# In-Depth Review of the Energy Efficiency Policy of MOLDOVA





ENERGY CHARTER SECRETARIAT

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**Executive Summary** 

# **Executive Summary**

The Republic of Moldova is situated in South-East Europe and borders Romania and Ukraine. The territory of Moldova covers an area of 33,800 km<sup>2</sup> and, as of 1 January 2015, it had a population of 3.56 million, 41.9% of whom were urban dwellers. The city of Chişinău (Kishinau) is the capital of the country and has a population of about 804,500. Moldova has a moderate climate and a favourable combination of climatic and soil conditions for agriculture.

Moldova has been an independent state since 27 August 1991. The transition period was characterised by political instability and numerous changes of government. Three more government changes took place in the recent past: in 2009, 2013 and 2015. The new government took office in early 2015. Following the parliamentary elections of 30 November 2014, a pro-European coalition was elected.

As a result of reforms carried out in recent years, there have been a number of positive developments in Moldova, notably in the field of energy efficiency and use of renewable energy sources. Integration into EU structures was until recently a priority of Moldova's policy development, which is reflected in the efforts at transposition of the EU acquis into national legislation. New directions of policy development in Moldova will be shaped during the near future, reflecting the latest political changes that took place in the country between the end of 2014 and the beginning of 2015.

Moldova has minor reserves of coal, petroleum and natural gas and moderate hydroelectric potential. This has led to a high dependence on energy imports (mainly from Russia, Ukraine and Romania); imports totalled 2,084 ktoe in 2013, or 87% of the total energy supply of 2,391 ktoe.<sup>1</sup> In 2013, total energy imports were comprised of: 44.7% natural gas, 34.1% petroleum products, 7.5% coal and 13.7% electricity.

At the same time the energy intensity in Moldova is still relatively high, though it has significantly decreased since 2005. The efficiency of energy transformation has high potential for improvement. The current level of efficiency of energy transformation is significantly lower than that of modern and comparable technology and process characteristics within the EU and worldwide, and compared with local records during times when the system was running at higher and close to optimal loads. Numerous factors, including ageing technology, equipment and networks, the system running at much lower than the designed load etc., contribute to higher energy losses.

The past decade has brought about changes in the fuel mix. A fivefold increase from 2005 to 2013 in average annual natural gas import prices from 76.1 \$/1000m<sup>3</sup> in 2005 to 379.6\$/1000m<sup>3</sup> in 2013 resulted in a sharp increase in tariffs for gas supply, but also in tariffs for locally produced electricity and heat.<sup>2</sup> These price increases served as the main driving force in the search for alternative energy resources, and also for optimisation of energy consumption in all sectors of the national economy. The final consumption of natural gas decreased from 2005 to 2013 by 28%.

As of 1 January 2014, 57% of the total *living area* in the housing sector was provided with centralised heat supply, which is 39.3% of the total housing area in Moldova. In the mid-1990s a progressive collapse began of the district heat supply systems throughout the country. Cur-

<sup>1</sup> Source: Energy and fuel resources: Energy balance in thousand tonnes of oil equivalent for 2006–2013, as of 10 April 2015, National Bureau of Statistics, http:// www.statistica.md/category.php?l=en&idc=128. Note: this source includes imported electricity supplied by MTPP.

<sup>2</sup> Raport privind activitatea Agenției Naționale pentru Reglementare în Energetică în anul 2013, Chișinău, 2014,

rently the utilisation of the installed heat generation capacity is decreasing and the non-payment rate for supplied heat is high. Heating prices have increased significantly and services have worsened and many customers are rejecting the centralised heat supply, searching for better-priced alternatives.

The majority of end-use sectors, except trade and public services and transport sectors, reduced their energy consumption from 2005 to 2013, although from 2007 to 2011 energy consumption in the residential sector was increased, as and between 2009 and 2012 industrial energy consumption increased. The reduction in energy consumption from 2005 to 2013 was only slightly owed to improved energy efficiency and mainly to the significant energy price increase as well as other factors including those inherent in the transitional period and the world economic crisis of 2009. All sectors have considerable potential for energy efficiency improvements.

Improving energy efficiency and energy security are among the main priorities of the National Development Strategy 'Moldova 2020' and the Energy Strategy of Moldova until 2030. The latter provides guidelines for national energy sector development, in order to ensure necessary grounds for economic growth and social welfare. The Strategy defines general policy goals for 2013 to 2030 as well as specific policy objectives for 2013 to 2020 and 2021 to 2030, specifying measures for their implementation. The following targets are set in this Strategy at national level:

- · decrease in energy intensity of 10% by 2020;
- decrease of losses in transmission and distribution networks for electricity of 11% by 2020 (up to 13% in 2015), for natural gas: 39% by 2020 (20% in 2015), and for heat: 5% by 2020 (2% in 2015);
- · decrease in greenhouse gas emissions (compared with 1990) of 25% by 2020;
- $\cdot$  decrease in buildings' energy consumption of 20% by 2020;
- $\cdot$  share of retrofitted public buildings of 10% in 2020.

The overall objective of the law on energy efficiency, approved in 2010, is to provide regulation of activities aimed at reducing the energy intensity of the national economy and the negative impact of the energy sector on the environment. The law provides the ground for energy efficiency improvements, including establishing and supporting the institutional activity in development and implementation of programmes, plans, energy services and other energy consumption efficiency measures. This law applies to energy services providers through whom the energy efficiency improvement measures are being realised, energy distributors, DSOs, energy suppliers and consumers.

The National Energy Efficiency Programme 2011-2020 and Action Plan 2013-2015 were adopted to provide the necessary set of measures for an overall reduction in final energy consumption in all sectors. In total, 428 ktoe of energy savings are estimated for the period 2013 to 2015. Out of this 45% or 193 ktoe are savings in the residential/building sector, followed by transport at 23% or 98 ktoe, the energy transformation sector at 13% or 57 ktoe, industry at 10% (43 ktoe) and the public/service sector at 9% (37 ktoe). According to the Energy Efficiency Agency, the 2013 savings were achieved in the energy transformation sector (29.3 ktoe), industry (21.5 ktoe) and the public sector (72.8 ktoe). For transport and residential sectors the final energy consumption continued to increase in 2013.

In 2014, Moldova signed and ratified an Association Agreement with the European Union, following its Energy Community membership since 2010. Following this agreement, it has to

make its legislation conform to the EU *acquis communautaire*, as specified in the Agreement deadlines, i.e. core EU energy legislation related to electricity, oil, gas, environment, competition, renewables, efficiency and statistics. Moldova also plans to be part of the European Network of Transmission System Operators for Electricity (ENTSO-E) by 2020 in order to connect to the European electricity market.

The government needs to prioritise and timely develop all necessary secondary legislation and regulations to facilitate the implementation and attain the objectives of the adopted energy efficiency and renewable energy strategies, plans and programmes. It further needs to develop enforcement and implementation mechanisms for its policies and to provide incentives in order to attract necessary private investments in the energy efficiency and renewable energy sectors.

Energy market unbundling is in accordance with the provisions of the third energy package and EU directives. In 2014 the National Agency for Energy Regulation drafted the Rules of Electricity Markets. Heat supply in Chisinau is currently being restructured in an attempt to solve the numerous problems (including inefficient operation and distribution networks, less than optimal technical conditions and accumulating financial debt) of the existing district heating company.

The EEA is responsible for the implementation of the state policy on efficiency and renewable energy and for taking measures for the national targets to be achieved; however, there is a pressing need to strengthen the institutional, human and financial capacity of the Agency to enable it to take a leading role in implementing energy efficiency and renewable energy policies and regulations within the country. Also, the limited institutional capacity of the local public administration authorities and the unclear mandate for regional energy managers to be appointed result in limited identification and implementation of the energy efficiency measures at the local and regional level.

# **General Recommendations**

- The government should consider the stability of legislative framework as an important precondition for attracting investments in the energy efficiency and renewable energy sectors.
- The government's energy policy should continue to reflect the potential contribution of energy efficiency towards decreasing fuel imports and supporting economic growth and the environment.
- Energy efficiency and renewable energy should continue to be given high priority by the government. Future energy policies should be supported by detailed analysis of economic energy efficiency potentials in all sectors of the economy. The barriers impeding the realisation of these potentials should be mitigated.
- The Ministry of Economy should strengthen its capacity to analyse and assess energy efficiency and renewable energy as a basis for future policy development.
- Efficient development of production, transmission and distribution assets in the gas and electricity sector is needed. This will maximise fuel burning efficiency and minimise the technical transmission and distribution losses.
- Energy strategies, policies and targets should be unified and their creation must be better coordinated on the national level.

• The level of transposition of the EU legislation in the energy efficiency sector is satisfactory. The emphasis needs to be on its practical implementation and proper enforcement on different levels.

## **Institutional Framework**

- Additional efforts are required to strengthen the capability and capacity building of various institutions that are important players in the energy sector. Special emphasis should be put on the Energy Efficiency Directorate within the Ministry of Economy and on the Energy Efficiency Agency.
- Dedicated authority, a clear mandate and a coordination function need to be given to the Energy Efficiency Agency. The role of the agency should be strengthened to enable it to take a leading role in implementing energy efficiency and RES policies and regulations within the country.
- Enhancement of inter-ministerial coordination is needed, in particular among other public policy-makers in the fields of energy, environment, transport, housing and industry.
- The government should consider ways and means to strengthen work on energy efficiency at regional, district and local levels, such as regional authorities and municipalities.
- The efforts of various stakeholders, including IFIs, professional and sector associations, universities, research centres and NGOs, need to be supported and included in the government's policy formulation and evaluation.
- The government needs to support research and development activities on renewable energy and energy efficiency technologies.
- The independence of the energy regulator needs to be guaranteed. It is crucial for the stability and proper functioning of the energy market.

# **Energy Market and Pricing**

- The National Energy Regulatory Agency (ANRE) should continue to ensure that the energy prices are cost-reflective.
- The initiated restructuring of the electricity and gas market is commended. Complete liberalisation of the market is the necessary precondition for its sustainable development in the future (this relates to the energy community treaty obligations as well as the third liberalisation package).

# **Specific Energy Efficiency Programmes and Measures**

- The long-term targets and objectives are currently set by National Energy Efficiency Programme 2011-2020. It needs to be made operational through short-term energy efficiency action plans with priorities and intermediate monitoring and evaluation.
- After further assessment of energy efficiency potential, the government might consider setting sector-specific targets.
- The government should continue to establish high-efficiency standards for new and existing buildings, with a focus on energy efficiency labelling schemes and minimum energy performance standards. These should include both construction characteristics and use of buildings. The responsible authority should ensure that compliance and enforcement procedures are in place.

- The government should continue stimulating energy efficiency through a wide range of measures for the building and industry sectors, such as compulsory energy audits, benchmarking, dissemination of information on energy efficiency measures, and involvement of sector associations in communication and information campaigns.
- The government should further facilitate the development of the market for energy services through a wide range of measures, such as a support scheme for energy audits, simplified procedures for investments in energy efficiency projects, and simplified procedures for certification of energy efficiency companies.
- The government should continue to give priority to highly efficient cogeneration and district heating plants.
- Improving the qualifications of energy auditors, technicians and other energy professionals needs to be a priority regarding the efficient achievement of settled goals in the energy efficiency and RES sectors.
- The government should continue to promote the introduction of energy management systems in industry.
- Awareness raising and information dissemination activities to promote energy efficiency should be continued and enhanced, particularly in municipalities, households and SMEs.
- Moldova should enhance international cooperation through participating in various international energy efficiency-related initiatives like Horizon 2020 and other community programmes.
- The role of the district energy manager should be clearly defined to allow for better implementation of district energy efficiency programmes as stipulated by energy efficiency law.

# **Renewable Energy Sources**

- RES development should become a priority for Moldova. The finalisation of primary and secondary legislation, including stable and transparent support schemes is necessary.
- Support schemes should also cover the production of heat from renewable energy sources.
- The development of RES resources needs to be carefully considered in the light of comparative cost, grid access, stability of transmission network and dispatch. Considering the biomass potential of the country, further utilisation should be supported by development of necessary regulation, certification and quality control.

# **Energy Efficiency Financing**

- Sufficient financial resources are necessary for increasing energy efficiency in public as well as in private sectors. It is important to be able to introduce sustainable instruments for financing energy efficiency and RES from a long-term perspective. The Energy Efficiency Fund should consider reducing the grant component in favour of loans with attractive interest rates.
- When implementing energy efficiency projects, public authorities should give careful consideration to the tender documentation in order to ensure the selection of the best available products and services.
- The government should ensure a good coordination mechanism with IFIs and donor communities, including priority settings, monitoring at the national level, and compatibility with the overall national strategy on energy efficiency and renewable energy.

• The government should explore which financial incentives are most appropriate for stimulating energy efficiency in different sectors.

# **Data Collection and Monitoring**

- To support monitoring of achieved results, a centrally coordinated project database needs to be set up to collect data from all activities related to energy efficiency in Moldova. This will allow use of the bottom-up approach for evaluating the results of the national energy efficiency action plans and programmes.
- Results at the project level should be aggregated at the national level in order periodically to assess the implementation progress of national policies.
- The statistics on the building stock should be created first, so that they can be used to estimate the energy-saving potential of the building sector and support the policy-making and improvement process.
- The government should ensure full implementation of international environmental reporting standards and methodologies concerning renewable energy and energy efficiency.
- Usage of metering devices needs to be considered in different sectors. They are an important instrument in terms of consumer rights protection as well as a source of valuable data on energy consumption.

Краткое изложение

### Краткое изложение

Республика Молдова расположена в Юго-Восточной Европе и граничит с Румынией и Украиной. Территория Молдовы занимает площадь 33,8 тысяч квадратных километров, а её население, по состоянию на 01.01.2015 года, составляет 3,56 млн. человек; доля городского населения - 41,9%. Город Кишинев (Кишинэу) является столицей страны с населением примерно 804,5 тыс. человек. В Молдове умеренный климат и благоприятное сочетание почвенно-климатических условий для ведения сельского хозяйства.

С 27 августа 1991 года Республика Молдова является независимым государством. Для переходного периода была характерна политическая нестабильность и смена множества правительств с момента провозглашения независимости. В недавнем прошлом также сменилось три Правительства: в 2009 и 2013 годах и в настоящий момент. Новое Правительство приступит к своим обязанностям в первые месяцы 2015 года. Лидирующую позицию после последних парламентских выборов 30 ноября 2014 года занимает проевропейская коалиция.

Результатом проведенных в последние годы реформ является ряд позитивных изменений в Молдове, в частности, в области энергоэффективности и использования возобновляемых источников энергии. Интеграция в структуры ЕС до недавнего времени была приоритетом развития политики Молдовы, которая находит свое отражение в усилиях по транспозиции законодательства ЕС (acquis) в национальное законодательство. Новое направление развития политики в Республике Молдова будет формироваться в течение ближайшего будущего, отражая последние политические изменения, которые произошли в стране в конце 2014 – в начале 2015 года.

Молдова обладает незначительными запасами угля, нефти, природного газа и средним гидроэнергетическим потенциалом. Это влечет за собой значительную зависимость от импорта энергии (главным образом, из России, Украины и Румынии) – в 2013 году импорт составил 2 084 тыс. тнэ, или 87% от общего энергоснабжения в объеме 2 391 тыс. тнэ.<sup>3</sup> В 2013 году общий объем импорта энергии составляли: 44,7% – природный газ, 34,1% - нефтепродукты, 7,5% - уголь и 13,7% - электроэнергия.

Вместе с тем, энергоемкость в Молдове все еще относительно высока, хотя она была существенно снижена в период с 2005 года до настоящего времени. Имеется большой потенциал для повышения эффективности преобразования энергии. Нынешний уровень эффективности преобразования энергии значительно ниже уровня характеристик современных и сопоставимых технологий и процессов в ЕС и в мире, а также в сравнении с местными учетными данными в то время, когда система работала при более высоких и близких к оптимальным нагрузках. Более высоким потерям энергии способствуют многочисленные факторы, в том числе устаревающие технологии, оборудование и сети, функционирование системы на уровне значительно ниже расчетных нагрузок и другие.

В последнее десятилетие произошли изменения в структуре топливного баланса. Пятикратное увеличение среднегодовых цен на импорт природного газа в период с 2005 по 2013 годы с 76,1 долл. США/1000 м<sup>3</sup> в 2005 году до 379,6 долл. США/1000 м<sup>3</sup> в 2013 году привело к резкому увеличению тарифов на поставку газа, а также тарифов на электроэ-

<sup>3</sup> Источник: Топливно-энергетические ресурсы. Энергетический баланс (тысяч тонн нефтяного эквивалента) (2006-2013 гг.), по состоянию на 10.04.2015, Национальное бюро статистики, http://www.statistica.md/category.php?l=en&idc=128. Примечание: в этом источнике электроэнергия, поставляемая с Молдавской ТЭС (МТЭС), учитывается как импорт.

нергию и тепло местного производства.<sup>4</sup> Этот рост цен послужил главным движущим фактором поиска альтернативных энергетических ресурсов, а также оптимизации потребления энергии во всех секторах национальной экономики. Конечное потребление природного газа в общем конечном потреблении в 2005-2013 годах сократилось на 28%.

По состоянию на 01.01.2014 года, 57% общей жилой площади в жилищном секторе было обеспечено централизованным теплоснабжением, что составляет 39,3% общей площади жилья в Молдове. С середины 1990-х годов начался прогрессирующий развал систем централизованного теплоснабжения по всей стране. В настоящее время использование установленных мощностей по производству тепла снизилось, а уровень неплатежей за отпущенное тепло является высоким. Цены на отопление значительно возросли и качество услуг по теплоснабжению ухудшилось. Многие потребители отказываются от централизованного теплоснабжения в поисках лучших ценовых альтернатив.

Большинство секторов конечного потребления, за исключением секторов торговли, коммунального обслуживания и транспорта, сократили потребление энергии в 2005-2013 годы, хотя в 2007-2011 годах потребление энергии в жилищном секторе возрастало; в 2009-2012 годах также увеличилось потребление энергии в промышленности. Снижение потребления энергии в 2005-2013 годах лишь в незначительной степени было обусловлено повышением энергоэффективности, но, главным образом, это стало следствием значительного повышения цен на энергию, а также других факторов, в том числе присущих переходному периоду, а также мирового экономического кризиса 2009 года. Все секторы обладают большим потенциалом для повышения энергоэффективности.

Повышение энергоэффективности и энергетической безопасности входят в число основных приоритетов Национальной стратегии развития «Молдова 2020» и Энергетической стратегии Республики Молдова до 2030 года. Последняя содержит конкретные руководящие указания по развитию национального энергетического сектора с целью обеспечения необходимой основы для экономического роста и повышения уровня благосостояния населения. Стратегия определяет общие стратегические задачи на 2013-2030 годы, а также конкретные политические цели на 2013-2020 и 2021-2030 годы с указанием мер по их реализации. На национальном уровне поставлены следующие цели:

- · сокращение энергоемкости на 10% к 2020 году;
- снижение потерь в транспортных и распределительных сетях: электрической энергии - до 11% к 2020 году (до 13% к 2015 году), природного газа - на 39% к 2020 году (на 20% в 2015 году) и тепловой энергии - на 5% к 2020 году (на 2% в 2015 году);
- снижение выбросов парниковых газов (по сравнению с 1990 годом) на 25% к 2020 году;
- · снижение энергопотребления в зданиях на 20% к 2020 году;
- · доля обновленных общественных зданий 10% в 2020 году.

Общей целью Закона «Об энергоэффективности», принятого в 2010 году, является обеспечение регулирования деятельности, направленной на снижение энергоемкости национальной экономики и уменьшение отрицательного воздействия энергетического сектора на окружающую среду. Закон обеспечивает предпосылки для повышения энер-

<sup>4</sup> Raport privind activitatea Agenției Naționale pentru Reglementare în Energetică în anul 2013, Chişinău, 2014.

гоэффективности, в том числе путем создания и поддержки деятельности структур, участвующих в разработке и реализации программ, планов, энергетических услуг и других мер по повышению эффективности потребления энергии. Этот Закон применяется к поставщикам энергетических услуг, посредством которых осуществляются меры по повышению энергоэффективности, к энергораспределительным предприятиям, системным операторам энергораспределительных предприятий, поставщикам энергии и конечным потребителям.

Были утверждены Национальная программа в области энергоэффективности на 2011-2020 годы и План действий на 2013-2015 годы, которые обеспечивают необходимый ряд мер для достижения общего сокращения конечного потребления энергии во всех секторах национальной экономики. В целом, объем энергосбережения в период с 2013 по 2015 годы оценивается в 428 тыс. тнэ. Наибольшая доля энергосбережения в объеме 45%, или 193 тыс. тнэ, приходится на жилищный/строительный сектор, за которым следуют транспорт - 23% или 98 тыс. тнэ, сектор преобразования энергии - 13% или 57 тыс. тнэ, промышленность - 10% (43 тыс. тнэ) и государственный сектор/сектор услуг - 9% (37 тыс. тнэ). Согласно данным, предоставленным Агентством по энергоэффективности (АЭЭ), в 2013 году экономия достигнута в секторе преобразования энергии (29,3 тыс. тнэ), промышленности (21,5 тыс. тнэ) и в государственном секторе (72,8 тыс. тнэ). Что касается транспортного и жилищного секторов, то в 2013 году конечное потребление энергии в них продолжало возрастать.

В 2014 году Молдова подписала и ратифицировала Соглашение об ассоциации с Европейским Союзом, а с 2010 года является членом Энергетического сообщества. Следуя этому соглашению, в определенные сроки она должна привести свое законодательство в соответствие с acquis communautaire EC, то есть с основным законодательством EC по электроэнергии, нефти, газу, окружающей среде, конкуренции, возобновляемым источникам энергии, эффективности и статистике. Молдова также планирует полностью синхронизировать свою электроэнергетическую систему с Европейской сетью операторов систем передачи электроэнергии (ENTSO-E) к 2020 году, чтобы подключиться к европейскому рынку электроэнергии.

Правительству необходимо определить приоритеты и своевременно разработать все необходимые подзаконные и нормативные акты для содействия реализации и достижению целей утвержденных стратегий. Также необходимо незамедлительно разработать правила, механизмы реализации его политики и обеспечить стимулы для привлечения необходимых частных инвестиций в энергоэффективность и возобновляемые источники энергии.

Разделение энергетического рынка и приватизация в энергетическом секторе осуществляются в соответствии с положениями Третьего энергетического пакета и директивами ЕС. В 2014 году Национальное агентство по регулированию энергетики разработало проект первых Правил рынка электроэнергии. В настоящее время проводится реструктуризация компаний теплоснабжения Кишинева в попытке решить многочисленные проблемы (включающие неэффективную эксплуатацию и распределительные сети, ненадлежащие технические условия и финансовую задолженность) существующих компаний централизованного теплоснабжения.

АЭЭ несет ответственность за утверждение и реализацию проектов в области эффективности и возобновляемых источников энергии, а также за принятие мер для достиже-

ния национальных целей, однако крайне необходимо укреплять институциональный, кадровый и финансовый потенциал Агентства, чтобы оно могло играть ведущую роль в реализации политики и внедрении норм в области энергоэффективности и ВИЭ в стране. Также были отмечены ограниченность институционального потенциала местных государственных органов управления и неопределенность мандата региональных энергетических менеджеров, которых планируется назначать, вследствие чего определение и реализация мер по повышению энергоэффективности на местном и региональном уровнях ограничены.

#### Общие рекомендации

- Правительству следует учитывать тот факт, что стабильность законодательной базы является важным условием для привлечения инвестиций в секторы энергоэффективности и возобновляемых источников энергии.
- Политика правительства в области энергетики должна и впредь отражать потенциальный вклад энергоэффективности в сокращение импорта топлива и поддержку экономического роста и окружающей среды.
- Правительству следует и впредь уделять первоочередное внимание энергоэффективности и возобновляемым источникам энергии. Будущие энергетические стратегии должны подкрепляться детальным анализом экономического потенциала энергоэффективности во всех секторах экономики. Следует снижать барьеры, препятствующие реализации этого потенциала.
- Министерству экономики следует укреплять свой потенциал для проведения анализа и оценки энергоэффективности и возобновляемых источников энергии в качестве основы для разработки будущей политики.
- Необходимо эффективно расширять мощности по производству, передаче и распределению в газовом и электроэнергетическом секторах. Это максимально повысит эффективность сжигания топлива и сведет к минимуму технические потери при передаче и распределении.
- Следует унифицировать стратегии, политику и цели в области энергетики и улучшить координацию их разработки на национальном уровне.
- Уровень транспонирования законодательства ЕС в секторе энергоэффективности является удовлетворительным. Акцент необходимо делать на практической реализации и надлежащем обеспечении его исполнения на различных уровнях.

#### Институциональные рамки

- Необходимо прилагать дополнительные усилия для расширения возможностей и укрепления потенциала различных органов, являющихся важными игроками в энергетическом секторе. Особое внимание следует уделять Управлению энергоэффективности в Министерстве экономики и Агентству по энергоэффективности.
- Агентству по энергоэффективности необходимо предоставить специальные полномочия, четкий мандат и функцию координатора. Роль агентства следует укреплять, чтобы оно могло играть ведущую роль в осуществлении политики и внедрении норм в области энергоэффективности и ВИЭ в стране.

- Необходимо улучшить межведомственную координацию, особенно среди других государственных органов, определяющих политический курс в сферах энергетики, окружающей среды, транспорта, жилищного сектора и промышленности.
- Правительству следует рассмотреть пути и способы расширения деятельности по энергоэффективности на региональном, районном и местном уровнях, таких как региональные органы власти и муниципалитеты.
- Следует поддерживать деятельность различных заинтересованных сторон, в том числе МФУ, профессиональных и отраслевых ассоциаций, университетов, научноисследовательских центров и НПО, и учитывать её при разработке и оценке политики правительства.
- Правительству необходимо поддерживать научные исследования и разработки, касающиеся технологий использования возобновляемых источников энергии и энергоэффективности.
- Необходимо гарантировать независимость органа регулирования энергетики. Это имеет решающее значение для стабильности и нормального функционирования энергетического рынка.

### Энергетический рынок и ценообразование в энергетике

- Национальному агентству по регулированию энергетики (ANRE) следует и впредь обеспечивать отражение затрат в ценах на энергию.
- Начавшаяся реструктуризация рынков электроэнергии и газа заслуживает одобрения. Полная либерализация рынка является необходимым условием для его устойчивого развития в будущем (это связано с обязательствами по Договору об Энергетическом сообществе, а также с Третьим пакетом по либерализации).

### Конкретные программы и меры в области энергоэффективности

- В настоящее время долгосрочные цели и задачи установлены Национальной программой по энергоэффективности на 2011–2020 годы. Необходимо сделать её действенной посредством краткосрочных Планов действий в области энергоэффективности с учетом приоритетов и с промежуточным мониторингом и оценками.
- Исходя из дополнительной оценки потенциала энергоэффективности, Правительство могло бы рассмотреть вопрос об установлении целевых показателей в отдельных секторах.
- Правительству следует и впредь устанавливать высокие стандарты эффективности для новых и существующих зданий, уделяя особое внимание системам маркировки и минимальным стандартам энергоэффективности. Они должны включать как строительные характеристики, так и нормы эксплуатации зданий. Уполномоченному органу следует обеспечить наличие процедур по обеспечению соответствия и соблюдения.
- Правительству следует и впредь стимулировать энергоэффективность с помощью широкого ряда мер в строительном и промышленном секторах, таких как обязательные энергетические аудиты, сопоставительный анализ, распространение информации о мерах по повышению энергоэффективности и привлечение отраслевых ассоциаций к участию в просветительских и информационных кампаниях.

- Правительству следует и далее способствовать развитию рынка энергетических услуг с помощью широкого ряда мер, таких как схемы поддержки энергетических аудитов, упрощенные процедуры осуществления инвестиций в проекты в области энергоэффективности и упрощенный порядок сертификации компаний, занимающихся энергоэффективностью.
- Правительству следует и впредь отдавать приоритет высокоэффективным ТЭЦ и теплоцентралям.
- Повышение квалификации энергетических аудиторов, технического персонала и других специалистов в области энергетики должно быть приоритетом в том, что касается эффективного достижения поставленных целей в секторах энергоэффективности и ВИЭ.
- Правительству следует и впредь способствовать внедрению систем энергетического менеджмента в промышленности.
- Следует продолжать и расширять деятельность по повышению уровня осведомленности и распространению информации в целях повышения энергоэффективности, особенно в муниципалитетах, домашних хозяйствах и на малых и средних предприятиях (МСП).
- Молдове следует расширять международное сотрудничество посредством участия в различных международных инициативах, связанных с энергоэффективностью, таких как «Горизонт 2020» (Horizon 2020) и других общественных программах.
- Следует четко определить роль районного энергетического менеджера для обеспечения более эффективного осуществления районных программ повышения энергоэффективности, как это предусмотрено законом об энергоэффективности.

#### Возобновляемые источники энергии

- Освоение ВИЭ должно стать приоритетом для Молдовы. Необходима доработка первичного и вторичного законодательства, в том числе стабильной, прозрачной схемы поддержки.
- Схемы поддержки должны также охватывать производство тепла от возобновляемых источников энергии.
- Освоение ресурсов ВИЭ необходимо тщательно рассматривать с учетом сравнительных издержек, доступа к сети, стабильности сети передачи и распределения нагрузки. Принимая во внимание потенциал биомассы в стране, следует оказывать поддержку расширению её использования путем разработки необходимого регулирования, сертификации и контроля качества.

#### Финансирование энергоэффективности

- Для повышения энергоэффективности в государственном, а также в частном секторах, необходимы достаточные финансовые ресурсы. Важно иметь возможность внедрять устойчивые инструменты для финансирования энергоэффективности и ВИЭ в долгосрочной перспективе. Фонду энергоэффективности следует рассмотреть вопрос о сокращении грантовой составляющей в пользу кредитов с привлекательными процентными ставками.
- При реализации проектов в области энергоэффективности, государственным органам следует уделять пристальное внимание тендерной документации, чтобы обеспечить выбор наилучших имеющихся продуктов и услуг.

- Правительству следует обеспечить эффективный механизм координации с МФУ и сообществами доноров, включая определение приоритетов, мониторинг на национальном уровне и совместимость с общей национальной стратегией в области энергоэффективности и возобновляемой энергетики.
- Правительству следует изучить вопрос о том, какие финансовые стимулы наиболее целесообразны для стимулирования энергоэффективности в различных секторах.

# Сбор данных и мониторинг

- Для содействия мониторингу достигнутых результатов, необходимо создать централизованно координируемую базу данных по проектам и собрать информацию обо всех видах деятельности, связанной с энергоэффективностью в Молдове. Это позволит использовать подход «снизу-вверх» при оценке результатов национальных программ и планов действий в области энергоэффективности.
- Результаты на уровне проектов следует агрегировать на национальном уровне для периодической оценки хода реализации мер национальной политики.
- Прежде всего, следует подготовить статистические данные по жилищному фонду, чтобы их можно было использовать для оценки потенциала энергосбережения в строительном секторе и содействия процессу принятия политических решений и модернизации.
- Правительству следует обеспечить полное внедрение международных стандартов и методологий экологической отчетности по возобновляемым источникам энергии и энергоэффективности.
- Следует рассмотреть вопрос об использовании приборов учета в различных секторах. Они являются важным инструментом в соответствии с защитой прав потребителей, а также для получения ценных данных о потреблении энергии.

Background

# Background

# **Brief country overview**

General information:5

Official name	REPUBLIC OF MOLDOVA				
Capital	Chişinău (Kishinau)				
President	http://www.presedinte.md				
Parliament	http://www.parlament.md				
Government	nttp://www.gov.md				
Independence was obtained on	27 August 1991				
Area	<b>33,800 km²</b> from North to South – 350km from East to West – 150km main rivers: Dniester, Prut and Răut				
Administrative units	32 districts; 5 municipalities: Chișinău, Bălți, Benderi, Comrat, Tiraspol; autonomous territorial unit (ATU) Gagauzia; administrative-territorial units from the left bank of the river Dniester (Transnistria); 60 cities; 1681 localities in total				
Resident population	<b>3, 557, 600</b> (beginning of 2014) 1,503,000 (42.3%) - urban 2,054,600 (57.7%) - rural				
Main religions	Orthodox (93.34%), Protestant (1.98%), Old-rite Christians (0.15%), Roman Catholic (0.14%), others				
National currency	Moldovan leu (MDL)				
National currency official exchange rates, average for 2014	1EUR = 18.6321MDL, 1USD = 14.0388 http://www.bnm.md/en/exchange_rates				

# **Economic background**

In 2013, the gross domestic product<sup>6</sup> (GDP) of Moldova was 96.5 billion MDL. Based on the official annual average currency exchange rates,<sup>7</sup> national GDP in 2013 was \$7.67 billion or  $\in$ 5.77 billion. Highest share in GDP in 2013 had revenues from taxes of 15.8%, followed by trade at 13.5%, the processing industry at 11.4%, transport and communications at 10.1%, agriculture at 15% (9.8% in 2012 (Figure 2). The structure of GDP in Moldova from 1995 to 2013 changed significantly. In 1995, the processing industry (27.2%) and agriculture (26.4%) accounted for the majority of GDP, both of these sectors being responsible for more than half (53.7%) of national GDP. In 2013, their cumulative proportion of GDP was only 26.3% (21.5% in 2012).

From 1995 to 2013, the processing industry's share of GDP decreased 2.4 times and that of agriculture 1.8 times (2.7 times for 1995 to 2012). As mentioned earlier, in 2013, the leading holder of national GDP was tax revenues at 15.8%, which in 1995 was 12.9%. The second larg-

<sup>5</sup> Sources: official public web-sites, www.statistica.md, Moldovan Economic Trends 2014: http://ince.md/

<sup>6</sup> Expressed in national currency and comparable prices

<sup>7</sup> Official exchange rates according to the National Bank of Moldova http://www.bnm.md/en/medium\_exchange\_rates; for 2013 1USD=14.0388 MDL, 1 Euro= 18,6321 MDL

est contributor to GDP in 2013 was trade at 13.5%, which in 1995 had a share of 8.2%. One of the leaders in terms of national GDP in 2013 was the transport and communications sector at 10.1%; in 1995 its share was 3.67%. From 1995 to 2013, GDP of Moldova expressed in comparable prices and in USD increased 7.4 times, and the share of the processing industry increased 3.1 times, that of agriculture 4.2 times (2.4 times from 1995 to 2012), that of tax revenues 9.0 times, that of trade 12.1 times and that of transport and communication 20.3 times.



Despite substantial macroeconomic risks and regional challenges, economic performance has been relatively strong over the past few years. According to the World Bank,<sup>8</sup> Moldova has experienced the highest cumulative GDP growth relative to 2007 compared with all its regional partners (Romania, Ukraine, Russian Federation), with GDP increasing by 25% since 2008. However, growth has been unstable, reflecting the country's vulnerability to climatic and global economic conditions (Figure 2).

Figure 2: GDP of Moldova 1990-2013 in USD.



#### **Energy supply and demand**

Moldova has minor reserves of coal, petroleum and natural gas and moderate hydroelectric potential. This has led to a high dependence on energy imports (mainly from Russia, Ukraine and Romania) – with imports of 2,084 ktoe in 2013, or 87% of the total energy supply of 2,391 ktoe. In 2013, total energy imports<sup>9</sup> were comprised of: 44.7% natural gas, 34.1% petroleum products, 7.5% coal and 13.7% electricity.<sup>10</sup>

The past decade has brought about changes in the fuel mix. A fivefold increase from 2005 to 2013 in average annual natural gas import prices from 76.1 \$/1000m<sup>3</sup> in 2005 to 379.6\$/1000m<sup>3</sup> in 2013 resulted in a sharp increase in tariffs for gas supply, but also in tariffs for locally produced electricity and heat.<sup>11</sup> These price increases served as the main driving force in the search for alternative energy resources, and also for optimisation of energy consumption in all sectors of the national economy. The final use of natural gas, almost 100% of which is imported from Russia, decreased from 2005 to 2013 by 28%. As per 2013, 100% of coal and 99% of petroleum products were imported and more than 80% of electricity supplied to consumers was provided from sources defined as external, including from Ukraine.

<sup>9</sup> The official data source counts as imported the electricity received from MTPP situated on the left bank of the river Dniester (see energy production and electricity chapters)

<sup>10</sup> Energy and fuel resources: Energy balance for 2006-2013, as of 10.04.2015, National Bureau of Statistics, http://www.statistica.md/category.php?l=en&idc=128

<sup>11</sup> Raport privind activitatea Agenției Naționale pentru Reglementare în Energetică în anul 2013, Chișinău, 2014.

# Table 1: Main macroeconomic and energy data for Moldova.

Main macroeconomic and energy data	Unit	2010	2011	2012	2013	2014(f)	2015 (f)	CAGR 2010-13
Total Population	Thousands	3,562	3,560	3,560	3,559	3,558	3,557	0.0
GDP (constant, 2005 prices)	Million Lei	44,119	47,126	46,780	50,944	52,723	55,095	4.9
Primary Energy Production	ktoe	189	238	245	283	323	371	14.4
Net Energy Imports	ktoe	1,800	1,923	1,813	1,889	1,906	1,930	1.6
Net Energy Imports (inc. other sources)	ktoe	2,058	2,136	2,022	2,051	2,044	2,049	-0.1
Total Primary Energy Supply (TPES)	ktoe	2,294	2,353	2,267	2,318	2,356	2,407	0.3
Total Final Energy Consumption (TFEC)	ktoe	2,006	2,083	2,007	2,055	2,096	2,148	0.8
Electricity Consumption	ktoe	282	291	298	300	310	318	2.1
Electricity Consumption	GWh	3,280	3,384	3,466	3,489	3,608	3,696	2.1
Per Capita Indicators	Unit	2010	2011	2012	2013	2014(f)	2015 (f)	CAGR 2010-13
Primary Intensity - TPES/ population	toe/capita	0.644	0.661	0.637	0.651	0.662	0.677	0.4
Final Intensity - TFEC/ population	toe/capita	0.563	0.585	0.564	0.577	0.589	0.604	0.8
Electricity/ population	kWh/capita	921	951	974	980	1,014	1,039	2.1
Energy Intensity	Unit	2010	2011	2012	2013	2014(f)	2015 (f)	CAGR 2010-13
TPES/ GDP	toe/ Million LEI of 20005	52.0	49.9	48.5	45.5	4.7	43.7	-4.4
TFEC/ GDP	toe/ Million LEI of 20006	45.5	44.2	42.9	40.3	39.8	39.0	-3.9
Overall efficiency of the trans- formation sector	Unit	2010	2011	2012	2013	2014(f)	2015 (f)	Δ 2010- 13
Total Transformation Output/ Input	%	80.7	80.9	80.4	80.2	79.5	78.2	-0.6
TFEC/TPES	%	87.4	88.5	88.5	88.7	89.0	89.2	1.2
Energy Dependency (Net Imports/ TPES)	Unit	2010	2011	2012	2013	2014 (f)	2015 (f)	∆ 2010-13
Net Imports/TPES	%	78.5	81.7	80	81.5	80.9	80.2	4.9
Heating Degree Days	Unit	2010	2011	2012	2013	2014 (f)	2015 (f)	1994-2014 average
HDDs for Chisinau	-	3,144	3,147	3,145	2,883	2,975	n.a.	3,083

Source: Short-Term and Long-Term Prospective Energy Balance for Moldova, TA – ESS Moldova: Support for the Development of an Energy Statistics System in the Republic of Moldova, Nicolas Brizard, TA-ESS Team Leader, Energy Consultant & Director at NBZ Consulting, 21 January 2015, Chisinau, Moldova

During the last few years, solid biofuels have had a growing share in total primary energy supply (TPES) and total final consumption (TFC) has. In 2013, solid biofuels accounted for 11.6% of TPES and 12.6% of TFC.

