

PART II

HOUSING SECTOR

Chapter 1 Existing housing stock, condition, maintenance and management

This chapter analyses the existing housing stock and its condition, the provision of new housing, energy efficiency of the housing sector and the management of the housing stock in the Republic of Moldova. It describes major challenges and recommends policies and actions that could address them.

A. EXISTING HOUSING STOCK AND ITS CONDITION

1. Existing housing stock

The housing stock expanded slowly, from 76,200.0 thousand m² in 2002 to 80,614.6 thousand m² in 2013 (an increase of 8% over a decade). The average yearly increase was approximately 1.7%/1,000 inhabitants, which is far below the EU average of 4.8%.

Available data is not sufficient to estimate the gap between the rate of new housing construction and the need to 1) satisfy housing demand, and 2) replace damaged houses, houses converted for other purposes, and dilapidated houses due to age and lack of maintenance. Another missing figure is the rate of vacancy. During the expert's mission, it was reported on several occasions that there is a high rate of vacancy due to the large number of emigrants. A vacancy rate of 5-6% is considered to be "healthy" for a housing market, while high vacancy rates affect its efficiency. Data on this rate is needed to address different problems that a potential high rate could cause to both the market and the condition of the housing stock.

It is recommended that a yearly replacement of housing rate of 1% is needed in a "normal" situation. This would include the regular replacement of housing stock due to damage from natural and other types of disasters and dilapidation. This rate for the Republic of Moldova would be some 800,000 m². Data shows (Table 1) that, from 2002 to 2012, the highest rate of construction was reached in 2008 with some 680,000 m² of housing constructed, which represented 0.9% of the existing stock. In addition, the housing market should supply new housing for the demand generated through the creation of new families. In conclusion, it can be assumed that there may be a housing shortage. However, further data and analyses are needed to support this hypothesis.

In 2012, the largest amount of new housing, 248,000 m², was developed in Chisinau, representing 81% of the country's total. Currently, a 10,000 m², 12-storey, multi-family housing block is being built on land owned by a hospital university. The building will consist of 1,800 apartments of between 36 and 100 m² in size. Hospitals own large amounts of land in Chisinau and they are not exclusively used for the health services.

Table 1. Dwellings completed, 2002-2012

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total area (000 m²)	255.0	287.0	344.0	461.0	579.0	558.0	680.0	502.0	546.2	589.3	502.5
Percent of total	0.35	0.4	0.47	0.63	0.79	0.75	0.91		0.72	0.77	0.65
Number of apartments (000)	2.3	2.3	2.8	4.0	4.9	5.0	6.8	4.8	4.9	5.2	5.1

Source: NBS, *Construction in the Republic of Moldova* (Chisinau, 2011), http://www.statistica.md/public/files/publicatii_electronice/Costructii/2011/Constructii_2011.pdf.

2. Age of the housing stock

Approximately 60% of the housing stock was built between 1976 and 1993, so it is relatively new. However, due to lack of maintenance and capital repairs, its condition in general is very poor.

Some 20-30% of the housing stock, which dates from more than 60 years ago, needs to be replaced because of old age and lack of maintenance and repair. If these houses continue to be inhabited without being repaired, they will become a serious risk for the health and safety of the dwellers.

In the last four years, new housing construction averaged a mere 0.65% yearly, which is not sufficient to replace the old housing stock and supply new housing. At this rate, it would take more than 80 years before the old housing stock was replaced.

3. Typology and characteristics of the housing stock

The main typology of the country's housing stock is individual housing, which accounts for 67% of the total (Table 2). At national level, apartments in multi-family housing consist of 23% of the total. However, in the municipalities of Chisinau and Balti, the situation is the opposite, with apartments in multi-family housing at 63% and 62% of the total, respectively.

Table 2. Housing stock, in thousand m²

Housing stock	2002	2012	2013
Total	76 200.00	80 163.40	80 614.60
Multi-storeys	14 330.00	19 070.00	-
Single-family	60 870.00	62 490.00	-
Private	71 628.00	78 302.00	78 688.10
Public	4 724.40	1 941.57	1 859.50

Source: NBS.

At national level, most of the buildings are made from bricks and stone, while panel constructions are found mostly in urban areas (Table 3). In 2011, 65% of houses were built with bricks and stone, compared to 78% in 2001, while those built with frame-panels accounted for 4.1%, compared to 10% in 2001. Housing stock has increased very modestly over the past years. Therefore, the impact of new housing stock on the overall quality of the housing stock is low. Furthermore, lack of maintenance, limited renovation, and poor housing management efficiency have diminished the quality of housing stock.

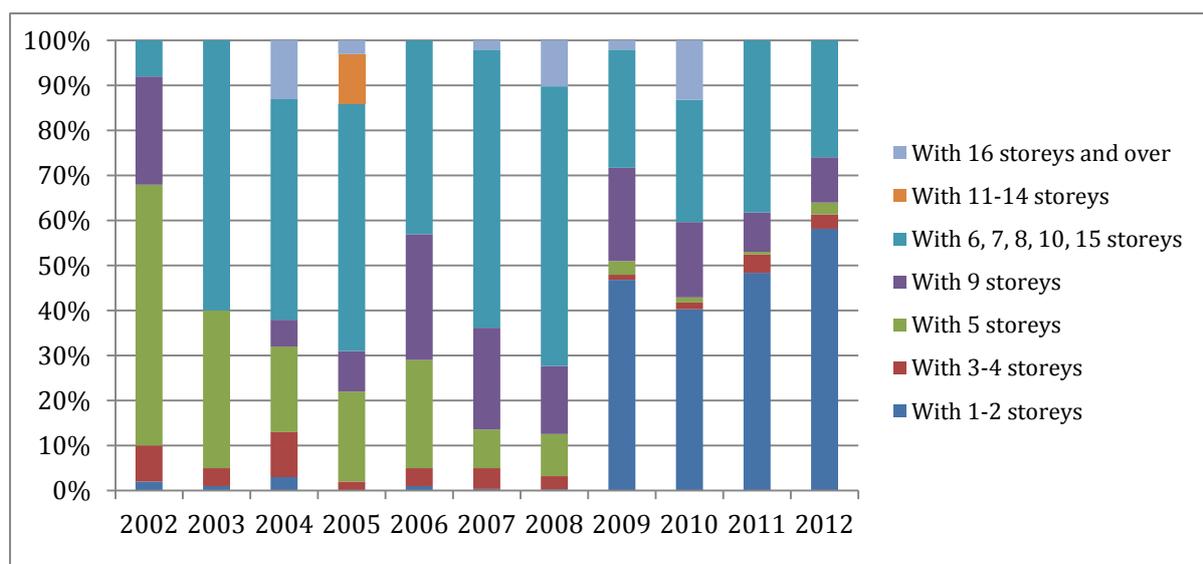
Table 3. Distribution of new dwellings by type of wall materials, 2000-2011, %

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bricks and stone	71.0	78.0	87.0	93.0	89.0	87.0	85.0	74.0	68.0	61.1	49.4	65.5
Large-panels and frame-panels	8.0	10.0	6.0	1.0	2.0	4.0	2.0	3.0	..	6.7	5.7	4.1
Large-block and prefabricated forms	6.0	3.0	1.0	1.0	4.0	..	1.0
Other types	15.0	9.0	6.0	5.0	5.0	9.0	12.0	23.0	32.0	32.2	44.9	30.4

Source: NBS. Information is presented without the data on districts from the left side of the river Nistru and the municipality of Bender. Data are presented according to the total area completed of dwelling houses.

