En.pdf

1.2. SIDA - The cooperation between Sweden and Moldova is governed by a *Cooperation Strategy for the period of 2011 – 2014* adopted by the Swedish Government in February 2011.

The Swedish support comprises three sectors: 1) Democracy, Human Rights and Gender Equality; 2) Sustainable Infrastructure, and 3) Market Development. Sweden is supporting programmes in Moldova through SIDA (Swedish International Development Cooperation Agency) with a country allocation of around 110 million SEK per year and through a special allocation to NGOs which amounts to around 5 – 7 million SEK per year.

The list of the project includes on-going projects, as well as indicative or planned contributions. There is also support to regional programmes of which Moldova is a beneficiary.

1.2.1 Sector Energy and Sustainable Infrastructure

A. EBRD's Energy Efficiency Financing in Moldova

Duration: 2010-04-26 – 2013-04-30,

Swedish Contribution: SEK 12 000 000

Targets groups: 1. Associations of Apartment Owners as legal and creditworthy entities; 2. industries, SMEs, agribusiness and service sectors.

Programme for Facilitating EBRD's Energy Efficiency Financing in Moldova (FEEF-MO)

Sida was in December 2009 requested by EBRD to finance two separate components linked to the EBRD Energy Financing Facility, (MO- SEFF).

The project components are:

1. Legal and regulatory development of the building sector and upgrading national Housing Codes and/or housing regulations. The assistance aims to upgrade and/or develop primary legislation, i.e. Housing Codes, the Law on Energy Efficiency of Buildings, in order to enhance the existing legal framework. Where needed technical assistance will be provided to develop executive secondary legislation (Ministerial Decrees, Ordinance etc). The activity also aims at strengthening the statute and institutional organization of Associations of Apartment Owners as legal and creditworthy entities.

2. Facilitation of energy efficiency of the corporate sector with focus on Biomass and Biogas targeted actions will aim at addressing stakeholders' awareness of benefits from energy efficiency, will assist project concept development and will provide walk-through energy audits and pre-feasibility and feasibility studies where applicable and where energy efficiency opportunities exist. The activity will also aim at increasing application of biomass and biogas in the corporate sector as well as more small and medium size projects from the regions in Moldova. Special attention will be paid to remote regions with specific actions in agribusiness.

The programme is proposed for the period of 3 years with an overall budget of EUR 1.2 million. The indicative budget is 600 000 Euro for each activity.

(Legal and regulatory gaps, Institution and financial sustainability of Chisinau HD sector)

1.2.2 WB Trust Fund Energy Sector Reform and Efficiency Improvements

Duration: 2010-12-10 2012-12-31

Agreement valid until: 2013-12-31

Swedish Contribution: SEK 19 800 970

The Trust Fund was set up in response to direct requests for support from the GoM.

The development objective for the TF is to support the GoM in identification of investments and measures to be adopted in order to address the issues of: (i) security and reliability of energy supply, and (ii) efficiency on both energy production and consumption.

Trust fund finances:

1. Rehabilitation of the heating engineering system of the Mother and Child Center.
2. Technical study to identify urgent priority rehabilitation and investments in Chisinau district heating system
3. Technical study on long-term system optimization and investment strategy for energy supply in Chisinau
4. World bank supervision of 1-3.

The World Bank has been working with the Government of Moldova to find solutions to Termocom issues and important steps have been taken recently as a result of this collaboration. In 2009, a policy note was issued, identifying the key issues and recommending actions to address them. Further assistance was provided by the World Bank in formulating a comprehensive strategy, including private sector participation. The Chisinau Heat and Electricity Supply Institutional and Financial Restructuring report was delivered in October 2011, funded by a **Swedish trust fund**.

Based on the studies and input provided, the Government issued a Cabinet decision in November 2011 providing for: (i) a vertical integration of Termocom and CHPs, including creating a new corporate management; and (ii) preparation of a debt restructuring plan with Moldovagaz.

In September 2012, the Municipal Council (owner of Termocom) approved the *Corporate and Financial Restructuring Strategy* adopted by the cabinet, as well. With the consensus reached by all major stakeholders on the way forward, the Government has requested support to form a new integrated district heating company. Upon formation of a new integrated company, a strong corporate governance structure is not only required to ensure a sustainable operation of the company, but also to attract the necessary foreign and private sector investments.

Several development and financial partners have already expressed such interest once urgent investments are addressed, debt restructuring is agreed upon, and an effective governance structure is in place.

1.2.3 Energy Efficiency in Public Buildings(2006-2013)¹²

1. Norway TA - Energy Audits in 13 public buildings – The identified energy saving measures require investments of 86 400 USD, offering savings of 44 700 USD/year with payback after 1.9 years in average.

2. Mother and Child Protection center - demonstration project (2006) – Energy Audit Report - aim to establish a Revolving Financial Mechanism for energy efficiency in the hospital sector. Possibilities and barriers were identified

3. Mansarda Trandafirilor – demo project

¹² http://energyefficiency.clima.md/public/files/Constientzare/AF_EE_RE_Moldova.pdf, <http://www.energy-community.org/pls/portal/docs/328183.PDF>

4. SIDA demonstration project – 5 buildings (5, 9, and 17 floors), 362 apartments:

Four packages of works have been proposed:

1. Supply of prefabricated District Heating Substations for Termocom (Contract price 107,001 Euro)
2. Supply of pre-insulated DH Pipes, fittings, valves and accessories for Termocom (materials for reconstruction of DH distribution pipes from the DH main pipes to the 5 residential buildings (94,926.50 USD)
3. Demolition of existing and design, supply, installation, testing and commissioning new internal heating and DHW systems and heat and DHW metering systems for 5 residential buildings (CANCELLED) (SEK 6,150,000):