In 2013, petroleum products accounted for 33.4 % of TPES and 36.5 % of TFC and were imported as follows:

- gasoline: 72% from Romania, 13.3% from Austria, 7.1% from Bulgaria and elsewhere including Hungary, Lithuania, Belarus and Germany;
- diesel: 60.5% from Romania, 17.2% from Russian Federation, 10.5% from Belarus, 8.1% from Israel, 2.1% from Austria, 1.2% from Greece and 0.4% from Ukraine;
- $\,$  LPG: 45.3% from Kazakhstan, 38.5% from Russian Federation, 8.6% from Belarus and 7.6% from Romania.  $^{\rm 12}$

From 2005 to 2013, the lowest level of TPES was in 2009 – 2,312 ktoe, or 5% less than in 2006 (Table 2). In 2013, gross inland demand for energy was about 2% less than in 2006. The highest share of gross inland demand for energy, in 2013, was that of natural gas at 36%, followed by petroleum products at 33.5%, electricity at 12.5%, biomass at 11.6% and coal at 6.5%. In the same year, 47.7% of the total gross inland demand for natural gas was used in heat and power generation.<sup>13</sup>

The process of revision and improvement of national energy statistics is on-going. This has resulted in a number of discrepancies in the latest and in previous official data provided by the National Bureau of Statistics of Moldova. In the current review for all presented data the official sources of data are provided. Keeping in mind that all national strategies, laws, programmes and action plans are based on the local official data, in the following text preference was given to the national statistical data rather than other sources like IEA, etc. The existing discrepancies in the local official statistical data should be seen as part of the on-going process of improvement of local energy and other statistics.

Data provided by the National Energy Regulatory Agency for 1997 to 2013 show that local power production in Moldova accounted for about 25% in 1997 and 18.3% in 2013 of the total. The rest of the electricity came from sources defined as external, including Ukraine.

<sup>12</sup> Source: Report on the Activity of the National Energy Regulatory Agency in 2013, Chişinău, 2014

<sup>13</sup> National Statistical Agency, 2014: http://www.statistica.md/public/files/publicatii\_electronice/balanta\_energetica/BE\_2014\_rom.pdf

# Table 2: Energy balance of Moldova 2005-2013, ktoe.

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Resources – total	2,463	2,430	2,358	2,410	2,312	2,401	2,442	2,358	2,391
Internal sources	87	92	88	110	124	104	116	123	125
liquid fuel	10	7	16	26	38	31	31	29	28
solid fuel	70	78	69	77	81	66	78	91	93
hydroelectricity	7	7	3	7	5	7	7	3	4
Import	2,185	2,157	2,115	2,104	1,973	2,071	2,150	2,041	2,084
liquid fuel	622	603	643	668	659	666	740	675	710
natural gas	1,205	1,201	1,110	1,057	977	1,033	1,015	971	932
solid fuel <sup>1</sup>	103	105	110	124	84	112	125	113	156
electricity	255	248	252	255	253	260	270	282	286
Fuel stocks	191	181	155	196	215	226	176	194	182
Distribution – total	2,463	2,430	2,358	2,410	2,312	2,401	2,442	2,358	2,391
Internal consumption <sup>2</sup>	2,278	2,271	2,160	2,191	2,071	2,209	2,237	2,145	2,160
transformation in other types of energy	842	817	767	764	716	737	717	704	717
production-technological needs of which:	1,436	1,454	1,393	1,427	1,355	1,472	1,520	1,441	1,443
industry and construction	161	163	156	142	85	107	118	125	130
agriculture	61	59	52	51	46	48	45	44	48
transport	267	285	325	336	291	358	383	369	505
trade and communal facilities	120	123	119	120	172	157	157	156	106
sold to population	704	691	598	632	660	689	708	639	521
other <sup>3</sup>	123	133	143	146	101	113	1 09	108	133
Export	3	4	7	5	15	18	14	27	42
Stocks of fuel end-year	182	155	191	214	226	174	191	186	189

Sources: Energy and fuel resources - Energy balance (thousand tonnes of oil equivalent), 2005-12 and 2006-13, National Bureau of Statistics of the Moldova, http://www.statistica.md/category.php?l=en&idc=128





Source: TheGlobalEconomy.com, 2015, http://www.theglobaleconomy.com/Moldova/GDP\_constant\_dollars/, http://www.theglobaleconomy.com/ indicators\_data\_export.php



#### Figure 4: Total primary energy supply and energy imports of Moldova 2005-2013, ktoe

Source: Sources: Energy and fuel resources - Energy balance (thousand tonnes of oil equivalent), 2005-2012 and 2006-2013, National Bureau of Statistics of Moldova, http://www.statistica.md/category.php?l=en&idc=128

### **Final energy consumption**

TFC was relatively stable in the 2005-2013 period; in 2013 the value was 2,061 ktoe. The highest share in total final consumption in 2013 was that of petroleum products at 36.5%, followed by natural gas at 18%, electricity at 14.8%, biomass at 12.6%, heat at 11.1%, and coal at 6.9%. In the same year, 76.4% of total final consumption or 74% of gross inland demand for petroleum products related to the transport sector.

As can be seen in Figure 5, from 2005 to 2013, the shares of natural gas and of heat in total final consumption of energy and energy resources in Moldova significantly decreased, but the shares of petroleum products and of electricity consumption increased. The shares of coal and of biomass remained comparatively stable.



TFC of energy and energy resources

Figure 5: Total final consumption of energy and energy resources in Moldova 2005-2013, %.

Source: Energy Balance of the Moldova, National Bureau of Statistics of the Moldova, http://www.statistica.md/public/files/publicatii\_electronice/balanta\_energetica/BE\_2013.pdf and http://www.statistica.md/public/files/publicatii\_electronice/balanta\_energetica/BE\_2014\_rom.pdf

In 2013, the residential sector's share of TFC was 41.6%, followed by the transport sector at 28.4%, industry at 12.5%, trade and public services at 12.4%, agriculture at 3.1%, and nonenergy use at 2%. Between 2010 and 2013, final energy consumption in industry increased by 13.2%, or 30 ktoe, in the residential sector by 6.1%, or 49ktoe, and in non-energy use by 31.3%, or 10ktoe. In other sectors, final energy consumption decreased as follows: in transport by 1%, or 6ktoe, in trade and public services by 7.6%, or 21 ktoe, and in agriculture by 9.9%, or 7 ktoe.



The structure of energy consumption in the main sectors of economy in Moldova from 2005 to 2012 is presented in Figure 7. As seen, the local power generation is based mainly on natural gas at 95.5%. Final energy consumption in industry, in 2012, comprised 33.7% electricity, 25% natural gas, 17.1% heat, and 11.9% each for coal and petroleum products. The structure of energy consumption in the residential sector (population) in 2012 was as follows: 29.1% petroleum products, 28% natural gas, 15.1% electricity, 13.2% heat, 7.8% biomass and 6.6% coal. In the trade and public services sectors, this structure was, respectively: 43.9% natural gas, 25.9% electricity, 18%- heat, 8.3% coal, 2.9% biomass, and 1.1% petroleum products. As of 2012, in the agriculture/forestry sectors 81.6% of energy consumption was in the form of petroleum products, 8.2% electricity, 6.1% natural gas, and 2% each heat and biomass.


## Figure 7: Energy consumption by fuel and by sector Moldova 2005-2012.





**Population (residential)** 







biomas

electricity







Source: Energy Balance of the Moldova, 2013, National Bureau of Statistics of Moldova

From 2005 to 2012 the energy consumption in the heat and power generation, industry and agriculture sectors decreased by about 28% each. In the residential sector the energy consumption decreased during the same period of time by 4.4%, but from 2007 to 2011 it increased. From 2005 to 2012, final energy consumption increased in the transport sector by 37.6%, and in the trade and public services sector by 18.8%.

About 45% of electricity consumption (3.6TWh in 2014) is consumed by households (54.6% in urban areas and 46.4% in rural) and 55% by non-household consumers. About 77% of heat consumption (1,422,200 Gcal in 2014) was that of households, 15% budgetary institutions and 8% companies. Out of 959 million m<sup>3</sup> of natural gas consumption in 2014, 41.4% was accounted for by the energy sector, 28.9% by households, 25.3% by other companies, and 4.4% by public institutions. Out of 636,000 tons of petroleum products imported in 2014, about 98% were consumed by the transport sector.<sup>14</sup>

The capital of Moldova, Chisinau, consumes about 87% of the total centralised heat supply in the country, 63% of total gas consumption and more than 50% of total electricity supply.

### **Energy intensity**

The energy intensity of economy in Moldova as seen in Table 3 and Figure 8 is higher than the OECD average and EU countries in the neighbourhood. However it has to be noted that in the 2000-2013 period, the primary intensity of Moldova decreased significantly from 0.48 to 0.21 toe/th.2005 USD ppp.

<sup>14</sup> Source: Raport privind activitatea Agenției Naționale pentru Reglementare în Energetică în anul 2014, pages 8, 19, 23 and 30, Chisinau, April 2015, http://www. anre.md/files/raport/RAPORT%20%20de%20activitate%20%202014.pdf

## Table 3: Energy intensity of economy in Moldova and other European countries 2000-2011.

			1	1								
	COUNTRY	2000	2002	2005	2006	2007	2008	2009	2010	2011	2012	2013
	OECD Total	0.16	0.16	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.13	0.13
TPFS/GDP	Non-OECD Europe and Eurasia	0.44	0.41	0.35	0.33	0.3	0.29	0.29	0.3	0.3	0.29	0.28
(toe per 2005	Bulgaria	0.31	0.29	0.26	0.25	0.23	0.21	0.2	0.2	0.21	0.2	0.18
USD PPP)	Moldova	0.38	0.36	0.33	0.31	0.29	0.27	0.27	0.28	0.26	0.26	0.21
	Romania	0.24	0.22	0.19	0.18	0.17	0.16	0.15	0.15	0.15	0.15	0.13
	Ukraine	0.63	0.56	0.47	0.42	0.39	0.37	0.37	0.41	0.37	0.36	0.34
	0ECD Total	0.11	0.11	0.1	0.1	0.1	0.1	0.09	0.1	0.09	0.09	0.09
TFC/GDP (toe	Non-OECD Europe and Eurasia	0.29	0.26	0.22	0.21	0.19	0.19	0.18	0.19	0.19	0.18	0.17
per thousand 2005 USD	Bulgaria	0.16	0.14	0.13	0.13	0.12	0.11	0.1	0.1	0.11	0.11	0.1
PPP)	Moldova	0.21	0.22	0.22	0.21	0.19	0.18	0.18	0.19	0.18	0.18	0.16
	Romania	0.16	0.14	0.13	0.12	0.11	0.1	0.1	0.1	0.1	0.1	0.09
	Ukraine	0.34	0.31	0.27	0.25	0.24	0.23	0.22	0.23	0.22	0.21	0.2
	OECD Total	3.16	3.11	3.14	3.12	3.11	3.03	2.87	2.97	2.91	2.85	2.89
TFC/nonula-	Non-OECD Europe and Eurasia	1.92	1.93	2.03	2.07	2.12	2.16	1.98	2.11	2.18	2.14	2.06
tion (toe per	Bulgaria	1.17	1.16	1.34	1.39	1.41	1.42	1.21	1.23	1.31	1.31	1.25
сарца)	Moldova	0.44	0.52	0.66	0.65	0.62	0.62	0.57	0.68	0.68	0.66	0.64
	Romania	1.06	1.1	1.22	1.23	1.22	1.28	1.15	1.15	1.18	1.21	1.14
	Ukraine	1.47	1.55	1.76	1.75	1.85	1.79	1.47	1.61	1.66	1.59	1.54
	OECD Total	7946	7967	8281	8285	8374	8332	7950	8266	8169	8088	8072
Electricity	Non-OECD Europe and	3633	3733	4069	4269	4375	4452	4215	4432	4497	4567	4510
consump- tion/popula-	Bulgaria	3674	3839	4122	4311	4524	4674	4484	4560	4864	4762	4640
tion (kWh per capita)	Moldova	1638	1872	2048	2166	1996	2028	1741	1723	1470	1514	1353
	Romania	1988	2080	2365	2446	2530	2606	2391	2551	2639	2604	2495
	Ukraine	2778	2845	3246	3400	3529	3534	3228	3550	3662	3641	3600

Source: IEA statistical database online



Figure 8: Comparison of energy intensity of Moldova with other EU countries.

### Electricity and heat generation capacity

The total installed capacity of Moldovan power plants is around 3,000 MW, but only less than half of it is being used. Moldovan Thermal Power Plant (MTPP) is currently running mainly on gas-fired power generation units. Out of the total installed capacities, 15% are on the right bank of the River Dniester and 85% are on the left bank, in Transnistria (installed capacities in operation are split between 30% and 70%). There are no records of electricity supply from HPP Dubasari to the right bank of the Dniester, as electricity supplied by this company is defined as 'external sources'.<sup>15</sup> The Combined Heat and Power Plants (CHP) work predominantly on a seasonal basis (CET-1, CET-Nord, CHPs of sugar factories, etc.).

Until 1995 Moldova was a regional exporter of electricity. In 1990 Moldova (right and left bank of the Dniester) was a self-sufficient electricity producer with electricity consumption in the country of 12.67 TWh<sup>16</sup> and total transportation through the grid of 20.2 TWh, including exports of 7.5 TWh.<sup>17</sup> In 1995, on the right bank of the Dniester, electricity consumption was 5.39 TWh, transportation through the grid of 5.5 TWh and exports 126.8 GWh. In 2014, 4.03 TWh of electricity was supplied to the grid and 3.55 TWh delivered to consumers.<sup>18</sup>

From 2001 to 2014 local (right bank of the Dniester) electricity production declined from 1.04 TWh in 2001 to 0.79 TWh in 2014.<sup>19</sup> In 2014, local (right bank of the Dniester) electricity produc-

<sup>15</sup> In 2003 MGRES was sold by the Transnistrian authorities. Today MGRES (Moldova TPP) makes part of the INTER RAO UES: http://www.interrao.ru/en/company/ structure/

<sup>16</sup> Of this, 5.2 TWh were consumed by industry

<sup>17</sup> Энергетика в экономике Республики Молдова, книга 3, часть 1 из серии "Энергетическая безопасность Республики Молдова", Медведев Л. Г., edition by acad. Postolatii V. M., Chisinau, 2007

<sup>18</sup> Source: Raport privind activitatea Agenției Naționale pentru Reglementare în Energetică în anul 2014, Chisinau, http://anre.md/files/raport/RAPORT%20%20 de%20activitate%20%202014.pdf

<sup>19</sup> Source: Raport privind activitatea Agenției Naționale pentru Reglementare în Energetică în anul 2014, http://anre.md/files/raport/RAPORT%20%20de%20activitate%20%202014.pdf

ers contributed only 19.1% to the total electricity purchased by DSOs. For comparison, in 2010 this amount was 22.7% and in 2001 it was 32.6%. In 2014, more than 80% of electricity was provided by imports (Ukraine) and sources defined as 'external' (MTPP) (see Table 4).

#### Table 4: Characteristics of power plants in Moldova.

Power Plant	Electric capac- ity, MW	Thermal capacity, Gcal/h	Type of fuel	Year of construction	Some of the latest developments
<b>Right bank of the River Dnies</b>	ter				
CHP CET-1, Chisinau	66	239	gas, fuel oil	1951-1961	1994-T ?-1 P-12-35-3M, 2001- T?-2 ?T-12/15-35/10M. Cumulative capacity: electric - 24 MW, thermal - 102 Gcal
CHP CET-2, Chisinau	240	240 1200		1976-1980	
CHP CET-Nord, Balti	24	342		1956-1970	1994, 1995, 2005 - replacement of three turbine units by ?T- 12/35 of 12 MW
Hydropower plant CHE- Costesti	16		hydro	1978	
Heat plants of Termocom and Apa-Canal	-	about 1000 (Ter- mocom) and about 25 (Apa-Canal)	gas, fuel oil	1967-1990	2003-2006: 14 HP of Termocom and 3 HP of Apa-Canal were modernised
Total:	443.5				
Left bank of the River Dnieste	er (Transnistria)			·	
MTPP (CERSM/ MGRES)	2520	coal (1600 MW), gas, fuel oil (920 MW)	1964-1982		
Hydropower plant Dubasari	48		hydro	1950-1955	
Total:	2,568				
TOTAL:	3,011.5				

Sources: Energy Strategy of Moldova until 2030, CET-2: http://cet2.md/, CET-Nord: http://www.cet-nord.md, NHE Costesi: http://www.mii.gov.md/ pageview.php?l=ro&idc=71, MGRES: http://moldgres.com/, http://moldgres.com/o-predpriyatii/proizvodstvennye-moshhnosti, Hydro power plant Dubasari: http://ges-dubossary.ru/

According to a UNECE study from 2009, the available capacity of all power plants on the right bank of the River Dniester is between 60 and 85% of the installed capacity by plant.<sup>20</sup> Lower levels are mainly for the hydropower plant and the higher levels are for CHPs. Nominal efficiency of existing power generation units and of fuel consumption is lower than that of currently available comparable technologies. Current de facto efficiency is also significantly reduced because of a major decrease in production volumes, and thus companies are operating on far less than optimal levels.

<sup>20</sup> Source: Republic of Moldova: National Energy Policy Information for Regional Analysis, United Nations Economic Commission for Europe, Energy Efficiency 21 Programme, September, 2009, http://www.clima.md/public/102/en/EnergyPolicyInformationForRegionalAnalysisMoldova.pdf

The market share of local electricity producers in the total electricity supply decreased from 2001 to 2014 by 1.7 times. The share of the biggest electricity and heat producer CET-2 decreased from 25.4% in 2001 to 14.9% in 2014. Shares of CET-1, CET-Nord and NHE-Costesti varied between 1 and 3.7% each. Other local electricity producers accounted for less than 1%.



Source: National energy regulatory agency, http://anre.md/files/raport/Raport%20anual%20de%20activitate%20a%20ANRE%20pentru%20anul%20 2013\_2.pdf



#### Figure 10: Share of production and import in total electricity purchases in Moldova 1997-2014

Data source: National energy regulatory agency; http://anre.md/files/raport/Raport%20anual%20de%20activitate%20a%20ANRE%20pentru%20 anul%202013\_2.pdf



Source: National energy regulatory agency; ,http://anre.md/files/raport/Raport%20anual%20de%20activitate%20a%20ANRE%20pentru%20anul%20 2013\_2.pdf As mentioned above, Moldova until 1995 was a significant regional exporter of electricity. As of today, electricity is provided mainly by external sources, the internal ones (right bank of the river Dniester) covering only about 20% of the total electricity supply. In 2013, local electricity producers contributed only by 18.4% in total electricity purchased by DSOs. For comparison, in 2010 this share was of 22.7% and in 2001 - 32.6%.<sup>21</sup> (figure 11)

Sources defined as being "external' include supplies from Ukraine (and Romania), but also electricity supplied by Moldovan State Power Plant (MGRES) located on the territory of Moldova, in Transnistrian region<sup>22</sup>, which is until now out of the state control. Also in Transnistrian region there is a Dubassary hydro power plant of 48 MW, but there are no officially recorded electricity supplies from that power plant to the right bank of the Dniester. In 2013, the share of MGRES in total electricity supplies to Moldova was 46% and the share of electricity supplied from Ukraine was 35.8%. Major dependence on these two sources of electricity supply significantly reduces energy security.

The price for locally produced electricity is not competitive with the above-mentioned external sources, except for that of electricity produced by the hydropower plant HPP-Costeşti (16 MW). In 2012, the price for electricity produced by CHP-1 and CHP-2 (municipality (mun.) of Kishinau, about 85% of total local electricity production) was on average twice as high as the price for electricity supplied by external sources. As already mentioned, only HPP-Costeşti has price-competitive electricity production, producing electricity five times cheaper than external sources.

In 2013, the share of CHPs in local electricity generation was 93.2%, and it was 95% in 2012 (Table 5 and Figure 12). These CHPs are primarily gas-fired power plants, 99% of fuel used for heat and power generation being natural gas. Two of them, CET-1 and CET-2, are located in the capital , and CET-Nord is located in the second largest city of Moldova, Beltsy (Bălți), in the northern part of the country. These power producers are also the main heat producers in the country during the winter season.

		2001	2005	2010	2011	2012	2013
Local electricity production, total (GWh)		1,042.9	999.8	888.1	854.3	776.1	747.9
share in total local production, %							
	CET-1	11.1	12.9	9.2	7.0	6.1	7.1
	CET-2	77.9	72.5	74.9	76.8	82.0	79.4
	CET-Nord	3.0	5.6	6.4	6.8	7.0	6.6
	HPP-Costesti	6.9	8.4	8.8	8.8	4.3	6.0
	other local producers	1.1	0.7	0.6	0.6	0.5	0.9
CET-2, CET-1,	CET-Nord: total	92.0	90.9	90.6	90.5	95.2	93.2

#### Table 5: Local electricity production in Moldova.<sup>23</sup>

#### Source: Annual activity report of the National Energy Regulatory Agency for 2013, www.anre.md

Electricity generation on the right bank of the Dniester in 2014 was 788 GWh whereas in 1990 it was 1 883 GWh, i.e. decrease of 2.5 times, and at MTPP during the same period the decrease

21 Raport privind activitatea ANRE în anul 2013, www.anre.md

<sup>22</sup> http://en.wikipedia.org/wiki/Transnistria

<sup>23</sup> Raport privind activitatea ANRE în anul 2013, www.anre.md

was about four times (13.5 TWh in 1990). Centralised heat generation on the right bank of the Dniester decreased from 1990 to 2014 from about 22,212,000Gcal to 1,820,000 Gcal. In 1990, district heating plants produced about 67% of the total heat generation and CHPs about 33%, and in 2014 heat was produced predominantly by existing CHPs, because the majority of district heating plants were closed or reduced their heat production. Heat production by CHPs decreased from 1990 to 2014 by about four-fold from 7,220,000 Gcal. This decrease happened mainly from 1990 to 2000 as from 2000 to 2014 the heat production level was more stable though steadily decreasing in the last few years.<sup>24</sup>

In 2014, the cumulative share of CET-2, CET-1 and CET-Nord in local electricity generation was 90% and it was 95% in 2012. CET-1 and CET-2 are located in the capital and CET-Nord is located in Beltsy.



Figure 12: Structure of electricity production in Moldova, right bank of the River Dniester, %.

Source: Annual Activity Report of the National Energy Regulatory Agency for 2013, www.anre.md

<sup>24</sup> Sources: Raport privind activitatea ANRE in anul 2013, www.anre.md, and National Energy Policy Information for Regional Analysis, United Nations Economic Commission for Europe, September, 2009, http://www.clima.md/public/102/en/EnergyPolicyInformationForRegionalAnalysisMoldova.pdf

Table 6: Fuel consumption and costs in power generation, Moldova.

			CET-2			CET-1		CET-Nord			
		2010	20	)11	2010	20	11	2010	20	11	
		2010	Electric	Heat	2010	Electric	Heat	2010	Electric	Heat	
Fuel consump	Fuel consumption										
grams of conventional fuel/kWh			308.58			337.47			253.38		
kg. of conventional fuel/Gcal				126.24			130			145.64	
Structure of fi	uel consumpti	ion, %									
	fuel oil		0.7		1.13						
	coal							0.42	0.43		
	natural gas	98.8	99.3	99.3		100		99.6	99.6		
Share of fuel cost in total production costs, %			89.5	90		81.8	81.8		77.9	70.1	

Sources: CET: structura tarifelor aprobate din 21.10.2011 și Structura tarifelor la energia electrică și termică produsă la CET-1, CET-2 și CET-Nord în anii 2010-11, ANRE, www.anre.md

Heat generation and supply in Moldova have undergone major changes during the past two decades. Sharp collapse of the centralised heat supply systems took place between 1990 and 2000. Until today, centralised heat production and supply has been steadily decreasing. The initially high share of heat plants in total heat production per country decreased and today CHPs are producing about two-thirds of the total heat supplied by centralised networks (see Figure 13).





Data sources: 1990-2010: National Inventory Report on Greenhouse Gas Emissions in Moldova 1990-2010, UNFCCC, Chisinau, 2013, http://unfccc.int/ resource/docs/natc/mdanir.pdf, 2011-2014: Rapoarte privind activitatea Agenției Naționale pentru Reglementare în Energetică în anii 2013 și 2014, Chisinau, 2014 și 2015www.anre.md

### **Electricity market**

Until 1997, the Moldovan energy system was operated by the single vertically integrated stateowned company Moldenergo. This company was responsible for all power generation, including MGRES, power transportation, distribution and supply, as well as some other energy sector activities. Following the military war of 1992 in Moldova, the central government lost control over the territories on the left bank of the River Dniester, called Transnistria, and all industrial and energy infrastructures in that region.

From 1997 to 2000 Moldenergo was legally and operationally unbundled into 19 companies, including but not limited to the following:

- TSO: state company Moldelectrica (high-voltage grids, central dispatch centre), municipality of Chişinău.
- DSOs:
  - JSC 'Power distribution grids (RED) North', municipality of Bălți;
  - JSC 'RED North-West', Donduşeni;
  - JSC 'RED Centre', Vatra, municipality of Chişinău;
  - JSC 'RED South', Comrat;
  - JSC 'RED Chişinău', municipality of Chişinău.
- Electricity and heat producers:
  - JSC 'Heat & power plant (CHP) nr. 1', municipality of Chişinău (CET-1);
  - JSC 'Heat & power plant nr. 2', municipality of Chişinău (CET-2);

- JSC 'Heat & power plant North', municipality of Bălți (CET-Nord);
- State company hydro power plant (HPP) Costeşti;
- Heat production and distribution company:
  - JSC RAPDET, municipality of Chişinău.
- Other companies.

In 1999 JSC Rapdet merged with JSC Termocom and state ownership of Termocom was transferred to the City Hall administration. The Termocom company started its activity in 1966 as the state enterprise Chisinau thermal networks. At the end of 2014, CET-1 and Termocom merged with CET-2 to form the single company CET-2.

In 2000, three out of five DSOs, namely: JSC 'Power grids' (mun. Chişinău), JSC 'RED Centre' (Vatra, mun. Chişinău) and JSC 'RED South' (Comrat) were purchased by a Spanish company, forming DSO 'RED Union Fenosa'.

In the light of Energy Community obligations and the requirements of the third energy package and the respective EU Directives, electricity market restructuring is an on-going process in Moldova, and the TSO DSOs were legally unbundled as of 1 January 2015. (Law on electricity of Moldova.<sup>25</sup>)

## Transmission and distribution losses ( electricity and heat)

## Electricity grid losses

In 2014, about 4.1TWh of electricity was transported through the *transmission system* of Moldova, operated by the state-owned TSO Moldelectrica.<sup>26</sup> As of today, the average level of technological consumption and technical losses in transportation network, as approved by ANRE, is 3.0% of the electricity supplied to transmission networks.<sup>27</sup> For comparison, as included in approved tariff calculations, in 2010 this level was 3.5%, in 2009 it was 2.94% and in 2007 it was 3.5%.<sup>28</sup>

In 2012, a project for rehabilitation of the transmission network in Moldova was launched. The project includes the design and modernisation of a number of substations and transmission lines. The rehabilitation will improve the energy efficiency of Moldelectrica's network, strengthen the stability of power supply and improve the overall operation of TSO Moldelectrica, a prerequisite for Moldova's integration into the European transmission network ENTSO-E. The project is financed through soft loans provided by EBRD (€15.5 million) and EIB (€17 million) for 2012 to 2019 and a grant by NIF (€8 million) for 2013 to 2019.

Regarding electricity losses in *distribution networks*, and as presented in Table 7, these losses are steadily decreasing and in 2014 they accounted for between 9.2 and 11.58% of the electricity supplied to the distribution grids.

<sup>25</sup> LEGE nr. 124 din 23.12.2009 cu privire la energia electrică, http://lex.justice.md/md/333639/

<sup>26</sup> Sursa: Raport privind activitatea ANRE în anul 2014, www.anre.md

<sup>27</sup> Sursa: Hotărâre ANRE privind tarifele pentru serviciul de transport al energiei electrice nr. 469 din 11 mai 2012, www.anre.md

<sup>28</sup> Sursa: Calculul tarifului pentru serviciile de transport și dispecerat a energiei electrice prestate de către Î.S. 'Moldelectrica' pentru anul 2010, anexa 1 și 13, www. anre.md

DSOs	Technolo	gic consu	mption a exit poi	and de fa nts from	cto losse transpor	s (as % o tation ne	Electricity purchased by	Electricity sup- plied to		Nr. of consumers, 2014				
	2001**	2005	2010	2011	2012	20	013	20	014	DSOs in 2014	GWh	%		%
RED UF	28	21.44	13.68	13.11	12.39	10.75	10.86*	9.45	9.54*	2,981.70	2,626.10	72.0	856,489	64.2
RED Nord	28.4	14.39	10.43	9.89	9.89	9.83	10.5*	8.53	9.2*	689.7	613.7	16.8	294,645	22.1
RED Nord-Vest	39.9	20.07	12.98	12.39	11.9	11.7	12.01*	11.3	11.58*	363.3	313.5	8.6	183,963	13.8

#### Table 7: Electricity distribution losses in Moldova 2001-2014.

\* as % of electricity supplied to the distribution grids

\*\* this includes commercial losses (commonly defined as thefts, non-metered and non-paid electricity consumption)

Sources: Raport privind activitatea Agenției Naționale pentru Reglementare în Energetică în anul 2014, http://anre.md/files/raport/RAPORT%20%20 de%20activitate%20%202014.pdf

As provided by the NEEP 2011-2020, DSOs should achieve reduction of losses from 13% in 2011 to 7-10% in 2020. The latest data of ANRE, as of April 2015, indicate the progress of all DSOs since 2011 towards achieving this target.

#### Heat supply losses

In 2013, as provided by ANRE, heat losses in distribution and supply systems were 22% of the total heat supplied to the network, increasing from 2011 to 2013. These data differ from the national statistical data, where the share of losses in 2012 was of 16%,<sup>29</sup> but both sources indicate a significantly decreasing level of centralised heat power supplies, regardless of weather conditions during the heating season. Thus, the final consumption of heat in 2012 was almost 30% lower than in 2005 and heat production, during the same period of time, decreased by 27.7%.<sup>30</sup> In 2013, 1,420,400 Gcal of heat was supplied to consumers, or 18.8% (328,000 Gcal) less than in 2010. From 2011 to 2013 the amount of heat delivered to the network decreased by 12.4% and the amount of heat delivered to consumers decreased by 15.1%.

<sup>29</sup> http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197

<sup>30</sup> Energy balance, National Statistical Agency

Company	Heat supplied into the network, 1000 Gcal			Heat losses, 1000 Gcal			H	Heat losses , %			eat supplied umers, 1000	to  Gcal	Share in total supplies, %		
	2,011.00	2,012.00	2,013.00	2,011.00	2,012.00	2,013.00	2,011.00	2,012.00	2,013.00	2,011.00	2,012.00	2,013.00	2,011.00	2,012.00	2,013.00
Termocom, Chisinau	1,770.90	1,717.70	1,577.20	355.20	359.20	358.90	20.06	20.91	22.76	1,415.70	1,358.50	1,218.30	84.60	85.40	85.80
Apa-canal, Chisinau	27.30	26.80	23.70	2.60	3.10	2.50	9.52	11.57	10.55	24.80	23.70	21.20	1.50	1.50	1.50
CET-Nord, Balti	214.90	213.30	183.10	41.10	49.10	35.10	19.13	23.02	19.17	173.90	164.20	148.00	10.40	10.30	10.40
Termogaz, mun. Balti	12.70	12.80	10.90	1.20	1.30	1.10	9.45	10.16	10.09	11.40	11.50	9.80	0.70	0.70	0.70
Comgaz Plus, Ungheni	14.90	10.90	8.00	2.80	2.30	1.10	18.79	21.10	13.75	12.10	8.60	6.90	0.70	0.50	0.50
Retelele Termice Calarasi	8.00	6.20	4.10	2.60	2.00	1.30	32.50	32.26	31.71	5.40	4.20	2.80	0.30	0.30	0.20
Servicii Publice Cimislia	1.20	0.90	0.70	0.10	0.10	0.00	8.33	11.11	0.00	1.10	0.80	0.70	0.10	0.10	0.10
Retelele Termice mun. Comrat	7.10	6.60	6.00	0.20	0.20	0.20	2.82	3.03	3.33	6.90	6.40	5.80	0.40	0.40	0.40
Antermo, Anenii Noi	2.30	2.00	1.50	0.20	0.20	0.10	8.70	10.00	6.67	2.10	1.80	1.40	0.10	0.10	0.10
Retelele Termice Stefan Voda	1.30	1.20	1.00	0.10	0.10	0.10	7.69	8.33	10.00	1.20	1.10	0.80	0.10	0.10	0.10
Retelele Termice Cahul	7.40	5.10	0.70	0.20	0.20	0.00	2.70	3.92	0.00	7.30	4.90	0.70	0.40	0.30	0.00
Retelele Termice Glodeni	3.30	2.10	0.00	0.20	0.20	0.00	6.06	9.52	0.00	3.10	1.90	0.00	0.20	0.10	0.00
Retelele Termice Criuleni	1.90	1.30	0.40	0.30	0.40	0.20	15.79	30.77	50.00	1.70	0.90	0.30	0.10	0.10	0.00
Centrale si Retele Termice, Orhei	6.60	2.20	3.90	0.30	0.10	0.20	4.55	4.55	5.13	6.30	2.10	3.80	0.40	0.10	0.30
Total per regulated companies	2,079.90	2,009.30	1,821.30	407.10	418.60	400.90	19.57	20.83	22.01	1,672.90	1,590.70	1,420.40	100.00	100.00	100.00

#### Table 8: Centralised heat supply and losses in Moldova 2011-2014.

Sources: Annual Activity Report of the National Energy Regulatory Agency for 2013 and 2014, http://anre.md/ro/reports/8

On 18 December 2014, a methodology for calculation of the normative values for heat losses was adopted.<sup>31</sup> This methodology is compulsory for all heat neatwork companies which are regulated by ANRE and is designed to improve the heat supply activity.

When monetised, total annual electricity and heat losses in Moldova account for about 39.8 million euro per year, including 12.5 million euro on heat and 27.3 million on electricity (transmission and distribution).<sup>32</sup> One per cent (or 41GWh) of electricity losses in the country accounted in 2014 for about 2.3 million euro.

### Electricity prices (households and industry)

Since 1998, the National Energy Regulatory Agency (ANRE) has set tariffs for electricity, heat and natural gas in the regulated market. Later on, based on the provisions of the law on renewable energy of 2007, ANRE was authorised to develop a methodology for tariff calculation and to set tariffs on electricity and fuels produced from RES. Since 2009, ANRE has also been responsible for approval of tariffs for centralised heat supply.

The law on electricity of 2009 required that regulated tariffs on electricity and heat produced by CHPs, electricity produced from RES, tariffs for electricity transportation and distribution services, tariffs for electricity supplies at regulated prices, etc. should be calculated by licence

<sup>31</sup> H\_ANRE\_nr. 742 din 18.12.2014 cu privire la aprobarea Metodologiei de determinare a valorilor normative a pierderilor de energie termică, de agent termic și a valorilor indicilor normativi de funcționare a rețelelor termice cu apă: http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=356820

<sup>32</sup> Annual Activity Report of the National Energy Regulatory Agency for 2014 and ANRE Decisions on heat production tariffs: www.anre.md

holders and approved by ANRE based on existing methodologies. Methodologies for calculation and application of regulated tariffs, as listed above, are approved by ANRE.

From 2005 to 2014 all tariffs set by ANRE were marked by major increases. As mentioned earlier, electricity and heat generation in Moldova are predominantly based on natural gas. Until March 2015, natural gas was imported from a single source and average import prices increased five-fold from 2005 to 2014, from 76.1 \$/1000m<sup>3</sup> in 2005 to 377.1 \$/1000m<sup>3</sup> in 2014.. The highest average annual price for natural gas in 2012 was 394 \$/1000m<sup>3</sup>. Average tariffs for natural gas, expressed in USD, supplied to consumers in Moldova increased between 2005 and 2014 6.1 times: from 72 \$/1000m<sup>3</sup> in 2005 to 436 \$/1000m<sup>3</sup> in 2014, or 6.9 times from 2005 to 2012.<sup>33</sup> Tariffs for heat produced by CET-2 and CET-1 increased more than five-fold. These two companies provide over 80% of district heating in Moldova. Local electricity production covers only about 20% of total consumption, and thus the increase of electricity tariffs for consumers was more moderate than that of gas and heat tariffs, because of the significant proportion of more stable electricity import prices. Tariffs for electricity produced by Iocal CHPs increased over three-fold, whereas tariffs for electricity supplied by DSOs to consumers approximately doubled.