In 2012, 58.2% of the total houses built were 1-2 storey buildings (Figure 4). It is interesting to note that, during the last five years, the construction of 1-2 storey houses prevailed in multi-family types of housing.

Figure 4. Distribution of new dwellings by number of storeys, 2002-2012

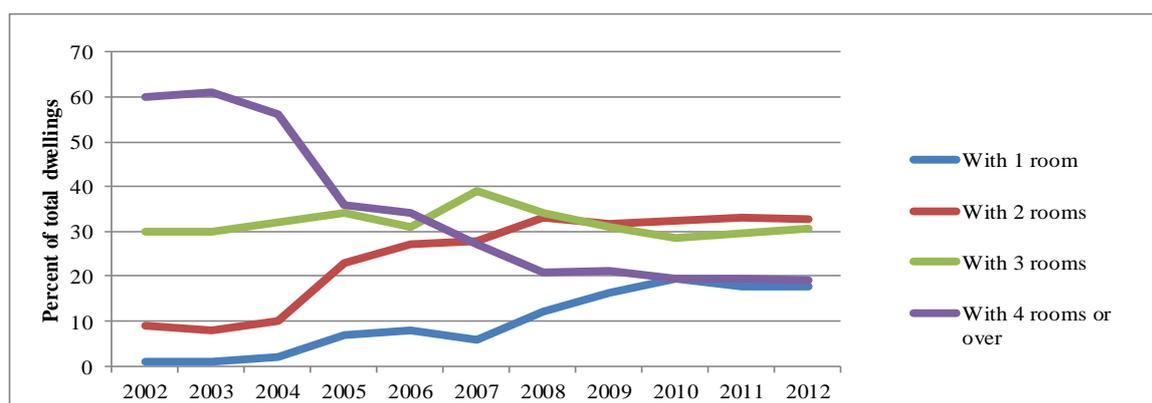


Source: NBS. Data from 2004 to 2008 are presented without individual dwelling houses.

Changes in life-style and economic reasons may have caused the reversal of preferences from big houses and apartments with four or more rooms to small apartments with one or two rooms (Figure 5). For example, in 2012, apartments with four or more rooms amounted to only 19% of the total, compared to 60% in 2002.

The downward trend in the number of rooms per dwelling demonstrates various changes in Moldovan society. For example, it shows that families are getting smaller; emigrants buy small houses because they use them seasonally; and families do not buy big houses because they consume more energy. The downward trend also suggests decreased housing affordability due to increased housing and maintenance costs, while income remains low or regresses because of the economic crisis.

Figure 5. Trend in housing by number of rooms, 2002-2012



Source: NBS.

The average size of an apartment built in 2012 was 99.1 m², which is 13% smaller than the average of 2011. Data from the 2004 census indicates that the majority of households were living in houses of between 50 m² and 99 m² and that housing consumption per capita (average space per person) was 22.5 m².

4. Quality of living conditions

One of the ways to assess the quality of living conditions is by using the principles that define the right to adequate housing²³. Seven criteria are specified in General Comment No. 4 of the Committee on Economic, Social and Cultural Rights (CESCR) pursuant to Article 11(1) of the International Covenant on Economic, Social and Cultural Rights. An analysis of those relevant to the Republic of Moldova is provided:

- a. Security of tenure:** housing is not adequate if its occupants do not have a degree of tenure security, which guarantees legal protection against forced eviction, harassment and other threats. There are no official figures on forced evictions in the Republic of Moldova. Although they are usually associated with informal housing, which is the most typical case, other situations could trigger this as well. For example, those in unregulated rental housing; those who default on their mortgage; families living in areas prone to natural disasters; and those living in areas that will be redeveloped; do not have security of tenure. Specific marginalized groups are more affected than others, e.g., Roma communities, displaced persons, or low-income families. During the mission, it was reported that the Government will legalize informal houses that comply with standards, and demolish those that do not. Policies should be carefully developed to avoid forced evictions and respect the principles set out by CESCR in its General Comment No. 7²⁴. However, it is clear that the Republic of Moldova is affected by natural disasters, so the eviction of families living in disaster-prone areas can save lives.
- b. Availability of services, materials, facilities and infrastructure:** access to housing infrastructure is one of the important aspects of household deprivation and an additional factor of household vulnerability. Access to sanitation services is important, not only to ensure decent living conditions, but also to radically decrease mortality and morbidity due to water-borne diseases.

Housing in the Republic of Moldova is characterized by low access to safe drinking water

²³ United Nations Office of the High Commissioner for Human Rights (UN OHCHR); CESCR, General Comment No. 4.

²⁴ Ibid, General Comment No. 7.

and sanitation. In 2012, about 1.5 million people were served by the public water supply system. This represented 42.1% of the population (68.9% urban and 22.7% rural). The largest shares are recorded in Gagauzia (66.6%) and the municipality of Chisinau (66.4%), followed by the south with 48.8%, the north with 30.5%, and the centre with 27.4%.²⁵

761,000 people had access to sanitation, representing 21.4% of the total population, including 50.1% in urban areas and only 1.0% in rural areas. The largest share of the population with access to improved sanitation is recorded in the north (23.4%), followed by the centre (10.2%), the south (6.7%) and Gagauzia (2.2%)²⁶.

Data from the NBS (although demonstrating inexplicable differences between two tables in their publication) show a low level of households supplied with services, even when referring to the best case scenario (Table 4 and Figure 6).

Table 4. Household dwelling facilities, 2006 and 2013, in %

	2006			2013		
	Whole country	Urban	Rural	Whole country	Urban	Rural
Electric lighting	99.6	99.9	99.4	99.9	100.0	99.9
Aqueduct	42.7	83.4	12	60.1	89.4	35.7
Central hot water system	13	29.8	0.3	9.1	20.0	-
Central heating	19.9	45.5	0.7	19.3	42.0	0.3
Own heating system	15.4	28.4	5.6	13.9	26.3	3.6
Gas facilities	45.4	79.2	19.9	56.6	82.0	35.5
Water closet	32.8	71.7	3.5	38.5	73.0	9.7
Sewerage	32.1	71.2	2.7	33.4	71.5	1.6
Bathroom or shower	38	75.7	9.6	48	77.1	23.8
Telephone	74.3	89.6	62.7	87.2	91.9	83.2

Source: NBS, Household Budget Survey.

Different regions and groups of the population are affected at different rates. Rural areas suffer most from a lack of access to sanitation and water, although the situation is improving. The situation of Roma communities is even worse; more than 80% of Roma households do not benefit from basic housing conditions such as potable water, water closet, bathroom and canalization²⁷. Specific programmes should be developed to provide Roma communities with safe water and sanitation. Investments for bringing water and sanitation to small communities may not be economically viable but can have a high social impact. Therefore, such investments should be based on a cost benefit analysis. Governments, in collaboration with local authorities and with participation of the affected communities, may also take into consideration the relocation of small communities to

²⁵ NBS, *Water supply systems and sanitation in 2012*. Available from <http://www.statistica.md/newsview.php?l=ro&idc=168&id=4086>

²⁶ Ibid.

