FOREWORD

The subject of Security of Supply (SoS) Statements for 2013 is the first SoS that the Ministry of Economy (MoE) of the Republic of Moldova (RoM) is submitting to the Energy Community (EnC) Secretariat.¹

'Security of supply' means the ability of an energy (electricity, gas and oil) system to supply final customers with respective (network) energy, as provided for under respective EU directives addressing the SoS issue.

The satisfactory SoS can be reduced to the unsatisfactory level due to several possible reasons: non-existence and/or reduced availability of indigenous energy resources; operational constrains of various nature (technical an non-technical) in the production / transport / supply chain; import inadequacy (single source and/or supply routes) or due to insufficient interconnections and non-existence of contingency plans in critical situations etc., however, which cannot be regarded as force majeure. Inadequate legal / regulatory and institutional / organisational and contractual arrangements may impose additional risks to the SoS.

On the other hand, proper planning and implementation of investments projects and other measures can significantly improve the SoS in the RoM, by establishing (i) an adequate level of generation capacity, (ii) an adequate balance between supply and demand, and (iii) c) an appropriate level of interconnections between the EU member states and Contracting Parties (CP) to the Energy Community Treaty (ECT), in our case Romania and Ukraine.

However, as each country’s energy systems have their own characteristics, the SoS in the RoM has to be observed with the country’s own conditions and peculiarities.

Generally, observing SoS contributes to providing transparency in the planning process, which is a prerequisite for timely implementation of both investment projects as well as operational measures to safeguard adequate SoS in the country.

Article 29 of the Treaty calls the CPs to the Treaty establishing the Energy Community ("the Treaty") to adopt Security of Supply statements starting one year after the entry into force of the Treaty. (Note: the RoM joined the Energy Community (EnC) in 2010.)

The SoS shall be communicated with the EnC Secretariat and updated every two years.

The minimal scope of the SoS statement addresses (i) diversity of supply, (ii) technological security, and (iii) geographical origin of the imported fuels.

Decision 2008/03 of the Ministerial Council of the Energy Community (MC-EnC) that the oil sector is considered as network energy also implicitly introduced obligation for the CPs to include oil within SoS statements, the oil sector falling within the scope of the Directive 2006/67/EC at that time. (Note: a new Directive 2009/119/EC of 14 September 2009 was subsequently developed. At the

¹ The presented SoS is prepared in line with the guidelines adopted at the 19th PHLG meeting (v. 23.02.2013) for the electricity an oil sector and update of the same guidelines dated February 2013 submitted to the Contracting Parties of the Energy Community Treaty by the EnC Secretariat. Unless otherwise stated it reflects the situation as of end September 2013.
Security of Supply Statements of the Republic of Moldova

MC-EnC meeting of 18 October 2012, a separate proposal was made to extend the relevant acquis on oil stocks to this Directive, the implementation of which would be due by 1 January 2023).

Article 4 of the Directive 2003/54/EC requires monitoring and reporting on SoS in the electricity market as well Article 7 of the Directive 2005/89/EC refers to the reporting requirements on SoS in the electricity sector also addressing adequacy of the system to cover projected demand for specified time horizons.

ACRONYMS

ASM Academy of Sciences from Moldova
BAT Best available technology
CAIDI Customer average interruption duration index
CET Centrale electrice de termificare (CHP)
CHP Combined heat and power plant (CET)
CP Contracting Party (to the ECT)
CPA Central public authorities
DoESEE Department of Energy Security and Energy Efficiency
ECT Treaty Establishing the Energy Community (Energy Community Treaty)
EnC Energy Community
DSO Distribution system operator
GoM Government of Moldova
HPP Hydro power plant
HV High voltage
ICS Intreprindere capital strain (Foreign capital company)
IS Intreprinderea de Stat (State enterprise)
JSC Joint stock company
LoE Law on Electricity (No. 124 of 23 December 2009)
LoEE Law on Energy Efficiency (No. 142 of 2 July 2010)
LoNG Law on Natural Gas (No. 123 of 23 December 2009)
LoRE Law on Renewable Energy (No. 160 of 12 July 2007)
LPA Local public authorities
MC-EnC Ministerial Council of the Energy Community
MD Moldova
MDL Moldovan lei
MoE Ministry of Economy
MPS Moldovan power system
MV Medium voltage
RE Renewable energy
RED Retele electrice de distributie (DSO)
RES Renewable energy sources
RoM Republic of Moldova
SA Societate pe actiuni (Joint stock company)
SAIDI System average interruption duration index
SAIFI System average interruption frequency index
SE State enterprise
SoS Security of Supply
SRL Societate cu raspundere limitata (Limited liability company)
TPP Thermal power plant
TSO Transmission system operator
UA Ukraine
# TABLE OF CONTENTS

## 0 INTRODUCTION – BRIEF OVERVIEW OF THE ENERGY SECTOR OF THE REPUBLIC OF MOLDOVA

## 1 ELECTRICITY

1.1 Key market players and description of their role

1.2 Relevant basic legal and regulatory framework in the sector

1.3 Electricity balance (2010-2012)

1.4 Existing power system capacities

   1.4.1 Generation

   1.4.2 Transport (transmission and distribution)

1.5 Technological and operational security of the power system

   1.5.1 Contractual arrangements

   1.5.2 Import of electricity

   1.5.3 System reserve

   1.5.4 Reactive power compensation

   1.5.5 Congestion management

   1.5.6 Electricity network losses

   1.5.7 Quality of services of distribution network operators

1.6 Electricity supply

   1.6.1 Diversity of electricity supply

   1.6.2 Electricity prices for captive customers (1997-2012)

   1.6.3 Instruments and measures to compensate shortfalls in electricity supply

1.7 Electricity consumption and peak power demand – current status and forecast for the next 5 years (2013-2018) and beyond

   1.7.1 Electricity consumption

   1.7.2 Peak power demand

   1.7.3 Power demand balancing instruments and associated risks

1.8 Planned investments in new power system infrastructure in the next 5 years (2013-2018)

   1.8.1 Generally on investment environment

   1.8.2 Planned retirement of existing power generation capacities and planned new power generation projects and capacities – prospects for the next 5-year period and beyond

   1.8.3 Ability to meet future peak-demand

   1.8.4 Planned supply patterns

   1.8.5 Planned new power transmission projects and capacities
Security of Supply Statements of the Republic of Moldova

2 GAS .................................................................................................. 45

2.1 KEY MARKET PLAYERS AND DESCRIPTION OF THEIR ROLE .................. 45
2.2 REGULATORY FRAMEWORK ................................................................ 45
2.3 DIVERSIFICATION OF SOURCES AND GAS SUPPLY NETWORKS .......... 46
2.4 TECHNOLOGICAL SECURITY AND QUALITY AND LEVEL OF NETWORK MAINTENANCE 47
2.5 SECURITY OF SUPPLY AND SECTOR FUNCTIONING UNDER THE STATE OF EMERGENCY CIRCUMSTANCES ................................................................. 48
2.6 GAS IMPORT AND SUPPLY .................................................................... 50
2.7 GAS CONSUMPTION ............................................................................. 52
2.8 INVESTMENT PROJECTS AND FORECASTS OF SECTOR DEVELOPMENT ........ 55
   2.8.1 Implementation of the 3rd Energy Package in the gas sector ............... 55
   2.8.2 Strategic development directions and next actions ............................. 56
   2.8.3 Priority investment projects ................................................................. 58
   2.8.4 Development plan of Moldovagaz SA for 2013-2015 .......................... 59
   2.8.5 Other possible investment projects ....................................................... 62

3 OIL .................................................................................................. 63

3.1 Brief overview of “upstream” operations ................................................. 63
3.2 Key market players in “downstream” operations ....................................... 63
3.3 Basic legal and regulatory framework ...................................................... 64
3.4 Oil balance (historic realisation: 2000-2012 and forecast by 2020) .......... 65
3.5 Diversity of the crude oil/petroleum products supply .............................. 66
   3.5.1 Import and production of petroleum products .................................... 66
   3.5.2 Petroleum products importers ............................................................... 68
   3.5.3 Import prices .................................................................................... 70
   3.5.4 Petroleum products operational reserves .......................................... 72
3.6 Outlook for establishment of mandatory oil stocks ................................. 72
   3.6.1 Estimated costs of providing mandatory oil reserves by 2020/2030 ....... 73
0 INTRODUCTION – BRIEF OVERVIEW OF THE ENERGY SECTOR OF THE REPUBLIC OF MOLDOVA

The overall energy balance of the RoM including Transnistria² for the last available year of 2011, is shown in Figures 0.1-0.4.

In total primary energy supply³ of the country, natural gas is by far the predominant energy form (64%). It is 100% imported (from Russia). Nearly 100% of oil products are also imported, representing 26% in total primary energy supply and ranked second. Coal and biofuels & waste represent mere 3% each while all other energy forms are below 1%. The share of imported electricity is no more than 2%. Due to imports of all hydrocarbons, however, the overall energy dependence of the RoM is very high - 97%.

---

² Based on OECD/IEA sources because the National Bureau of Statistics in Chisinau does not cover Transnistria in energy balances.

³ Denotes gross inland energy consumption including energy used in transformations (e.g. power plants, CHPs etc.), losses of energy transportation systems to final consumers and final energy consumption.
At the final energy consumption level, oil products represent by far the major share (39%) followed by natural gas (21%) and electricity (20%). Also, heat supplied through district heating systems has a visible share of 11%.

Breakdown of final energy consumption by sector demonstrates that as much as 65% of energy is consumed by the so-called Other consumption, the details of which are further shown in Figure 0.4, followed by transport (18%) and industry with a share of mere 6%.

The Other consumption sector is dominated by the Residential sector which represents as much as 72%, follows by Commerce and public services (18%) and Agriculture (4%).

When observing the mainland (i.e. the right bank of the Dniester River) of the RoM only, there is a considerable difference in the structure of total primary energy supply because the major part of imported natural gas is shown in the energy balance of the mainland under electricity purchases from the Moldavskaya GRES (CERMS) located in Transnistria, while the main characteristics of final energy consumption pattern are similar to the overall pattern of the country as described above.
In general, the Moldovan energy sector on the mainland is overwhelmed with difficulties. High dependence on imported gas and electricity, historical debts, outdated electricity generation and district heat production systems, inefficient district heating systems, together with tariffs set well below economic levels in the past, all contributed to the poor performance of the sector still today.

The mainland of the RoM is a transit country and considerable importer of energy as aforementioned with only 5% of primary energy demand met from indigenous energy resources of the mainland. Such outrageous energy dependence makes the country’s economy very vulnerable to any external disturbance in energy supply, energy price fluctuations and there unpredictability in the future. The prevailing situation also represents a threat for social security and a severe risk for development of national economy in the future.

The RoM is poor in energy resources. There are no reserves of coal and oil while exploratory works for gas have been abolished several years ago. Regarding renewable energy sources (RES), the potential is limited and quite average in wind and solar. Due to intensive activities in agriculture, cattle breeding and vinery, biomass is regarded as the only considerable and attainable potential for extensive exploitation for energy purposes.


The Moldovan electric power system is operated as part of the IPS/UPS (Figure 0.5) electricity system, which is not synchronised with the ENTSO-E (UCTE) system of the other Energy Community (EnC) countries, which prevents the RoM to access the internal electricity market in the rest of EnC and further in EU, as well as represents a serious impediment for investments in power generation in the RoM and in reinforcement of the power grid towards EnC and EU.

![Figure 0.5: Major synchronous transmission grids in Europe and CIS](image)
There is quite poor diversification of primary energy supply as natural gas represents approx. 64% of the total primary energy supply of the country. Natural gas is supplied by Russia, through Ukraine and Transnistria. It is predominantly consumed by energy companies in the central transformation sector (CHPs, heat only plants) – 45%, followed by Residential sector – 31% and Commerce and public services - 19%.

The RoM is an important transit country / route for securing natural gas supply regionally (Russian gas via Ukraine and the RoM to Romania, Bulgaria, Turkey and FYR of Macedonia). The construction of another gas interconnection (Ungheni - Iasi) with Romania started in August 2013. The RoM has no gas storage capacity on its territory.

Business operations in the natural gas sector are carried out by Moldovagaz SA with JSC Gazprom of Russian Federation as the major shareholder. Due to existence of the single source of import and supply of natural gas at regulated tariffs, according to the ANRE Resolution No. 408 of 06.04.2011, the natural gas market in the RoM is regarded as non-competitive.

The RoM has only minor own oil production facilities (12,000 t/a). There are no oil exploration activities and no oil pipeline in the country. The RoM has a small refinery of nominal processing capacity of 100,000 t/a. As a consequence, the RoM imports petroleum products (from Romania, Belarus, Greece, Russia and Ukraine), about 600,000 t/a of gasoline and diesel oil and some 70,790 t/a of LPG (2012).

Detailed data on oil storage capacity are not available, however, it is estimated at some 150,000 t including State and industry facilities (excluding army).

In conditions of poor domestic energy resources, energy efficiency is a cornerstone of future energy strategy, because improvement of energy efficiency is one of the rear activities that can be controlled by the State itself. However, in order to safeguard progress and success the country needs very strong institutional framework, capacity building, developed policies and plans, financing mechanisms in place and, last but not least, considerable support of donors particularly in the initial stage of implementation. In February 2013, the first National Energy Efficiency Action Plan (NEEAP) for the period 2013-2015 was adopted.

Regarding renewable energy sources (RES), according to available data, the overall technical potential of RES is estimated at 113.4 PJ, of which solar (50.4 PJ) and wind (29.4 PJ) represent about 70% of the total RES potential, while the rest is biomass (21.5 PJ or 19%) and hydro (12.1 PJ or 11%). However, it still has to be studied which technologies are suitable to enter the renewable energy market or be promoted via the state-driven incentive schemes in order not to endanger technical stability of the Moldovan power system MPS as well as not to entail too high electricity tariffs increases which would cause social problems and/or be not justifiable from the macro-economic viewpoint of the RoM.

The Energy Efficiency Fund was established in June 2012, with an aim at promoting, developing and financially supporting investment projects in the area of energy efficiency and renewable energy sources.
1 ELECTRICITY

The description of Moldovan power system (MPS) in the following refer to the part located on the right bank of the Dniester River, despite the fact that the major part of power generation capacities are located on the left bank (Transnistria). However, due to complicated political situation associated with this territory, the main energy sector institutions mainly located in the capital (Chisinau) have limited actual control over the power system in Transnistria. The electricity export license is the only energy activity license granted to an energy undertaking in Transnistria (Moldavskaya GRES) by the national regulatory authority – ANRE.

1.1 KEY MARKET PLAYERS AND DESCRIPTION OF THEIR ROLE

Apart from the executive branch of state administration powers designated to Government of Moldova (GoM), the line ministry responsible for energy is Ministry of Economy (MoE), which is according to the Law on Energy empowered with energy sector administration and being primarily in charge of energy sector policies and legal framework development. As Central Government Authority, the MoE through its Department for Energy Security and Energy Efficiency (DoESEE) is also in charge of SoS of energy (electricity, gas, oil, district heating etc.). Other responsibilities of MoE/DoESEE include:

- elaboration and promotion of state policies in energy sector;
- elaboration of concepts and programs on energy sector development;
- monitoring the implementation of development and investments programs;
- elaboration of normative documents in the field of energy;
- development of international energy relations, including on acquisition of strategic energy resources, attracting investments, development of energy interconnections, and development of the energy market;
- management of state energy property;
- supporting competition and limiting the monopolistic presence in the energy sector.

Related to SoS, the MoE elaborates and implements measures to ensure the energy security in the country.

The National Agency for Energy Regulation (ANRE) was established in 1997 and is a permanent central public regulatory authority having the status of a legal entity which is not subordinated to any other public or private authority. ANRE as an independent authority to support the introduction of market mechanisms in the energy sector, while protecting the interests of consumers and investors has the following competences:

- supervision of the enforcement of energy laws;
- promotion and insurance of fair competition and efficient operation of energy markets;
- issuance of licenses for licensed energy activities on energy market (according to Law on Natural Gas, Law on Electricity and Law on Petroleum Products Market);
- monitoring the fulfilment by licensees of their obligations and application of provisions of laws listed above;
- promotion of an adequate tariff policy following the interest of both producers and consumers;
Security of Supply Statements of the Republic of Moldova

- approving tariffs calculated based on approved methodologies and monitoring of their application;
- supervising the application of necessary and justified costs principle by regulated operators for regulated activities;
- supervising the consumers rights protection.

The specific role of ANRE in achieving SoS is in approving costs of power system maintenance and planed investments by regulated companies.

The **Competition Council** is the authority for safeguarding that provisions of the Law on Competition are implemented properly.

On the other side is power industry. The key market players are power system undertakings – legal persons are:

1) **Generation:**
   - *CET-1 SA, CET-2 SA in Chisinau and CET-Nord SA in Balti* (all CHPs are regulated producers of electricity);
   - *Nodul Hidroenergetic Costesti IS* (HPP Costesti – regulated producer);
   - *Moldavskaya GRES or CERMS*;
   - CHPs in sugar industry.

2) **Transmission (incl. central dispatch):** *Moldelectrica IS* is the state-owned single power transmission system operator (TSO) of RoM, which also provides market operator functions however in a limited scope at present.

   Moldelectrica IS manages the internal transmission network on the right bank of the Dniester River. With respect to SoS, the TSO is typically responsible for:
   - Ensuring ancillary services (reserve, load-frequency control and balancing energy) (not included in the licence or in the law) required for operation of the power system;
   - Dispatching of power generation units connected to the transmission network (not included in the licence or in the law);
   - Congestion management;
   - Purchasing energy for covering transmission system losses (not in place yet);
   - Maintenance and planning / construction of power transmission system.

3) **Distribution and supply at regulated tariffs**\(^4\) consists of 3 distribution system operators (DSO): *RED Nord SA, RED Nord-Vest SA* (both state-owned) and *ICS RED Union Fenosa SA* (privately-owned), the latter covering about 70% of the overall electricity supply on the right bank of the Dniester River. With respect to SoS, the DSOs are typically responsible for:
   - Ensuring balancing energy required for their consumers;
   - Dispatching of power generation units connected to the distribution system;
   - Purchasing energy for covering distribution system losses;

---

\(^4\) Note: According to Law on Electricity (No. 124) Distribution and Supply should have had separate accounts and become legally unbundled by 1.1.2013. However, in reality, the accounts are separated while legal unbundling has not been achieved yet as this is now postponed by 1.1.2015, in accordance with Draft Law amending and supplementing Law on Electricity.
• Maintenance and planning / construction of power distribution system.

4) Supply at non-regulated tariffs: Energocom SA is a state-owned electricity supplier and trader on the wholesale market in charge of managing electricity import contracts with Ukraine. In addition, there are 7 smaller suppliers currently licensed by ANRE, however, their scope of activity is rather marginal;

5) Mixed (network/generation) functions: are performed by Dnestrenergo JSC company of Tiraspol, which operates Eastern electricity networks in Dubasari city, South Eastern electricity networks in Tiraspol city and HPP Dubasari;

6) Final consumers (since 1 January 2013):
   • Eligible consumers: all non-households consumers, however, only one of them is active and actually uses its eligibility right to freely choose its supplier on the market;
   • Non-eligible (household) consumers: 1,207,731 (as of end 2012).