Current regulated electricity, heat and natural gas tariffs in Moldova are as follows:

33 Source: Raport privind activitatea Agenției Naționale pentru Reglementare în Energetică în anul 2014, page 21, Chisinau, April 2015, http://www.anre.md/files/ raport/RAPORT%20%20de%20activitate%20%202014.pdf

## Table 9: Regulated electricity and heat tariffs in Moldova 2005-2014.

	Tariffs (without VAT)		Tariffs of 2005			Current tariffs		Tariffs increase during 2005-2014, times			
F		bani/ kWh	c\$/kWh	c€/ kWh	bani/kWh	c\$/kWh	c€/kWh	bani/MDL	(c) \$	(c)€	
E	ectricity production <sup>1</sup>	build, itter	cų, itrii		a di inf	C4, 1111			(-/ +	(c) c	
F	(FT-1	43.68	3 47	2 78	166 14	11.8	89	3.8	34	3.2	
┢	(FT-2	37.5	2.47	2.70	158.63	11.0	8.5	4.2	3.1	3.6	
⊢	CET 2	40.27	2.00	2.57	127 11	0.0	7.4	2.4	2.0	2.0	
⊢	CEI-NOIU CHE Costosti	40.37	0.77	2.37	20.64	9.0 1 E	1.4	3.4	3.0	2.7	
D	CRE-COSTEŞU EC <sup>2</sup> (other than evicting hydro neuver	7./ I	0.77	0.02	20.04	C.I	1.1	2.1	1.9	1.0	
n	Lorence (2010, 2012)	Jidiils)			172	12.2	0.2				
┝	biogas (2010, 2015)				1/3	12.3	9.5				
L	solar (2012-2013)				192	13./	10.3				
┝	solar (2014)				188	13.4	10.1				
	wind (2013)				124	8.8	6./				
E	lectricity transportation and disp	atching <sup>3</sup>				- T					
L	Moldelectrica										
L	within the country	3.93	0.31	0.25	8.02	0.6	0.4	2.0	1.8	1.7	
L	cross-border flows				8.02						
L	400kV				3.23						
E	lectricity distribution and supply <sup>4</sup>										
	RED-Union Fenosa										
	35; 110 kV	55	4.36	3.50	117	8.3	6.3	2.1	1.9	1.8	
Γ	6; 10 kV				140	10.0	7.5				
Γ	0.4 kV	78	6.19	4.97	158	11.3	8.5	2.0	1.8	1.7	
	RED-Nord										
F	35; 110 kV	55	4.36	3.50	120	8.5	6.4	2.2	2.0	1.8	
F	6: 10 kV				157	11.2	8.4				
F	0.4 kV	70	5.56	4.46	171	12.2	9,2	2.4	2.2	2.1	
F	RFD-Nord-Vest										
F	35· 110 kV	55	4 36	3 50	120	85	64	22	2.0	18	
F	6: 10 kV		1.50	5.50	120	11.2	8.4	2.2	2.0	1.0	
⊢	0.4 kV	70	5 56	4.46	137	17.2	0.1	2.5	22	21	
┢	0.4 KV	lei/Gcal	\$/6cal	£/6cal	lei/Gcal	\$/6cal	£/6cal	2.5	2.2	2.1	
u	00\$* <sup>5</sup>		y/ ucai	C/ UCUI		J/ Utai	C/ UCUI				
P	CET 1	126	10.70	0.66	710 55	£1.2	20.6	E 2	47	4.5	
┝		100	0.10	6.00	/ 10.JJ	J1.2	21.6	J.J E 0	4./ 5 C	4.5	
┝	CET Nord	200	0.10	10.00	207.07 10E6	41.9	51.0	).0 2 E	2.2	4.9	
┝		299	25./5	19.05	0001	75.2	52.0	5.5	5.2	5.0	
┝	lermocom				98/	/0.3	53.0				
┝	Apa-Canai Chişinau JSC				1093	//.9	58./				
⊢	i ierritogaz J.V., mun. Balți				1090	//.6	58.5				
┝	Comgaz-Plus JSC, Ungheni				1326	94.5	/1.2				
L	Kețelele lermice Călărași J.V.				1519	108.2	81.5				
L	Central și Rețele Iermice J.V., Orhei				1378	98.2	74.0				
L	Servicii Publice Cimișlia J.V.				1432	102.0	76.9				
L	Rețelele Termice J.V., mun. Comrat				1273	90.7	68.3				
L	Antermo J.V., Anenii Noi				1472	104.9	79.0				
L	Rețelele Termice Ștefan-Vodă J.V.				1386	98.7	74.4				
L	Rețele Termice Glodeni J.V.				1350	96.2	72.5				
L	Rețelele Termice Cahul J.V.				1355	96.5	72.7				
L	Rețelele Termice Criuleni J.V.				2870	204.4	154.0				
L		lei/ 1000m <sup>3</sup>	\$/ 1000m <sup>3</sup>	€/ m <sup>3</sup>	lei/ 1000m <sup>3</sup>	\$/1000m <sup>3</sup>	€/ m <sup>3</sup>				
N	atural gas <sup>6</sup> (with VAT):										
	for CHPs	846	67.14	53.89	5237	373.0	281.1	6.2	5.6	5.2	
	for consumers (<30m) <sup>3</sup>	1080	85.71	68.80	5971	425.3	320.5	5.5	5.0	4.7	

Sources: National Energy Regulatory Agency (ANRE) (www.anre.md):

For *non-household consumers*, who have the appropriate metering equipment, the payment for electricity consumption is differentiated according to the consumption period:

- between 10 and 17hrs, 20 and 22hrs during first and fourth quarters of the year, respectively; between 10 and 20hrs during the second and third quarters of the year: coefficient 1.0 is applied to the existing tariff;
- during peak system load hours: 7 to 10hrs, 17 to 20hrs during first and fourth quarters of the year, respectively; and 7 to 10hrs, 20 to 22hrs, respectively, during the second and third quarters of the year: coefficient 1.6 is applied to the existing tariff;
- during night hours: 22-7hrs, throughout the year coefficient 0.6 is applied to the existing tariff.

For *households consumers*, who have the appropriate metering equipment, the payment for electricity consumption during night hours (from 22 pm until 6 am) shall be made at the rate of 0.6 coefficient applied to the existing tariff.



de%20activitate%20%202014.pdf

The dynamics of electricity tariffs from 1997 to 2014 is presented in Figure 15 and it can be seen that tariffs increased more than threefold from 1999 to 2012 and more than doubled from 2005 to 2012.





Source: Raport privind activitatea Agenției Naționale pentru Reglementare în Energetică în anul 2014, Chisinau, http://anre.md/files/raport/RAPORT%20 %20de%20activitate%20%202014.pdf

Energy and energy efficiency strategy and legislation

# Energy and energy efficiency strategy and legislation

## Background

The energy policy of Moldova is based on national priorities and international commitments, notably since 2009 when Moldova acceded to the Energy Community Treaty. In the period between receiving full membership of the Energy Community (2010) and before signing and ratification of the EU-MD Association Agreement (2014), several policy documents were adopted in Moldova, including but not limited to:

- ✓ National Development Strategy 'Moldova 2020', adopted by Law nr. 166 of 11 July 2012, and
- ✓ Energy Strategy of Moldova until 2030, adopted by Government Decision nr. 102 of 5 February 2013.

As stated in the National Development Strategy 'Moldova 2020', energy efficiency and security have a direct impact on economic development and social welfare. Among the eight priority objectives for long-term development of Moldova, as defined in this policy document, one objective (nr.5) comprises: '... decrease in energy consumption through increased energy efficiency and use of RES'.

The strategic vision of this document refers to '... creation, by 2020, of a competitive and efficient energy sector that will provide consumers with quality energy resources in an affordable and reliable way, and will meet the challenges of rising energy prices, energy resources' import dependence and sector's impact on climate change'.

As stated in the Strategy, the achievement of these strategic objectives is based on two pillars, namely:

- ensuring national energy security, and
- improving energy efficiency.

Energy efficiency improvement is expected to be attained by:

- energy intensity reduction in residential, industry, transport and agriculture sectors;
- modernisation of the energy system;
- implementation of energy-efficient technologies;
- development of local energy resources, including RES;
- public awareness-raising regarding the need for energy savings (including public utilities, building materials, housing, household appliances, etc.).

The government's commitment to achieving these strategic goals is attested by:

- strengthening the sector reform, including adoption of new and EU-aligned energy legislation;
- implementation of energy efficiency promotion measures;
- attracting investments in the sector;
- strengthening institutional capacity in this field.

## Policy goals and targets

As stated in the MD-2020 Strategy, increasing energy efficiency will have a direct impact on numerous sectors of the national economy, especially on those that are consuming energy in

the production process, but also on households and public institutions. The planned gradual increase in energy efficiency by up to 10% could result in annual savings of about 830 million lei in current prices by 2020.

Among the specific targets set out in this Strategy are the following:

### Table 10: Energy efficiency targets in Moldova's 2020 national development strategy.

Indicator	2015	2020
Energy security		
New interconnections:		
electricity transmission grids, km		139
• natural gas pipelines, km		40
Increase of local power generation, MW		800
RES share in annual electricity production, %		10
Energy efficiency		
Decrease in energy intensity by, %		10
Decrease of electricity losses in transmission and distribution networks to, %	13	11
Decrease of natural gas losses in transmission and distribution networks by, $\%$	20	39
Decrease of heat losses in transmission and distribution networks, %	2	5
Decrease in greenhouse gas emissions by (compared with 1990 level), %		25
Decrease in buildings' energy consumption by, %		10
Share of retrofitted public buildings, %		10

Source: National Development Strategy Moldova 2020

The *Energy Strategy of Moldova until 2030* provides guidelines for national energy sector development, in order to ensure necessary grounds for economic growth and social welfare. Through this document, the government presented its vision and identified strategic national opportunities in a rapidly changing energy context. The Strategy highlights the priority problems of the country, which require rapid solutions and the re-dimensioning of objectives in order to provide an optimal balance between local resources (those currently used, but also projected ones) and the emergency needs of the country, the objectives of the European Union and Energy Community and national targets, international commitments resulting from treaties, agreements and programmes to which Moldova is party. The Strategy defined general policy goals for 2013 to 2030 as well as specific policy objectives for 2013 to 2020 and 2021 to 2030, specifying measures for their implementation.

As stated in this Strategy, from 2013 and 2020 the first results are expected in the implementation of less expensive energy efficiency measures aimed at a 20% reduction in energy consumption by 2020. The evolution between 2021 and 2030 of the energy sector of Moldova will be determined by the national policy implementation success rate between 2013 and 2020.

One of the specific objectives set by the Strategy is to improve energy efficiency. This policy document supports national energy efficiency targets for 2020 set out in the National Development Strategy Moldova 2020, presented above, namely:

- decrease in energy intensity by 10% by 2020;
- decrease of losses in transmission and distribution networks for electricity to 11% by 2020 (up to 13% in 2015), for natural gas: by 39% by 2020 (by 20% in 2015), and for heat: by 5% by 2020 (by 2% in 2015);
- decrease in greenhouse gas emissions (compared with 1990) by 25% by 2020;
- decrease in buildings' energy consumption by 20% by 2020;
- proportion of retrofitted public buildings of 10% in 2020.

Regarding targets for 2030, as of today there are no precise thresholds. As provided by the Energy Strategy 2030, Moldova has committed itself to implement by 2020 the third EU legislative package, which is due to be partly implemented in 2015.

### Institutional framework

The Ministry of Economy is the top government authority in the energy field of Moldova. The Minister of Economy is one of three deputy prime ministers and leads the activities of the Ministry of Economy, but also coordinates activities related to the development of the national economy, including the administration of public property, infrastructures, regional development and construction, agriculture, environment and others.

The prime minister leads the government and coordinates the activities of its members. He currently also coordinates activities related to planning and implementation of public policies in accordance with the priorities of the government programme, coordinates and monitors relations with international financial institutions and donor countries, including technical assistance, grants and external credits received by Moldova. He coordinates the activities of the Ministry of Finances and the Ministry of Justice. Coordination of the legal powers of the government in relations with local public authorities is also under the responsibility of the prime minister.

The deputy prime minister, the Minister of Foreign Affairs and the Minister of European Integration coordinate activities of the central public authorities related to foreign collaboration, cooperation with international, regional and European organisations, and the realisation of foreign policies and promotion of economic, scientific and other relations with other countries.



The Energy Security and Energy Efficiency Department of the **Ministry of Economy** develops and implements legal and regulatory framework and promotes state policy in the field of energy efficiency and RES, electricity, heat and natural gas, as well as the implementation of energy efficiency and RES projects. It comprises three units including the Energy Efficiency and RES Unit. The Ministry of Economy has in its charge the **Energy Efficiency Agency, State Energy Inspectorate, Consumer Protection Agency** and a number of other administrative authorities. It also monitors the activity of the National Accreditation Centre. The Ministry of Economy is the founder of a number of public institutions, including the **Moldovan Energy Projects Implementation Unit** (MEPIU), SMEs Development Organisation and others.

**The Deputy Prime Minister and Minister of Economy** is mandated to coordinate the activity of the Ministry of Regional Development and Construction, Ministry of Agriculture and Food Industry, Ministry of Transportation and Roads Infrastructure, Ministry of Environment, National Bureau of Statistics and a number of other public authorities. Additionally, the Minister of Economy should ensure efficient collaboration between central public administration authorities and the ANRE, Competition Council, Chamber of Commerce and Industry and other institutions, but also NGOs in the field of economy.

**The Energy Efficiency Agency** (AEE) is the national administrative authority subordinate to the Ministry of Economy and it was created in 2010, succeeding the Agency for Energy Conservation. AEE implements the state policy in the field of energy efficiency and RES. It is responsible for the surveillance and monitoring of national and local energy efficiency programmes and action plans, and of international energy efficiency and RES development programmes joined by Moldova.

**The Energy Efficiency Fund** (EEF) was established in 2010 for identification, evaluation and financing of energy efficiency and RES projects, aiming at increasing energy efficiency and reduction of GHG emissions. EEF is administered by the Management Board comprised of nine representatives: one from the Ministry of Economy, 1 - Ministry of Finances, 1 – Ministry of Environment, 1 – Ministry of Regional Development and Construction and 5 – from the private sector and international donors. Annual allocation of funds to EEF from the state budget is proposed by the Ministry of Economy, subject to approval by the Management Board of EEF.

Participants in the development and implementation of the energy efficiency and RES policy in Moldova include the Ministry of Economy, Ministry of Regional Development and Construction, Ministry of Environment, Ministry of Agriculture and Food Industry, Ministry of Transportation and Roads Infrastructure, Academy of Sciences, local public authorities, Consumer Protection Agency, State Energy Inspectorate, and others.

The National Energy Regulatory Agency is responsible for market surveillance, licensing and tariff-setting.

## Legislative framework

Moldova's activity in the field of energy efficiency dates back to the early days of independence but gradually became a priority after 2004 as a result of excessive price increases in energy and energy resources in a comparatively short period of time. This price increase resulted in drastic deterioration of the economic and social situation in the country already weakened by transition processes from an all-USSR centrally planned economy to a local market-based economy. It also significantly reduced the competitiveness of locally manufactured products not only in regional and international markets, but even domestically. The first legal energy efficiency provisions were set by the law on energy, adopted in 1998 and stating that '... the purpose of this law is to create a legal framework to ensure energy efficiency, reliable supply of the national economy and population with energy'. Although the law on energy conservation was adopted in 2000, with subsequent creation in 2002 of the Agency for Energy Conservation and the National Fund for Energy Conservation, de facto, the more comprehensive and more effective energy efficiency activity began only in the last few years.

The law on energy efficiency (approved on 2 July 2010) is one of the main legal documents in the field of energy efficiency, provides a number of new legal definitions, including: energy efficiency, energy consumption efficiency, energy savings, energy efficiency mechanisms, energy performance (energy efficiency improvement programmes), financial instruments for energy savings, energy auditing, energy auditor, energy performance contract, energy service, energy service company, and others.

This law defines also the main principles in the field of energy efficiency, which are:

- promotion of the energy efficiency by supporting energy efficiency improvement programmes. These programmes provide for implementation of advanced energy and fuelbased technologies in energy generation (such as cogeneration and trigeneration), distribution, transportation and consumption by introducing energy efficiency standards for installations, buildings, machinery and equipment, and by controlling the compliance with these standards;
- promotion of private initiative and the development of energy service companies which should contribute to optimisation of the energy systems operation and use, based on the energy performance contracts;
- state monitoring, provided by the competent authority, of the evolution of overall energy consumption in the economy, including per product unit;
- support the cooperation between energy producers, transporters, distributors, suppliers and consumers in order to insure the correlation of their interests and to achieve realisation of the state policy energy efficiency goals;
- cooperation with other countries aiming at promotion of advanced technologies, implementation of scientific innovation and of advanced experience in the field of energy consumption;
- informational support of energy efficiency activities, including public dissemination of information regarding initialisation, realisation, costs and benefits of projects significantly reducing energy intensity and environmental impact;
- training of decision-makers at all levels in order to identify and achieve energy consumption efficiency measures;
- awareness-raising and involvement of civil society in decision-making processes and in implementation of energy efficiency improvement measures.

The overall objective of the law on energy efficiency is to provide regulation of activities aimed at reducing the energy intensity of the national economy and the negative impact of the energy sector on the environment. The scope of this law is to provide ground for energy efficiency improvements, including by establishing and supporting the institutional activity in development and implementation of programmes, plans, energy services and other energy consumption efficiency measures specified in law. This law applies to energy services providers through whom the energy efficiency improvement measures are being realised, energy distributors, DSOs, energy suppliers and consumers.

This law establishes the obligations of final energy consumers as follows:

- administrators of publicly owned buildings are obliged to take measures in order to ensure:
- efficient use of heating and air-conditioning systems,
- efficient use of lighting;
- the use of energy consumption metering and control equipment;
- the use of building materials and elements that increase energy efficiency;
- fulfilment of the energy efficiency requirements of technical regulations.
- energy distributors and suppliers must present the energy consumption data to AEE (once every three years) for the development of the national plan.

As regards programmes and action plans for improving energy efficiency the existing legislation provides for national and local programmes and action plans. The local level is composed of district councils (*consiliile raionale*), municipal councils and People's Assembly of ATU Gagauzia.<sup>34</sup> The National Programme is designed for a 10-year time-frame and is elaborated by the central energy authority (as of today: the Ministry of Economy) with the participation of AEE and informational and organisational assistance of central and local public administration authorities. The National Action Plan is developed for a period of three years by AEE in collaboration with central and local public administration authorities. The National Programme defines state energy efficiency policies and the National Action Plan provides for the implementation of these policies in accordance with the National Program.

The National Programme and National Action Plan are approved by the government. The Local Programme is designed for a three-year time-frame and the Local Action Plan for one year. They define policies and sets of actions aimed at improving energy efficiency in the territory of local authority jurisdiction, in accordance with the National and Local Programmes, respectively. Local Programmes and Action Plans, after being coordinated with AEE, are approved by respective local top authority, namely district and municipal councils, and the People's Assembly of ATU Gagauzia. The deadline for approval of the Local Programme and Action Plan is the end of September of the year preceding the start of their implementation.

Energy efficiency programmes and action plans should provide for:

- use of most efficient energy and energy production technologies in order to decrease energy intensity and negative environmental impact;
- implementation of legal provisions, state energy strategy, technical regulations and national standards for increase of efficiency in energy and fuel consumption;
- motivation of investors to invest in energy efficiency projects;
- energy efficiency capacity growth;
- environmental impact assessment of use of energy sources;
- progress assessment criteria in implementing energy efficiency programmes and action plans.

<sup>34</sup> ATU stands for autonomous territorial unit

Under current legal provisions, the district councils, municipal councils and People's Assembly of ATU Gagauzia are obliged to appoint certified energy managers from among persons with university education in the energy field. Energy managers are responsible for planning and monitoring of the energy efficiency measures implementation, including those provided by energy efficiency programmes, and for recording energy savings. Energy managers must, at least once a year, provide an energy consumption analysis in order to determine possible energy consumption optimisation measures. This analysis should be based on the requirements set by AEE and should be presented to AEE together with the annual implementation report of the local programmes.

### Energy Community Treaty and EU-Moldova Association Agreement commitments

Moldova's commitments resulting from the Energy Community Ministerial Council decisions are summarised in the *acquis communitaire* of the Energy Community (EnCom) and are reflected in the Energy Strategy of the Energy Community (27 July 2012). One of the objectives of the Energy Community Strategy is to provide secure and sustainable energy supply to consumers. As defined by this Strategy '...improving energy security implies, among others, to promote diversity, efficiency and flexibility within the energy sectors of the Contracting Parties. Energy security is closely associated with timely investments in energy supply in line with economic development and environmental needs'.

Realisation of the EnCom objectives is provided through a number of specific and well-defined actions. As stated in the Energy Strategy of the Energy Community: ... the most important action is to set and achieve energy savings target. This, i.e. setting clear targets, served as one of the most essential requirements for further development of the energy efficiency in Moldova, and was reflected in and defined by the National Energy Efficiency Programme 2011-2020 (2011) and National Action Plan for Energy Efficiency for 2013 to 2015 (2013), as well as local energy efficiency programmes and action plans.

**The Association Agreement between the European Union and Moldova** provides in the energy efficiency field of activity a list of legislative and regulatory documents that should be transposed into the legislative and regulatory framework of Moldova within the given time-frame.<sup>35</sup> Some of these documents are already integrated into the activity of the Energy Community. As stated in the EU-Moldova Association Agreement, energy efficiency cooperation covers, among others, the following areas and objectives:

- energy strategies and policies;
- promotion of energy efficiency and energy saving, inter alia, concerning energy performance of buildings, and the development and support of renewable energies in an economic and environmentally sound manner;
- reduction of emissions of greenhouse gases, including through energy efficiency and renewable energy projects;
- scientific and technical cooperation and exchange of information for the development and improvement of technologies in energy production, transportation, supply and end use, with particular attention to energy-efficient and environmentally friendly technologies; and others.

Current Moldovan commitments in the field of energy efficiency include transposition and im-

plementation of a number of European Directives and Regulations. These commitments result from the Energy Community process, but also the EU-MD Association Agreement, and include:

	Energy Community <sup>36</sup>	EU-MD Association Agree- ment
Directive 2006/32/EC of 5 April 2006 on energy end-use efficiency and energy services	Х	
Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings <sup>37</sup>	Х	Х
Directive 2010/30/EU of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products, and implementing labelling regulations <sup>38</sup>	Х	Х
Directive 2004/8/EC of the European Parliament and of the Council on the promotion of cogenera- tion based on a useful heat demand in the internal energy market and related Commission Decisions of 21 December 2006 and 19 November 2008		Х
Directive 2009/33/EC of the European Parliament and of the Council on the promotion of clean and energy-efficient road transport vehicles		Х

Resulting from the above listed commitments, during 2014 the following new laws were adopted:

- Law on energy performance of buildings (nr. 128 of 11 July 2014, in force since 1 January 2015),
- Law on labelling of energy-related products (nr. 44 of 27 March 2014, in force since 25.Octobr 2014), and
- Law on heat and promotion of cogeneration (nr. 92 of 29 May 2014).

The law on energy efficiency of 2010 is to be amended in line with existing commitments and the realisation of this task was scheduled for 2015. As of now, the above Energy Community commitments are partially transposed and implemented.<sup>39</sup> Additionally, commitments resulting from the EU-MD Association Agreement are to be implemented within three years of the entry into force of that Agreement.

### Government programmes and action plans

Implementation of the energy efficiency policies is realised through the government action plans, as mentioned above, but also through the energy efficiency programmes and action plans, which cover national and local levels. The local level is comprised of district councils (consiliile raionale), municipal councils and People's Assembly of Autonomous Territorial Unit ATU Gagauzia.

Government action plans for 2011 to 2014 and 2012 to 2015 have served for a significant period of time as the main planning documents of the government of Moldova and allow us now to trace the main trends and achievements from 2011 to 2014, as well as to identify institutions responsible for the tasks set. The period covered by these documents comes just after the accession of Moldova to the Energy Community and they show the actions planned and realised in order to comply with commitments resulting from EnCom membership.

<sup>36</sup> Source: https://www.energy-community.org/portal/page/portal/ENC\_HOME/AREAS\_OF\_WORK/Obligations/Energy\_Efficiency, http://www.energy-community.org/portal/page/portal/ENC\_HOME/ENERGY\_COMMUNITY/Legal/Decisions

<sup>37</sup> Implementation of this Directive had several deadlines for different articles. Most of the deadlines were for 30 June 2013, the latest being for 20 June 2021. For more details see the Decision no. 20101021MC-EnC of 24 September 2010 of the Ministerial Council of the Energy Community

<sup>38</sup> Decision no. 20101021MC-EnC of 24 September 2010 of the Ministerial Council of the Energy Community amending Decision 2009/05/MC-EnC of 18 December 2009 on the implementation of certain directives on energy efficiency

<sup>39</sup> Source: https://www.energy-community.org/portal/page/portal/ENC\_HOME/AREAS\_OF\_WORK/Implementation/Moldova/Energy\_Efficiency

The government action plan for 2014 includes the following policy objectives and actions related to energy efficiency:

- integration of Moldova into the European energy market, by correlating policies, harmonising energy regulations, joining the relevant European organisations and attracting European investments in the sector (objective arising from the National Development Strategy 'Moldova 2020' (MD2020) referred to herein above);
- valorisation of all opportunities provided by the Energy Community Treaty, including the transposition of EU directives on energy and attracting investment in the sector (MD2020);
- decrease of the energy intensity and energy consumption in all sectors of the national economy by implementing the National Programme for Energy Efficiency until 2020 and the National Action Plan for Energy Efficiency for 2013 to 2015 (MD2020);
- development of the heat and power generation pathway based on the retrofitted and efficient heating, using cogeneration technology (MD2020), including:
- strengthening the institutional capacity of the energy regulatory authority and insuring transparency and good governance in the energy sector (MD2020);
- promotion of the energy conservation, particularly by elaboration of the programmes on the heating retrofit of existing buildings and providing financial support for these programmes (MD2020), as well as, by implementation and coordination of the projects on promotion of energy efficiency and use of RES in public buildings, giving priority to schools, kindergartens, hospitals and other public buildings;
- elaboration and adoption of the building sector development strategy;
- support in implementation of innovations and new technologies in buildings, by providing reform of buildings' technical regulations and implementation of the buildings' performance standards. This requires elaboration of the programme on updating buildings' technical regulations and gradual transition to European standards.

The government's roadmap for improving the competitiveness of Moldova includes, among others, the following:

- increase of the energy efficiency in generation, transmission and distribution of electricity and heat by using advanced metering and evaluation systems and devices for heat and power,
- increase of the energy efficiency in final consumption of electricity and heat by promoting energy performance of buildings (Q4, 2016),
- retrofit of heating system by applying high-efficiency cogeneration and rehabilitation of heating networks (Q4, 2016),
- promotion of energy labelling of electric household appliances, based on the energy efficiency class (Q4, 2016),
- transposition and implementation of EU regulations in the field of eco-design (Q4, 2015),
- ensuring effective functioning of EEF by developing its institutional capacities (Q4, 2014) and by improving financial instruments applied by EEF, including the shift from co-financing through grants to co-financing through preferential loans (Q4, 2015),
- strengthening the energy efficiency and RES policy implementation capacity, including through:

- promotion and implementation of energy efficiency and RES projects on public buildings, giving priority to schools, kindergartens, hospitals and others (permanently);
- strengthening the AEE's capacity, including by hiring energy consultants and experts (permanently);
- implementation of the Communication Strategy on energy efficiency and RES (Q4, 2016),

The National Energy Efficiency Programme (NEEP) 2011-2020, was adopted through Decision nr. 833 of 10 November 2011.<sup>40</sup> This programme defines the overall objectives and specific measures needed by 2020 to improve the energy efficiency in the following sectors:

- energy transformation sector, including all related activities: production of electricity and heat; transmission and distribution of electricity, heat and natural gas; final consumption of all types of energy resources;
- industrial sector;
- buildings sector;
- transportation sector;
- public sector.

The programme includes also some cross-sectoral actions for 2011 to 2020 and defines the National Communication Strategy in the field of energy efficiency.

Aiming at reduction of energy resources' import dependence and the energy sector's negative impact in terms of climate change, the programme defines the following targets:

- increase in efficiency of the total primary energy consumption by 20% by 2020;
- increase of RES share in the total energy mix from 6% in 2010 up to 20% in 2020;
- increase of biofuel in total fuel consumption to at least 10% by 2020;
- reduction by 2020 of at least 25% of greenhouse gas emissions compared with the base year 1990.

This programme also defines a number of specific objectives in order to improve energy efficiency, including:

- promotion of electricity production in cogeneration mode, as being more efficient than separate generation of electricity and of heat. The annual overall efficiency of new CHPs should be not less than 80% and electric efficiency should be 45 to 50%;
- review of the Concept paper regarding renovation of the national heat supply system, adopted by Decision no. 189 of 20 February 2003, the priority being given to electricity production in cogeneration mode, use of RES, and use of the existing heat supply system;
- loss reduction in electricity distribution networks from 13% in 2011 to 7 to 10% in 2020, which requires an annual loss reduction of 0.52% to 0.82%;
- provision of 100% metering of natural gas consumption by 2020;
- certification of buildings' energy performance;
- increase in the number of nearly zero-energy buildings;

<sup>40</sup> http://lex.justice.md/viewdoc.php?action=view&view=doc&id=340940&lang=1

- training energy managers to monitor energy consumption in the public sector;
- elaboration by local public authorities (once per three years), of local energy efficiency plans;
- elaboration of a national programme for the development of heat distribution networks, which will be implemented by all distribution companies, regardless of ownership, as set out in the Energy Strategy of Moldova until 2020;<sup>41</sup>
- setting energy and environmental performance requirements for energy-related products used by consumers;
- elaboration and adoption of the law on heat and secondary regulatory framework;
- continued installation of heat metering devices and heat metering in 100% of buildings in Moldova by 2016;
- amendment in 2012 of the regulatory framework regarding relations between heating service providers and heat consumers;
- · launch in 2012 of individual and buildings' boilers inspection;
- provide by 2012 financial mechanisms for use of RES in heating and cooling;
- elaboration and adoption of the draft law on energy performance of buildings, as well as regulations on energy performance of buildings and inspection of boilers and heating systems;
- elaboration of a programme on energy efficiency in industry.

Based on the above list of objectives, in the programme there is also a defined number of performance indicators. The overall expected outcome resulting from the programme's implementation is expressed by a national target of 20% energy savings by 2020. This overall target is split into intermediate and annual targets and is based on the energy consumption indicators of the year 2009, taking into account the increase in energy consumption by 2020, calculated according to the consumption trend in the last five years:

- national target for energy saving by 2020: 20%, which will contribute to the reduction of greenhouse gas emissions by 761 498.7 tons CO,eq;
- intermediate target for energy saving by 2016: 9%, which will contribute to the reduction of greenhouse gas emissions by 323 637.5 tons CO<sub>2</sub>eq;
- annual energy savings target: 1.8%.

Sectoral and cross-sectoral measures to promote energy efficiency as set out in the programme include the following:

- to provide the legal framework for promotion of energy efficiency:
  - to elaborate legal and regulatory framework to promote and stimulate energy efficiency and use of RES,
  - to elaborate the National Action Plan for Energy Efficiency,
  - to define the energy efficiency indicators and benchmarks and/or to align the existing indicators with those in the European Union, including for:
  - household, IT and lighting appliances,

<sup>41</sup> http://lex.justice.md/index.php?action=view&view=doc&id=325108

- home heating units,
- industrial ovens, engines and drive systems,
- public buildings and facilities: schools, public administration, hospitals, street lighting, etc.;
- transport services;
- inclusion of indicators and benchmarks in statistics, which will be taken into account in decision-making and further planning;
- revision of national standards in terms of the applicable European Union standards.
- institutional capacity building, which will include:
  - energy managers,
  - energy auditors and energy audits,
  - energy inspectors,
  - independent experts authorised to issue performance certificates,
  - authorised installers;
- creating conditions for the development of energy service companies (ESCOs) by providing economic incentives (performance contracts);
- creating conditions for public-private partnership, including the establishment of an appropriate legislative framework;
- elaborating and proposing voluntary agreements for energy-intensive industries,
- case-based analysis of the possibility of introducing a white certificate scheme to encourage energy savings, and analysis of economic effects resulting from imposing an obligation on the distribution companies to find each year a fixed number of energy savings;
- to establish an Energy Efficiency Fund, and to provide from the state budget 10% of the amount contributed to EEF by donors. This includes the following:
  - elaboration of the Fund's Rules and Operations Manual;
  - identification of EEF's donors;
  - provide required training;
  - collaboration in equipment's quality compliance assessment and installation monitoring;
  - public awareness-raising regarding financing instruments offered by EEF.
- energy consumption metering and information.

Based on the National Energy Efficiency Programme for 2011 to 2020, the *National Action Plan for Energy Efficiency (NEEAP) for 2013 to 2015* confirms the commitment of Moldova to achieving the objectives set out. The scope of this plan refers exclusively to achieving efficient energy consumption and to reducing greenhouse gas emissions. This is the first NEEAP of Moldova, adopted in 2013, and it should be followed by NEEAPs for 2016 to 2018 and 2019 to 2021.

The goal of NEEAP 2013-2015 is to provide a necessary set of measures to achieve the overall reduction in final energy consumption in all sectors of the national economy by 428 ktoe,

which should result in reduction of greenhouse gas emissions by 962 848 tonnes of  $CO_2$ eq during the period covered by the plan. This plan includes a number of measures to increase energy efficiency in end-use sectors and primary energy savings.

## Table 11: NEEAP 2013-2015 measures and energy savings estimates for Moldova.

	Energy savi	s, ktoe			
Section, the and no. of action according to NEEAP 2015-2015	2015	2016	2020		
Section 1. Measures to increase energy efficiency in energy transformation					
98. Energy efficiency programmes for electricity transportation and distribution	5.81	9.58	16.56		
99. Natural gas metering in final consumption	0.74	1.24	2.47		
100. Creation of the legislative and regulatory framework and of the monitoring system in the heating sector	non-applica	ble	le		
101. Energy efficiency programme for the heating sector	7.1	11.84	21.35		
Section 2. Measures to increase energy efficiency in industry					
102. Modernisation and renovation of industrial sector	15.9	26.5	47.75		
103. The introduction of energy management and best practices in industry	non-applica	ble			
104. The development of the energy services market for industry	non-applica	ble			
Section 3. Measures to increase energy efficiency in buildings					
105. Develop the legal framework on the energy performance of buildings	0.167	126.4	270.6		
106. Promotion of nearly zero-energy buildings	from 2018		0.32		
Section 4. Measures to increase energy efficiency in public sector					
107. Energy management at the level of local public authorities					
108. Improve energy efficiency in the public sector	3.61	12.9	32.5		
109. Optimisation of public street lighting	0.05	0.13	0.26		
Section 5. Measures to increase energy efficiency in transportation					
110. Promoting energy efficiency in land transportation	non-applica	ble			
Section 6. Horizontal and cross-sectoral measures					
111. Updating and adoption of the legal framework to ensure the implementation of law on energy efficiency	non-applica	ble			
112. Promoting energy service companies	non-applicable				
113. Labelling of energy-related products and implementation of eco-design	14.33	23.8	43.84		
	1	1.6	3		
114. Support to promotion of energy auditing	non-applicable				
Total*:	48.8	214	438.6		

\*This does not include possible energy savings resulting from measure nr. 107

NEEAP 2013-2015 also provides numerous public information and awareness-raising activities for 2013-2015. Many of them have already been realised. These activities are supported and promoted by official authorities and the private sector of Moldova, but also by numerous foreign partners to this process who are active in the energy efficiency sector of Moldova, including UNDP, UNIDO, SIDA, USAID, GIZ, GEF, EBRD, and others.
Energy efficiency policies and their implementation

Sector	Expected 2013-	l savings 2015	Achieve	Achieved 2013			
	ktoe	%	ktoe	Deviation, %			
Energy transformation	57	13.4	29.3	-48.6	60.9		
Industry	43	10.0	21.5	-50.0	81.5		
Transport	98	23.0	-35.3	-136	24.3		
Public (services)	37	8.6	72.8	96.7	91.6		
Residential	193	45.0	-40.6	-121	-15.9		
TOTAL	428	00.0	47.8	-88.9	242.4		

Table 12: Estimated and achieved energy savings (calculated using 'top-down approach') for Moldova.

# Energy efficiency policies and their implementation

Source: Presentation at PEEREA In-depth Energy Efficiency Review Mission, March 2015

# **Electricity and heating sectors**

In recent years (2011 to 2013) the electricity and heat generation sector has accounted for about 42% of total natural gas consumption in Moldova. About 45% of total electricity supplies is consumed by households (about 56% in urban areas and 44% in rural areas), and about 76.7% of total heat supplies is consumed also by households, followed by budgetary institutions (about 15%) and companies (8.5%).

According to the available statistical data, as of 1 January 2014, 57% of total living areas were provided with a centralised heat supply, which is 39.3% of the total housing area. In 2013, the total living area of the housing sector in Moldova provided with centralised heat supply was 31,717,100 m<sup>2</sup>, and in 2005 it was 1,4776,600 thousand m<sup>2</sup>. This major increase in the number of the total living areas provided with centralised heating is owed mainly to the significant number of new buildings in mun. Chişinău. As can be seen in Figure 17, mun. Chişinău accounted for 52% of the number of the total living areas connected with centralised heating in 2013.



Figure 17: Residential areas provided with centralised heat supply in Moldova 2005-2013.

Source: Dwellings stock, 2005-2013, National Bureau of Statistics of Moldova, 2015, http://statbank.statistica.md/pxweb/Database/EN/06%20L0C/L0C01/ L0C01.asp

It is clear that both electricity and heat generation sectors in Moldova are of strategic importance for the country's well-being, but both are facing major difficulties. The high number of households in the total electricity and heat consumption figures and the size of the low-income population determine the need for subsidising centralised heat production, including locally produced electricity. The state is undertaking various measures in order to support the activity of local power producers and to protect vulnerable consumers. Locally produced electricity is purchased by all three existing DSOs, allowing them, among others, to provide a geographically better balanced distribution of electricity and price mix (from local and external sources) (see Table 13). Local energy producers can maintain the minimum level of security of energy supply if/when existing external sources are unavailable for non-defined periods of time, as is currently the case with electricity supplies from Ukraine, which in 2013, as mentioned earlier, provided about 35.8 % of the total electricity supplies to Moldova and 17.7% in 2014.

## Table 13: Electricity purchases by DSO, Moldova.

			DSOs				
Electricity supply, by sources	GWh	share in total, %	RED Union Fenosa	RED Nord	RED Nord-Vest		
				% out of total per source			
CET-1	47.7	1.2	77.6	17.0	5.4		
CET-2	636.4	15.7	74.1	17.1	8.8		
CET-Nord	54.5	1.3	74.0	17.1	8.8		
NHE Costești	33.5	0.8	73.7	0.0	26.3		
Other local producers	4.0	0.1	100.0	0.0	0.0		
Local producers, total	776.1	19.1	74.3	15.7	10.0		
MTPP(CERSM/MGRES)	2,433	60.0	100.0	0.0	0.0		
Energocom (Ukraine)	846	20.9	1.1	67.6	31.4		
External sources, total	3,279	80.9	73.9	17.8	8.3		
Total electricity supply	4,055	100.0					

Source: Raport privind activitatea ANRE în anul 2013, www.anre.md și Calculul tarifului de furnizare a energiei electrice consumatorilor pentru anul 2012, http://old.anre.md/rate/index.php?vers=1&sm=9.