- Demolition of old heating and DHW systems,
- Reconstruction of the main pipes in the basement starting with the new substations;
- Installation of common vertical main risers for heating, DHW and DHW recirculation in the common area of buildings;
- Installation of distribution boxes in the common area on each floor with shut-off and balancing valves, heat and DHW meters for each apartment;
- Reconstruction of the internal heating system in apartments with new pipes and radiators with automatic thermostats; new systems in apartments – two-pipe horizontal, connected to the distribution boxes;
- DHW pipes to apartments from distribution boxes;
- Automatic metering data transmission, processing and billing system for HOAs

4. Supply of prefabricated DH substations for Termocom (additional 12 substations for 12 residential buildings). Contract price 204,341 Euro.

Duration: 2009-07-19 2011-12-31

Agreement valid until: 2012-06-30

Swedish Contribution SEK 16 000 000

The project consists of three subprojects:

- i) Technical Assistance to the Energy II Extension of the Heating Component,
- ii) Technical Assistance to prepare a feasibility study for the Mother and Child Centre rehabilitation project
- iii) Tirnova Hospital rehabilitation project.

An original request from Moldova asked for investment support for the Mother and Child Centre hospital. However, before taking such a decision a feasibility study needs to be performed in order to thoroughly investigate the possible outcomes of such an investment.

With continued help from donor agencies, national governments should continue the urban heating reform aimed at the creation of an attractive investment climate for more private sector participation and investment in energy utilities and services.

1.2.4 Energy Efficiency: Agency & MoET

Status - Planned,

Swedish Contribution Approx SEK 13 000 000

The contribution is the response to a request from the MoEF to provide assistance to MoET in strategic planning and implementation in the area of energy efficiency and renewable energy. A concrete measure includes support to implementing government decisions to form an *Energy Efficiency Agency, revision of National Energy Strategy, and legal approximation towards EU legislation.*

The assistance is closely coordinated with EU sector budget support to the energy sector 2011-2013.

1.2.5 EBRD Energy efficiency in residential areas

Status: Indicative

Duration: 2011-2012

Indicative budget: SEK 25 000 000

Target group - Associations of Apartment Owners as legal and creditworthy entities

B. EBRD has initiated with Sweden and the EU Delegation in Moldova a discussion on possible support to increase financing opportunities for energy saving investments in residential areas.

The proposed EBRD program- *Moldova Residential Energy Efficiency Credit Line, MoREECEL*-includes three main components with a tentative total budget of 12.5 MEUR to cover TA, support to increase incentives and to share risks. Pending further discussion, SIDA may opt for support to the TA component thus continuing the approach of support to Moldovan Sustainable Energy Financing Facility (MoSEFF).

EBRD Moldovan Residential Sector EE Finance Facilities (MoRSEFF)¹³

Target groups- lending to Banks

Project Cost - €35 million.

Status – Board Approved

Duration – PSD disclosed on April 2012

Technical cooperation is funded by Swedish International Development Cooperation Agency and the European Union. EBRD engages a project consultant to support the partner banks and sub-borrowers with project preparation and implementation.

The EBRD has established the Project Complaint Mechanism (PCM) to provide an opportunity for an independent review of complaints from one or more individuals or from organizations concerning projects financed by the Bank which are alleged to have caused, or likely to cause, harm. The Rules of Procedure governing the PCM can be found at www.ebrd.com/downloads/integrity/pcmrules.pdf.

Subproject component MoREEFF - Procredit Bank Moldova; MoREEFF Moldindconbank; MAIB - Residential Energy Efficiency; MOREEFF - Mobiasbanca

Project Description

The EBRD considers establishing a new financing facility of up to €35 million to support energy efficiency investments in the Moldovan residential sector.

¹³ http://www.moseff.org/fileadmin/files/doc/MoSEFF_presentation/Engl/MoSEFF-presentation-short-engl-2013-07-30-progress-report.pdf

The project consists of credit lines to local banks for on-lending to individuals, households, groups of residents, housing associations, condominiums and cooperatives as well as housing management companies (HMCOs) and energy service companies (ESCOs) for financing eligible residential energy efficiency improvements. In addition to the EBRD financing, the facility will be supported by a grant from the **EU Neighborhood Investment Fund (EU NIF)** to fund incentives to the sub-borrowers and participating banks.

Transition Impact

The Project is expected to have three sources of transition impact: Demonstration effect and market expansion. The Project generates transition impact by demonstrating the benefits of energy conservation and promoting the expansion of energy efficiency lending to sectors where commercial financing is absent and in a country characterized by energy inefficient economy and largely constrained market. In addition, MoREEFF opens the window for financing housing associations /condominiums as well as corporate entities (ESCOs, HMCOs, service companies) on residential energy efficiency projects.

Transfer of skills

The Project is expected to transfer and build expertise and skills on several levels: (i) Participating Banks, (ii) sub-borrowers and local experts and technology providers. As the first residential energy efficiency financing vehicle in Moldova, MoREEFF will address the currently untapped private housing sector and increase stakeholders' awareness, as well as build market capacities, strengthening the structure and expanding markets / promoting policies that support markets. The Project supports the ongoing legislative changes in the area of energy efficiency of buildings and housing regulations.

