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NAMA on

Promoting energy efficient lighting in the Republic of Moldova

NAMA proposal draft

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The NAMA on Promoting energy efficient lighting in the Re-public of Moldova is a supported NAMA with unilateral elements. The objective of the NAMA is to set up an enabling framework to promote the transition to energy efficient lighting in all lighting sectors of the country. Preliminary estimates indicate that annual energy consumption of lighting could be reduced by 358 GWh if all conventional light bulbs were replaced by more energy efficient bulbs. This would reduce annual GHG emissions by 150,000 tCO_2.

The NAMA will be rolled out in three phases: a Pilot Phase (2016-2018), a Scale-up Phase (2019-2020) and a Transformation Phase (from 2021 onwards). During the first two phases, the focus of the NAMA is on replacing conventional light bulbs by LEDs in the urban street lighting, public and residential sectors. The target of the NAMA is to improve street lighting in up to 10 cities, to install LEDs in up to 30% of public buildings and to replace up to 10% of incandescent light bulbs by LEDs in the residential sector.

Activities that will be implemented under the NAMA framework will complement existing activities and resources for energy efficient lighting in Moldova and remove barriers for the implementation of a national efficient lighting programme. The NAMA framework has three components each of which consists of a set of measures to promote the large-scale implementation of efficient lighting. The components include (1) a Capacity Building Programme to enhance the skills and knowledge of national stakeholders to develop and implement efficient lighting initiatives; (2) a Technical Support Programme to promote the implementation of pilot projects and (3) a Market Development Programme to increase the demand for efficient lighting products and to enable the supply side to offer relevant products and services. A finance mechanism will be implemented as an overarching component to secure long-term funding for efficient lighting projects and to increase their profitability.

Abbreviations and acronyms

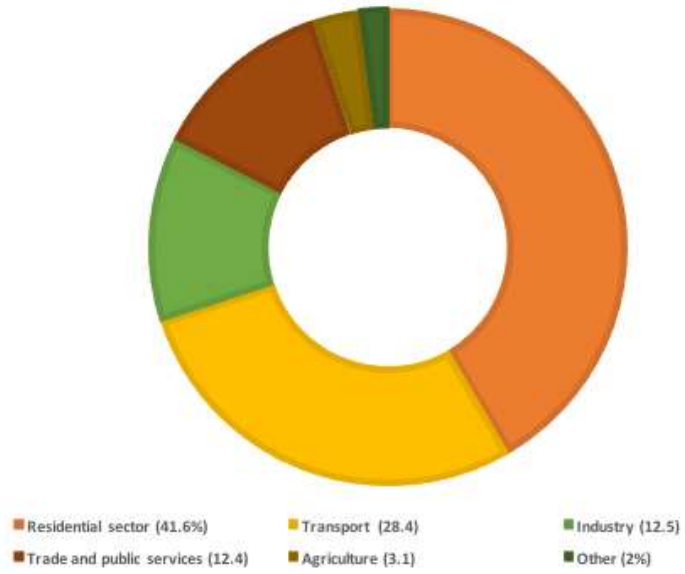
BAU	Business as Usual
C	Carbon
CDM	Clean Development Mechanism
CCO	Climate Change Office
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EEA	Energy Efficiency Agency
EEF	Energy Efficiency Fund
GDP	Gross Domestic Product
GHG	Greenhouse gas
INDC	Intended Nationally Determined Contribution
IRR	Internal rate of return
LEDS	Low Emission Development Strategy
LEEP	Local Energy Efficiency Programme
LEEAP	Local Energy Efficiency Action Plan
LPA	Local Public Authority
MDL	Moldovan leu (pl. lei)
MoEN	Ministry of Environment
MRV	Measuring, Reporting and Verification
NGO	Non-governmental organization
NPV	Net present value
UNFCCC	United Nations Framework Convention on Climate Change

1. The energy sector of the Republic of Moldova

1.1 Developments and trends in the energy sector

The Republic of Moldova is located in Southeast Europe, bordering Romania and Ukraine. The country has a population of 3.56 million of which about 40% live in urban areas. Moldova is highly dependent on energy imports from Russia, Ukraine and Romania and imported about 87% (2,084 ktoe) of the total energy supply in 2013. About 44.7% of the imports were natural gas, 34.1% were petroleum products, 13.7% electricity and 7.5% coal. The residential sector was the largest consumer of energy, followed by the transport sector, industry, trade and public services, agriculture and other sectors (Figure 1).

