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1. GEOGRAPHICAL LOCATION

The Republic of Moldova, covering an area of 33,846 square km, is located in Central Europe, in the north-western Balkans. Moldova's capital city is the municipality of Chisinau (mentioned in the historical records for the first time in 1436) with the population of approximately 785 thousand people (as at 2008).

Moldova borders on Ukraine in the North, East and South and on Romania in the West, with the Western border line going along the river Pruth (Figure 1).



Figure 1: Map of the Republic of Moldova

The total length of Moldova's national border is 1389 km, including 939 km of the border with Ukraine and 450 km of the border with Romania.

Moldova is situated at longitude 28°50' east and latitude 47° north. The exact location of the extreme points on Moldova's territory is as follows: the northernmost point is Naslavcea (latitude 48° 21' north and longitude 27° 35' east); the southernmost point is Giurgiulesti (latitude 45° 28' north and longitude 28° 12' east) which is also Moldova's sole location on the bank of the Danube; the westernmost point is Criva (latitude 48° 16' north and longitude 26° 30' east); the easternmost point is Palanca (latitude 46° 25' north and longitude 30° 05' east). The distance between the extreme points is about 350 km from Naslavcea to Giurgiulesti and only 120 km from the West to the East at the latitude of the municipality of Chisinau.

The Republic of Moldova is a Black Sea region country. Its southern border extends almost as far as the Black Sea coast, and the access to the Black Sea is open for Moldova through the Dniester estuary and the Danube.

2. RELIEF

The region between the Pruth and the Dniester Rivers is a part of the Moldovan Plateau, which starts at the foothills of the Bukovina Mountain Crest and Moldova's Sub-Carpathians in the West and reaches as far as the Dniester in the East. The south-western part of the Podol Upland extends along the left bank of the Dniester. Hills and flatland areas can be observed next to the upland relief within the framework of those major relief-forming units. The absolute altitudes are within the range of 429 m (Balanesti Hills) and 4 m above the sea level in the Dniester River flood land (Palanca). The relief has contributed to the formation and development of geographic landscapes and ecosystems - next to the other geo-ecological, biotic and socio-human factors. The current geo-ecological complex took shape at the end of the Late Pleistocene Epoch and in the first half of the Holocene (Recent) Epoch. The current biotic complex (flora, fauna, soil) and soils appeared in the second half of the Holocene epoch.

3. CLIMATE

The climate of the RM is moderately continental, characterized with relatively mild winters with little snow, long warm summers and low humidity. The country is located in the area where the air masses coming from the Atlantic Ocean via Western Europe interact and mix with the air from the extreme continental north-eastern regions and the Mediterranean air from the south-west.

Changes in temperature and precipitations in the RM are measured within the hydro-meteorological monitoring network, since 1886. In conformity with the State Hydrometeorological Service data, the average air temperature at the Chisinau meteorological station during the instrumental record was continuously increasing (during 1886-2007 this increase represented circa 1^oC), as well as the amount of precipitations (during 1891-2007 this increase represented circa 60 mm) (Table 1).

Table 1: Dynamics of Average Annual Temperature and Amount of Precipitations at the Chisinau Meteorological Station

| Times series | Air temperature | Times series | Amount of precipitations |
|--------------|-----------------|--------------|--------------------------|
| 1886-1960 | +0.5 °C | 1891-1960 | +40 mm (+8%) |
| 1960-2007 | +0.5 °C | 1960-2007 | +20 mm (+3%) |
| 1886-2007 | +1.0 °C | 1891-2007 | +60 mm (+11%) |

Higher temperatures in winter, spring and summer in the RM is a peculiarity of the past 100 years (the average winter air temperature at the Chisinau meteorological station was 1.3^oC higher, in spring it was higher by 0.9^oC, in summer – by 0.7^oC, in autumn – by 0.2^oC, while the average air temperature increased by 0.8^oC). The amount of precipitations in the past 100 years also increased by 56 mm, or 12 percent, however, this increase is different by seasons. The biggest increase occurred in autumn (by 32 mm), while in spring it even diminished by 5 mm (Table 2).

Table 2: Dynamics of Average Annual Air Temperature and Amount of Precipitations in the Past 100 Years at Chisinau Meteorological Station

| Season | Air temperature | Amount of precipitations |
|--------|-----------------|--------------------------|
| Winter | +1.3 °C | +9 mm (+9%) |
| Spring | +0.9 °C | -5 mm (-4%) |
| Summer | +0.7 °C | +20 mm (+11%) |
| Autumn | +0.2 °C | +32 mm (+30%) |
| Annual | +0.8 °C | +56 mm (+12%) |

During the instrumental record period the warmest year was 2007, when the average annual air temperature was 12.1°C, by 2.6°C higher than the normal level. The coldest year was 1933, when the average annual air temperature was 7.2°C, by 2.3°C lower than the normal level. The most humid year was 1912, when the amount of precipitations reached 915 mm, or by 75 percent above the norm. The year with the highest deficit of precipitations was 1896, with as little as 301 mm, or 58 percent of the norm.

The observation records of the past 25 years show the average annual air temperatures varying between 6.5°C in the North (1987) and 12.3°C in the South (2007) (Table 3), when the average monthly air temperatures was varying between minimum -8.5°C in January (1996) and maximum +26.0°C in August (1992). The warm period of the year is approximately 190 days long.

Table 3: The Average Annual Air Temperatures and Precipitations Reported at the Stations Briceni (North), Chisinau (Centre) and Cahul (South) in Moldova, 1985–2008

| | Average annual air temperatures, °C | | | Annual average precipitations, mm | | |
|------|-------------------------------------|----------|-------|-----------------------------------|---------|-------|
| | Briceni | Chisinau | Cahul | Chisinau | Briceni | Cahul |
| 1985 | 6.5 | 8.0 | 8.2 | 672 | 593 | 564 |
| 1986 | 7.9 | 9.6 | 9.7 | 463 | 400 | 379 |
| 1987 | 6.5 | 8.1 | 8.5 | 619 | 593 | 525 |
| 1988 | 7.5 | 9.0 | 9.3 | 740 | 652 | 569 |
| 1989 | 9.3 | 10.9 | 10.9 | 653 | 460 | 441 |
| 1990 | 9.5 | 11.3 | 11.4 | 471 | 360 | 359 |
| 1991 | 8.0 | 9.4 | 9.3 | 655 | 673 | 661 |
| 1992 | 8.5 | 10.1 | 10.2 | 518 | 417 | 369 |
| 1993 | 7.8 | 9.4 | 9.3 | 557 | 533 | 537 |
| 1994 | 9.5 | 11.3 | 11.3 | 456 | 403 | 383 |
| 1995 | 8.4 | 10.0 | 10.0 | 609 | 702 | 401 |
| 1996 | 7.1 | 9.1 | 9.1 | 835 | 711 | 603 |
| 1997 | 7.7 | 9.4 | 9.1 | 587 | 607 | 813 |
| 1998 | 8.2 | 10.3 | 10.1 | 891 | 666 | 584 |
| 1999 | 9.2 | 11.0 | 10.9 | 564 | 484 | 674 |
| 2000 | 9.7 | 11.2 | 11.2 | 451 | 437 | 342 |
| 2001 | 8.8 | 10.3 | 10.4 | 711 | 618 | 600 |
| 2002 | 9.5 | 10.8 | 11.0 | 578 | 604 | 568 |
| 2003 | 8.6 | 9.8 | 10.3 | 618 | 459 | 307 |
| 2004 | 9.0 | 10.3 | 10.9 | 515 | 591 | 470 |
| 2005 | 8.7 | 10.5 | 10.8 | 800 | 638 | 513 |
| 2006 | 8.4 | 10.2 | 10.8 | 683 | 564 | 367 |
| 2007 | 10.1 | 12.1 | 12.3 | 618 | 480 | 517 |
| 2008 | 9.7 | 11.3 | 11.8 | 773 | 466 | 444 |

Two distinctive patterns can be observed as regards territorial distribution of the climatic features in Moldova: (i) distinct zoning of the annual rainfall averages which show a decreasing trend from the North-West to South-East; and (ii) the increase by approximately 100 mm of the multi annual rainfall averages in the upland regions depending on the neighbouring flatland areas.

During 1985-2008 the annual rainfall averages varied between 451 mm (2000) and 891 mm (1998) in the Northern part of Moldova and 307 mm (2003) and 813 mm (1997) in the South of the country. The total number of rainy days (with no less than 0.1 mm of rainfall) varied between 121 (1986) and 174 days (1987) in a year in the northern regions and respectively between 91 (2003) and 152 days (1991) in a year in the southern regions.

The analysis of data provided by the National Hydro-Meteorological Data Fund for the instrumental record period (1890-2008) revealed that of 118 years, 22 years were marked by

serious droughts during the vegetation period (April-September), and 18 years were marked by close to drought conditions (mild droughts). Droughts for two continuous years occurred 3 times, and droughts for three continuous years occurred twice. It has been stated that average frequency of droughts in the Republic of Moldova in 10 years time span is 1-2 droughts in the North; 2-3 droughts in the central part and 5-6 droughts in the South. It should be noted that in 1990–2007 time span, 9 years (1990, 1992, 1994, 1996, 1999, 2000, 2001, 2003 and 2007) were marked by droughts of various intensity, which contributed to a significant reduction of crops yield. In 1990, 1992 and 2003 the droughts continued during the entire vegetation period (April-September), while in other years the droughts occurred in summer. The disastrous drought of 2007 affected over 80 percent of the territory of the country, being the most severe drought in the entire instrumental record period. By its core agro-meteorological indicators, this drought surpassed the drought of 1946, causing catastrophic damage to national economy.

4. NATURAL RESOURCES

4.1. Land Resources

Moldova has unique land resources characterized by: (a) predominant black earth soils (chernozems) with high productivity potential; (b) very high utilization rate (>75%); and (c) rugged topography (above 80% of the total arable land are located on hill slopes). As of January 1, 2008 RM's total available land amounted to 3384.6 thousand hectares (ha), including 1978.9 thousand ha (or 58.5%) of agricultural land ('lands for agricultural purpose'); 502.1 thousand ha of the surplus land ('surplus fund') comprised of the areas intended for social development of the respective communities and land in public use (such as land under pastures; plantings; flooded areas; land under roads, diverse structures, etc.) (14.8%); 444.1 thousand ha of land under forests and natural preserves ('lands of the forestry fund and for nature protection purposes')(13.1%); 315.7 thousand ha of land belonging to localities (villages, towns and cities/municipalities) (9.3%); 85.2 thousand ha of land under water basins ('lands of water fund') (2.5%) and 58.6 thousand ha of land under industrial facilities, transportation routes and other special purpose land ('lands for industry, transport, communications and other special purposes') (1.7%) (Table 4).

Moldova's soil cover is very diverse and comprised of above 745 soil types. Chernozems accounts for approximately 73.7% of the country's total territory; grey forest soil (found mainly on elevations with altitudes above 200 m on the Northern Plateau, on hills along the Dniester and in the Codrii Zone) accounts for about 9.4%, and brown forest soil (found on hilltops at altitudes exceeding 300 m, covered currently or previously with beech, hornbeam and oak tree forests) - respectively for about 0.6%; alluvial soils (found in river floodplains and water meadows on recent alluvial deposits) account for approximately 10.2%; and deluvial soils (formed on hill slopes and in vineyards from soil particles brought by the land erosion processes) - respectively about 3.7%; rendzine (soddy-calcareous) soils (formed on limestone under the influence of the steppe and forest grass aggregations) – about 1.0%; chernozem-like, swamp and humus-peaty soils (found in fragments in forest-steppe zones) – about 0.7%; vertisol soils (formed predominantly in the steppe and forest-steppe environment, under grass canopy on the bed of hard clay rock) – about 0.4%; and alkaline (solonchic) and saline soils account for about 0.2% of Moldova's total territory. The extremely high land utilization rate in agriculture dictates the necessity of resource conservation, amelioration and protection of soils from erosion, land slides and other types of ill-considered human intervention.