²⁷ Sorin Cace, Vasile Cantarji, Nicolae Sali, Marin Alla. *Roma in the Republic of Moldova*. (Chisinau: Casa Editorial-Poligrafica Bons Offices, 2007). Available from [http://www.undp.md/publications/roma_report/Roma in the Republic of Moldova.pdf](http://www.undp.md/publications/roma_report/Roma%20in%20the%20Republic%20of%20Moldova.pdf) (accessed 2 Sept. 2013).

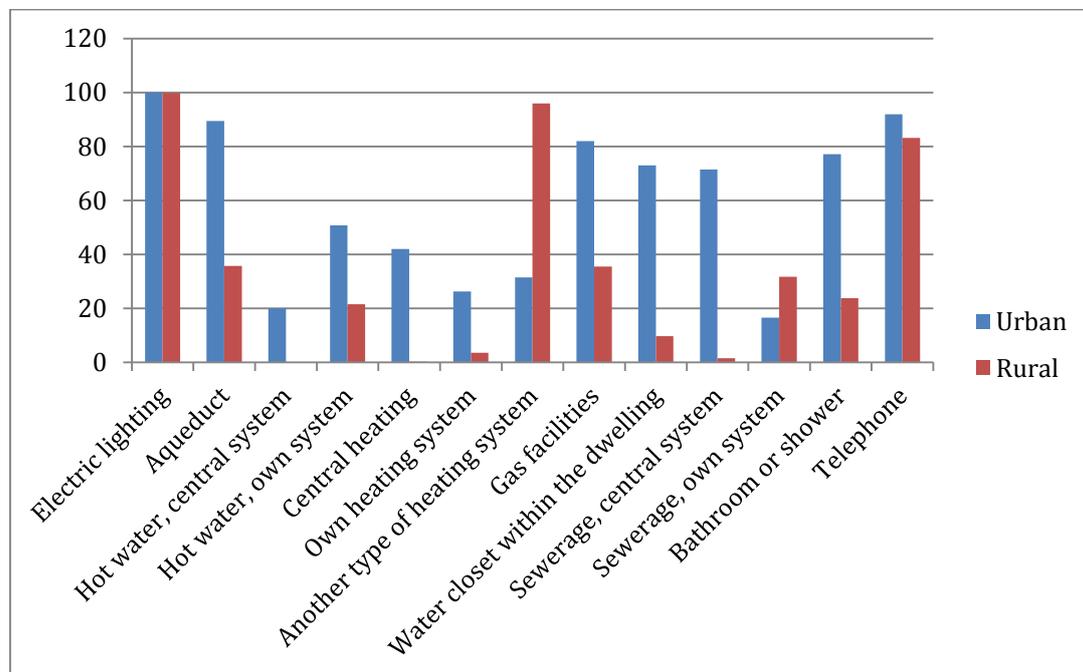
more densely-populated areas, which are equipped with the necessary infrastructure. The feasibility of each solution should be analysed.

Box 1. Roma in the Republic of Moldova

About nine out of ten Roma dwellings do not have a flushing WC and piped potable water in the dwelling. However, this situation is also characteristic for the majority of the non-Roma population, where 71% have no flushing WC and 76% live without potable water. Eight out of ten Roma households do not have bathrooms and sewerage treatment in their dwellings. This situation is also true for the non-Roma population, where 51% do not have bathrooms and 60% do not have sewerage treatment. The most significant difference observed was concerning the availability of kitchens; 42% of Roma households surveyed do not have one, in comparison with 17% for non-Roma households. Households' lack of access to electricity is another example of deprivation. Electricity supply was not available to 10% of Roma households but to only 2% of non-Roma households. While Roma households use predominantly wood for cooking (44%), 61% of non-Roma households use gas (piped or bottled). Wood is the primary heating source for both groups during the cold period of the year, but the non-Roma population uses more charcoal (27%) and gas (15%) than Roma.

Source: UNDP Moldova (2007), Roma in the Republic of Moldova.

Figure 6. Household dwelling facilities in 2013, in %



Source: NBS, Household Budget Survey.

- c. **Affordability:** housing is not adequate if its cost threatens or compromises the occupants' enjoyment of other human rights. Affordability is subject to national interpretation. However, the most common notion of affordable housing implies that households that

spend more than 30% of their gross income to obtain adequate and appropriate housing have an affordability problem²⁸.

- d. Habitability:** housing is not adequate if it does not guarantee physical safety or provide adequate space, as well as protection against the cold, damp, heat, rain, wind, other threats to health, and structural hazards.

According to a UNDP survey, 7% of the population of the Republic of Moldova live in ruined or poor housing. Moreover, the country is exposed to natural disasters such as flooding, landslides and earthquakes. For example, in July 2008, 1,123 houses were flooded due to rainfall alone, of which 91 were totally demolished and approximately 450 needed to be completely rebuilt²⁹. In July 2010, heavy rains affected 12,000 people. A total of 3,183 houses in half of the country (85 settlements) were flooded and most of them were destroyed. The most affected district was Hincesti where 700 houses were destroyed³⁰. The country needs to develop a comprehensive national plan indicating the areas at risk of disasters, isolate settlements adjacent to these areas, and start planning and implementing their gradual relocation if engineering solutions for upgrading the existing safety levels are more expensive.

One of the key factors in assessing the quality of housing conditions is the availability of sufficient space in the dwelling. According to Eurostat, a person is considered as living in an overcrowded household if the household does not have at its disposal a minimum number of rooms equal to:

- one room for the household
- one room per couple in the household
- one room for each single person aged 18 or over
- one room per pair of single people of the same gender between 12 and 17 years of age
- one room for each single person between 12 and 17 years of age and not included in the previous category
- one room per pair of children under 12 years of age.

There are no official data or studies on households living in overcrowded apartments in the Republic of Moldova. The data from the 2004 census are aggregate and cannot be disaggregated at the level required for undertaking a thorough analysis. However, some very conservative calculations based on data provided by the census³¹ suggest an overcrowding rate of 11%. For this purpose, the number of households with three, four and five members, living in apartments with one and two rooms, were used. This rate is below the average for the EU-27 which, in 2011, was 16.5%. However, due to the low level of new housing construction, it can be speculated that the overcrowding rate increased in the seven years after the 2004 census.

²⁸ Alice Pittini, "Housing Affordability in the EU: Current situation and recent trends", CECODHAS Housing Europe's Observatory Research Briefing, Year 5/1, January 2012. Available from <http://www.housingeurope.eu/resource-122/housing-affordability-in-the-eu>

²⁹ UNDP, "Empowering Communities to Prevent and Mitigate Natural Disasters and Crises: the UN Response to Floods in Moldova". Available from [http://www.gripweb.org/gripweb/sites/default/files/Moldova_Empowering Communities to Prevent and Mitigate Natural Disasters and Crises.pdf](http://www.gripweb.org/gripweb/sites/default/files/Moldova_Empowering%20Communities%20to%20Prevent%20and%20Mitigate%20Natural%20Disasters%20and%20Crises.pdf) (accessed 14 October 2013).