In order to improve the existing situation and to provide higher energy efficiency in both electricity and heating sectors, the National Energy Efficiency Programme 2011-2020 established a set of energy efficiency improvement measures:

- to identify and stimulate investments in modernisation and further development of existing CHPs. Realisation of this measure is seen as impossible without private investments, because of high investment costs. In order to achieve the required investments, an attractive investment climate should be insured, providing clear and transparent rules for electricity and heat tariffs setting and allowing coverage of operational costs and realisation of profit;
- to retrofit the existing heat plants into cogeneration power plants;
- to establish priority order for electricity produced in cogeneration and from RES in relation to electricity imported or produced by CHPs;
- to create appropriate grounds to secure, through tariffs, the return on investments in reasonable time limits;
- to elaborate, by central public authority in the electricity sector, the electricity transmission system development programme, as well as to develop and implement high voltage network codes;
- to harmonise national technical standards with EU standards and promote the use of advanced technologies that ensure greater efficiency;
- to develop and implement a national electricity grid monitoring system.

General objectives for the heating sector include:

- loss reduction in transmission and distribution pipelines;
- optimisation of existing heat producing sources;

- use of RES for heating purposes;
- promotion of cogeneration in order to optimise use of energy resources. In this regard, central public authority in the heating sector will promote high-efficiency cogeneration based on useful heat demand;
- reduction and optimisation of the total final heat demand;
- diversification of the energy mix for space heating and cooling and for water heating;
- improving the indoor climate;
- promotion of new technologies and efficient equipment designed to help reduce heat consumption.

Measures to improve energy efficiency in the heating sector include:

- updating the Concept paper for renovation of the national heat supply system in accordance with the Energy Community Treaty requirements;
- development by local public administration authorities of local heat supply plans;
- creating a transparent and reliable legal and institutional framework for attracting investments in the heat production and supply sector;
- maintaining heat tariffs at the cost recovery levels;
- provide institutional reform and improve electrical and thermal efficiency of existing CHPs;
- establishing, based on existing legislation and regulations, efficiency requirements for hot water boilers;
- establishing, based on existing legislation and regulations, efficiency requirements for boilers in decentralised heat supply systems, including minimum energy performance requirements, maximum allowable greenhouse gas emission rates and security rules;
- encouraging heat consumption metering and consumption-based billing;
- promoting the production and use of solid biofuels for heating in rural areas;
- informing end-users on the heating tariffs' cost structure;
- promotion of cogeneration

The National Action Plan for Energy Efficiency 2013-2015 has set concrete measures for the energy transformation sector and the total estimated savings up to 2020 are 40.38 ktoe.

In 2014, the law on heat and promotion of cogeneration was adopted. This law partially transposes Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency. The promotion of high-efficiency cogeneration is to be provided by:

- development of a comprehensive assessment of the potential application of high-efficiency cogeneration and implementation of energy-efficient centralised heat supply systems,
- adoption of supporting measures for high-efficiency cogeneration heat producers,
- confirmation by the guarantee of origin of the electricity produced in high-efficiency cogeneration,
- guarantee of the transmission and distribution of electricity from high-efficiency cogen-

eration in compliance with transparency and non-discrimination criteria approved by ANRE,

- mandatory setting by DSO of standardised and simplified procedures for grid connection of distributed generation plants for electricity in high-efficiency cogeneration in order to facilitate connection to the distribution grid,
- assessment of the existing legal and regulatory framework in order to improve its effectiveness in encouraging the installation of electricity and heat production in high-efficiency cogeneration,
- improvement of statistical data collection for a) national production of electricity and heat in cogeneration, b) cogeneration capacities, and c) fuels used in cogeneration, and achievement of primary fuel savings by using cogeneration to improve statistical data collection.

This law on heat and promotion of cogeneration defines the principles and objectives of the state policy in the heating sector, including:

• production, distribution and supply of heat in the most efficient way to ensure energy security and environmental protection, and to protect the rights and interests of consumers.

According to the law, suppliers are obliged to purchase heat produced in high-efficiency cogeneration, except when: a) heat demand is already covered by sources provided by law, or b) it would result in heat tariff increases for customers, or c) technical characteristics of produced heat do not comply with required characteristics. Distribution companies are obliged, inter alia, to rank in priority order the heat produced by high-efficiency cogeneration plants and RES on the basis of contracts concluded with suppliers and under the condition of no tariff increase for heat supplied to consumers.

Disconnecting from the centralised heat supply, including in order to connect to another source of heat supply, is prohibited, except where feasibility studies demonstrate the economic viability of disconnection. Feasibility studies should be coordinated with AEE. Disconnection of individual apartments or parts of apartments in apartment buildings supplied with heat through a centralised system, regardless of cause, can be done only in compliance with provisions set by law.

Tariff regulation provides that heat tariffs may have two components, which are reflected in tariff methodologies, namely: a) capacity price, reflecting the fixed costs related to the heat production, distribution and/or supply, except costs related to redundant heat losses, and b) heat price, reflecting variable costs for heat supplied. Tariff methodologies should contribute to the reliability of heat supply, at minimal cost and providing efficient use of the heating system, including production units. Heat losses in the heat supply network, included in the heat tariffs, are based on a methodology elaborated and approved by ANRE.

Guarantees of origin are issued per 1 MWh of electricity produced in cogeneration and refer to gross electricity production measured at the metering point. The guarantee of origin should contain information on primary energy savings, nominal efficiency of electricity and heat production plants, lower heating value of the fuel used for electricity production, and others.<sup>42</sup>

In order to improve the situation in the heat supply sector and following the commitments of

<sup>42</sup> Lege nr. 92 din 29.05.2014 cu privire la energia termică și promovarea cogenerării, anexa 4

Moldova to the Energy Community, the government adopted in 2011 a concept paper on the corporative, institutional and financial restructuring of the centralised heat supply system in mun. Chişinău and an implementation action plan.<sup>43</sup> This concept paper reflected inputs and recommendations provided by WB, EU, SIDA and other international participants in the process. Its main goals are:

- adjustment of the legal framework in the sector,
- financial reform, including debt management,
- corporative and institutional reform of centralised heat supply system in mun. Chişinău,
- operational efficiency (technical and technological) of centralised heat supply system in mun. Chişinău.

On this basis, the law on heat and promotion of cogeneration and the law on energy performance of buildings were developed and adopted, the draft law on housing was developed and approved by Decision nr. 656 of 29 August 2013, and amendments were made to the law on condominium of 2000, the law on privatisation in the housing sector of 1993 (including the latest amendments of 19 March 2015) and numerous other legal and regulatory documents. The concept paper suggests balanced development of both centralised and decentralised heat supply, the case-based conversion of DH plants West, East and South in cogeneration plants and of central heat points in mini-CHPs, the rehabilitation, modernisation and optimisation of the heat supply networks and circuits, the thermal rehabilitation of the buildings, the improvement of heat metering and other actions.<sup>44</sup> Expected heat loss reduction is 16.7% by 2020.

The strategy on the energy efficiency of Termocom for 2012 to 2020 was adopted.<sup>45</sup> The overall purpose of the strategy is to ensure heat supply to consumers in optimal conditions, affordable prices, increasing energy efficiency and reduced environmental impact. The strategy foresees the conversion of the DH plants West and South into cogeneration plants (on natural gas) of 20MW each and the modernisation of five suburban DH plants. The cogeneration units should operate under nominal parameters of at least 7000h/y with an overall energy efficiency of at least 80% (70% for biomass-based cogeneration). It also considers the implementation of advanced solutions in monitoring, metering and billing, implementation of monitoring systems like 'LOVATI' and 'MONITOR', but also GIS 'HeatGraph'. It stipulates that the final goal is to reduce heat loss to the level of 10 to 12% in the entire centralised heat supply system of mun. Chisinau.

From 2007 to 2012, Termocom with the support of a Swedish grant achieved significant energy efficiency improvements and loss reduction. Projects in the heating sector of Moldova include but are not limited to:

- implementation of the WB Energy-2 project (heat component): 2007 to 2008 (\$10 million),
- implementation of the National Programme on renovation and decentralisation of the heat supply systems in Moldova: 2007 to 2010 (> \$10 million),
- modernisation of the heat generation capacities: 2007 to 2015 (\$10 million),

<sup>43</sup> HG\_nr. 983 din 22.12.2011 cu privire la restructurarea corporativă, instituțională și financiară a sistemului centralizat de alimentare cu energie termică din mun. Chișinău, http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=341598

<sup>44</sup> HG\_nr. 983 din 22.12.2011 cu privire la restructurarea corporativă, instituțională și financiară a sistemului centralizat de alimentare cu energie termică din mun. Chișinău, cap. 3, point 14.4.1 - 4

<sup>45</sup> http://termocom.md/termo/STRATEGIA2.pdf

rehabilitation of the heat transportation and distribution networks, etc.

At the end of 2014, Termocom and CET-1 merged with CET-2, and they operate today as part of CET-2. It is expected that this will result in higher system efficiency and better performance in the sector.

Following the EU-MD Association Agreement of 2014, Moldova must implement within three years of the entry in to force of the Agreement:

- Directive 2004/8/EC of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market, and
- Commission Decision of 21 December 2006 establishing harmonised efficiency reference values for separate production of electricity and heat in application of Directive 2004/8/EC (2007/74/EC).

On 30 September 2014 Decision nr. 800 was adopted. launching the process of negotiation with IBRD of a new project on improvement of energy efficiency in the centralised heat supply sector at a cost of \$40 million (soft loan).

In 2014 a project was launched on rehabilitation of the centralised heat supply in mun. Balti, with a budget of €10 million, including an EBRD loan of €7 million and a €3 million grant by EIB (E5P: Eastern Europe Energy Efficiency and Environmental Partnership).

Between 2011 and 2014 the 'Moldova Energy and Biomass' project was implemented. This project is funded by the European Union (€14 million) and co-founded and implemented by the United Nations Development Programme (€0.56 million). So far, this project has achieved exceptional results and greatly exceeded expectations. Consequently, the project has been extended to 2015-2017 with a budget of €9.41 million. Achieved project results covered 144 public institutions in 127 communities/villages from all districts (rayon) in Moldova. Total installed new heat capacities for biomass are 29.6 MW with a total heated area of 270,025m<sup>2,46</sup> Realised capital investments include \$12.3 million from the project funds and 28.28 million MDL contributed by local communities. Direct project beneficiaries total 41,000 people. Extended project aims at installation of additional 80 heat plants on biomass in public institutions. Out of these, 21 institutions have installed solar collectors for hot water. The extension is funded by the EU and is implemented by UNDP.

Another biomass heating project 'Effective Use of Biomass Fuel in the Republic of Moldova' (2013 to 2014) was realised with the support of Japan, thanks to the agreement between Japan International Cooperation Agency (JICA) and the Ministry of Agriculture and Food Industry of Moldova. The project is financed through a grant of \$14 million, with an estimated contribution of 17.5 million MDL by Moldova, and includes procurement and installation of 25 biomass heating systems at public facilities in 23 rural communities in Moldova. The project equipment originates predominantly from Japan.

Both projects are based on biomass from agricultural residues. So far, neither of these projects considers biomass-based cogeneration.

# Industry

According to the official national statistics, from 2005 to 2013, the share of industry in TFC of energy and energy resources was around 10%; in 2013, it reached 12.5% (Figure 6). In 2013, the share of industry in TFC of energy was as follows:

<sup>46</sup> http://www.biomasa.md/map-map-2-en/, http://www.biomasa.md/img/docs/MEBP\_Proiecte\_de\_incalzire\_a\_institutiilor\_publice\_01.12.2014\_ENG.pdf

- in TFC of electricity 24%: food, beverage and tobacco industry about 40%, non-metallic mineral products - 19%, wood processing and furniture - 6%, textiles and leather - 4.7%, chemical and petrochemical industry - 4.6%, and other - 25.7%;
- in TFC of heat 22%: food, beverage and tobacco industry 92.5%, textiles and leather 3.7%, and other -3.8%;
- in TFC of natural gas -15.7%: non-metallic mineral products 65%, food, beverage and tobacco industry 27.6%, and other- 7.4%,
- in TFC of petroleum products about 1%, of solid biomass less than 1%, of coal 39%, etc.  $^{\rm 47}$

The share of industrial activities in gross industrial added value in Moldova from January to November 2014 was as follows (Table 14).

47 http://www.statistica.md/public/files/publicatii\_electronice/balanta\_energetica/BE\_2014\_rom.pdf, pages 59-63

# Table 14: Indices of industrial production by types of activities in Moldova in January-November 2014.

	Share of the gross added value, %
Industry – total	100.0
Mining and quarrying industry	2.4
Processing industry	80.8
Food industry	23.9
production, processing and preserving of meat and meat products	4.2
processing and preserving of fish, crustaceans and molluscs	0.4
processing and preserving of fruit and vegetables	3.0
manufacture of vegetable and animal oils and fats	2.3
dairy production	3.4
manufacture of grain mill products, starches and starch products	0.7
manufacture of bakery and farinaceous products	4.3
manufacture of bread; manufacture of fresh pastry goods and cakes	3.4
manufacture of macaroni, noodles, couscous and similar farinaceous products	0.2
manufacture of other food products	4.1
manufacture of cocoa, chocolate and sugar confectionery	1.4
manufacture of beverages	8.8
distilling, rectifying and blending of spirits	1.9
production of wine from grapes	4.7
production of soft drinks; production of mineral waters and other bottled waters	0.8
manufacture of tobacco products	1.5
manufacture of textiles	3.9
manufacture of apparel	7.4
tanning and dressing of leather; manufacture of luggage, handbags and footwear; dressing and dyeing of fur	2.1
footwear production	1.4
wood processing, manufacture of wood and cork products, except furniture; manufacture of articles of straw and plaiting materials	0.5
manufacture of paper and paper products	0.6
manufacture of chemicals and chemical products	1.5
manufacture of basic pharmaceutical products and pharmaceutical preparations	0.8
manufacture of rubber and plastic products	2.9
manufacture of other non-metallic mineral products	7.9
metallurgical industry	0.9
manufacture of fabricated metal products except machinery and equipment	2.0
manufacture of computer, electronic and optical products	3.0
manufacture of electrical equipment	3.7
manufacture of machinery and equipment	1.9
manufacture of furniture	2.2
Production and supply of electricity and heat, gas, hot water, air-conditioning	14.5
generation, transmission and distribution of electricity	11.0
steam and air-conditioning supply	3.5

Source: http://www.statistica.md/newsview.php?l=ro&idc=168&id=4622

Numerous policy developments and activities have been realised in the field of energy efficiency in industry. This sector was one of the main targets in the Energy Conservation Programme 2003-2010 and is now in the National Energy Efficiency Programme 2011-2020 and in the National Action Plan for Energy Efficiency 2013-2015.

The overall objectives and measures needed to improve energy efficiency in the industry, as provided in the National Energy Efficiency Programme 2011-2020, are as follows:

- to stimulate investment in replacement of low-efficiency technologies and equipment;
- to apply low-energy consumption machinery, equipment and technologies.

The following measures are foreseen:

- drafting and implementation of voluntary agreements to achieve energy efficiency measures in the industry. It is estimated that long-term agreements may allow achieving 10 to 20% of energy savings. Voluntary agreements should be provided in a transparent manner and should include case-based quantifiable monitoring and reporting of targets;
- elaboration of the energy efficiency programme for the industrial sector;
- the possibility of including white certificate schemes;
- monitoring of energy consumption in the sector through energy efficiency reports which should be designed by the Energy Efficiency Agency and filled in by the energy-intensive companies by the end of each year;
- information and training in the industrial sector regarding energy management and training, case-based, of the energy managers.

On an annual basis, energy suppliers and/or DSOs should present statistical data on final consumers who have filled in energy efficiency reports according to the form set out by the EEA. Inter alia, this form should include current and historical information about final energy consumers, including the load curve, type of consumer and geographical location, by respecting the confidentiality requirements, regardless of whether this is personal or commercial information.

As provided in the NEEAP 2013-2015, the energy savings targets for the industrial sector of Moldova, based on the 'top-down' method, are 43 ktoe from 2013 to 2015 and 87 ktoe from 2013 to 2016, and, respectively, 16 ktoe and 27 ktoe based on 'bottom-up' calculations. In the first case, industrial energy savings account for 10% of the total energy savings targets for the specified periods of time; in the case of the 'bottom-up' calculation approach the share of industry reaches 29% in the total energy savings target for 2013 to 2015 and 11% for 2013 to 2016 (Table 15).

The Energy Efficiency Agency reports energy savings of 21.5 ktoe for 2013 and a cumulative saving of 81.5 ktoe for the period 2009 to 2013<sup>48</sup>.

## Table 15: Energy savings estimates for the industrial sector of Moldova 2013-2015 and 2013-2016.49

Inductrial contar	2013·	-2015	2013-2016		
industrial sector	ktoe	%	ktoe	%	
Energy saving targets per sector, based on the 'top-down' approach	43	10.0	87	10.0	
Energy saving targets per sector, based on the 'bottom-up' approach	16	29.28	27	11.05	

Source: NEEAP 2013-2015

Measures to increase energy efficiency in the industry, as provided in NEEAP 2013-2015, include:

- modernisation and renovation of the industrial sector,
- introduction of energy management and best practices in industry,
- development of the energy services market for industry.

The modernisation and renovation of the industrial sector, as for 2013 to 2015, is aimed at providing help with financing the energy efficiency projects in the industry, including dedicated credit lines with a grant component of 5 to 20%. Numerous industrial companies are still using energy-intensive technologies and equipment which do not comply with current efficiency and environmental requirements. Providing new technologies should resolve this issue and provide better economic results for the companies. The final goal of this measure is to reduce energy intensity in the industry, to implement the latest technologies, to modernise production lines, to increase the competitiveness of locally manufactured products on external markets, to create new jobs and to reduce the energy consumption in the country. It is expected that the implementation of these measures will result in 15.9 ktoe of energy savings in 2015, 26.5 ktoe in 2016 and 47.75 ktoe in 2020.

The financing of this measure is mainly by the second credit line within the Moldovan Sustainable Energy Financing Facility<sup>50</sup> (MoSEFF - II) project of the European Bank for Reconstruction and Development (EBRD), with funding by the European Union (grant funding and technical assistance<sup>51</sup>) and INOGATE ( $\in 22$  million for 2012 to 2014). Another source of financing is the Energy Efficiency Fund (see details in the section Financing energy efficiency).

Two other measures to increase energy efficiency in the industry provided by NEEAP 2013-2015, the introduction of energy management and best practices in industry and the development of the energy services market for industry, were launched in 2011. Implementation of both of these measures was realised with the support of UNIDO. The first one, the introduction of energy management and best practices in industry, was implemented by the Ministry of Economy with the participation of industrial companies. Monitoring of the implementation process was assigned to the Ministry of Economy and the EEA.

The second one, the development of the energy services market for industry, was implemented by the Ministry of Environment, national experts and energy services companies. Monitoring of the implementation process was assigned to the Ministry of Environment and the EEA. To realise this measure, €300,000 were provided by the Global Environment Fund.

<sup>49</sup> The discrepancy between targets calculated on the 'top-down' and 'bottom-up' calculation approaches is because in the case of the 'bottom-up' approach only already planned direct investments are considered.

<sup>50</sup> http://www.moseff.org

<sup>51</sup> http://www.ebrd.com/downloads/research/factsheets/seff.pdf

The purpose of the measure on the introduction of energy management and best practices in industry is to provide support to the industrial companies in implementation of cost-efficient energy management activities and best practices. This includes organisation of trainings technical assistance with the involvement of national experts, and tools to facilitate the adoption and implementation of relevant decisions. The overall goal of this measure is to contribute to the energy saving and GHG emission reduction in the industrial sector through continuous implementation of the best practices and best available technologies and providing energy efficiency in daily management, procurement activities, and investment decisions of industrial companies. This measure includes the following activities:

- training of companies' employees in implementation of the energy management system (EMS) in compliance with ISO 50001 and energy sector optimisation;
- implementation of the EMS in compliance with ISO 50001 in industrial companies and other major energy consumers;
- implementation of the energy efficiency projects based on the implemented EMS: metering, renewal or replacement of boilers, combustion regulation, hot water pipe insulation, efficient design, efficient cooling systems, heat exchangers, optimisation of the compressed air systems, etc.; providing foreign technical assistance in development and implementation of the EMS and of other energy efficiency projects;
- dissemination and promotion of EMS implementation results and best practices.

In its turn, the measure on the development of the energy services market for industry aims at developing and strengthening the local expertise and service providers' capacity for implementation of EMS in compliance with ISO 50001 and training coaches who will provide further training and technical assistance to the companies and other major energy consumers. EMS and the standard ISO 50001 were new to Moldova and its energy service providers. Thus, this measure was aimed at demand creation for and implementation of the best EMS in the industrial sector. The outcomes of this measure were expected to be the improved quality of the energy services provided to industrial companies and other sectors, and development of the national demand for and supply of the energy services and products of the industry. This measure includes the following activities:

- training of local experts, including practical on-site training by foreign experts;
- technical assistance to companies by local experts who have successfully completed training provided by UNIDO.

Both of these measures have synergies and multiplier effects in relation to the projects supported and financed by existing dedicated credit lines (like MoSEFF, MOREEFF, etc.) and the Energy Efficiency Fund.

The target groups for all three above-mentioned energy efficiency measures are industrial companies and other major energy consumers. Some of the achieved results are briefly presented below.

The implementation results of the UNIDO Project 'Reducing Greenhouse Gas Emissions through Improved Energy Efficiency in the Industrial Sector in Moldova' can be summarised as follows:

• training on the Energy Management System - EN ISO 50001:

training on the implementation of EMS based on ISO 50001 were finalised in November of

2012; 13 people passed the exam and are now active in the process of implementation of this system within industrial companies in Moldova;

• training on steam system optimisation in industry:

from November 2012 to June 2013 representatives of 18 companies received two weeks of training on optimisation of the steam production and utilisation system; 13 people passed the exam and were authorised as field experts and are now eligible to provide consultancy to local companies;

• training on system optimisation for suppliers of steam equipment and systems:

in 2013 training was provided for representatives of 15 suppliers of steam production and utilisation equipment and systems. Training was on the latest equipment for steam production, utilisation and monitoring, as related to the needs of Moldova;

• staff training on implementation of EMS based on EN ISO 50001:

in 2013, two companies (JLC' JSC, Chisinau, and 'Lactis' JSC, Râşcani: milk product companies) received staff training on EMS and implemented ISO 50001. In 2014, training was provided for 'CET-2' (electricity and heat producer and, starting in December 2014 also a heat supplier) JSC and 'Parcul Municipal de Autobuse' (municipal bus company) and, following an audit by international experts they were certified as companies which implemented EMS in accordance with ISO 50001;

• staff training on steam system optimisation:

during 2013, authorised experts in steam production and utilisation systems provided staff training at nine companies: 'CET-2', 'CET-1', 'CET-Nord' (electricity and heat producers), 'Lactis' JSC (milk products, Rîşcani), 'JLC' JSC (milk products, Chisinau), 'Carmez' JSC (meat products, Chisinau), 'Natur Bravo' JSC (fruit and vegetable processing, Cupcini), 'Floare-Carpet' JSC (carpets) and 'Efes-Vitanta Moldova Brewery' JSC (brewery, Chişinău). Following the training, experts provided companies with steam system evaluation reports including a list of required improvements.

Implementation of the EMS and dissemination of the results led to an increasing number of investments in the energy efficiency in the industry, strengthening the bankability of such projects, but also benefiting other sectors of the national economy. Implementation of the EMS improved data collection, monitoring and analysis activities not only within the company but also on the sectoral and national levels.

Several donors have supported over the past decade **Cleaner Production (CP)** and/or related industrial environmental and energy projects in Moldova. These include:

- support for capacity building in CP and energy conservation (2001 to 2008, funded by the government of Norway),
- a regional CP programme for Moldova, Kazakhstan and Georgia (2004 to 2007, funded by the European Union),
- a capacity building and demonstration project for organic wine (funded by the government of the Netherlands), and
- several technical and policy support studies (funded by the government of the Czech Republic).

Jointly, these projects, and possibly others, have confirmed that Cleaner Production can be

meaningfully applied in the Moldovan industrial sector, even though their collective impact on the uptake of CP in the sector has been relatively modest. Professional training appears to have been most successful. Also, considerable efforts have been invested in information/ awareness activities and industrial pilot projects. Although informative outputs have been produced, there is no information on further CP implementation. To provide a solid foundation for promoting CP in future, more attention needs to be paid to the monitoring of current implementation and the benefits thereof.

The National Cleaner Production Programme (NCPP). A full-scale implementation phase of the NCPP in Moldova<sup>52</sup> was set up in 2011 and officially launched in 2012 for the promotion and uptake of the Resource Efficiency and Cleaner Production concept as a follow-up to the preparatory stage.

The National Cleaner Production Programme was implemented by the United Nations Industrial Development Organisation (UNIDO) under its global joint programme with the United Nations Environment Programme (UNEP) on Resource Efficient and Cleaner Production (RECP). The NCPP was funded in its second phase by the government of Austria, (the Czech government funded the first phase). The NCPP is directed by a National Executive Board with membership of the Ministries of Environment and Economy, Chamber of Commerce and Industry, Academy of Sciences and civil society, and is hosted by the Technical University of Moldova.

The objectives of NCPP are:

- fostering sustainable development in the country, and
- fostering sustainable production and consumption patterns to the industrial sector through the implementation of RECP concept methods, practices and policies.

The NCPP is build around the following three subsets of outputs and activities, respectively:

- 1. RECP Capacity: improved capacity for and widespread utilisation of RECP services that support adaptation and adoption of RECP methods, practices and technologies. A cadre of 13 national RECP experts has been created and advanced training opportunities provided. Further communication and awareness activities are foreseen, including regional workshops, a national conference and a web site.
- 2.3RECP Demonstration: increased implementation of RECP methods, practices and technologies by enterprises in the priority sectors; monitoring and verification of the environment, resource use and economic benefits have been achieved. Specific demonstration, replication and technology upgrading components will be provided, and the aim is to achieve RECP implementation in some 100 companies over the three years of the NCPP.
- 3. RECP Policy and Strategy: a policy framework is to established and/or strengthened that enables the realisation of RECP methods, practices and technologies, particularly in the target sectors. Upon assessment of the policy gaps, a national strategy will be developed and promoted. Support is also foreseen for development, piloting and evaluation of key policy instruments, including training and capacity building for implementation, monitoring and enforcement. *Priority sectors* for the NCPP are food and beverage, construction materials and municipal services (including waste, sanitation, district heating, schools, hospitals, etc.). These sectors are generally perceived to have the greatest development potential, and would also contribute to improvements in living standards.

# Table 16: Examples and cumulative benefits of RECP measures, implemented by fruit and vegetable processing company Orhei Vit JRC, Moldova 2012-2014

Approach	Example Options Implemented
Cood housekeening	Repair of 10 autoclaves for pea conservation and equipment maintenance in vegetable processing unit
dood nousekeeping	Installation of water valves / water hoses
Improved presses control	Replacement of gas meter with a lower displaying threshold (8m <sup>3</sup> compared to 75m <sup>3</sup> displaying threshold used earlier)
improved process control	Controlling the process using a refractometer to measure dry content of juice BRIX (65 %)
	<ul> <li>Putting in operation of a new steam boiler with capacity of 3 t/h (replacing the old boiler 10 t/h)</li> </ul>
Technology modification	Modernization of pea processing unit by installation of a new solid waste separator (based on air blowing) and a new
	canning belt
Process modification	Insulation of steam transporting pipes in vegetable processing department
Part and a second second second	Waste sorting by fraction and external recycling
External reuse and recycling	Return of condensate in concentrated juice production

Resource	Savings	Unit	Savings (USD)
Electricity	501 502	kWh	60 262
Natural gas	176 884	m <sup>3</sup>	86 680
Drinking water	77 852	m <sup>3</sup>	28 816
Waste water	48 169	m <sup>3</sup>	96 3 1 3
TOTAL			272 072

#### Source: Presentation during PEEREA In-depth Energy Efficiency Review Mission, March 2015

The implementation of NCPP resulted in training on RECP methods and techniques by 13 (2012 to 2013) and 12 (2014 onwards) local experts. As part of industry outreach, a number of seminars and information materials, including web pages, were provided. RECP implementation and replication resulted in involvement of 56 companies and organisations, including 31 RECP demonstration (expert assessment) and 25 RECP replication (self-assessment) cases. Demonstration activities involved seven companies from the food/beverage and construction sectors and 24 public institutions, and replication included activities provided though regional RECP Clubs in Chisinau, Causeni and Ungeni.

The list of Moldovan companies who benefited from NCPP activities includes, but is not limited to, the following:

- concrete producer 'FEC'- one of the largest enterprises producing concrete and precast concrete in Moldova: achieved benefits include reduction of electricity consumption on average by 183,000 kWh/year, improved material productivity and reduction in fuel consumption, reduction in waste generation, reduction in air emissions of around 201.5 tons of CO<sub>2</sub>eq per year, and other benefits;<sup>53</sup>
- fruit and vegetable processing company 'Agrosfera-BM': the improved organisational management and operational control of vegetable processing alone addressed by RECP saved per year 5,000 kWh of electricity and 300 m<sup>3</sup> of natural gas, and reduced air emissions by five tons of CO<sub>2</sub>eq per year. The energy productivity thus improved by 2% and the pollution intensity dropped by 9%;<sup>54</sup>
- fruit and vegetable processing company 'Orhei-VIT', Causeni branch: the company

<sup>53</sup> http://www.ncpp.md/docs/UNIDO\_FEC\_Story\_En.pdf

<sup>54</sup> http://www.ncpp.md/docs/UNIDO\_Agrosfera\_Story\_En.pdf

achieved reduction of annual natural gas consumption by 56,275 m<sup>3</sup>; annual water consumption by 3,300 m<sup>3</sup>; waste water generation by 3,300 m<sup>3</sup>; air emissions by 103,9 tons  $CO_2$ eq. In addition, more than seven tons of solid waste have been recycled. The amount of auxiliary process materials like filter salt and deaeration chemicals has been also reduced,<sup>55</sup>

- the largest confectionery producer 'Bucuria' with a share of 90% of the Moldovan market: the successful implementation of RECP options allowed the company to reduce annual electricity consumption by 105,000 kWh, subsequently reducing air emissions by 104 tons  $CO_2eq$ ,<sup>56</sup>
- construction materials company 'BNV' producing concrete, precast concrete, bricks, blocks, pavement tiles and other construction elements made of wood and metal: the company adopts RECP techniques that employ full recycling of materials: waste concrete is collected and used for production of concrete elements of lower quality; the water from cleaning of moulds and mixers is collected and reused for concrete production; waste is separated, metal scrap and plastic are recycled;<sup>57</sup>
- meat processing company 'CARMEZ' one of the biggest in Moldova: the company reduced electricity consumption by more than 400,000 kWh per year, improved material productivity by 3% and decreased the intensity of generated wastes by 25%;<sup>58</sup>
- beekeeping and bee product processing company 'Vastdial & Co': the company aims to expand existing processes by adding a new technology for vinegar production from wasted honey. Turning waste into products is an interesting opportunity, which opens future perspectives for fruitful collaboration with NCPP Moldova,<sup>59</sup>
- wine producer 'Doina-VIN' has 1,500 hectares of vineyards, bottling line capacity of 6,000 bottles/hour and a potential of 4.4 million bottles for export: reduction in water use by 1,800 m<sup>3</sup> per year, reduction in oil use by 11.5 tons per year, avoided waste water spillage onto the ground and protection of the environment, air emission reduction by 34.5 tons of CO<sub>2</sub>eq per year;<sup>60</sup>
- wine factory 'Stăuceni', founded in 1842 and producing today over 60 varieties of wines: increased yield of quality must of 7%, reduction in waste water of 200  $m^{3.61}$
- Prometeu-T one of the leading exporters of Moldavian walnuts and walnut kernels: after identification and implementation of RECP measures and improving operational processes, including acquisition of new equipment, the company improved its environmental performance as follows: water productivity increased by 141% per year, the CO<sub>2</sub> eq emissions were reduced by 30%, and waste water intensity was reduced by 59% per year.<sup>62</sup>

Apart from the industrial sector, RECP assessments have been completed for 24 public institutions from the municipal services sector, and further guidance is provided to assist with implementation of recommended options and tracking of implementation benefits. Specialised

<sup>55</sup> http://www.ncpp.md/docs/UNID0\_OrheiVIT\_Story\_En.pdf

<sup>56</sup> http://www.ncpp.md/docs/RECP\_results\_2012\_En.pdf, page 3

<sup>57</sup> http://www.ncpp.md/docs/RECP\_results\_2012\_En.pdf, page 4

<sup>58</sup> http://www.ncpp.md/docs/Brochure\_NCPP\_Moldova\_En.pdf, page 3

<sup>59</sup> http://www.ncpp.md/docs/RECP\_results\_2012\_En.pdf, page 4

<sup>60</sup> http://www.ncpp.md/docs/UNIDO\_DoinaVin\_Story\_En.pdf

<sup>61</sup> http://www.ncpp.md/docs/UNIDO\_Stauceni\_Story\_En.pdf

<sup>62</sup> http://www.ncpp.md/docs/Brochure\_NCPP\_Moldova\_En.pdf, page 4

guidelines have been prepared for schools/ educational institutions and trailed in nominated schools/kindergartens in the Ungheni region.

Common measures	Energy Savings (MWh/yr)	Investment (1,000 USD)	Payback yr
<ul> <li>Insulation of exterior walls</li> </ul>	4,447	913	1.8-4.1
<ul> <li>Insulation of ceiling slab or roof</li> </ul>	3,474	421	2.2-7.5
Insulation of basement floor slab	2,185	779	3.0-7.1
Changing windows and doors	1,275	820	2.1 - 12.1
Total (10 buildings)	11,381	2,933	

# Table 17: Cumulative benefits from RECP measures in public buildings, Moldova.

Source: Presentation during PEEREA In-Depth Energy Efficiency Review Mission, March 2015

The cumulative benefits of RECP implementation at 37 companies are shown in Figure 18.



Figure 18: RECP implementation cumulative benefits, Moldova.

Source: Presentation during PEEREA In-depth Energy Efficiency Review Mission, March 2015

RECP policy development resulted in inclusion of provisions on RECP in the Environmental Strategy 2014-2023 and its Implementation Plan approved by the government on 24 April 2014.63

So far, the results of promotion of the RECP concept over the past 15 years have remained modest, though there has been an increase in awareness and implementation in some sectors and regions in recent years. RECP is not yet firmly placed on the business and policy agenda in Moldova. Its application area is limited mostly to businesses participating in international projects. Many of the projects carried out so far have not assumed RECP continuity.

A general cause of the rather modest CP and RECP promotion is the absence of a national strategy and hence sole reliance of RECP promotion on training of experts and demonstration projects under local, intermittent and temporary programmes reliant on external support.

<sup>63</sup> HG nr. 301 din 24.04.2014 cu privire la aprobarea Strategiei de mediu pentru anii 2014-2023 și a Planului de actiuni pentru implementarea acesteia, http://lex. justice.md/index.php?action=view&view=doc&lang=1&id=352740

Other causes relate to specific conditions and national context including the lack of a general concept for the implementation of the RECP strategy in the national economy, especially in industry, lack of coordination at national level of numerous RECP-related public authorities and lack of permanent activities at national level aimed at RECP implementation, as well as no or insufficient knowledge of companies and public officials on the economic-environmental benefits resulting from revised industrial processes and products even without the launch of new technologies.

# **Buildings sector (residential and public)**

According to the latest statistical data, as of 1 January 2014, Moldova's total housing area was 80,614.6 thousand m<sup>2</sup>, which is 4.6% or 3,537.6 thousand m<sup>2</sup> more than in 2005. At the beginning of 2014, 97.6% of the total housing area was in private ownership, 2.3% in public ownership and a small percentage was mixed or foreign property type. From 2005 to 2013, the average annual increase in the total housing area was 442 thousand m<sup>2</sup> or 0.6% per year (Table 14). During the same period of time, the residential area of the total housing area was around 69%, and the urban housing totalled 39.3% in 2013 and 37.1% in 2005.

Urban areas accounted for 36.4% in 2013 and 34.4% in 2005 of the total living area. The mun. Chişinău accounted for 22.1% and 19.9%, respectively, in 2013, of total housing and living areas and 19.4% and 17.9%, respectively, in 2005. As of 1 January 2014, the housing sector of Moldova had 1,318,400 apartments. Mun. Chişinău has 22.3% of the total number of apartments in the country. According to the available statistical data, there was an annual increase in the number of apartments in mun. Chişinău from 2005 to 2013 of around 2,980, or 1.1% of the total, per year. Such growth numbers are registered for mun. Chişinău only.

#### Table 18: Housing sector in Moldova 2005-2013.

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total area, 1000 m <sup>2</sup> Living area, 1000 m <sup>2</sup>	77.077	77.131	77.772	78.382	78.854	79.343	79.860	80.163	80.615
Lining alca, root in	53.651	53.673	53.995	54.295	54.513	54.925	55.195	55.373	55.509
Total area, 1000 m <sup>2</sup>									
Urban	28.608	28.587	23.125	29.688	30.101	30.423	30.859	31.078	31.719
Rural	48.469	48.544	48.647	48.695	48.753	48.92	49.001	49.086	48.895
Living area, 1000 m <sup>2</sup>									
Urban	18.468	18.460	18.740	19.016	19.217	19.490	19.727	19.840	20.184
Rural	35.183	35.213	35.256	35.280	35.296	35.435	35.468	35.533	35.325
Total area, 1000 m <sup>2</sup>									
Mun. Chisinau	14.947	14.865	15.273	15.807	16.192	16.622	17.089	17.337	17.793
Mun. Balti	2.526	2.535	2.561	2.562	2.569	2.436	2.450	2.463	2.472
Total living area, 1000 m <sup>2</sup>									
Mun. Chisinau	9.583	9.536	9.726	9.977	10.154	10.439	10.691	10.814	11.037
Mun. Balti	1.677	1.678	1.689	1.689	1.692	1.588	1.596	1.600	1.606
Apartments, 1000 units	1 200	1 207	1 202	1 200	1 212	1 211	1 215	1 217	1 210
(Total of the Republic)	1.299	1.27/	1.302	1.300	1.312	1.511	CI C. I	1.517	1.310
including:									
Urban	529	527	533	539	543	544	547	549	556
Rural	770	770	769	769	769	767	768	768	763
Mun. Chisinau	270	267	270	276	280	282	286	289	294
Mun. Balti	51	51	52	52	52	50	50	50	51

Source: Fondul locativ la sfirsitul anului, in profil teritorial, 2005-2013, Asigurarea populatiei cu locuinte, in profil teritorial, 2005-2013:

In 2014 the law on energy performance of buildings, transposing Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings, was adopted. This law entered into force on 1 January 2015, except for some provisions, as will be presented later in the text. Another law governing energy efficiency, including in the buildings sector, was adopted in 2010.

Also, as relates to the energy efficiency of buildings, Moldova has instituted a number of technical regulations and norms, including, but not limited to the following.