In summary, on the electricity market there are 6 licensed generators, 3 suppliers at regulated tariffs, 8 suppliers at non-regulated tariffs, 3 distribution system operators and 1 transmission system operator (status as of 2 July 2013). The three distribution system operators act as default suppliers and play the role of the "supplier of the last resort" in their respective supply area.

According to art. 52 coupled with art. 46 from Law on Electricity, No.124 of December 23, 2009, starting with January 1, 2013, all non-household consumers are declared eligible and thus are entitled to buy electricity from any electricity generator or supplier, including from abroad. In terms of energy, the market is open 54.7%. According to the Treaty Establishing the Energy Community (ECT), the full liberalization of the energy market in the RoM is set for 1 January 2015.

1.2 RELEVANT BASIC LEGAL AND REGULATORY FRAMEWORK IN THE SECTOR

In order to promote development of the electricity sector, the legal framework was developed constantly during the last few years having a clear objective to align it to the European framework and relevant acquis on electricity of Energy Community.

The key normative act governing the electricity sector, notably Law on Electricity (No. 124-XVIII) is dated prior to Moldova’s full-fledged membership in EnC (23 December 2009). The law transposed Directive 2003/54/EC concerning common rules for the internal market in electricity and thus created the necessary framework for its implementation, particularly by:

• Defining respective competences of central and local governmental authorities, and the powers, functions and rights of ANRE, including rules on regulation of tariffs;
• Defining concept of public service obligations and basic rules for imposition of such obligations;
• Defining market opening schedule for the power sector etc.

However, the law remained short in transposition of Directive 2005/89/EC of 18 January 2006 of the European Parliament and of the Council on security of electricity supply and infrastructure investments. Since mid-2012, the RoM has been making its best endeavours to eliminate the pending issues by preparation of Draft Law amending and supplementing Law No. 124-XVIII ‘On Electricity’, which is awaiting governmental approval and adoption by the Parliament by the end of 4Q2013. By that, the country’s obligations under the Second Energy Package will be fulfilled.
Security of Supply Statements of the Republic of Moldova

Law on Renewable Energy (No. 160) was adopted in 2007. However, due to supplemented *acquis* on renewables in October 2012, the RoM is currently in process of finalising a new Law on Promotion of Energy from Renewable Sources, which will replace the previous law. The new law will fully transpose the Directive 2009/28/EC of 23 April 2009 of the European Parliament and of the Council on the promotion of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Prior to its adoption, the MoE will launch the standard public consultation process in 4Q2013.

The new RES law is important for RES-E issues, which can also impact the SoS of electricity.

The district heating sector is very important for the country from various aspects. Thus, Moldova being committed to introduce reforms also in this sector accepted the obligation to transpose the Cogeneration Directive 2004/8/EC, which became part of the budget support SPSP Energy programme between Moldova and the EU and a policy target by end 2013, despite this Directive (i) is not part of *acquis* under the ECT, and (ii) has already been repealed by adoption of new Directive 2012/12/EU on Energy Efficiency on 25 October 2012. Despite that, a draft new Law on Heat has been prepared, the adoption of which is likely by the end of 2013.

Apart from primary legislation, there are several decisions of ANRE in the field of electricity, notably:

- No. 266/20.11.2007 regarding approval of the technical norms for electricity transmission network;
- No. 267/20.11.2007 regarding approval of the technical norms for electricity distribution networks;
- No. 75/12.12.2002 regarding approval of the electricity market rules, amended by the Decision of ANRE no. 320/16.01.2009;
- No. 382/2.7.2010 regarding approval of the regulation on electricity metering for commercial purposes;
- No. 411/27.4.2011 regarding the methodology for determination, approval and implementation of electricity transmission service;
- No. 497/20.12.2012 regarding the methodologies for calculation, approval and adjustment of tariffs for electricity distribution services, the methodology for calculation, approval and adjustment of regulated tariffs for electricity supply;

and additionally, the ANRE’s resolutions in the field of RES, notably:

- No. 321/22.01.2009 regarding methodology of determination, approval and application of tariffs for electricity produced from renewable energy and biofuel;
- No. 330/03.04.2009 regarding guarantees of origin for electricity produced from renewable energy sources;

followed by five decisions of ANRE regarding the level of tariffs for electricity produced from renewable energy sources that were issued to interested investors in solar, wind and landfill gas RES-E facilities (No. 389/11.11.2010, No. 493/30.11.2012, No. 510/27.2.2013, No. 511/27.2.2013 and No. 519/30.5.2013).

After the amended and supplemented Law on Electricity and new Law on the Promotion of Energy from Renewable Sources are adopted there will be a need to amend and supplement some existing regulations and develop some new ones to ensure proper implementation of new provisions.

The transposition of the Third Energy Package into national legislation is planned to start in 1Q2014 in accordance with Government plans.
### 1.3 ELECTRICITY BALANCE (2010-2012)

Selected elements of electricity balance for the last 3 years (2010-2012) are shown in Table 1.1.

<table>
<thead>
<tr>
<th>SN</th>
<th>Category</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Purchases and Imports, of which:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>From Moldavskaya GRES</td>
<td>3,027.5 (77.3%)</td>
<td>3,139.4 (78.6%)</td>
<td>3,278.4 (60.1%)</td>
</tr>
<tr>
<td></td>
<td>From Ukraine</td>
<td>3,007.8 (99.2%)</td>
<td>2,478.6 (78.8%)</td>
<td>2,432.7 (74.2%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24.8 (0.8%)</td>
<td>665.6 (21.2%)</td>
<td>845.7 (25.8%)</td>
</tr>
<tr>
<td>2</td>
<td>Net own electricity production, of which:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CHP-1 Chisinau</td>
<td>888.1 (22.7%)</td>
<td>854.3 (21.4%)</td>
<td>776.1 (19.2%)</td>
</tr>
<tr>
<td></td>
<td>CHP-2 Chisinau</td>
<td>665.4</td>
<td>655.9</td>
<td>636.4</td>
</tr>
<tr>
<td></td>
<td>CHP North Balti</td>
<td>57.1</td>
<td>57.8</td>
<td>54.5</td>
</tr>
<tr>
<td></td>
<td>HPP Costesti</td>
<td>78.3</td>
<td>75.5</td>
<td>33.5</td>
</tr>
<tr>
<td></td>
<td>Other domestic generators</td>
<td>5.3</td>
<td>5.3</td>
<td>4.0</td>
</tr>
<tr>
<td>3=1+2</td>
<td>Total available for the system (gross inland consumption), of which purchased by:</td>
<td>3,915.6</td>
<td>3,993.7</td>
<td>4,050.3</td>
</tr>
<tr>
<td></td>
<td>RED Union Fenosa</td>
<td>2,842 (72.6%)</td>
<td>2,901 (72.7%)</td>
<td>2,949 (72.8%)</td>
</tr>
<tr>
<td></td>
<td>RED Nord</td>
<td>651 (16.6%)</td>
<td>663 (16.6%)</td>
<td>664 (16.4%)</td>
</tr>
<tr>
<td></td>
<td>RED Nord-Vest</td>
<td>342 (8.7%)</td>
<td>344 (8.6%)</td>
<td>353 (8.7%)</td>
</tr>
<tr>
<td></td>
<td>Eligible consumers</td>
<td>80 (2.0%)</td>
<td>84 (2.1)</td>
<td>84 (2.1)</td>
</tr>
<tr>
<td>4</td>
<td>Losses, of which:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transmission losses</td>
<td>606.5 (15.5%)</td>
<td>587.3 (14.7%)</td>
<td>572.2 (14.1%)</td>
</tr>
<tr>
<td></td>
<td>Distribution losses</td>
<td>109.6 (2.8%)</td>
<td>111.8 (2.8%)</td>
<td>113.4 (2.8%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>496.9 (13.0%)</td>
<td>475.5 (12.2%)</td>
<td>458.8 (11.6%)</td>
</tr>
<tr>
<td>5=3-4</td>
<td>Available for final consumption (incl. eligible consumers), of which:</td>
<td>3,309.1</td>
<td>3,406.4</td>
<td>3,479.9</td>
</tr>
<tr>
<td></td>
<td>Non-households:</td>
<td>1,799.2 (54.3%)</td>
<td>1,865.9 (54.7%)</td>
<td>1,905.0 (54.7%)</td>
</tr>
<tr>
<td></td>
<td>(of which eligible consumers)</td>
<td>(77.4)</td>
<td>(81.7)</td>
<td>(81.8)</td>
</tr>
<tr>
<td></td>
<td>Households</td>
<td>1,512.4 (45.7%)</td>
<td>1,542.8 (45.3%)</td>
<td>1,574.9 (45.3%)</td>
</tr>
<tr>
<td>or by electricity supplier and other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RED Union Fenosa</td>
<td>2,376 (71.7%)</td>
<td>2,449 (71.9%)</td>
<td>2,511 (71.1%)</td>
</tr>
<tr>
<td></td>
<td>RED Nord</td>
<td>565 (17.1)</td>
<td>580 (17.0%)</td>
<td>581 (16.7%)</td>
</tr>
<tr>
<td></td>
<td>RED Nord-Vest</td>
<td>289 (8.7%)</td>
<td>293 (8.6%)</td>
<td>301 (8.7%)</td>
</tr>
<tr>
<td></td>
<td>Eligible consumers and other</td>
<td>82.4 (2.5%)</td>
<td>87 (2.5%)</td>
<td>86 (2.5%)</td>
</tr>
<tr>
<td>6=3-4-5</td>
<td>Accounting difference</td>
<td>0.0</td>
<td>0.0</td>
<td>-4.2</td>
</tr>
</tbody>
</table>


In the last 3-year period, own electricity generation on the mainland has been permanently decreasing while electricity demand was increasing.

In 2012, generation decreased by 78.2 mill. kWh (9.2%) vs. the previous year thus registering the lowest level (776.1 mill. kWh) since 2001. The decrease as compared to the previous year was typical for all electricity generators, and the most considerable decrease in production volume by 2.3 times (by 42.0 mill. kWh) occurred in HPP Costesti because the power plant was out of operation during the entire second part of 2012 due to capital repairs and modernization. Also, electricity generation by CHP-1 Chisinau decreased significantly by 20.3%, this trend being noticed for the third year in a row with a production volume of only 40.8% of the level of 2009.
In the same year, electricity consumption was 3,479.9 mill kWh which is by 71.1 mill. kWh (or 2.1%) more than in the previous year. Such an upward demand trend, except for 2009, has been observed since 2000.

Thus the amount of electricity generated on the mainland covers today no more than around 19% of electricity demand. Such trends denote a state of increased electricity dependence and vulnerability in terms of SoS.

Electricity demand on the mainland is met by approximately 20% production of electricity from the CHPs and one HPP, while the rest is generally accounted as imports from Ukraine and acquisitions from Moldavskaya GRES. In practice, the remaining approximately 80% of energy comes from Transnistria (2/3) and the remaining 1/3 as statistically correct import from Ukraine. In energy statistics accounting standards, however, actually no more than 20% would be accounted as import because Moldavskaya GRES in Transnistria would be accounted as indigenous production.

Electricity imported from Ukraine is primarily for power system balancing purposes as there is no suitable power generation units for system reserve and balancing energy demand on the mainland.

Unfortunately, little can be improved at least in the next medium-term of 3-5 years. Due to poor natural energy resource endowment of the country with fossil fuels and geopolitical position of the country (landlocked country with no direct access to the Black Sea), apart from limited harnessing of energy from renewable sources for electricity production (RES-E), the Energy Strategy 2030 does not envisage any diversification of fuels in power generation by 2030.

Another risk for the SoS is quite limited technical reliability and consequently, availability of existing power and CHP plants due to very high rate of wear and tear of the facilities. All power plants and CHPs are at least 20 years old, while CHP-1, for example, is already more than 50 years old. The very high rate of wear and tear in energy production and transportation (transmission and distribution) facilities have severe adverse impacts on both technical (capacity availability, efficiency of fuel conversion, energy distribution losses, etc.), as well as economic performance of energy utilities, thus representing a risk for SoS.

### 1.4 Existing Power System Capacities

#### 1.4.1 Generation

The principal power generation facilities in the RoM are:


- CHP 1 (or CET-1 in Chisinau) (1951-1961), natural gas-fired, installed electrical capacity 66 MWe (available capacity about 40 MWe) and installed thermal capacity 254 Gcal/h;

- CHP 2 (or CET-2 in Chisinau) (1976-1980), natural gas-fired, installed capacity 240 MWe / available capacity 210\(^5\) MWe and installed thermal capacity 1,200 Gcal/h, of which only 540 Gcal/h is installed at the cogeneration units and 660 Gcal/h is installed in five heat only boilers. Due to the fact that heat load of consumers decreased

---

5 The available capacity of 210 MWe corresponds to the case when designed heat power is produced at this CHP. Due to the significant decreasing of the last the effective available capacity is much lower during the year.
significantly heat only boilers are used only for a very short time in winter when the air temperature is very low. Some heat only boilers were conserved and it may be considered that at present the available heat capacity 540 Gcal/h in cogeneration mode and about 300 Gcal/h in heat only boilers;

- CHP North in Balti (or CET Nord, Balti) (1956-1970), natural gas-fired, installed 24 MWe / available 21 MWe and installed thermal capacity 342 Gcal/h, of which 200 Gcal/h constitutes the capacity of two heat only boilers. Due to the fact that the existing equipment of the power plant is not old it is considered that the available heat capacity is approximately the same as installed one, however heat load decreased significantly in comparison with designed capacity;

- Nine6 CHPs (or CETs) of sugar mills (1956-1981), natural gas-, coal- and heavy fuel oil-fired, installed capacity 98 MWe / available capacity for the power grid of around 207 MWe (the remaining is self-consumption);

- HPP Dubasari (or CHE Dubasari) (1954-1966) in Transnistria, installed capacity 48 MW / available capacity 48 MW;

- HPP Costesti (or CHE Costesti) (1978), installed capacity 16 MW / available capacity being the same, however during most of time when this generating unit produces electricity its capacity is not more than 10 MW on average.

The nominal installed power generation capacity on the whole territory of the RoM amounts to 3,016 MW. However, based on the current contracts, not more than approximately 1,305 MW (43%) of this capacity is actually available for the mainland. As regards the mainland only, out of total 448 MW of installed power generation capacities (incl. sugar mills), which represents not more than 15% of total installed capacity of the country, no more than 310 MW (69%) can be actually used at the moment, while on the other hand, due to complicated contractual arrangements, not more than 960 MW (37% of installed capacities in Transnistria) is available for the mainland.

The mainland power capacities generate electricity in the base-load which is not dispatched, the output of which highly depends on the needs for district heating. Typical power generation mode is shown in Figure 1.1, which demonstrates that between 200-260 MW is produced in the 3 winter months only, 120-140 MW during the 2 spring and autumn months, while between as low as 15 MW and 60 MW is generated in all other months of the year.

Moldavskaya GRES having a possibility to combine / commit several units with reasonable technical ability to vary the load, demonstrates considerable flexibility in its production mode by following the daily load curves (Figure 1.2). Its production can vary between 250 MW and 800 MW over the day.

The production of Moldavskaya GRES exceeds the demand of the RoM in total. Some power (up to 130 MW, see Figure 1.3)) depending on a season and actual demand is exported to Romania in circumstances that part of Romanian consumers become isolated from ENTSO-E network and are connected to the IPS/UPS system (island mode).

The power exchanges with Ukraine vary considerably every hour over the year, as the role of its power system is to provide balancing energy and load-frequency control services to the RoM and additional regular energy if needed by the MPS or in case of reduced production in the Moldavskaya GRES.

---

6 At present, only four Sugar CHPs are known to be in operation: Cupcini, Drochia, Glodeni and Falesti. http://lex.justice.md/document_rom.php?id=1C05448F:8A46BBDC

7 The available to the grid capacity of Sugar CHPs depends much on sugar plant operation conditions during the year.
Security of Supply Statements of the Republic of Moldova

Figure 1.1: Average commitment of power generation units on mainland (CHP-1, CHP-2, CHP-North, HPP Costesti) by month and hour (MW)

Figure 1.2: Average commitment of power generation units in Moldavskaya GRES by month and hour (MW)

Figure 1.3: Average exchange of power with Romania by month and hour (MW)
1.4.2  Transport (transmission and distribution)

The power transmission system operator Moldelectrica IS manages the internal electricity transport networks on the right bank of the Dniester River, including 5,977.5 km transmission lines of 400, 330, 110kV, and 2,5877.4 km distribution lines of 35 and 6-10kV voltage levels (Table 1.2 and Figure 1.4). The medium-voltage (MV) distribution lines are mainly of radial type.

The high-voltage (HV) Interconnections with neighbouring countries include:

- 7 lines of 330kV and 11 lines of 110kV with Ukraine;
- 3 lines of 110kV and 1 line of 400kV with Romania.

The HV interconnection between Moldova and Romania is made up by the 400kV overhead line Vulcanesti-Isaccea, and three lines of 110kV. There is a critical need for additional HV lines to fulfil the operational reliability and safety criterion and to increase the interconnection capacity in the future.

The transmission network of the RoM was once optimised and constructed to serve the needs of the interconnected system of former Soviet Union when it was still synchronised with Romania, Bulgaria and most eastern European countries (SUDEL). Today, after Romania and all of these countries have joined the ENTSO-E network, the disconnected MPS system demonstrates certain limitations in operational stability and power exchange possibilities.

### Table 1.2: Key elements of the existing electricity transmission and distribution network

<table>
<thead>
<tr>
<th>Voltage level (kV)</th>
<th>Lines</th>
<th>Transformers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length (km)</td>
<td>Number (-)</td>
</tr>
<tr>
<td>Transmission system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>202.5</td>
<td>1*)</td>
</tr>
<tr>
<td>330</td>
<td>532.4</td>
<td>5 (3*)</td>
</tr>
<tr>
<td>110</td>
<td>5,231.1</td>
<td>166 (131*)</td>
</tr>
<tr>
<td>Transmission – total</td>
<td>5,977</td>
<td></td>
</tr>
<tr>
<td>Distribution system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>1,378.4</td>
<td>122 (49*)</td>
</tr>
<tr>
<td>6-10</td>
<td>2,449.9</td>
<td>14,698 (1*)</td>
</tr>
<tr>
<td>Distribution - total</td>
<td>2,5877.4</td>
<td></td>
</tr>
</tbody>
</table>

Note: *) Owned by Moldelectrica IS.
1.5 TECHNOLOGICAL AND OPERATIONAL SECURITY OF THE POWER SYSTEM

1.5.1 Contractual arrangements

According to the Law on Electricity, the Electricity Market Rules and issued licenses each supplier of electricity at regulated tariffs should sign bilateral contracts for purchasing electricity at the lowest price that will enable it to cover the demand of all its final consumers, and all such contracts should be notified to the regulator (ANRE).