Table 4: Available Land by Category in Moldova within 1990-2008, thousand hectares

| | 1990 | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 | 2006 | 2008 |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Lands for agricultural purpose | 2537.7 | 2050.2 | 2018.3 | 1980.9 | 2087.2 | 1946.7 | 1950.9 | 1952.6 | 1978.9 |
| Lands that belong to localities | 400.8 | 434.6 | 446.4 | 449.0 | 299.8 | 309.9 | 309.3 | 309.1 | 315.7 |
| Lands for industry, transports, communications and other special purposes | 77.6 | 57.8 | 58.2 | 58.4 | 58.6 | 58.6 | 58.7 | 58.5 | 58.6 |
| Lands of the forestry fund and for nature protection purposes | 327.1 | 333.3 | 346.6 | 350.4 | 354.4 | 356.2 | 405.8 | 432.3 | 444.1 |
| Lands of water fund | 26.2 | 45.9 | 47.2 | 47.3 | 36.3 | 57.1 | 81.2 | 83.7 | 85.2 |
| Surplus land | 6.6 | 463.3 | 467.8 | 498.4 | 548.1 | 655.8 | 578.7 | 548.4 | 502.1 |
| Total lands | 3376.0 | 3385.1 | 3384.5 | 3384.4 | 3384.4 | 3384.3 | 3384.6 | 3384.6 | 3384.6 |

Sources: Statistical Yearbooks of the Republic of Moldova for the years 2008 (page 21), 2003 (page 20), 1999 (page 18) and 1994 (page 36)

4.2. Water Resources

4.2.1. Rivers

There are 3,621 rivers and water-springs in Moldova. All of them form part of the Black Sea basin and can be categorized as follows: the Dniester Basin Rivers, the Pruth Basin Rivers and the southern region rivers falling into either the Danube estuary or in the Black Sea coastal salt lakes. The majority of rivers are small in size. The largest rivers include: the Dniester (1,352 km long, including 657 km in Moldova, with the annual water debit of approximately 10 cubic km), the Pruth (976 km long, including 695 km in Moldova, with the annual water debit of about 2.4 cubic km), the Reut (286 km long), the Cogilnic (243 km long, including 125 km in Moldova), the Bic (155 km long), the Botna (152 km long). Moldova's drainage network density is 0.48 km per square kilometer on the average, varying between 0.84 km/km² in the northern regions and 0.12 km/km² in the regions on the left bank of the Dniester. The principal water sources feeding the rivers are snowfalls and rainfalls, whereas the subsoil water plays only a minor role. The majority of precipitations occur in the form of rainfall, whereas snow accounts for as little as 10% of the total precipitations. High water levels are observed in spring due to the melting snow (40-50% of the annual flow). In summer the water levels in rivers - and in particular in small rivers - can rise considerably after storm rainfall, sometimes causing disastrous floods.

4.2.2. Lakes

There are approximately 60 natural lakes in Moldova. Most of them are the lakes located in the high-water beds of the rivers Pruth (Beleu, Rotunda, Fontan) and Dniester (Old Dniester, Cuciurgan). There exist in addition above 3500 water storage ponds created and maintained for diverse economic purposes (such as: irrigation, fishing, recreation, industrial and household needs, protection from floods). The large water-storage reservoirs have been created for hydro-power plants: Costesti-Stinca (735.0 mln.m³) on the river Pruth jointly with Romania; and Dubasari (277.4 mln.m³) on the Dniester river.

4.2.3. Groundwaters

Ground waters have a special role in the surface water balance in Moldova. They participate actively in the hydrological cycle as a component of the ground water debit. The distribution of the available ground waters is not even across Moldova, because their major

portion is concentrated in the high-water beds of the Dniester and the Pruth. The water supply capacity of the ground water-bearing horizons decreases with the increasing distance to those rivers.

There are approximately 7 thousand boreholes (water-wells) in Moldova, drawing the available water from 10 horizons and water systems: (1-2) the alluvial horizon dating back to the Quaternary and Middle Pliocene Epochs is in use in the valley of the Dniester and the Pruth; (3) the Pontian horizon is exploited in certain localities in the south-west of Moldova; (4-5) the Late Sarmatian – Meotian system is used in the southern regions of the country; (6-7) water from the Middle Sarmatian horizon can be found in the central, southern and south-eastern regions of Moldova (8) the Badenian (Middle Miocene) – Early Sarmatian water system forms the basis for centralized water supply to the capital city and localities in the central regions of Moldova; (9) the Cretaceous-Silurian water system is used in the northern parts of the country; (10) the water-bearing layers in the Vendian and Late Riphean deposits are exploited in the north-east of Moldova. Moldova's available ground water capacity was approximately 3,465.0 thousand m^3 per day as at 01.01.2007, including the approved ground water sources with the total capacity of 2,198.5 thousand m^3 per day.

4.2.4. Mineral Waters

There are 27 types of mineral water being approved for use and certified in the Republic of Moldova; these are drawn from 47 table, table/therapeutic or therapeutic water springs; furthermore, there are water sources with balneological (spa) characteristics. Water mineralization levels vary between 1.0 and 10.0 g/dm^3 . Therapeutic mineral water springs are typical for the southern and north-eastern regions of the country. Their water contains hydrogen sulphide (30.0-80.0 mg/dm^3), iodine (17.0-26.0 mg/dm^3), bromine (132.0-139.0 mg/dm^3) and other chemical elements (lithium, radon, strontium, boron).

The existence of mineral waters in combination with the appropriate climate and natural conditions creates the adequate pre-requisites for the development of an extensive network of health treatment facilities of the health resort type. One more pre-requisite is the fact that the Moldovan mineral waters are similar in their therapeutic characteristics and properties to the worldwide popular waters of Karlovy Vary (Czech Republic), Borzhomi (Georgia) and Essentuki-17 (Northern Caucasus, Russian Federation).

As at the beginning of 2007, the acknowledged available mineral water capacity totalled 13,774 m^3 per day, including 10488 m^3 per day of potable mineral water and 3,286 m^3 per day of mineral water for external use.

4.2.5. Industrial Waters

The industrial ground water available in Moldova contains less-common extractable chemical elements, with the waters containing iodine, bromine, strontium, cesium, rubidium, boron and helium being the most widespread. The highest concentration of chemical elements in the water with mineralization levels of 70-100 g/dm^3 is: 60 mg/dm^3 for iodine; 360 mg/dm^3 for bromine; 380 mg/dm^3 for strontium; 1.0 mg/dm^3 for cesium; 3 mg/dm^3 for rubidium; and 15.0 ml/dm^3 for helium.

4.2.6. Thermal Waters

Thermal water is common in the high-water bed of the Pruth and in the southern regions of Moldova. The water temperature is 20.0-80.0°C, and the water debit of the wells is 10-100 m³ per day.

4.3. Biologic Resources

4.3.1. Flora

Moldova's geographic location, climate and relief have pre-conditioned the development of the extremely variable vegetation with a large number of species; currently Moldova's flora comprises about 5,513 plant species (with 1,989 superior plants and 3,524 inferior plants). The ecosystems which have the richest flora composition include: the forest (above 850 species), steppe (above 600 species), high-water basin (approximately 650 species), petrophyte (about 250 species), water and swamp (about 160 species) systems.

In terms of landscape, Moldova's territory is located in two natural zones – wooded steppe and steppe. The steppe zone comprises the fields and elevations in the regions to the south of the Codrii Upland and to the south and east of the Tigheci Hills. In addition to the above, the steppe flora can be found also in the North - in the Cubolta Upland, in the Ciulucuri Hills and in the Middle Pruth Upland. Most of the steppe regions are used currently in agriculture; and therefore the typical steppe flora represented by mat-grass, feather grass, fescue and diverse other grass types has persisted solely on small hill slope areas with old land slides or on more inclined erodible slopes. Of the total number of steppe plant species, 18 have been included in the Red Book of Moldova, including 9 species (*Astragalus dasyanthus* Pall., *Belevallia sarmatica* (Georgi) Woronow, *Bulbocodium versicolor* (Ker.-Gawl.) Spreng., *Colchicum triphyllum* G.Kunze, *C. Fominii* Bordz., *Galanthus ebwesii* Hook. fil., *Ornithogalum amphibolum* Zahar., *O. oreoides* Zahar., *Stembergia colchiciflora* Waldst. et Kit.) which are included also in the Red Book of Ukraine (1996) and in Romania's Red List of superior plants (1994).

The forest flora can be found - in addition to the steppe regions - in the wooded steppe zone, on higher hills more frequent in the Codrii Region. The deciduous forests typical of the Central Europe prevail and account for 97.9%, whereas resinaceous forests account for as little as 2.1%. Moldova's forest ecosystems have 45 native species of trees, 81 native species of shrubs and 3 native species of forest vines (lianas). The most common native woody plant species found in our forests include: English Oak (*Quercus robur*), Durmast Oak (*Quercus petraea*), Pubescent Oak (*Quercus pubescens*), Common Ash (*Fraxinus excelsior*), European Hornbeam (*Carpinus betulus*), European White Elm (*Ulmus laevis*), Sycamore Maple (*Acer pseudoplatanus*), Small-Leaved Linden (*Tilia cordata*), European Weeping Birch (*Betula pendula*) and European Beech (*Fagus sylvatica*).

4.3.2. Fauna

Moldova's fauna is relatively rich and manifold. There are above 15.5 thousand species of animals in Moldova, including 461 species of vertebrates and above 15 thousand species of non-vertebrates. The vertebrates include 70 species of mammals, 281 bird species, 14 reptile species, 14 amphibian species and 82 fish species. Birds are highest in number among the vertebrates (281 species and subspecies), and insects - among non-vertebrates (above 12 thousand species).

The most widespread native species of mammals include: brown long-eared bat (*Plecotus auritus*), hedgehog (*Erinaceus europaeus*), European mole (*Talpa europaea*), common shrew (*Sorex araneus*), noctule bat (*Nyctalus noctula*), red squirrel (*Sciurus vulgaris*), brown hare (*Lepus europaeus*), European ground squirrel (*Citellus citellus*), spotted squirrel (*Citellus suslicus*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), wood mouse (*Apodemus sylvaticus*), yellow-necked mouse (*Apodemus flavicollis*), red fox (*Vulpes vulpes*), European roe deer (*Capreolus capreolus*), wild boar (*Sus scrofa*), Eurasian badger (*Meles meles*), beech marten (*Martes foina*), European polecat (*Mustela putorius*), and least weasel (*Mustela nivalis*). Rare and endangered species are protected by the law; 116 animal species have been entered in the Red Book of Moldova (the edition of 2001), including 14 mammal species, 39 bird species, 8 reptile species, 1 amphibian species, 12 fish species, 1 Cyclostomata species, 37 insect species, 1 Crustacean species and 3 Mollusc species.

There are five natural reservations established for scientific research purposes with the total area of 19.4 thousand ha in the Republic of Moldova. Two natural forest reservations – “Codrii” and “Plaiul Fagului” – are located in the central regions of Moldova; two more reservations – “Prutul de Jos” and “Padurea Domneasca” – in the Pruth valley; and the fifth reservation – “Iagorlic” (Dubasari district) – has been established to protect and study the unique water ecosystem of the Dniester river.

4.4. Mineral Resources

As of 01.01.2008, minerals were extracted from 425 deposits in Moldova. Most of the minerals are extracted from open mines, and only certain limestone varieties are mined from underground galleries (limestone quarries).