- Energy saving: NCM E.04.03-2008,
- Heat protection: NCM E.04.01-2006,
- Technical rules on external and internal heat insulation: CP E 04.02-2013,
- Design of heat protection: CP E 04.05-2006,
- Heat networks: NCM G.04.07-2006,
- Heat isolation of equipment and pipelines: NCM G.04.08-2006,
- Heat plants: NCM G.04.10-2009,

- Energy certificate: CP G.04.01-2002,
- Regulation on the energy audit of existing buildings and of heating and domestic hot water systems: CP G.04.02-2003,
- Designing norms for office buildings: NCM C.01.04-2005,
- Designing schools: NCM C.01.03-2000,
- Individual apartment heat supply by gas boilers: NCM G.04.04-2006,
- Methodology on assessment of heat losses in water heating networks: RD 34.09.255-97,
- Boiler houses: NCM G.04.10-2009,
- Design of heat insulation for equipment and pipes: CP G.04.05-2006.

In addition to this, in 2012, regulations on energy auditing and energy auditors were adopted through government Decisions.

Within Energy Community activities, the Study on Energy Efficiency in Buildings in the Contracting Parties of the Energy Community was provided in 2012. This study helped to identify cost-effective energy saving potential in Moldova, and ranked energy efficiency measures required for family houses, apartment buildings, healthcare and educational buildings, as well as offices and other buildings (see Table 19). It also provided some estimates for savings targets and investment needs (see Table 20).

	Fa	amily hou	se	Apartment buildings		Healthcare		Education			Other (offices, trade, hotels, etc.)				
Building stock area, m <sup>2</sup>		41	,369,800		37	,484,000		1	,419,400		4	,336,960			788.54
Total savings, %	2	6	Invest-	2	1	Invest-	2	5	Invest-	1	1	Invest-	1	9	Invest-
	Sav	ings	ment	Sav	ings	ment	Sav	ings	ment	Sav	ings	ment	Sav	ings	ment
Measures	kWh/m²a	€/ m²a	€/m²	kWh/m²a	€/ m²a	€/m <sup>2</sup>	kWh/m²a	€/ m²a	€/ m <sup>2</sup>	kWh/m²a	€/ m²a	€/ m <sup>2</sup>	kWh/m²a	€/ m²a	€/ m <sup>2</sup>
	34	1.9	13.34	42.3	2.3	17.5	93.4	4.1	25.44	16.9	1	4.9	30.7	1.3	10
energy efficient lighting															
new stoves															
new gas boiler															
new oil boiler									·						
insulation of roof		·	·								·	<u> </u>			
hydraulic balancing +															
thermostatic valves															
insulation of external walls															
heat recovery															
new windows											·	·			
	2,010,900	112.1	788.3	1,584,550	86.2	642.9	132.600	5.8	36.1	73.350	4.4	21.4	24.240	1.1	7.9
	MWh/a	€, mln	€, mln	MWh/a	€, mln	€, mln	MWh/a	€, mln	€, mln	MWh/a	€, mln	€, mln	MWh/a	€, mln	€, mln

# Table 19: Cost-effective energy saving potential in Moldova 2012.

applicable measures

Source: Study on Energy Efficiency in Buildings in the Contracting Parties of the Energy Community, Energy Savings International AS, Final Report, 24. February 2012, http://www.energy-community.org

Duilding stogory	Savi	Investment		
Building category	MWh/a	€/a	€	
Family houses	495.200	27,599,200	194,116,200	
Apartment buildings	679.900	37,005,500	275,847,200	
Healthcare	48.200	2,092,500	13,098,500	
Education	57.700	3,479,500	16,838,600	
Other (offices, trade, etc.)	11.600	503.900	3,749,600	
Total	1,292,600	70,680,600	503,650,100	

# Table 20: Investment need and savings target in the buildings sector of Moldova 2011-2020.

Source: Study on Energy Efficiency in Buildings in the Contracting Parties of the Energy Community, Energy Savings International AS, Final Report, 24 February 2012, http://www.energy-community.org

According to the study, the aggregated energy savings target for Moldova for family houses, apartment buildings, healthcare and educational buildings, offices, etc. until 2020 (2011 to 2020) is estimated at 1.29TWh/a, which would result in 70.68 million euro of annual savings and would require 503.6 million euro of investments until 2020. The accumulated savings will be much higher than the aggregated savings presented in the table above. At the end of the year 2020, the investment of 503.7 million euro will have generated accumulated savings of 353 million euro. Bearing in mind the long economic lifetime of several of the included measures, significant savings will also be achieved after 2020. Furthermore, considering the scenario with implementing the most profitable projects a first priority as well as combining renovation and energy efficiency projects, it is possible to achieve the savings target with lower investments than presented in the table above.

The overall objectives and sectoral energy efficiency improvement measures for the buildings sector, including residential and public buildings, as defined by the National Energy Efficiency Programme 2011-2020, are as follows:

- rationalisation of the use of natural resources, petroleum products, natural gas and solid fuels;
- reducing carbon dioxide emissions;
- providing energy demand management in buildings;
- improving the security of energy supply in the medium and long term;
- developing the administrative, legal and financial capacities, enabling large-scale implementation of comprehensive energy efficiency measures in the housing sector;
- providing incentives for public and private sector investments in energy efficiency in the housing sector.

Actions to be taken in order to improve energy efficiency in the buildings sector include:

- ensuring regulatory framework for energy performance of buildings;
- rulemaking regarding minimum energy performance requirements for buildings and their units and elements;
- drafting of the methodology for calculating the energy performance of buildings, imposing for new buildings, before beginning the construction, the requirement to con-

duct a feasibility study of the technical, economic and ecological alternative systems with higher efficiency: decentralised energy supply systems based on renewable energy; cogeneration; building integrated heating or cooling systems; heat pumps;

- establishing minimum energy performance requirements for existing buildings or their units subject to major renovations;
- establishing the requirements for the overall energy performance, installation and sizing, adjustment and control of technical systems installed in buildings, including: heating, hot water, air conditioning, large-capacity ventilation or a combination of such systems; stimulating installation of intelligent metering systems in newly constructed or under major renovation buildings, and, where appropriate, installation of active control systems such as energy consumption automation, control and monitoring systems;
- drafting of the programme for the gradual increase in the number of buildings with almost zero energy consumption in the public sector. Starting from 31.December 2018, new buildings occupied and owned by public authorities should be nearly zero-energy buildings; drafting of the National Plan for the gradual increase in the number of nearly zero-energy buildings in other than public sectors. The Plan should include interim targets for improving the energy performance of new buildings, information on the policies and financial support or other issues, including national requirements and measures concerning the use of renewable energy sources in new buildings, as well as in existing buildings under major renovation;
- introduction of energy performance certificates for buildings or building units which are constructed, sold or rented, and buildings with a total useful floor area of 500 m<sup>2</sup>; organising the activity of independent experts authorised to issue energy performance certificates;
- ensuring the inspection of heating and air-conditioning systems. training and accreditation of energy inspectors;
- providing effective independent control systems for energy performance certificates and inspection reports of heating and air-conditioning systems;
- introduction of penalties for non-compliance with energy performance requirements for energy-related products;
- drafting of a programme for rehabilitation of existing multi-storey buildings, which will aim at improving energy performance and reducing the heat consumption in these buildings;
- informing the public on measures taken and results achieved.

NEEAP 2013-2015 requires that the residential sector contribution to energy savings targets for 2013 to 2016 is 45% (top-down) or 52.7% (bottom-up), with estimated energy savings of 271 ktoe by 2020. For the buildings sector NEEAP 2013-2015 provides the following measures:

- development of the legal framework for the energy performance of buildings;
- promotion of nearly zero-energy buildings.

The *development of the legal framework for the energy performance of buildings* includes drafting of the following:

· law on energy performance of buildings;

- regulation on energy performance of buildings;
- regulation on the inspection of heating and air-conditioning systems;
- methodology for calculating the energy performance of buildings;
- methodology for inspection and reporting with regard to heating and air-conditioning systems.

As regards the *promotion of nearly zero-energy buildings*, and as provided by NEEAP 2013-2015, it should result in reduction of energy consumption per m<sup>2</sup>, providing the main part of energy from RES, and ensuring a growing number of nearly zero-energy buildings. This action includes:

- providing specifications for a feasibility study on nearly zero-energy buildings;
- elaboration of the feasibility study on nearly zero-energy buildings.

In 2011, the Ministry of Regional Development and Construction (MRDC), the national leading authority in the field, with the support of EBRD, elaborated the law on energy performance of buildings, which was adopted in 2014:

- regulation of energy performance of buildings;
- methodology for calculation of the energy performance of buildings;
- regulation on inspection of boilers and heating systems;
- methodology for regular inspection of boilers.<sup>64</sup>

The law on the energy performance of buildings, was adopted on 11 July 2014 and entered into force on 1 January 2015, except for the provisions on ventilation, cooling and lighting as related to energy performance of buildings, which will come into force on 1 January 2017. This law supersedes Directive 2010/31/EU of the European Parliament and the Council of 19 May 2010 on the energy performance of buildings. The law applies to new and existing buildings, and includes the following building categories: single-family houses, multi-storey buildings, offices, educational buildings, hotels & restaurants, sports facilities, wholesale & retail trade services buildings, other types of energy-consuming buildings.

This law defines requirements for:

- general guidelines for the methodology for calculating the energy performance of buildings and building units;
- minimum energy performance requirements application for:
  - new buildings and new units in existing buildings;
  - existing buildings and their units under major renovation;
  - elements that are part of the building envelope and that have a significant impact on the energy performance of the building envelope when they are retrofitted or replaced;
  - technical building systems, whenever they are installed, upgraded or replaced;
- energy certification of buildings and building units;
- inspection of buildings' heating and air-conditioning systems;

- independent control systems for buildings' energy performance certificates and reports on the inspection of heating and air-conditioning systems;
- national plan for increasing the number of nearly zero-energy buildings.

Each building is assigned an energy class based on the energy performance evaluation report and according to the procedure established by the central public administration body in the field of construction.

**Minimum energy performance requirements** are set by the central public administration body in the field of construction, according to the building's category and considering the cost-optimal level, calculated according to the methodology. Minimum energy performance requirements must be reviewed no less than once every five years, and, where appropriate, be updated to reflect technical innovation in the construction industry.

When new buildings are designed and before the building permit is obtained, the technical, economic and environmental feasibility of high-efficiency alternative systems such as those specified below, if available, should be considered and taken into account:

- decentralised energy supply systems based on energy from renewable sources;
- cogeneration;
- heat pumps;
- district or block heating or cooling, particularly where it is based entirely or partially on energy from renewable sources.

When new buildings are designed the most feasible solution should be applied in accordance with the law. New buildings and existing buildings under major renovation should use at least a minimum amount of energy from RES, as defined by the central public administration body in the field of construction. Requirements for the use of RES in buildings are set depending on the building's category, and apply when feasible technically, economically and functionally.<sup>65</sup>

According to the law, after 30 June 2019, new public buildings should be nearly zero-energy buildings, and after 30 June 2021, all new buildings must be nearly zero-energy buildings. The national plan for increasing the number of nearly zero-energy buildings is to be approved by the government. This plan must include:

- detailed definition of nearly zero-energy buildings, reflecting national, regional or local conditions, and including indication of the primary energy use, expressed in kWh/ year/m<sup>2</sup>;
- intermediate targets for improving the energy performance of new buildings;
- targets for the conversion of existing buildings into nearly zero-energy buildings;
- financial and other incentives for achieving targets set by law and for promotion of nearly zero-energy buildings, including specification of requirements for the use of RES in new buildings and in existing buildings under major renovation.<sup>66</sup>

Regarding the *inspection of heating systems*, Law stipulates that heating systems equipped with boilers and having rated output of >20 kW must be subject to periodic inspections. Heating systems with rated output of >100 kW with boilers fired by liquid or solid fuels must be inspected at least once in every 2 years, and those with boilers fired by gaseous fuel - at least once in every 4 years.

<sup>65</sup> Lege nr. 128 din 11.07.2014 privind performanța energetică a clădirilor, art. 14

<sup>66</sup> Lege nr. 128 din 11.07.2014 privind performanța energetică a clădirilor, art. 15

Periodic *inspection of air-conditioning systems* will be carried out for air-conditioning systems with a rated output of >12 kW.

The law on energy performance of buildings lays down the requirements for the creation and management of the national information system (IS) on buildings' energy efficiency, which will serve as a national register of auditors, inspections experts and energy performance certificates.

The law provides for creation of independent control systems for energy performance certificates and inspection reports, which establishes random selection and verification of at least a statistically meaningful percentage of the annual total energy performance certificates, heating and air-conditioning system reports.

From 2010 to 2014 EBRD carried out the programme 'Facilitating Energy Efficiency Financing in Moldova I' (FEEF-Mo-I) with the financial support of the government of Sweden. FEEF-Mo-I provided technical assistance to the Ministry of Regional Development and Construction (MRDC) and the Ministry of Economy in drafting a supportive legal and regulatory framework in accordance with Moldova's commitments within the Energy Community. Following the successful implementation of FEEF-Mo-I, the national authorities of Moldova, represented by the MRDC and the Energy Efficiency Agency, have requested an extension to the provided technical assistance in order to support the implementation process of the new legislative and institutional framework as envisaged under the law on energy performance of buildings (LEPB). The objective of the proposed second stage of technical assistance (FEEF-Mo-II) is to assist the MRDC in setting up and implementing a policy and legal, regulatory and institutional framework facilitating energy efficiency investments in the buildings sector, in particular the residential sub-sector. The overall aim of the project is to contribute to successful implementation of the LEPB.

In order to achieve the objectives set for the buildings sector of Moldova, the MRDC and AEE signed in 2013 the roadmap for the implementation of EPBD and the government has recently adopted an action plan for harmonisation of technical regulations and national standards with the respective European regulations and standards from 2014 to 2020. State authorities responsible for the implementation of this plan are the MRDC, the Ministry of Economy, regulators and others. Reports on the implementation of the plan will be provided twice per year.

Currently, the project 'Modernisation of Local Public Services in the Republic of Moldova' is under implementation. The project duration is January 2010 to December 2015 and has a total budget of  $\in$ 23.8 million, including: government of Germany -  $\in$ 12.6 million, government of Sweden -  $\in$ 5.5 million, government of Romania -  $\in$  0.7 million, European Union -  $\in$  5.0 million; and additionally investment support of  $\in$  7.3 million (government of Germany). The list of projects selected for funding under German Investment Support for 2014 to 2015 includes two projects on energy efficiency in public buildings:

- Nisporeni Regional Hospital (Nisporeni Rayon Council): thermal rehabilitation of the hospital's surgery building (a five-storey building with a one-storey annex), including thermal insulation works on the building envelope and replacement of the existing windows with new energy-efficient windows €1,244,709;
- Orhei Regional Hospital (Orhei Rayon Council): thermal rehabilitation of the maternity ward building through the insulation of the building envelope; renovation of heating networks, the installation of individual substations and the refurbishment of a boiler room; installation of a solar water heating system for the surgical block of about 100 beds €571,491.

A sub-project within the 'Modernisation of Local Public Services in the Republic of Moldova' project is 'Energy Efficiency in Public Buildings: Regional Programmes and Project Pipeline for Regions North, South, Centre', which is being implemented by GIZ (Germany) with the financial support of the Swedish government and the EU. In 2014, with the support of this project, three regional programmes on energy efficiency in public buildings were adopted for each of the regions: Centre, North and South. Out of 110 initially submitted project proposals, 12 projects were selected for further development and implementation, including nine schools and three medical institutions. These are initial projects. The targets of the Regional Sector Programmes in Energy Efficiency in Public Buildings are:

- North: refurbished floor area: 160,942 m<sup>2</sup> → 80 buildings → €39.2 million → 25.4 GWh/y,
- Centre: refurbished floor area: 174,452 m<sup>2</sup> → 87 buildings → €42.5 million → 27.56 GWh/y,
- South: refurbished floor area: 93,497 m<sup>2</sup> → 47 buildings → €22.7 million → 14.77 GWh/y.

Total estimated investment costs are about €104.47 million with energy savings of about 67.7 GWh/y.

A new energy efficiency and RES project was recently launched for the city of Orhei. The project is financed by the European Commission within the 'Supporting the Eastern Partnership Cities in the Implementation of Sustainable Energy Action Plans (SEAPs) under the Covenant of Mayors' project. The project duration is 38 months with a budget of €1.076 million. Project activities include:

- modernisation of local energy producers, based on cogeneration and local biomass;
- modernisation of the DH distribution system, DH substations for heating and DHW in each building (two public and two residential buildings), energy metering;
- modernisation and improved flexibility of heating systems in the buildings;
- improvement of building envelope for selected buildings;
- solar DHW system of one of the buildings (the kindergarten), complementary to the DH source;
- energy management system;
- energy audits and monitoring;
- awareness-raising campaigns, dissemination of information, etc.<sup>67</sup>

Energy Service Companies (ESCOs). Following the commitment by Moldova within the Energy Community to implement the European Directive 2006/32/EC on energy end-use efficiency and energy services of 5 April 2006, a number of ESCO-related projects are on-going in Moldova.

On 1 April 2015 the project 'ESCO Moldova - Transforming the Market for Urban Energy Efficiency in Moldova by introducing Energy Service Companies' was launched. Project partners are the Ministry of Environment, Ministry of Economy, Chisinau City Hall, Energy Efficiency Fund, Energy Efficiency Agency, Ministry of Regional Development and Construction, Ministry of Finance, banking sector, and private sector. The project's objective is to create a functioning, sustainable and effective ESCO market in Moldova by converting existing energy service provider companies into ESCO-type companies, as a basis for scaling up mitigation efforts in the whole municipal building sector in Moldova, leading to CO<sub>2</sub> emission reductions by means of energy performance contracts.

The project will work on the largely untapped energy efficiency market in the municipal sector, especially in facilities owned and operated by municipalities, in the Chisinau area in the first stage and will then move on to other parts of Moldova.

The operational framework for ESCOs in Moldova is assisted also by INOGATE. From 3 to 6 March 2015, experts met under the umbrella of INOGATE with the energy service provider companies of Moldova to review the current legislative framework, identify obstacles to the successful implementation of EPC in the country and facilitate the development of draft legislation including secondary legislative acts.

The involvement of INOGATE in the 'Organisation of an Operational Framework for ESCOs' is part of the project 'New INOGATE Technical Secretariat and Integrated Programme in support of the Baku Initiative and the Eastern Partnership Energy Objectives', funded by the EU. Under this project, training on industrial and building sector energy auditing for bankable projects was provided: 63 energy auditors certified by the AEE received training in assessing investment projects.

# Lighting and energy-using products

As shown in the example of cost-effective energy saving potential in buildings (Table 18), energy-efficient lighting is at the top of the list of energy efficiency measures in Moldova. This includes dwellings (family houses and apartment buildings), educational and medical institutions, but also offices, commercial premises, hotels, and so on. Street lighting also has high energy-saving potential.

One of the general sectoral objectives and planned measures, as related to the public sector and as stated in the NEEP 2011-2020 is to implement programmes for improvement of street lighting, and also to raise public awareness regarding best practices, the costs and benefits of energy-efficient equipment, RES, etc.

As stipulated in NEEP, the Ministry of Economy, together with AEE and other relevant public authorities, will provide support to the local administration authorities in promoting energy efficiency and RES, including the implementation and support of programmes for the improvement of street lighting. AEE will define energy efficiency indicators and benchmarks and/or align existing indicators with those in the European Union, including those for household, IT and lighting appliances.

The NEEAP for 2013-2015 includes the following measures:

- improved energy efficiency in the public sector;
- optimisation of public street lighting;
- labelling of energy-related products and implementation of eco-design.

The improvement of energy efficiency in the public sector has broader application and is aimed at implementation at the level of local public authorities of energy efficiency projects and ensuring sustainable energy consumption. The planned budget allocation for this measure for 2013 to 2014 was 335 million MDL (about €19 million), to be provided by EEF, National Regional Development Fund (NRDF) and external sources. Implementing authorities are the Ministry of Economy and AEE. By 2020 this measure is expected to generate 32.5 ktoe of energy savings.

The optimisation of public street lighting, according to the NEEAP 2013-2015, has energy savings potential of 0.26 ktoe by 2020. This measure aims at implementation of efficient lighting systems in Moldova and optimisation of electricity consumption in these systems. The target

group and implementation authorities of this measure are local administration authorities. This measure was proposed for inclusion as a priority measure in local energy efficiency programmes and action plans.

Following its Energy Community commitments, Moldova is currently implementing EU Directive 2006/32/EC of 5 April 2006 on energy end-use efficiency and energy services, Directive 2010/30/EU of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products, and EU Directive 2009/125/EC of 21 October 2009 establishing a framework for the setting of eco-design requirements for energy-related products.<sup>68</sup>

The commitment of Moldova to energy labelling and eco-design criteria for energy-related products is reflected in NEEP 2011-2020 and NEEAP 2013-2015. Both of these documents provide a set of actions/measures for implementation of energy labelling and eco-design criteria for energy-related products. The implementation of these activities is supported financially by the EU and the Global Environment Fund (GEF). Implementation authorities are the Ministry of Economy, AEE and the Ministry of Environment. The target groups are consumers, distributors, and suppliers of energy-related products. NEEAP 2013-2015 estimates energy savings by 2020 as follows:

- 43.84 ktoe, as a result of the introduction of the tax and customs incentives for energy-related products with high energy efficiency (class A +++ A);
- 3 ktoe, as a result of annual 20% customs duty increase for incandescent lamps and zero customs duty regime for efficient lamps.

Moldova's fulfilment of the above-mentioned commitments resulted in the adoption in 2014 of two new laws.

- A law on labelling of energy-related products (27 March 2014, entered into force on 25 October 2014), transposing *Directive 2010/30/EU of 19 May 2010*. The law defines general provisions for energy efficiency class, fiche and label, requirements on energy-related information, responsibilities of operators and other provisions. It defines the responsibilities of the Ministry of Economy, AEE and the Consumer Protection Agency. Responsibility for its implementation is assigned to the *Consumer Protection Agency*. On 10 December 2014, five *Regulations on requirements for energy labelling of energy-related products* were adopted by a government Decision, which superseded EC energy labelling implementing regulations with regard to tumble driers, air conditioners, ovens, electric lamps and washing machines.
- A law on eco-design requirements for energy-related products (17 July 2014) transposes Directive 2009/125/EC. The law entered into force on 10 April 2015 and provides the background for establishment of the legal framework on eco-design requirements for energy-related products and defines requirements for energy-related products placed on the market and/or put into service, thereby contributing to sustainable development, increasing energy efficiency and environmental protection levels and improving the security of energy supply. According to this law, the Consumer Protection Agency is the supervisory authority regarding compliance with legislation on eco-design requirements for energy-related products. In 2014, a Decision on adoption of seven implementing regulations on eco-design was drafted and its approval is expected in 2015.<sup>69</sup>

68 https://www.energy-community.org/portal/page/portal/ENC\_HOME/AREAS\_OF\_WORK/Obligations/Energy\_Efficiency,

<sup>69</sup> Source: Raportul Anual de Activitate al Ministerului Economiei pentru anul 2014, http://www.mec.gov.md/sites/default/files/raport\_mec\_anul\_2014\_final\_.

Financing energy efficiency and renewable energy

# Financing energy efficiency and renewable energy

During the last ten years financing the energy sector in Moldova from the state budget varied between 0.9% of GDP in 2005 and 0.1% in 2011. In 2013 it accounted for 0.42% of GDP.<sup>70</sup> In euros this was about 4.7 and 24 million per year from 2005 to 2013. After 2012, financing of the energy sector activities from the state budget was based on the mid-term expenditure strategy for this sector. Such strategies were devised for 2013 to 2015, 2014 to 2016 and 2015 to 2017.<sup>71</sup> They include sub-sectors such as policy development and management, electricity grids, heating sector, natural gas supply system, energy efficiency and RES. Reports on the implementation of the Energy Sector Expenditure Strategy show that in 2014 about 165 million MDL were used for energy sector development and 243 million MDL in 2013.

## Table 21: Energy sector public financing, Moldova.

Drawn, Daulanniant of the anary costar (2000)	Total public expenditures, 1000 MDL		Foi	ecast, 1000 M	Share of each program in total sectoral expenditures, %			
Program: Devisiophicit of the energy sector (5800)	2013 de-facto	2014 approved	2015	2016	2017	2015	2016	2017
Sub-program: Policies and management in the energy sector (58.01)	7,889.9	18,037.0	11,540.6	46,646.2	46,696.1	4.02	15.96	12.92
Sub program: Gas pipelines and networks (58.02)	29,602.0	89,131.8				0	0	0
Sub-program: Electricity grids (58.03)	-	100,240.5	126,367.3	154,402.0	224,421.1	44	52.83	62.11
Sub program: Energy efficiency and RES (58.04)	198,651.1	188,745.6	149,177.4	91,195.1	90,220.0	51.95	31.21	24.97
including: the Energy Efficiency Fund	192,466.7	172,680.0	126,088.5	91,195.1	90,220.0	43.91	31.21	24.97
Sub program: Heat networks (58.05)	7,216.9	6,600.0	95.8			0.03	0	0
Total per energy sector	243,359,9	402,754,9	287,181.1	292,243.3	361,337.2	100	100	100
Financed from:								
State Budget, total:	243,359.9	402,754.9	287,181,1	292,243,3	361,337.2	100	100	100
including:								
main expenses	214,122.8	251,885.1	137,629.1	137,730,2	236,916.1	47.92	47.13	65.57
special funds and resources	5,274.5	-	-			0	0	0
investment projects financed from external sources	23,962.6	150,869.8	149,552.0	154,513.1	124,421.1	52.08	52.87	34.43
shore in total financing, %	9.8	37.5	52.1	52.9	34.4			
budgets of the local administration	-	-	-			0	0	0
Total in 1000 euro	14,551.4	21,616.2						

Source: Expenditure strategy for the energy sector for 2015 to 2017, Ministry of Economy, as of 10 April 2015, http://www.mec.gov.md/ro/content/ strategii-de-cheltuieli-domeniul-energetic

<u>The Energy Efficiency Fund</u> was established by the law on renewable energy and requires that financial allocations from the government to this fund should be at least 10% of the EEF's total amount. Other fund resources are represented by grants, loans and other financial instruments, but also financial results from EEF's operational activity.

pdf, April 2015

<sup>70</sup> Source: Strategia Sectorială de Cheltuieli în domeniul energetic, 2015 - 2017, point 1.2, http://www.mec.gov.md/ro/content/strategii-de-cheltuieli-domeniulenergetic

<sup>71</sup> Source: http://mf.gov.md/middlecost, http://mf.gov.md/files/Acte%20Legislative%20si%20Normative/CBTM/2013-2015/Anexa%2025%20Infrastructura%20calitatii.pdf

Before EEF became operational, a number of energy efficiency and RES projects were funded by the National Environmental Fund. These included rehabilitation and modernisation of street lighting, waste processing and production of biogas, and others.<sup>72</sup>

Since the beginning of activity of EEF in 2012 until the end of January 2015 about 169 projects were approved for funding, including 53 between November 2014 and January 2015. These 53 projects cover energy efficiency in public buildings projects, including 10 kindergartens, 32 educational institutions, 6 hospitals, 2 national research institutions, 1 Court of Justice, 1 district council and 1 village hall.

Table 22: EEF projects 2012	2-2015, Moldova.
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Call/status	CPP no. 1 closed	CPP no. 3 in progress	CPP no. 4 in progress	CPP no. 5 in progress	Total
Allocated budget, mil. lei	150	250	50	50	500
Projects submitted	303	485	2	51	841
Projects approved for financing	87	82	-	-	169
Total requested amount, mil. lei	≈ 200	≈ 184	-	-	384
Requested EEF contribu- tion, <i>mil. lei</i>	≈ 150	≈ 134	-	-	284
Estimated savings, mil. lei	≈ 40	≈31		-	71

### Source: EEF presentation during PEEREA In-Depth Review Mission, March 2015

By the end of October 2014, 93 projects had been approved for financing and 83 grant agreements had been signed. EEF relies on the following financial resources for funding EE and RES projects:

- at least 10% of EEF's budget is financial allocations from the state budget;
- donations from individuals and legal entities from the Republic of Moldova and from abroad, including donations from international financial institutions and funds;
- financial revenues consisting of interest rates on EEF current accounts or bank deposits, as well as interest rates and fees resulting from contracts concluded with EEF beneficiaries;
- · loans and other financial tools of banks and investors.

EEF's financial support is in the form of grants, financial security, loans and leasing. EEF finances projects that meet the following minimal eligibility criteria:

- beneficiary's own contribution at least 20% of the total project cost;
- payback period 7 years for EE projects and 15 years for RES projects.

Out of five calls for proposals, three targeted public sector buildings and public lighting and EEF provided grants for 75 to 80% of the total project eligible cost. The other two calls targeted the private sector; however, the proposals were not able to attract many eligible projects (the first call in 2013 was cancelled because of a lack of eligible project applications).

<sup>72</sup> http://mediu.gov.md/index.php/en/component/content/article?id=72:fondul-ecologic-national&catid=79:institutii-subordonate

## Table 23: Call for proposals, launched by EEF 2012-2015.

Call/status	call nr. 1 closed	call nr. 3 in progress	call nr. 4 in progress	call nr. 5 in progress	Total
Allocated budget, mil. lei	150	250	50	50	500
Projects submitted	303	485	2	51	841
Projects approved for financing	87	82	-	-	169
Total requested amount, mil. lei	≈200	≈184	-	-	384
Requested EEF contribu- tion, <i>mil. lei</i>	≈150	≈134	-	-	284
Estimated savings, <i>mil. lei</i>	≈ 40	≈31	-	-	71

Source: Presentation by EEF during review mission to Moldova, March 2015

It should be mentioned that no projects were funded by EEF from 2012 to 2013. Out of 552.7 million MDL (or about €33 million) allocated to EEF between 2012 and 2014, about 53% was provided by the Ministry of Finance, though in 2014 no funds were provided to EEF by MF. By the end of October 2014, 13.8 million MDL (€0.7 million or 2.5% of EEF funds) had been used to fund projects.<sup>73</sup>

<u>The Moldovan Sustainable Energy Financing Facility</u> (MoSEFF) project was launched by EBRD in February 2010 and its first stage was completed in December 2012. The total funding for MoSEFF projects by now (first and second credit lines), amounts to  $\epsilon$ 42 million. This financing facility is made available through Moldovan partner banks. It supports investments in energy efficiency and renewable energy for eligible project types. It provides free technical assistance and a grant component of 5 to 20% of the loan amount. The actual grant level depends on the investment of the project, the applied technology, the amount of energy saved and the CO, emissions avoided (Table 24).

## Table 24: Type of projects and grants provided by MOSEEF.

	Investment, euro	technology type	% of grant			
small energy efficiency projects	10,000 – 250,000	standard	10			
small energy efficiency projects	10,000 - 250,000	best available technologies	20			
small renewable energy projects	10,000 – 250,000		20			
large energy efficiency projects	250,000 - 2 million		5-20			
projects with energy savings higher than 35% will receive 20% grant						
large renewable energy projects	250,000 - 2 million		5-15			

Source: http://www.moseff.org/index.php?id=98&L=1

<sup>73</sup> Sources: Raportul auditului performanței Fondului pentru Eficiență Energetică, Hotărîrea Curții de Conturi nr. 54 din 28.11.2014, and www.fee.md

Eligible projects must lead to a reduction in primary energy consumption, reduction of CO<sub>2</sub> emissions and in general improve rational energy use in industries, agribusiness and commercial buildings. Projects which apply advanced technologies as follows may be eligible for higher levels of grants: combined heat and power plants and tri-generation; condensing gas boilers; heat pumps; transparent thermal insulation; vacuumed solar thermal collectors; absorption or evaporative cooling systems; installation of new multi-stage operated chillers (compressors); turbo-compressors with inflow choke control; variable speed drives on electric motors, fans, pumps and drives; energy management systems, and dynamic balancing of heating and cooling systems. Eligible renewable energy technologies include wind power, small hydro, solar photovoltaic and geothermal energy projects.<sup>74</sup>

As of March 2015,<sup>75</sup> MoSEFF energy saving performance expressed in energy consumption reduction achieved by financed projects was as follows:

Final energy savings (electricity) MWh/yr	24,423
Final energy savings (fuel) MWh/yr	94,975
Final energy savings (fuel) toe/yr (toe)	8,166
Primary energy savings, MWh/yr	299,537
CO <sub>2</sub> -Eq. emission reductions, tCO <sub>2</sub>	66,147

MoSEFF projects so far include: 236 projects approved by the MoSEFF team, 152 projects financed by MoSEFF partner banks, six on-going projects and loan assessments,  $\in$ 54 million project loans approved by MoSEFF team,  $\in$ 31.3 million project loans signed by partner banks,  $\in$ 1.4 million on-going project and loan assessments.

Some of the most successful projects realised during 2014 with the support of MoSEFF are listed below.

- A PV project for the BASM shopping centre in Balti. The centre installed a 30 kWp PV system on the centre's roof comprising 125 solar panels. The photovoltaic installation will generate approximately 44 MWh of electricity annually and will reduce  $CO_2$  emissions by about 30 tons annually. The project was 100% financed by a MoSEFF loan and is eligible for a grant component of 20% of the loan amount.
- A solar water heating system installed at the MOBILE company. MOBILE SRL is a clothes production company, established in 1994, intended to serve the local fashion retail market. Since 2006, MOBILE has become a significant manufacturer and exporter of competitively priced, high-quality and reliably delivered garments to a large number of EU countries. To support hot water production, the company installed a solar water heating system, which comprises eight evacuated solar thermal collectors, based on heat pipe technology, of configuration type SCM/58/1800-15 and with a total area of 15.8 m<sup>2</sup>. The proposed solar collectors have a low loss coefficient of 0.8W/ (m<sup>2\*</sup>K) and an estimated efficiency of 71.7%. The solar system will allow the company to save up to 70% of the costs of hot water generation.
- The implementation of two steam boilers with 4.5 t/h each in the dairy plant in Chisinau of the JLC company, the largest dairy processing factory in the Republic of Moldova. The company applied to MoSEFF for financing of the replacement of its old DE-4/14 and DE-

<sup>74</sup> http://www.moseff.org/index.php?id=102&L=1

<sup>75</sup> Presentation during PEEREA In-Depth Energy Efficiency Mission, March 2015

6.5/14 steam boilers, to increase the efficiency and reliability of steam production. The new steam boilers are CLAYTON SEG-304-3, with a heating capacity of 2,943 kW each and a steam production capacity of about 4.5 t/h per unit. The Clayton Steam Generator is of modular design and pre-assembled on a base frame. The boilers are fitted with high-efficiency gas burners as well as gas and flame safety systems, a high-efficiency insulated steam separator, a control panel, and all necessary valves and instruments. The steam boilers consist of a helical water coil, with high fuel-to-steam heat transfer characteristics, which allows short start/stop cycles and saves significant amounts of fuel, particularly in fluctuating operation modes. Since the compact boilers were mounted close to the production building, about 327 m of the old steam distribution pipeline was decommissioned, avoiding significant distribution losses. The savings for JLC comprise a 21% reduction in natural gas consumption and a 49% reduction in boiler-related electricity consumption. The investment of about 510,000 EUR will be paid back in 4.2 years. The project was 100% financed by a MoSEFF loan.

- The launch of a new production line for apple, cherry and grape juice concentrate at the Orhei branch of Orhei-Vit JSC. The new line of production is modern and unique in Moldova. The technique was purchased from the Bucher-Unipektin Swiss Company, a world leader in industrial machinery production. The line has a production capacity of 500 tons of fruit per day. According to Orhei-Vit Council President Alexandr Bilinkis, the new line will help create jobs, increase exports and make a contribution to the local and national budgest. 'This line will help reduce the farmers' harvest losses', he reported. Most of the products produced at Orhei-Vit are exported to the European Union: Germany, Austria and Poland. In the current year, Orhei-Vit has invested €5 million in the modernisation of the enterprise. The project was conducted in collaboration with MoSEFF.
- A photovoltaic project completed by the AutoMar company. AutoMar is a small company which owns a fuel supply station and a car wash. Through the MoSEFF project, the company received a loan for a 30 kW PV system installation and a grant component after the project's implementation. The project comprises 120 photovoltaic panels mounted and placed on the roof surface. The photovoltaic installation will generate approximately 43 MWh of electricity annually and will help to reduce CO<sub>2</sub> emissions by 30 tons annually. This is the eighth photovoltaic system in the Republic of Moldova installed under the MoSEFF financing facility.
- The implementation of a 330 kW PV project in Chisinau by G&G Solar 1. The company completed the installation of the project on the territory of the Porsche Centre near Chisinau. The system comprises 6,660 ground-mounted amorphous silicon GS Solar GS-50 PV modules. The project will generate about 420 MWh of electricity per year and, thank to its proximity to the load centres in Chisinau, it will contribute to the reduction of electricity transmission and distribution losses in Moldova. The project equipment was 100% financed by a MoSEFF loan. The MoSEFF team supported G&G Solar in various aspects of risk management in the framework of the grid connection to the Gaz Natural Fenosa grid and the tariff approval process. The project is the second medium-scale PV project supported by MoSEFF and one more step towards the increased utilisation of the solar radiation potential in Moldova.<sup>76</sup>

<sup>76</sup> http://www.moseff.org/index.php?id=109&L=1
## Moldova Residential Energy Efficiency Financing Facility (MoREEFF)

MoREEFF was set up by the European Bank for Reconstruction and Development. The investment incentives are paid from the European Union Neighbourhood Investment Facility (EU NIF) and the Swedish International Development Cooperation Agency (SIDA) sponsors marketing, administration and technical support.

The MoREEFF facility was established to provide householders, condominiums/associations of apartment owners, housing management companies, energy service companies (ESCOs) and any other eligible service companies across Moldova with an opportunity to realise the benefits of energy efficiency home improvements by providing them with loans and investment incentives through local participating banks.

The MoREEFF programme offers financing for energy efficiency home improvements comprising two elements: a loan for eligible technologies and a grant (investment incentive) payable upon their successful completion, subject to MoREEFF's terms and conditions.

Any borrower who takes a MoREEFF loan is entitled to receive an incentive payment toward the cost of the energy saving project once it has been completed, subject to terms and conditions. However, if any project costs have been partly or fully supported by other grant support programmes, the project is not eligible for a MoREEFF loan.

Subject to terms and conditions, borrowers are entitled to receive payment of investment incentives equal to 30% of the total amount of the MoREEFF loan for any building-level projects and 35% for building-level projects undertaken by legal entities and encompassing measures on both building envelope and building service systems. Borrowers are entitled to receive payment of up to 20% of the total amount disbursed by a participating bank for dwelling-level projects, provided that the investment incentives payable in respect of each eligible energy efficiency measure do not exceed the caps defined by the programme.