Electricity suppliers and eligible consumers are obliged to buy all electricity produced by CHPs and hydropower plants on mainland which *de facto* represents all electricity produced on mainland at present. In this respect, each supplier at regulated tariffs signs contracts on electricity purchase with CHPs and the hydropower plant, according to the supplier’s market share.

For the remaining part of needed electricity the suppliers and eligible consumers sign bilateral negotiated contracts typically on an annual basis. At present, the two state-owned suppliers RED
Nord SA and Red Nord-Vest SA have such contracts with Energocom SA for electricity imports from Ukraine, while ICS RED Union Fenosa SA\(^8\) has direct contract with Moldavskaya GRES. Further on, Energocom SA has direct contract with the Ukrainian wholesale supplier, which is selected based on Ukrainian bid for the allocation of the available Ukraine-Moldova cross-border capacity.

Any contract on electricity purchase by suppliers should be presented to the TSO (Moldelectrica IS) to be examined in regard of technical possibility to implement such contracts.

Each electricity supplier at regulated tariffs and eligible consumers sign contracts with Moldelectrica IS for provision of transmission services by TSO.

### 1.5.2 Import of electricity

Apart from electricity imports from Ukraine as being part of the interconnected and synchronized IPS/UPS system, electricity import is technically also possible from Romania, however, only in island mode due to different frequency standards of ENTSO-E.

At present, the price for electricity coming from Ukraine (based on different power units, mostly on coal-fired condensing power units and based on a combination of gas-fired combined cycle and gas-, coal-fired condensing units) is at the same level as the price of electricity purchased from Moldavskaya GRES of 5.2 EUR cents/kWh (without VAT). In case of generation unit outage in Moldavskaya GRES, the load is covered by the Ukrainian power system at the same price for electricity.

Except Energocom SA, there are seven other independent electricity suppliers at non-regulated tariffs (licensed by ANRE) that potentially could enter into the competition to provide cheaper electricity, either referred to base or balancing power. However, due to lack of credibility, financial strength of these suppliers as well as severe conditions put by producers and external suppliers no contracts with them have been recorded until now.

In 2011, another set of contractual provisions was established for balancing power from Ukraine. If the day before planned dispatched load exceeded effectively the frame of ± 50MW the price for balancing power was twice higher as base electricity.

Import capacity from Ukrainian power system to Moldova is limited by the static stability criterion. It is limited by so-called "control interface Ukraine - Moldova, Odessa", which consists of 4 lines of 330 kV Dniestrovscia HPP (UA) - Balti (MD), Kotovsk (UA) – Moldavskaya GRES (MD) and Adjalik (UA) - Usatovo 1 and 2 (UA). Import capacity depends on power flow value of “Control Interface” for the region Odessa, the configuration of the Moldova and Ukraine transmission lines, the number of generation units in operation at Moldavskaya GRES and HPP Dniestrovscia. In case of normal network topology, allowable power flow through "Control Interface" varies and depends on the number of generating units operating at Moldavskaya GRES and HPP Dniestrovscia and is ranged within 1,250–1,500 MW. In 2011, the maximum load of "Control Interface" to Odessa was 900 MW and the amount of import capacity from Ukraine to Moldova was in the range of 350-600 MW.

The maximum value of import capacity from Romania through all 3x110kV and 1x400kV interconnection lines is in the range of 150 - 200 MW (in island mode).

\(^8\) Note: Since May 2011, ICS RED Union Fenosa SA has been using also a commercial mark »Gas Natural Fenosa«.
1.5.3 System reserve

Due to its deficient power generation capacity on the mainland (approximately 300 MW available vs. 800 MW of the winter peak-load), very peculiar power generation conditions (heat demand driven CHPs and small-scale HPP with vulnerable hydrology) and involved technologies, mainland of the RoM has practically no power system reserve in winter and summer when the CHPs are generally out of operation due to no heat demand. All typical types of reserves envisaged in the technical Norms of the Electricity transmission network (primary, secondary, fast tertiary and slow tertiary reserves) have to be consequently provided from outside (Ukraine) including frequency control services. Moldavskaya GRES may provide some reserves, however, by now there has been not such agreement established and prices negotiated. The Technical Norms also provide the conditions and requirements under which the reserves are provided.

1.5.4 Reactive power compensation

For normal operation, the internal transmission network is sufficient for current consumption levels. However, during grid maintenance or grid outages there might appear some local or system power supply problems. Reactive power generated in the system (generators and power lines) is greater than the reactive load consumed and that imposes a need to implement the appropriate voltage control equipment, which is lacking at the moment. One of the local system problems refers to the southern part. When the 400 kV MGRES – Vulcanesti line is in maintenance it may appear situation when it is difficult to maintain the voltage level within the established limits.

As well, due to heavy integration of RoM power system in UA power system, there is a significant impact from UA system that may lead occasionally to too high or too low voltage levels in RoM, in which cases the Moldovan dispatcher lacks the required means to control the local voltage levels in Moldovan transmission system and is left with only one option – disconnection of HV lines in order to decrease the line charging.

1.5.5 Congestion management

ANRE has developed draft regulation on the allocation of capacities and congestion management mechanism on interconnections between the MPS and those of the neighboring power systems. The main elements of this document are the following:

- The allocation of the available capacity on interconnectors is done by the TSO through auctions performed annually and monthly;
- The allocation of interconnectors’ capacity is performed for each interconnector or for a group of interconnectors of the power system of the Republic of Moldova as follows: Republic of Moldova – Ukraine; Ukraine – Republic of Moldova. There will not be at initial phase the allocation of interconnections capacity for Republic of Moldova – Romania border;
- Congestion management needs to ensure non-discrimination and should be based on market mechanisms that will provide efficient economic signals to the market participants and the TSOs;
- TSO defines the capacity products for capacity allocation and the capacities available in cooperation with the neighboring TSOs;
- Producers, suppliers, eligible consumers and foreign legal entities that perform cross-border electricity exchanges may participate at the allocation of interconnectors’ capacity;
- The interconnectors’ capacity that is not used will be re-allocated;
To ensure the transparency of the capacity allocation process the TSO will determine and publish on annual and monthly basis on its website: total available transmission capacity of each interconnector, net transmission capacity of each interconnector, allocated transmission capacity of each interconnector and transmission reserve margin. TSO coordinates all these figures with the TSOs of the neighboring countries.

The precondition for adoption of new regulation is prior promulgation of draft Law amending and supplementing Law on Electricity.

1.5.6 Electricity network losses

Approximately 70-75% of the energy sector equipment is worn out. During 2005-2010, losses in the electricity distribution networks dropped down from a level of over 20% (RED Nord SA recorded only 14.4%), to a level of 13%, after the distribution network operators were obliged to improve their performance under the regulations approved by ANRE. In 2012, losses reported by the distribution network operators accounted for 9.9% - by RED Nord SA, 11.9% - by RED Nord-Vest SA, and 12.4% - by ICS RED Union Fenosa SA or 11.6% on average. (Table 1.3 and Figure 1.5)

Table 1.3: Comparison between actual and acknowledged losses by ANRE of distribution system operators

<table>
<thead>
<tr>
<th>Electric distribution networks operators</th>
<th>Normative losses acknowledged by ANRE (%)</th>
<th>Actual losses *) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED Nord</td>
<td>19.2</td>
<td>16.0</td>
</tr>
<tr>
<td>RED Nord-Vest</td>
<td>19.2</td>
<td>16.0</td>
</tr>
<tr>
<td>RED Union Fenosa</td>
<td>19.2</td>
<td>14.38</td>
</tr>
</tbody>
</table>
It is evident that the situation with losses improved tremendously in the last decade at all distribution network operators. Actual losses in the range between 28-40% still in 2001 were reduced to 10-13% in the last 3 years. In its calculation of tariffs, ANRE considered much lower value of 19.2% (normative losses) in 2001, thus de-stimulating the distribution network operators to continue with inefficient operations. However, in most recent years, the situation came in a stage of saturation when the set values by ANRE at 12.5% came in proximity of actually achieved levels by the operators. Further improvements are technically possible, however, only with considerable investments in the distribution system, which would consequently cause increase of regulated tariffs due to increased value of accounted assets.

1.5.7 Quality of services of distribution network operators

The quality of electricity distribution during 2012 was assessed according to provisions of the Regulation on the quality of the electricity transmission and distribution services, approved by ANRE Decision No. 406 of February 25, 2011.

The evolution of the delivered power quality indices points out to a continuous improvement since 2007, but also, to a stagnation or even negative evolution in 2010 of:

- Customer average interruption duration index (CAIDI) at one of the distribution system operators, and
- System average interruption duration index (SAIDI) and System average interruption frequency index (SAIFI) for all distribution system operators.

However, the SAIDI value was significantly improved in 2011 by all three distribution system operators.
Despite the attention paid in the reports by ANRE to the quality indicators of the distribution / supply service, final consumers rarely claim compensation for the remaining time for connections / reconnections, therefore, more information campaigns are needed.

Taking into account the range of problems of the consumers' appeals to ANRE, it is found that most of the requests regarding the service quality relate to continuity of electricity supply, but also the quality of the electricity provided. Further, the analysis will focus particularly on this issue.

**Continuity of electricity supply**

According to the Regulation, continuity of supply is observed by SAIDI, SAIFI and CAIDI indicators, which reflect the general situation over the company regarding the unplanned (emergency) interruptions and guaranteed indicators which concern each end-consumer individually.

The SAIDI indicator reflects the average duration of interruption of power supplies in the system during the reported period and is calculated for interruptions generated by different fault reasons. The situation in 2012 for distribution network operator is shown in Figure 1.6.

Distribution network operators are responsible for interruptions produced by "other reasons" (AC). The average SAIDI level was set by the Regulation for 2012 – 550 minutes.

![Figure 1.6: SAIDI indicators by fault reason and distribution network operator (minutes)](image-url)

*Note: FM – force majeure and extreme weather conditions, IC – defects in the consumer facilities; AT – actions of third parties; AC – other reasons.*

Based on Figure 1.6, it is obvious that apart from “other reasons” quite a high proportion is attributed to the force majeure interruptions and extreme weather situations. Because there is no strict mechanism for determining and proving the force majeure circumstances, ANRE eventually accepted to eliminate from the annual indicator calculation number of certain days when force majeure events or extreme weather situations took place. In addition, amendment of the Regulation is required to resolve this issue as the days of special circumstances should be determined based on statistical calculations. Finally, it can be stated that all distribution network operators fell within the SAIDI indicator for 2012 imposed by ANRE.

The historic trends of SAIDI indices by distribution network operators vs. the regulated values set by ANRE are shown in Figure 1.7. During the observed period of 2007-2012, a general downward trend is noted. The distribution system operators started to fulfill the regulated SAIDI values after 2009 only. However, in 2012, the indicators demonstrated a slightly growing trends at all operators.
In particular, the achieved SAIDI value at RED Nord SA (546 minutes) was just 0.3% below the regulated ceiling value – 550 minutes.

Although the general situation over the companies regarding the disconnections caused by various incidents tends to improve in some areas of the country, the target of having continuous supply of electricity remains only partially achieved, which causes a large number of complaints from consumers. Also, not all districts served by the same supplier are supplied at the same quality level. ICS RED Union Fenosa SA, for example, serves a total number of eighteen districts of the country and the capital Chisinau. In eleven districts, the registered value of the SAIDI indicator was greater than the allowable one (550 minutes). Thus, 291,432 consumers or 35% of the total number of consumers of ICS RED Union Fenosa SA have been served below the national average quality level set by ANRE. Endeavors have to be made to improve the SAIDI values for all customers.

![Figure1.7: Development of SAIDI index by distribution system operators (2007-2012)](image)

On the other hand, the situation at RED Nord SA is quite good because both the average as well as specific indicators for individual districts are much below the ANRE values.

Finally, RED Nord-Vest SA had the worst SAIDI indicator in 2012 (546 minutes). In three supplied districts, the limit was exceeded, and in one of them (Drochia) quite critically (from 132 minutes in 2011 to 793 minutes in 2012).

**Guaranteed continuity indicators**

Among general indicators, which if violated the distribution network operators might be penalized by ANRE through tariff reductions, the Regulation also sets guaranteed indicators, which are set for each end-consumer individually. For instance, the Regulation sets the length of the permissible interruption (planned or unplanned), the permitted number of interruptions during a year etc.

From the reports submitted for 2012, there were 270,020 cases (30,535 more than in 2011), when the electricity consumers had the right to claim compensation from the distribution network operator for failing to comply with the allowed number of planned and unplanned interruptions. In case if all these consumers would claim compensation these companies would pay at least 5.4 mill. MDL (approximately 0.33 mill. EUR).
As compared to 2011 the number of such cases increased significantly for all distribution network operators. Thus, despite some general indicators which show improvement of the situation per companies, the situation in relation to a good many of end-consumers is getting worse.

Though the Regulation provides payment of compensations to end-consumers, for whom the allowed number of interruptions was exceeded, during 2012 were registered only 3 payment requests for compensations from ICS RED Union Fenosa SA consumers, and the amount paid was mere 200 MDL (12 EUR). Largely this is due to insufficient information provided to consumers. At the same time, the payment of compensations upon request as provided by the Regulation is a quite burdensome procedure. For these reasons, in future it is necessary to prepare an information base for application of automatic payments in case of failure to comply with quality indicators.

The quality of electricity supplied to end-consumers remains to be quite a serious problem. If expressed in monetary terms, this problem during 2012 caused the distribution network operators material damages in the amount of 1,177,835 MDL (71,384 EUR), among which ICS RED Union Fenosa SA paid to end-consumers 1,132,008 MDL (68,607 EUR), and RED Nord SA – 45,827 MDL (2,777 EUR). In most cases, money was paid for repairing the consumers electrical devices damaged following the electricity supply with violation of the established standard parameters. RED Nord-Vest SA reported zero damages paid to consumers, which is explained by the fact that in this company the “personal responsibility” of the employees is practiced. In case of inadmissible voltage deviations in a certain sector, the specialist responsible for the operation of this sector is personally responsible for repairing the electrical devices damaged.

### 1.6 ELECTRICITY SUPPLY

#### 1.6.1 Diversity of electricity supply

Electricity is supplied by 3 electricity suppliers at regulated tariffs, notably, ICS RED Union Fenosa SA, RED Nord SA and RED Nord-Vest SA. Apart from that there are 8 wholesale suppliers at non-regulated tariffs. All suppliers are licensed by ANRE.

Purchased volumes and electricity sales to final consumers including the respective average prices in the last 3 years (2010-2012) are shown in Table 1.4.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Total purchased electricity by (3) electricity suppliers</td>
<td>Mill. kWh</td>
<td>3,835.7</td>
<td>3,909.5</td>
<td>3,966.1</td>
<td>+73.8</td>
<td>+1.9</td>
</tr>
<tr>
<td></td>
<td>Mill. MDL</td>
<td>2,905.5</td>
<td>3,190.2</td>
<td>3,761.0</td>
<td>+284.7</td>
<td>+9.8</td>
</tr>
<tr>
<td>2. Average price of purchased electricity</td>
<td>Bani/kWh</td>
<td>75.75</td>
<td>81.60</td>
<td>94.83</td>
<td>+5.85</td>
<td>+7.7</td>
</tr>
<tr>
<td>3. Total electricity supply to final consumers (excl. eligible consumers)</td>
<td>Mill. kWh</td>
<td>3,229.2</td>
<td>3,322.2</td>
<td>3,393.9</td>
<td>+93.0</td>
<td>+2.9</td>
</tr>
<tr>
<td></td>
<td>Mill. MDL</td>
<td>4,320.4</td>
<td>4,742.4</td>
<td>5,179.2</td>
<td>+422.0</td>
<td>+9.8</td>
</tr>
<tr>
<td>4. Average tariff for supplied electricity (excl. VAT)</td>
<td>Bani/kWh</td>
<td>133.80</td>
<td>142.75</td>
<td>152.60</td>
<td>+8.95</td>
<td>+6.7</td>
</tr>
</tbody>
</table>

Note. MDL (Moldovan Lei), 1 MDL = 100 Bani.
The three distribution companies, excluding the eligible consumers, purchased electricity in an amount of 3,966.1 mill. kWh in 2012 (1.4% more than in 2011), but supplied to final consumers 2.2% more electricity than in the previous year (3,393.9 mill kWh) due to lower losses in the distribution network.

As per status of end 2012, the three distribution system operators served a total number of 1,312,352 consumption points equipped with electric meters, of which ICS RED Union Fenosa SA 839,583 (64%), RED Nord SA 293,509 (22%) and RED Nord-Vest SA 179,260 (14%). As some consumers have several consumption points, the actual number of consumers (legal or physical persons) is lower by 69,181 or 1,243,171 in total (source: published data on websites of DSOs), of which about 1,207,731 (97.1%) are household consumers and 35,440 (2.9%) are non-household consumers.

There were only four eligible consumers in 2012 that had been given the right to sign direct electricity supply contracts on opened market, however, only one was actually used its eligibility right in practice.

ICS RED Union Fenosa SA is the largest distribution company/supplier of electricity at regulated tariffs and served 769,988 consumers (61.9%), of which 746,530 (97.0%) are household consumers and 23,458 (3.0%) non-household consumers. The majority of consumers’ installations are connected to low voltage electric networks. However, 9 electric installations of consumers are connected to 35-110 kV lines and 4,369 are connected to medium voltage lines of 6-10 kV.

In 2012, RED Nord SA served 293,904 (23.6%) consumers, of which 286,770 (97.6%) were household consumers and 7,134 (2.4%) non-household consumers. The majority of consumers' installations are connected to low voltage electric networks. However, 1 electric installation is connected to 35 kV and 645 electric installations of consumers are connected to medium voltage lines of 6-10 kV.

In the same year, RED Nord–Vest SA served 179,275 (14.4%) consumers, of which 174,431 (97.3%) were household consumers and 4,844 (2.7%) non-household consumers. The majority of consumers' installations are connected to low voltage electric networks. However, 3 electric installations of consumers are connected to 35 kV lines and 366 electric installations are connected to medium voltage lines of 6-10 kV.

The consumers’ structure by electricity supply company, type of consumer and voltage level of connection is shown in Table 1.5.

### Table 1.5: Structure of electricity consumers (status of end 2012)

<table>
<thead>
<tr>
<th>Suppliers and eligible consumers</th>
<th>0,4kV</th>
<th>6-10kV</th>
<th>35-110kV</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Household</td>
<td>Non household</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RED Union Fenosa</td>
<td>746,530</td>
<td>19,080</td>
<td>4,369</td>
<td>9</td>
</tr>
<tr>
<td>RED Nord</td>
<td>286,770</td>
<td>6,488</td>
<td>645</td>
<td>1</td>
</tr>
<tr>
<td>RED Nord-Vest</td>
<td>174,431</td>
<td>4,475</td>
<td>366</td>
<td>3</td>
</tr>
<tr>
<td>Eligible consumers</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>1,207,731</td>
<td>30,043</td>
<td>5,380</td>
<td>17</td>
</tr>
</tbody>
</table>
1.6.2  Electricity prices for captive customers (1997-2012)

In the observed period (1997-2012) prices used by individual suppliers at regulated tariffs for final consumers were set by decisions of ANRE. Evolution of electricity tariffs is shown in Figure 1.8, in local currency (Bani/kWh) and after conversion in EURc/kWh based on exchange rates on the date of adopted decisions. It is evident that in EUR-terms electricity tariffs were pretty constant around 5 EURc/kWh during 1997-2006, while from end December 2006 to mid May 2012, they increased by a factor of 2.5 (from 4.4 EURc/kWh to 10.8 EURc/kWh) on average. The main reasons can be attributed to higher prices of natural gas delivered to Moldova by Russian Federation and adjustments in tariff methodologies applied by ANRE, which accounted all occurred costs plus minimal return on capital.