II. USAID/Hellenic - Aid SYNENERGY

1. RES Stocktaking (conducted);
2. MARKAL (underway);
3. Municipal Energy Planning (Local Programs and Action Plans);
4. Operational Manual EE Fund (developed);
5. Cogeneration Directive transposition;

2.1. USAID

Legal authority for private sector participation in municipal utilities

- Privatization
- Leasing
- Concessions
- JVs
- Performance Contracts - Moldova does not have specific legislation allowing energy performance contracting.

Energy auditing requirements, supervision, and certification of auditors - State-authorized audit must be obligatory for all commercial companies and state enterprises. The state or economic agencies with annual fuel consumption of over 500 tones of conventional fuel per year have to undergo mandatory audits every 5 years. If the audit registers an over-consumption of energy resources, the organization has to implement compulsory energy efficiency programs in a specified period of time.

III. GIZ - Overall Budget - 5,5 M€ between 2010 and 2014.

1. Project for the modernization of public services in the energy sector. The task of the project is mainly focused on improving planning and management of municipal services in selected rural communities of Moldova, with priority on water supply, sewage and waste disposal, local road maintenance, renewable energy and energy efficiency.
2. Training of European Energy Managers: In cooperation with the Potsdam Chamber of Commerce a course for training energy managers is adapted to local needs. Similar courses have been held successfully for several years in Potsdam. The aim is to provide local experts with specific knowledge on how to calculate, construct and implement modern energy efficient technologies in both companies and buildings.

IV. Moldovan Social Investment Fund (MSIF)

MSIF total budget is approx. \$55,8 mil.(funds from the World Bank (IDA), Sweden, German Bank for Development (KfW), DFID, Government of Japan (JSDF), Government of the Republic of Moldova and communities' contributions.

No fixed amount of funds to be used exclusively for EE and RE. 1.5 M Euro recently approved for demonstration project based on solar energy and agricultural waste.

V. EE Projects with Social Issues (2006 – 2013)

In October 2011 Moldova signed **The Memorandum of Understanding on Social Issues in the context of the Energy Community**. The Memorandum indicates the political intent of the Contracting Parties to take due account of the social consequences of implementing the Treaty establishing the Energy Community, and the necessary energy sector reforms. The Treaty does not provide for a specifically defined set of social acquis. The Memorandum of Understanding addresses the social protection of consumers, the safeguarding of limits to the impact of social and economic change, particularly for the most vulnerable consumers, the improvement of energy sector workers' living and working conditions and the anticipation of and negative impacts as a result of sector restructuring and finding solutions to these. It also addresses issues relating to the protection of workers' rights, the improvement of safety at work, equal opportunities for men and women, dealing with surplus workers, continuous investment in life-long learning, ensuring improvements in energy efficiency at work and similar activities. In order to achieve those objectives, each Contracting Party, in close cooperation with their social partners, should adopt a *Social Action Plan* covering four activities:

In order to achieve those objectives, each Contracting Party, in close cooperation with their social partners, should adopt a Social Action Plan covering four activities:

1. Ensuring the protection of vulnerable customers in line with a sustainable and competitive energy market.
2. Strengthening the information and consultation mechanisms of social partners in the energy sector.
3. Improvement in the delegation of work and qualifications structure of employees.
4. Improvement in working conditions and living standards, workers' rights and safety at work in the energy sector.

The Ministerial Council also established an annual Social Forum at its meeting in December 2007, as a platform for discussing the progress of the Memorandum's implementation.

According to the recent Energy Community Implementation Report (2012) Moldova has had registration progress in legislation. Even if there is no mandatory social acquis under the Social Treaty, the government of Moldova has adopted some legislation for the protection of vulnerable customers. In 2000, a *law concerning the social protection of certain categories of the population* includes provisions for payment of cash compensation for communal services, such as electricity, gas and other heating sources, and water. In addition, a Law adopted in 2010 and concerning social compensation for the cold season of 2010 gives additional cash-in-hand to socially vulnerable parts of the population without indicating the use (e.g. for the payment of utility bills).

The legislation in place, i.e. the Law on Social Support of 2008 and the Law on Social Support Canteens of 2003, as amended in 2006 and 2007, generally defines vulnerable customers as “*disadvantaged families*” but not specifically for the energy sector. An economic support scheme for vulnerable customers is provided by the State budget. The customer categories receiving support are: pensioners, disabled people, single mothers with children aged up to 16 years, and people living in one-room apartments who have a monthly income of up to 1,100 lei (around 66.6 EUR). The support scheme includes heating in the winter season, and electricity and gas for the whole year.

Moldova became a Contracting Party to the Energy Community only on 1 May 2010 and has signed the Memorandum of Understanding in October 2011. **It has therefore not yet prepared Social Action Plans.**

8.3. Benchmarking review of HD reforms in CCE

The share of the market served by district heating is much higher in transition economies than in the countries of Western Europe¹⁴. This is one of the legacies of central planning and many argue that energy efficiency, economic, and environmental advantages of district heating should be preserved. Many of the systems are in dire need of upgrade or replacement, and preserving the systems may involve a higher cost than the one of improved energy security, which begets the question of who should pay the higher cost and how great is it.

The bottom line is that policy makers have the obligation to take actions to implement the country-specific strategy that affects the ability of business

¹⁴ On the base of “Urban Heating in Transition Economies”, District Energy Third Quarter Report 2009

interests to engage in ventures that provide the intended policy outcome. Both need to work together and collaborate with donor organizations to develop timely solutions that meet their mutual needs.

For instance, Lithuania and Poland each provide reasonable examples of policy frameworks for improving district heating systems in the region. Poland has achieved both investment and relatively low prices, and Lithuania is now marshalling investments to combat high price levels. Bulgaria and other nations have made good progress recently. Romania continues to make progress but has great transition problems to solve in terms of ownership, management and tariff regulation.