The eligible energy efficiency technologies for residential buildings financed by MoREEFF are as follows:

- energy-efficient windows
- insulation of walls, roof, and floors/ceilings
- efficient gas boilers and systems
- efficient biomass stoves/boilers and systems
- solar water heaters and systems
- cooling and heating heat pump systems
- building-integrated photovoltaic systems
- heat-exchanger stations and building installations.

As of March 2015,<sup>77</sup> MoREEFF has made energy savings of 11 800 MWh per year and reduction in CO<sub>2</sub> emissions of 2 697 tons per year. The MoREEFF programme has committed to 1450 energy efficiency loans totalling  $\in$ 5 526 581 and incentive grants amounting to  $\in$  1 477 128. A summary of the results for each implemented technology is presented in Table 25.

<sup>77</sup> Presentation during PEEREA In-Depth Energy Efficiency Mission, March 2015

#### Table 25: MOREEFF projects.

Energy Efficiency Home Improvement Measure	Amount of Sub-loans (EUR)	Amount of Investment Incentives (EUR)	Number of Projects	Percentage of Sub- loans
Energy-efficient windows	3 002 233	802 528	1092	54.3 %
Wall insulations	710 311	189 873	26	12.9 %
Roof insulations	61 488	16 436	11	1.1 %
Floor insulations	5 185	1 386	4	0.1 %
Solar water systems	44 387	11 865	9	0.8 %
Biomass stoves & boilers	398 699	106 576	180	7.2 %
Hot water gas boilers	1 225 631	327 624	191	22.2 %
Heat pump systems	47 922	12 810	15	0.9 %
Integrated photovoltaics	0	0	0	0.0 %
Central heating	30 725	8213	1	0.0 %

Energy Efficiency Home Improvement Measure	Energy Savings (MWh/Year)	CO <sub>2</sub> Reduction (Tonne/ Year) <sup>1</sup>	Heat Generation Capac- ity Substituted (MW) <sup>2</sup>	Energy Saved against Annual Heat Use <sup>3</sup>
Energy-efficient windows	3 299	749	1.03	0.22 %
Wall insulations	1673	380	0.52	0.11 %
Roof insulations	145	33	0.05	0.01 %
Floor insulations	12	3	0.00	0.00 %
Solar water systems	81	18	0.03	0.01 %
Biomass stoves & boilers	1972	448	0.62	0.13 %
Hot water gas boilers	4333	984	1.35	0.29 %
Heat pump systems	321	73	0.10	0.02 %
Integrated photovoltaics	0	0	0.00	0.00 %
Central heating	45	10	0.01	0.00 %

Presentation during PEEREA In-Depth Energy Efficiency Mission, March 2015

A large range of EU initiatives and programmes aims at promoting investments in energy efficiency and renewable energy sources. In particular, the platform supports the participation of Moldova in energy efficiency initiatives such as the Covenant of Mayors. A brief summary of energy projects in Moldova (co)funded by external sources shows that from 2008 to the beginning of 2015, the total costs of actual commitments in the energy sector accounted for at least €180 million for more than 29 projects (Table 21).<sup>78</sup> Around 46% of this amount was provided by the EU.

For comparison, during the same period of time, Moldovan projects in the transportation and storage sector accounted for about €667 million (at least 24 projects): agriculture – €287 million (44), industry – €10.9 million (9), government and civil society – €682 million (205), communications – €360,000 (2), and others.<sup>79</sup> This shows that though the energy sector received by now substantial financial support for its development, still during 2009-2014 the share of

energy projects in the total projects launched in Moldova was of only 6%, when the share of agriculture was of 10%, transport and storage – 23%, government and civil society – 23%, industry – 0.4% and other sectors.

As regards **donors**, the leading contributor to the projects launched in Moldova from 2009 to 2014 was the EU with €883 million (30%), followed by EIB - €397 million (13.7%), EBRD - €333 million (11%), USA - €316 million (11%), WB - €299 million (10%), Romania - €116.3 million (4%), Poland - €115.6 million (4%), UN - €70.98 million (2.4%), Japan - €63.6 million (2.2%), Germany - €45.8 million (1.6%), Sweden - €44.98 million (1.5%), and others.<sup>80</sup>

## Table 26: List of projects supported by donors and financial institutions.

Project title		Start-completion	Financing instrument	Total costs, €, actual commitments
Sector policy support programme to	EU	06/12/2011-05/12/2015	Grant	50,000,000
Support for reform of the energy sector	EU	05/06/2012-03/12/2015	Grant	2,600,000
Capacity building to the Ministry of Economy in the area of	Sweden	01/07/2011-29/12/2015	Grant	2,425,500
energy efficiency and renewable energy   Promotion of sustainable development strategies in the				2,125,500
renewable energy technologies sector through piloting of	FU	15/12/2010-13/06/2013	Grant	1 500 000
demonstration projects based on usage of solar energy and	20	13, 12, 2010 13, 00, 2013	Giunt	1,500,000
Grant agreement between JICA and the GRM for effective	lanan	26/06/2013_31/03/2017	Grant	0.016.414
use of biomass fuel	Jahan	20/00/2013-31/03/2017	Gidin	9,010,414
Biogas generation from animal manure pilot (GEF)	WB	06/07/2011-05/07/2014	Grant	687.519
Increasing energy efficiency of Chisinau and Sevastopol	EU	24/12/2009-22/04/2012	Grant	348.502
Moldova District Heating Programme - Project Identifica-				
tion Study	EBRD	06/05/2013-30/11/2013	Grant	300
Loan agreement between the Republic of Moldova and	EBRD	11/1/2014	Soft Loan	7.000.000
EBRD on Balti District Heating (S. A. CET Nord)	Guadan	10/07/2000 16/01/2012	Crant	1 440 000
• Energy enricency in public buildings	Sweden	19/07/2009-10/01/2012	Gidili	1,440,000
• Energy Efficiency in Buildings Plan in the Black Sea area	EU	01/06/2013-30/05/2015	Grant	84.686
Programme for facilitating EBRD's energy efficiency financ- ing in Moldova (EEEE-MO)	Sweden	26/04/2010-25/04/2013	Grant	1,252,800
World Bank Trust Fund energy sector reform and efficiency		10/12/2010 00/12/2012	C (1)	2 002 072
improvements	Sweden	10/12/2010-09/12/2012	Soft Loan	2,083,062
• ESCO Moldova – Transforming the market for urban energy	UN	01/05/2013-01/05/2014	Grant	46.58
efficiency by introducing energy service companies • Moldelectrica Power Transmission Network Rehabilitation				
(NIF)	EU	01/04/2013-01/11/2019	Grant	8,000,000
Moldelectrica power transmission (EBRD & EIB)	EBRD	26/06/2012-26/06/2019	Soft Loan	15,526,745
Moldelectrica power transmission (EBRD & EIB)	EIB	26/06/2012-26/06/2019	Soft Loan	17,000,000
Financing energy efficiency investment for climate change mitigation 2	EU	23/07/2010-23/07/2011	Grant	27.23
Energy 4 Eastern Mayors Regional Project	EU	12/12/2011-01/06/2014	Grant	76.866
Sustainable energy planning in Eastern Europe and South				
Caucasus – towards the Covenant of Mayors – Moldova,	EU	17/09/2012-18/07/2014	Grant	112.697
Ukraine and Azerbaijan				
lasi-Ungheni gas pipeline construction	EU	27/08/2013-27/08/2014	Government Counterpart Funds	7,000,000
	Government of Moldova		Grant	8,289,766
• Finance and project agreement between KFW, R. Moldova				
and Social Investment Fund: the sustainable use of improved	Germany	15/12/2010-15/12/2014	Grant	7,000,000
municipal services as well as a more efficient use of energy	,			
Energy 2 project - additional financing	W/D	20/01/2000 20/12/2011	Soft Loop	7 1/3 000
Renewable energy with zero (0, emissions for Drachia)	VVD	23/01/2003-23/12/2011		7,142,900
Sports School	Sweden	01/07/2010-29/12/2011	Grant	504.358
Energy auditing of Gymnasium "laroslav Ga?ek" from	Czech Renublic	15/10/2013-15/12/2013	Grant	2 022
Huluboaia v., Cahul District	czeci nepublic	13/ 10/ 2013 13/ 12/ 2013	udit	2.032

Source: http://ncu.moldova.md/public/files/00000000000000000\_\_\_\_2014/2009-2014\_sectoare\_Ro.pdf

Renewable energy policy

# **Renewable energy policy**

## Strategic and legal background

Recent policy and legal developments directly related to renewable energy sources (RES) include, but are not limited to, the following documents.

- National Development Strategy 'Moldova 2020' (2012): the leading national strategy document, adopted by law, which defines RES targets, particularly for electricity and biofuels.
- Energy Strategy 2030 (2013): the leading sectoral strategy document, adopted by a government Decision, which defines RES implementation priorities and order, based on provisions of the National Development Strategy 'Moldova 2020'and NEEP 2011-2020 and succeeding the Energy Strategy 2020 (2007).
- Energy Strategy of the Energy Community (2012): defined as one of the key actions to incorporate Directive 2009/28/EC in the acquis of the Energy Community and identify RES targets and actions related to renewable energy in the member states.
- EU-MD Association Agreement (2014): supports the Energy Community commitment regarding implementation of Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable energy sources.
- Law on renewable energy (2007): defines state policy objectives and targets in the field of renewable energy, including electricity and biofuels, as well as state administration, establishment of the Energy Efficiency Fund, state support in promotion of RES and others.
- Law on electricity (2009): provides rules for electricity market functioning, including production, transportation, distribution and supply, system operation, administrative and regulatory authorities, licensing, system technical requirements, etc.
- NEEP 2011-2020 (2011).,
- National Renewable Energy Action Plan 2013-2020 (2013).
- Regulation on solid biofuels (2013).
- Regulation on the guarantee of origin for electricity produced from RES (2009).
- Methodology on calculation, approval and application of tariffs on electricity produced from RES and on biofuels (2009).

Renewable energy provisions are incorporated also in the *law on energy* (1998, art. 12.6) and the *law on energy efficiency* (2010, art. 26.2).

Two new draft laws are now in the adoption process:

- on the promotion of use of energy from renewable sources
- on biofuels, biofuels for transportation and bio-oils, approved by Parliament at the first reading in 2007.<sup>81</sup>

The draft law on the promotion of use of energy from renewable sources aims at transposing into national legislation Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable energy sources, as resulting from the Energy Community and EU-MD Association Agreement commitments.

<sup>81</sup> http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=321735, http://energyeficiency.clima.md/public/files/publication/Raport\_privind\_politicile\_nationale\_energetice.pdf

One of the eight strategic development priorities according to the National Development Strategy until 2020 is to decrease energy consumption through increased energy efficiency and use of RES. Specific objectives, as provided in this strategy and as applicable to the field of RES, are:

Monitored indicators	2015	2020					
Energy security							
Promotion of use of RES in total gross final energy consumption, $\%$	10	20					
To insure a growing proportion of biofuels in total fuel consumption, $\%$	4	10					
Increase of local power generation capacities, MW		800					
To insure RES in annual gross final electricity production, %		10					

It is further stated in the Energy Strategy 2030 that '... the development of use of RES-based energy [and] the improvement of the energy efficiency have exceptional status'.

According to the Energy Strategy 2030, Moldova aims at increasing power generation capacity by 400MW of conventional energy (cogeneration), the retrofit of an existing 250MW of cogeneration in mun. Chişinău, and addition of 400MW of power generation based on RES. By 2030, power generation based on RES should increase up to 600MW. At the same time and in relation to 2021 to 2030, the Strategy indicates that for achieving the security of energy supply and climate change objectives, there are also less expensive alternatives than RES. Thus, addition between 2021 and 2030 of 200MW of power generation based on RES should be not seen as increasing the RES target, which by 2030 should be about 15%.

It is expected that 400MW of RES-based and system integrated power generation capacity will be provided mainly by wind power generation and to a lesser degree by solar power. Solar-based power generation, with a greater potential than wind, is expected to have wider implementation from 2021 to 2030 based on cost developments for these technologies. Biomass will continue to be used predominantly for heating purposes.

Security of energy supply										
Indicators	units	2015	2020							
Stimulating the use of RES-based energy in gross inland demand	%	10	20							
Ensuring the place of biofuels in total fuel consumption	%	4	10							
Use of RES-based energy in all types of transportation:	%	6 5	10							
proportion of ethanol and gasoline mixture in total sales of gasoline,	MW		800							
proportion of biodiesel in total sales of diesel fuel	%		10							

As regards RES, the Strategy defines progress indicators (Table 27).

#### Table 27: List of progress indicators by 2020 provided by Energy Strategy of Moldova until 2030.

Source: Energy Strategy of Moldova until 2030

The Strategy also requires that between 2018 and 2020 Moldova should achieve regional integration of the electricity market. One of the specific objectives of the Strategy 2021-2030 is to implement smart grids

The *Energy Strategy of the Energy Community* (2012) states that one of the key actions related to renewable energy is to incorporate Directive 2009/28/EC in the acquis of the Energy Community and to establish a target for renewable energy at the national level:it also wants to increase the proportion of renewable energy (RE) in the gross final energy consumption of the contracting parties in line with the methodology used for setting EU member states' targets,and at the levels decided by the Ministerial Council in October 2012. Sub-activities defined by this Strategy are:

- allow priority access or guaranteed access to the grid for RE;
- adopt and implement National Renewable Energy Action Plans;
- simplify and accelerate the authorisation procedures for RE plants and grid connections;
- introduce and/or revise (if necessary) existing support schemes for RE in order to ensure continuity and stability for investors.

The renewable energy target for Moldova set by this Strategy is 20% by 2020. As provided by this Strategy, domestic electricity supply forecast - base scenario, for RES (other than hydro) in Moldova has zero values for 2015, 2020 and 2030, though new (planned) power generation RE (other than hydro) in Moldova is 54 MWe for 2009 to 2012 and 218 MWe for 2012 to 2021.

The *law on renewable energy* aims at ensuring the legal framework for renewable energy sources (RES), social and economic interactions in the process of implementation of RES, and production and marketing of RES-based energy and fuels. This law provides the following:

- establishes principles and objectives of the state policy in the field of renewable energy;
- defines how to integrate renewable energy sources in the national energy system;
- defines the correlation of activities of production, metering, transportation, distribution and consumption of renewable energy and fuel;
- identifies financial resources and economic-financial mechanisms to support RES's implementation;
- specifies methods of informational support for RES activities;
- defines economic and organisational measures aimed at stimulating the production and use of energy from RES;
- defines the priority directions of cooperation in this field.

As defined by law, the goal of the state policy in the field of renewable energy is to increase the country's energy security and to reduce the negative impact of the energy sector on the environment through the annual increase of renewable energy and fuel production and consumption rates. State policy in the field of renewable energy is realised through national, sectoral and local programmes, monitored by the assigned public authority.

State policy objectives in the field of renewable energy, as defined by law, include the diversification of the local primary energy resources and ensuring by 2020 20% of RES-based energy production in the amount of energy originated from traditional sources. In 2020, mixtures of bioethanol & gasoline and biodiesel & diesel fuel should each account for 20% of the total marketed quantity of gasoline and diesel. Other state policy objectives in the field of renewable energy include, but are not limited to: establishing a system for production, distribution, marketing and rational consumption of renewable energy and fuels; attracting investments in the renewable energy; technical-scientific international cooperation and implementation of advanced international scientific and technical solutions in renewable energy; ensuring informational support in implementation of RES; increase in environmental security and ensuring public and labour health protection in implementation of RES.

As provided by law, the origin and conformity of renewable energy and fuels is certified for RES-based electricity by a guarantee of origin issued by the grid system operator, and for renewable fuels by a certificate of conformity issued by the authority appointed by the National System of Products Conformity Assurance body.

The law on renewable energy states that national authority in the field of RES is the Agency for Energy Efficiency (AEE). The National Energy Regulatory Agency (ANRE) is responsible, among others, for licensing renewable fuel production and for setting the tariffs for each type of renewable energy and fuel. Legally such tariffs should be based on the methodology adopted by ANRE, and should provide for the investment payback period of up to 15 years under the condition that the return-on-investment rate in such a case will not exceed the double level of this rate as in the traditional energy sector. RES tariffs are to be set out and approved on an annual basis, taking into account, if appropriate, the prices on the international market.

Legally, the sale of RES-based electricity through distribution and/or transmission networks is provided for power generation units of *at least 10kW*.

This law, adopted in 2007, provides an obligation regarding the elaboration and adoption of a comprehensive legal and regulatory framework in the field of RES in compliance with EU Directives. It states also that programmes on implementation of RES should be realised according to international standards.

The law on electricity (23 December 2009, last amended on 27 March 2014) repealed the law on electricity nr.137-XIV of 17 September 1998 and provided the legal framework for application of European Directives 2003/54/EC of 26 June 2003 concerning common rules for the internal market in electricity and 2005/89/EC of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment.

As provided in the law on electricity of 2009, one of the fundamental principles in electricity sector regulation is promotion of electricity production from RES.

According to the law, the government must approve the construction and the type of fuel of new power generation plants with installed capacity of >20MW. It also designates the supplier who will purchase and supply to the electricity market the electricity produced from RES. The supplier purchases electricity produced from RES based on the tariffs approved by ANRE. Regulated electricity tariffs for RES are based on existing methodology used by licence-holders and are approved by ANRE. Suppliers of electricity based on non-regulated tariffs negotiate the electricity price directly with consumers. The construction of power plants with installed capacity of >20MW can be refused only on objective, non-discriminatory and well-justified grounds.

As provided by law, TSO and DSOs are obliged to accord priority in power dispatching of the electricity produced in cogeneration and from RES. The electricity supplier is also obliged to consider the priority order of the electricity produced in cogeneration and from RES. TSO and DSOs should ensure non-discriminatory access to the power grids for all system users and

third parties. In the case of a grid connection request, the connection notice should be issued by TSO/DSO to the applicant within a maximum of 30 days from the day of request registration. TSO/DSOs have the right to interrupt service, in the case of power system imbalances, non-compliance with power system operational regime, etc.

Power-generating plants with installed capacity of 5 MW and more producing electricity for public consumption and power plants with installed capacity of at least 20MW producing electricity for internal consumption can operate only with a licence issued by ANRE. Licences for electricity production are issued for **25 years**. The owner of power-generating plants with installed capacity of less than 5 MW producing electricity for public consumption and power plants with installed capacity of less than 20MW producing electricity for internal consumption should inform ANRE about the start of operation of such power plants and should collaborate with licence-holders operating in the power system.

By 1 January 2015, as provided by law, Moldova should have achieved full opening of the electricity market.

Provisions of the law related to future system planning and operation mean that the government approves the energy balance for the next five years and the strategy for the development of power system and interconnections with other countries for at least 15 years. The government, through an assigned public authority, monitors the security of electricity supply for five- and 15-year periods and the security of power grid operation and investment projects for the coming five years. Annual monitoring reports should be made publicly available. TSO is obliged by law to provide a five-year investment plan, which should be published on its official web page, and also to provide daily operational and technical information on the power system on its web site. DSOs are obliged to provide an annual investment plan and to make it publicly available on their official web pages after its approval by ANRE.

## National Renewable Energy Action Plan 2013-2020

The plan states that in the case of a development scenario with increased energy efficiency, by 2020 the gross final consumption of energy in heating & cooling, electricity and transport will be 2,160 ktoe: heating & cooling – 1,258 ktoe, electricity – 417 ktoe and transport – 485 ktoe. This means that by 2020 and when compared with the base year 2009, the gross final consumption of energy will increase by 89 ktoe, instead of 622 ktoe in the case of the baseline development scenario (Table 28).

# Table 28: Forecast of the gross final consumption of energy by 2020 in heating & cooling, electricity and transport in Moldova, ktoe.

	2009	2020		difference		
	base year	baseline scenario	improved energy	baseline scenario	improved energy	
heating and cooling	1,224	1,676	1,258	452	34	
electricity	286	412	417	126	131	
transport	561	605	485	44	-76	
gross final consumption of energy	2,071	2,693	2,160	622	89	

Source: National Action Plan for Renewable Energy Sources for 2013-2020, government Decision nr. 1073 of 27 December 2013, http://lex.justice.md/ index.php?action=view&view=doc&lang=1&id=351034 In the case of an increased energy efficiency development scenario, energy consumption will be significantly decreased in the heating & cooling and transport sectors, whereas the electricity consumption will keep increasing. Estimates for RES development by 2020 as provided in NREAP 2013-2020 are based on the improved energy efficiency scenario and targets set out for Moldova under the Energy Community commitments, i.e. 17% RES out of 2,160 ktoe of gross final consumption of energy.

#### Table 29: Energy Community Renewable Energy 2020 Targets for Moldova.

Proportion of energy from RES in gross final consumption of energy in 2009, %	11.9
Target for proportion of energy from renewable sources in gross final consumption of energy, 2020, %	17
Total adjusted energy consumption as estimated for 2020, ktoe	2,160
Estimated amount of energy from RES by 2020, according to the target of 17%, ktoe	367.2

Source: https://www.energy-community.org/pls/portal/docs/1766219.PDF, https://www.energy-community.org/portal/PAC\_HOME/ AREAS\_0F\_WORK/Obligations/Renewable\_Energy

The renewable energy target of 17% by 2020 as set by the Energy Community (2012) is lower than the national renewable energy target of 20% set out in the Energy Strategy of Moldova 2030 (2013) and in the law on renewable energy (2007). National renewable energy targets by 2020 for the heating & cooling, electricity, and transport sectors are as follows.

#### Table 30: National RES targets by 2020 and their estimated development trend.<sup>82</sup>

	2009	2014	2015	2020
RES in heating & cooling (%)	19.36	23.02	24.21	27.19
RES in electricity (%)	1.75	1.99	2.02	10
RES in transport (%)	-	-	1.12	10
Overall RES target (%)	11.7	13.5	14.3	20

Source: National Action Plan for Renewable Energy Sources for 2013-2020, government Decision nr. 1073 of 27 December 2013, http://lex.justice.md/ index.php?action=view&view=doc&lang=1&id=351034

As provided in NREAP 2013-2020, in order to achieve the renewable energy target set out by the Energy Community, the target's minimum development path should be as follows: 14.2% from 2015 to 2016, 15.2% from 2017 to 2018 and, finally, 17% in 2020, or 367.2 ktoe in 2020 against 242.3 ktoe in 2009 (11.7% out of 2071 ktoe), i.e. addition of 124.9 ktoe to the level of 2009.

Table 31: Contribution of each sector regarding the energy from RES in final consumption of energy.

(ktoe)	2009	2015	2016	2017	2018	2019	2020
Estimated gross final consumption of energy from RES in heating & cooling	237,0	292.9	302.7	312.6	322.4	332.2	342.0
Estimated gross final consumption of electricity from RES	5,0	7.4	9.9	17.8	25.8	33.7	41.7
Estimated final consumption of renewable energy in transportation	0,0	6.4	13.6	20.9	28.1	35.3	42.5
Estimated total consumption of renewable energy	242	307	327	354	380	406	432
Estimated transfers of renewable energy to other parties	0,0	1.5	22.2	26.5	52.7	58.1	64.8
Estimated transfers of renewable energy from other parties and third countries	0,0	0.0	0.0	0.0	0.0	0.0	0.0
Target-adjusted consumption of renewable energy	242	305	305	327	327	348	367

Source: National Action Plan for Renewable Energy Sources 2013-2020, government Decision nr. 1073 of 27 December 2013, http://lex.justice.md/index. php?action=view&view=doc&lang=1&id=351034

The target of 400 MW by 2020 of new power generation capacities based on RES, as provided in the Energy Strategy of Moldova 2030 and as mentioned earlier in the text, is split in the NREAP 2013-2020 into the following: 150 MW should be installed by 2015 and 250 MW should be added between 2016 and 2019. By 2015, 140 MW should be based on wind and solar energy and 10 MW on other RES, and of the additional capacity, by 2019, 220 MW should also be based on wind and solar energy and 30 MW based on other RES. That is, by 2020, Moldova should have 360 MW of new power generation based on wind and solar energy and 40 MW based on other RES. 'Other RES'should be based mainly on biomass/biogas.

The RES contribution by type of RES by 2020, as provided by NREAP 2013-2020, in electricity, heating & cooling, and transportation can be summarised as follows (Table 31).

		2009	2015	2016	2017	2018	2019	2020
Hudro nower > 10MW	MW	11	16	16	16	16	16	16
nyuto power: > towiw	GWh	58	81	81	81	81	81	81
Wind neuron	MW	-	-	9.3	44.19	79.08	113.9	148.9
wind power	GWh	-	-	23.3	110.5	197.7	248.9	372.2
Solar		-	-	-	-	-	-	-
Solid biomass		-	-	-	-	-	-	-
Diagon	MW	-	2	3	5	7	9	10
Blogas	GWh	-	5	10	15	21	26	31
	MW	11	18	28.3	65.1	102	139	175
IUIAL	GWh	58	86	114.3	206.5	299.7	391.9	484.2
including in cogeneration		-	-	-	-	-	-	-

Table 32: Estimated contribution by type of RES to electricity target by 2020.

Source: National Action Plan for Renewable Energy Sources 2013-2020, government Decision nr. 1073 of 27 December 2013, http://lex.justice.md/index. php?action=view&view=doc&lang=1&id=351034

#### Table 33: Estimated contribution by type of RES in heating & cooling target by 2020, ktoe.

	2009	 2015	2016	2017	2018	2019	2020
Geothermal energy	-	 -	-	-	-	-	-
Solar	-	 3	4	5	6	7	8
Solid biomass	237	 289.9	298.7	307.6	316.4	325.2	334
Other	-	 -	-	-	-	-	-
TOTAL	237	 293	303	313	322	332	342
including biomass of households	237	 266	271	276	280	285	290

Source: National Action Plan for Renewable Energy Sources 2013-2020, government Decision nr. 1073 of 27 December 2013, http://lex.justice.md/index. php?action=view&view=doc&lang=1&id=351034

#### Table 34: Estimated contribution by type of RES in transportation target by 2020, ktoe.

	2009	2015	2016	2017	2018	2019	2020
Bioethanol/bio-ETBE <sup>83</sup>	-	1.95	3.89	5.84	7.79	9.73	11.68
including imports	-	1.95	3.89	5.84	7.79	9.73	11.68
Biodiesel	-	4.47	8.94	13.41	17.88	22.35	26.82
including imports	-	4.47	8.94	13.41	17.88	22.35	26.82
Hydrogen	-	-	-	-	-	-	-
Electricity from RES	-	-	1	2	2	3	4
including road transportation	-	-	1	2	2	3	4
Other	-	-	-	-	-	-	-
TOTAL	-	6.42	13.8	21.3	27.7	35.1	42.5

Source: National Action Plan for Renewable Energy Sources 2013-2020, government Decision nr. 1073 of 27 December 2013, http://lex.justice.md/index. php?action=view&view=doc&lang=1&id=351034

By 2020 the majority of electricity generated by RES is expected to be from wind energy, followed by existing hydropower generation and biogas. The existing electricity generation based on biogas is expected to increase at least five-fold by 2020. In heating & cooling the traditional RES – solid biomass will maintain its leading share, being supplemented by an increasing but still small proportion of solar energy. In the transportation sector, biofuels are expected to originate predominantly from imports.

The Strategy on Adaptation to Climate Change by 2020 and its Implementation Plan (2014) define energy sector actions aimed at reduction of risks and adaptation to climate change, including<sup>84</sup>:

- promotion of environmentally friendly RES technologies (by 2020): aimed at implementing wind (mainly) and PV power generation, and use of biomass for heating;
- promotion of gradual implementation of biofuels (by 2020): aimed at biofuels constitut-

<sup>83</sup> http://www.biofuelstp.eu/etbe.html

<sup>84</sup> Source: Strategia Republicii Moldova de adaptare la schimbarea climei pînă în anul 2020 şi a Planului de acțiuni pentru implementarea acesteia, actions 59, 60, 29, 62.

ing 15% of fuel consumption; implementation of standards and technical regulations;

- evaluation of climate change risks and vulnerabilities for the energy and transportation sectors (by 2016);
- improvement of sustainability of power transportation and distribution infrastructure (2020).

#### Renewable energy potential

Despite the ambitious targets set at national level, the proportion of renewables in the total energy mix in 2012 was only about 4%. According to NES and NREAP, 400 MW of additional renewable energy capacity is planned before 2020. It is assumed that investment in renewable technologies will come from the private sector.

#### Table 35: Technical potential of the main types of renewable energy sources in Moldova.<sup>85</sup>

	Technical potential		
	PJ		million toe
Solar	50.4		1.2
Wind	29.4		0.7
Hydro	12.1		0.3
Biomass	Agricultural wastes	7.5	
	Firewood	4.3	
	Wastes from wood processing	4.7	
	Biogas	2.9	
	Biofuels	2.1	
	Total biomass	21.5	0.5
	Total RES potential	113.4	2.7
Low energy potential sou	rces, including geothermal	> 80,0	> 1,9

Source: Strategia națională de dezvoltare 'Moldova 2020' (2012)

As of today, hydro energy and biomass are predominantly used, but there has been a number of recent developments in biogas (inclusing landfill gas), solar, wind, bioethanol and geothermal. In the past Moldova had numerous small and micro hydro and wind farms, but most of them do not exist now.

## Renewable energy installed capacity and market share

On the right bank of the Dniester there is one hydro power plant supplying electricity to the network: NHE-Costeşti (16 MW, 1978). This is the interstate cross-border power plant shared equally by Moldova and Romania (Costeşti-Stînca). Starting in 2010, ANRE approved a number of tariffs for new RES-based electricity producers. The cumulative installed capacity of these producers is 4.9 MW.<sup>86</sup> In 2014, electricity supplied to the network by these producers increased by 64.3% from 1.9 GWh in 2013 to 3.1 GWh in 2014. Of this, 47.3 % was wind energy, 40.7 % biogas (from biomass) and 12.1 % solar.

<sup>85</sup> Strategia națională de dezvoltare 'Moldova 2020' (2012)

<sup>86</sup> Source: ANRE Annual Activity Report 2014, page 11, Chisinau, April 2015, www.anre.md



#### Figure 19: RES-based electricity generation in Moldova 2001-2014.

NHE-Costesti's market share in 2014 of total electricity supply was 1.4% or 7.4% of total electricity generation on the right bank of the Dniester. This company is the only one in the country whose electricity is priced competitively with import sources, electricity supplied from MTPP, and all other local sources. It is seven times cheaper than electricity generated by CHPs, six times cheaper than wind electricity and about nine times cheaper than biogas and solar electricity.

RES electricity tariffs: issued MRE         Type of RES         date of A           Decision / company name         Type of RES         Decision			date of AN RE Decision	T	ariff, without VA	T	Capacity, kW	Electricity produced and supplied to the grid, MWh 2013 2014		
				lei/kWh	c\$/kWh	c€/kWh		2013	2014	
1	"MorariV.I."	biogas	11.11.2010	1.73	14.0	10.5	85	324.4	318.6	
2	"Solotrans-Agro" Itd	solar	30.11.2012	1.92	15.9	12.3	95	89.9	99.9	
3	"Tasotilex" Itd (abrogated)	solar	27.02.2013	1.92	15.2	11.5	10			
4	"Elteprod" Itd	wind	27.03.2013	1.24	9.8	7.4	1100	979.8	1481.2	
5	"Tevas Grup" Itd	landfill gas	30.05.2013	1.73	13.7	10.3	320	502.5	956.8	
6	"G & G Solar 1" Itd	solar	07.04.2014	1.9	13.5	10.2	n/i	-	260.1	
7	"Covoare Lux" Itd	solar	31.07.2014	1.9	13.5	10.2	500			
8	"Sudzucker Moldova" JV	biogas	31.07.2014	1.96	13.97	10.5	2400			
9	"Duca Vitalie Mihail"	solar	18.11.2014	1.88	13.4	10.1	20	-	0.14	
10	"Tasotilex" Itd	solar	18.11.2014	1.88	13.4	10.1	18	11.3	17.65	
11	"Sadisal Auto" Itd	solar	25.11.2014	1.88	13.4	10.1	15			
12	"Auto-Mar" Itd	solar	25.11.2014	1.88	13.4	10.1	30			
Total electricity produced and supplied to the grid							1,907.9	3,134.5		

#### Table 36: New RES-based electricity producers in Moldova 2010-2014.

Sources: Decisions of the National Energy Regulatory Agency (ANRE); ANRE Annual Activity Report 2014, www.anre.md

New RES-based electricity producers are connected to DSO, except Covoare Lux Ltd, which is connected to TSO Moldelectrica. In 2014, 70 guarantees of origin were issued for 3.1GWh.<sup>87</sup>

From 2011 to 2014 29.6 MW of new biomass-based heat generation capacities were installed at 144 public institutions in 127 communities/villages in Moldova within the project 'Moldova Energy and Biomass'. Biomass-based heating became competitive because of the excessive increase in the price of imported natural gas. An additional 25 biomass heating systems are to be operated at public facilities in rural areas, provided within the project 'Effective Use of Biomass Fuel in the Moldova'. The project primarily focuses on improving heating comfort levels in rural public sector buildings including schools and community centres by using readily available waste straw supplied from local agricultural enterprises. As testified during the In-Depth Energy Efficiency Mission in March 2015, the project contributed significantly to stimulating local markets for improved household heating, industrial cogeneration, and biomass-based briquetting, as well raising local capacity in the biomass sector, and promoted the benefits of biomass energy. Capacity-building activities to support further growth of biomass markets at regional and local levels have been organised for municipal management including mayors and public officials, technical experts, fuel suppliers and boiler operators.



#### **Biomass heating systems**

Figure 20: Biomass project heating systems installed in Moldova.

Source: Presentation during PEEREA In-Depth Energy Efficiency Review Mission, March 2015

Additionally, the project supported the launch of 30 businesses and the creation of 100 new jobs in the biofuel manufacturing sector. Agricultural entrepreneurs managed to purchase by instalment, at the expense of European funds, briquette/pellet manufacturing equipment and

<sup>87</sup> ANRE Annual Activity Report 2014, Table 6, p. 11, Chisinau, April 2015, www.anre.md

biomass shredding, baling and transporting machines.

The 'Südzucker Moldova' JV project on production of electricity from biogas is located in Drochia and is based on production of biogas from sugar beet processing wastes. Project development started about a decade ago. The company has two sugar factories which are operated on a seasonal base for about 100 days per year, processing about 650,000 tons of sugar beet and producing 91,000 tons of sugar. The sugar is sold in Moldova, and also in EU and other countries. About 90,000 tons/year of sugar beet processing wastes are now being used for biogas production and replacement of natural gas consumption by the company's industrial CHP. Project documentation was completed by Ecofys Germany GmbH.<sup>88</sup>

In 2011, a project on agricultural (including livestock) residue processing and production of biogas in the Hincesti district (Garma Grup Ltd) was financed by the National Ecologic Fund (NEF) under the Ministry of Environment and is now operational. Currently, the project is aiming to produce biogas-based electricity. NEF provided substantial funds to the Social Investment Fund for piloting demonstration projects on solar energy and electricity production based on agricultural residues. NEF has also financed bioenergy projects in Riscani, Calarasi, Telenesti, Straseni and other districts in Moldova.<sup>89</sup>

As of today, biofuels are not yet used in transportation.

http://clima.md/public/files/2\_Cadrul\_National/Prezentare\_Project\_Sudzucher.pdf, http://clima.md/public/files/2\_Cadrul\_National/PDD\_Sudzucher\_Rom.pdf
 Source: National Ecologic Fund: http://mediu.gov.md/index.php/en/about-ministry/hystory?id=72:fondul-ecologic-national&catid=79:institutii-subordonate

Environmental policies, related to energy efficiency

# Environmental policies, related to energy efficiency

Moldova acceded in 2003 to the Kyoto Protocol, but as a non-Annex I Party it had no obligation to reduce GHG emissions under that Protocol. On 29 January 2010, Moldova submitted a voluntary emissions reduction target for the Copenhagen Accord of 2009, and that target was included in Appendix II of the Accord.<sup>90</sup> Also in 2010, Moldova became a member of the Energy Community and committed to the realisation of its *acquis communautaire*, including in the field of the environment. In 2014, Moldova signed and ratified an EU-MD Association Agreement and under this Agreement it committed to carry out approximation of its legislation to the EU acts and international instruments covered by the Agreement, including in the field of the environment and climate change.

Between 2011 and 2014, Moldova adopted a number of policy papers, programmes and action plans which cover the issues of environment and climate change objectives and actions. The documents contain greenhouse gas emission (GHG) targets, as follows.

- National Development Strategy 'Moldova 2020': to decrease GHG emissions by 25% compared with the 1990 level.
- Energy Strategy of Moldova until 2030: to decrease GHG emissions by 25% by 2020 compared with the 1990 level.
- National Energy Efficiency Program for 2011-2020: reduction by 2020 of at least 25% of GHG emission compared with the 1990 level. The national 20% energy savings target by 2020, compared with the 2009 level, is expected to contribute to the reduction of GHG emissions by 761,498.7 tons  $CO_2$  eq. The intermediate target by 2016, 9%, is expected to result in reduction of GHG emission by 323,637.5 tons  $CO_2$  eq.
- National Action Plan for Energy Efficiency 2013-2015: overall reduction in final energy consumption in all sectors of the national economy by 428ktoe, as well as reduction of GHG emissions by 962,848 tons CO<sub>2</sub> from 2013 to 2015.
- National Renewable Energy Action Plan 2013-2020: implementation of 400MW of wind and biogas power generation, respectively accounting for 92.5% and 7.5%, is estimated to result in 2020 in a saving of about 241,296 tons of CO<sub>3</sub>.
- Moldova's commitment in the UNCCC Copenhagen Accord: ... a reduction of no less than 25% of the base year (1990) level total national GHG emissions have to be achieved by year 2020 through implementation of global economic mechanisms focused on the climate change mitigation, in accordance with the Convention's principles and provisions'.

Comprehensive assessment of Moldova's GHG emissions during 1990-2010 is presented in the National Inventory Report of GHG Sources in Moldova in 1990-2010 (2013) and the Third National Communication of Moldova under the United Nations Framework Convention on Climate Change (UNFCCC, 2013) The latter document also provides projections of GHG emissions by 2020, as does the draft Strategy on Low Emissions Development of the Moldova until 2020.

National reports and data provided by the Climate Change Office of the Ministry of Environment show that aggregated GHG emissions ( $CO_2$ eq) decreased from 1990 to 2010 3.3-fold, decrease in the energy sector - by 3.9 times, in industrial processes – by 3.4 times, in agriculture – by 2.4 times. During the same period, aggregated GHG emissions per capita decreased three-fold and aggregated GHG emissions per square kilometre decreased 3.3-fold. About 80%

<sup>90</sup> http://unfccc.int/files/meetings/cop\_15/copenhagen\_accord/application/pdf/moldovacphaccord\_app2.pdf

of these decreases took place between 1990 and 1995, when much of the industrial production in Moldova collapsed, but also when the major industrial region in the country, Transnistria, moved out of central government control and statistical data monitoring and reporting.