Figure 1 Energy consumption by sector

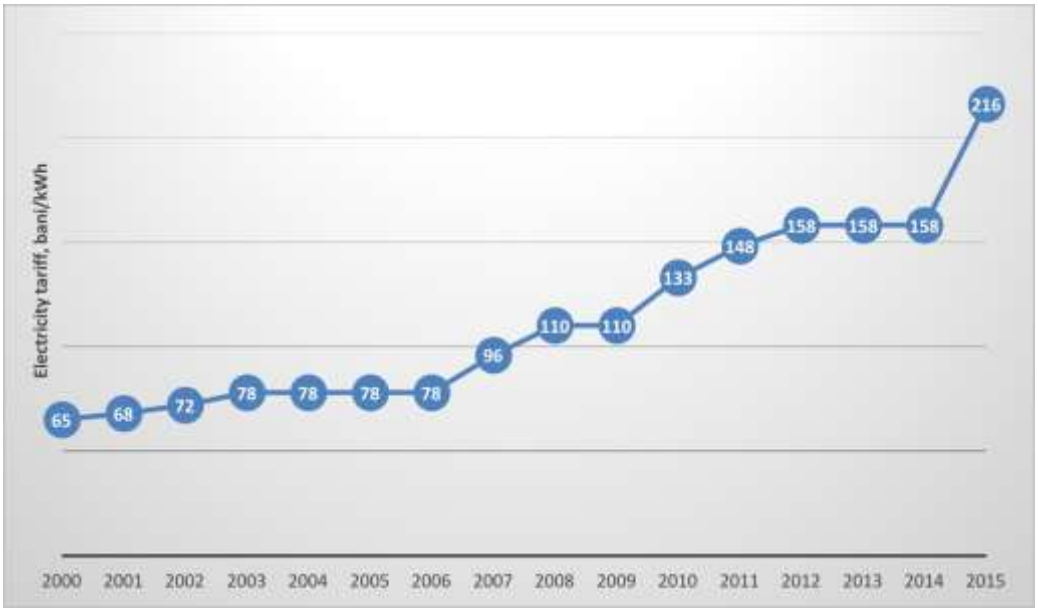


The energy intensity in Moldova is still high compared to other European countries due to low efficiency of energy transformation. Different factors contribute to this low efficiency, including aging technology, equipment and networks as well as systems running at much lower than designed loads.

Over the last decade, prices for energy increased sharply resulting in a heavy burden for households, the public sector and industry. As a result, the majority of end-use sectors reduced

their energy consumption during 2005-2013, except for the transport and trade and public services sectors. The price increases and the dependency on energy imports have been among the key drivers in the formulation of energy efficiency policies and for the implementation of energy efficiency programmes and projects.

Figure 2 Development of electricity tariffs between 2000-2015



Source: National Bureau of Statistics

Moreover, national energy and energy efficiency policy development is shaped by Moldova's relationship with the EU which is characterized by gradual economic integration and political cooperation. The country is a member of the Energy Community since 2010 and signed and Association Agreement with the EU in 2014. Following this agreement, the Republic of Moldova 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 to the European Network of Transmission System Operators for Electricity (ENTSO-E) by 2020 in order to connect to the European electricity market (Energy Charter Secretariat, 2015).

Moldova has achieved major progress in development of energy efficiency policies and programmes but the progress in their implementation is still moderate. To promote the

implementation and meet the objectives of energy efficiency policies, programmes and plans, all necessary secondary legislation and regulations need to be adopted. Moreover, enforcement mechanisms need to be put in place and incentives need to be provided to attract investments in energy efficiency (Energy Charter Secretariat, 2015).

Over the last ten years, funding from the state budget for the energy sector varied between 0.1 and 0.9% of the GDP, which was equivalent to an annual contribution between □4.7 and 24 million per year.

1.2 Promoting energy efficient lighting in the Republic of Moldova

In the Republic of Moldova, energy efficient lighting is at the top of the list of cost-effective energy efficiency measures. This includes energy efficient lighting for the residential, public, commercial and street lighting sectors. The government is making efforts to promote energy efficient lighting through various energy efficiency plans and programmes. LED based lighting systems are being implemented on a pilot scale in a few cities to study the technical performance and to demonstrate their electricity savings potential to different stakeholder groups (Table 1).

Table 1 Overview on pilot street lighting projects in Moldova

City	Description
Ocnita, Soroca, Cantemir	Moldova received a grant of € 400,000 from the European Commission to improve the street lighting systems of the cities Ocnita, Soroca and Cantemir. The cities own contribution to the project is 20%. The grant was issued within the framework of Sustainable Urban Demonstration Projects offered to Covenant of Mayors signatories. The Covenant of Mayors is the mainstream European movement involving local and regional authorities, voluntarily committing to increasing energy efficiency and use of renewable energy sources on their territories.
Chisinau	On the road between Chisinau and the airport, 409 LED luminaries were installed on 10 km for a total cost of 22 billion MDL.
Ustia, Dubaresi distric	In Ustia, Dubasari district, 14 km of streets received LED lighting for a total cost of 2 billion MDL.
Orhei	In Orhei, the entire street lighting network of 76 km was renovated. This included the installation of 1300 LED luminaries.