Figure 1.8: The evolution of electricity tariffs by suppliers of electricity at regulated tariffs (1997-2012)

1.6.3  Instruments and measures to compensate shortfalls in electricity supply

In Draft Law amending and supplementing Law No. 124-XVIII ‘On Electricity’, the title of Article 48 shall be changed to read: “Emergencies, disruptions and limitations in energy supply”. Article 48 shall be supplemented with paragraph (7), with the following wording:

“(7) “Electricity supply restrictions during emergencies shall meet the pre-defined criteria for imbalances management by the transmission network and system operator. Any safeguard measures shall to be taken by the transmission network and system operator after consultation with other electricity transmission network operators in countries with which the power system of the Republic of Moldova is interconnected, subject to bilateral agreements, including agreements on information sharing, as appropriate.”
1.7 ELECTRICITY CONSUMPTION AND PEAK POWER DEMAND – CURRENT STATUS AND FORECAST FOR THE NEXT 5 YEARS (2013-2018) AND BEYOND

1.7.1 Electricity consumption

Development in the past

Historic development of final energy consumption in the period 2001-2012 is shown in Figure 1.9, separately for household and non-household consumers. Additional information on electricity production on mainland demonstrates that the share of indigenous production was gradually reducing from 1,043 mill. kWh (48%) in 2001 to no more than 776 mill. kWh (22%) in 2012. The remaining part had to be purchased from Moldavskaya GRES and imported from Ukraine, the details of which are shown in Figure 1.10. During 2006-2008, electricity purchases from Moldavskaya GRES were stopped as Moldova decided to buy all needed electricity from Ukraine. Since 2001, total purchases of electricity from Moldavskaya GRES and imports Ukraine have been following an increasing trend (2001: 2,152 mill. kWh) and 2012: 3,278 mill. kWh).

![Figure 1.9: Historic development of Final electricity consumption and indigenous production during 2001-2012 (mill. kWh)](image-url)
Electricity consumption forecast

Based on the analysis of past trends, several forecasts of future electricity consumption have been prepared recently by various institutions and for different purposes.

The gross electricity consumption\(^9\) forecast used in new Energy Strategy of the RoM until 2030 (ES2030) which was adopted in February 2013 is shown in Figure 1.11 as Wmax scenario (ES2030). The average annual growth rate in the period 2012-2020 is 5.40%/a and in the period 2020-2030 – 4.24% (see Figure 1.12). This represents high values in comparison with realised historic growth rates shown in the same figure: 2010-2012 – 1.7%/a or in the last 5-year period (2007-2012) – 1.92%/a. The reasons for such a high growth can be attributed to the fact that no energy efficiency (EE) or demand-side management (DSM) measures have been taken into account as the forecast is based on linear extrapolation of sectorial trends in the past. The ES2030 scenario can therefore be regarded as High boundary scenario.

Another considerably lower forecast is the one produced by the Institute of Power Engineering of Academy of Science of Moldova (ASM), shown as Wmax scenario (ASM) in Figure 1.11, which takes into account quite ambitious targets on EE/DSM improvements as planned by 2020. As a consequence, the resulting growth rates are not more than 2.8%/a by 2020 and 2.01% by 2030, which represents smoother continuation of trends encountered in the last 3 years. The ASM scenario can therefore be regarded as Low boundary scenario.

---

\(^9\) Gross electricity consumption denotes quantities of electricity that enters into the HV power network, from net indigenous generation plus net imports. On the other side, this counterbalances electricity needed for meeting Final energy consumption plus transmission / distribution losses plus electricity consumed by energy transformation sector.
The difference between the High and Low scenarios are opportunities for EE/DSM measures in electricity sector, which are roughly estimated between 773 mill. kWh (or 14% of total electricity consumption by 2018) to 1,115 mill. kWh (18%) in 2020 and 3,175 mill. kWh (34%) in 2030.

In terms of development of Final electricity consumption in the ES2030 scenario by 2018, 2020 and 2030, annual growth rates by sector and period are shown in Figure 1.13. By 2018 (and beyond) it is envisaged that the highest increase will be encountered in Construction sector (7.4%/a), followed
by Industry (6.2%/a), Transport (6.2%/a) and Residential sector / Other sectors (6.0%/a), while Agriculture will remain at approximately 2%/a in the whole period until 2030.

![Average annual growth rates of final electricity consumption by period and sector (%/a)](image)

**Figure 1.13: Average annual growth rates of final electricity consumption by period and sector (%/a)**

The ES2030 scenario does not anticipate any major changes in the shares of individual sectors in Final electricity consumption over time by 2030: Residential – 46.0%, Industry – 31.0%, Other sectors (commerce and public services) – 19.7%, Transport – 1.5%, Agriculture – 1.2% and Construction - 0.5%, which results in Final electricity consumption by sector as shown in Figure 1.14.

However, in reality these shares will be changed over time at least for two reasons: (i) uneven economic development among sectors, and (ii) different potential for EE/DSM measures introduced in the respective demand sectors. By adoption of awaited draft Law on Energy Performance of Buildings in 2013, Moldova has ambitious plans to address public buildings as the first priority of the NEEAP (2013-2015). In addition, adoption of draft laws on energy labeling and eco-design shall contribute to specific-electricity savings in the residential sector. However, because electrical heating is not generally used in Moldova, considerable electricity savings for thermal end-uses cannot be expected, just the contrary, due to improved living standards over time more electricity will be used for air-conditioning and heat pumps in the future. This will impact the system load diagram particularly in summer. Possibilities for EE/DSM measures in industry are probably most unpredictable as the implementation highly depends on business decisions and financial capacity of industry owners.

Due to very limited energy resources of the RoM, energy efficiency is practically the only directly controllable means to reduce energy dependence and thus to contribute to better SoS in the future.
1.7.2 Peak power demand

Apart from 2 HPPs, electricity generation in TPPs and CHPs on both side of the Dniester River is based almost entirely on natural gas imported from Russian Federation via Ukraine (some 2.5-2.7 bcm of natural gas) are imported annually. Therefore, there is practically neither fuel nor fuel-origin diversity in the RoM, which represents a considerable risk for the SoS.

The typical load variation in the winter season is between the minimal base load of 330-430 MW and the maximum peak-load of 700-760 MW, while in the summer season, it is in the range from min. 250 – max. 550 MW. The maximum / minimal loads on characteristic working days (each 3rd Wednesday in month) by month in 2012 are shown in Figure 1.15 and load curves by month in Figure 1.16. The absolute annual power system peaks of 946 MW on 4/1/2011 at 19h and of 831 MW on 2/2/2012 at 18h were registered. The factor between the maximum peak-load and the minimal base-load is therefore about 2 (or 100%) both in winter as well as in summer period.
An example of an average daily load diagram for a month with the highest monthly electricity demand of 413 mill. kWh in 2012 (February with average peak-demand of 751 MW, and absolute annual peak-demand of 831 MW on 2/2/2012 at 18:00) is shown in Figure 1.17, which demonstrates a typical demand – supply pattern for the RoM.

The heat-demand driven CHP units (CET-2 and CET-1) as well as the only HPP Costesti operate solely in a base-load mode. The remaining part of the base-load and the variable part of the peak-load demand are met from purchases from Moldavskaya GRES and imports from Ukraine. While electricity production in Moldavskaya GRES demonstrates pretty standard electricity generation pattern of this power plant, which to a great extent tend to follow the load curve, the role of Ukraine is to fill the gaps and ensure balancing energy to the MPS. Part of production in Moldavskaya GRES is used also for electricity exports to Romania, which is implemented in an island mode.
Figure 1.17: Load diagram and meeting the demand on a day of absolute peak in 2011 (MW)

**Peak-demand forecast (MW)**

In the next 5-year period by 2018, the peak-demand (Pmax) in the MPS will reach 986 - 1,143 MW according to ASM and ES2030 forecast, respectively. In 2020, the Pmax will be between 1,031 – 1,258 MW, and by 2030, it will further increase to 1,243 – 1,883 MW, respectively (Figure 1.18). The rising difference in Pmax between the two forecasts is obvious, which results in 228 MW in 2020 and in 640 MW in 2030.

Because binomial and zonal tariffs are planned to be applied in the near future, a smoother daily load curve is expected to record from year to year, having an appropriate impact on the value of peak load. Correspondingly, the annual peak load of 831 MW recorded in 2012 (4,872 hours, load factor of 0.556) shall increase to 1,031 MW and 1,243 MW (4,959 hours, load factor of 0.566) by 2020 and 2030, respectively, in the ASM scenario as mentioned above.
1.7.3 Power demand balancing instruments and associated risks

According to the Electricity Market Rules all suppliers of electricity at regulated tariffs and eligible consumers must sign contracts for balancing energy with providers of balancing energy. At present, all balance-responsible parties, i.e. the three existing suppliers of electricity at regulated tariffs and the eligible consumers have signed contracts with Energocom SA for balancing energy, which is provided from Ukraine.

In order to make the balancing more flexible, the Law on Electricity and the Electricity Market Rules, would have to be modified. According to the Draft Law amending and supplementing Law No. 124-XVIII ‘On Electricity’, TSO would have the ultimate responsibility to ensure balancing energy thus be obliged to sign contracts for balancing energy in case (i) the balance-responsible parties fail to sign contracts for balancing energy or (ii) the providers of balancing energy do not fulfill their obligations.

The price of balancing energy will depend on the results of negotiation and the contractual arrangements agreed between the suppliers, eligible consumers, TSO and the providers of balancing energy.

If the cost of balancing energy is proven to be justified by the supplier of electricity at regulated tariffs, these costs are eligible to be included in the electricity tariffs approved by the regulator (ANRE). However, more centralized mechanism, where the balancing power would be ensured by the TSO (Moldelectrica IS) may lead to more efficient utilization of balancing energy providers and consequently, lower balancing costs.
1.8  **PLANNED INVESTMENTS IN NEW POWER SYSTEM INFRASTRUCTURE IN THE NEXT 5 YEARS (2013-2018)**

1.8.1  **Generally on investment environment**

Concerning the administrative procedures, based on the assessment of the relevant applicable legislation, there are currently no administrative or spatial planning procedures that provide additional incentives for investment in new energy infrastructure.\(^\text{10}\)

Based on the existing legislation, the allocation of responsibilities between the institutions of central public administration (CPA) is as follows:

- Permits for construction of new power plants exceeding capacity of 20 MW as well as for capacity increase of over 20 MW in the existing plants by GoM, which is also responsible for the organisation of respective tenders;
- Technical authorisations in the field of industrial security and certificate on equipment security to be used at the hazardous industrial objects (by MoE);
- Licenses to perform activities concerning generation, transmission; distribution and supply of electricity at regulated or non-regulated tariffs (by ANRE);
- State ecological expertise and environmental impact assessment (by Ministry of Environment and its subdivisions);
- Planning certificates and construction authorisations for works/constructions of national interest public utility (by Ministry of Regional Development and Constructions and its subdivisions);
- Authorisation for connection to the grid and guarantees of origin for electricity produced from renewable energy sources (by Moldelectrica IS).

Local public authorities (LPA) are responsible for planning certificates and construction authorisations.

1.8.2  **Planned retirement of existing power generation capacities and planned new power generation projects and capacities – prospects for the next 5-year period and beyond**

The installed capacity for power generation in Moldova represents the prerequisite for creating a generation platform that can significantly contribute, both to the economic growth and social welfare in the country, as well as to balancing the consumption within the Energy Community, conditioned by the real integration of Moldova's market into the regional market.

Once the priority directions for developing a strong generation platform will be established, an important role will be played by decisions on proportions of the generation mix:

1. The proposed objective for 2020 is to extend the existing power generation capacity by 800 MW. This will be done through decommissioning of 250 MW currently installed in

\(^\text{10}\) Note: The new published tariff methodology by ANRE obliges the distribution network operators to invest at least the amount of financial sources they collect under the depreciation category of the tariff. In the last tariff methodology adopted the appropriate amounts have been also established, however they are not linked to the value of depreciation.
existing cogeneration plants (CET-1 and CET-2 in Chisinau) and building of new capacities, summing up to 1,050 MW.

2. 650 MW out of 1,050 MW will be achieved through construction of a new cogeneration plant based on combined cycle in Chisinau. Given the approximate installation costs of 950 EUR/kW, a total investment of about 617.5 mill. EUR is required for the 650 MW electrical capacity based on natural gas. Assuming a capacity factor of 0.5, the plant will generate 2.85 TWh. The planned feasibility study shall analyse the optimal capitalization possibilities of the current location, infrastructure and constructions, as well as the level of training of the current staff to operate the new technology. One of the consequences of the capacity extension will be the creation of new jobs. The capacity extension opportunity of CET Nord, to the extent of their thermal load, will be also analysed.

3. The remaining 400 MW out of 1,050 MW will be based on power generation from renewable sources (RES-E): wind, photovoltaic and biomass-fired small-scale CHPs. Given the policy commitment to produce 10% of electricity from RES-E in 2020, and considering a capacity factor of 0.25, the minimum actually available capacity from RES-E would then be about 250 MW. An increased capacity in relation to this minimum target of 400 MW could cover about 16% of electricity consumption estimated for 2020. It is assumed that investments in the RES-E technologies will come from private initiatives. Part of RES-E generation will contribute to cover up to 15% of country’s electricity demand in 2030 by the RES-based generation capacities of 600 MW (by applying the same capacity factor of 0.25).

The amount of natural gas consumed annually by the new 650 MW cogeneration capacity, respectively CET in Chisinau is estimated at about 496 mill. m³ per year. In 2011, the total amount of natural gas consumed by the energy sector on the right bank of the Dniester River (circ. 350 MW) accounted for 430.8 mill. m³.

The above strategy results in 1,192 MW of installed and 1,104 MW of available capacity on the mainland in 2020, and 1,292 MW of installed and 1,304 MW of available capacity in 2030, of which 400 MW is intermittent in 2020 and 600 MW in 2030, respectively. For capacity balance vis-à-vis peak-demand, see Section 1.8.3 in the following.

**Integration of RES-E electricity generation**

Integration of RES-E electricity generators into the MPS entails several issues, which may represent serious technical problems for operations of the MPS and may represent a risk for the SoS unless they are adequately solved in advance.

Existing conditions require the presence of the control tools for the TSO, the possibility of dispatching (control of active and reactive power generated, connect / disconnect, real-time voltage control, manual or automatic) and monitoring (electrical and character data collection technology in real time) of new power sources, both renewable and conventional as to ensure security of the national electricity system operation and compliance with contractual agreements.

Another uncertainty is the lack of data on wind potential, which would allow for a more optimal power system development planning. Lack of centralized RES integration (capacities and location) planning leads to the uncertainties within the project approval process. The absence of a regulated mechanism for prioritizing RES projects makes very problematic to plan the measures for strengthening the distribution/transmission grid.
The stability of the MPS strongly depends on the stability of the Ukrainian/CIS power system. The integration of large scale of intermittent RES-E generation like wind and solar farms combined with high electricity import scenario might lead to operational problems. The frequency control of the MPS is ensured by Ukrainian TSO. That is acceptable when balancing power needs are small, not exceeding around 50 MW. When this amount was higher, the present practice and the associated costs to cover it would not more be acceptable for Ukrainian power system. In order to overcome the problem there are only two solutions at the moment: (i) in non-existence of any balancing market, to pay for needed balancing power as asked for by Ukraine exercising a monopoly position, and which price would be much higher than regular electricity imports, or (ii) to disconnect whole regions of the MPS when the frequency cannot be maintained within the limits prescribed by relevant standards.

Potential large-scale integration of intermittent RES-E generation in Moldova will require significant changes in utilities' operational practices. Improving conventional generation flexibility by adding faster response generation units and reducing minimum loading level on steam turbines is one potential solution. Additional methods may include incorporating wind and solar power forecasting into utilities' day-ahead planning process. Other means of absorbing renewables' variability, such as demand response and energy storage, can be used as well.

1.8.3 Ability to meet future peak-demand

As of today, the available capacity on the mainland is sufficient to cover no more than 36.6% of peak-demand (approx. 830 MW that occur in winter). The remaining has to be ensured by electricity purchases from Moldavskaya GRES and primarily the peak-capacity (including the balancing energy) from Ukraine.

Based on peak-demand forecasts (Section 1.7.2) and plans of capacity retirement and commissioning of new capacities (Section 1.8.2), the future power capacity balance in the MPS by 2020 and 2030 in both scenarios (ES2030 and ASM) is shown in Figure 1.19.

As compared to 2012, provided that, for example, 50% of planned RES-E by 2020 is commissioned by 2018 (or 200 MW), the share of mainland capacity will increase to 51% by 2018. However, by exclusion of intermittent (wind) capacity, the share would even decrease to 30.8%, which represents a risk for the SoS unless Moldova finds adequate solutions for ancillary services in negotiations with Moldavskaya GRES and Ukraine in conditions that no interconnection with Romania can be expected by that time.

In 2020, provided the RES-E plans are fully implemented (400 MW) as well as the new 650 MW of net power capacity addition to CHPs is realised, the mainland would be theoretically able to meet 87.8% of peak-demand in the ES2030 scenario and have capacity surplus of 7.1% in the ASM scenario. However, due to the intermittent character of RES-E, the “guaranteed” percentages are much lower, 56.0% and 68.3%, respectively.

In 2030, the situation deteriorates to 37.4% and 56.6%, respectively, due to peak-demand growth, additional 200 MW of intermittent capacity and no new firm capacity.

The above demonstrates that the MPS will remain quite vulnerable in terms of ensuring peak power in the future and that the planned introduction of a 650 MW combined cycle CHP in 2020 will solve problems for a limited period of time. The intermittent RES-E generation may by its nature help, or not, the MPS in provision of capacity and energy needed. However, the country will need to have adequate contractual arrangements with the neighbouring systems in order not to endanger its SoS. Due to well-known unpredictability of RES-E generation, especially if provided by wind farms, the
RES-E generation therefore cannot be regarded as reliable contributor to improvement of the SoS to mainland of Moldova, in absence of adequate firm capacity. In such circumstances, after 2020, Moldova may consider to attract foreign investors to invest in additional power generation capacities, where coal-fired power plant based on BAT technology cannot be excluded. Such independent power producer would also contribute to electricity market development both in Moldova as well as regionally, especially if the planned interconnection with Romania would be implemented by that time. Finally, new fuel type introduced in central energy transformations sector as well as resource diversification would be advantages to widen the playing ground for Moldova in negotiations for imported energy sources in the future.