³⁰ International Federation of Red Cross and Red Crescent Societies, "Moldova: Floods", International Federation's Disaster Relief Emergency Fund (DREF) Operation Final Report, 15 January 2010. Available from http://reliefweb.int/sites/reliefweb.int/files/resources/D4FB06C58EA1CF638525782500568419-Full_Report.pdf

³¹ NBS, Households by Occupied Dwelling Type, Composition and Average Household Size, 2004 census (Living Conditions of Population). Available from <http://www.statistica.md/pageview.php?l=en&id=2361&idc=295>

- e. Accessibility for the disabled:* The existing Housing Code stipulates the provision of elevators in buildings with more than five floors. Therefore, both existing and new housing are not accessible for people with disabilities. New norms should provide standards for accessibility and for eliminating barriers to it, starting with small interventions such as introducing ramps, handrails, etc.
- f. Cultural adequacy:* housing is not adequate if it does not respect and take into account the expression of cultural identity. In the Republic of Moldova, single-family housing is the most popular type of housing, which suggests that Moldovans embrace the traditional way of living and shows their strong rural roots. However, industrialization and urbanization will change these traditions.

B. ENERGY EFFICIENCY OF THE HOUSING STOCK

The Republic of Moldova imports 95% of its energy resources, which makes the country highly dependent on external sources and its economy volatile with regards to fluctuations in the energy markets.

Buildings consume 40% of the energy, 65% of which is used by the residential sector. The Republic of Moldova is one of the poorest countries in Europe. With increased energy prices, the poor suffer from poor housing quality, as they are least able to heat their homes. Energy-efficiency refurbishments could improve housing conditions and reduce energy costs in the future. Moreover, enhanced energy efficiency could contribute to energy security, less dependence, and economic competitiveness, and could have a positive impact on the environment.

The National Development Strategy envisions the development of the country's energy sector based on: (i) ensuring the country's energy security; and (ii) increasing energy efficiency.

Several measures are foreseen to improve energy efficiency, including: reduction of energy intensity in the residential, industrial, transport and agriculture sectors; modernization of the energy system; implementation of efficient energy technologies; etc. Soft measures are also foreseen, such as raising public awareness on the need to save energy. The goal for 2020 is to reduce energy consumption in buildings by 10%³².

The Republic of Moldova, together with Armenia and Georgia, has joined the Eastern Europe Energy Efficiency and Environment Partnership (E5P). This initiative will support the country's efforts in improving energy efficiency and reducing harmful emissions, through the pledge of additional funding.

The energy sector is one of the top priorities for the Government and it is addressed in a number of policy documents, laws and regulations.

In 2010, the Law on Energy Efficiency (Law No. 142 of 2 July 2010) was approved, which partially transposes the *Directive 2006/32/CE on energy end-use efficiency and energy services*. Based on this law, the Energy Efficiency Agency was established, which implements the State energy-efficiency and renewable energy policies.

The MRDC, with the support of the EBRD and the Swedish International Development Cooperation Agency (SIDA), elaborated the draft Law on Energy Performance of Buildings

³² IMF, *Moldova 2020 National Development Strategy: 7 Solutions for Economic Growth and Poverty Reduction* (Washington D.C., IMF, 2013). Available from <http://www.imf.org/external/pubs/ft/scr/2013/cr13269.pdf>

(which transposes *Directive No. 2010/31/EU* into the national legislation), which was approved by the Government and adopted by the Parliament in 2014. The Law provides for, inter alia, the establishment and enforcement of minimum energy performance requirements for existing buildings when they undergo major renovation; energy performance certification of buildings or units thereof; the responsibilities of central and local government specialists on energy efficiency; etc.

The legal framework has, among others, transferred the responsibility for heat tariff setting from the LPAs to the National Energy Regulatory Agency (ANRE). It has also transferred the responsibility for the ANRE's budget approval and Administrative Board assignment from the Government to the Parliament. These changes allow the setting of heat tariffs at cost-recovery level.

However, the Republic of Moldova remains one of the six countries in Europe and Central Asia with the highest energy intensity (more than 0.3 kgoe/GDP). The EU-15 average is 0.11 kgoe/GDP, and 0.17 for the EU-12. According to a World Bank study³³, for a country to move from high or medium to transitional energy intensity, it should:

- Set energy prices to reflect the cost of supply
- Ensure that energy efficiency is embedded in the legal framework
- Establish an adequate budget for energy efficiency
- Establish energy-efficiency targets that are monitored and evaluated
- Enable competition for the industrial sector
- Create reasonable building standards and ensure implementation
- Establish appliance standards

It should be noted that, in improving the energy efficiency of the residential sector, several challenges have to be addressed, which are summarized in Table 5. The greatest potential for energy savings lies with the existing housing stock, the majority of which is located in rural areas in the form of individual housing. This report focuses on multi-family housing, which does not represent the major share of the housing stock but is a high consumer of energy and is the most challenging to address due to its form of management.

The EBRD has established a financing facility, the MoREEFF, and has dedicated the amount of EUR 35 million to supporting energy-efficiency investments in the Moldovan residential sector. The project consists of credit lines disbursed through local banks to:

- Individuals or groups of individuals and households registered under the laws of the Republic of Moldova as residents or owners in the building for which they intend to perform eligible sub-projects
- Associations/condominiums of apartment owners registered under the laws of the Republic of Moldova
- Legal entities, including housing management companies, energy service companies or any other service company providing maintenance, operation, construction or refurbishment services for the purpose of the implementation of eligible energy-efficiency projects in the residential sector.

The loan can be used for a dwelling-level project or a building-level one.

³³ Gary Stuggins, Alexander Sharabaroff, and Yadviga Semikolenova, *Energy Efficiency: Lessons Learned from Success Stories*, (Washington, D.C., World Bank, 2013). Available from <https://openknowledge.worldbank.org/bitstream/handle/10986/12236/9780821398036.pdf?sequence=7>

Table 5. Challenges in improving energy efficiency in the residential sector

Description	Challenges and/or opportunities	Consequences for energy-efficiency measures
Existing multi-family housing stock		
<ul style="list-style-type: none"> - Accounts for 23% of the total housing stock - 90% is located in urban areas - More than 90% is apartments that were privatized in the early 1990s 	<ul style="list-style-type: none"> - Needs capital repairs (e.g.: insulation of roofs, walls and floors; replacement of apartments' windows, entrance door and common windows; replacement of heating network; etc.) - Decisions need to be taken by the majority of homeowners - Municipal agencies still have the monopoly on managing the common properties - In many cases the homeowners' association is not established or registered as a legal person - The condominium property, including the land, is not registered under the name of the association 	<ul style="list-style-type: none"> - High costs for repair cannot be borne by most homeowners - No decisions are taken - Low quality of management and lack of participation of homeowners in decision-making - Homeowners cannot enter into a contract agreement as an association, but they should sign individually - The homeowners' association cannot obtain a loan from the bank
New multi-family housing		
<ul style="list-style-type: none"> - Represents less than 10% of the housing stock - Adds less than 0.6% to the housing stock yearly 	<ul style="list-style-type: none"> - There are no benchmarks for energy consumption - Some of EU regulations are transposed - Not sure that standards for energy efficiency are met - Voluntary implementation by developers 	<ul style="list-style-type: none"> - Not enough information on the energy efficiency of the building for the consumers - Potential increase of energy inefficiency due to the low capacity of monitoring of the implementation of regulations