The most popular minerals are: (1) carbonate strata rocks dating back to the Early Sarmatian and Badenian Era (used in construction of industrial facilities and housing, cement production, sugar refining, road construction, as additives to animal feed, etc.); (2) clint rocks (siliceous limestone, diatomite/kieselgur, fossil meal/tripoli) (used in food industry, production of artificial leather, paper, thermal and electro-thermal materials, etc.); (3) clay rocks (slate clay, bentonite clay, ordinary clay) (used in production of cement, claydite, ceramite, bricks, tiles and ceramic pipes); (4) sand and broken stone (gravel) (used in the manufacture of glass, concrete, in the various construction sectors including road construction); (5) sulphate rocks (gypsum) (used in construction, medicine, pharmaceuticals); (6) crystal rocks (gabbro, granite, gabbro-norite) (used in production of ferro concrete, in road construction); (7) caustobioliths (petrol, gas, brown coal) available in insignificant quantities in the South (Valeni, Victorovca, Vladiceni).

5. ADMINISTRATIVE-TERRITORIAL ORGANISATION, POPULATION AND HUMAN CONTEXT

5.1. Administrative-Territorial Organisation

According to Law No. 764 as of 27.12.2001 on the administrative territorial organisation, the Republic of Moldova is divided into 32 districts (rayons), 5 municipalities and 2 administrative-territorial units (Figure 2).



Figure 2: Administrative-Territorial Map of the Republic of Moldova

In most districts (Anenii Noi, Basarabasca, Briceni, Cahul, Cantemir, Calarași, Caușeni, Cimislia, Criuleni, Donduseni, Drochia, Edinet, Falesti, Floresti, Glodeni, Hincești, Ialoveni, Leova, Nisporeni, Ocnita, Orhei, Rezina, Riscani, Singerei, Soroca, Straseni, Soldanesti, Stefan Voda, Taraclia, Telenesti, Ungheni) the administrative centre is located in a town, and only the district of Dubasari has Cocieri community as its centre. By January 2008, the number of population in the regions varied between a minimum of 29.5 thousand people (Basarabasca district) to a maximum of 129.5 thousand people (Orhei district).

In the Republic of Moldova municipalities are urbanized areas which play a significant role in the nation's economic, social-cultural, scientific, political and administrative life, with relevant industrial, commercial, health care and cultural facilities as well as educational establishments.

In most cases municipalities are an agglomeration of several settlements. For example, the municipality of Chisinau, which is the capital city of the Republic of Moldova, comprises 35 settlements, which include 5 city districts, 6 towns and 12 communities (the latter comprising the total of 26 settlements). The other 4 municipalities are: Balti, Comrat, Tiraspol and Bender. The purpose of dividing the territory of the country into a number of administrative territorial units is to ensure the execution of the principles of local autonomy, decentralise public services, electiveness of the local public administration authorities, the access for the citizens to their authorities and to the advice on the local problems and issues of particular interest.

All local problems and issues fall within the authority and powers of the local administrative councils, which are elected. The prefects and mayors for the districts and municipalities are nominated by the local administrative councils and appointed by the President of the Republic of Moldova.

There are two administrative-territorial units in the Republic of Moldova: the Administrative-Territorial Unit Gagauzia (ATU Gagauzia) and the administrative-territorial units on the left bank of the Dniester (ATULBD). The area of ATU Gagauzia is approximately 3,000 km² (159.8 thousand people), and the area of ATULBD is respectively about 4,163 km² (540.6 thousand people). Since the collapse of the Soviet Union (USSR), the administrative-territorial units on the left bank of the Dniester started promoting the separatist policy in respect of Moldova's centralized public administration authorities. At present the official authorities of the Republic of Moldova monitor that area only in part.

5.2. Population

As of 01.01.2008 Moldova's population was 4.1 million people, with the density of approximately 122 persons per square kilometre. Thus, numerically the Republic of Moldova outruns such European countries as Lithuania, Ireland and Slovenia. During 1990-2008 the number of population decreased by about 5.3 percent (230 thousand people). That decrease was caused by the negative natural balance as well as the negative external migration flow balance. The above dynamics resulted in the decrease in the average population density from 129 persons per square kilometre in 1990 down to 122 persons per square kilometre at the beginning of 2008. However, even in such conditions the density of population in the Republic of Moldova is almost twofold of Europe's average and approximately threefold of the global average.

Females prevail with 52.3 percent in the nation's population - as opposed to 47.7 percent of males in the total population. This evident misbalance with prevalence of females in the population structure by gender has rated Moldova among the top 10 states worldwide according to that indicator, thus impacting adversely the nation's demographic development.

The majority of the population is concentrated in the rural areas. The existing 1,614 rural settlements have 2.3 million residents (55.1 percent of the total population), averaging about 1,400 residents per settlement. The urban population is 1.8 million (44.9 percent of the total). The urbanization rate is among the lowest in Europe. Urban settlements are small in size, with about 27 thousand residents on the average, and only 5 thereof can boast the population exceeding 50 thousand residents: Chisinau (785.1 thousand people), Balti (148.1 thousand people), Tiraspol (140.4 thousand people), Bender (95.0 thousand people) and Ribnita (52.2 thousand people).

According to the data of the 2004 population census held separately in the areas on the right bank of the Dniester and in the administrative-territorial units on the left bank of the Dniester, Moldavians accounted for about 69.6 percent of the country's population (64.5 percent in 1989), Ukrainians – 11.2 percent (13.8 percent in 1989), Russians – 9.4 percent (13.0 percent in 1989), Gagauz – 3.8 percent (3.5 percent in 1989), Bulgarians – 2.0 percent (2.2 percent in 1989), Romanians – 1.9 percent (0.1 percent in 1989), Gypsies – 0.3 percent (0.3 percent in 1989), Jews – 0.1 percent (1.5 percent in 1989), other nationalities – 1.6 percent (1.3 percent in 1989), etc. (Table 5).

Table 5: Resident Population by the Main Nationalities in the Republic of Moldova (According to the 2004 Population Census Data)

| Ethnic origin | Republic of Moldova (the right bank of the Dniester) | % | ATULBD (the left bank of the Dniester) | % | Republic of Moldova (total) | % |
|---------------|--|------|--|------|-----------------------------|------|
| Moldovans | 2564.8 | 75.8 | 177.1 | 31.9 | 2741.9 | 69.6 |
| Ukrainians | 282.4 | 8.3 | 159.8 | 28.8 | 442.2 | 11.2 |
| Russians | 201.2 | 5.9 | 168.4 | 30.4 | 369.6 | 9.4 |
| Gagauz | 147.5 | 4.4 | 4.1 | 0.7 | 151.6 | 3.8 |
| Romanians | 73.3 | 2.2 | 1.0 | 0.2 | 74.3 | 1.9 |
| Bulgarians | 65.7 | 1.9 | 13.8 | 2.5 | 79.5 | 2.0 |
| Gypsies | 12.3 | 0.4 | 0.1 | 0.0 | 12.4 | 0.3 |
| Jews | 3.6 | 0.1 | 1.2 | 0.2 | 4.8 | 0.1 |
| Other | 32.5 | 1.0 | 28.9 | 5.2 | 61.4 | 1.6 |
| TOTAL | 3383.3 | 100 | 554.4 | 100 | 3937.7 | 100 |

5.3. Demographic Situation

Between 1990 and 2007 the demographic processes registered a distinctive negative development pattern, which showed itself in the general instability of demographic indicators and phenomena as well as falling birth rate, growing mortality, depopulation, demographic ageing, etc.

For example, the 2007 birth rate was 10.6‰ (registering a decrease in comparison with the 1990 rate of 17.7‰), and the mortality was 12.0‰, i.e. higher than the 1990 rate of 9.7‰). The infant mortality rates remained among the highest in Europe (11.3‰,) but were lower than the 1990 figures (19.0‰). Beginning in 1999, the natural balance of the population was negative (-1.4‰ in 2007; for comparison, the 1990 figure showed the natural population growth of 8.0‰). That dynamics has resulted, among other things, in the demographic ageing of the population which shows itself as the reduced portion of the

young and the increased portion of the elderly. During 1990-2007, the portion of the population aged under 15 decreased from 27.9 percent in 1990 down to 19.2 percent in 2007, and the age group of persons above 60 increased respectively from 12.6 percent in 1990 up to 14.8 percent in 2007.

During 1990-2007 the 'average life expectancy at birth' indicator somewhat decreased - from 69.0 years in 1990 to 68.8 years in 2007 (the respective indicator decreased from 65.5 years to 65.0 years for males and increased from 72.3 years to 72.6 years for females). The values of this particular indicator are relatively modest - as opposed to other countries, thus rating Moldova among the last in Europe on the force of those levels.

6. INSTITUTIONAL FRAMEWORK

6.1. Institutions

Republic of Moldova proclaimed its independence on August 27, 1991; it remained however a part of the Soviet Union until the latter's formal dissolution in December of 1991. Moldova's new constitution was approved in the national referendum and ratified by the Parliament on July 28, 1994. According to the Constitution, the Republic of Moldova is a neutral country. The Constitution guarantees the voting right to all its citizens who have reached the age of 18 and provides for the diverse civil rights and liberties.

The President is the head of the state. Prior to the amendments to the Constitution introduced in 2000 presidential elections used to be direct. Currently the President is elected by the Parliament for the term of 4 years and may hold the presidential office no more than two consecutive terms. The President has the power to dissolve the Parliament. The Constitution provides for the possibility to accuse the President of a penal or constitutional infringement.

The President appoints the Prime Minister and (upon the latter's recommendations) the Cabinet of Ministers. The Prime Minister and the Cabinet require the approval of the Parliament. The current Government (formed after the elections held on 29th of July 2009) is comprised of 16 ministries:

1. Ministry of Economy
2. Ministry of Finance
3. Ministry of Justice
4. Ministry of Internal Affairs
5. Ministry of Foreign Affairs and European Integration
6. Ministry of Defence
7. Ministry of Constructions and Territorial Development
8. Ministry of Agriculture and Food Industry
9. Ministry of Transport and Road Administration
10. Ministry of Environment
11. Ministry of Education
12. Ministry of Culture
13. Ministry of Work, Social Protection and Family
14. Ministry of Health
15. Ministry of Youth and Sport
16. Ministry of Information Development and Communications

The nation's supreme legislative authority is the one-chamber Parliament. It is composed of 101 deputies (MPs) elected directly for the term of four years. The Parliament has two ordinary sessions per year; furthermore, it is possible to convene an extraordinary parliamentary session. In addition to adoption of laws and exercising other basic legislative functions, the Parliament may declare the state of national emergency, martial law or war.

The judiciary system includes three supreme courts: the Supreme Court of Justice, the Court of Appeals and the Constitutional Court – the supreme authority on constitutional issues issuing final decisions which can not be appealed against. Tribunals and courts exercise judicial procedures at the local level. The President appoints judges for the Supreme Court of Justice and the Court of Appeals from the nominees submitted by the Supreme Council of Magistrates.

The Supreme Council of Magistrates composed of 11 magistrates and elected for a five-year term is in charge of appointments, transfers and promotions of judges. The Council includes the Minister of Justice, the Chairman of the Supreme Court of Justice, the Chairman of the Court of Appeals, the Chairman of the Economic Court and the Attorney General, three members elected from among the members of the Supreme Court of Justice and another three members elected by the Parliament from among the accredited university professors.