Poland, Hungary, Czech Republic, Bulgaria, Romania have all gone a long way on the reform path, and while there are still objectives to be accomplished, the host countries do have the capacity and institutions to pursue the needed reform independently and they have the financial capacity to incur the costs required.

The EU Directives provide the general legal framework and political priority for the CHP, building energy performance requirements, while the European emissions trading system catalyzes the market for emission abatements. The EU accession and structural funds are also providing tremendous support in enforcing these ambitious reforms, considering that the rest of the international development agencies have completed their key assistance programs in those countries, and the IFI continue mainly lending activities, with little to no grant assistance available.

On the other hand, the rest of the transition economies, particularly those that are not entering EU, are still in the early phases of reforming their heat sectors. While the energy sector reform has well progressed in the region, the heat sector reform has lagged significantly. The general economic and political instability of the countries, the social welfare of their citizens, and generally more aggravating starting conditions than their Western neighbors, have resulted in unforgivable slow reform process. As a result, the district heating sector remains a difficult sector in constant need of investments, outdated, with frequent accidents, inefficient technology and poor service quality.

In some countries the valuable heating assets inherited from the Soviet era have fully depreciated, service quality kept worsening instead of rising, collections started dropping, market competition started offering more attractive decentralized heating options and the heat sector started losing

customers before it managed to recover efficiency and commercialize service provision (in Moldova, Armenia, Georgia, Azerbaijan).

Based on an in-depth review of heat sector restructuring and reform efforts in Moldova, as well as an analysis of the experiences with and results generated by this reform in the CEE region and CIS, several key recommendations can be articulated for national authorities and international financial institutions involved in the heat sector reform in Moldova.

The heat sector reform is a multi-component process and it is critical to steer the path to reform along a sequence of milestones in order to avoid pushing the sector in the wrong direction. A heat sector policy needs to encompass all the aspects of the heating chain in its entirety, including private sector participation, financing mechanisms for investment, efficiency on both the supply and demand sides, metering and billing, energy planning at the local level, heat assistance schemes and effective contractual arrangements for heat supply service. The main policy instruments that have performed successfully in the region are summarized below by intervention areas, relevant actors and specific policy and program recommendations that proved effective in countries of the region.

DIMENSION 1: Local energy planning and competition

Problem Addressed: Failure to integrate the heat sector into the local development agenda and unfair competition between various heating options resulting in suboptimal allocation of heating options from efficiency, environmental, social, safety standpoints.

Actors: Municipalities and local government, along with technical and methodological support from line ministries

Policies and Programs:

- Ensuring availability of full-time energy managers in municipalities for technical support and oversight in municipal energy management and municipal DH companies' operations.
- Developing municipal plans that compare and evaluate all possible heat supply options, potential fuel sources (including renewable energy), generation costs and energy efficiency.
- Zoning that allocates various heating options to the areas of coverage in a way that utilizes the least cost supply option and achieves the

most affordable tariffs, the best return on investments and the most environmentally friendly performance and demand-driven service, based on heat load density, planning infrastructure and generation facilities based on their costs and benefits, as well as locally available fuels, renewable energy resources and surplus heat (CHP, waste incineration, industrial heat/steam). For example, a municipal energy plan might suggest DH as a heating option for densely populated residential areas; CHP-DH in suitable areas where industrial heat loads are present; local HOBs for segregated small neighborhoods, and direct natural gas for less densely populated areas.

- Evaluate future heat demand and necessary investments to accommodate the additional supply.
- Incorporating heating options into urban planning, requiring that new residential buildings or existing public buildings connect to the recommended heating option available in the area.
- Coordinating local heat planning with related regional territorial and sectoral development policies and plans (such as infrastructure and urban and rural housing policies).
- Declaring certain heating options a priority over others in appropriate localities or zones and create investment conditions to develop them as a temporary support mechanism while market distortions are eliminated to allow fair competition. Attribute generation costs to every heat source to enable purchase of least-cost heat first by heat networking companies.
- Including full life-cycle costs analysis with sensitivity tests for potential energy price fluctuations.
- Introducing differentiation of connection charges based on heat load densities and availability of reserve capacity.

(Benchmarking: Sites where practiced successfully: Estonia, Latvia, Lithuania)

DIMENSION 2: Healthy Regulatory Framework

Problem Addressed: Underinvestment and tariff subsidies

Actors: Utility Regulatory Commissions and Line Ministries (Social, Economic, Housing, Territorial, Energy)

Policies and Programs:

- Developing market-based pricing policies that allow full cost recovery and sending efficiency and conservation signals, instead of performing social policy.
- Eliminating subsidies and cross-subsidies that impede fair competition between centralized heating and individual gas heating.
- Internalizing environmental externality costs into the heat-supply cost calculation to ensure that the least-cost heat supply choice adheres to national (or local) environmental requirements.
- Ensuring that national environmental and competition laws and regulations adequately address district heating companies; establishing national tariff methodology that reflects local economic conditions, costs, and purchasing power.
- Establishing a legal/regulatory framework including the institutional capacity that fosters investment in sustainable heat systems and reliable customer service; considering authorizing the national energy regulator to establish the tariff methodology with price setting at the local level and dispute mediation at the national level.
- Avoiding subsidizing one CHP product at the expense of a high sales price on the other – this requires coordinated regulation for electricity and heat supply.
- Evaluating real, not “normative”, heat losses and including them in tariffs.
- The regulatory entity should advocate the establishment of a social safety net to address the tariff impacts. Priority responsibility should be assumed by the government, the use of the tariff mechanism should be considered a temporary transition approach.
- Ensuring better monitoring of local heating markets to enable proper analysis and policymaking.
- Introducing seasonal heat prices.
- Developing a legal framework for applying sanctions against non-payment.