Figure 1.19: Power capacity balance in the ES2030 scenario (left) and the ASM scenario (right) (%)

1.8.4 Planned supply patterns

Based on forecasted electricity consumption in Section 1.7 and planned availability of power generation capacities in Section 1.8, the electricity supply patterns in the forthcoming 5-year period by 2018 and beyond can be assessed.

In term of electricity supply balance, the further growing electricity demand (kWh and MW) will ask for additional electricity to be supplied to Moldovan consumers. In the 2013-2018 period, no new firm capacity will be commissioned on the mainland but only RES-E capacity additions are planned (wind farms, some photovoltaic and biomass-fired small-scale CHPs). Due to very limited capacity factor of wind farms (0.25) the probable commissioning of approx. 200 MW by 2018 would generate no more than 438 mill. kWh, while final electricity consumption will increase by 1,597 mill. kWh (or 39% compared to 2012) by that time. It is therefore clear that electricity supply to the country will be primarily based on electricity purchases from Moldavskaya GRES and import from Ukraine, the scope of which will continue to increase over time. The situation can be drastically changed only after 2020, should the new 650 MW combined cycle CHP be commissioned. However, purchases from outside will continue even after that.

By construction of new combined cycle CHP, the country will further increase its dependence on imported natural gas, which is a risk for the SoS. Another risk is introduction of RES-E by deploying intermittent technologies (particularly wind). Even in case the power network is technically adequate to absorb the planned capacity, the MPS is exposed to several operational risks associated with system reserve, load frequency control and the provision of balancing energy, and the solutions to these problems have neither been studied nor found yet. Finally, introduction of RES-E will entail several additional costs that will have to be borne by all electricity consumers. In order to maintain
acceptable tariffs for electricity and social cohesion in general, the GoM will have to put all necessary emphasis on studying the issues prior to introducing too promising RES-E support schemes.

1.8.5 Planned new power transmission projects and capacities

Given its geographical position between two strong power systems of Romania and Ukraine, regional transmission network configuration, and power generation potential, Moldova has always held a strategic advantage, however, that was not fully exploited in the past decade. In the Energy Strategy 2030 the GoM sets its energy strategy priorities as strengthening the bidirectional transmission connections between the IPS/UPS and the ENTSO-E systems in order to enhance the position of Moldova as a power transit country, as well as the full commercial strengthening and exploitation of indigenous power generation capacities (Moldavskaya GRES and new plants in the future).

The diversification of power supply to Moldova has no other alternatives but the development of the power transmission network. The interconnection projects of Moldova with the EU internal power market through new power lines, as well as the strengthening of internal networks are essential, both for the supply security, and for the social welfare in Moldova.

The final benefit of the development and intensification of competition, can be ensured only through participation in a larger energy market, a participation which will not arise for Moldova without an asynchronous / synchronous interconnection of its network with the ENTSO-E system. Connection with EU offers, along with an enhanced security, better prices on the market, given the perspective to improve competition, which will result at the end in a final energy price less onerous for Moldovan consumers.

As to the power interconnectors with Romania, by 2020, the extension of the power network will include a minimum of two interconnection lines of 400kV (Figure 1.20), notably:

1. **OHL Suceava-Balti.** On 18 February 2011, Moldelectrica SE and Transelectrica JSC concluded a Memorandum of Understanding on the construction of the OHL-400kV Balti (RoM) – Suceava (Romania). The already completed feasibility study was funded by the EBRD. The study was finalized, the project implementation costs are estimated at 66.4 mill. EUR, of which 36.9 mill. EUR represent the project costs for the Moldovan side (52 km through the country, or the total of 115 km of the extension of the Balti Power Station to accommodate a 400kV OHL, 400kV distribution installation and 400/330kV autotransformers). The project is on hold due to lack of financing and uncertainty/delay of the RoM/UA to ENTSO-E interconnection project.

2. **OHL Straseni-Ungheni - Iasi** (alternatively, Straseni-Ungheni 330/400kV and Ungheni-Iasi 400kV). A similar feasibility study is still required for the Straseni-Ungheni-Iasi line, in order to establish the technical conditions and related costs. This project also requires the identification of funding sources. The cost of this line accounts for approximately 64 mill. EUR, of which 28 mill. EUR are for the Romanian side and 36 mill. EUR for the Moldova side.

These projects are feasible only in the context of effective interconnection to the ENTSO-E or asynchronous operation by installing back-to-back station interconnection lines.
Security of Supply Statements of the Republic of Moldova

This is definitively an ambitious programme, which neither the Moldovan state budget nor Moldelectrica IS can fully afford. The following are the alternative scenarios for providing the necessary funding:

1. Recognise the RM-EU interconnection as a top priority on the EU-ENTSO-E agenda, using all the cooperation ways that are provided by the contracting party quality to the Energy Community and the partnership with the EU;
2. Continuity of the support from donors and the IFIs that have until now significantly contributed to developing Moldova’s internal power network, as well as to improving its functioning through new facilities, with the final goal to transform the Moldovan power system into a viable component of the EU system. Also, the effective implementation of the acquis under the ECT is conditioned by this connection which represents an access to EU markets;
3. The opportunity for the Moldavskaya GRES to support a potential power export through participation in the interconnection projects.

Figure 1.20: Plans for new interconnections of Moldova with Romania and Ukraine

As to the power interconnector with Ukraine, present congestions on the RoM – Ukraine interconnector limit the import from Ukraine as well as future power transit opportunities. To increase the capacity of the RoM – Ukraine interconnector, two power lines of 330kV Balti-CHE Dnestrovsk, of 123 km (87 km in Moldova) are needed (a second line 330kV Balti-CHE Dnestrovsk would allow to increase the import capacity through “control interface”). The feasibility study for the Moldovan side has been completed. Costs are estimated at minimum 15 mill. EUR, of which 6 mill.
EUR on the Ukrainian side and 9 mill. EUR on the Moldovan side. Like in the case of the previous project, the undertaking of any further steps will depend on the interconnection project to the ENTSO-E EC system, as well as on the final costs and funding possibilities.

As a continuation of the rehabilitation and consolidation works of the power transmission network, Moldelectrica IS has been upgrading the transmission network through financial assistances totalling 39.3 mill. EUR, of which EBRD loan - 14,3 mill. EUR, EIB loan - 17 mill. EUR and 8 mill. EUR grant offered by the Neighbourhood Investment Facility (NIF) of the EC.

The estimated costs of presently planned interventions stand at about 31.5 mill. EUR. The rehabilitation will improve the transmission network system efficiency, consolidate the stability of power supply and will improve financial performance of the company, which is a precondition for Moldova's integration into the ENTSO-E.

For Moldova, the accession to the ENTSO-E means the accession to an extended EU regional market. Year 2019 is the most optimistic deadline for the connection of networks as described above, while a deadline after 2020 is regarded unacceptable for various strategic reasons.

Moldelectrica IS and Ukrenergo NPC have signed a Memorandum of Understanding on the joint accession to the ENTSO-E, where Transelectrica JSC (Romania) is a supporting party. A joint application was submitted on 31 March 2011, by Moldova, Ukraine and Romania, to the Joint Operational Programme for funding the feasibility study on the joint accession by Moldova and Ukraine to the ENTSO-E. In early May 2012, the Joint Programme approved a 5-mill. EUR grant for the feasibility study. Total costs of the feasibility study are of 7.067 mill. EUR with an execution period of 30 months.

The feasibility study has to analyse different scenarios: synchronous connection versus asynchronous connection. The asynchronous connection to ENTSO-E means the possibility to decide without constraints, at any time, between the alternative to buy energy from the East / West, independently of the Ukrainian market's evolution, but depending on the price level. Also, this solution provides Moldova with the commercial arbitration between the two blocks, as well as avoids the disconnection of the Ukrainian system from the IPS/UPS system, a disconnection that is considered as being very difficult from the technical point of view and very costly from the financial point of view.

The asynchronous connection (back-to-back) of Moldova with a complete Moldova-Romania segment synchronous with ENTSO-E requires the installation of back-to-back stations in Moldova for the following:

1. 400kV OHL Vulcanesti-Isaccea (a strictly needed project);
2. 400kV OHL Balti-Suceava (additional project, leading to the development of the synchronous section Moldova-Romania with asynchronous connection and increase in the possible export-import-transit flow);
3. 400kV OHL Straseni - Ungheni - Iasi (additional project, leading to the development of the full synchronous section Moldova-Romania, with asynchronous connection, increase in the possible export-import-transit flow and provision of the n-2 regime).

The back-to-back solution is based on the existent line 400kV Vulcanesti-Isaccea, as a minimal solution, with extensions through the other two OHLs. The estimated cost of each 500 MW convertor is 70 mill. EUR. In case of an asynchronous connection scenario, the 330kV OHL Balti – CHE Dnestrovsk represents an additional project, to extend import possibilities from Ukraine.
2 GAS

The description of Moldovan gas\textsuperscript{11} system (MGS) shown in this document refers mainly to the part located on the right bank of the Dniester River.

2.1 KEY MARKET PLAYERS AND DESCRIPTION OF THEIR ROLE

Key players in the gas sector are:

- **Moldovagaz SA** is a single vertically integrated company, thus having a monopoly position by controlling the entire chain of gas business (import, transit, transmission, wholesale supply, distribution and retail supply). It is designated as the national operator of the gas system and dominant supplier. It signs import contract with JSC Gazprom and an agreement for the use of gas storage in Ukraine. Its shareholders are JSC Gazprom (50%), central public administration of the RoM (36.6%), regional authorities of the Transnistria region (13.4%);

- 2 transmission system operators: **SRL Moldovatransgaz** and **SRL Tiraspoltransgaz** (all subsidiaries of Moldovagaz SA);

- 12 regional distribution system operators (all subsidiaries of Moldovagaz SA) on the right bank of the Dniester River and 6 distribution system operators in Transnistria;

According to the Rules of natural gas market, the status of the national operator of the gas system was assigned to Moldovagaz SA. As per status of end September 2013, on the gas market there are 24 licensed suppliers operating at regulated tariffs, one at non-regulated tariffs, a transmission system operator (TSO) - SRL Moldovatransgaz and 25 licensees for natural gas distribution.

According to the ANRE Decision no. 408 of 6 April 2011, the natural gas market in the RoM is determined as being uncompetitive because of a single import source, with imports being carried out by the supplier at regulated tariffs – Moldovagaz SA.

2.2 REGULATORY FRAMEWORK

By passing Law on Natural Gas (No. 123-XVIII) in 2009, Moldova transposed Directive 2003/55/EC concerning common rules for the internal market in natural gas which provides general framework, prescribes roles of GoM and ANRE, provisions, rights and obligations of TSO, DSOs, suppliers, consumers; regulates access to the grid, licensing conditions, and guarantees the right of every consumer to conclude contracts with any (including foreign) supplier.

However, the completion of transposition of Directive 2004/67/EC of 26 April 2004 of the European Parliament and of the Council concerning measures to safeguard security of natural gas supply is being implemented only now. Draft Law amending and supplementing the Law on Natural Gas has already concluded the consultation process and awaits government decision and final promulgation by the Parliament. It is likely to be adopted by 4Q2013.

\textsuperscript{11} The term “gas” in this section refers entirely to natural gas. Other gases that can be used in the gas sector supply chain (e.g. LNG, biogas, synthetic gases, various types of derived gases etc.) are not developed yet in the RoM, therefore not covered in the report.
In addition, there are some decisions of ANRE in the field of natural gas that are relevant:

- Rules of the natural gas market;
- Regulation on supply and use of natural gas;
- Regulation on natural gas measuring for commercial purposes;
- Regulation on extension of natural gas network;
- Technical norms for gas transportation / transmission network;
- Technical norms of gas distribution networks;
- Methodology of calculation and application of gas tariffs;
- Methodology of calculation and application of natural gas tariffs;
- Methodologies of calculation of natural gas losses in transportation and distribution networks.

### 2.3 DIVERSIFICATION OF SOURCES AND GAS SUPPLY NETWORKS

There is quite poor diversification of primary energy supply in the RoM as natural gas represents approx. 53% of the total primary energy supply of the mainland. Gas is supplied predominantly from Russia, despite technical possibility to be provided also from Romania (under certain conditions).

Moldova is an important transit country for Russian natural gas, being on the route from Ukraine to Romania, Bulgaria and Turkey, including branches to Greece and FYR of Macedonia. The total length of Moldova's three transit pipelines is 247 km (SRL Moldovatransgaz) with a total capacity of 34.6 bcm/y.

Another pipeline interconnection with Ukraine in the north of the country traverses through Moldova to connect two parts of the Ukrainian network. This pipeline, with a capacity of 9.1 bcm/y, has an important role in security of supply for Moldova, as it connects to the storage facilities Bogorodchany in Ukraine.

In practice, the capacity utilization rate of all cross-border pipelines is only about 45–55%, i.e. ca 20 bcm/y of natural gas is transited through the Southern route and 1.3 – 2 bcm/y through the Northern route. The national network is only partly used as well. The internal transmission network stretches over 1,550 km.

It should be mentioned that actually over 58% of localities have access to natural gas and over 50% of consumers are connected.

There are no gas storage facilities in Moldova and there is no access to LNG and no interconnections with EU Member States (i.e. Romania).
2.4 TECHNOLOGICAL SECURITY AND QUALITY AND LEVEL OF NETWORK MAINTENANCE

Regulation on the quality of natural gas transmission and distribution service was approved at June 9, 2011 and implemented starting with November 11, 2011. According to Regulation provisions the license holders submitted reports on quality indicators achieved during 2012.

The companies related to Moldovagaz SA in 2012 registered 1,861 of planned interruptions, as compared to only 650 interruptions in 2011. In all cases the network operators reported that reconnection was carried out in due time according to Regulation, obtaining an overall performance indicator of 100%. All cases of interruptions were announced by the network operators in advance, according to requirements in force.

The total number of registered unplanned interruptions was 611, all of them being announced in advance, according to the established rules. As compared to 2011 when 185 interruptions were registered there is an increase by 426 unplanned interruptions by companies within the Moldovagaz SA group. In all 611 cases reconnections were carried out in an optimal period of time registering a performance indicator of 100%.

In 2012, the companies related to Moldovagaz SA received 10,210 connection requests, by 5,242 requests more than in 2011, when only 4,968 requests were registered. During 2012, per all the companies related to Moldovagaz SA 9,618 connection notices were issued, and 1,041 requests were refused. During the same year 13,774 requests were registered for connection to the network.
Only in 12,819 cases connection was carried out in due time according to Regulation, registering an efficiency ratio of 93%. In 2011 only 6,078 requests for connection to the network were registered, among which 6,071 in due time, i.e. a 99.9% performance. During 2012, 10,178 reconnection requests were registered among which only 9,701 consumers were reconnected in due time or a performance coefficient of 95.3%. In 2011, 2,891 reconnection requests were submitted, of which 2,891 being carried out in due time, i.e. 100%.

Among other network operators which do not belong to the Moldovagaz SA group only 3 companies submitted their reports. 24 planned interruptions were reported, all of them being announced in advance and solved in time. There were registered 188 unplanned interruptions, all of them being performed within a reasonable time period and announced in advance. A total of 219 connection requests were registered, all of them fulfilled by the network operators in due time according to the Regulation, thus registering a performance coefficient of 100%. There were registered 444 connection requests, all of the 444 requests being carried out according to regulation. 56 reconnections were made all of them in time required by the Regulation.

2.5 SECURITY OF SUPPLY AND SECTOR FUNCTIONING UNDER THE STATE OF EMERGENCY CIRCUMSTANCES

According to Draft Law amending and supplementing the Law on Natural Gas, presumably to be adopted by the end of 2013:

Article 5 shall be supplemented with new paragraph (3) as follows:

“(3) Annually, by March 1, the Government shall approve the Commission for surveillance of emergencies on the natural gas market. The Surveillance Commission for emergencies on the natural gas market shall be convened by its Chairman. Criteria for selecting members of the Commission, the role and functions of the Commission shall be defined in the Regulation approved by the Government.”

Art. 5 shall be followed by a new Article 51, as follows:

"Article 51. Action Plan for emergencies on the natural gas market

(1) The Action Plan for emergencies on the natural gas market shall be developed by the Surveillance Commission for emergencies on the natural gas market, shall be approved by the Government Decision and shall be binding upon all participants in the shall develop the Action Plan for emergencies o the natural gas market, shall be based on proposals submitted by the transmission system operator and other participants in the natural gas market. The Action Plan for emergencies on the natural gas market shall be approved by the Government by May 1, and shall be reviewed annually.

(2) In developing the Action Plan for emergencies on the natural gas market the following shall be considered:

- availability of storage capacity and of the necessary amount of natural gas contained, as well as the existence of necessary investments to ensure storage capacity in emergency situations;
- extraction capacity of storage facilities;
- the need for the transmission system operator to ensure the transport capacity of the gas transmission network to make possible taking over and channelling the amounts of natural gas to the areas facing the risk of being..."
affected, and the need to extend the natural gas transmission network to supply natural gas to final customers in such areas;

- flexibility of the natural gas system;
- the need to foster contracts containing clauses on disruption of supply;
- the possibility to use, on the basis of the national program, under item p), some alternative fuels in industrial and energy production installations;
- availability and strengthening the interconnectors’ capacity to ensure cross-border trade of natural gas;
- the need to boost cooperation of the transmission system operator with the natural gas transmission system operators from neighbouring countries, to coordinate gas supplies;
- the need to coordinate natural gas supply activities between the transmission system operator and the distribution system operators;
- internal production of natural gas;
- flexibility of internal natural gas production;
- flexibility of natural gas imports;
- possibility to diversify the sources of natural gas supply;
- long term natural gas procurement contracts;
- the need to optimize infrastructure investments to expand transmission capacity, replace outdated pipes to reduce natural gas losses and ensure security of natural gas supply, as well as for the purpose of natural gas import via re-gasification terminals and pipelines;
- the National Program provisions on limitation and / or suspension of natural gas supply, drafted by the specialized body of central public administration in the energy sector and approved by the Government, with further publication in the Official Gazette, which contains the list of interruptible end users and the order in which natural gas supply to these shall be limited and / or suspended, type and, where applicable, the quantities of alternative fuels to be used by end users during suspension.

(3) While performing its tasks related to implementation of the Action Plan for emergencies on the natural gas market, the Surveillance Commission for emergencies on the natural gas market shall take account of:

- immediate measures undertaken by the participants in the natural gas market in response to a major reduction of natural gas supply;
- other measures adopted by the Government on security of natural gas supply for emergencies on the natural gas market.”

Art. 50 shall be supplemented with four new paragraphs, as follows:

“(7) Upon stating of an emergency situation on the natural gas market, the transmission system operator shall take immediate action in accordance with the Action Plan for emergencies on the natural gas market and notify such situation to the Surveillance Commission for emergencies on the natural gas market. Within 12 hours since notification, the Surveillance Commission for emergencies on the natural gas market shall check if the criteria for the emergency situation the natural gas market have been
met, and where appropriate, state the occurrence of the emergency situation on the natural gas market.

(8) If, after having checked, the Surveillance Commission for emergencies on the natural gas market decides that there has not been an emergency on the natural gas market, the transmission system operator shall be bound to immediately resume work under normal conditions.