6.2. Institutional, Regulatory and Policy Framework for EE and RES

6.2.1. Institutional Policy-Makers

The Ministries in charge of the energy policy in the Republic of Moldova are:

- The *Ministry of Economy (MEC)*¹: MEC is in charge of developing and implementing energy policy in the Republic of Moldova. Its main tasks related to the energy sector comprise the development of strategies and state policies such as the Energy Strategy 2020. Furthermore it elaborates and implements measures to ensure the energy security in the country and organizes and coordinates the draft legislative and normative acts in the area of energy. In 2008, the Ministry of Industry and Infrastructure, which took over the responsibilities of the energy sector from the Ministry of Energy in 2005, was dissolved, and the Ministry of Economy has taken over the responsibility of the energy sector.
- The *Ministry of Environment (MoEN)*²: MoEN is in charge of development policies and strategies in field of environmental protection and economical utilization of the natural resources. On behalf of the Government of the Republic of Moldova, MoEN is responsible for implementation of international environment treaties to which the Republic of Moldova is a Part (including the UNFCCC, signed by the Republic of Moldova on June 12, 1992, ratified by the Parliament on March 16, 1995, as well as the Kyoto Protocol, ratified by the Republic of Moldova on February 13, 2003). Representatives of MoEN and subordinated institutions also perform the function of the GEF Political and Operational Focal Points, as well as UNFCCC Focal Point.

¹ <http://www.mec.gov.md/>

² <http://www.medi.gov.md/>

Further governmental agencies involved in the energy policy in the Republic of Moldova are:

- *Climate Change Office*³: The Climate Change Office of the Ministry of Environment is mainly focused on the implementation of climate change issues and environmental projects. The main area of activity of Climate Change Office is the elaboration, promotion and implementation of national policy on climate change. Priority fields on climate change issues promoted by the Climate Change office are related to decreasing of greenhouse gases (GHG) and adaptation to new climate conditions. Furthermore the Climate Change Office is the national contact point for the Clean Development Mechanism of the Kyoto Protocol.
- The *National Agency for Energy Regulation (ANRE)*⁴: ANRE was established in 1997 as an independent authority to support the introduction of market mechanisms in the energy sector, while protecting the interests of consumers and investors. It issues licenses, regulates fuel and power prices, establishes energy pricing principles and calculation methodology.
- The *National Agency for Energy Conservation (NAEC)*: NAEC was established in 1994; however it had to stop its activities in 2006 due to its restructuring. In July 2007, the Agency was re-launched and renamed as the Agency for Energy Efficiency. The regulation of the Agency for Energy Efficiency is currently under development. It is expected that the Energy Efficiency Agency will be operational by January 2010.

6.2.2. Non-Institutional Policy-Makers

Non-institutional policy-makers in the field of energy in the Republic of Moldova are:

- The *Academy of Sciences of Moldova (ASM)*⁵: The Academy, established in 1946, is the main scientific organization of the Republic of Moldova and coordinates research in all areas of science and technology.
 - *Institute of Power Engineering*⁶ of the ASM is a scientific organization which performs research works in the field of power end electrical engineering. The main directions of research being: energy security and efficiency of functioning of a power complex of Republic of Moldova; new technical decisions in construction of electric transmission and distribution lines, the equipment for management of regimes of smart energy networks; new methods of calculation of transients and stationary modes of operation in non-uniform circuits (lines) with the distributed and lumped parameters; efficient use of electricity and heat; installations and systems for energy conversion from renewable sources. Together with the Ministry of Economy the Institute of Power Engineering of the ASM has been responsible for the development of the Energy Strategy 2020.
 - *Agency for Innovation and Technology Transfer (AITT)*⁷ of the ASM was created by the Supreme Council of the ASM in order to coordinate, motivate and implement the mechanisms of innovation activity and technology transfer. Under the auspices of

³ <http://www.clima.md/>

⁴ <http://www.anre.md/>

⁵ <http://www.asm.md/>

⁶ <http://www.ie.asm.md/>

⁷ <http://www.aitt.md/>

AITT, within the 2005-2008 period there were finalized the following technology transfer projects in the field of EE and RES: (i) implementation of development scheme alternatives of the high tension current network of the energetic system of Moldova between Straseni 330 kV - Balti 330 kV - Soldanesti 110 kV; (ii) elaboration of the technology and of the equipment for biofuel production from vegetable raps oil; (iii) implementation of the complex technology of grape seeds processing with a view to obtain renewable energy sources; (iv) introduction of the technologies of processing forage wheat and corn for obtaining of ethanol and other products and their economical utilization; (v) introduction of the technology of the cultivation of sugar sorghum for obtaining the biomass for purposes of the production of bioethanol; (vi) introduction of the technology of obtaining food and technical oil, biofuel and second products from the oil of grapes and rape seeds; (vii) the implementation of new generation motor – internal combustion engine with a rod (without the crankshaft and connecting rod couple); (viii) development of electronic 3-phase frequency converter for asynchronous motor driving with power range up to 2.2 kW; (ix) electric motors with the improved technical and economic indices for the airtight pumps; (x) introduction of innovational energy-saving technologies in the industrial construction; (xi) testing of pilot-mini-hydroelectric station for irrigation and draining of land sections adjoining to the rivers Pruth and Dniester. The following technology transfer projects are currently ongoing in the field of EE and RES: (i) implementation of the equipment for biofuel production for motors with firing by compression; and (ii) implementation of the solar panel for water warming (public bathrooms, private houses, mobile box).

- *Technical University of Moldova (TUM)*⁸: TUM is the only higher education institution in the Republic of Moldova offering engineering and technological programs for almost all sectors of the national economy. The TUM comprises 10 faculties (Power Engineering, Engineering and Management in Mechanics, Engineering and Management in Machine Building, Computers, Informatics and Microelectronics, Radio-Electronics and Telecommunications, Technology and Management in Food Industry, Textile Industry, Civil Engineering, Urban Planning and Architecture, Economy and Business), 58 departments, 67 specialties and 85 specializations, as well as the Center for Continuing Education, the Center for High Technologies Implementation “ETALON”, the Students Training Center and several production centers and laboratories. Directly involved in the field of energy are the Faculty of Electrical Power Engineering, the Faculty of Mechanical Engineering and Management, as well as the Faculty of Urban Planning and Architecture.
- *“ENERGY plus”*⁹: ENERGY plus is a Non-Governmental Organization (NGO) working on the promotion of renewable energy sources in the Republic of Moldova. Closely related to the Technical University of Moldova, the NGO conducts research studies on renewable energy sources, lobbying and also pre-feasibility studies on solar and wind energy projects. The NGO created databases of the renewable energy sources potential and methodologies that could be consulted during future renewable energy sources projects.

⁸ <http://web.utm.md/>

⁹ <http://www.energyplus.utm.md/>

- The *Alliance for Energy Efficiency and Renewables (AEER)*¹⁰: AEER is a Moldovan NGO founded on May 14, 2007 as a follow-up of MUNEE program in Moldova implemented by the Alliance to Save Energy, the USA NGO, under USAID Project during 2001-2007. The goal of AEER is to contribute to the promotion of strategies and policies in the field of energy efficiency (EE), renewable energy resources (RES) and environment protection.

6.2.3. Decentralized Regulatory and Administrative Institutions

The five municipal authorities in the Republic of Moldova may establish their own energy efficiency programs under the existing legal framework. However, no such programs have been developed so far by the municipalities, even though the municipalities dispose of their own budget formation mechanism, mainly derived from local taxes, and a certain degree of autonomy compared to the nation level.

The regional and district levels dispose of the possibility to develop and implement policies. However, so far the only policies developed at the mentioned levels concern only strategic local action plans in the area of environmental protection, and not in the area of renewable energy sources or energy efficiency.

7. ENERGY LEGISLATION

The main energy policy documents of the RM's energy framework are shown in Table 6. One of the most important energy policy documents is the *Energy Strategy of the Republic of Moldova until 2020*, which has been published in 2007 (Government Decision Nr. 958 of August 21, 2007) and has three strategic objectives: 1) security of energy supply; 2) promoting energy and economic efficiency; and 3) liberalization of the energy market and restructuring of power industry.

Table 6: Energy Framework of the Republic of Moldova

| Document name | Type of Document | Date |
|--|--------------------------------|------------|
| Regulation on the Guarantees for Origin of Electricity Generated from Renewable Electric Energy and Biofuel | ANRE Resolution Nr. 330 | 03.04.2009 |
| Methodology for the determination, approval and application of tariffs for the electricity generated from renewable energy and | ANRE Resolution Nr. 321 | 22.01.2009 |
| Energy Strategy of the Republic of Moldova until 2020 | Government Decision Nr. 958 | 21.08.2007 |
| Law on Renewable Energy Sources | Parliament Resolution Nr. 160 | 12.07.2007 |
| National Program of Energy Conservation for the years 2003-2010 | Government Decision Nr. 1078 | 05.09.2003 |
| Establishment of the National Agency for Energy Conservation | Government Decision Nr. 1527 | 26.11.2002 |
| Regulation on the National Fund for Energy Conservation | Government Decision Nr. 1528 | 26.11.2002 |
| Law on Energy Conservation | Parliament Resolution Nr. 1136 | 13.07.2000 |
| Energy Strategy of the Republic of Moldova until 2010 | Government Decision Nr. 360 | 11.04.2000 |
| Law on Electricity | Parliament Resolution Nr. 137 | 17.09.1998 |
| Law on Gas | Parliament Resolution Nr. 136 | 17.09.1998 |
| Law on Energy | Parliament Resolution Nr. 1525 | 19.02.1998 |

¹⁰ <http://www.managenergy.net/actors/A5134.htm>

The Ministry of Economy monitors the progress of strategy implementation on a quarterly basis. Based on the mentioned three strategic objectives the following priorities have been defined:

- Establishment of an acceptable level of energy security by both construction of own power plants and the enlargement of the capacity of Moldova-Ukraine and Moldova-Romania high voltage interconnections lines
- Adherence to the regional electricity market in South East Europe with the aim to join the union for the co-ordination of transmission of electricity (UCTE) system
- Creation of conditions to ensure real market competition leading to cheaper electricity prices
- Full liberalization of the power market
- Strengthening of the gas transport network and improvement of energy efficiency.

7.1. Policy and Regulation on Energy Efficiency

Energy efficiency is a priority in the Republic of Moldova and strategic policy objectives for energy conservation have been defined in the *National Program of Energy Conservation for 2003-2010* (Government Decision Nr. 1078 of September 5, 2003). The Program is the main enacted policy document guiding government actions in pursuing increased energy efficiency of the economy. It sets out quantitative targets for efficiency improvements at the economy level, priority areas for energy conservation and efficiency interventions and it indicates activities to carry out in order to achieve stated objectives. The Program aims at increasing energy efficiency by minimizing energy intensity by 2-3% annually.

Secondary legislation elements like the law on ESCOs or regulation regarding energy conservation incentives are under development and will play a crucial role in supporting the implementation of the energy conservation policy.

7.2. Policy and Regulation on Renewable Energy Sources

There are three major documents on renewable energy policy in the Republic of Moldova: *Law of Renewable Energy*, approved through Parliament Resolution No. 160 from 12.07.2007; the ANRE Resolution No. 321 from 22.01.2009 on approving the *Methodology for the Determination, Approval and Application of Tariffs for the Electricity Generated from Renewable Electric Energy and Biofuel*, as well as the ANRE Resolution No. 330 from 03.04.2009 on approving the *Regulation on the Guarantees for Origin of Electricity Generated from Renewable Electric Energy and Biofuel*.

The Energy Strategy of the Republic of Moldova until 2020, foresees an increase of the share of renewable energy sources in the country's energy balance up to 6% in 2010 and 20% in 2020.

Furthermore the Energy Strategy deals with objectives, measures and activities orientated towards a more efficient, competitive and reliable national energy industry whilst ensuring the country's energy security, the upgrading of energy-related infrastructure, improved energy efficiency and the utilization of renewable energy sources, and its integration into the European energy market.