(Benchmarking - Sites where practiced successfully: Hungary, Czech Republic)

DIMENSION 3: Market Rules and Legal Framework

Problem Addressed: Lack of focus on the heat sector in the national energy policy agenda

Actors: Regulators, Energy ministries, with donor technical assistance

Policies and Programs:

- Ensuring successful opening of the heating sector for private sector participation: experience shows that leasing, concessions, partial privatization and other PSP schemes can support local authorities in DH sector restructuring and DH systems' modernization.
- Providing incentives for CHP and DH enterprises by prioritizing heating options based on economic, strategic, environmental, and fuel availability criteria, as well as energy security considerations of the sovereign governments. The adoption of heat sector and privatization laws announces the stance of the state on the heat sector, thus helps to build investor confidence. In addition, the favorable investment climate and general long-term political and economic stability is of essence for foreign and domestic investors and will stimulate private participation.
- Launching “profit-from-savings” mechanisms to generate a revenue stream that repays DH rehabilitation and modernization investments once affordability limits are approached or exceeded and once further heat tariff increases will result in declining collection rates or quality of service.
- Making the district heating sector attractive for both private sector and municipal companies by providing more operational flexibility and stable market rules to DH companies—regardless of their form of ownership—in order to improve the market environment, making market rules transparent and stable, and changes - predictable. Ensuring better monitoring of local heating markets to allow for proper analysis and policymaking.

(Benchmarking - Sites where practiced successfully: CEE countries)

DIMENSION 4: Energy Efficiency

Problem Addressed: Unsatisfactory technical performance; Lack of affordability in light of increasing heat tariffs to cost-recovery levels

Actors: Line Ministries (Energy, Spatial, Urban Planning), Regulators, Heating enterprises, with donor technical assistance

Policies and Programs:

- Without supplying heat at the lowest possible cost, heat supply will perpetually remain sub-optimal: to compensate for high costs apartments will be under-heated, the heating season will be shortened and frequent accidents will occur, all resulting in lower collection rates that trap heating companies in a vicious cycle. This effect could be even further aggravated by the low quality of heat supply, which is a common issue in some of the CIS countries (Moldova, Russia, Ukraine,) due to the low efficiency of generating systems and high network losses. Higher losses and fuel waste, in turn, create the need for a higher heat tariff.
- While there is an incentive for efficiency in private, profit-oriented businesses, in other cases policy interventions can promote efficiency of heat supply and end use. These include energy efficiency standards for heat generation equipment and heating networks, certification and labeling programs, building energy codes, regulatory requirements on metering and customer relations prescribed in the supplier's license, debt amnesties for installing metering devices, training for local personnel (particularly in small towns) and government support for investments in low-income households.
- To encompass all the aspects of the heating chain in its entirety, combined with other efforts for promoting private sector participation, financing mechanisms for investment, energy planning at the local level, heat assistance schemes, and effective contractual arrangements for heat supply service, the following efficiency improvements are necessary:
- Establishing incentive programs, funds, and information campaigns to promote weatherization of buildings and balancing heating networks to ensure low energy and high quality service). These can be achieved through building energy codes, regulatory requirements on metering and customer relations prescribed in the supplier's license, debt amnesties for installing metering devices and government support for investments in low-income households.
- Medium-cost, mid-term measures: Supply-side efficiency measures for improved cost-efficiency and competitiveness of centralized heat

supply, including more expensive measures such as replacing the oldest and most damaged network parts, eliminating network leakages, and renovating substations.

- Cost-intensive, long-term measures, such as replacing all networks with pre-insulated pipes, (Alliance to Save Energy, page 68) modernizing generation plants, introducing more CHPs, and expanding the network to connect new customers.

(Benchmarking - Sites where practiced successfully: Macedonia, Poland, Bulgaria, Czech Republic, Baltic States)

DIMENSION 5: Financing mechanisms

Problem Addressed: Lack of Financing

Actors: National Government, Donors and IFIs, in conjunction with local banks

Policies and Programs:

- Conduct targeted market studies to identify and eliminate market failures (e.g. subsidies, low collections, poor management, uncertainty, etc.) that hamper commercial financing for the heating sector. Promoting financing mechanisms—such as loans and credit guarantees—that ensure sufficient rates of return on investments in energy efficiency and modernization improvements to heating enterprises, and that promote the establishment of centralized heat supply in areas where such services can be cost-effective.
- Accelerating the influx of banking capital to the heat sector by providing technical assistance to borrowers for heat modernization. Attracting loans from international financial institutions with careful consideration of terms and conditions.

Benchmarking- Sites where practiced successfully: Bulgaria, Romania, Latvia

DIMENSION 6: Service Quality and Customer Orientation

Problem Addressed: Lack of Consumer Focus

Actors: Regulators, heating companies, line ministries, home-owner associations and NGOs, with capacity building from donor programs

Policies and Programs:

- Switching to consumption-based billing based on metered heat, where

- possible, and to more accurate consumption norms for consumers not equipped with meters.
- Avoiding a blind “metering everything and everywhere” policy and instead tuning metering programs to selected heat market models and institutional forms of market agents;
 - Updating and enforcing building energy codes and encouraging energy audits.
 - Strengthening the associations of home-owners to play a bigger role in the organization of transparent billing, DMS measures, fee collections, building energy efficiency, etc.
 - Eliminating legal gaps limiting borrowing by condominium associations to promote building thermal rehabilitation.
 - Integrating reliability, efficiency and quality of service indicators (standards) into heat supply requirements.
 - Ensuring regular communication with consumers to improve payment discipline and cash collection. The assistance to very low-income households should be a national or local government prerogative (see next section on Social Safety).
 - Providing information on end-use energy efficiency – the way they help (economic benefits), what measures should be considered and how to find them.