(9) During the emergencies on the natural gas market, measures undertaken in accordance with the Action Plan for emergencies on the natural gas market shall be binding and shall take precedence over contractual agreements, laws and regulations in this field.

(10) Once the causes for declaring an emergency on the natural gas market become void, the transmission system operator shall be bound to immediately resume work under normal conditions and immediately notify the Surveillance Commission for emergencies on the natural gas market about this. The Surveillance Commission for emergencies on the natural gas market shall check, within 24 hours at most, and shall state the termination of emergency situation on the natural gas market.”

2.6 GAS IMPORT AND SUPPLY

The RoM is a net importer of energy, the natural gas purchased from a single source representing the major source of fuel. However, the EU-27 energy supply mix structure is very different from the one in the RoM, in terms of natural gas participation in total primary energy supply (23.9% versus 40.5% in the RoM, meaning about almost half), so that the impact of this dependence is remarkably different.

Table 2.1 shows the amounts of natural gas purchased and supplied to final consumers on the mainland of the RoM, both distributed to the end-consumers and directly supplied through transmission networks.

Table 2.1: Natural gas purchased and supplied to final consumers

<table>
<thead>
<tr>
<th>Indices</th>
<th>Unit</th>
<th>2001</th>
<th>2005</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>Amendments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Purchase of natural gas – total</td>
<td>Mill. m³</td>
<td>1,127.0</td>
<td>1,418.6</td>
<td>1,187.8</td>
<td>1,152.1</td>
<td>1,095.5</td>
<td>-35.7</td>
</tr>
<tr>
<td></td>
<td>Mill. MDL</td>
<td>1,131.8</td>
<td>1,364.9</td>
<td>3,674.0</td>
<td>4,614.0</td>
<td>5,185.0</td>
<td>+940.0</td>
</tr>
<tr>
<td>2. Average price of natural gas purchased</td>
<td>US$/1000 m³</td>
<td>78.0</td>
<td>76.1</td>
<td>250.1</td>
<td>339.3</td>
<td>394.0</td>
<td>+89.2</td>
</tr>
<tr>
<td></td>
<td>MDL/1000 m³</td>
<td>1,004</td>
<td>962</td>
<td>3,093</td>
<td>4,005</td>
<td>4,733</td>
<td>+912</td>
</tr>
<tr>
<td>3. Supply of natural gas (through distribution and transmission networks) – total</td>
<td>Mill. m³</td>
<td>1,108.5</td>
<td>1,315.0</td>
<td>1,089.8</td>
<td>1,036.3</td>
<td>989.6</td>
<td>-53.5</td>
</tr>
<tr>
<td></td>
<td>Mill. MDL</td>
<td>1,004.0</td>
<td>1,551.0</td>
<td>4,362.2</td>
<td>5,327.1</td>
<td>5,942.6</td>
<td>+964.9</td>
</tr>
<tr>
<td>4. Average tariff for natural gas supplied (including VAT)</td>
<td>MDL/1000 m³</td>
<td>906</td>
<td>1,180</td>
<td>4,003</td>
<td>5,140</td>
<td>6,005</td>
<td>+1,137</td>
</tr>
</tbody>
</table>
In 2012, as in the previous years, the JSC Gazprom was the only natural gas supplier on the Moldovan market. The total amount of the natural gas purchased was 1,095.5 mill. m$^3$ and as compared to the previous year diminish by 4.9%, which is a more pronounced decrease than the one by 3.0% in 2011 compared to 2010. Thus a downward trend is revealed persisting the past years.

Concerning final supplies of natural gas to final consumers during 2010-2012, it should be noted that all distribution companies registered a decrease, except SRL Edinet-gaz and SRL Orhei-gaz, in the service areas, the increases of which consumption took place by 8.1% and 1.2% respectively (Table 2.2). For the rest of the companies a more or less pronounced decrease in consumption of the natural gas is revealed. The most significant decrease by 28.1%, was registered only by SRL Floresti-gaz, for 3 companies – SRL Gagauz-gaz, SRL Cahul-gaz and SRL Taraclia-gaz the decrease in amounts was between 10.1-14.3%, and the other 6 companies were characterized by decreases smaller ranging between from 2.5% and 7.3%.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>SRL Chisinau-gaz</td>
<td>672.5</td>
<td>636.1</td>
<td>620.2</td>
<td>62.7</td>
<td>62.5</td>
<td>63.8</td>
</tr>
<tr>
<td>2.</td>
<td>SRL Ialoveni-gaz</td>
<td>66.2</td>
<td>61.2</td>
<td>56.8</td>
<td>6.2</td>
<td>6.0</td>
<td>5.8</td>
</tr>
<tr>
<td>3.</td>
<td>SRL Balti-gaz</td>
<td>100.5</td>
<td>99.6</td>
<td>93.4</td>
<td>9.4</td>
<td>9.8</td>
<td>9.6</td>
</tr>
<tr>
<td>4.</td>
<td>SRL Edinet-gaz</td>
<td>34.3</td>
<td>30.9</td>
<td>33.4</td>
<td>3.2</td>
<td>3.0</td>
<td>3.4</td>
</tr>
<tr>
<td>5.</td>
<td>SRL Floresti-gaz</td>
<td>48.8</td>
<td>45.9</td>
<td>33.0</td>
<td>4.6</td>
<td>4.5</td>
<td>3.4</td>
</tr>
<tr>
<td>6.</td>
<td>SRL Orhei-gaz</td>
<td>31.1</td>
<td>28.8</td>
<td>29.1</td>
<td>2.9</td>
<td>2.8</td>
<td>3.0</td>
</tr>
<tr>
<td>7.</td>
<td>SRL St. Voda-gaz</td>
<td>15.5</td>
<td>14.6</td>
<td>13.7</td>
<td>1.5</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>8.</td>
<td>SRL Gagauz-gaz</td>
<td>32.9</td>
<td>32.3</td>
<td>29.0</td>
<td>3.1</td>
<td>3.2</td>
<td>3.0</td>
</tr>
<tr>
<td>9.</td>
<td>SRL Cahul-gaz</td>
<td>23.2</td>
<td>23.9</td>
<td>21.5</td>
<td>2.2</td>
<td>2.3</td>
<td>2.2</td>
</tr>
<tr>
<td>10.</td>
<td>SRL Taraclia-gaz</td>
<td>8.1</td>
<td>7.7</td>
<td>6.6</td>
<td>0.8</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td>11.</td>
<td>SRL Cimislia-gaz</td>
<td>15.1</td>
<td>14.8</td>
<td>13.7</td>
<td>1.4</td>
<td>1.5</td>
<td>1.4</td>
</tr>
<tr>
<td>12.</td>
<td>SRL Ungheni-gaz</td>
<td>23.6</td>
<td>22.4</td>
<td>21.4</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1,071.8</td>
<td>1,018.2</td>
<td>971.8</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

As a result of a non-uniform decrease per service areas of the distribution network operators some changes took place in their share in the total final supplies of natural gas in 2012. Thus, due to a relative small decrease by 2.5% as compared to an average and against 4.6% concerning SRL Chisinau-gaz, or increase in supplies concerning SRL Edinet-gaz and SRL Orhei-gaz their share in the composition of the total useful supplies grew by 1.3 and by 0.4 and 0.2%, respectively. At the same time, most significantly decreased the share of SRL Floresti-gaz, by 1.1%, and the share of SRL Ialoveni-gaz, SRL Balti-gaz and SRL Gagauz-gaz diminished by 0.2%, of SRL Cahul-gaz and SRL Taraclia-gaz – by 0.1% each.

Given the fact that 99.9% of natural gas is imported, Moldova was severely hit by a drastic increase of energy prices started in 2007 following conclusion of new natural gas supply contract signed
between JSC Gazprom and Moldovagaz SA. According to that contract, prices for natural gas were increased to the average European level within 4 years, the process that finished in 2011 and resulted in a 2.5-fold price hike.

Starting with January 2012, the contractual purchase price for the natural gas was 388.3 US$/1000 m³, which was valid for first quarter of 2012 and being by 3.5% lower than the one from the previous quarter (in the fourth quarter of 2011 – 402.2 US$/1000 m³). Subsequently, however, the purchase price calculated according to a predetermined formula in the natural gas purchase contract and amended quarterly in the second quarter was 398.0 US$/1000 m³, in the third quarter – 398.2 US$/1000 m³ and in the fourth quarter – 399.6 US$/1000 m³. Thus, in 2012, the average purchase price of gas from JSC Gazprom was 394.0 US$/1000 m³, which is by 16.1% higher than the one paid in 2011 (339.3 US$/1000 m³).

The increase of price of gas purchase is determined by ANRE increase of gas tariff for the end users. The evolution of the average natural gas tariffs in the Republic of Moldova is shown in Figure 2.2.

![Figure 2.2: Evolution of the average natural gas tariffs during 1997-2011 (US$/1000 m³)](source: Annual Reports of ANRE)

### 2.7 GAS CONSUMPTION

After a significant drop in the 1990s, natural gas consumption in Moldova begun recovering since 2008, and nowadays amounts to 3 bcm/y, out of which approximately 1 bcm/y is consumed on the right bank of the Dniester river. Consumption is concentrated in the capital Chisinau, which consumes approximately 60%. Natural gas consumed on the left bank of the Dniester is mainly used for electricity production.

Moldova has a very high share of natural gas used in total primary energy consumption (58.7%) and is among the countries with the highest share of natural gas in electricity and heat production (accounting for 96.1%).
Table 2.3: Composition of final natural gas consumption by consumer categories

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mill. m³</td>
<td>%</td>
<td>Mill. m³</td>
<td>%</td>
<td>Mill. m³</td>
</tr>
<tr>
<td>Total final natural gas consumption, of which:</td>
<td>1,089.8</td>
<td>100.0</td>
<td>1,036.3</td>
<td>100.0</td>
<td>989.6</td>
</tr>
<tr>
<td>- Households</td>
<td>340.5</td>
<td>31.2</td>
<td>314.0</td>
<td>30.3</td>
<td>298.9</td>
</tr>
<tr>
<td>- Public institutions</td>
<td>50.9</td>
<td>4.7</td>
<td>52.7</td>
<td>5.1</td>
<td>50.3</td>
</tr>
<tr>
<td>- Energy sector</td>
<td>457.8</td>
<td>42.0</td>
<td>430.8</td>
<td>41.6</td>
<td>428.9</td>
</tr>
<tr>
<td>- Other economic agents</td>
<td>240.6</td>
<td>22.1</td>
<td>238.8</td>
<td>23.0</td>
<td>211.5</td>
</tr>
</tbody>
</table>

In the context of the general decrease in 2012 of the natural gas consumption is to be noted that the same trend was typical without any exceptions for each monitored category of consumers (Table 2.3).

A relevant decrease of the natural gas consumption by 15.0 mill. m³ (4.8%) was registered in the case of the households, and in the context of a same substantial decrease in 2011 a reversal uptrend was confirmed of the households consumption in the previous period which fact takes place in spite of the gas infrastructure development and expansion in the number of the household consumers. A relatively similar decrease with a moderate pace by 4.5% took place in case of the natural gas consumption by the public institutions while the smaller decrease by 0.5% was typical to companies from the energy sector – combined heat and power plants, power plants generating and supplying thermal energy to urban consumers through centralized supply systems. However, the general downward trend was determined particularly by a drastic decrease by 11.5% (27.4 mill. m³) of the natural gas consumption registered by all the other economic agents, which was typical for this category of consumers for the past years except for the growth in 2010.

In the composition of gas consumption the largest share of 43.3% belongs to the companies from the energy sector which is decreased by 1.7% as compared to the previous reference period. The share of the household consumers was 30.2%, which was less by 0.1 percentage points than in the previous year after a more pronounced decrease by 0.9 percentage points, in 2011. The share of the other economic agents (except for those from the energy sector) was 21.4% which diminished by 1.6% due to the most significant decrease per categories. It should be emphasized that the share of the natural gas consumption which belong to public institutions during the reference period remained at the same level as in 2011.

Development trends of final natural gas consumption and its breakdown by sector during 2001-2012 are shown in Figures 2.3-2.4.
Figure 2.3: Final natural gas consumption by sector during 2001-2012 (mil. m³)

Figure 2.4: Final natural gas consumption by sector during 2001-2012 (%)
2.8 INVESTMENT PROJECTS AND FORECASTS OF SECTOR DEVELOPMENT

2.8.1 Implementation of the 3rd Energy Package in the gas sector

Moldova is a member of the Energy Community and committed to implement the 2nd and 3rd Energy Packages. In order to ensure a better coordination of the implementation process, the GoM developed a Roadmap that is aimed to implement the respective commitments during 2013 – 2020.

The Law on Natural Gas (No. 123 of 2009) established the basic legislative framework for the gas market in line with the 2nd Energy Package, in particular, with Directive 2003/55/EC. Several acts of secondary legislation – namely the Regulation on Natural Gas Supply and Use, the Technical Rules for Networks and the Regulations on Quality of Natural Gas Transportation and Distribution Services - define technical rules in the gas sector.

In late 2011, the Board of Moldovagaz SA decided on the company’s reorganization in line with the Law on Natural Gas. Accordingly, by 2013 Moldovagaz SA should have been transformed into a holding company with separate legally and functionally unbundled daughter companies for (1) supply and (2) transmission as well as (3) four distribution companies. However, the actual implementation of the decision has not been implemented yet.

As a temporary option, the MoE has suggested to reorganize only Chisinau-gaz SRL, one of 12 regional distribution system operators (all subsidiaries of Moldovagaz SA), according to the art. 54 (1) b) of Law on natural gas, that stipulates the unbundling of distribution and delivery activities for companies that deserve more than 100,000 of final consumers. This reorganization has been launched from 01.01.2013.

Thus, in order to keep the legal framework, SRL Chisinau-gaz was reorganized, taking into account the proposals presented by the executive body of Moldovagaz SA, in coordination with the Ministry of Economy, ANRE and JSC Gazprom.

On 6th October 2011, at the 9th Ministerial Council Meeting, Chisinau (Moldova), the RoM together with other contracting parties to the ECT adopted the decision related to the implementation of the Third legislative Package for an internal EU gas and electricity markets. This was an important step towards aligning Moldovan energy market rules to EU standards and to its integration in the regional market.

On 14th December 2011 an official Statement of the Republic of Moldova regarding the implementation of the 3rd internal energy market package was brought to the attention of the PHLG meeting.

It should be mentioned that the implementation process of the Third legislative Package in the natural gas sector of the RoM has to be considered in the context of the current as well as medium- and short-term developments on the ground of the existing contractual and ownership realities in the country.

The new gas market Directive 2009/73/EC provides for a new unbundling regime with three models as options: (1) ownership unbundling, (2) Independent System Operator (ISO) and (3) Independent Transmission Operator (ITO). When analysing the steps towards following its obligations under the ECT, the authorities of the RoM came to conclusion that the implementation of any of the 3 models of Directive 2009/73 is linked to concrete difficulties, which might jeopardize not only the implementation process, but the overall economic, financial, political and social developments of the country. Nonetheless, possible failure in the implementation of unbundling of Moldovagaz SA could
have irremediable adverse implications, therefore the issue denotes most serious risk for the SoS of the country.

Taking into account the perspective for implementation of the 3rd Energy Package, and in order to have guarantees for the assets from the gas sector of the RoM, JSC Gazprom has conditioned the position regarding the clarification of situation concerning its assets in Moldovagaz SA.

It should be noted that the previous longer-term contract between Moldovagaz SA and JSC Gazprom has expired in December 2011. Since then the parties have not succeeded to renegotiate and conclude a new contract apart from extending the previous agreement on an annual basis for 2012, 2013 and 2014, respectively. All negotiations for a new contract were disturbed by discussions on the implementation of the 3rd Energy Package, including threats for possible stoppage of gas deliveries to Moldova.

Moreover, taking into consideration the fact that the territory of the RoM is crossed by transit pipelines through which JSC Gazprom transits natural gas to other countries of South-Eastern Europe, the strained relations between Moldova and JSC Gazprom could affect the SoS in the neighbouring countries of the region as well.

On this ground, Moldova considered carefully some major Treaty provisions. Thus, e.g. according to article 101 of the ECT, without prejudice to Articles 102 and 103, the rights and obligations arising from agreements concluded by a Contracting Party before the signature of this Treaty shall not be affected by the provisions of this Treaty. To the extent that such agreements are not compatible with this Treaty, the Contracting Party concerned shall take all appropriate measures to eliminate the incompatibilities established, no later than one year after the date of entry into force of this Treaty.

Moldova considers that this text needs to be also concretely analysed along the existing realities. This is also valid e.g. for Article 8 of the Treaty, which specifies that “Nothing in this Treaty shall affect the rights of a Party to determine its choice between different energy sources and the general structure of its energy supply”. In concrete terms, however, Moldova notes that its choice in this aspect is completely limited.

At the same time, Article 28 of the ECT provides that the Energy Community shall take additional measures establishing a single mechanism for the cross-border transmission and/or transportation of Network Energy. This text should be also noted in the context of the existing factual and legal relations.

Having regard to Moldova's special situation, as the only Contracting Party where a foreign investment in gas infrastructure enjoys protection under a bilateral agreement within the meaning of Article 101 of the Treaty, based on Decision D/2012/04/MC-EnC, Moldova achieved derogation on postponement of implementation of Article 9 of Directive 2009/73/EC concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC by 1 January 2020. It was a positive decision for the Moldovan gas sector's development.

### 2.8.2 Strategic development directions and next actions

Moldova is currently in the process of negotiations with the Russian side on a new energy cooperation framework, being guided by the commitments as member of the Energy Community. One of the key stakes in the negotiations with Russian side is the settlement of the historical debt of Moldovagaz SA to JSC Gazprom which currently constitutes about 4.4 bill. US$, of which more than 87% is the debt of Tiraspoltransgaz - the Transnistrian region transport system operator.
Consolidation of the outstanding debt as explained above needs consideration of all possible options on how the very complicated situation could be remedied, which involves complex reforms in several involved sectors: gas, power and district heating.

The strategic development directions that shall positively contribute to the SoS for natural gas in the RoM, considered by the GoM, are as follows: (I) diversification of supply sources, (II) access to LNG and (III) establishment of gas storage facilities.

I. The diversification of supply sources has three measures: (i) improve transmission interconnectors in order to provide alternative supply routes, (ii) a higher number of alternative suppliers and (iii) a better assessment / exploitation of existing reserves in Moldova.

1) From the point of view of alternative supply routes, Moldova has only two neighbour countries that can provide cross-border flows from one or several supply sources. However, the existing natural gas supply connection with Romania does not allow a reversible, the only possible direction until now being the one towards Romania. Consolidation of Moldova’s current role as a natural gas transit country is based on maintaining the current transit direction and creating a secure transit route in the alternative direction.

   a) The maintenance in the future of the current East-West transit direction, which is also Asia-Europe’s main natural gas supply direction, will be performed by strengthening the current Moldovagaz SA – JSC Gazprom partnership and extending the interest of JSC Gazprom in keeping this transit route for the horizontal integration of the company through involvement in the production of power, which is in full conformity, both with JSC Gazprom’s policy in Europe, and Moldova’s needs for retrofitting cogeneration assets in Chisinau.

   b) Setting up of alternative routes will be materialized through the construction of a new interconnection with Romania (the Ungheni-Iasi pipeline) with a possibility to maintain flows in both directions.