The programme provides incentives to borrowers upon completion of their projects, subject to MoREEFF terms and conditions.³⁴ The MoREEFF established an investment incentive ceiling for 10 different energy-efficiency home improvement measures. The total lump sum should not exceed EUR 6,000 per borrower (Table 6). The European Union Neighbourhood Investment Facility (EU NIF) and SIDA, in support of the MoREEFF programme and with the aim of stimulating investments in energy-efficiency measures, have earmarked EUR 11 million to award the incentives to the borrowers.³⁵ Any borrower who takes a MoREEFF loan is entitled to receive an incentive of up to 20%, 30% or 35% of the loan amount for a dwelling-level, building-level, or building-level project of an association of apartment owners, respectively.

³⁴ MoREEFF "About Grants". Available from <http://moreeff.info/en/grants/about-grants/>

³⁵ MoREEFF "About Us". Available from <http://moreeff.info/en/>

Table 6. Energy-efficiency home improvement measures and investment incentive cap of MoREEFF

Energy-efficiency home improvement measures	Investment incentive cap (EUR)
Energy-efficient windows	800
Wall insulation	1,000
Roof insulation	750
Floor insulation	350
Efficient biomass stoves and boilers	600
Solar water systems	1,000
Efficient gas boilers	600
Heat pump systems	2,000
Roof-top photovoltaics in buildings (up to 2.0 kW per dwelling)	1,800
Maximum aggregate investment incentive per borrower	6,000

The MoREEFF Programme has granted 1,536 loans so far, totalling close to EUR 6 million. Incentive grants have been pledged, amounting to EUR 1.7 million. According to MoREEFF:

“To date, the MoREEFF financed projects have saved 12,626 MWh per year, which is enough energy to heat water for 631,300,707 cups of tea or enough to drive a car over 18,939,021 kilometres.

To date, the MoREEFF supported projects have brought reduction in CO₂ emissions of 2,866 tonnes per year, which is equivalent to the amount of CO₂ annually absorbed by a forest of 106,152 trees”.

C. MANAGEMENT AND REFURBISHMENT OF THE HOUSING STOCK

This part addresses the problems of the housing stock privatized under the Law on Privatization of the Housing Stock, No. 1324-XII of 10 March 1993.

The privatization of the public housing stock was expected to improve housing maintenance and management by passing the ownership to the sitting tenants. However, as in other countries with economies in transition, the situation has not really improved. This can be attributed to the following factors:

- Privatization occurred very fast, without taking into consideration the time needed to inform and train tenants on their responsibilities as homeowners.
- The cost of privatization was not based on the value of the houses and, in many cases, it was done free of charge. This was a strong incentive for tenants to get ownership, without paying attention to the future need for maintenance.
- In most cases, tenants were poor and, giving them the ownership of a house with the financial obligation of maintenance, meant trapping them deeper in poverty.
- The Law stipulates the formation of homeowners’ associations (HOAs) without limitation. However, there is a provision that for apartment buildings that are connected to the same water, heat and electricity pipelines, the HOAs should be in the

form of cooperatives and for a maximum of 500 apartment units. This provision brought about the establishment of a single condominium association for a large number of apartments blocks, which was not the right solution. In a smaller association, the decision-making is more efficient.

The privatization of the housing stock was not accompanied by a reform of the management companies, which still control a large share of the housing management market. This situation does not help the creation of a market for housing management, as the municipal companies have almost a monopoly.

The Republic of Moldova has some 6,888 buildings of multi-family houses. 70% of them are administered by local governments, 7-8% by condominium associations, and 17-19% by cooperatives and homeowners' associations. Moreover, some 50-66% of the common properties of privatized housing stock still remain in the ownership of local authorities. Homeowners have outstanding debts to local management companies for unpaid dues, and these companies are not willing to privatize the common parts unless the debt is paid. This means that the land cannot be registered as the common property of the association, which is a serious impediment to implementing projects for the refurbishment of the deteriorated housing stock.

Condominium management

The decision-making bodies of a condominium are the General Meeting of members (representatives) and the Administrative Council.

If the condominium consists of over 40 members, for every five members one representative is assigned to the General Meeting.

The General Meeting is considerate deliberative if at least two thirds of the total number of votes are present. If there is no quorum, the next Meeting can be organized not earlier than 48 hours and not later than 30 days after the date that was originally fixed. The Meeting organized for the second time can adopt decisions with only 51% of the total number of votes.

The decisions of the General Meeting are reflected in the Protocols, which are signed by the President and the Secretary of the Meeting.

Later provisions of Law No. 913-XIV of 30 March 2000 give associations of co-owners the possibility of managing the common property either directly by the property owners if the condominium consists of four property owners at most, or through the association of property co-owners. The association may administer the condominium independently or they may contract these functions (partially or entirely) out to a duly authorized physical or legal person. In practice, however, for privatized apartment stocks, the management of the common parts is undertaken by municipal housing management companies, which have the same structure as those that operated during the Soviet system.

Despite improvements introduced by the new Law on Condominiums in Housing Stock, the management and maintenance situation has not improved.

1. Legal and operational

Several authors highlight discrepancies in the Law on Condominiums. For example, a study undertaken by Citrus³⁶ underlines the following legal bottlenecks:

³⁶ Citrus Partners LLP, "Moldova: Study into Improving the Energy Efficiency of Residential Buildings", Final draft, Bath, 2011.

- The Law does not contain adequate provisions to support transparent management by condominium associations
- Condominium associations lack the power needed to collect payments
- Accounting is not transparent, which leads to a lack of trust
- Invoicing is not transparent, which leads to cross-subsidizing among homeowners
- Condominiums comprise multiple apartment blocks and different types of properties, which leads to conflicts of interest between homeowners
- The high percentage of homeowners required to be present at meetings (66%) and to take decisions (51%) can be a barrier to change

Some further comments and recommendations would include the need for additional transitional provisions for those properties that are already registered based on previous legislation, as well as for the owners of privatized apartments that have not taken legal steps to form associations and to register the property. The Law should also provide regulations for mandatory up-keep and maintenance of some basic standards, such as health and security. This should be monitored by existing public departments at the local level, such as public health, fire control, building inspection, etc.

The Republic of Moldova has a large number of emigrants living abroad and there are many empty flats in multi-apartment buildings due to this. It is estimated that in Chisinau up to 10% of apartments are empty³⁷, while in Criuleni the percentage ranges between 12 and 15%. The emigrants do not pay their maintenance fees, thus aggravating the financial constraints of the association. The Law should provide obligations for owners who do not live in their houses to pay maintenance dues. It should also provide penalties for those who contravene the provisions of the Law, mainly for the non-payment of dues and lack of maintenance.