Chisinau	To improve street lighting and lighting of public spaces in Chisinau, Moldova's capital, the EBRD and other donors are supporting a project that has the objective to replace high-pressure mercury vapor lamps by LEDs. Public spaces in Chisinau are currently lit by a network of approximately 34,000 lights of which only one third are actually working. EBRD and the EBRD administered Green Energy Special Fund (funded by the Taiwanese International Cooperation and Development Fund) are supporting the investment with a grant of € 11.7 million. In addition, the European Investment Bank is supporting the project with €10.3 million. LEDs are expected to reduce energy consumption for lighting by nearly 60% which will result in annual savings of €106,280.
Climautii de Jos	In Climautii de Jos, in the district of Soldanesti, the EU supported the implementation of 7 km of LED based street lighting. The cost of the project was € 108,120.

One of the general sectoral objectives and planned measures, as related to the public sector and as stated in the National Energy Efficiency Programme (NEEP) 2011-2020, is to implement programmes for improvement of street lighting and to raise public awareness regarding best practices and the costs and benefits of energy-efficient lighting. According to the NEEP, the Ministry of Economy, together with the Energy Efficiency Agency (EEA) and other relevant public authorities, will provide support to Local Public Authorities (LPAs) for the development and implementation of energy efficient street lighting. The optimisation of public street lighting, according to the previous National Energy Efficiency Action Plan (NEEAP) for 2013-2015, has an energy savings potential of 0.26 ktoe by 2020.

Following its Energy Community commitments, Moldova is implementing the EU Energy Labelling Directive (2010/30/EU) and EU Directive 2009/125/EC on establishing a framework for the setting of eco-design requirements for energy-related products. The commitment of Moldova to energy labelling and eco-design criteria for energy-related products is reflected in NEEP 2011-2020 and in the previous NEEAP (2013-2015). Both documents provide a set of measures for implementing 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, EEA and the Consumer Protection Agency. Responsibility for its implementation is assigned to the Consumer Protection Agency.
- A law on eco-design Directive 2009/125/EC 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 (Energy Charter Secretariat, 2015).

1.3 Institutional framework and key stakeholders

Stakeholders in the development and implementation of the energy efficiency policies and programmes include the Ministry of Economy, the Ministry of Regional Development and Construction, the Ministry of Environment, the Ministry of Transportation and Roads Infrastructure, the Academy of Sciences, LPAs, the Consumer Protection Agency and the State Energy Inspectorate, among others.

Ministry of Economy. The Ministry of Economy is the central public authority that defines policy objectives and the strategic direction of activities in the area of energy efficiency. The Ministry is in charge of the Energy Efficiency Agency, the State Energy Inspectorate, the Consumer Protection Agency and a number of other administrative authorities. It is also the the founder of a number of public institutions, including the Moldovan Energy Projects Implementation Unit and the SMEs Development Organisation.

Energy Security and Energy Efficiency Department of the Ministry of Economy. The Department develops the legal and regulatory framework for energy efficiency and promotes energy efficiency projects and programmes. The Energy Efficiency Unit is one of three units that comprise the Department

Energy Efficiency Agency (EEA). The EEA was created in 2010 and and is subordinate to the Ministry of Economy. It is the administrative body in the area of energy efficiency and renewable energy and implements relevant state policy. Moreover, EEA oversees and monitors national and local energy efficiency programmes and action plans as well as international energy development programmes joined by Moldova.

Energy Efficiency Fund (EEF). The EEF was established in 2012 as an independent government body that has the objective to identify and manage financial resources for the implementation of energy efficiency measures that are outlined in energy efficiency programmes and strategies. The Fund is administered by the Management Board which has nine members: one representative each from the Ministry of Economy, the Ministry of Finance, the Ministry of Environment, the Ministry of Regional Development and Construction as well as five representatives from the private sector and international donors. The Management Board also approves the annual contribution of the state budget to the Fund which is proposed by the Ministry of Finance.

Consumer Protection Agency. The Consumer Protection Agency is an administrative authority responsible for consumer protection policy and state control over the enforcement of legislation in this area. Moreover, the Agency monitors the compliance of products and services offered on national markets with respective quality requirements, norms or standards.

Ministry of Regional Development and Constructions. The Ministry develops, promotes and implements state policy on regional development, land use planning, architecture, design and construction. With regard to energy efficiency, it develops the legal and regulatory framework necessary to achieve the objectives for its fields of activity, which includes, for example, the alignment of national building standards with EU standards.