(Benchmarking - Sites where practiced successfully: CEE and Baltic States)

DIMENSION 7: Social Safety

Problem Addressed: Lack of targeted social assistance; affordability concerns used as a reason to avoid increasing tariffs to cost-recovery levels

Actors: Regulators, local governments, community councils, Social and Energy Ministries, with donor technical assistance

Policies and Programs:

- Carefully evaluate affordability limits when setting pricing policies and eliminating cross-subsidies.
- Shifting from control of heat tariffs alone to also taking into account the customers’ purchasing power (ability to pay). The more efficient the

heating, the greater the ability of low income households to pay for it. Basic economic logic dictates that a high price for any product or service reduces the demand for it, and any high tariff or tax rate increases the number of free-riders in society. Similarly, in the district heat market, increasing heat tariffs should theoretically raise the supplier's revenues, but if the tariffs cross the affordability threshold of the consumers, the household collection rates suffer. Developing energy efficiency programs for low-income households aimed at reducing their consumption, instead of the traditional allowances to cover their energy bills; combining the elimination of subsidies with supply-side efficiency improvements and providing targeted assistance for the purchase of end-use metering, HCAs, and TRVs, becoming a driver for even more tariff growth if the heat supply company's costs are not reduced, further aggravating affordability issues.

(Benchmarking - Sites where practiced successfully: Hungary, Poland, Bulgaria)

DIMENSION 8: Training, Capacity Building and Awareness

Problem Addressed: Lack of local expertise and awareness

Actors: Donors and IFIs

Policies and Programs:

- Addressing the extensive need for capacity building in heat sector issues in countries with transitional economies by providing assistance at all levels and for all relevant target groups: state and municipal authorities, energy consultants, management and technical personnel of the heat providers, the banking sector and other targeted financiers, as well as the consumers and HOAs. Capacity building should cover the range of topics affecting the heat sector, such as state-of-the-art technologies, successful institutional models, commercial business practices, municipal energy planning, municipal heat master planning, and customer relations, preparation of energy efficiency and borrowing proposals and ESCO contracting by HOAs.
- Optimizing and maintaining employment provided by the DH systems by eliminating unnecessary bureaucracy and recruiting new accounting, customer relations personnel and western-style managers.
- Developing information instruments that effectively and succinctly communicate to all levels, including for example: [1] guidelines or

manuals for managers and personnel on ways to improve reliability and effectiveness of heat supply, not only on the effectiveness of heat sources and networks, but stressing the importance of the effective use of heat in customer installations; [2] guidelines on upgrading and modernizing substations and end-use installations in customers' buildings; [3] guidelines on co-operation between heat producers and distributors, heat distributors and customers; [4] developing PSP contracts; and [5] developing effective heat pricing regulations that would guarantee an efficient, economically viable and affordable heat supply service.

DIMENSION 8: Training, Capacity Building and Awareness

Problem Addressed: Lack of local expertise and awareness

Actors: Donors and IFIs

Policies and Programs:

- Addressing the extensive need for capacity building on heat sector issues in countries with transitional economies by providing assistance at all levels and for all relevant target groups: state and municipal authorities, energy consultants, management and technical personnel of the heat providers, the banking sector and other targeted financiers, as well as the consumers and HOAs. Capacity building should cover the range of topics affecting the heat sector, such as state-of-the-art technologies, successful institutional models, commercial business practices, municipal energy planning, municipal heat master planning, customer relations, preparation of energy efficiency and borrowing proposals and ESCO contracting by HOAs
- Optimizing and maintaining employment provided by the DH systems by eliminating unnecessary bureaucracy and recruiting new accounting, customer relations personnel and western-style managers. Develop information instruments that effectively and succinctly communicate to all levels, including for example: [1] guidelines or manuals for managers and personnel on how to improve reliability and effectiveness of heat supply, not only on the effectiveness of heat sources and networks but stressing the importance of the effective heat use of heat in customer installations; [2] guidelines on upgrading and modernizing substations and end-use installations in customers' buildings; [3] guidelines on co-

operation between heat producers and distributors, heat distributors and customers; [4] developing PSP contracts; and [5] developing of effective heat pricing regulations that would guarantee efficient, economically viable and affordable heat supply service.

- Supporting the organization and co-operation of residents through Home Owner Associations or similar arrangements. This is a prerequisite to any successful heating sector development.
- Cultivating public-private partnerships with municipalities to facilitate the elimination of institutional barriers while attracting private capital. For example, service and management contracts can be used to upgrade the operational efficiency of the system, and also boost the value of assets if privatization is being considered. Providing HOA training in contracting with DH companies, billing and collections among apartment owners, preparing and implementing energy efficiency projects, and ESCO contracting.
- Using the experience of suitable demonstration projects to inform government policies on the choice of institutional and regulatory reforms.

(Benchmarking- Sites where practiced successfully: Bulgaria, Latvia, Lithuania, Armenia, etc.)