2) From the point of view of alternative natural gas suppliers, both neighbour countries (Ukraine and Romania) are currently relying on the same sources in upstream, which is the Russian concern JSC Gazprom, while Romania also has its own natural gas production, and Ukraine intends to rediscover its own potential in the natural gas area. However, in the future, both countries can rely on their own alternative gas resources either by extracting gas from the Black Sea, from shell-gas reserves or by establishing additional connections to non-Russian sources. These neighbours aim at diversifying their gas supply sources with specific steps, both considering the gas from the Caspian Sea, Romania from Azerbaijan, Georgia, Romania Initiative (AGRI), and Ukraine by building an LNG terminal.

3) From the perspective of internal sources, the zones in the South of Moldova (gas basins in the residential areas of Gotesti, Baurci, Aluat, Manta) will be reassessed, the process being combined with the implementation of clear leasing policies of deposits for the benefit of the state and citizens.

As concerning the diversification of natural gas supply sources for Moldova, until around 2015, there will be no alternative sources to the Russian gas, and the transit through Ukraine remains relatively stable.
By the end of this decade, the transit to Europe through Ukraine could diminish given the gradual increase of imports through the North Stream pipeline and planning of the construction of the South Stream pipeline by JSC Gazprom.

II. In case of a deficit, like in the gas crisis in 2009, the liquefied natural gas (LNG) could represent an important share of additional supplies; at that time, this share was of about 10%. The LNG is a chance for the natural gas market of the Southeast Europe to grow in volume, as well as to increase its liquidity, that could represent a basis for the short-term trading. However, specific conditions must be taken into consideration, when Moldova will decide, upon a thorough analysis, to become part of the initiative: investments in the LNG are very high, compared to pipelines, and Turkey may eventually not allow the transit of LNG tankers via Bosfor.

Once the AGRI project can become feasible, depending on the additional investments, the alternative for Moldova to participate in the project will be analysed in terms of viability, both from the financial and technical points of view.

III. The possibility to fulfill the supply security standards, by using the storage facilities located not only in Ukraine, but also in Romania, will be capitalized as part of the agreements associated to the construction of an additional interconnection with Romania through a specific bilateral agreement, as the applicable directive suggests. Meanwhile, possibilities for the construction of natural gas storage capacities in Moldova have been explored within two surveys, carried out in 2009 by the Berkeley Associates Company and in 2011 by the Institute of Geology and Seismology of the Academy of Science of Moldova. The possibility of implementing the surveys' findings will be considered with donors at a later stage. Benefits of the natural gas storage capacity will be represented by the improved capacity of the supply system to cover the peak consumption, as well as to ensure the supply under interrupted transit conditions.

Within the natural gas sector, the transmission infrastructure in the region faces a process of diversification and reprioritization of transit routes. This development will be constantly evaluated and forecasted, for the purpose of maintaining and enhancing existing alliances and ensuring the required transmission infrastructure in order to develop them regardless of the future changes, and to influence within reasonable limits the mentioned reprioritizations.

2.8.3 Priority investment projects

As concerns infrastructure development, construction works on the new interconnector with Romania, Iasi (RO) – Ungheni (RoM) started on 27 August 2013. This interconnection shall diversify delivery routes for natural gas to the RoM and thus ensure high SoS for gas, especially to high gas demand centres (Chisinau), by construction of the reversible gas pipeline.

Key characteristics of the interconnection are:

- Length: 43.28 km in total, of which 10.48 km in RoM, with 736 m crossing the Prut river;  
- Pipeline diameter 20"; reversible operation; transport capacity: 1.5 bcm/year at 55 bar nominal pressure and a min. pressure of 16 bar on the border;  
- Total cost – 26 mill. EUR, of which 9.1 mill. EUR on the Moldovan side and 16.9 mill. EUR on the Romanian side;  
- Financing (Moldovan side): EU grant – 3 mill. EUR and grant from Romanian Government – 6.1 mill. EUR;
• Financing (Romanian side): EU grant - 4 mill. EUR and contribution of Romanian Government – 12.9 mill EUR;
• Planned completion within 8 months (by April 2014).

The next and final phase of the project is the extension of the pipeline of 130 km (Ø500mm) on the RoM territory by construction of (1) gas pipeline Ungheni-Chisinau, (2) the ring around Chisinau and of (3) a distribution / measurement station on the ring. By that the new source of supply from Romania will be connected with the biggest consumption area, Chisinau (approx. 60% of total consumption of the country).

This pipeline is feasible if the Gas Pumping Station (on the territory of Romania) will be constructed and Romanian gas transmission network will be strengthened in the region (in this respect, 130 km of new/upgraded gas transmission pipe is under discussion).

The estimate budget of the project is approx. 70 mill. EUR. This project is of a strategic importance for the RoM and represents a significant step forward towards building and consolidating the energy security of the country.

In order to prepare the project for the implementation the MoE of the RoM is currently seeking donor’s support to develop a Feasibility Study (FS), which will include the Environmental and Social assessment (ESA). This FS is planned to be finalized by end of 4Q2014 provided financial resources are ensured by the end of 2013. The project design is also envisaged to be drafted with the support of the donor community. The deadline would be by end of 3Q2015. In this regards, financing of the FS will be provided by EBRD and a draft ToR is currently under discussion (October 2013).

The Financing Agreement on the construction Ungheni-Chisinau pipeline should be signed preferably in 2015, taking into account the support offered by EBRD, EIB, European Commission through NIF (ENPI). The goal is to finalize the entire project by the end of 2017.

The Ungheni-Chişinău pipeline (with all of its parts), including the Moldovan part of the Iaşi-Ungheni pipeline will be the sovereign property of the RoM. The operation of this new gas transport system will be subjected to further assessment in the feasibility study. At the same time, the GoM already identified two alternative options for the operation under the obligation of the provisions of the 2nd and 3rd Energy Package:

• To create a new company that will operate the new pipelines including other state-owned national pipelines;
• The Government will sign a contract for service operations of the new pipelines with the existing TSO (SRL Moldovatransgaz).

Thus, the reversible connection of the natural gas transmission system to the system in Romania will be fully feasible in 2014, with the short-term objective to offer gas supply alternatives in emergency situations and the long-term strategic objective to benefit from the existing connections (with Hungary), under construction (with Bulgaria) and the planned ones (with Serbia) of Romania. Subsequently, by 2020, along with the development of Southern Corridor and South Stream gas pipelines, this line will provide additional connection not only with the Balkan countries.

2.8.4 Development plan of Moldovagaz SA for 2013-2015

The Development Plan of Moldovagaz SA for 2013-2015 which includes the investment program and the capital repair plan has been elaborated in accordance with the current development
perspectives of the existing natural gas transportation and distribution network of the RoM that include the following:

- Consolidation of the special status of natural gas transit state by consolidation of transportation possibilities;
- Providing higher reliability and safety of operation of gas transportation and distribution systems;
- Increased deliveries of natural gas to the consumers.

The implementation of the Development Plan of Moldovagaz SA for 2013-2015 depends on several key factors including effective development of macro-economic indices of the RoM as well as adequacy of tariff policy of ANRE vs. natural gas market situation, solvency of Moldovagaz SA and its ability to collect payments from its consumers.

The planned amounts of required investment and capital repair costs for the years 2013-2015 is estimated at approximately 64.9 mill. EUR, including (i) investments – 37.5 mill. EUR and (ii) capital repairs – 27.4 mill EUR (Figure 2.5).

The investment program has been elaborated taking into consideration the following:

1. The amount of planned investments in construction of objects is 12.2 mill. EUR. The total length of gas pipelines to be constructed is around 158.08 km. The main program items provide the following:
   - Construction of 152.3 km of gas pipelines in localities for the connection of over 3,100 potential consumers;
   - Construction of 4.17 km of gas pipelines (loops) for the improved operation of existing gas distribution system;
   - Construction of 125 separately standing gas metering nodes at entries to localities and in the service area division borders;
   - Construction of Gas Distribution Station no. 3 in Chisinau;
• Installation of remote control systems for trunk main valves, monitoring and telemetry systems, cathode protection systems of steel pipelines for a higher operational safety;
• Etc.

2. The amount of planned investments in reconstruction and modernization of gas transportation and distribution system is estimated at 6.6 mill. EUR. It will provide a higher safety of gas transportation and distribution systems and contains the following main activities:
• Replacement of 5 existing gas distribution stations with new stations with automated technological processes;
• Technical upgrade of gas distribution and transportation system objects;
• Reconstruction of 15.6 km of existing underground steel pipelines;
• Replacement of 28 gas metering nodes with modern ones equipped with electronic correctors.

3. The amount of planned investments in procurement of fixed assets is 13.1 mill. EUR, including:
• Transportation vehicles, automobiles and mechanisms;
• Devices, equipment and electrical tools;
• Computers, office equipment, alarm systems, communication equipment;
• Software products.

4. The amount of planned investments in the survey and design works for the future construction is 0.6 mill. EUR.

The investments will be aimed at raising the reliability and safety of existing gas transportation and distribution systems; safety of industrial processes; modernization of gas transportation and distribution systems with installation of automatics, remote control and communication systems; improvement of commercial and technological gas metering systems, creation of new premises for working with consumers.

Regarding capital repairs, the planned capital repair costs that amount to 28.7 mill. EUR include:
• Repair of trunk mains and branch pipelines;
• Replacement of technical devices;
• Repair of production, technological and administrative buildings.

Reduction of gas losses and technological consumption are a priority for the Moldovagaz SA.

In distribution networks of Moldovagaz SA it is planned that the losses and technological consumption will be reduced to 1.6 mill m³ by 2013 and further down to 1.3 mill. m³ by 2015. The estimated costs of measures in the domestic sector are 12.9 mill. EUR and 0.2 mill. EUR in the non-domestic sector.

In transmission networks of Moldovagaz SA it is planned that the losses and technological consumption will be reduced to 6.0 mill m³ by 2013 and further down to 4.2 mill. m³ by 2015. The estimated costs of measures are 6.0 mill. EUR in the observed 3-year period.
The reduction of technological gas consumption and technical losses in trunk mains, with reference to the normative volume, will be assured by:

- successive implementation of remote control and telemetry of gas transportation system;
- modernization of gas metering nodes on the Balkan direction gas pipelines (based on ultrasound gas meters);
- installation of a control gas metering point on the Gas Distribution Station no. 1 in Chisinau based on ultrasound gas meter;
- provision of linear gas pipelines with pressure and temperature transducers for a more precise determination of gas amounts in the pipelines;
- maximum takeout of gas by the consumers from the pipeline sections to be repaired before disconnection, in order to reduce the volumes of gas released from pipeline.

2.8.5 Other possible investment projects

At present, there is no gas storage facility located on the territory of the RoM. However, there is a possibility that Moldova accomplish also this challenging goal.

Construction of an underground storage facility (Cazaclia) of working gas volume of 7,410 mill. Nm$^3$, max. daily withdrawal capacity of 1.78 mill. Nm$^3$/day, max. daily injection capacity of 1.9 mill. Nm$^3$/day and the cycling rate of 1 time/day (total investment costs of 750 mill. EUR) has been proposed by the RoM for the Energy Community Secretariat as PECI project.

The facility would increase the SoS for gas in case of gas supply crisis. The RoM, Romania and other countries from the Balkan region could be provided with gas from the Cazaclia underground gas storage in case of need through the existing major pipelines. The underground gas storage would cover the demand of natural gas in the period of peak demand in cold season and would treat the risk of interruption of supply on domestic and regional markets.

As per adopted Energy Strategy 2030, natural gas resources identified in the Southern part of the country (Cantemir district) will be further explored and if feasible, also developed.
3 OIL

3.1 BRIEF OVERVIEW OF “UPSTREAM” OPERATIONS

In the “upstream” operations, the RoM has only minor own crude oil production and processing facilities. The Valeni oil reserves in Cahul district are estimated at 0.5 mill. tones, and the maximum annual extraction rate of crude oil is 10-16 thousand tones. At the same time, maximum annual rate of extraction of associated natural gas is 150-250 thousand m³.

There are no oil exploration activities and no oil pipeline in the country at the moment. The RoM has a mini refinery (Comrat city) of nominal processing capacity of 100 thousand t/a.

As a consequence, the RoM imports petroleum products (from Romania, Belarus, Greece, Russia and Ukraine) about 500-550 thousand t/a of gasoline and diesel and some 70-80 thousand t/a of LPG (2011-2012).

Detailed data on oil or petroleum products storage capacities are not available. However, it is estimated at some 150 thousand tones, including State and industry facilities (excluding army).

In order to increase SoS for oil it is necessary to diversify both the sources and the ways of supply of petroleum products. A short-term objective should be to complete the building of the transportation infrastructure (road and rail) of the Giurgiulesti terminal, which will allow importing petroleum products by inland water-ways and thus avoid problems arising due to land transportation.

3.2 KEY MARKET PLAYERS IN “DOWNSTREAM” OPERATIONS

The Moldovan oil market is fully liberalised and open with many oil undertakings active in commercial business. In the “downstream” operations, there are many companies of different ownership operating, the activities of which are licensed but not regulated by ANRE.

During 2012, ANRE issued a total of 105 licenses for different activities on the petroleum products market, among which 82 – for holders who extended their activity for the next 5 years (Table 3.1).

Table 3.1: Licenses issued for activities on the petroleum products market in 2012

<table>
<thead>
<tr>
<th>#</th>
<th>Type of activities</th>
<th>Number of licenses issued</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Import and wholesale of gasoline and diesel oil</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Retail sale of gasoline and diesel oil at the certified filling stations</td>
<td>64</td>
</tr>
<tr>
<td>3</td>
<td>Import and wholesale of liquefied petroleum gas (LPG)</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Retail sale of LPG at the certified filling stations</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>105</td>
</tr>
</tbody>
</table>

In 2012 ANRE issued licenses to 3 new economic agents (ICS Petrom Moldova SA, ICS Flaga Gaz SRL, and IALG SRL) for Import and wholesale of LPG, and to 4 new economic agents (IM Andezit SRL, Vesi Plus SRL, Arnaut Petrol SA and Beruf Auto SRL) issued licenses for Import and wholesale of gasoline and diesel fuel.

Also, during 2012, the existing license holders extended their network of the petroleum products filling stations by purchase, lease and construction of new stations. At the license holders request,
after verifying the compliance of the submitted documentation with the requirements of legislation, ANRE issued 800 certified copies of licenses possessed, including 267 - for retail sale of LPG at the filling stations and 533 - for retail sale of the gasoline and diesel oil at the filling stations.

The LUKoil-Moldova SRL, Tirex Petrol SA, Petrom Moldova SA and Rompetrol Moldova SA companies possess licenses for all the types of the licensed activities on the petroleum products market.

As of end September 2013, there are 175 licenses valid on the petroleum products market, for different types of activities: (i) 30 licenses for import and wholesale, of which 20 licenses for gasoline and diesel oil and 10 licenses for LPG, and (ii) 145 licenses for retail sale, of which 83 licenses for petroleum products and 66 licenses for LPG. Overall in the RoM, there operate 607 (certified) filling stations with gasoline and diesel oil and 400 (certified) filling stations with LPG (Table 3.2).

Table 3.2: Number of license holders operating on the petroleum products market

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of activities</th>
<th>Number of license holders</th>
<th>Number of the certified copies of the license issued to license holders for each certified station</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Import and wholesale of gasoline and diesel oil</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Retail sale of gasoline and diesel oil at the certified filling stations</td>
<td>83</td>
<td>607</td>
</tr>
<tr>
<td>3</td>
<td>Import and wholesale of LPG</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Retail sale of LPG at the certified filling stations</td>
<td>66</td>
<td>400</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>179</td>
<td>1,007</td>
</tr>
</tbody>
</table>

3.3 BASIC LEGAL AND REGULATORY FRAMEWORK

The primary piece of legislation governing the oil sector (gasoline and diesel oil) is the Law on the petroleum products market (2001). Article 13 of the Law sets special conditions for importers of petroleum products (e.g. owned or leased oil storage - at least 5,000 m³ and minimum volume of required capital - at least 750,000 US$).

The other law is the Law on licensing of entrepreneurial activities, 451 of 2001, Resolution of ANRE number 263 of 2007 on the approval of the Methodology for calculation and applying of the prices for petroleum products.

Draft technical regulations on diesel oil, gasoline and biofuels have been developed by the MoE and will be approved by the end of 2013.

At the Ministerial Council meeting of 18 October 2012, a separate proposal was also made to extend the relevant acquis on oil stocks to: Directive 2009/119/EC imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products. The preliminary indication is that the RoM together with other CPs to the ECT will have to implement the provisions of the mentioned directive not later than 01 January 2023.

However, there has not been any actions undertaken to transpose the provisions of the mentioned directive in local legislation and regulations (see also Section 3.6).
3.4 OIL BALANCE (HISTORIC REALISATION: 2000-2012 AND FORECAST BY 2020)

In the RoM, 99% of petroleum products are imported. A great majority of petroleum products are consumed in final consumption, in particular in transport (35.6%) followed by industry (28.8%) residential sector (18.8% and agriculture (16.8%) (2011). During 2010-2012, the share of diesel oil demonstrated an ascending trend (from 55% to 60%) and the share of gasoline a descending downward trend (from 33% to 28%), while the share of LPG remained relatively constant (12%) (Figure 3.1).

![Figure 3.1: Development of shares of petroleum products during 2010-2012 (%)](image)

Consumption of petroleum products in the period 2000-2012 is shown in Figure 3.2, together with a forecast by petroleum products for the period by 2020, which is based on trend analysis (see the pertaining linear trends lines). It is assumed that quite fluctuating consumption in the past (from -8%/a to +17%/a) will stabilise in the period 2013-2020 (starting from some 8%/a in 2013 to 3.5%/a by 2020).

![Figure 3.2: Consumption of petroleum products - realisation: 2000-2012 and forecast: 2013-2020 (1000 toe)](image)
3.5 DIVERSITY OF THE CRUDE OIL/PETROLEUM PRODUCTS SUPPLY

3.5.1 Import and production of petroleum products

During 2000–2012, imports of petroleum products denote generally an ascending trend, which was particularly valid for the period between 2000 and 2005, when the total imports grew by 1.6 times from 365.0 to 579.9 thousand tons. Subsequently, starting with 2005 the total annual import of petroleum products remained almost at the same level. The lowest consumption amounted at 553.4 and 561.8 thousand tons in 2006 and 2010, respectively, and the highest ones of 622.7 and 625.0 thousand tons in 2008 and 2011, respectively, with maximum fluctuation of 13.0%.

Concerning the composition of petroleum products imports it should be noted that already four years in a row starting with 2009 an upward trend in the share of the diesel fuel by 8.0% from 52.2% to 60.2% is revealed, of the LPG by 2.0%, from 10.2% to 12.2% due to decreasing share of the gasoline from 37.5% to 27.5%, by 10.0%. (Figure 3.3).