Ministry of Environment. The Ministry of Environment is the state authority responsible for the development and promotion of state policies and strategies in the areas of environmental protection, rational use of resources and climate change.

Climate Change Office (CCO). The CCO of the Ministry of Environment provides logistical support to the Government, central and local public administration authorities, non-government and academic organizations, in activities implemented and promoted by the Republic of Moldova under the UNFCCC and the Kyoto Protocol. Moreover, the CCO implements climate change related projects and activities, including the elaboration of national GHG inventories, development and implementation of GHG mitigation projects, and the implementation of activities that aim at raising awareness on climate change related topics.

Local public authorities (LPAs). LPAs are responsible for the promotion and implementation of state policy in the field of energy efficiency at the local level. According to the national Law on Energy Efficiency, LAPs have to appoint an energy manager who develops and monitors the implementation of Local Energy Efficiency Programmes (LEEPs) and Local Energy Efficiency Action Plans (LEEAPs).

1.4 Objective of the NAMA

The NAMA on Promoting energy efficient lighting in the Re-public of Moldova is a supported NAMA with unilateral elements. The objective of the NAMA is to support the set-up of an enabling framework for promoting the transition to energy efficient lighting in all lighting sectors of the country.

Preliminary estimates indicate that annual electricity consumption of lighting could be reduced by 358 GWh if all conventional light bulbs were replaced by more energy efficient bulbs. This would reduce annual GHG emissions by 150,000 tCO2. The NAMA will be rolled out in three phases: a Pilot Phase (2016-2018), a Scale-up Phase (2019-2020) and a Transformation Phase (from 2021 onwards). During the first two phases, the focus of the NAMA is on replacing conventional light bulbs by LEDs in the urban street lighting, public and residential sectors. During the Pilot and Scale-Up Phase, the target of the NAMA is to improve street lighting in up to 10 cities, to install LEDs in up to 30% of public buildings and to replace up to 10% of incan-descent light bulbs by LEDs in the residential sector.

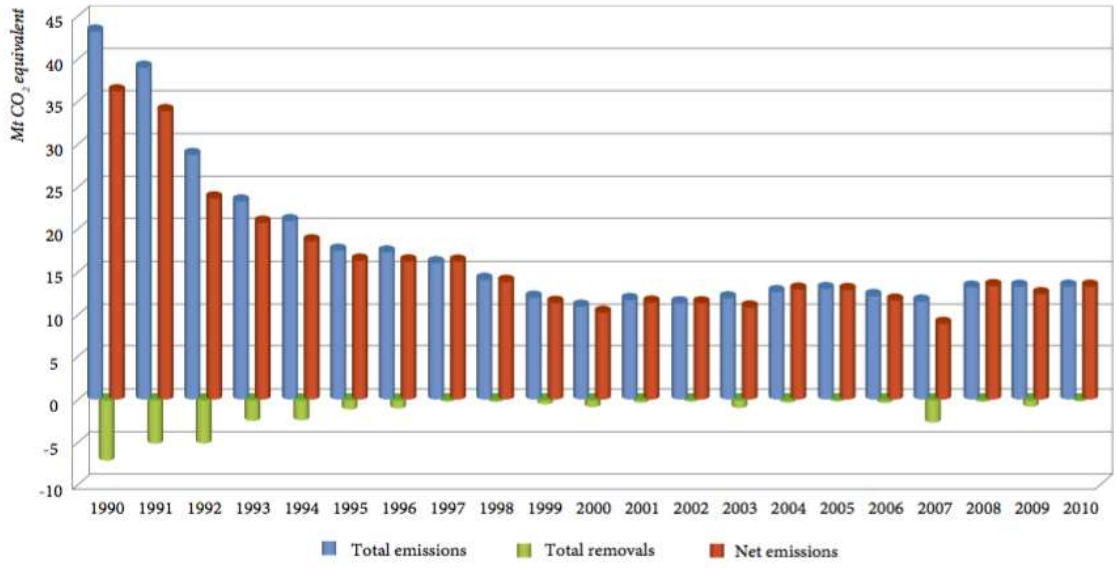
Activities that will be implemented under the NAMA framework will complement existing activities and resources for energy efficient lighting in Moldova and remove barriers for the implementation of a national efficient lighting programme. The NAMA framework has three components each of which consists of a set of measures to promote the large-scale implementation of efficient lighting. The components include (1) a Capacity Building Programme to enhance the skills and knowledge of national stakeholders to develop and implement efficient lighting initiatives; (2) a Technical Support Programme to promote the implementation of pilot projects and (3) a Market Development Programme to increase the demand for efficient lighting products and to enable the supply side to offer relevant products and services. A finance mechanism will be implemented as an overarching component to secure long-term funding for efficient lighting projects and to increase their profitability.