## Figure 21: CO, emissions in Moldova 1995-2011.



CO<sub>2</sub> Emissions from Fuel Combustion



#### Figure 22: CO, indicator comparison for Moldova.

The draft Low Emissions Development Strategy of Moldova to the year 2020<sup>91</sup> is now in the process of approval. This draft strategy has been developed within the UNDP project 'Support to Environmental Protection and Sustainable Use of Natural Resources', an activity implemented by the Climate Change Office of the Ministry of Environment with the financial support of the United Nations Development Programme (UNDP) Regional Bureau for Europe and the Commonwealth of Independent States (RBEC) and UNDP Moldova. This draft document provides a summary of the cost-effective mitigation options and their marginal abatement cost for the power generation sector (see Table 37).

<sup>91</sup> http://clima.md/lib.php?l=en&idc=236&, http://particip.gov.md/proiectview.php?l=ro&idd=929

Table 37: Cost-effective mitigation of	options and their marginal	abatement cost
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			Marginal abatement cost €/tC02						
	Capacity	Capital cost, € mln	Origina	source	Point Carbon	Assumption			
		Chill	5 ROR 20 % 20 % ROR		5 ROR 20 %	20 % ROR			
Wind power									
Case 1 - UNECE Case study	204 MW	288	-28.8	102.2	-2.2	134.9			
Case 2 - National Energy Policy	26 MW	26	-7.9	32.8	-1.7	131.8			
Case 3 - Institute of Power Engineering	20 MW	22.5	-44.4	61.4	-2.9	127.4			
Case 4 - CDM Windfarm South Moldova	50 MW	77	-10.6	117	4.4	147.5			
Case 5 - CDM Wind Waves	182 MW	273	-12.5	59.4	3.2	144.2			
Waste to Energy									
Chisinau Waste to Energy - UNECE Case		200	61	121.9	61	121.9			
Solar energy									
Residential water heating - NEP 2009		150	93.6	192.4	93.6	192.4			
Residential water heating - TNA		171	75.4	163.9	75.4	163.9			
Agricultural drying - TNA		3.6	23.4	72.6	23.4	72.6			
Solar PV-NEP 2009	6.3	19	214	609.6	214	609.6			
Energy from Biomass									
Biomass to energy - NEP 2009	25	75	-91.4	-74.1	123.3	229.8			
UNDP Biomass Study	300 kW	0.071	-15.6	7.7	-15.6	7.7			
Biogas - NEP 2009		3.5	22	166	22	166			
Biofuel - NEP 2009		7.2	-75.5	-75.2	26.2	31.9			
Hydropower									
Hydro plants - NEP 2009	60	66	-290.5	-70.8	-90.9	-32.2			
Micro hydro - Institute of Power Eng.	1.5	2.3	-77.6	3.5	-77.9	-0.7			
CHP upgrades - Institute of Power Eng.									
CHP-1, Chisinau, Upgrade		18	-23.1	16.3	-107	-28.2			
CHP-Nord, Balti		57	-260.9	-46.1	-4.5	179			
CHP-2, Chisinau		97.5	-87.6	-25.1	-88.2	-25.3			
New CHP	30	18	-109.5	-42.4	-109.5	-42.4			

Source: Draft Low Emissions Development Strategy of the Republic of Moldova to the year 2020

This draft strategy suggests that the technical tasks related to the implementation of the mitigation aspects of the Low Emission Development Strategy could be assigned to the Energy Efficiency Agency. The Energy Efficiency Fund could undertake the role of the trustee administering the low emission development finance. Monitoring, reporting and verification of the Low EmissionsDevelopment Strategy (LEDS) and National Appropriate Mitigation Actions (NA-MAs) should be assigned to the Climate Change Office and the Financing Carbon Office of the Ministry of Environment. The implementation of the Low Emission Development Strategy is to be assigned to the Low Emission Development Commission.

In 2006, the 'Moldova Biomass Heating in Rural Communities' project was realised under the Clean Development Mechanism (CDM).<sup>92</sup> This project aimed at GHG emission reduction as a result of energy efficiency improvements and fuel switching measures for a number of public buildings (kindergartens, schools, vocational schools, hospitals, polyclinics, etc.) located across Moldova. The goal of the project was to generate added value to the Moldova Social Investment Fund (SIF) II Project through GHG emission reduction benefits for SIF project participants by creating incentives. This would encourage further implementation of GHG mitigation measures.

The project covered 65 energy project activities (public buildings) in 25 districts (*rayons*) of Moldova. The owners of all public buildings involved in the project were local public authorities and the beneficiaries of the Community Development Carbon Fund project. The anthropogenic GHG emission reductions in this project were achieved as a result of:

- fuel switching from coal to natural gas;
- energy efficiency improvements of local heating systems (low-efficiency boiler/stove replacement by modern boilers; strengthening the insulation of external and internal heat and hot water distribution pipelines);
- implementation of energy conservation measures in buildings (additional insulation of building envelopes and replacement of roofs, windows and doors),

Completion of the last project boiler was on 9 April 2008. In this project, coal was substantially substituted by natural gas. More advanced technologies for heat production were used in the project. The new technologies employed increased the overall efficiency of the heating systems by 70 to 90%, resulting in energy savings and consequent reduction in GHG emissions. The first monitoring report for the period from 1 January 2008 30 April 2012 indicated Certified Emission Reductions (CERs) of 23,837 tCO<sub>2</sub>e during the monitoring period.

The first project in Moldova on energy production based on landfill gas is the 'Landfill Gas Recovery and Energy Production at the Tintareni Landfill Site', 35 km from Chisinau, project realised by the TEVAS GRUP Ltd.<sup>93</sup> The project's estimated amount of annual average GHG emission reductions is 63 378 t  $CO_2$ eq. The landfill surface area is about 22 ha and the depth of waste is 25 to 30 metres. This project aims at reduction of methane gas generated at the landfill by flaring and producing electricity from the collected gas. This landfill started its operation in 1991. Waste is expected to be disposed of at the landfill site until at least 2017 and the concession for landfill gas extraction is valid for 30 years starting from 2012. Approximately 3,000 m<sup>3</sup> of waste are disposed of at the landfill more than five days per week. Because of the lack of advanced alternative waste treatment technologies the volume of waste is steadily increasing. On average, around 1,000,000m<sup>3</sup> of municipal solid waste is estimated to be delivered annually. Installed power generation capacity is 320 kW. In 2014 this energy producer supplied 957 MWh to the grid.

Currently 21 local authorities are signatories to the Covenant of Mayors. Ten of them submitted local Sustainable Energy Action Plans, but there are as yet no monitored results. The Covenant of Mayors, a European Commission initiative, is a commitment by signatory towns and cities to go beyond the objectives of EU energy policy in terms of reduction of  $CO_2$  emissions through enhanced energy efficiency and cleaner energy production and use. Out of 10 submitted local Sustainable Energy Action Plans, eight areas targeted the overall  $CO_2$  emission reduction target of 20%, Ungheni 33% and Causeni 48%.

<sup>92</sup> http://cdm.unfccc.int/filestorage/9/Y/B/9YBJPXTIV65SC21QOMLHU3EWFGZAKN/0160%201%20MR.pdf?t=b1l8bm80c2FjfDA0IYSofr900k-41hT2LmC6, http:// cdm.unfccc.int/Projects/DB/DNV-CUK1133985755.59/view

<sup>93</sup> https://cdm.unfccc.int/filestorage/l/u/BFPGMOVQUHTIADYW32RES49NXKL0C5.pdf/PDD\_ver\_2.0.CDM\_1%5B1%5D.pdf?t=0ER8bm81YWUxfDCnCAp2LY1xh W9IHqSvHWmU

Assessment of progress and recommendations

## Assessment of progress and recommendations

Moldova depends almost entirely on imports of fossil fuels and electricity with natural gas providing two-thirds of its energy needs, all of which was imported from the Russian Federation (Russia) via Ukraine up to the end of 2014. In order to improve energy security and reduce resource dependency, Moldova has set ambitious objectives and targets to improve energy efficiency and to diversify the energy mix with more renewable energy resource development (National Development Strategy 'Moldova 2020').

In 2014, Moldova signed an Association Agreement with the European Union, following its membership of the Energy Community in 2010. Following this agreement, it has to make its legislation conform to the EU *acquis communautaire* until December 2017, i.e. core EU energy legislation related to electricity, oil, gas, environment, competition, renewables, efficiency and statistics. Moldova also plans to fully synchronise its electricity network with the European Network of Transmission System Operators for Electricity (ENTSO-E) by 2020 in order to connect to the European electricity market.

In recent years Moldova has achieved major progress in energy efficiency policies and programme development, though the progress in their implementation is still moderate. The main policy documents, programmes, laws and regulations include the following.

Strategies

- National Development Strategy 'Moldova 2020'
- Energy Strategy of Moldova until 2030
- Strategy on Wastes Management 2013-2027
- Environmental Strategy 2014-2023
- Strategy on Adaptation to Climate Change until 2020
- National Strategy for Agricultural and Rural Development 2014-2020
- National Strategy for Regional Development 2013-2015

National Programmes

- National Energy Efficiency Programme 2011-2020
- Urban Development Programme and its Implementation Plan 2013-2016
- National Action Plans and Government Activity Plans
- National Energy Efficiency Action Plan 2013-2015
- National Renewable Energy Sources Development Plan 2013-2020
- Implementation Action Plan for the Strategy on Adaptation to Climate Change until 2020
- Action Plan for Harmonisation of the Technical Regulations and National Standards in the Field of Construction with the European Legislation and Standards

Laws

- Law on energy efficiency
- Law on accession of Moldova to the Energy Community Treaty
- Law on energy performance of buildings
- Law on electricity (last amended on 27 March 2014),

- Law on heat and promotion of cogeneration
- Law on labelling of energy-related products
- · Law on eco-design requirements for energy-related products

The government needs to prioritise and timely develop all necessary secondary legislation and regulations to facilitate the implementation and attain the objectives of the adopted energy efficiency and renewable energy strategies, plans and programmes. It further needs to develop enforcement and implementation mechanisms for its policies and to provide incentives to attract necessary private investment in the energy efficiency and renewable energy sectors.

The energy market unbundling is in accordance with the provisions of the third energy package and EU directives. In 2014 the National Agency for Energy Regulation drafted the Rules of Electricity Markets. Heat supply in Chisinau is currently being restructured in an attempt to solve the numerous problems (including inefficient operation and distribution networks, less than optimal technical conditions and accumulating financial debt) of the existing district heating company.

The EEA is responsible for the implementation of the state policy on efficiency and renewable energy and for taking measures for the national targets to be achieved, but there is a pressing need to strengthen the institutional, human and financial capacity of the Agency to enable it to take a leading role in implementing energy efficiency and renewable energy policies and regulations within the country. Also, the local public administration authorities have limited institutional capacity and there is no clear mandate for the appointment of regional energy managers, which results in limited identification and implementation of the energy efficiency measures at the local and regional level.

## Recommendations

#### General Recommendations

- The government should consider the stability of legislative framework as an important precondition for attracting investments in the energy efficiency and renewable energy sectors.
- The government's energy policy should continue to reflect the potential contribution of energy efficiency towards decreasing fuel imports and supporting economic growth and the environment.
- Energy efficiency and renewable energy should continue to be given high priority by the government. Future energy policies should be supported by detailed analysis of economic energy efficiency potentials in all sectors of the economy. The barriers impeding the realisation of these potentials should be mitigated.
- The Ministry of Economy should strengthen its capacity to analyse and assess energy efficiency and renewable energy as a basis for future policy development.
- Efficient development of production, transmission and distribution assets in the gas and electricity sector is needed. This will maximise fuel burning efficiency and minimise the technical transmission and distribution losses.
- Energy strategies, policies and targets should be unified and their creation must be better coordinated on the national level.
- The level of transposition of the EU legislation in the energy efficiency sector is satisfactory. The emphasis needs to be on its practical implementation and proper enforcement on different levels.

## Institutional Framework

- Additional efforts are required to strengthen the capability and capacity building of various institutions that are important players in the energy sector. Special emphasis should be put on the Energy Efficiency Directorate within the Ministry of Economy and on the Energy Efficiency Agency.
- Dedicated authority, a clear mandate and a coordination function need to be given to the Energy Efficiency Agency. The role of the agency should be strengthened to enable it to take a leading role in implementing energy efficiency and RES policies and regulations within the country.
- Enhancement of inter-ministerial coordination is needed, in particular among other public policy-makers in the fields of energy, environment, transport, housing and industry.
- The government should consider ways and means to strengthen work on energy efficiency at regional, district and local levels, such as regional authorities and municipalities.
- The efforts of various stakeholders, including IFIs, professional and sector associations, universities, research centres and NGOs, need to be supported and included in the government's policy formulation and evaluation.
- The government needs to support research and development activities on renewable energy and energy efficiency technologies.
- The independence of the energy regulator needs to be guaranteed. It is crucial for the stability and proper functioning of the energy market.

#### Energy Market and Pricing

- The National Energy Regulatory Agency (ANRE) should continue to ensure that the energy prices are cost-reflective.
- The initiated restructuring of the electricity and gas market is commended. Complete liberalisation of the market is the necessary precondition for its sustainable development in the future (this relates to the energy community treaty obligations as well as the third liberalisation package).

## Specific Energy Efficiency Programmes and Measures

- The long-term targets and objectives are currently set by National Energy Efficiency Programme 2011-2020. It needs to be made operational through short-term energy efficiency action plans with priorities and intermediate monitoring and evaluation.
- After further assessment of energy efficiency potential, the government might consider setting sector-specific targets.
- The government should continue to establish high-efficiency standards for new and existing buildings, with a focus on energy efficiency labelling schemes and minimum energy performance standards. These should include both construction characteristics and use of buildings. The responsible authority should ensure that compliance and enforcement procedures are in place.
- The government should continue stimulating energy efficiency through a wide range of measures for the building and industry sectors, such as compulsory energy audits, benchmarking, dissemination of information on energy efficiency measures, and involvement of sector associations in communication and information campaigns.
- The government should further facilitate the development of the market for energy services through a wide range of measures, such as a support scheme for energy audits, simplified procedures for investments in energy efficiency projects, and simplified procedures for certification of energy efficiency companies.
- The government should continue to give priority to highly efficient cogeneration and district heating plants.
- Improving the qualifications of energy auditors, technicians and other energy professionals needs to be a priority regarding the efficient achievement of settled goals in the energy efficiency and RES sectors.
- The government should continue to promote the introduction of energy management systems in industry.
- Awareness raising and information dissemination activities to promote energy efficiency should be continued and enhanced, particularly in municipalities, households and SMEs.
- Moldova should enhance international cooperation through participating in various international energy efficiency-related initiatives like Horizon 2020 and other community programmes.
- The role of the district energy manager should be clearly defined to allow for better implementation of district energy efficiency programmes as stipulated by energy efficiency law.

## Renewable Energy Sources

- RES development should become a priority for Moldova. The finalisation of primary and secondary legislation, including stable and transparent support schemes is necessary.
- Support schemes should also cover the production of heat from renewable energy sources.
- The development of RES resources needs to be carefully considered in the light of comparative cost, grid access, stability of transmission network and dispatch. Considering the biomass potential of the country, further utilisation should be supported by development of necessary regulation, certification and quality control.

## Energy Efficiency Financing

- Sufficient financial resources are necessary for increasing energy efficiency in public as well as in private sectors. It is important to be able to introduce sustainable instruments for financing energy efficiency and RES from a long-term perspective. The Energy Efficiency Fund should consider reducing the grant component in favour of loans with attractive interest rates.
- When implementing energy efficiency projects, public authorities should give careful consideration to the tender documentation in order to ensure the selection of the best available products and services.
- The government should ensure a good coordination mechanism with IFIs and donor communities, including priority settings, monitoring at the national level, and compatibility with the overall national strategy on energy efficiency and renewable energy.
- The government should explore which financial incentives are most appropriate for stimulating energy efficiency in different sectors.

## Data Collection and Monitoring

- To support monitoring of achieved results, a centrally coordinated project database needs to be set up to collect data from all activities related to energy efficiency in Moldova. This will allow use of the bottom-up approach for evaluating the results of the national energy efficiency action plans and programmes.
- Results at the project level should be aggregated at the national level in order periodically to assess the implementation progress of national policies.
- The statistics on the building stock should be created first, so that they can be used to estimate the energy-saving potential of the building sector and support the policy-making and improvement process.
- The government should ensure full implementation of international environmental reporting standards and methodologies concerning renewable energy and energy efficiency.
- Usage of metering devices needs to be considered in different sectors. They are an important instrument in terms of consumer rights protection as well as a source of valuable data on energy consumption.

Annex I: Basic economic and primary energy data

# Annex I: Basic economic and primary energy data

## Table 38: Energy balance of Moldova 2005-2013, ktoe.

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Resources - total	2463	2430	2358	2410	2312	2401	2442	2358	2391
Internal sources	87	92	88	110	124	104	116	123	125
liquid fuel	10	7	16	26	38	31	31	29	28
solid fuel	70	78	69	77	81	66	78	91	93
hydroelectricity	7	7	3	7	5	7	7	3	4
Import	2185	2157	2115	2104	1973	2071	2150	2041	2084
liquid fuel	622	603	643	668	659	666	740	675	710
natural gas	1205	1201	1110	1057	977	1033	1015	971	932
solid fuel <sup>1</sup>	103	105	110	124	84	112	125	113	156
electricity	255	248	252	255	253	260	270	282	286
Stocks of fuel as for the beginning of the year	191	181	155	196	215	226	176	194	182
Distribution - total	2463	2430	2358	2410	2312	2401	2442	2358	2391
Internal consumption <sup>2</sup>	2278	2271	2160	2191	2071	2209	2237	2145	2160
transformation in order types of energy	842	817	767	764	716	737	717	704	717
production-technological needs	1436	1454	1393	1427	1355	1472	1520	1441	1443
of wich:									
industry and construction	161	163	156	142	85	107	118	125	130
agriculture	61	59	52	51	46	48	45	44	48
transport	267	285	325	336	291	358	383	369	505
trade and communal facilities	120	123	119	120	172	157	157	156	106
sold to population	704	691	598	632	660	689	708	639	521
other <sup>3</sup>	123	133	143	146	101	113	109	108	133
Export	3	4	7	5	15	18	14	27	42
Stocks of fuel end-year	182	155	191	214	226	174	191	186	189
<sup>1</sup> mainly coal									
<sup>2</sup> Calculated as: internal sources + import - export + changes in stoc	:ks								
<sup>3</sup> Including losses during storage and transportation									

Sources: Energy and fuel resources - Energy balance (thousand tonnes of oil equivalent), 2005-2012 and 2006-2013, National Bureau of Statistics of Moldova, 2015

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Electricity production	1,228.9	1,191.7	1,100.0	1,096.5	1,030.7	1,064.4	1,015.6	932.1	905.0
Electricity purchased from external sources <sup>1</sup>	2,973.8	2,887.1	2,933.9	2,968.6	2,943.6	3,037.9	3,149.5	3,282.4	3,331.2
Distributed electricity - total	4,202.7	4,078.8	4,033.9	4,065.1	3,974.3	4,102.3	4,165.1	4,214.5	4,236.2
including to:	2,682.2	4,078.8	4,033.9	4,065.1	3,974.3	4,102.3	4,165.1	4,214.5	4,236.2
industry	995.2	1,037.2	1,082.6	1,095.6	950.9	1,048.4	1,071.2	1,054.9	1,080.0
construction	46.7	47.8	34.2	36.5	26.0	27.4	33.7	21.6	11.6
transport	82.2	91.2	94.6	85.1	70.7	64.0	68.5	77.0	81.9
agriculture	141.2	146.7	84.6	61.2	65.5	63.6	64.0	67.4	77.0
population and lightening	1,040.1	1,148.2	1,293.0	1,366.7	1,446.7	1,510.8	1,540.9	1,573.0	1,609.5
including:									
rural	456.8	482.4	557.5	590.1	601.8	581.0	571.7	595.3	609.0
urban	583.3	665.8	735.5	776.6	844.9	929.8	969.2	977.7	1.001
budgetary institutions	209.7	237.6	280.0	266.3	250.7	245.1	248.3	245.9	262.6
including:									
state subordination	105.7	121.0	128.4	116.5	116.9	114.0	113.5	112.6	128.6
local subordination	104.0	116.6	151.6	149.8	133.8	131.1	134.8	133.3	134.0
water supply and sewerage system	134.6	144.4	155.1	159.3	145.7	144.5	146.9	154.4	135.6
communication companies & institutions	32.5	38.0	42.0	45.6	43.6	63.1	54.4	68.4	69.9
street lightning		21.3	27.6	32.7	41.7	37.5	40.9	27.0	39.1
trade companies		159.7	168.1	236.6	279.7	228.5	242.8	264.6	270.7
other companies		513.5	288.2	194.8	165.3	154.1	141.2	217.2	167.2
technological consumption of electricity in power distribution and supply grids		493.2	483.9	484.7	487.8	515.3	512.3	443.1	431.1

## Table 39: Electricity balance of Moldova (million kWh) 2005-2013.

<sup>1</sup>Including electricity received from Moldovan Thermoelectric Power Plant (MTPP/ CERSM/ MGRES)

Sources: Energy and fuel resources - Electricity balance in the national economy (million kilowatt-hour), 2005-2012 and 2006-2013, National Bureau of Statistics of Moldova

## Table 40: Structure of electricity balance in Moldova 2005-2013 (%).

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Electricity production	29.2	29.2	27.3	27.0	25.9	25.9	24.4	22.1	21.4
Electricity purchased from external sources <sup>1</sup>	70.8	70.8	72.7	73.0	74.1	74.1	75.6	77.9	78.6
Distributed electricity - total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
including to:									
industry	23.7	25.4	26.8	27.0	23.9	25.6	25.7	25.0	25.5
construction	1.1	1.2	0.8	0.9	0.7	0.7	0.8	0.5	0.3
transport	2.0	2.2	2.3	2.1	1.8	1.6	1.6	1.8	1.9
agriculture	3.4	3.6	2.1	1.5	1.6	1.6	1.5	1.6	1.8
population and lightening	24.7	28.2	32.1	33.6	36.4	36.8	37.0	37.3	38.0
including:									
rural	43.9	42.0	43.1	43.2	41.6	38.5	37.1	37.8	37.8
urban	56.1	58.0	56.9	56.8	58.4	61.5	62.9	62.2	62.2
budgetary institutions	5.0	5.8	6.9	6.6	6.3	6.0	6.0	5.8	6.2
including:									
state subordination	50.4	50.9	45.9	43.7	46.6	46.5	45.7	45.8	49.0
local subordination	49.6	49.1	54.1	56.3	53.4	53.5	54.3	54.2	51.0
water supply and sewerage system	3.2	3.5	3.8	3.9	3.7	3.5	3.5	3.7	3.2
communication companies & institutions	0.8	0.9	1.0	1.1	1.1	1.5	1.3	1.6	1.7
street lightning		0.5	0.7	0.8	1.0	0.9	1.0	0.6	0.9
trade companies		3.9	4.2	5.8	7.0	5.6	5.8	6.3	6.4
other companies		12.6	7.1	4.8	4.2	3.8	3.4	5.2	3.9
technological consumption of electricity in power distribution and supply grids		12.1	12.0	11.9	12.3	12.6	12.3	10.5	10.2

<sup>1</sup>Including electricity received from Moldovan Thermoelectric Power Plant (MTPP/ CERSM/ MGRES)

Sources: Energy and fuel resources - Electricity balance in the national economy (million kilowatt-hour), 2005-2012 and 2006-2013, National Bureau of Statistics of Moldova

## Table 41: Total final consumption of energy in Moldova in 2013.

thousand tons of petroleum e										
Supply and consumption, 2013	Total	Coal	Natural gas	Petroleum products	Biofuels & wastes	Electricity	Heat			
Final consumption, total	2.061	142	372	753	260	306	228			
Industry	257	55	58	16	1	75	52			
incl: food processing, beverages & tobacco	98	2	16	2	1	30	47			
Transport	586	-	6	575	-	5	-			
ind: auto	556	-	1	552	-	3	-			
Residential sector (population)	857	61	234	63	251	139	109			
Trade and public services	255	26	70	3	7	82	67			
Non-energy use	42	-	-	42	-	-	-			
							%			
Supply and consumption, 2013	Total	Coal	Natural gas	Petroleum products	Biofuels & wastes	Electricity	Heat			
Final consumption, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0			
Industry	12.47	38.73	15.59	2.12	0.38	24.51	22.81			
incl: food processing, beverages & tobacco	38.1	3.6	27.6	12.5	100.0	40.0	90.4			
Transport	28.43		1.61	76.36		1.63				
incl: auto	94.9		16.7	96.0						
Residential sector (population)	41.58	42.96	62.90	8.37	96.54	45.52	47.81			
Trade and public services	12.37	18.31	18.82	0.40	2.69	26.80	29.39			
Agriculture/ forestry	3.11		1.08	7.17	0.38	1.63				
Non-energy use	2.04			5.58						
							%			
Supply and consumption, 2013	Total	Coal	Natural gas	Petroleum products	Biofuels & wastes	Electricity	Heat			
Final consumption, total	100.0	6.89	18.05	36.54	12.62	14.85	11.06			
Industry	100.0	21.40	22.57	6.23	0.39	29.18	20.23			
incl: food processing, beverages & tobacco	100.0	2.04	16.33	2.04	1.02	30.61	47.96			
Transport	100.0		1.02	98.12		0.85				
incl: auto	100.0		0.18	99.28		0.54				
Residential sector (population)	100.0	7.12	27.30	7.35	29.29	16.22	12.72			
Trade and public services	100.0	10.20	27.45	1.18	2.75	32.16	26.27			
Agriculture/ forestry	100.0		6.25	84.38	1.56	7.81				
Non-energy use	100.0			100.00						

Source: Balanța Energetică a Republicii Moldova culegere statistică 2013, Chisinău, 2014, National Bureau of Statistics of Moldova, http://www.statistica. md/public/files/publicatii\_electronice/balanta\_energetica/BE\_2014\_rom.pdf,

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Company	Heat s	supplied ork, 1000	to the ) Gcal	Heat losses, 1000 Gcal			Heat losses, %			Heat supplied to consumers, 1000 Gcal			Share in total supplies, %		
company	2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
Termocom, Chisinau	1770.9	1717.7	1577.2	355.2	359.2	358.9	20.1	20.9	22.8	1415.7	1358.5	1218.3	84.6	85.4	85.8
Apa-canal, Chisinau	27.3	26.8	23.7	2.6	3.1	2.5	9.5	11.6	10.5	24.8	23.7	21.2	1.5	1.5	1.5
CET-Nord, Balti	214.9	213.3	183.1	41.1	49.1	35.1	19.1	23.0	19.2	173.9	164.2	148.0	10.4	10.3	10.4
Thermogaz, mun. Balti	12.7	12.8	10.9	1.2	1.3	1.1	9.4	10.2	10.1	11.4	11.5	9.8	0.7	0.7	0.7
Comgaz Plus, Ungheni	14.9	10.9	8.0	2.8	2.3	1.1	18.8	21.1	13.8	12.1	8.6	6.9	0.7	0.5	0.5
Retelele Termice Calarasi	8.0	6.2	4.1	2.6	2.0	1.3	32.5	32.3	31.7	5.4	4.2	2.8	0.3	0.3	0.2
Servicii Publice Cimislia	1.2	0.9	0.7	0.1	0.1	0.0	8.3	11.1	0.0	1.1	0.8	0.7	0.1	0.1	0.1
Retelele Termice mun. Comrat	7.1	6.6	6.0	0.2	0.2	0.2	2.8	3.0	3.3	6.9	6.4	5.8	0.4	0.4	0.4
Antermo, Anenii Noi	2.3	2.0	1.5	0.2	0.2	0.1	8.7	10.0	6.7	2.1	1.8	1.4	0.1	0.1	0.1
Retelele Termice Stefan Voda	1.3	1.2	1.0	0.1	0.1	0.1	7.7	8.3	10.0	1.2	1.1	0.8	0.1	0.1	0.1
Retelele Termice Cahul	7.4	5.1	0.7	0.2	0.2	0.0	2.7	3.9	0.0	7.3	4.9	0.7	0.4	0.3	0.0
Retelele Termice Glodeni	3.3	2.1	0.0	0.2	0.2	0.0	6.1	9.5	0.0	3.1	1.9	0.0	0.2	0.1	0.0
Retelele Termice Criuleni	1.9	1.3	0.4	0.3	0.4	0.2	15.8	30.8	50.0	1.7	0.9	0.3	0.1	0.1	0.0
Centrale si Retele Termice, Orhei	6.6	2.2	3.9	0.3	0.1	0.2	4.5	4.5	5.1	6.3	2.1	3.8	0.4	0.1	0.3
Total per regulated companies	2079.9	2009.3	1821.3	407.1	418.6	400.9	19.6	20.8	22.0	1672.9	1590.7	1420.4	100	100	100

Source: http://anre.md/files/raport/Raport%20anual%20de%20activitate%20a%20ANRE%20pentru%20anul%202013\_2.pdf
#### Table 43: Greenhouse gas emissions in Moldova 1990-2013.

									Modification, times			s	
	Unit	1990	1995	2000	2005	2010	2011	2012	2013	1990	1990	1990	2000
	Abcolu	to valuo	c of omi	ccione (	in (0, or	uivalor	<b>1</b>			1995	2000	2010	2010
Carbon diavida (CO.)	ADSOIU				0 4			NA	NA	2.1		4.0	1.4
	wit/year	55.4	11.0	0.4	0.4	0.9	INA	INA		-5.1	-5.5	-4.0	1.4
Methane (CH <sub>4</sub> )	Mt/year	4.6	3.8	3.1	2.9	2./	NA	NA	NA	-1.2	-1.5	-1./	0.9
Nitrous oxide (N <sub>2</sub> 0)	Mt/year	3.3	2.0	1.4	1.7	1.6	NA	NA	NA	-1.7	-2.4	-2.1	1.1
HFCs (HFC 32, HFC 125, HFC 134a, HFC 143a)	kt/ycar	NO, NE	1.9	13.4	39.4	102.4	NA	NA	NA				7.7
PFCS ( $CF_{4'}C_2F_6$ )	kt/year	NO, NE	NO, NE	NO, NE	NO, NE	0.0	NA	NA	NA				
Sulphur Hexafluoride (SF <sub>6</sub> )	kt/year	NO, NE	NO, NE	NO, NE	0.0	0.6	NA	NA	NA				
Aggregated emissions (CO <sub>2</sub> equivalents)	Mt/year	43.3	17.4	10.9	12.9	13.3	NA	NA	NA	2.5	4.0	3.3	1.2
Net emissions/removals by Land use, land use change, forestry (LULUCF)	Mt/year	-7,2	-1.2	-0.8	-0.1	0.0	NA	NA	NA	-6.2	9.2	272.0	0.0
Aggregated emissions including emissions /removals from LULUCF (CO <sub>2</sub> equivalents)	Mt/year	36.1	16.2	10.1	12.8	13.3	NA	NA	NA	-2.2	-3.6	-2.7	1.3
	Aggregat	ted emis	sions by	sector:	s (in CO <sub>2</sub>	equival	ents)						
Energy-total	Mt/year	34.5	11.7	6.7	8.5	8.9	NA	NA	NA	-2.9	-5.2	-3.9	1.3
of which - combustion in stationary sources	Mt/year	29.8	9.8	5.3	6.2	6,6	NA	NA	NA	-3.0	-5.6	-4.5	1.2
of which - combustion in mobile sources	Mt/year	4.1	1.3	0.9	1.7	1.9	NA	NA	NA	3.0	4.7	-2.1	2.2
of which • fugitive emissions	Mt/year	0.7	0.6	0.5	0.7	0.5	NA	NA	NA	-1.2	-1.4	-1,4	1.0
Industrial Processes	Mt/year	1.9	0.5	0.3	0.6	0.6	NA	NA	NA	-3.9	-6.8	-3.4	2.0
Solvent and other product use	Mt/year	0.1	0.0	0.0	0.1	0.1	NA	NA	NA	-2.4	-2.9	-1.7	1.7
Agriculture	Mt/year	5,1	3.4	2.3	2.4	2,1	NA	NA	NA	-1.5	-2.2	-2.4	0.9
Land use, land use change, forestry	Mt/year	7.2	-1.2	0.8	-0.1	0.0	NA	NA	NA	-6.2	-9.2	272.0	0.0
Waste	Mt/year	1.6	1.8	1.7	1.4	1.6	NA	NA	NA	-0.9	-1.0	-1.0	1.0
	<u></u>	pecific	emissio	ns (with	out LUL	UCF)							
Aggregated GHG emissions per capita	t CO <sub>2</sub> eq /capita	9.9	4.0	2.5	3.1	3.3	NA	NA	NA	-2.5	-3.9	-3.0	1.3
Aggregated GHG emissions per km <sup>2</sup>	1000 t CO <sub>2</sub> eq /km <sup>2</sup>	1.3	0.5	0.3	0.4	0.4	NA	NA	NA	-2.5	-4.0	-3.3	1.2
Aggregated GHG emissions per unit of GDP	t CO <sub>2</sub> eq / 1000 USD	4.4	4.4	3.1	2.6	2,3	NA	NA	NA	-1.0	-1.4	-1.9	0.7

Source: Time series data on the indicators for 1990-2013: Greenhouse gas emissions (GHG): Republic of Moldova, Official documents: Environmental indicators, Climate Change Office of Moldova, 2014, http://clima.md/lib.php?l=en&idc=264

Annex II: EU-MD Association Agreement: energy efficiency and renewable energy implementation

# Annex II: EU-MD Association Agreement: energy efficiency and renewable energy implementation

#### **Energy efficiency**

Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market

Timetable: that Directive's provisions shall be implemented within three years of the entry into force of this Agreement.

Commission Decision of 19 November 2008 establishing detailed guidelines for the implementation and application of Annex II to Directive 2004/8/EC of the European Parliament and of the Council (2008/952/EC)

Timetable: that the Decision's provisions shall be implemented within three years of the entry into force of this Agreement.

Commission Decision of 21 December 2006 establishing harmonised efficiency reference values for separate production of electricity and heat in application of Directive 2004/8/EC of the European Parliament and of the Council (2007/74/EC)

Timetable: that the Decision's provisions shall be implemented within three years of the entry into force of this Agreement.

Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings

Timetable: that the Directive's provisions shall be implemented according to the timeline agreed within the framework of the Energy Community Treaty.

Directive 2009/33/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of clean and energy-efficient road transport vehicles

Timetable: that the Directive's provisions shall be implemented within three years of the entry into force of this Agreement.

Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 on establishing a framework for the setting eco-design requirements for energy-related products

Timetable: that the Directive's provisions shall be implemented within three years of the entry into force of this Agreement.

#### Implementing Directives/Regulations:

- Commission Regulation (EC) No 278/2009 of 6 April 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to eco-design requirements for no-load condition electric power consumption and average active efficiency of external power supplies
- Commission Regulation (EU) No 347/2010 of 21 April 2010 amending Commission Regulation (EC) No 245/2009 as regards the eco-design requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps
- Commission Regulation (EC) No 245/2009 of 18 March 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to eco-design requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps

- Commission Regulation (EC) No 244/2009 of 18 March 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to eco-design requirements for non-directional household lamps
- Commission Regulation (EC) No 107/2009 of 4 February 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to eco-design requirements for simple set-top boxes
- Commission Regulation (EC) No 1275/2008 of 17 December 2008 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment
- Commission Regulation (EC) No 641/2009 of 22 July 2009 implementing Directive 2005/32/ EC of the European Parliament and of the Council with regard to eco-design requirements for glandless standalone circulators and glandless circulators integrated in products
- Commission Regulation (EC) No 640/2009 of 22 July 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to eco-design requirements for electric motors
- Commission Regulation (EC) No 643/2009 of 22 July 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to eco-design requirements for household refrigerating appliances
- Commission Regulation (EC) No 642/2009 of 22 July 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to eco-design requirements for televisions
- Council Directive 92/42/EEC of 21 May 1992 on efficiency requirements for new hotwater boilers fired with liquid or gaseous fuels

Timetable: the provisions in the framework Directive as well as in the relevant existing implementing measures shall be implemented within three years of the entry into force of this Agreement.

Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products

Timetable: to be implemented according to the timeline agreed within the framework of the Energy Community Treaty.

#### Implementing Directives/Regulations:

- Commission Directive 2003/66/EC of 3 July 2003 amending Directive 94/2/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations
- Commission Directive 2002/40/EC of 8 May 2002 implementing Council Directive 92/75/ EEC with regard to energy labelling of household electric ovens
- Commission Directive 2002/31/EC of 22 March 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household air-conditioners
- Commission Directive 1999/9/EC of 26 February 1999 amending Directive 97/17/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household dishwashers

- Commission Directive 98/11/EC of 27 January 1998 implementing Council Directive 92/75/EEC with regard to energy labelling of household lamps
- Commission Directive 97/17/EC of 16 April 1997 implementing Council Directive 92/75/ EEC with regard to energy labelling of household dishwashers
- Commission Directive 96/89/EC of 17 December 1996 amending Directive 95/12/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household washing machines
- Commission Directive 96/60/EC of 19 September 1996 implementing Council Directive 92/75/EEC with regard to energy labelling of household combined washer-driers
- Commission Directive 95/13/EC of 23 May 1995 implementing Council Directive 92/75/ EEC with regard to energy labelling of household electric tumble driers
- Commission Directive 95/12/EC of 23 May 1995 implementing Council Directive 92/75/ EEC with regard to energy labelling of household washing machines
- Commission Directive 94/2/EC of 21 January 1994 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations
- Council Directive 92/75/EEC of 22 September 1992 on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances

Timetable: the provisions in the framework Directive as well as in the relevant existing implementing measures shall be implemented according to the timeline agreed within the framework of the Energy Community Treaty.

Regulation (EC) No 106/2008 of the European Parliament and of the Council of 15 January 2008 on a Community energy-efficiency labelling programme for office equipment

Timetable: that the Regulation's provisions shall be implemented within three years of the entry into force of this Agreement.

Council Decision No 2006/1005/EC of 18 December 2006 concerning conclusion of the Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment

Timetable: that the Decision's provisions shall be implemented within three years of the entry into force of this Agreement.

Regulation (EC) No 1222/2009 of the European Parliament and of the Council of 25 November 2009 on the labelling of tyres with respect to fuel efficiency and other essential parameters

Timetable: that the Regulation's provisions shall be implemented within three years of the entry into force of this Agreement.

#### **Renewable energy**

Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable energy sources

Timetable: that the Directive's provisions shall be implemented according to the timeline agreed within the framework of the Energy Community Treaty.