2. *Social challenges*

The Republic of Moldova has significantly reduced both its absolute and extreme poverty levels. In 2006, about 1 million people (30.2%) were living in absolute poverty according to the international poverty line and, in 2012, the figure was down to 12.7%. About 150,000 (4.5%) people were living in extreme poverty in 2006, down to 0.3% in 2013.³⁸ Poor homeowners find it challenging to cope with maintenance costs. Moreover, the condition of the housing stock and utilities linked to it are deteriorated, which increases the inefficiency of their maintenance. The rehabilitation of housing and utilities are unaffordable for many households. Without external support, it would be impossible for these families to invest. Households in absolute poverty cut their expenditure on heating, thus decreasing their quality of life.

However, poverty is not the only reason for lack of maintenance. Unit owners are not ready to pay maintenance fees. Lack of transparency and trust in the management of finances, low quality of the services offered by municipal companies, and the lack of tradition and knowledge on property management also seriously hamper this process.

Establishing a sustainable housing management system is a long-term objective. Developing related skills requires time, the engagement of the educational system, and the expansion of training courses.

³⁷ Ibid, page 8.

³⁸ UNDP, Republic of Moldova, “Eradicate extreme hunger and poverty”. Available from <http://www.md.undp.org/content/moldova/en/home/mdgoverview/overview/mdg1.html> (accessed 29 July 2015).

Stimulating housing management through specialized management companies will contribute to supporting small businesses. However, the market will only start to provide these services when the demand for them has increased. Rules to regulate the performance of management enterprises and requirements for their professional profile and vocational training need to be developed.

D. ADDRESSING THE PROBLEM OF DETERIORATED HOUSING STOCK

Improvement of privately owned housing stock is the obligation of the homeowners. However, experience from other countries with different economic and social backgrounds has shown that the process is usually initiated by the public sector. This means that there is a public interest in renovating the private housing stock. This is related to social, economic, environmental and political factors:

1. Social factors

Many households are asset rich and cash poor. This is mainly due to the privatization of the public housing stock. Households are not able to pay for the maintenance and renovation of their houses. Moreover, the houses privatized in the early 1990s are in bad shape, due to poor quality of construction, poor maintenance and lack of capital repairs. In the last 20 years, there has also been a lack of regular maintenance and capital repairs and, therefore, the quality of these houses has deteriorated. Regular maintenance will not bring any added value to these houses if they are not first brought up to acceptable standards. It is important to note that low quality of living affects physical and mental health, and also learning capabilities and work performance.

2. Economic factors

There are economic losses because of the devaluation of the assets, and opportunity losses by not investing in renovation. Property tax is based on the value of the property and, therefore, if houses are improved, the value of the property will rise and the tax gains will be higher. Stimulating renovation programmes will create new job opportunities and, if combined with the introduction of energy-efficiency measures and the stimulation of new technologies, will help the production sector. Housing renovation programmes and wider urban regeneration make cities more attractive and competitive.

3. Environmental factors

Deteriorated housing stock has an environmental impact due to high energy consumption.

Some of the major problems of privatized housing stock are:

- Leaking roofs
- Energy-inefficient windows and lack of adequate insulation of roofs and walls
- The need for general repair of common spaces

Based on information from the Housing Department of the MRDC, as of 2008, some 589 buildings needed renovation of the roofs, and approximately 1,000 housing blocks needed rehabilitation.

Three scenarios for addressing the deteriorated housing stock can be summarized as follows:

1. Keeping the status quo

This approach does not require taking action. It presupposes that neither homeowners nor the State will invest in the refurbishment and maintenance of the housing stock. This stock will lose value, and developers may become interested in redeveloping the area and demolishing the houses. The process involves the temporary relocation of families, but can cause gentrification if policies are not put in place to keep a good mix of different groups. The process could take time or it could be spontaneous, if local government is unprepared and does not guide the process. However, only houses located in attractive areas, which have good access to infrastructure, may attract the attention and interest of the private sector. Moreover, high-density housing blocks will not be attractive due to the high number of homeowners to be relocated and difficulties in getting agreement.

2. Demand-driven approach

This is based on the interest of homeowners in housing improvements, and is a bottom-up approach. Financial schemes have been developed and are being used to support the demand of homeowners for housing improvements. A good example of this type of project is the MoREEFF.

3. Urban regeneration

Urban regeneration programmes are initiated by the public sector, usually by municipalities, and are a top-down approach. They are complex programmes and not limited to housing improvements. They address run-down neighbourhoods and problematic communities. The aim is the social, economic and environmental rehabilitation of urban areas, through the creation of job opportunities, and the investment in infrastructure, public spaces, social services and housing renovation. In urban regeneration projects it is crucial to keep a balanced mix of different income groups. The key to the success of these projects is the ability to establish multi-partner partnerships and to engage the community in the whole process.

E. BUDGET ALLOCATION FOR HOUSING REPAIR AND MAINTENANCE

The total budget of the Chisinau municipal council in 2013, as approved by Decision No. 3/4 of 02 April 2013, was MDL 2,695,113,000 (approx. USD 211 million), and 1.31% of this went on housing repair and maintenance. This amount is not enough to bring the deteriorated housing stock up to standard (including energy-efficiency standards) but it can be effective if its use is diversified. Moreover, analysis of budget revenue sources reveals that 66% comes from the revenues of Chisinau municipality itself. With the process of decentralization, it is expected that revenues of municipalities will rise, that they will levy more taxes, and that they will have more discretion in establishing tax levels and deciding on their use. It is also important to note the level of property tax. Regarding the budget proposal for 2013, five taxes relate to property: tax on agricultural land; tax on land for purposes other than agriculture; real estate tax paid by juridical persons; real estate tax for commercial and industrial premises; and real estate tax paid by individuals based on the estimated real estate market value (for more information on the tax on real estate, please refer to Part IV). All these taxes amount to only 4% of the local revenues. No particular model indicates the best ratio of real estate taxes to the total revenue of local government. However, a higher real estate tax can have a positive impact on local revenue, which can then be used for housing improvements and/or social housing programmes. It can also improve housing consumption and the diversification of housing tenure.

F. PUBLIC UTILITIES

1. Water supply and sanitation

Cold fresh water is supplied to 100% of urban settlements and 40% of rural ones. Water sanitation supply figures are low - 70% of urban settlements and 10% of rural ones.³⁹ In 2013, 839 million m³ of water was collected from natural wells. Losses during transportation accounted for 57 million m³ (6.8%)⁴⁰.

The Republic of Moldova has a piped water system of 9,324.2 km, 49% of which serves urban areas. 74.9 million m³ of water was supplied in 2013. 70% of it was provided to the population, which corresponds to 14.7 m³/p/y or 40 l/p/d. This was an increase of 10% compared to 2005. However, it is still low compared to the rates of EU Member States.

In Chisinau, water supply coverage is 100% and sanitation coverage ranges from 54% in individual houses in suburbs to complete coverage in the city. Chisinau has a separate household wastewater and street rainwater collection and treatment system. Table 7 presents basic statistical data on the sewerage infrastructures in Chisinau and Balti.