2. Analysis of policies and barriers

2.1 National climate policy context of the NAMA

The Republic of Moldova contributes about 0.03% of the global GHG emissions. In 2013, the country's total GHG emissions were 12.8 Mt CO_2e and the per capita GHG emissions were less than half of the world's average. About 65.5% of the national GHG emissions originated from the energy sector, followed by the agricultural sector (16.6%), waste sector (12.2%) and industrial processes sector (5.2%). Between 1990 and 2010, national GHG emissions decreased by almost 70% (Figure 3), while GHG emissions from the energy sector decreased by almost 25% from 34.52 Mt CO_2e to 8.95 Mt CO_2e during the same period.

Figure 3 National GHG emissions and removals between 1990 and 2010



Source: MoEN (2013)

The sharp decline of GHG emissions after 1990 is mainly a result of the economic crisis following the break up of the Soviet Union and the transition to a market economy. The transition also lead to changes in the fuel mix by substituting fossil fuels through natural gas.

In 2010, the Republic of Moldova joined the Copenhagen Accord and submitted an emission reduction target to the UNFCCC Secretariat, which states that "*a reduction of no less than 25% of the 1990 level total national GHG emissions has to be achieved by 2020 through implementation of global economic mechanisms focused on climate change mitigation, in accordance with the Convention's principles and provisions*." The target was submitted without defining specific NAMA programmes or projects and needs for support. However, it was mentioned that significant financial, technological and capacity building support would be needed to reach the national GHG mitigation target.

A GHG emission reduction target for the energy sector is included in several national strategies and programmes. The National Development Strategy "Moldova 2020" identifies the improvement of energy security and energy efficiency as one of seven key areas for interventions to promote sustainable economic growth and reduce poverty in the Republic of Moldova. The Strategy establishes the target to reduce GHG emissions by 25% compared to the 1990 level by 2020. Along with the GHG emission reduction target, several energy efficiency targets are defined, including:

- reducing the energy intensity by 10% by 2020;
- reducing energy consumption of buildings by 20% by 2020;
- insuring the renovation of 10% of public buildings by 2020.

To increase energy efficiency, the Strategy aims at reducing energy intensity in the residential, industrial, transport and agricultural sectors by implementing energy efficient technologies, among other measures. Another focus is on raising public awareness regarding the need to save energy, for example by using energy efficient construction materials, appliances and technologies. To achieve the objectives, a favourable environment for investments in the energy sector needs to be created by creating and strengthening mechanisms to attract funding for energy projects.

The GHG emission reduction target as well as the energy efficiency targets are also included in the Energy Strategy of the Republic of Moldova until 2030, the document that provides guidelines for national energy sector development. The Strategy defines general policy goals for 2013 to 2030 as well as specific policy objectives for the periods from 2013 to 2020 and from 2021 to 2030.

In September 2015, the Republic of Moldova submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC which states that the country *"intends to achieve an*

economy-wide unconditional target of reducing its greenhouse gas emissions by 64-67 per cent below its 1990 level in 2030 and to make best efforts to reduce its emissions by 67 per cent" (Government of Moldova, 2015). Moreover, the emissions reduction target could be increased to 78 below 1990 levels, "*conditional to, a global agreement addressing important topics including low-cost financial resources, technology transfer, and technical cooperation, accessible to all at a scale commensurate to the challenge of global climate change"*.

By mid-2016, the Government will prepare a draft LEDS for 2030. After consultations at the national level, the LEDS will be subject to approval by the Government by end of 2016. As in the draft LEDS for 2020, NAMAs are expected to be an important element of the new LEDS.

2.2 Alignment of the NAMA with national and sector strategies and policies

Several Moldovan laws, government programmes and plans and standards target issues related to energy efficient lighting (Figure 4).

Laws targeting energy efficient lighting

- Law N° 142 on Energy Efficiency (adopted on July 2, 2010) states that administrators of publicly owned buildings are obliged to take measures in order to ensure efficient use of lighting[1]. The overall objective of the Law 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. According to the Law, National Energy Efficiency Programmes shall be elaborated every ten years to outline the strategic direction for energy efficiency improvements, while National Energy Efficiency Action Plans provide information on concrete energy efficiency measures for a three-year period.