During 2012 the RoM imported a total of 578.0 thousand tons, or by 7.5% less petroleum products than in 2011. It should be noted that during the reference period the imported amounts diminished per all types of fuel. Most of all decreased the import of gasoline by 17.6%. At the same time, LPG was imported less by 9.4% and diesel fuel by 1.6% as compared to 2011.

Table 3.3 shows the amounts of petroleum products imported in 2012 as compared to data of the two previous years.

<table>
<thead>
<tr>
<th>Type of the product</th>
<th>Unit</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2011 / 2010 (%)</th>
<th>2012 / 2011 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>tons</td>
<td>185,869</td>
<td>193,258</td>
<td>159,182</td>
<td>+4.0</td>
<td>-17.6</td>
</tr>
<tr>
<td>Diesel fuel</td>
<td>tons</td>
<td>309,111</td>
<td>353,629</td>
<td>348,064</td>
<td>+14.4</td>
<td>-1.6</td>
</tr>
<tr>
<td>Liquefied petroleum gas</td>
<td>tons</td>
<td>66,773</td>
<td>78,142</td>
<td>70,790</td>
<td>+17.0</td>
<td>-9.4</td>
</tr>
<tr>
<td>Total petroleum products</td>
<td>tons</td>
<td>561,753</td>
<td>625,029</td>
<td>578,036</td>
<td>+11.3</td>
<td>-7.5</td>
</tr>
</tbody>
</table>

Figure 3.3: Dynamics of the petroleum products imports in 2000-2012 (1000 tons)
The detailed data on imports by type of petroleum products and exporting countries are shown in Figures 3.4-3.6 below.

**Figure 3.4: Gasoline exporting countries to the RoM**

Romania has been and remains the main partner of the RoM, from which 65.9% of the total gasoline was imported followed by Austria – 12.3%, Bulgaria – 7.1%, Lithuania – 6.3%, Belarus – 4.4%, Hungary – 3.9%, insignificant amounts less than 0.1% were imported from Andorra and Germany.

**Figure 3.5: Diesel petroleum exporting countries to the RoM**

The same as gasoline, diesel petroleum was mainly imported from Romania – 50.7%, followed by Belarus – 15.6%, Russian Federation – 15.2%, Austria – 4.4%, Israel – 7.9%, Ukraine – 4.4%, Greece – 1.0%, the rest 0.8%, from United States, India, and Great Britain.
3.5.2 Petroleum products importers

The following three Figures 3.7-3.9 show the market shares of petroleum products importing companies, for gasoline, diesel oil and LPG.

**Figure 3.7: Imports of gasoline by companies in 2012**

*Note. The category “Other importers” includes 14 companies, the individual market shares of which are below 1%.*
In 2012, the major amounts of total gasoline imported were registered by the companies: Petrom Moldova SA – 34.2%, LUKoil Moldova SRL - 31.7%, Tirex Petrol SA – 14.3% and Rompetrol Moldova SA – 9.3%.

Most operators on the petroleum products market operating in 2011 and 2012 reduced their imports of gasoline. Among companies possessing big import shares for gasoline in 2012 reduced their import amounts in relation to the previous year: LUKoil Moldova SRL by 22.0%, Tirex Petrol SA by 14.1%, while the amounts imported by Petrom Moldova SA and Rompetrol Moldova SA grew by 2.7% and 4.7% respectively. Likewise, among companies with more or less significant market shares Vero-Nadina SRL has increased its imports by 4.3%, the rest of the companies, almost all of them reduced imports of gasoline.

At the same time, for various reasons several companies were withdrawn licenses: Agropetrol SRL, Azurit SRL and Armamil Com SRL. Vesi SRL and Parstar Petrol SRL got their licenses expired without applying for prolongation.

At the same time, for various reasons several companies were withdrawn licenses: Agropetrol SRL, Azurit SRL and Armamil Com SRL. Vesi SRL and Parstar Petrol SRL got their licenses expired without applying for prolongation.

Note. The category “Other importers” includes 10 companies, the individual market shares of which are below 0.7%.

Figure 3.8: Imports of diesel oil by companies in 2012

In 2012, almost all the companies entitled to import imported diesel oil, except for IS Moldresurse and Arnaut Petrol SRL. As in the case of the gasoline, the important shares of diesel oil were imported by four large companies, such as: LUKoil Moldova SRL – 32.9%, Tirex Petrol SA – 16.1%, Petrom Moldova SA – 15.1%, and Rompetrol Moldova SA – 9.3%.

Among companies with major market shares significantly increased their import share of diesel oil as compared to the previous year Petrom Moldova SA and Rompetrol Moldova SRL by 2.2 times and by 17.1%, respectively. Other companies such as Vero-Nadina SRL, Valiexchimp SRL and Avante SRL also registered a growth by 68.3%, 34.0% and 16.7%, respectively.

At the same time, imports of diesel oil diminished at large companies such as: LUKoil Moldova SRL by 4.1%, Tirex-Petrol SA by 21.9% and Bemol Trading SRL by 83.2%. Similarly, reduced their imports of diesel oil Parstar-Petrol SRL by 24.8%, Moldis Trading LTD SRL by 21.6%.
A prevailing amount (more than ¾) of LPG was imported only by three companies: Printemps SRL with the share of 28.0%, LUKoil Moldova SRL – 25.9% and Dominic SRL – 21.8%.

Among those who increased their shares in imports in 2012 in relation to the imported amounts in 2011 are only three companies: Printemps SRL by 24.5%, Duvasen SRL by 31.3% and Rompetrol Moldova SA by 11.9%. The rest of the companies registered substantial decreases. Thus, Tirex-Petrol SA reduced its imports by 92.7%, Dominic SRL by 31.6%, LUKoil Moldova SRL by 12.1%, Tezed-S SRL by 5.5%.

### 3.5.3 Import prices

The following two Figures 3.10-3.11 reflect the average Platts quotations and interrelation with the import prices for gasoline, diesel fuel and liquefied gas, expressed in U.S. dollars per ton, monthly, during 2012.
The annual average import price for gasoline was US$ 1,074 per ton and grew in relation to the previous year by US$ 58 or by 5.7%. The lowest monthly average import price for gasoline was registered in January representing US$ 987 per ton, and the highest in April – US$ 1,199 per ton. Since April the price came down to US$ 997 per ton by June maintaining till July, then grew to US$ 1,147 per ton in September. Starting with October and till the end of the reporting period the average import price of gasoline dropped by US$ 138, thus in December the average import price of gasoline was US$ 1,009 per ton.

The average import price for diesel oil in 2012 was US$ 1,026 per ton and grew in relation to 2011 by US$ 24, or by 2.4%. The highest import price for diesel fuel was registered in March representing US$ 1,083 per ton, and the lowest was US$ 943 per ton in July. Since the beginning of 2012 till March the monthly average import price for diesel oil grew from US$ 1,010 per ton to US$ 1,083 per ton. Starting with April the price continued to drop till July reaching US$ 943 per ton, then grew to US$ 1,072 per ton in September. Since November the import price for diesel oil has been falling, as by December to reach the value from the beginning of the year – US$ 1,010/ton.

With reference to LPG, in average for 2012 the import price was US$ 825 per ton, registering a decrease by 2.4% in relation to the previous year.

During 2012 the highest import price for liquefied gas was registered in May reaching US$ 895 per ton and the lowest US$ 714 per ton was registered in July. In the first two months the price dropped from US$ 829 per ton to US$ 803 per ton, then followed a price rise by May reaching the maximum value of the year – US$ 895 per ton, then rapidly decreased reaching US$ 714 per ton in July. Subsequently, the import price for LPG has increased, and by the end of the year a ton of LPS was imported on average at US$ 875.
The monthly average import prices for petroleum products in 2012 and annual averages as compared to 2011, expressed in US$ per ton are shown in the following Table 3.4.

Table 3.4: Monthly average import prices for petroleum products in 2012 as compared to 2011 (US$/ton)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>2011</td>
<td>897</td>
<td>917</td>
<td>993</td>
<td>1,089</td>
<td>1,098</td>
<td>1,066</td>
<td>1,069</td>
<td>1,081</td>
<td>1,076</td>
<td>989</td>
<td>976</td>
<td>935</td>
<td>1,012</td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td>987</td>
<td>1,090</td>
<td>1,124</td>
<td>1,199</td>
<td>1,125</td>
<td>997</td>
<td>997</td>
<td>1,104</td>
<td>1,147</td>
<td>1,112</td>
<td>999</td>
<td>1,009</td>
<td>1,088</td>
</tr>
<tr>
<td>2012/2011 (%</td>
<td></td>
<td>10.0</td>
<td>18.9</td>
<td>13.2</td>
<td>10.1</td>
<td>2.5</td>
<td>-6.5</td>
<td>-6.7</td>
<td>2.1</td>
<td>6.6</td>
<td>12.4</td>
<td>2.4</td>
<td>7.9</td>
<td>7.5</td>
</tr>
<tr>
<td>Diesel fuel</td>
<td>2011</td>
<td>872</td>
<td>917</td>
<td>1,001</td>
<td>1,050</td>
<td>1,021</td>
<td>1,023</td>
<td>1,029</td>
<td>1,025</td>
<td>1,021</td>
<td>997</td>
<td>1,044</td>
<td>1,026</td>
<td>1,007</td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td>1,010</td>
<td>1,043</td>
<td>1,080</td>
<td>1,077</td>
<td>1,034</td>
<td>947</td>
<td>943</td>
<td>1,008</td>
<td>1,072</td>
<td>1,063</td>
<td>1,018</td>
<td>1,010</td>
<td>1,026</td>
</tr>
<tr>
<td>2012/2011 (%)</td>
<td></td>
<td>15.8</td>
<td>13.7</td>
<td>7.9</td>
<td>2.6</td>
<td>1.3</td>
<td>-7.4</td>
<td>-8.4</td>
<td>-1.7</td>
<td>5.0</td>
<td>6.6</td>
<td>-2.5</td>
<td>-1.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Liquefied petroleum gas</td>
<td>2011</td>
<td>836</td>
<td>799</td>
<td>706</td>
<td>768</td>
<td>837</td>
<td>821</td>
<td>859</td>
<td>867</td>
<td>936</td>
<td>923</td>
<td>907</td>
<td>878</td>
<td>858</td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td>829</td>
<td>805</td>
<td>815</td>
<td>882</td>
<td>895</td>
<td>770</td>
<td>714</td>
<td>725</td>
<td>846</td>
<td>863</td>
<td>878</td>
<td>875</td>
<td>831</td>
</tr>
<tr>
<td>2012/2011 (%)</td>
<td></td>
<td>-0.8</td>
<td>0.8</td>
<td>15.4</td>
<td>14.8</td>
<td>6.9</td>
<td>-6.2</td>
<td>-16.9</td>
<td>-16.4</td>
<td>-9.6</td>
<td>-6.5</td>
<td>-3.2</td>
<td>-0.3</td>
<td>-3.1</td>
</tr>
</tbody>
</table>

3.5.4 Petroleum products operational reserves

At the end of 2012 the petroleum products reserves of all license holders were: 18.7 thousand tons of gasoline, 24.5 thousand tons of diesel oil and 6.4 thousand tons of LPG.

The amount of gasoline which was in stock at the end of 2012 is lower by 29.4%, and of LPG by 32% in relation to the amounts stored at the end of 2011. At the same time the amount diesel oil stored grew by 6.3%.

3.6 Outlook for establishment of mandatory oil stocks

According to preliminary indication the RoM will have to implement the provisions of Directive 2009/119/EC imposing an obligation to Member States to maintain minimum stocks of crude oil and/or petroleum products not later than 01 January 2023.

Moldova as signatory of the EnC Treaty shall start organizing the compulsory oil stocking issue in order to reach to the necessary decisions and implementation in due time. Furthermore, it is also a matter of national policy to collaborate with all other South East European countries on energy security policies.

Detailed data on existing oil or petroleum products storage capacities are not available. However, it is estimated at some 150 thousand tones, including State and industry facilities (excluding army). Therefore, the problem is multifold; (i) data on the existing storage capacities is not confirmed, (ii)
the actual usage of capacities has to be still clarified as some capacities are intensively used for operational reserves of oil industry, (iii) the ownership issues may cause problems to use such facilities for oil stocks, and (iv) even if the capacities are available, many of such facilities would have to be refurbished prior to being used for oil stocks. Establishment of an in inventory of existing storage capacities is therefore required as a matter of high priority.

The needs for storage capacities to keep the 90-days obligation, in accordance with the EU methodology of calculation, are estimated in the order of 240 thousand m$^3$ by 1 January 2013 and 314 thousand m$^3$ by end 2030 (Table 3.6).

The type and the extent of the emergency oil stockholding activity in Moldova are substantially related to the following aspects which have to be decided by the GoM when the business plan of compulsory oil activity is launched:

- **Growth rate of** compulsory oil product stockholding activity in terms of days of consumption coverage;

- **Enhancement of activities undertaken** based on a schedule which will take into account the acquisition of experience and knowledge on the oil products stockholding activity;

- **Development of national and international scope** of the oil product security activity, as far as the local capacity and the trading activities allow such evolution. It is reasonable and occurs in many EU countries with sufficient storage capacity to direct compulsory oil product stockholding activity within their territory as a priority and secondly, turn to oil storage services offered abroad, especially when they cannot meet their obligation in existing tanks.

The combination of decisions on the above mentioned points as well as on other issues determining the scope of activities to be promoted in the context of the compulsory oil activity and the selection of the proper organisational scheme result to the formulation of the RoM model for compulsory oil stocks.

The following schedule of sequential actions is envisaged:

1. **Founding of the Central Stockholding Entity (CSE) to manage and control proper implementation of the security oil product stockholding and participate in the next steps of establishing security oil product stockholding activity**;

2. **Design in detail the security oil product stockholding system of the country**;

3. **Preparation of the relevant Regulation from the item 2. based on the system design and in proper detail to avoid disputes and illegal actions by the market actors**;

4. **Announcement by the CSE of initiation day and procedures to be followed by market actors regarding their obligations with emergency oil product stockholding activity**.

It is planned that the market actors in all the above phases are involved through consultations and information dissemination in order that they will be prepared for the market conditions which will be created after the establishment of the security oil product stockholding system. Furthermore, the owners of oil storage capacity should be also prepared to refurbish existing tanks.

**3.6.1 Estimated costs of providing mandatory oil reserves by 2020/2030**

According to scenario of consumption of petroleum products from Section 3.4 (Figure 3.2), for the purpose of the construction of new and modernization of existing storage capacities, for ensuring the overall 90-day strategic reserves of oil products, it is necessary to provide approximately 150-
Security of Supply Statements of the Republic of Moldova

200 mill. EUR by 1 January 2023 and additional 60 mill. EUR in the period from 1.1.2023 to 31.12.2030 (Table 3.5).

Table 3.5: Key characteristics of implementation of 90-day oil stocks in the RoM

<table>
<thead>
<tr>
<th>Data category</th>
<th>Unit</th>
<th>By 1.1.2023</th>
<th>By 31.12.2030</th>
<th>Addition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total consumption of petroleum products 2), of which:</td>
<td>1000 toe</td>
<td>799</td>
<td>1,040</td>
<td>242</td>
</tr>
<tr>
<td>a) Gasoline</td>
<td>1000 toe</td>
<td>228</td>
<td>266</td>
<td>38</td>
</tr>
<tr>
<td>b) Diesel oil</td>
<td>1000 toe</td>
<td>571</td>
<td>774</td>
<td>203</td>
</tr>
<tr>
<td>Required volume 90-day stocks, of which:</td>
<td>1000 t</td>
<td>196.9</td>
<td>221.3</td>
<td>24.4</td>
</tr>
<tr>
<td>a) Gasoline</td>
<td>1000 t</td>
<td>56.2</td>
<td>59.2</td>
<td>3.0</td>
</tr>
<tr>
<td>b) Diesel oil</td>
<td>1000 t</td>
<td>140.7</td>
<td>162.1</td>
<td>21.4</td>
</tr>
<tr>
<td>Total required storage capacities 3), of which:</td>
<td>m³</td>
<td>242,470</td>
<td>314,713</td>
<td>72,243</td>
</tr>
<tr>
<td>a) Gasoline</td>
<td>m³</td>
<td>74,957</td>
<td>87,483</td>
<td>12,527</td>
</tr>
<tr>
<td>b) Diesel oil</td>
<td>m³</td>
<td>167,513</td>
<td>227,230</td>
<td>59,716</td>
</tr>
<tr>
<td>Total investment cost in storage capacities 3) 4) 5)</td>
<td>Mill. EUR</td>
<td>58.2</td>
<td>75.5</td>
<td>17.3</td>
</tr>
<tr>
<td>Total cost of purchasing petroleum products 6)</td>
<td>Mill. EUR</td>
<td>140.1</td>
<td>182.3</td>
<td>42.2</td>
</tr>
<tr>
<td>Total cost of implementation of 90-day stocks obligation</td>
<td>Mill. EUR</td>
<td>198.2</td>
<td>257.8</td>
<td>59.6</td>
</tr>
</tbody>
</table>

Note:  
1) Denotes energy consumption in 2022 and conditions to be accomplished by 1st January 2023;  
2) Average annual growth rate of 3%/a for petroleum products consumption was applied from 2012 to 2030;  
3) Under assumption that no presently available storage capacities could be used for 90-day oil stocks, therefore all storage capacities required to accommodate 90-days reserves have to be newly constructed;  
4) Includes gasoline and diesel oil;  
5) Specific investment cost of 240 US$/m³ for new storage capacity and exchange rate 1 EUR = 1.32 US$ as average for December 2012 applied;  
6) Platts prices of December 2012 have been used to calculate cost of purchasing petroleum products.

If the current oil storage capacities estimated at approx. 150 thousand tones (or approx. 200 thousand m³ of petroleum products) could be fully used for oil stocks, the additionally required capacities by 2023 would be reduced from the above approx. 242 thousand m³ to approx. 42 thousand m³ and consequently, the required investment costs in new storage capacities would be reduced from approx. 58 mill. EUR to 10 mill. EUR by 1 January 2023.

As a consequence, the estimated investment cost for establishing storage the required capacities by 1 January 2013 is somewhere between the theoretical minimum of approx. 10 mill. EUR and maximum of approx. 58 mill EUR. Procurement of required oil products would add an additional 140 mill. EUR in all cases, which would then result in the overall costs between approx. 150 and approx. 198 mill. EUR by 1 January 2023.

Due to growing demand for petroleum products in the period from 1 January 2023 to 31 December 2030 (approx. 3%/a on average), additional storage capacities of approx. 72 thousand m³ and purchase of additional approx. 24 thousand tonnes of petroleum products would be required by the
end of 2030, which would entail additional total costs of approx. 60 mill. EUR for the period 2023-2030.

The amount of costs represent a serious burden for the State, oil industry and energy consumers. It can be accomplished stepwise over a period of at least five years after the legal-regulatory and institutional-organisational frameworks are agreed upon and put in place. Apart from an option of looking for its own solutions, Moldova shall look for adequate regional solutions in order to share the financial burden with strategic partner countries as well as to optimise the continued import of petroleum products in the future.