ANNEX III: MoSEFF: Eligible project types

# Annex III: MoSEFF: Eligible project types<sup>94</sup>

#### Standard Technologies

50		1		
	Turno of president	Draiget avamples	Technical r	equirements
	Type of project	Project examples	Small projects	Large projects
1	Rehabilitation of boilers	Enhanced controls, economisers, improved insula- tion, regenerative burners, automatic blow-down, etc.		1
2	Replacement of old gas boilers with new low- emission boilers	Replacement of an old gas or coal boiler with a state new gas boiler	Efficiency at	full load>85%
3	Switch from electricity heating to fuel based heating	Replacement of an electric heating system with a gas boiler	Automatic feeding, eff	iciency at full load ?75%
4	Biomass heat only and CHP plants	Installation of wood chip boiler or pellet boiler	Efficiency of combus	stion at full load ?75%
5	Biogas heat only and CHP plants	Communal solid waste, waste water, animal breed- ing manure, agricultural waste	Efficiency of combus	stion at full load ?85%
6	Process improvements including enhanced control, measurement and metering	Process inspection with specialised cameras which inspect products in process to ensure that faulty products are removed from production before too much extra process value is added		
7	Rehabilitation of steam distribution systems	Installation of steam traps, increased condensate recovery, replacement of pipe insulation, etc.		
8	Installation of new furnaces, kilns, ovens, etc.	Replacement of old furnaces, ovens or kilns	Reduction of the specific	consumption of fuel >15%
9	Rehabilitation of heat (hot water) distribution systems	Replacement of pipe insulation	Reduction of losses by 20%	
10	Rehabilitation of power distribution systems	Replacement of old or oversized transformers, installation of capacitors to reduce reactive power consumption, etc.	Reduction of	losses by 20%
11	Installation of heat recovery from production processes	Installation of economizers for pre-heating purposes, heat recovery for space heating, heat recovery for drving, etc.	Efficiency of r	ecovery > 30%
12	Rehabilitation of compressed air systems	Replacement of compressors, installation of variable speed drives, installation of control systems		
13	Additional thermal insulation of walls	Thermal insulation with stone wool, polyurethane foam or polytyrol boards	Average temperature o transfer improves b	lifference is > 10 K, Heat y ?U > 0.60 W/m²*K
14	Additional thermal insulation of roof structures dividing environments	Thermal insulation with stone wool, polyurethane foam or polytyrol boards	Average temperature o transfer improves b	lifference is > 10 K, Heat y ?U > 1.00 W/m²*K
15	Additional thermal insulation of floors dividing	Thermal insulation with stone wool, polyurethane	Average temperature of transfer improves h	lifference is $> 10$ K, Heat
16	Installation of rolling doors or door lockers	Installation of rolling doors with closed cell ure- thane foam insulation: replacement of door lockers		y :0 > 0.40 w/m K
17	Installation of new windows	Replacement of single glazed wooden windows with 2-3 glazed windows or windows with coating or gas filling	Uwo ?2.	1 W/m²*K
18	Installation of individual heat exchanger stations	Installation of heat recovery systems in ventilation systems	Automatic weather a	and/or demand-based
19	Hydraulic and hydronic balancing of heat and cold distribution systems	Installation of automatic flow limiting valves		
20	Plate solar thermal collectors	Installation of solar collectors for hot water preparation	Conversion factor ? 0.7	0; loss coefficient a1?4.0

94 http://www.moseff.org/fileadmin/files/doc/LEP\_List\_of\_eligible\_projects.pdf

Be	Best Available Technologies		
1	On site co-generation and tri-generation		
2	Absorption or evaporative cooling systems		
3	Installation of new multi-stage operated chillers (compressors)		
4	Turbo-compressors with inflow choke control		
5	Heat pumps	COP>3.2 under nominal operation conditions	
6	Condense gas boilers	Full load efficiency ?95%	
7	Installation of Variable Speed Drives on selected electric motors, fans, pumps and drives		
8	Implementation of Energy Management Systems, Energy Monitoring, Building Management		
9	Dynamic balancing of heating and cooling systems		
10	New low-emission transparent structures (windows, glazed walls, facades)	e<0.5 and U<1.2 W/m <sup>2</sup> *K	
11	Any transparent structures (including glazing and frames)	U<1.2 W/m².K	
12	Transparent thermal insulation with total solar energy transmittance under diffuse radiation		
13	Vacuumed solar thermal collectors	Conversion factor ? 0.70; loss coefficient a1 ? 1.8	
14	Any thermal insulation	Coefficient of conductivity I<0.035 W/m.K	
15	Logarithmic, scene or any dynamic lighting system.		

Annex IV: Implementation in 2013 and 2014 of the mid-term Expenditure Strategy for the energy sector of Moldova.

# Annex IV: Implementation in 2013 and 2014 of the mid-term Expenditure Strategy for the energy sector of Moldova.

2014

Policy actions (measures), 2014	Budgetary expension 1000	nditures MDL
Middle-term policy objectives / Planned / Realised	adjusted plan	rea
Sub-program 5801: "Policy development and management in the energy sector"		
<ul> <li>Strengthening institutional capacity in the energy sector, particularly in energy efficiency and RES <ul> <li>implementation of the state policy in the field of energy efficiency and RES, including: efficient operation of the AEEand</li> <li>Information Desk for investors in RES and energy efficiency (Governmental Action Plan (GAP) for 2014, Governmental</li> <li>Decision (GD) nr. 164 of 05.03.2014,</li> <li>on-going implementation of NEEP, NEEAP and NREAP;</li> <li>4 LEEAP and 7 LEEP were developed and approved by the local public authorities (LPAs) and coordinated with AEE;</li> <li>2 Guidelines were developed in energy efficiency and RES: Guideline for the economic evaluation of energy efficiency and RES projects and Guideline for the promotion of energy co- and tri-generation technologies in R. Moldova. The elaboration of wind atlas in R. Moldova is on going.</li> <li>more than 200 consultations were offered during 2014 by the Information Desk to the local public authorities, investors, individuals and companies interested in investing in energy efficiency and RES projects.</li> <li>Nr. of implemented programs and action plans - 3; nr. of local programs and action plans coordinated with AEE - 35; nr. of elaborated Guidelines for the investors and Codes - 2 per year; nr, of consultancies offered by the Information Desk - 200</li> </ul> </li> </ul>	15,983.3	
per year,	(expected	outcome
<ul> <li>- 7, in: of local programs and action plans - 5, in: of local programs and action plans coordinated with Acce -11; nr. of elaborated Guidelines for the investors and Codes - 3; nr. of consultancies offered by the Information Oesk - over 200;</li> </ul>	(achieved	d results)
0; 24 less: LEEP and LEEAP are elaborated based on the LPA initiative, AEE coordinates the process and the outcome; 1; 0	(general)	outcome,
<ul> <li>Chamma provided for 32 energy managers and automisations issues for 40 energy automs (15 legal effitues and 25 individuals);</li> <li>following publication on 10.10.2014 of the Law on the energy performance of buildings, nr. 128 of 11.07.2014, a number of activities for the implementation of this Law will be launched, including those aimed at establishing the market for buildings' energy performance certification, training of the buildings' administrators, etc.</li> <li>Nr. of trained energy managers - 35 per year; nr. authorised energy auditors - 100 per year; nr. of authorised energy evaluators - 25 per year; nr. of trained buildings' administrators and energy inspectors - 50 per year;</li> <li>Nr. of trained energy managers - 35; nr. authorised energy auditors - 40; nr. of authorised energy evaluators 0, nr. of trained buildings' administrators and energy inspectors - 0;</li> <li>0; 60 less: AEE provides trainings for energy auditors, but the success rate at final tests, for obtaining the authorisation, is low; 25 less: the Law on the energy performance of buildings was published at the end of 2014, thus there were issued no authorisations for energy evaluators during 2014; 50 less: training of the buildings' administrators and energy inspectors is to be launched soon, following publication of the Law on the energy performance of buildings.</li> <li>financing the energy audits in public buildings (GAP-2014, GD nr, 164 of05,03.2014, point, 158);</li> </ul>		
<ul> <li>- 158 energy audits (dossiers) were submitted before 31.12.2014 within EEF Call nr. 3 (public sector).</li> <li>- AEE financed additional 45 activities on energy auditing of the cultural buildings.</li> <li>Nr. of completed energy audits -100 per year;</li> </ul>		
Nr. of completed energy audits - 203;		
+103		
Raising public awareness and knowledge on energy efficiency and RES issues		
<ul> <li>- implementation of the Communication Strategy in energy efficiency and RES (GD nr. 833 of 10.11.2011 on NEEP for 2011-2020)</li> <li>- 16 events were organised for promotion of energy efficiency and the use of RES, with about 1500 participants;</li> <li>- print runs: "MOLDOVA ECO ENERGETICA 2013" magazine - 2840 pcs, "MOLDOVA ECO ENERGETICA 2014" magazine - 1600 pcs; Guidelines for economic evaluation of the energy efficiency and RES projects - 500 pcs; promotional leaflets - 30000 pcs and A2+ posters - 800 pcs for the Program implementation activities of AEE and Moldova Energy and Biomass</li> <li>Nr. of organised events - 6 per year; nr. of participants at those events - 400 per year; nr. of published promotional materials</li> </ul>		

Policy actions (measures), 2014	Budgetary exper 1000	nditures in 2014, MDL
Middle-term policy objectives / Planned / Realised	adjusted plan	realised
Nr. of organised events -16; nr. of participants at those events -1500; nr. of published promotional materials - 35740;		
+10; +1100; +10740		
<ul> <li>Development of the database on energy efficiency and RES         <ul> <li>development of the database on energy efficiency and RES (GD nr. 833 of 10.11.2011 on NEEP for 2011-2020);</li> <li>the biomass module in the database "db.aee.md" was further developed by adding the following data layers: i)             heating systems based on solid biofuels installed in rural public institutions; ii) list of solid biofuels producers in R.             Moldova; iii) energy potential of solid biomass - total per R. Moldova;</li> <li>as part of the database review and up-date process, data collection from LPAs on the implemented and initiated             street lighting rehabilitation projects, as well as, on public buildings within the territory of LPAs is currently             on-going;             update and verification of data on public buildings is done on continuous basis.             Nr. of new developed modules - 2 per year;</li> </ul> </li> </ul>		
Nr. of new developed modules - 2;		
0		
Elaboration and adoption of the legal and regulatory framework for energy efficiency and RES according to acquis communautaire, as well as, of the relevant studies elaboration of the legal and regulatory framework and of the relevant studies on energy efficiency and RES (GAP-2014, GD nr. 164 of05.03.2014, point 152) During 2014, the following laws were elaborated and/or adopted: - Law on eco-design requirements for energy-related products, nr. 151 of 17.07.2014; - Law on labelling of the energy-related products, nr. 44 of 27.03.2014; - Law on energy performance of buildings, nr. 128 of 11.07.2014; - Governmental Decision nr. 200 of 20.03.2014 on adoption of Regulations on requirements for energy from RES Governmental Decision nr. 1003 of 10.12.2014 on adoption of Regulations on requirements for energy labelling of energy-related to the energy efficiency and RES, were elaborated: - Impact analysis of taxation system on producers of biofuels; - Study on quality assessment of LED street lights existent in R. Moldova; - Study on assessment of the national energy efficiency potential. Nr. of legal and regulatory documents elaborated and adopted - 3 per year; nr. of studies performed - 1 per year;	2,222.0	2,069.9
N. or regarantic regulatory documents elaborated and adopted = 3, nr. or studies performed = 3,		
+2,+2 Total per sub-program thousands MDI	18 205.3	7.655.5
	10,203.5	1,055.5
Sub-program 5802: "Development of the national natural gas supply system"		
Build-up natural gas system interconnection with Romania by 2015         - construction of the gas pipeline Ungheni-laji (CAP-2014, CD nr. 164 of 05.03.2014, point 149)         Operation of the gas pipeline Ungheni - laji was launched on 27.08.2014: total length of 43,2 km, including 10,48 km on the territory of R. Moldova and the capacity of 1.5 bcm/year. Construction of the gas metering station for gas pipeline Ungheni - laji was completed.         5,2 km of the interconnecting gas pipeline built; 1 - gas metering station built	114,319.9	109,581.7
10,48 km; 1		
+5,28 km;0		
Total per sub-program, thousands MDL	114,319.9	109,581.7

Sub-program 5803: "Electricity grids"		
Increase of electricity transportation grids efficiency through electricity loss reduction by up to 2,8% by 2016		
<ul> <li>Strengthening institutional capacity in the energy sector, particularly in energy efficiency and RES <ul> <li>Program on rehabilitation of the electricity transportation grids (EBRD, EIB, EC) (National Development Strategy "Moldova 2020", adopted by Law nr. 166 of 11.07.2012, priority "Energy: supplied reliably, used efficiently").</li> <li>During 2014 the following activities were realised: <ul> <li>during February-April, 2014 the process of pre-qualification for Tenders A and B was launched;</li> <li>on 28.05.2014 EBRD loan preparatory procedures were completed. Financing structure was changed as follows: tenders A and C - EIB, tenders B and D - EBRD and EU;</li> <li>in august 2014 EIB approved prequalification results for tender A and EBRD for tender B. Prequalification procedure was launched for tender C.</li> <li>in parallel with on-going procedures on tenders A, B and C, TSO "Moldelectrica" launched self—financed projects for reconstruction of 5 grid lines for tender D, which are being now assessed for conformity with European standards and for possibility of launch of tender D.</li> <li>Length of rehabilitated electricity transportation grids - 27,6 km; number of electric equipment installed/replaced 12; rebuilt substations -1</li> </ul> </li> </ul></li></ul>	79486.7	0
Length of rehabilitated electricity transportation grids - 0 km; number of electric equipment installed/replaced - 0; rebuilt substations - 0		
-27,6 km;-12;-1		
Increase of security of energy supply through electricity interconnection grids with EU - elaboration of the feasibility study on interconnection of electricity transportation systems of R. Moldova and Ukraine with ENTSO-E (National Development Strategy "Moldova 2020", adopted by Law nr. 166 of 11.07.2012, priority "Energy: supplied reliably, used efficiently"; GAP-2014, GD nr. 164 of 05.03.2014, point 150). On 06.11.2014 the service contract have been signed with ENTSO-E with the deadline of 31.12,2015, following that the first tranche of finances for R, Moldova have been disbursed for the feasibility study and, respectively, transferred to ENTSO-E 18,238.4 thousands MDL for the start of the work on study. Feasibility study completed -1	18833.4	18494.1
Feasibility study completed - 0		
To be completed by 31.12.2015		
Total per sub-program, thousands MDL	98320.1	18494.1
Sub-program 5804: "Energy efficiency and RES"		
<ul> <li>Decrease of energy intensity;</li> <li>increase of use Of RES;</li> <li>improvement of energy performance of buildings;</li> <li>implementation of energy efficiency and RES projects through the Energy Efficiency Fund (National Development Strategy "Moldova 2020", adopted by Law nr. 166 of 11.07.2012, priority "Energy: supplied reliably, used efficiently"; GAP-2014, GD nr. 164 of05.03.2014, point 157).</li> <li>For financing energy efficiency and RES projects, EEF launched 5 calls for projects (APP), including 3 in public sector.</li> <li>87 projects with the total amount of 201.4 mln MDL, including EEF's contribution of 149.3 mln MDL were ap- proved within APP nr.l, for public sector, launched in 2012. EEF's contribution to this call is of maximum 80% from the total amount. During 2014 money were disbursed for 75 projects and for this call in amount of 50.0 mln MDL.</li> <li>for 3 calls launched in 2014 (APP nr. 3, nr. 4, nr. 5), for public and private sectors, available funds were of 350 mtn MDL for energy efficiency and RES, money left non-used in the preceding years. The procedures for projects evaluation and approval were defined with time lags resulting in delayed use of EEF's funds. Currently the legal framework for EEF's operation is in place, Operational Manual is completed, a number of quality criteria are established, etc.</li> <li>Energy efficiency and RES projects: 150 in 2014; rate of funds use -100%;</li> </ul>	172,680.0	
Energy efficiency and RES projects - 75; rate of funds use - 0%;		
-75; -100%		

<ul> <li>capacity building in energy efficiency and RES (project "Technical Assistance for Capacity Building to Sustainable Energy Management", financed by Swedish Government) (National Development Strategy "Moldova 2020", adopted by Law nr. 166 of 11.07.2012, priority "Energy: supplied reliably, used efficiently"; GD nr. 833 of 10.11.2011 on NEEP for 2011-2020)</li> <li>this project supported EEF and the Ministry of Economy in harmonisation of the national energy efficiency and RES legislation with acquis communautaire.</li> <li>3 modules of training courses on capacity building were provided during 2014 to employees of the Ministry of Economy, AEE, EEF, Ministry of Regional Development and Construction, ANRE organised within the project "Technical Assistance for Capacity Building to Sustainable Energy Management in R. Moldova";</li> <li>3 study visits were organised to Sweden, Spain and Italy with participation of 19 employees of the Ministry of Economy and EEA aimed at exchange of experiences.</li> <li>Degree of project's ToR completion -100%; degree of project fund's use -100%</li> </ul>	15,471.5	3,785.0
Degree of project's ToR completion - 97%; degree of project fund's use - 97%		
-3%;-3%		
Inspection of the energy-related products - inspection and testing of the energy-related products (GD nr. 833 of 10.11.2011 on NEEP for 2011¬2020) - Testing of the low-voltage energy-related household equipment will be launched in 2015, following entry into force of the Governmental Decision nr. 1003 of 10.12,2014 on adoption of Regulations on requirements for energy labelling of energy-related products.	228.1	
<ul> <li>- during 2014, 34 inspections of energy-related products were realised.</li> <li>Extension of the Moldova Energy and Biomass project. During reporting period of time the following results were achieved within this project:         <ul> <li>160 public institutions from 127 rural communities were connected to the modern heating systems on biomass;</li> <li>593 grants were provided aimed at marketing and installation of the biomass heating systems, including replacement or supplementing of traditional heating systems.</li> <li>(GD nr. 833 of 10.11.2011 on NEEP for 2011-2020)</li> <li>Nr. of inspections - 30 per year; nr. of testing - 3 per year;</li> </ul> </li> </ul>	21,575.2	20,111.8
Nr. of inspections - 34; nr. of testing - 0; nr. of institutions connected to the modern heating systems on biomass -160; nr. of grants provided for marketing and installation of biomass heating systems - 593		
4;-3: legal and regulatory framework for testing process was adopted by GD nr. 1003 of 10.12.2014.		
Total per sub-program, thousands MDL	209,954.8	23,896.8
Sub-program 5805: "Development of heating sector"		
<ul> <li>Implementation of the short-term investment plan of "Termocom" JSC, according to technical requirements</li> <li>finalisation of the documentation for implementation of corporative, institutional and financial reform in the heating sector in mun. Chisinau (GAP-2014, HG nr. 164 of 05.03.2014, point 155).</li> <li>on 15.10.2014, based on the GD nr. 318 of 07.05.2014 on reorganisation of some companies in the heating sector, the merger by absorption was completed for "CET-1" JSC by "CET-2" JSC.</li> <li>Merger of "CET-2" JSC and "Termocom" JSC (technologic circuit) was completed after the Court Decision of 01.12.2014 on approval of sale-purchase contracts.</li> <li>Thus, "CET-2" JSC was reorganised through merger with "CET-1" JSC and "Termocom" JSC. Merger documentation completed; heat &amp; power company created; technical specifications completed - 5; final report approved - 1;</li> </ul>	6,600.0	5,534.6
Set of merger documentation completed -3; heat & power company created -1; technical specifications completed - 5;		
Tinal report approved – U; 2; 0; 0; -1: Final report on project "Reform of the energy sector and increase of efficiency in the energy sector of R. Moldova"		
should be completed before the end of the project - 30.06.2015.	6 600 0	5 534 6
Total per sus program, disusande MDI	447 400 1	165 162 7
iotai per program, ciousanus MDL	447,400.1	105,102./

Source: Raport privind implementarea Strategiei sectoriale de cheltuieli in domeniul energetic pentru 2014 Ministry of Economy, April 2015, http://www.mec.gov.md/ro/content/strategii-de-cheltuieli-domeniul-energetic

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Program 5800: "Energy sector development"		
Policy actions (measures), 2013	Budgetary ex 2013,10	penditures in 00 MDL
Middle-term policy objectives / Planned / Realised	adjusted plan	realised
Sub-program 5801: "Policy development and management in the energy sector"		
<ul> <li>Strengthening institutional capacity in the energy sector, particularly in energy efficiency and RES         <ul> <li>strengthening the implementation capacity for energy efficiency and RES policies, including: elaboration of programs and action plans, provide consultative and informational assistance, development and maintenance of the informational database, etc.</li> <li>during 2013,10 employees of the AEE were trained in the field of energy efficiency and RES.</li> <li>on 07.02.2013 the first NEEAP, for 2013-2015, was approved through the Governmental Decision nr. 113.</li> <li>on 27.12.2013 the first NREAP, for 2013-2020, was approved through the GD nr. 1073.</li> <li>AEE provided consultative services to the energy managers, energy auditors, public and private sector representatives, representatives of the foreign companies acting in EE and RES, etc., with an average weekly number of consultations of 100-150.</li> <li>during 2013, AEE developed a module on "Public buildings" in its EE and RES database.</li> <li>Nr. of programs and action plans developed - 3; nr. of consultations provided -100</li> </ul> </li> </ul>	4,205.5	2,615.4
Nr. of programs and action plans developed - 2; nr. of consultations provided - 100-150/week.		
-1: the work on drafting the NEEAP for 2016-2018 should be launched in 2014.		
<ul> <li>training of energy managers, energy auditors, energy inspectors and building administrators         During 2013 the following activities were realised:         <ul> <li>29 (out of 35) energy managers designated by LPAs were trained on application of the legal and regulatory             framework in energy auditing, use of biomass, production of biogas, use of available financial instruments in EE             and RES, etc.</li> <li>70 energy auditors received training by AEE in collaboration with INOGATE program. At the same time, 63 people             participated in the Training course on energy auditing.</li>             Nr. of trained energy managers - 35; nr. of authorised auditors -100</ul></li> </ul>		
Nr. of trained energy managers - 29: nr. of authorised auditors - 55		
<ul> <li>-6: some LPAs designated the energy managers by the end of 2013, thus their involvement in trainings was reduced; -45: during 2013, out of 133 participants in trainings on energy auditing 55 received authorisation to act as energy auditors.</li> <li>Awareness raising and knowledge dissemination in energy efficiency and RES;</li> <li>- implementation of the Communication Strategy in energy efficiency and RES, including annual organisation of the workshops, conferences, exhibitions, publishing manuals on energy efficiency and RES for pupils         <ul> <li>- during the reporting period 24 events were organised (seminars, conferences, round tables and exhibitions) on promotion of energy efficiency and RES</li> <li>Nr. of events organised - 6; nr. of event's participants - 350;</li> </ul> </li> </ul>		
Nr. of events organised - 24		
+18; esimative number of participants per event was between 30-60. During Gala event "Moldova Eco-Energetica" participated around 300 people.		
<ul> <li>Elaboration and adoption of the legal and regulatory framework for energy efficiency and RES according to acquis communautaire, as well as, of the relevant studies.</li> <li>elaboration of legal and regulatory framework on energy efficiency and RES</li> <li>during 2013, in order to improve legislative and regulatory framework in energy efficiency and RES, 7 draft legislative and regulatory documents were elaborated and 3 of them were adopted:</li> <li>Governmental Decision on energy services - adopted by GD nr. 1093 of 31.12.2013;</li> <li>Governmental Decision of Agnoval of Regulation on solid biofuels - adopted by GD nr. 1070 of 27.12.2013;</li> <li>Draft Law on promotion of use of energy from RES - approved at Governmental meeting of 26.02.2014;</li> <li>NREAP for 2013-2020 - approved by GD nr. 1073 of 27.12.2013;</li> <li>Draft Law on energy labelling - approved by GD nr. 1095 of 31.12.2013;</li> <li>Draft Law on a number of amendments to existing legislation - passed approval procedure and submitted to the Government for approval;</li> <li>Draft Law on eco-design requirements for energy-related products - passed approval procedure and submitted to the Government for approval.</li> </ul>		

Nr. of legislative and regulatory documents elaborated and adopted - 7		
0		
- elaboration of studies on energy efficiency and RES		
Nr. of studies completed -1		
0		
- purchase and adoption of European and international standards in the energy sector.	560.0	-
due to non-transfer of the due amount of 560,000 MDL from the State Treasury, the purchase and adoption in		
2013 of European and international standards was not possible.		
Total per sub-program, thousands MDL	4,765.5	2,615.4
Sub avogram 5907: "Douglasmont of the national natural gas supply system"		
Sub-program Sov2: Development of the national natural gas supply system		
<ul> <li>realisation of the project on interconnection of the national natural gas transportation systems of R. Moldova and Romania through gas pipeline "Ungheni-laşi"</li> <li>On 27.08.2013 the construction of interconnecting gas pipeline Ungheni - laşi between R. Moldova and Romania was launched. 10,48 km of gas pipeline and a gas metering station are to be build by the end of 2014 in R. Moldova.</li> </ul>	56,967.1	29,602.0
<ul> <li>- construction of the local gas supply networks.</li> <li>- initial amount of money considered for these activities in the Expenditure Strategy for energy sector for 2013-2014 was of 25730 thousands MDL, which was subsequently reduced to 2375.0 thousands MDL, as a result only 6 km of local gas pipelines were built financed from budgetary sources.</li> <li>Nr. of connected consumers - 5000; length of constructed local gas pipeline - 220 km</li> </ul>	2,375.0	
Nr. of connected consumers - 200; length of constructed local gas pipeline - 6 km		
4800 of new consumers less; -114 km		
Total per sub-program, thousands MDL	59,342.1	29,602.0
Sub-program 5804; "Energy efficiency and RES"		
<ul> <li>Decrease of energy intensity and increase of use of RES;</li> <li>Improvement of energy performance of buildings;</li> <li>implementation of energy efficiency and RES projects, including energy performance of buildings (EEF)</li> <li>EEF is responsible for Implementation of energy efficiency projects. By the end of Q4, 2013, 87 pre-contracts were approved and signed for financing energy efficiency projects in public sector in the total amount of about 135 mln MDL. Final financing decisions due in January-April</li> <li>Projects implementation rate -100%; use of available funds rate -100%; energy efficiency and RES projects - 35</li> </ul>	197,466.7	192,466.7
Projects implementation rate - 0%; use of available funds rate - 0%; energy efficiency and RES projects - 0		
100: during 2013, FFF worked on the development and adjustment of regulatory framework on projects' regulirements		
and approval procedure, and that caused lags in financing energy efficiency projects; -100; -35: signing projects' financing agreements due in January-April 2014.		
and approval procedure, and that caused lags in financing energy efficiency projects; -100; -35: signing projects' financing agreements due in January-April 2014. - energy audits in public buildings - during 2013, 303 energy audits in public buildings were completed; - coordination of the LEEAPs. According to the Law nr. 142 of 02.07.2010 on energy efficiency, art. 18 (I)-(5), the obligation is set for district Councils, municipal Councils and Popular Assembly of ATU GSgSuzia to provide and co- ordinate with AEE the LEEAPs. During 2013, only 4 local public authorities submitted for coordination their LEEAPs. Rate of completed energy audits -100%; completed energy audits - 200; nr. of LEEAPs - 35 per year; Rate of completed energy audits -151,5%; completed energy audits - 303; nr. of LEEAPs - 4 LEEAPs. 4EE on the set of the term of term of term of term of term of the term of term of the term of the term of the term of the term of term of the term of term of term of term of the term of term of term of the term of		

<ul> <li>- capacity building in energy efficiency and RES ("Technical Assistance for Capacity Building to Sustainable Energy Management" project, financed by Swedish Government)</li> <li>Project was aimed at improvement of legal, institutional and professional background for the development of energy efficiency and RES in R. Moldova. This project provided support to the Ministry of Economy and the AEE in development of the legal framework, including:         <ul> <li>Energy Strategy of the R. Moldova until 2030;</li> <li>NEEAP for 2013-2015;</li> <li>NREAP for 2013-2020.</li> <li>Also, in 2013 a financial expert was selected (donors' representative) for Administrative Council of EEF.</li> </ul> </li> <li>Project's ToR completion rate -100%; project's funds allocation rate - 100%</li> </ul>	6,215.9	6,184.4
Project's ToR completion rate -100%; project's funds allocation rate - 99,5%		
0; -0.5%: remaining 31,5 thousands MDL due for audit of 2013 which was delayed by auditing company.		
<ul> <li>- implementation by AEE of the Program on support and development of solid biofuels production</li> <li>- AEE is responsible for implementation of the Program on support and development of solid biofuels production in R. Moldova. Achieved results include:</li> <li>-16 producers of solid biofuels (from biomass) were accepted for payment in instalments for briquetting equipment;</li> <li>- 27 households received grants for purchase of boilers;</li> <li>- Company "Sudzuker Moldova" JV was designated as a beneficiary in piloting the comgeneration technology within an agro-industrial company in R, Moldova.</li> <li>- District Council of Leova was designated as a beneficiary in piloting the PPP in biomass pelleting.</li> </ul>	6,633.4	5,274.5
Nr. of beneficiaries of briquetting equipment paid in instalments -16; nr. of beneficiaries of grants for boilers purchase - 27; nr. of beneficiaries in piloting the co-generation technology within agro-industrial company -1; nr. of beneficiaries in piloting the PPP in biomass pelleting - 1		
16; 27; 1; 1		
<ul> <li>- inspection and testing of the energy-related products</li> <li>- Law on labelling of the energy-related products provides legal background for inspection and testing of the energy-related products. Currently this Law passed first reading in the</li> <li>Rate of completed inspections -100%; rate of completed testing -100%.</li> </ul>		
0; 0		
100: lack of legal framework for such actions; -100		
Total per sub-program, thousands MDL	210,316.0	203,925.6
Sub-program 5805: "Development of heating sector"		
Elaboration of the short-term investment plan and renovation of infrastructure of "Termocom" JSC energy sector reform and increase of energy efficiency in the energy sector (identification of short term priority invest- ments and completion of technical specifications and tender documents for "Termocom" JSC) - during 2013 a number of reports/studies/project documents were developed for corporative restructuring/merger of Termocom, CET-1 and CET-2. Rate of project's ToR completion -100%; investment plan elaborated -1; nr. of units/equipment modernised/renovated - on average 30 per year; degree of heating companies' readiness for the heating season	7,216.9	7,216.9
Rate of project's ToR completion - 80%; investment plan elaborated -1; nr. of units/equipment modernised/ renovated - 30; degree of heating companies' readiness for the heating season - 100%; reports and studies on corporative restructuring of Termocom, CET-1 and CET-2 completed - 100%; merger documentation for Termocom, CET-1 and CET-2 completed - 90%		
-20%: project's ToR completion was delayed due to lags in decision making by public authorities; 0; 0; 0; 100%; 90%		
Total per sub program, thousands MDL	7,216.9	7,216.9
Total per program, thousands MDL	281,640.5	243,359.9

Source: Raport privind implementarea Strategiei de cheltuieli pe anii 2013-2015 pentru dezvoltarea sectorului energetic pentru anul 2013, Ministry of Economy, 2015, http://www.mec.gov.md/ro/content/strategii-de-cheltuieli-domeniul-energetic

Annex V: List of references

# **Annex V: List of references**

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- Strategia energetică a Republicii Moldova pînă în anul 2030 (05.02.2013),
- Strategia energetică a Republicii Moldova pînă în anul 2020 (21.08.2007, Abrogată pe 05.02.13)
- Strategia de dezvoltare a industriei pe perioada pînă în anul 2015 (05.10.2006),
- Strategiei de mediu pentru anii 2014-2023 (24.04.2014),
- Strategia Republicii Moldova de adaptare la schimbarea climei pînă în anul 2020 (10.12.2014),
- Strategia națională de dezvoltare agricolă și rurală pentru anii 2014-2020 (04.06.2014),
- Strategia naționala de dezvoltare durabilă a complexului agroindustrial al Republicii Moldova in 2008-2015 (11.03.2008),
- Strategia națională de dezvoltare regională pentru anii 2013-2015 (04.09.2013),
- Strategia de gestionare a deşeurilor în Republica Moldova pentru anii 2013-2027 (10.04.2013)

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- Programul național pentru eficiență energetică 2011-2020 (10.11.2011),
- Programul pe termen mediu de elaborare a planurilor urbanistice la nivel de localități pe anii 2013-2016 (04.07.2013),
- Programul național de conservare a energiei pentru anii 2003-2010 (05.09.2003, abrogat pe 25.10.2012)
- Programul Național de renovare și descentralizare a sistemelor de alimentare cu căldură a localităților din Republica Moldova (29.08.2003, abrogat pe 29.09.2008),
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- Concepția politicii de mediu a Republicii Moldova (02.11.2001),
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- Programul de conservare și sporire a fertilității solurilor pentru anii 2011-2020 (20.08.2011),

#### **National Action Plans and Government Activity Plans**

• Planul național de acțiuni în domeniul eficienței energetice pentru anii 2013-2015 (07.02.2013),

• Planul național de acțiuni în domeniul energiei din surse regenerabile pentru anii 2013-2020 (27.12.2013),

- Planul de acțiuni cu privire la implementarea Strategiei de dezvoltare a industriei pe perioada pînă în anul 2015 (05.10.2006),
- Planul de acțiuni pentru implementarea Strategiei de mediu pentru anii 2014-2023 (24.04.2014),
- Planul de acțiuni pentru implementarea Strategiei Republicii Moldova de adaptare la schimbarea climei pînă în anul 2020 (10.12.2014),
- Foaie de parcurs pentru ameliorarea competitivității Republicii Moldova (14.01.2014),
- Planul de acțiuni al Guvernului pentru anii 2012-2015 (07.05.2012, abrogat pe 05.03.2014),
- Planul de acțiuni al Guvernului pentru anii 2011-2014 (23.03.2011, abrogat pe 07.05.2012),

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- Regulament privind organisarea și funcționarea Agenției pentru Eficiență Energetică (21.12.2010),
- Regulamentul de organisare și funcționare a Fondului pentru Eficiență Energetică (12.06.2012),
- Regulamentul de organisare și funcționare a Agenției Naționale pentru Reglementare în Energetică (26.10.2012),
- Regulament privind organisarea și funcționarea Agenției pentru Protecția Consumatorilor (09.12.2011),
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- Regulamentul privind auditul energetic (27.11.2012),
- Regulamentul privind autorizarea auditorilor energetici (27.11.2012),
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- Regulamentul cu privire la extinderea rețelelor electrice de distribuție (23.11.2011),
- Regulamentul pentru furnizarea și utilizarea energiei electrice (15.12.2010, amended on 26.11.2013),
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- Regulamentul privind garanțiile de origine pentru energia electrică produsă din SER (03.04.2009),
- Regulamentul cu privire la calitatea serviciilor de transport și de distribuție a energiei electrice (25.02.2011),
- Regulamentul cu privire la biocombustibilul solid (27 December 2013),
- Regulamentul cu privire la modul de atribuire, modificare a destinației și schimbul terenurilor (24.12.2007),
- Regulamentul cu privire la modul de prestare și achitare a serviciilor locative, comunale și

necomunale pentru fondul locativ, contorizarea apartamentelor și condițiile deconectării acestora de la/reconectării la sistemele de încălzire și alimentare cu apă (19.02.2002),

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- Regulamentul cu privire la verificarea proiectelor și a execuției construcțiilor și expertizarea tehnică a proiectelor și construcțiilor (25.06.1996),
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- Regulament cu privire la evaluarea impactului asupra mediului înconjurător (29.05.1996),
- Regulamentul rețelei naționale de observare și control de laborator asupra contaminării (poluării) mediului înconjurător cu substanțe radioactive, otrăvitoare, puternic toxice și agenți biologici (21.08.2006, modificată prin HG\_nr. 993 din 10.12.2014),
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- Regulile Pieței de gaze naturale (22.09.2005),
- Regulamentul cu privire la extinderea rețelelor de distribuție a gazelor naturale (23.11.2011),
- Regulamentul cu privire la modul de măsurare a gazelor naturale în scopuri comerciale (12.08.2010),
- Regulamentul privind acordarea compensației unice pentru conectarea la conducta de gaze naturale a unor categorii de populație din mediul rural (19.11.2007),
- Regulamentul Cadastrului obiectelor și complexelor din fondul ariilor naturale protejate de stat (02.05.2000)

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- Proiect de Lege cu privire la biocombustibili, biocombustibili pentru transport și bio-uleiuri

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 on the implementation of Directive 2009/28/EC and amending Article 20 of the Energy Com munity Treaty, <u>https://www.energy-community.org/pls/portal/docs/1766219.PDF</u>

ANNEX VI: List of institutions and stakeholders met during the In-Depth Energy Efficiency Review Mission

# Annex VI: List of institutions and stakeholders met during the In-Depth Energy Efficiency Review Mission

CET-2 / CET-Nord / TSO (Moldelectrica) / DSO (REDuri) / Apa-Canal (heat plants) Climate Change Office

Congress of local authorities of Moldova

EBRD

Embassy of Sweden

Energy and Biomass project

Energy Efficiency Agency

Energy Efficiency Fund

Energy Efficiency Fund

ESCO project

European Commission

Ministry of Agriculture and Food processing Industry

Ministry of Economy

Ministry of Environment

Ministry of Regional development and Construction

Ministry of Transport and Roads Infrastructure

Moldavian Sustainable Energy Financing Facility

National Agency for Consumers Rights Protection

National Energy Regulatory Agency

UNDP

World Bank

**ANNEX VII: Abbreviations** 

## **Annex VII: Abbreviations**

AEE	Energy Efficiency Agency
ANRE	National Energy Regulatory Agency
CHP	Combined Heat and Power Plants
EEF	Energy Efficiency Fund
EnCom	Energy Community
ESCOs	Energy Service Companies
FNCE	National Fund for Energy Conservation
GDP	Gross Domestic Product
GEF	Global Environment Fund
LEDS	Low Emission Development Strategy
MDL	Moldovan Leu
MEPIU	Moldovan Energy Projects Implementation Unit
Moreeff	Moldova Residential Energy Efficiency Financing Facility
MoSEFF	Moldovan Sustainable Energy Financing Facility
MRDC	Ministry of Regional Development and Construction
MTPP	Moldovan Thermal Power Plant
NAMAs	National Appropriate Mitigation Actions
NCPP	National Cleaner Production Programme
NEEAP	National Action Plan for Energy Efficiency
NEEP	National Energy Efficiency Programme
RECP	Resource Efficient and Cleaner Production
TFC	Total Final Consumption
TPES	Total Primary Energy Supply
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organisation

# In-Depth Review of the Energy Efficiency Policy of MOLDOVA

#### © Energy Charter Secretariat, 2015

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