DIMENSION 9: Environmental Considerations

Problem Addressed: Weak environmental regulations

Actors: Environmental Ministries, Designated National Authorities, Donors

Policies and Programs:

- Local emission standards
- Energy carrier or carbon taxes
- Use of environmental funds for fuel switch and cogeneration projects
- Carbon financing and capacity building on methodologies for project financing in the heat sector under the UNFCCC flexibility mechanisms, including Joint Implementation and Clean Development Mechanism
- Smooth and transparent procedure for carbon project approval

(Benchmarking - Sites where practiced successfully: Poland, Romania, Bulgaria, starting in Ukraine, Armenia)

Conclusions and Recommendations

The main problems of the centralized heat supply system in Chisinau (CHSSC) mainly have a double nature: on the one hand, production / supply of heating suffer from inefficiency due to physical and moral depreciation of equipment and networks in operation since the Soviet period, and huge debts accumulated by the leading supplier of heat in Chisinau, Termocom JSC, because of ruinous pricing policies practiced before 2010. These debts have caused other debts in the whole system of supply (CET-1 JSC and CET-2 JSC to Moldovagaz) making it difficult to find immediate solutions. On the other hand, the sector of customers (the demand side of CHSSC) suffers of the same inefficiency, if not greater than the one of the sector of production. It lies in rigid and inflexible delivery systems of heat to final consumers, which do not offer the latter any reason / incentive to reduce consumption and implement energy efficiency measures. Thus, both the central heating units (CHU) which distribute heat to buildings, and the interior systems in blocks are to be changed to make the system geared to the needs and purchasing power of consumers, allowing adjustment and heat metering in each apartment. Currently, regulating and metering consumption is possible only on the housing block level, which does not solve the problem.

While on the offer / supply side of CHSS over the years several projects for the rehabilitation of the system have been implemented (replacing part of the old equipment, changing tubes, implementation of electronic monitoring, replacement of CHU with IHU, etc.), which led to the reduction of energy losses, these (losses) are still high (22% in 2012), and there are still reserves for final tariff reduction on the account of the reduction of losses. But reducing losses means further investment in replacing the production equipment and external networks of heat delivery. Currently there is a CHSSC restructuring plan, which

provides for the merger of CET-1, CET-2 and Termocom. It aims at solving debt problems of these companies, and the debt to Moldovagaz (by improving the financial situation of the new company resulting from the merger, sale of assets and the contracting of loans from international financial institutions). This corporate restructuring of the supplier should result in increasing its ability to invest in the system gradually replacing obsolete equipment and networks. According to the plan in force, corporate restructuring of the heat provider must end in 2014, and increasing the efficiency of its operation technically and technologically - by investing gradually until 2020. These investments are estimated at approx. 4951.64 million lei (approx. €280 million), of which only a fraction of financial resources have been identified. Respectively the successful implementation of the supplier technical and technological modernization plan, and reducing system losses will depend on the success in identifying all the necessary financial resources. *This is a potential area of intervention of donors through financial and technical assistance in modernizing the production / supply sector* and has been studied the best so far. However, the supplier's technical and technological modernization has the potential to reduce heat consumption estimated by only 5-10% (according to NEEAP).

According to our calculations, provided that there are investments in the heat production and supply system in CHSSC, energy savings can be obtained which would reduce the current tariff of approximately 11% or 110 lei to 877 MDL / Gcal, from today's 987 MDL / Gcal. However, given the scale of investment required, this option will be difficult to achieve in the short and medium term.

The largest reserves of thermal energy reduction, and respectively, the final tariff for consumers, leading to reduced financial burden on vulnerable groups for the payment of heating bills, are related to the consumption/demand side of CHSSC. According to estimations of NEEAP, measures for increasing efficiency of the system on the side of production, along with thermal rehabilitation of buildings and replacing old vertical interior delivery systems of heat in apartments with horizontal ones, have the potential to reduce heat consumption by 30%. Considering that such measures will be implemented, which would reduce heat consumption by 25%; we concluded that the tariff for consumers could be further reduced by another 23% (225 lei). Thus, cumulatively these measures (on production and consumption sides) could reduce the tariff for consumers with approx. 34%. At the same time, evidence suggests that in blocks recently connected to CHSSC through IHU and horizontal internal delivery systems of

heat the savings for the payment of bills are between 40-50% and even more, due to individual regulation in each apartment of heat consumption. As in the case of rehabilitation of the system on the side of production, efficiency measures on the consumer side will be difficult to achieve in the short to medium term, because of the huge investments required. Recent estimates of an IDIS Viitorul study show that the thermal rehabilitation of all multi-storey blocks in Chisinau, with the installation of IHU and horizontal heat distribution systems in flats, requires approx. 662 million EUR, or approx. 3641 EUR per apartment. These measures will not only be difficult to implement because of the large investments required, but also because of the insufficient development of the Homeowners Association sector, the reduced capacity of these associations to implement projects for thermal rehabilitation of blocks of flats, insufficient awareness of the problem by individual residents and the lack of financial mechanisms and incentives for the implementation of such measures by individual owners or associations, certain legal and institutional drawbacks. As in the case of the production/supply side, solution for investments on the consumers' side are long-term due to their complexity and major financial effort required.

However, because of greater reserves for tariff reduction for end-users, the weaker study of issues/options on this side of CHSSC, the complexity of problems and the possibility to implement solutions on a step by step basis, including some that don't require big financial efforts, ***on this segment we see the main area of intervention for donors, Moldovan authorities and other stakeholders.*** In our opinion, the main barriers that prevent the implementation of energy efficiency measures in the residential sector include:

- Limited knowledge and awareness of residential consumers about energy efficiency measures;
- Undeveloped institutional framework in the management of the housing sector, lack of practice and procedures for common property management;
- Deficiencies in housing legislation;
- Low households income and lack of financial support for low-income people for the maintenance and implementation of energy saving solutions in apartment blocks;
- Poor realization by a large number of residents of their responsibility for the maintenance of apartments and apartment blocks;

- Lack of funding and incentives for implementing energy efficiency measures in the residential sector;
- The absence of state projects and programs with real objectives, robust mechanisms for implementation and real results;
- Weak managerial and financial capacities of key actors in the residential sector, including HA, condominiums and municipal enterprise of housing maintenance.