The Energy Strategy foresees the development of the energy potential of biomass (production of biofuel from cereals, sugar sorghum and oily technical cultures - rape, sunflower, grape seeds from wine industry etc.), solar energy by conversion to electricity and heat, wind, hydropower, and, in the future, new sources of energy.

7.3. International Commitments and Current Status of Implementation

The EU-Moldova Action Plan from 2004 is a political document laying out the strategic objectives of the cooperation between the Republic of Moldova and the EU. The implementation of the Action Plan will help fulfill the provisions in the Partnership and Cooperation Agreement (PCA) and will encourage and support the Republic of Moldova's objective of further integration into European economic and social structures.

Regarding energy, the Action Plan outlines the preparation of an updated energy policy converging towards EU energy policy objectives, a gradual convergence towards the principles of the EU internal electricity and gas markets and the improvement of the transparency, reliability and safety of the gas transit network.

8. CURRENT STATE OF THE ENERGY SECTOR

8.1. Energy Supply

Republic of Moldova has insignificant reserves of solid fuels, petroleum and gas, and a low hydroelectric potential (Table 7). This has led to a high dependence on energy imports (mainly from Russia and Ukraine) – with import levels varying within the 2000-2007 time series between 94% and 98% of total consumption.

Table 7: Energy Balance of the Republic of Moldova (without Transnistria) within 2000-2007 time series, ktoe

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|-------------------------------------|------|------|------|------|------|------|------|------|
| Interne sources | 72 | 85 | 92 | 87 | 84 | 87 | 92 | 88 |
| Liquid fuels | – | – | – | 2 | 8 | 10 | 7 | 16 |
| Solid fuels | 59 | 68 | 65 | 79 | 71 | 70 | 78 | 69 |
| Hydroelectricity | 13 | 17 | 27 | 6 | 5 | 7 | 7 | 3 |
| Import | 1776 | 1676 | 1785 | 1956 | 2096 | 2185 | 2157 | 2115 |
| Liquid fuels | 416 | 451 | 485 | 577 | 609 | 622 | 603 | 643 |
| Natural Gases | 888 | 981 | 977 | 1062 | 1083 | 1205 | 1201 | 1110 |
| Solid fuels | 66 | 88 | 98 | 166 | 115 | 103 | 105 | 110 |
| Electricity | 406 | 156 | 225 | 151 | 289 | 255 | 248 | 252 |
| Export | 4 | 2 | 1 | 12 | 42 | 3 | 4 | 7 |
| Stocks variation | -9 | 24 | -16 | 53 | -6 | -9 | -26 | 36 |
| Intern Consumption from which, for: | 1853 | 1735 | 1892 | 1978 | 2144 | 2278 | 2271 | 2160 |
| Production of electricity and heat | 935 | 810 | 802 | 681 | 783 | 842 | 817 | 767 |
| Technological needs, inclusive in: | 918 | 925 | 1090 | 1297 | 1361 | 1436 | 1454 | 1393 |
| Industry and Construction | 104 | 111 | 117 | 124 | 130 | 161 | 163 | 156 |
| Agriculture | 69 | 68 | 80 | 80 | 71 | 61 | 59 | 52 |
| Transport | 171 | 169 | 248 | 279 | 254 | 267 | 285 | 325 |
| Commerce and Public Service | 55 | 66 | 86 | 137 | 126 | 120 | 123 | 119 |
| Residential (sold to population) | 420 | 429 | 477 | 575 | 656 | 704 | 691 | 598 |
| Other | 99 | 82 | 82 | 102 | 124 | 123 | 133 | 143 |

Source: National Bureau of Statistics of the Republic of Moldova (2008), *Energy Balance of the Republic of Moldova (without Transnistria)*, 2007: *Statistical Book*. Chisinau: Statistica, 2008 (Statistica Moldovei), page 9.

Moldovan total energy resources amount for 2762 ktoe, most of which derive from natural gas and petroleum products, with shares of 45.3% and 27.7% respectively (see Table 8).

Table 8: The Structure of Main Energy Resource in the Republic of Moldova (without Transnistria) within 2000-2007 time series, %

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|-----------------------------|------|------|------|------|------|------|------|------|
| Total resources, inclusive: | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Coal | 5.5 | 6.3 | 6.4 | 9.3 | 7.7 | 6.8 | 6.7 | 6.6 |
| Diesel oil | 10.9 | 13 | 14 | 15 | 15.3 | 15.1 | 15.1 | 16.6 |
| Residual fuel oil | 3.2 | 3.3 | 2.4 | 1.7 | 1.4 | 1.1 | 1.1 | 0.9 |
| Gasoline | 7.3 | 8.4 | 9.8 | 11 | 10.8 | 10.6 | 9.7 | 10.2 |
| Natural gases | 42.9 | 49.4 | 45.8 | 46.2 | 43.4 | 47.1 | 47.7 | 45.3 |
| Liquefied gases | 2.4 | 3.3 | 3.1 | 3.1 | 2.9 | 2.8 | 2.6 | 2.7 |
| Fuel wood | 2.7 | 2.9 | 3 | 3 | 2.5 | 2.5 | 2.9 | 2.7 |
| Electricity | 21.1 | 9.1 | 12 | 7.2 | 12.3 | 10.6 | 10.5 | 10.8 |
| Other | 4 | 4.3 | 3.5 | 3.5 | 3.7 | 3.4 | 3.7 | 4.2 |

Source: National Bureau of Statistics of the Republic of Moldova (2008), *Energy Balance of the Republic of Moldova, 2007: Statistical Book*. Chisinau: Statistica, 2008 (Statistica Moldovei), page 11.

Moldova is dependant from electricity imports, which account for 9% of the total energy supply (see Table 9).

The years of transition brought about changes in the fuel mix of energy supply and consumption. Significant changes have occurred in the gas demand. Coal consumption has substantially decreased, while natural gas has become the main fuel for the power stations and boiler houses and has reached a share of 45% of primary energy supply.

In 2006, the Republic of Moldova electricity generation amounted for 2'866.8 GWh (1192 GWh produced on the right bank of Dniester and 1674.8 GWh produced on the left bank of Dniester) (Table 10 and Table 11), produced at 98% from imported gas.

Table 9: Energy Balance of the Republic of Moldova (without Transnistria) in 2007, ktoe

| Types of Energy and Fuels | Total resources | Resources | | | | Distribution | | | | |
|---------------------------|-----------------|------------------------------------|------------|----------------------------|--------|--------------------|--------|--------|--------------------|------------------------------|
| | | Stock at the beginning of the year | Production | Entries from other sources | Import | Intern consumption | Export | Losses | Other distribution | Stock at the end of the year |
| Coal, total, inclusive: | 156 | 46 | - | - | 110 | 78 | - | - | 2 | 76 |
| anthracite | 96 | 32 | - | - | 64 | 61 | - | - | 1 | 34 |
| Crude Oil | 9 | 1 | 8 | - | - | 8 | - | - | - | 1 |
| Diesel oil | 391 | 26 | 3 | - | 362 | 356 | - | 1 | - | 34 |
| Oven fuel | 1 | - | - | 1 | - | 1 | - | - | - | - |
| Residual fuel oil | 21 | 7 | 5 | 2 | 7 | 13 | 1 | - | - | 7 |
| Reactive engine fuel | 22 | 2 | - | - | 20 | 21 | - | - | - | 1 |
| Gasoline | 240 | 27 | - | - | 213 | 211 | - | 2 | - | 27 |
| Lubricants | 21 | 5 | - | - | 16 | 10 | 6 | - | - | 5 |
| Bitumen | 28 | 3 | - | - | 25 | 25 | - | - | - | 3 |
| Natural gases | 1069 | 14 | - | - | 1055 | 979 | - | 76 | - | 14 |
| Liquefied gases | 63 | 8 | - | - | 55 | 58 | - | 1 | - | 4 |
| Fuel wood | 64 | 13 | 51 | - | - | 48 | - | - | - | 16 |
| Wood residues | 11 | 3 | 8 | - | - | 7 | - | - | 1 | 3 |
| Agriculture residues | 10 | - | 10 | - | - | 10 | - | - | - | - |
| Electricity | 347 | - | 95 | - | 252 | 289 | - | 57 | 1 | - |
| Heat | 309 | - | 309 | - | - | 255 | - | 54 | - | - |
| TOTAL resources | 2762 | 155 | 489 | 3 | 2115 | 2369 | 7 | 193 | 4 | 190 |

Source: National Bureau of Statistics of the Republic of Moldova (2008), *Energy Balance of the Republic of Moldova, 2007: Statistical Book*. Chisinau: Statistica, 2008 (Statistica Moldovei), page 47.

Table 10: Electricity Production on the Right Bank of Dniester River in the Republic of Moldova within the 1990-2007 time series, GWh

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------------------------|------|------|------|------|------|------|------|------|------|
| Electricity Production – Total | 1883 | 1697 | 1591 | 1452 | 1236 | 1176 | 1398 | 1450 | 1246 |
| Combined Heat Power | 1815 | 1577 | 1518 | 1384 | 1189 | 1089 | 1309 | 1360 | 1160 |
| Hydroelectric Power Plant | 37 | 71 | 60 | 66 | 46 | 85 | 87 | 87 | 84 |
| Other Production Units | 31 | 49 | 13 | 2 | 1 | 2 | 2 | 3 | 2 |
| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Electricity Production – Total | 1134 | 931 | 1263 | 1179 | 1046 | 1022 | 1229 | 1192 | 1100 |
| Combined Heat Power | 1039 | 843 | 1188 | 1057 | 977 | 958 | 1137 | 1108 | 1061 |
| Hydroelectric Power Plants | 91 | 85 | 73 | 121 | 64 | 59 | 85 | 77 | 33 |
| Other Production Units | 4 | 3 | 2 | 1 | 5 | 5 | 7 | 7 | 6 |

Table 11: Electricity Production on the Left Bank of the Dniester River within 1990-2006 time series, GWh

| | 1990 | 1991 | 1992 | 1993 | 1995 | 1996 | 1997 | 1998 |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Electricity production – Total | 13789 | 11449 | 9666 | 8934 | 4986.6 | 4839.8 | 3923.5 | 3593.4 |
| Hydroelectric Power Plant | 220 | 227 | 198 | 308 | 239.7 | 279.4 | 295.0 | 224.0 |
| Thermal Power Plant | 13569 | 11222 | 9468 | 8626 | 4746.9 | 4560.4 | 3628.5 | 3369.4 |
| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Electricity production – Total | 2973.1 | 2720.0 | 3649.9 | 3228.5 | 3016.1 | 3156.6 | 2995.9 | 1674.8 |
| Hydroelectric Power Plant | 285.6 | 256.7 | 284.1 | 286.5 | 223.0 | 266.1 | 295.0 | 275.0 |
| Thermal Power Plant | 2687.5 | 2463.3 | 3365.8 | 2942.0 | 2793.1 | 2890.5 | 2700.9 | 1399.8 |

The energy system of the Republic of Moldova includes one large thermal power plant located in the Transnistrian region, three heat and power cogeneration (CHP) plants, two hydropower plants and 9 CHP plants within sugar factories. The total installed capacity of the country's power stations is about 3000 MW, of which only about 1600 MW are actually used, however. With small exceptions, all Moldovan power plants have an age of 20-45 years, showing an advanced rate of wear. The available capacity of hydroelectric power plants constitutes 30 MW. Sugar factories power plants have an installed capacity of 97.5 MW and are operated mostly seasonally to cover energy needs at the stage of processing sugar beet. Due to the obsolete and work-out condition of the generation equipment in the Moldovan Thermoelectrical Power Plant (MTPP), the available generation capacity is now estimated to be about 1200 MW. The electricity production capacities have a non-uniform territorial repartition, the majority (more than 80%) being concentrated on the left side of the Dniester River, i.e. in the de-facto autonomous region of Transnistria. It has to be noted, however, that the energy from Transnistria is not considered as imported energy in the energy balances of the country.