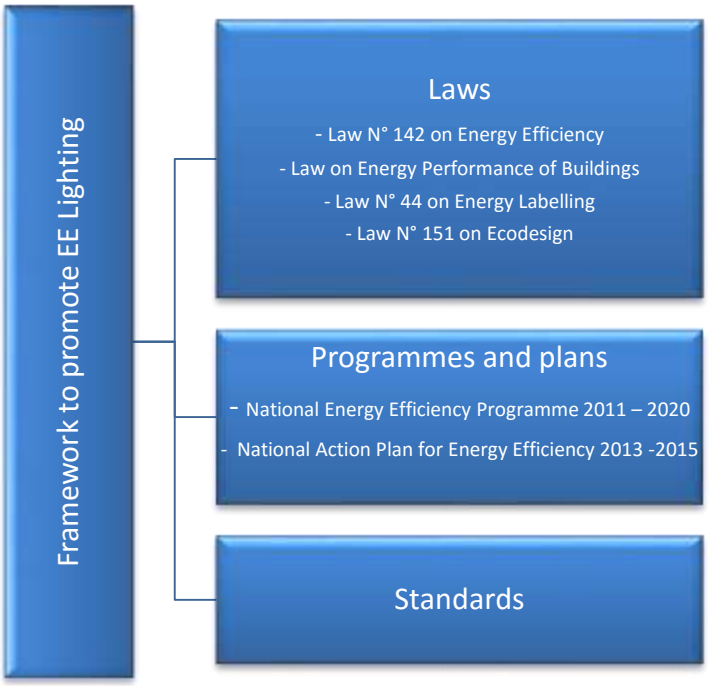
- The Law on Energy Performance of Buildings (adopted on January 1, 2015) includes provisions on ventilation, cooling and lighting that will come into force in 2017[2].

[1] http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=335818

[2] http://lex.justice.md/viewdoc.php?action=view&view=doc&id=354929&lang=1

- Law N° 44 on labelling energy-related goods impacting energy consumption (adopted on March 27, 2014) transposes the EU's Energy Labelling Directive 2010/30/EU[3].
- Law N° 151 on ecodesign requirements applicable to energy-related products (adopted on July 17, 2014) transposes the EU's Ecodesign Directive 2009/125/EC[4].

Figure 4 Policy and legislative framework to promote EE lighting in Moldova



Source: own elaboration

National programmes and plans

- The National Energy Efficiency Programme 2011 – 2020 defines energy efficiency

3 http://lex.justice.md/viewdoc.php?action=view&view=doc&id=352631&lang=1

4 http://lex.justice.md/viewdoc.php?action=view&view=doc&id=355009&lang=1

indicators and benchmarks, including for lighting appliances, and aligns them with definitions of the European Union[5].

- The National Action Plan for Energy Efficiency 2013 -2015 included a list of measures to improve energy efficiency in different sectors[6]. Implementation of efficient lighting activities were planned for the industrial and public sectors. According to the plan, the industrial sector should be equipped with more efficient, high-quality lighting that matches the requirements of technological processes. The optimisation of street public lighting systems was among the measures planned for the public sector to reduce power consumption in municipalities throughout the country. Target group of this measure were LPAs who should promote the development of proposals that restrict the use of incandescent light bulbs, energy audits of existing lighting systems, replacement of incandescent bulbs by more efficient bulbs and monitoring of energy consumption of newly installed lighting systems, among other activities. The optimisation of public street lighting was estimated to result in energy savings of 0.05, 0.13 and 0.26 ktoe by 2015, 2016 and 2020, respectively. Moreover, the plan promoted several cross-sectoral measures including the development of energy service companies (ESCOs). Among their activities would be the support of LPAs to reduce energy losses in lighting systems.

Standards

- The National Institute of Standardization (INS) has released several standards for lighting (Box 1). An exclusive standard for LED lighting does not exist. However, the Energy Efficiency Fund provides guidelines for project developers which include minimum performance requirements for LED luminaires to be implemented in lighting projects[7].