Next, we present recommendations for the improvement of centralized heat supply system in Chisinau and for the reduction of heat consumption and heat tariff, for each category of stakeholders:

Recommendations	Stakeholders
Short term	
Develop a concept and comprehensive viable program to improve energy efficiency of buildings in Chisinau.	Chisinau City Hall, the Government, donors
Organize information and promotion campaigns among citizens regarding the benefits and modalities to increase energy efficiency in buildings in Chisinau, stimulate the participation of tenants in such campaigns.	Chisinau City Hall, the Government, donors, NGOs
Assess the needs to amend the legal framework, simplify procedures for creating and registering condominium owners associations, improve regulations on establishment and operation of condominium owners associations.	The Government of Moldova
Strengthen the capacities of homeowners associations, condominiums, housing maintenance enterprises in the management of the housing sector and implementation of building energy efficiency.	Moldovan Government, City Hall, homeowners associations, donors
With the support from donors, create a center for the consolidation of capacities, training and education in property management. This center would provide training, information and other capacity building support for housing associations (condominiums) in the management of the housing sector.	Chisinau City Hall, donors, NGOs
Issue a specialized guide to inform the presidents of associations and private owners of apartments on opportunities for energy efficiency in apartment blocks, familiarizing them with potential energy efficiency technologies that can be used, ways to finance the work, etc.	Chisinau City Hall, donors, NGOs

Implement, with donor support, pilot projects for energy efficiency of existing residential blocks to serve as an example/ model or benchmark for owners' associations willing to implement such works.	Donors, Chisinau City Hall
Impose obligation on owners to contribute to a fund for repairs and energy efficiency of buildings.	Chisinau City Hall, the Government
Support the development of private housing management businesses; liberalize the pricing of housing services.	Chisinau City Hall, the Government
Develop programs that would provide subsidies to low-income homeowners for their contributions to capital repairs, modernization and increasing energy efficiency of residential buildings, decided upon by joint owners associations.	Chisinau City Hall, the Government
Institute the obligation for all newly constructed apartment buildings (including mansards to the existing buildings) in the regions covered by CHSSC to be necessarily connected to CHSSC.	Chisinau City Hall
Switch the production of thermal energy from the CET-1 to CET-2, as the heat produced on CET-1 is much more expensive	Termocom, the Government of Moldova
Reconnect to CHSSC the public buildings (Government House, the Parliament, State Universities, etc.)	Termocom, the Government of Moldova
Upgrade existing systems in buildings by installing thermostatic radiator valves and heat allocators, which measure heat transferred by each radiator separately.	Termocom, the Government, homeowners associations, donors
Study similar experiences of other countries and introduce a separate heating tariff for socially vulnerable population.	The Government of Moldova, NAER
Study similar experiences of other countries in applying differentiate tariffs depending on consumers' predilection to save thermal energy (consumers that don't save thermal energy; „average” consumers; - consumers that save energy agresively; „weekenders”; uninhabeted appartments).	The Government of Moldova, NAER
Create a system of tax relief and incentives for individual apartment owners and homeowners associations, for measures to raise energy efficiency in buildings.	The Government of Moldova
Provide incentives in legislation to implement energy efficiency measures by public institutions and the possibility to use the energy savings achieved by them in the interest of these institutions.	The Government of Moldova
Introduce legislative provisions on loans for residential sector energy efficiency projects and flexible funding mechanisms that would encourage adjustment and reform of the sector on the thermal energy consumer side.	The Government of Moldova, donors

Initiate a campaign for the attraction of new consumers to the CHSSC.	Chisinau City Hall, Termocom
Offer the flexibility to the housing blocks with Individual Heating Units to connect and disconnect from the CHSSC.	Chisinau Municipal Council
Switch from the Gcal thermal energy metering to the metering of kWh, for aligning to the EU standards.	NAER, Termocom
Long term	
Identify funding opportunities and installing individual heating units instead of central ones.	Termocom, the Government, homeowners associations, investors, donors
Reconstruction and the modernization of networks of thermal energy transmission and distribution that are worn and cause losses.	Termocom, the Government of Moldova, investors
Reducing heat and water loss by replacing pipes with a high degree of wear with pre-insulated pipes, etc.	Termocom, the Government of Moldova, investors
Installation of vertical distribution column lines in the common area of the block for the further connection of individual apartments by means of horizontal systems, installation of meters, and the ability to adjust heat consumption.	Termocom, the Government, homeowners associations, investors, donors
Installation by tenants of horizontal individual heating systems in apartments with thermostatic valves to each radiator, and connecting them to the main column by heat meter for cost sharing.	The Government, homeowners associations, donors
Developing a program for modernizing the thermal energy production.	Termocom, the Government of Moldova
Construction of a modern plant with a combined cycle fueled with gas, or a new and modern CET powered by alternative fuels such as waste to provide base load of the entire system.	Termocom, the Government of Moldova
Reconsider the methodology of rendering heat compensations (subsidies) to individual consumers from Chisinau municipal budget in order to avoid vicious practices of subsidy allocation.	Chisinau City Hall

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