Overall in 2008, the electricity production in the Republic of Moldova – excluding Transnistria – amounted to 1'100 GWh, while 2'264 GWh were either produced in Transnistria or imported from Ukraine. The imports from Ukraine have been however decreased, as the import price of electricity was gradually being increased at a rate of USD cents 0.1 per month.

In 2008, United Energy Moldova, a subsidiary of the Czech J&T Finance Group, announced that it will invest EUR 600 mln into the construction of a new coal power plant with a capacity of 350 MW in the Ungheni district. It is expected that the new power plant will generate annually 735 GWh. The project envisages the construction of a high-voltage line from Ungheni to the city of Iasi in Romania. The power plant is supposed to be operative by 2011.

In 2006, heat supply in the Republic of Moldova amounted to 309 ktoe, covering around 10.8% of the final energy consumption of the country. Heat is mainly produced by gas (95%). The heat sector consists of centralized heat supply systems, decentralized systems (autonomous heat supply installations), and local systems. Heat is supplied in the large centralized heating systems from combined heat and power and large heat-only plants.

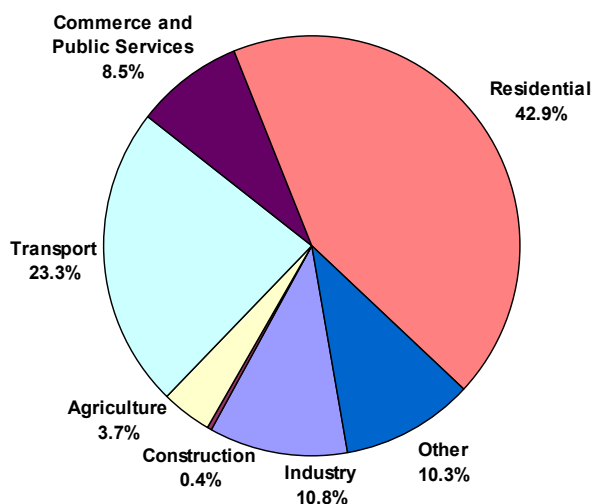
Municipal systems powered by large heat-only plants exist in Chisinau, Balti, and four other cities, while six other cities are supplied with heat from the combined heat and power units of the sugar factories. Local heating systems provide heat from local or industrial thermal plants in small towns. In total, about 75% of the urban dwellings in Moldova have district heating systems. In the early to mid-1990s heat supplies were still adequate although inefficient, while from the mid-1990s a progressive degradation of the heating networks throughout the country started. Currently, the utilization of the installed heat generation capacity is extremely low. Many boiler-houses, both industrial and communal ones, do not operate at all, and at the utilization factor is very low - about 0.40 for communal source, and between 0.1-0.7 for the industrial ones. The Chisinau and Balti combined heat and power plants generate more than 50% of the produced heat

8.2. Energy Demand

The residential sector is the first consumer of primary energy, representing 42.9% of the total consumption. The industry and the transport sectors amount respectively for 10.8% and 23.3% of the total final consumption (Figure 3, Table 12).

The energy consumption in the residential sector represents in average 5% of the yearly budget of households. After residential users (38.5%), the industry (31.2%) and commerce and public services (22.1%) sectors are predominant electricity users as shown in Table 13 and Figure 4. Overall, the electricity consumption in 2007 was with 3.364 TWh significantly lower than in 1990 when it used to be over 11.426 TWh.

Figure 3: Primary energy consumption by sectors in the Republic of Moldova (without Transnistria) in 2007 (in % of total final consumption)



Source: National Bureau of Statistics of the Republic of Moldova (2008), *Energy Balance of the Republic of Moldova, 2007: Statistical Book*. Chisinau: Statistica, 2008 (Statistica Moldovei), page 10.

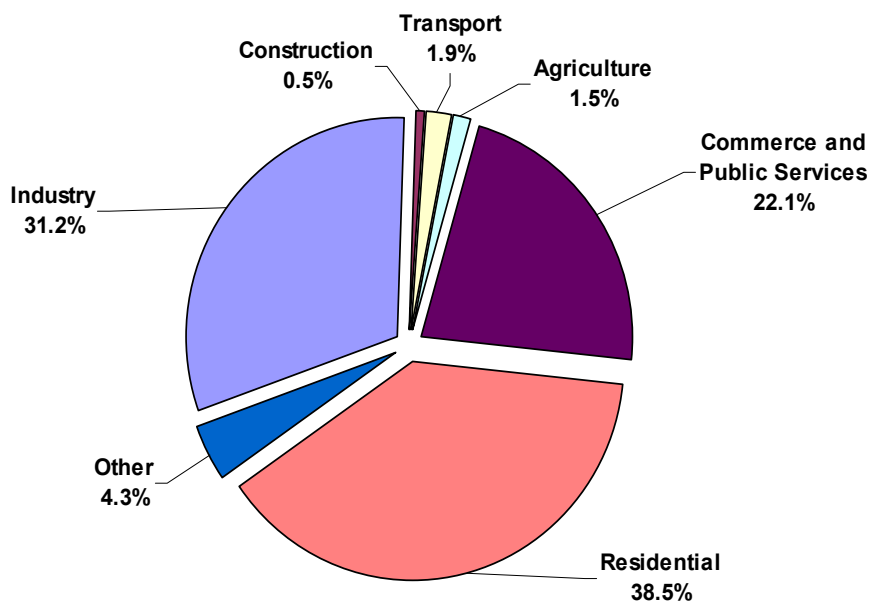
Table 12: Primary Energy Consumption by Sectors in the Republic of Moldova (without Transnistria) within 2000-2007 time series, ktoe

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|--|------|------|------|------|------|------|------|------|
| Primary energy consumption for technological needs, inclusive: | 918 | 925 | 1090 | 1297 | 1361 | 1436 | 1454 | 1393 |
| Industry | 100 | 107 | 113 | 121 | 126 | 157 | 157 | 150 |
| Construction | 4 | 4 | 4 | 3 | 4 | 4 | 6 | 6 |
| Agriculture | 69 | 68 | 80 | 80 | 71 | 61 | 59 | 52 |
| Transport | 171 | 169 | 248 | 279 | 254 | 267 | 285 | 325 |
| Commerce and Public Service | 55 | 66 | 86 | 137 | 126 | 120 | 123 | 119 |
| Residential (sold to population) | 420 | 429 | 477 | 575 | 656 | 704 | 691 | 598 |
| Other | 99 | 82 | 82 | 102 | 124 | 123 | 133 | 143 |

Source: National Bureau of Statistics of the Republic of Moldova (2008), *Energy Balance of the Republic of Moldova, 2007: Statistical Book*. Chisinau: Statistica, 2008 (Statistica Moldovei), page 10.

After residential users (49.9%), the industry (28.4%) and commerce and public services (18.0%) sectors are predominant heat users as shown in Table 14 and Figure 5. Overall, the heat consumption in 2007 was with 2'554 Gcal significantly lower than in 1990 when it used to be over 20'983 Gcal.

In 2007, residential and industry sectors accounted respectively for 53.2% for 29.8% of the total gas consumption, as shown Figure 8. In 2008 the gas consumption decreased for all categories of consumers, except households, thus revealing the tendency of constant decrease in natural gas consumption, registered in recent years.

Figure 4: Electricity Consumption by Sectors in the Republic of Moldova (without Transnistria) (in % of Electricity Final Consumption)


Source: National Bureau of Statistics of the Republic of Moldova (2008), *Energy Balance of the Republic of Moldova, 2007: Statistical Book*. Chisinau: Statistica, 2008 (Statistica Moldovei), page 13.

Table 13: Electricity Consumption by Sectors in the Republic of Moldova (without Transnistria) within 2000-2007 time series, GWh

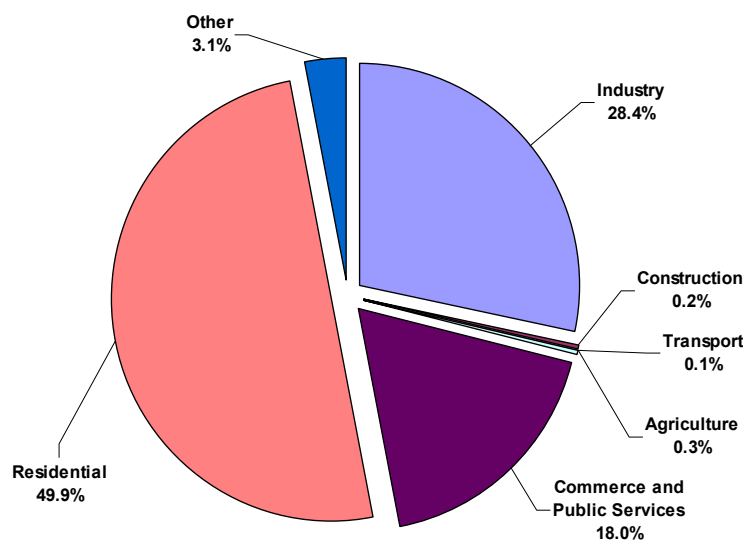
| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|----------------------------------|------|------|------|------|------|------|------|------|
| Total recourse | 3379 | 3390 | 3781 | 4629 | 4383 | 4196 | 4074 | 4031 |
| Total electricity consumption, | 2244 | 2206 | 2449 | 2527 | 2634 | 2921 | 3215 | 3364 |
| Industry | 627 | 648 | 733 | 865 | 871 | 974 | 1026 | 1049 |
| Construction | 11 | 10 | 9 | 8 | 10 | 10 | 14 | 15 |
| Transport | 61 | 60 | 61 | 51 | 47 | 50 | 58 | 65 |
| Agriculture | 71 | 59 | 63 | 52 | 48 | 51 | 55 | 50 |
| Commerce and Public Service | 393 | 347 | 566 | 581 | 539 | 671 | 753 | 745 |
| Residential (sold to population) | 790 | 813 | 774 | 836 | 964 | 1041 | 1154 | 1295 |
| Other | 291 | 269 | 243 | 134 | 155 | 124 | 155 | 145 |

Source: National Bureau of Statistics of the Republic of Moldova (2008), *Energy Balance of the Republic of Moldova, 2007: Statistical Book*. Chisinau: Statistica, 2008 (Statistica Moldovei), page 13.