[5] http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=340940

[6] http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=346722

[7] http://www.fee.md/files/Anexa_4.a5.pdf

Box 1 Overview on relevant lighting standards

- 1. CP D.02.11 – 2014 - Recommendations for roads and street design for urban and rural areas
- 2. SM SR EN 40-1:2013 – Poles for street lighting. Terms and definitions
- 3. SM SR EN 40-2:2013 – Poles for street lighting. Part 2. General requirements and dimensions
- 5. SM SR EN 40-5:2010 – Poles for street lighting. Part 5. Requirements for steel poles
- 6. SM SR EN 40-6:2010 – Poles for street lighting. Part 6. Requirements for aluminum poles
- 7. SM SR EN 40-7:2010 – Poles for street lighting. Part 7. Requirements fiber reinforced poles
- SM SR EN 60598-2-6+A1:2010 – Luminaries. Part 2. Special conditions. Section 6. Luminaries with integrated converter for incandescent lamps.
- SM SR EN 61347-2-11:2010 – Equipment for lamps. Part 2-11: Particular prescriptions for different electronic circuits used together with luminaries.
- SM SR EN 60432-1:2010 – Incandescent lamps. Security prescriptions. Part 1: Tungsten filament lamps for domestic and similar general lighting.
- SM SR EN 60432-2:2010 - Incandescent lamps. Safety requirements. Part 2: Tungsten halogen filament lamps for domestic and similar general lighting
- SM SR EN 13201-2:2011 – Public lighting. Part 2: Performance requirements
- SM SR EN 13201-3:2011 - Public lighting. Part 3: Calculation of performance
- SM SR EN 13201-4:2011 - Public lighting. Part 4: Methods of measuring the photometric performance
- SM SR EN 15193:2011 - Energy performance of buildings. Energy requirements for lighting
- SM SR EN 62031:2012 - LED modules for general lighting. Safety requirements
- SM SR EN 60598-2-14:2013 - Lighting. Part 2-14: Particular requirements. Lighting discharge lamps, tubular, cold cathodes (tubes) and similar equipment
- SM SR EN 60598-1:2014 - Lighting. Part 1: General requirements and tests
- SM SR EN 62560:2014 – LED lamps for general lighting operating at voltages > 50V. Safety requirements
- SM SR EN 60432-1:2010/A2:2015 - Incandescent lamps. Safety requirements. Part 1: Tungsten filament lamps for domestic and similar general lighting

Source: National Institute for Standardization[8]

[8] http://www.estandard.md

2.3 Barriers to the implementation of the NAMA

2.3.1 Economic and financial barriers

Efficient lighting projects have a significant potential for energy savings but require a high level of upfront investment. In times of economic crisis, investments in energy efficiency are generally not a top priority in the Republic of Moldova, and this also applies to investments in efficient lighting technologies. Due to budget constraints, many municipalities struggle to pay their electricity bills for public lighting and refurbishment of lighting systems is done in a piecemeal fashion, replacing conventional with more efficient lighting when repairs become necessary. As a result, street lighting and infrastructure for lighting of public buildings often do not adhere to current standards in many municipalities. Fiscal instruments are lacking that could generate a steady flow of revenues for the refurbishment and maintenance of lighting systems and for investments in modern, energy efficient lighting infrastructure.

With regard to street lighting, Local Public Authorities (LPAs) are in charge of its provision and maintenance work within the territory under their administration. This set-up is based on Article 3 of the Law on Local Public Administration N° 436-XVI (adopted on December 22, 2006), which gives LPAs autonomy in organizational and financial management. It includes the right to implement local tax schemes. However, according to a Government Decree from 2002, LPAs have to cover the costs of street lighting from their own budgets and cannot charge end users for providing these services. Revenues generated by a road tax and a tax for territory planning cover part of the expenses of street lighting but also have to be used for road maintenance and related infrastructure investments. Moreover, the Law on Energy N° 1525-XIII (adopted on February 19, 1998) states that investments in local energy efficiency measures and infrastructure have to be covered from LPAs' budgets.

Investment decisions of other lighting sectors are equally constrained by a lack of financial resources. Customers have to focus on covering short-term needs and are not able to take potential long-term savings from energy savings and longer-lasting products into account when making investment decisions. Therefore, the higher initial costs for efficient lighting products compared to conventional products are an important barrier to investments in all lighting sectors (Table 2).

Table 2 Average lamp price in MDL

Incandescent light bulbs	Fluorescent tube	Compact fluorescent lamp	LED
5-10	15-25	30-50	150-250

Source: own elaboration

Another major barrier to investments in efficient lighting projects are a lack of dedicated finance schemes with instruments that can increase their profitability and reduce investment risks. The Energy Efficiency Fund was established for this purpose but it is a subsidy fund and strongly depends on external support. Converting the subsidy fund into a revolving loan fund could help to secure long-term funding for projects in the energy efficiency sector. Proposals to restructure the Energy Efficiency Fund are currently being discussed among responsible authorities.

Access to financial services is limited in the Republic of Moldova and is a large barrier to investments in all economic sectors. Currently, the situation is intensified by a corruption scandal in the banking sector which affects banks' liquidity and investors' opportunities to obtain loans. Conventional loans are offered at an interest rate of around 19%, along with restrictive requirements for collateral, which does not match the needs of energy efficiency projects with high initial investment costs and long pay-back periods. Moreover, under current circumstances in which project developers have to compete for the few available loans, energy efficiency projects are hardly competitive. Many banks have no experience with their assessment and many projects are small in scale which makes their transaction costs highly prohibitive.

An ESCO market is in very early stages of development in Moldova. A few energy service providers are active in the energy efficiency market but they only take over the development of technical proposals. They do not finance project implementation because their financial capacity is limited due to a lack of project financing offered by the local banking industry. Energy service providers are therefore unable to shift their current business model towards an ESCO business model.