Table 7. Sewerage systems in the main cities of the Republic of Moldova

City	Length of sewers, km	Capacity of water treatment plant, % in use	Average energy (direct expenditure only, i.e., electricity) spent to pump and treat 1m ³ of water, kWh/m ³	Population served
Chisinau (coverage 70-92.6%)	1,023	32.3	0.4	800,600
Balti (coverage 50%)	150	32.4	0.5	70,000

Source: "Moldova Apa-Canal" Association website: <http://www.amac.md/>.

Increased urbanization, population growth and living standards are major drivers in increasing urban water use, and the Republic of Moldova will face this challenge in the near future. Given the limited water resources, it is of utmost importance to ensure the efficiency of the water system. Currently, water meters are installed for each building, and this system should be enhanced to make possible the accounting of water consumption for each household.

Another concern is water leakage due to old water pipes. For example, in the Balti municipality water losses amount to as much as 40%. The Government has invested in extending the water pipelines, but rehabilitation of the existing network should also be prioritized.

According to Apa Canal Chisinau (ACC), there is an average discrepancy of 16% between meter readings of the cold water supply to a multi-apartment building and the total of all

³⁹ According to an interview at the Ministry of Environment during the research mission of independent international experts in August 2013 for the development of the Moldova CP.

⁴⁰ NBS, Water Consumption (use) (2006-2013), StatBank. Available from <http://www.statistica.md/category.php?l=en&idc=99> (accessed 15 March 2015).

readings of individual apartments⁴¹. It estimates losses in its networks due to leakages (prior to entering buildings) to be about 37%, which is quite high compared to 5-10% for developed countries. However, the altitude difference in the Chisinau water supply system, which exceeds 200 metres, makes it more challenging to limit leaks.

Unaccounted-for water (UFW) results from physical (leakages) and commercial losses (e.g., discrepancies in meter readings). Table 8 shows a comparison of UFW for some cities in the Republic of Moldova with selected cities in other countries. The concept of UFW helps to better understand the typology of water network losses, which could help in developing a strategy for more efficient utility systems. UFW represents the difference between “net production” (the volume of water delivered into a network) and “consumption” (the volume of water that can be accounted for by legitimate consumption, whether metered or not).⁴²

Table 8. Unaccounted-for water in selected cities in the Republic of Moldova in comparison with cities of other countries

Country/City/Year	UFW (%)		
	Physical losses	Commercial losses	Total
Balti			27.7
Chisinau ^a	37	16	53
Criuleni			50
Tokyo, Japan ^b			3.3
Singapore, 1989 ^c	4	7	11
Barcelona, Spain, 1988 ^c	11	12	23
Philadelphia, Pennsylvania (Philadelphia Water Department, 2010 - highest in the USA) ^d			31
San Jose, Costa Rica, 1990 ^c	21	25	46

Sources: “Moldova Apa-Canal” Association; NBS.

a - ACC

b - Bureau of Waterworks, Tokyo Metropolitan Government, 2009. Retrieved from https://www.waterprofessionals.metro.tokyo.jp/pdf/efficient_usage_of_water_by_leakage_prevention.pdf

c - Yepes, Guillermo; Dianderas, Augusta. 1996. Water and wastewater utilities: indicators, 2nd edition. Washington, D.C.: World Bank. Available from <http://documents.worldbank.org/curated/en/1996/05/696572/water-wastewater-utilities-indicators-2nd-edition>

d - Control and Mitigation of Drinking Water Losses in Distribution Systems, U.S. Environmental Protection Agency. November 2010.

⁴¹ Ibid.

⁴² SWITCH, Loughborough University, “Managing Water for the City of the Future”. Available from <http://www.switchurbanwater.eu/cities/index.php>. The UNESCO-IHE presentation on SWITCH was a major research partnership funded by the European Commission.

Table 9. Guidelines for interpreting water loss within distribution systems

UFW, %	Recommended action (UNESCO-IHE*)
< 10	Acceptable, monitoring and control
10-25	Intermediate, could be reduced
> 25	Matter of concern, reduction needed

Source: UNESCO-IHE presentation on SWITCH available at <http://www.switchurbanwater.eu/cities/index.php>. SWITCH is a European Commission-funded major research partnership on urban water issues.

*UNESCO-IHE is the largest international postgraduate water education facility in the world and is based in Delft, the Netherlands.

Based on statistics for UFW presented in Table 7, utility companies in the Republic of Moldova fall into the least acceptable category according to the UNESCO-IHE guidelines for interpreting water loss (Table 9). This suggests that efficiency in water distribution should be a policy priority. Currently, Tokyo has one of the most efficient water systems in the world. It was successful in reducing the leakage rate from 20% in 1956 to 3.6% in 2006 (population served: almost 13 million; total length of distribution pipes: 26,219 km). Reduction in leakages not only reduces monetary loss; it also saves a significant amount of energy. Table 10 presents some statistical data on the potable water supply infrastructures in Chisinau and Balti.

Table 10. Cold potable water infrastructures in Chisinau and Balti

City	UFW, %	Length of distribution pipes, km	Average water consumption, litres per person per day	Average energy spent to process and deliver 1m ³ of water, kWh/m ³
Chisinau	53.0	1,816	131-166	0.8
Balti	27.7	261	71	1

Sources: NBS; “Moldova Apa-Canal” Association website: <http://www.amac.md/>.

The utility infrastructure for cold water supply has not been upgraded for many decades now; its operational efficiency is low. It is estimated that modernizing the pumping equipment in water supply and sanitation networks can reduce electricity consumption by 25-30%⁴³. Many of these projects are supported by international donors. For instance, the EBRD is considering financing the construction of a 70 km-long 1.2 m-diameter water main in the city of Balti, which would increase coverage in nearby villages and connect 100,000 more households. The German Agency for International Cooperation (GIZ) proposed investments in the water supply in the Leova District, where only the district centre of the town (Leova), out of 2 towns and 37 villages, benefits from quality water and sanitation services.⁴⁴ However, challenges remain. For instance, the GIZ project plans to connect 14,700 people in

⁴³ According to an interview at the Ministry of Environment during the research mission of independent international experts in August 2013 for the development of the Moldova CP.

⁴⁴ According to an interview at the GIZ office during the research mission of independent international experts in August 2013 for the development of the Moldova CP.

the first stage, which is due to be completed by 2030, while the population of the district is projected to reach 61,060 by that time. Another project in the city of Orhei will provide a modern sewerage treatment plant for 30,000 people; the plant will use constructed wetlands technology, and will be operated by five staff members. The project will cost about EUR 5 million.⁴⁵

The local council sets water and sanitation tariffs (Table 11). They are very low and do not cover the cost of service provision. They differ between municipalities and changes to them are politically sensitive.

Table 11. Water tariffs in selected cities of the Republic of Moldova

Municipality	Water tariff	Municipality	Water tariff
Chisinau	9.19 Lei/m ³ (USD 0.72)	Soldanesti	5.4 Lei/m ³ (USD 0.42)
Balti	15 Lei/m ³ (USD 1.18)	Hincesti	18.4 Lei/m ³ (USD 1.45)
Ungheni	5.84 Lei/m ³ (USD 0.46)	Calarasi	16.5 Lei/m ³ (USD 1.30)

Source: “Moldova Apa-Canal” Association website: <http://www.amac.md/>.