Table 14: Heat Consumption by Sectors in the Republic of Moldova (without Transnistria) within 2000-2007 time series, thousand Gcal

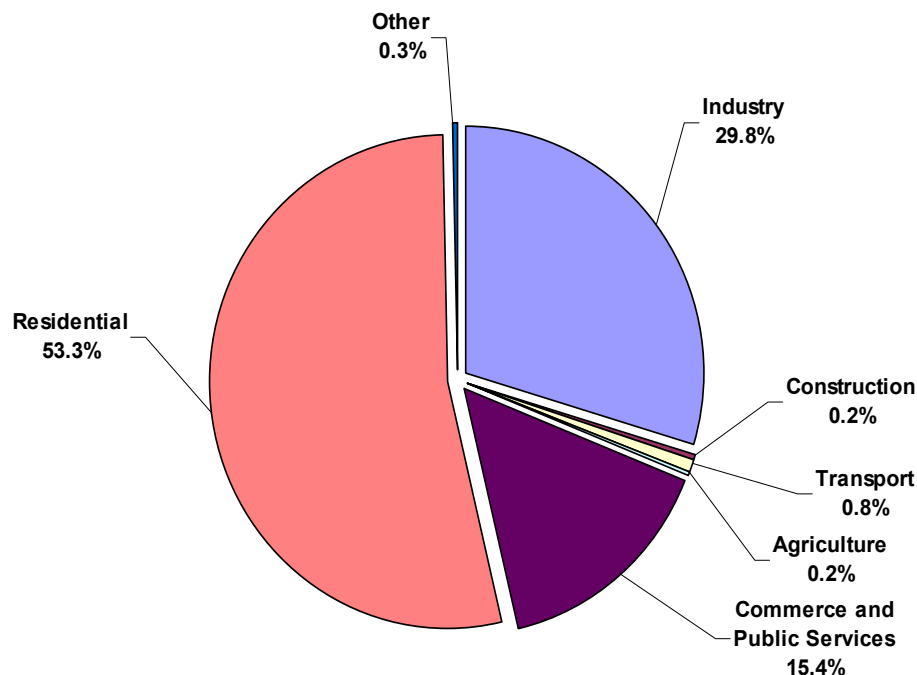
| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|------|------|------|------|------|------|------|------|
| Total recourse | 3057 | 3298 | 3217 | 3347 | 3147 | 3591 | 3552 | 3094 |
| Total electricity consumption, inclusive: | 2673 | 2809 | 2699 | 2799 | 2686 | 3084 | 2903 | 2554 |
| Industry | 909 | 984 | 987 | 935 | 1011 | 1007 | 932 | 724 |
| Construction | 4 | 3 | 3 | 4 | 4 | 5 | 6 | 6 |
| Transport | 3 | 4 | 4 | 4 | 2 | 2 | 4 | 2 |
| Agriculture | 38 | 18 | 13 | 11 | 14 | 20 | 10 | 8 |
| Commerce and Public Service | 428 | 582 | 422 | 471 | 436 | 568 | 506 | 460 |
| Residential (sold to | 1194 | 1128 | 1180 | 1288 | 1129 | 1395 | 1330 | 1274 |
| Other | 97 | 90 | 90 | 86 | 90 | 87 | 115 | 80 |

Source: National Bureau of Statistics of the Republic of Moldova (2008), *Energy Balance of the Republic of Moldova, 2007: Statistical Book*. Chisinau: Statistica, 2008 (Statistica Moldovei), page 16.

Figure 5: Heat Consumption by Sectors in the Republic of Moldova (without Transnistria) (in % of Heat Final Consumption)


Source: National Bureau of Statistics of the Republic of Moldova (2008), *Energy Balance of the Republic of Moldova, 2007: Statistical Book*. Chisinau: Statistica, 2008 (Statistica Moldovei), page 16.

Figure 6: Gas Consumption by Sectors in the Republic of Moldova (without Transnistria) (in % of Gas Final Consumption)



Source: National Bureau of Statistics of the Republic of Moldova (2008), *Energy Balance of the Republic of Moldova, 2007: Statistical Book*. Chisinau: Statistica, 2008 (Statistica Moldovei), page 48.

8.3. Energy Markets

8.3.1. Electricity

Electricity networks in the Republic of Moldova were designed as part of southern area of the former Soviet electricity system. At present, Moldova's electricity system operates synchronously with the Ukrainian electricity system and by extension with the Unified Electricity Systems of CIS.

Moreover the Ukrainian system is involved in providing balancing of the Moldovan power system, which lies in the responsibility of the Moldovan transmission and dispatching company Moldelectrica, and ensuring supply of an important share of electricity demand. Presently Moldova's electricity networks are interconnected with the Ukrainian electricity system via 6 lines of 330kV, and with the Romanian electricity system through 3 lines of 110kV, while a 400 kV over head power line (OHPL) ensures connection with the Bulgarian energy system; connections with Romania and Bulgaria are being made occasionally under an island regime.

Before 1997, the state company Moldenergo was the sole enterprise in charge for the production of electricity and heat. In 1997, however, the energy sector was subject to a reform, leading to a break-up of Moldenergo into 16 new entities, i.e. eight electricity generation companies, three district heating companies and five electricity distribution companies. As a step towards liberalization of the electricity market, three out of the five electricity distribution networks of the Republic of Moldova have been sold to the Spanish

utility and international investor Union Fenosa in 2000 for USD 26 mln. Overall, there are 27 licensed actors supplying electricity at non-regulated prices while five supply electricity at the regulated tariff.

According to the Ministry of Economy the Moldovan electricity market should be liberalized by 2015. The timeframe was deliberately set at 2015 since technical issues regarding the transmission and dispatching company Moldelectrica have still not been solved. Currently about 10% of the total electricity demand, is based on the consumption of eligible consumers, who are directly connected to the highest voltage level and procure their energy on negotiated contracts.

Electricity tariffs are determined by the National Agency for Energy Regulation (ANRE) for the different electricity distribution companies. This independent authority created in 1997 is in charge of defining the pricing principles, the methodology for price calculation and of regulating prices. According to ANRE, the tariffs are regulated for production, transmission and distribution. Accordingly, for each sector of the energy value chain different methodologies are applied. Principally a cost-plus methodology is being applied in order to guarantee the recovery of investments. ANRE is supervising the investments of the utilities very strictly in order to understand if they are rational. In general the applied methodologies are valid for up to five years, while the prices are being adjusted yearly. The tariffs for all components are being calculated and approved gradually and by the end of the year the deviations are being calculated and necessary adjustments being made. It has to be noted however that the regulated prices from ANRE do not apply to the Transnistrian region. Tariffs have been progressively raised from above 37 EUR/MWh in 2003 to 74.5 and 81 EUR/MWh in 2008. For consumers connected to the high-voltage 110 kV lines and equipped with meters of high performance at the delineation points in the distribution network of Union Fenosa, tariffs reached 53.5 EUR/MWh. Social tariffs for low income households are available.

The prices of the state-owned distribution companies RED North and RED North-West are slightly higher than the ones of their private counterparts RED Chisinau, RED Centre and RED South (Union Fenosa), which covers 60% of the Moldovan population, despite their lower fuel purchasing costs and relatively lower distribution losses.

8.3.2. Gas

Local demand of natural gas is covered by imports from Gazprom purchased by a Russian-Moldovan joint venture company called JSC Moldovagaz, whose shareowners are Gazprom (50%), the Republic of Moldova (37%) and the region of Transnistria (13%). JSC Moldovagaz owns upstream pipelines for transporting natural gas on the territory of the Republic of Moldova.

Tiraspoltransgaz SRL is the transmission and distribution operator of natural gas on the territory of Transnistria.

The natural gas supply system consists of about 1'400 km network of upstream pipelines, four compressors stations and 74 distribution stations. The total length of high, medium and low pressure pipelines were about 15'735.4 km at the end of 2007. The Republic of Moldova is also a transit country for gas deliveries from Russia to central-eastern Europe. International upstream pipelines towards Bulgaria cross the territory of the Republic of Moldova with a length of 100 km. The annual amount of transited natural gas is about 25 bln m³.

In spite of the fact that the natural gas market was officially opened by law at present it can not be considered a functional market, because the supply of natural gas is limited by a single supplier, which is GAZPROM. It controls the transmission networks that provide access to other sources of supply such as those in Middle Asia. This makes it practically impossible to contract natural gas supplies from other sources. In 2008, 12 gas distribution enterprises operated in the Republic of Moldova, the biggest of which is Chisinau-gas LLC, with a market share of over 60% of the total final supply in 2008.

The contractual price for natural gas purchased from GAZPROM increased significantly since 2007, from 170 USD/1000 m³ to 284 USD/1000 m³ in the fourth quarter of 2008. This price increase, together with milder temperatures, led to a decrease in gas consumption in the RM of about 8% in 2008 compared to the previous year.

Like for electricity, gas tariffs are determined by the ANRE. They are based on costs and depend on consumption and consumer types. Social tariffs exist for the low income households. In 2008, tariffs for gas supply were recalculated by the ANRE inter alia in order to abolish cross-subsidies and ranged between 206-244 EUR/1000 m³ (3'200-3'800 MDL/1000 m³).

8.3.3. Heating

District heating systems operate currently in Chisinau, Balti and in some district centers in the country (Aneni Noi, Cahul, Calarasi, Cimislia, Edineti, Glodeni, Stefan Voda, Ungheni). Heat supply to consumers in Chisinau is performed by JSC „Termocom”. Transmission of thermal energy to customers in Chisinau is made by heat supply pipelines (224 km), inter-district heating pipelines (265 km) and hot water supply pipelines (214 km), as well as underground polyurethane insulated pipelines (9'173) km and 491 central thermal points. In the city of Balti the company CHP-North, operator of the local CHP plant, performs both heat production and distribution. Distribution of heat and hot water in Balti is carried out by a 195.2 km heat supply network and 67 heat distribution points.

The National Program for renovation and decentralization of heating supply responsibilities to municipalities sets up directions for developing the heating sector until the year 2010. Government objectives in this area include upgrading urban systems for heating supply through the rehabilitation of centralized district heating systems in Chisinau and Balti and by building mini-CHP plants in other residential areas across the country.

The number of district heating companies decreased dramatically since 2000 and in 2004 only eight cities were fully or partially supplied with district heat. Decentralized heating systems now meet residential and public sector demands while industry has almost completely disconnected from district heating systems. In the period of 2003– 2005 over 400 thermal stations were built for the decentralized supply to customers, including 148 units in 2005. This trend will continue in the future, first of all in order to ensure heating supply to customers in rural areas. As primary energy natural gas and local renewable energy sources (solar energy and solid, liquid and gaseous biofuels) will be used.

The tariff setting for heat supply in the Republic of Moldova was transferred to municipalities in 1999. There are different prices for hot water and steam. Prices of centralized heating and hot water supply are set by the suppliers in coordination with the governmental agencies. In case of disagreement, prices are defined by the agencies for a limited period.

The heating tariffs vary substantially between cities, mainly depending on the fuel used. In Chisinau, where natural gas is used as a fuel, the tariff in 2004 was 15 EUR/Gcal (233 MDL/Gcal), while in other cities, where diesel fuel is used, the tariff reached 32 EUR/Gcal (500 MDL/Gcal). This was a considerable increase over the last 20 years as prices were at around 4.5 EUR/Gcal (70 MDL/Gcal) in 1999.

ANRE is setting tariffs for the steam and hot water supplied by the state owned combined heat and power plants.

Non-payment in the district heating sector is an enduring problem according to the EnCharter PEEREA report. The heating services have worsened constantly in recent years and many customers refuse heat supply. However, during the last few years the payment rate for district heating has increased almost 98%, due to the fact that the government is now providing social tariffs, which ensure a high payment rate.

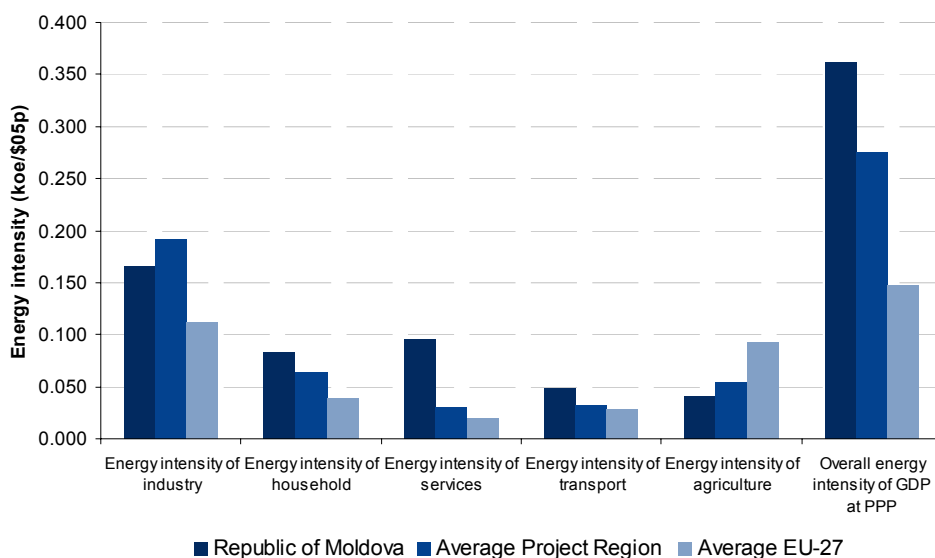
According to the Ministry of Economy the payment rate in the district heating sector was even 104% in 2008, since consumer paid back debts that they accrued over the years. In the past non-payments were related to the poor quality of the heating provided, since the temperature provided by the district heating system to the apartments was insufficient.

8.4. Potential for energy savings and increase in efficiency

8.4.1. Energy Intensity

The energy intensity of gross domestic product at purchasing power parities for the Republic of Moldova in 2007 is significantly higher than the EU-27 average and the region average (see Figure 7).

Figure 7: Energy intensity at purchasing power parity

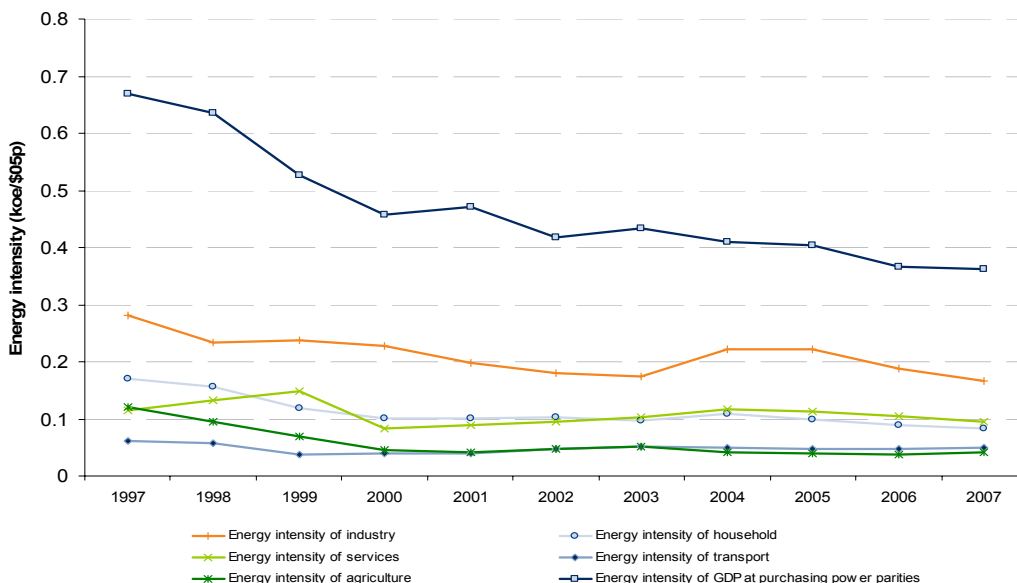


Source: Enerdata (2007)

The period following independence in 1991 has been characterized by a significant decrease in energy use in the country. This reduction in energy consumption is not a sign of improved energy efficiency, but is due to many other factors inherent to the transitional

period, including production crisis, financial difficulties and irregular energy supply. Final energy consumption in 2007 was still 75% lower than in 1990.

Figure 8: Energy intensity in the Republic of Moldova by sector at purchasing power parity



Source: Enerdata (2007)

Table 15: Indices on consumption of energy resources and energy intensity in the Republic of Moldova, 2000-2007

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|--------|-------|-------|-------|-------|-------|-------|-------|
| Intern consumption of energy resources, ktoe | 1853 | 1735 | 1892 | 1978 | 2144 | 2278 | 2271 | 2160 |
| Distribution of electricity – total, GWh | 3379 | 3390 | 3781 | 4629 | 4383 | 4196 | 4074 | 4031 |
| Consumption of electricity – total, GWh | 2244 | 2206 | 2449 | 2527 | 2634 | 2921 | 3215 | 3364 |
| Industrial output (current prices), million lei | 8167.7 | 10428 | 12624 | 15963 | 17591 | 20770 | 22371 | 26174 |
| Energy intensity of industrial production, toe/1000 lei | 0.227 | 0.166 | 0.15 | 0.124 | 0.122 | 0.11 | 0.102 | 0.083 |
| Electricity intensity of industrial production, kWh/1 lei | 0.414 | 0.325 | 0.3 | 0.29 | 0.249 | 0.202 | 0.182 | 0.154 |
| Per capita average annual energy consumption, toe/person | 0.509 | 0.478 | 0.522 | 0.548 | 0.595 | 0.633 | 0.633 | 0.604 |
| Per capita average annual electricity consumption, kWh/person | 929 | 934 | 1044 | 1282 | 1216 | 1166 | 1136 | 1127 |
| GDP, million lei (current prices) | 16020 | 19052 | 22556 | 27619 | 32032 | 37652 | 44754 | 53354 |
| Import of energy resources, ktoe | 1776 | 1676 | 1785 | 1956 | 2096 | 2185 | 2157 | 2115 |
| Share of import to the intern energy consumption, % | 95.8 | 96.6 | 94.4 | 98.9 | 97.7 | 95.9 | 95.1 | 97.9 |
| GDP per 1 kg oe of intern energy consumption, lei | 8.65 | 10.98 | 11.92 | 13.96 | 14.94 | 16.52 | 19.71 | 24.7 |
| GDP per 1 kWh of intern electricity consumption, lei | 7.14 | 8.64 | 9.21 | 10.93 | 12.16 | 12.89 | 13.92 | 15.86 |

Source: National Bureau of Statistics of the Republic of Moldova (2008), *Energy Balance of the Republic of Moldova, 2007: Statistical Book*. Chisinau: Statistica, 2008 (Statistica Moldovei), page 51.

In line with this development the energy intensity of gross domestic product declined by 46% in the past decade (Figure 8). Despite this large decrease, Moldova's economy still has a high level of primary energy consumption per unit of gross domestic product compared with the two reference values (EU-27 and project region average) as stated above.

The energy intensity of the industrial sector is well above the EU-27 average but below the region average and decreased by over 40% since 1997 (Figure 8).

The energy intensities of the household, services and the transport sector are significantly higher than both the EU-27 and the project region average. Nevertheless all mentioned sectors witnessed a considerable drop in energy intensity levels in the last decade. The only sector, which is below the EU-27 as well as the region average, is the agricultural sector, which experienced the highest decrease in terms of energy intensity of all sectors since 1997.

8.4.2. Energy Losses from Electricity and Gas Grids

The share of technological and commercial losses at the distribution level amounted to 14.5% in 2008, showing a constant decrease compared to previous years. The effective losses of the distribution companies that were submitted to the National Agency for Energy Regulation (ANRE) for 2008 amounted to 10.97% for RED North, 13.59% for RED North-West and 15.38% for RED Union Fenosa. The total energy transmission and distribution losses are estimated to be in the range of 15-25%. Especially the distribution companies controlled by Union Fenosa have been upgrading the meter cables and replacing the domestic meters, thus improving the prevention of theft and reducing commercial losses.

100% of industrial and residential electricity customers have a conventional meter installed. In case of non-payment, customers can be disconnected within 30 days. Reconnection to the electricity grid is possible after paying for consumption and an additional tax for reconnection. Gas meters for residential and industrial customers are installed. If one meter is installed for a house with more than one apartment then the indicated consumption is divided equally by the number of persons in the house.

8.4.3. District Heating Grid

Ever since the mid-1990s a progressive degradation of the heating networks throughout the country has started. In addition to old and inefficient heat production plants, it is estimated that over 15% of the heat produced is lost due to the long distribution lines of the two largest district heating systems in Chisinau and Balti. According to JSC "Termocom", losses of heat are as high as 19– 21%, but used to be even higher in 2001 with 36%. Reducing losses of heat supply networks remains a priority for the energy sector and complies with EU policies including the Green Paper of 2006. A key issue in this context is energy efficiency regulation, including installation of energy efficient equipment and optimization of heat demand. Around 80% of residential buildings are equipped with collective heat meters but households do not have any incentive to reduce their consumption.

8.4.4. Other sources of inefficiency

Apart from the above mentioned inefficiencies in the energy sector, no information is available regarding other relevant sources of energy inefficiency in the Republic of Moldova.

8.4.5. Estimated potential for energy savings by sector

According to the Energy Strategy of the Republic of Moldova to the year 2020, it is estimated that a well-planned and concerted implementation of an energy efficiency program in Moldova could reduce the financial impact of the energy sector on the gross domestic product by 1.6 - 1.7% per year, starting with 2008.

8.4.6. Development of markets for energy efficiency

Lack of financing limits the demand for energy services until now. No real ESCO have been created but there are engineering companies that have worked on donor-financed turn-key contracts in the range of USD 50'000 to USD 150'000.

8.5. Renewable Energy Sources and Future Deployment Potential

8.5.1. Deployment of Renewable Energy Sources

Hydro power accounts for a mere 12.3% of electricity generation in the Republic of Moldova, while biomass and waste represent also around 1.5% of the heat generation.

The hydro generation is based on the output of two hydro power plants, i.e. Dubasari (48 MW) and Costesti (16 MW). The total installed capacity of six micro hydro stations, which have been built by individuals or enterprises, is 141 kW.

8.5.2. Markets for Renewable Energy Sources

The market for renewable energy sources in the Republic of Moldova is still in an early stage.

8.5.3. Estimated Potential for Renewable Energy Sources

In 2001, the Technical University of the Republic of Moldova conducted a research project with the goal to establish the Wind Atlas of the Republic of Moldova. The results of this study show that there are favorable zones for wind installations, with wind speed equal or exceeding 7 m/s at 50 m above ground (*five wind power plants with a total installed capacity of 204 MW are currently being considered for development in Moldova, inclusive: 64 MW in Cotibana, Cahul district; 44 MW in Baimaclia, Cantemir district; 58 MW in Poborna, Floresti district; 26 MW in Nucareni, Telenesti district and 12 MW in Dubna, Soroca district, the project developer being the MODEOLE Ltd*). The overall wind potential is estimated to be 1'000 MW, while the Energy Strategy 2020, foresees an installed wind capacity of about 26-34 MW in 2015, capable of generating 89-111 GWh.

In order to achieve the goals established in the Energy Strategy 2020, about one million m² of solar installations for water heating and 80'000 m² of solar installations for the drying of agricultural products, such as tobacco, are required up to 2010. Based on this estimates up

to 40'000 toe of fuel could be substituted, while the required installation of photovoltaic cells for electricity production would amount to 6'300 kW.

The potential of wood combustion and agricultural and wooden wastes in the Republic of Moldova is estimated to be 820'000 toe, while the biogas potential is estimated to be 3.7 mln m³. Currently one power plant is being constructed in Chisinau, which will operate on solid waste and methane recovered from landfills. The power plant is expected to be operational by the end of 2009. Furthermore Accord, a non-governmental organization that has been set up in cooperation with the State Agrarian University of Moldova, is active in the exploration of new possibilities for utilization of biomass as renewable energy source. The aim of the project, which has been financed by the Czech Republic, is to explore all possibilities along the value chain of biomass and thereby identifying the biomass exploitation potential. Different residues have been analyzed and storage and processing facilities, as well as boilers been set up. The project was finalized in 2008 and proved that the overall energetic balance is positive (taking into account all energy used during the value chain).

The potential for biofuels in the Republic of Moldova is currently unknown. However, some estimates show that with the use of 50'000 ha, which represents 2.5% of the overall arable land in the country, 52'500 t of biofuel could be produced, which would cover 26% of the fuel need for agricultural works.

The overall hydro potential is estimated at 3 TWh, of which 1.9 TWh could derive from large hydro and the remaining 1.1 TWh from small hydro plants.