According to the Law on Drinking Water, No. 272-XIV of 10 February 1999, water is part of the public domain. Water supply systems are owned by the State and local authorities (municipal property) or by businesses and individuals. The main systems are centralized and state-owned.

The operation of centralized and decentralized water supply is carried out by specialized companies, which are bound by strict standards, rules and sanitary norms.

In Chisinau, the ACC operates the system. All shares in this company are owned by the Chisinau Municipal Council.

Some of the constraints facing the water supply and sewerage systems are:

- a) Low coverage of water services and sanitation in areas of the country
- b) The existing legal framework does not ensure sustainable development in the field of water supply and sanitation
- c) Poor spending on water supply and sewerage systems
- d) Outdated and inefficient infrastructure (leakages)
- e) Lack of specialists
- f) Approval of tariffs is politically sensitive
- g) The inability of enterprises to cover the costs of production
- h) Low quality in the provision of water and sewerage to customers
- i) The high share of non-invoiced water
- j) The problem of the difference in water consumption between the data from common meters and that from apartment meters.

A draft law on the public service of water supply and sewerage is being prepared. It was developed by the Ministry of Environment and establishes the legal framework for the creation, organization, management, regulation and monitoring of the operation of public water supply, industrial and domestic sewage, and industrial wastewater in terms of accessibility, availability, reliability, continuity, competitiveness, transparency, and

⁴⁵ According to an interview at the Ministry of Environment during the research mission of independent international experts in August 2013 for the development of the Moldova CP.

compliance with quality and environmental safety standards to ensure the effective functioning of public water and sewers.

2. Heating and hot water supply

Heating for the majority of cities and towns is centralized (district heating system), as the infrastructure was inherited from Soviet times. Hot water is heated at a power plant and is distributed to users via a network of conduits. Hot water for heating is usually separated from the hot water communal supply. Balti's mayor estimates that heating and the hot water utility networks for 130 multi-apartment houses need replacement.

The centralized network of housing heating in the Chisinau municipality is powered by two electric heating plants "CET-1" and "CET-2", which have been privatized and are now joint stock companies, as well as by three thermal stations which belong to the network service company "Termocom". Termocom is a joint stock company under the town and municipal councils of Chisinau. The company aims to produce, supply and distribute heat and hot water to consumers, municipal housing organizations, State institutions, budgetary organizations, socio-cultural, private and State economic agents, etc.⁴⁶ Its network also includes 19 suburban thermal stations, and encompasses:

- 331 km of dual pipes for heating agent (hot water) circulation
- 188.6 km of pipes carrying hot water for domestic consumption
- 17 pumping stations
- 365 units of central thermal points
- 301 units of individual thermal points
- Over 3,240 pumping units, and
- 824 control units.⁴⁷

Heating supply companies face increasing technical and structural challenges, such as an outdated and aging infrastructure and a poor system for collecting fees. High energy costs and low efficiency result in high prices for private consumers, many of whom prefer to opt out of district heating, and heat their apartments by electricity or gas. This results in revenue loss for heat providers but no reduction of actual consumption, since heating systems in multi-apartment houses require roughly the same amount of energy due to the heat circulation arrangement via pipe networks and heat migration between apartments. Eventually, heating becomes even more expensive for the consumers who decided not to opt out.

Termocom has been implementing a decentralization strategy, which involves using individual thermal points instead of providing heat via a long network (production of heat closer to the consumer). These points reduce heating expenses by at least 5-10%, and integration with the internal heat supply system allows for over 30% of additional savings. Using this new system, a consumer is able to regulate heat consumption according to his needs, and even connect or disconnect heating entirely in individual apartments. For Termocom, the introduction of individual thermal points will allow the elimination of the centralized system and the reduction of 188.6 km of district heating networks, which will increase the efficiency of the whole system, according to projections. The practice of consumers opting out of district heating is not unique to the Republic of Moldova; a number of former Soviet republics reported it as well⁴⁸. In Dushanbe, the capital of Tajikistan, almost

⁴⁶ Termocom, "About JSC "Termocom"". Available from http://termocom.md/en/?page_id=2

⁴⁷ Ibid.

⁴⁸ *United Nations Economic Commission for Europe (UNECE) Country Profiles on the Housing Sector: Tajikistan* (UN publication ECE/HBP/163). Available from <http://www.unece.org/index.php?id=27165>

80% of residents in multi-family houses have dismantled radiators and hot water pipes, which resulted in electricity overconsumption and outages during wintertime⁴⁹. The situation in the Republic of Moldova is much more stable; only 15% of consumers have opted out from the heating supply⁵⁰. However, the technical efficiency of district heating is a major concern, as well as the efficiency in managing it.

Termocom was successful in upgrading 14 of its 19 thermal power plants located in the suburbs of Chisinau between 2003 and 2011. These power plants produce thermal energy from coal, oil or natural gas. The upgrading programme allowed for the installation of gas boilers and more efficient machines with a total installed capacity of 25.6 megawatts. Currently 10 of the power plants work in automatic mode, allowing for the optimization of the number of staff and the reduction of production costs. According to Termocom, there is an average discrepancy of 36% (28% according to ACC) in meter readings between hot water supply in a multi-apartment building and the sum of the readings of individual apartments⁵¹. While 15% of consumers opted out of the heating supply during the last 10 years, energy consumption by Termocom has fallen by just 5%, which suggests a 10% loss in efficiency. Termocom estimates losses of energy in its networks (prior to entering buildings) to be 21%, of which 2% are due to leakages and 98% due to insulation. Modernization of the main networks and of heat distribution has also been one of the major challenges for the company. This has been carried out by the replacement of existing old transmission and distribution pipes with pre-insulated pipes; the replacement of the existing compensators and bellows; the mounting of ball valves; and the installation of monitoring systems. It targets heat losses due to leakages of the heating agent and poor pipe insulation.

3. Municipal Solid Waste (MSW) management

MSW appears to be a major problem for almost all settlements in the Republic of Moldova, including the capital, Chisinau. There, the MSW management system is linked to waste collection; 1.2 million m³ of MSW is collected per year, of which 75% is from households and 25% from businesses. The waste is transported by trucks to “a temporary storage site” because the 21-hectare landfill is already way over its capacity. There is no waste sorting, recycling, or separate collection of hazardous waste.

MSW is collected by a special enterprise, and the service is paid according to the following fixed norms: Chisinau urban: 1.3 kg per person per day; Chisinau rural: 0.25 kg per person per day; and Balti urban: 0.8 kg per person per day. There is a need to update these norms and to conduct a study on the actual amount of waste that is generated and on its composition.

The legal provisions for MSW management are rather weak; there are no mandatory provisions for MSW management at the LPA level.

⁴⁹ Ibid.

⁵⁰ According to an interview at Termocom during the research mission of independent international experts in August 2013 for the development of the Moldova CP.

⁵¹ Ibid.