2.3.2 Awareness and capacity barriers

A lack of awareness of the benefits of efficient lighting – in combination with high price sensitivity of customers - is an important barrier to large-scale implementation of efficient lighting technologies in Moldova and equally affects all sectors. Promotion for LED products and easily accessible, reliable information on initial investment costs, energy savings potential and profitability of investments are hardly available.

At the government level, not all decision makers are aware of the energy and cost savings potential of efficient lighting. Moreover, energy efficient lighting projects have to compete with other projects for scarce financial and human resources, and quite often preference has to be given to more urgent or more popular investments in health, education or infrastructure projects. In the field of energy efficiency, measures related to heating seem to be given higher priority than efficient lighting projects. Little financial and private sector activity despite rapidly increasing electricity tariffs is also a sign of a lack of awareness of possible investment returns from energy efficiency projects and not only an indicator of a lack of financial resources.

In a relatively short time, the Government of Moldova has set up a comprehensive policy framework to promote energy efficiency in the country. Building up human capacity to fully implement government programmes and plans will be a longer process. The number of available professionals, who are trained to identify investment opportunities in this field, to prepare bankable project proposals and to promote and monitor their implementation, is still small compared to the number of professionals required for the scaling up of energy efficiency activities. Additional training opportunities are needed to increase the number of energy efficiency professionals and to enhance the skills on energy efficient lighting of different stakeholder groups.

Technical skills to design and evaluate energy efficiency projects are reasonably well developed but they are concentrated in a few companies and institutions and are less available in rural areas. A lack of knowledge of energy managers on energy efficiency has an impact on the number and eligibility of project proposals presented to the Energy Efficiency Fund and other funding sources by LPAs.

2.3.3 Regulatory, technical and market barriers

Moldova has implemented important elements of a legal framework to promote energy efficient lighting. Following its Energy Community commitments, it adopted laws to transpose the EU's Ecodesign and Energy Labelling Directives as well as a number of corresponding regulations.

This included the adoption of the regulation on labelling of electrical lamps and luminaires. The laws and regulations have come into force and the last National Energy Efficiency Action Plan for 2013 – 2015 stipulated a number of measures that were to be implemented to ensure compliance with the regulations. Regarding compliance with the Ecodesign and Energy Labelling Directives, the measures included:

- "[…] checking the economic operators in terms of their compliance with the requirements set for labelling the energy-related products. The shops and/or distribution points will be visited, at least, once a month to check the availability of labels and energy-related information;
- testing the energy-related products in an accredited European laboratory. Upon importing such products from another country, it is recommended to consider and accept the test results of energy-related products in the country of origin;
- identifying the possibilities to introduce tax incentives and customs facilities for energy-related products with high energy efficiency (Classes A+++ - A). Increasing the import duties on energy-intensive products; […]
- setting energy performance requirements for the plants and appliances manufactured in and/or imported to the Republic of Moldova;
- increasing the import duties on incandescent light bulbs by 20% annually and applying zero-rate tax on energy-efficient light bulbs".

With regard to street lighting, the following measures were planned:

- "[…] developing proposals aimed at restricting the use of incandescent light bulbs in the public sector; […]
- replace the existing light fittings with more efficient ones […]".

While many of these measures are important steps for transforming the lighting sector, they need to be integrated into a coherent framework to ensure their full development, implementation and monitoring. Otherwise they run the risk of being discontinued if future Energy Efficiency Action Plans set new priorities.

Moldova made significant progress regarding transposition of Labelling Directive 2010/30/EU within the reporting period. The framework Law on the Labelling of Energy-Related Products in Moldova came into force in October 2014 and a number of energy labeling regulations was adopted to support the process. Nevertheless, Moldova remains only partially compliant with this Directive, as long as the remaining labelling regulations adopted by the Ministerial Council are not in force.[9]

Inferior quality lighting products still dominate on the Moldovan market and are commonly used in all lighting sectors. Underperforming and improperly labelled efficient lighting products create a negative image for these technologies and impede the development of the energy efficient lighting market.

The Moldovan market for efficient lighting and related services is in early stages of development which hampers the large-scale implementation of LEDs. Due to the low demand, the availability of low-cost, high-quality products and services is still small. The market currently consists of a few specialized importers and retailers, project developers and one small manufacturer who assembles LEDs from imported parts. There is no testing laboratory which is equipped to carry out performance testing of efficient lighting products and very few collection points for used light bulbs have been installed.

Moreover, the large-scale implementation of efficient lighting systems is constrained by several technical barriers. Voltage instability in the electric system has an impact on the satisfactory performance of energy efficient lighting technologies. Incandescent lamps are more proof to the voltage fluctuations and therefore preferred by consumers who experience frequent voltage fluctuations. Inconsistent installation and maintenance practices across municipalities make project planning and budgeting more difficult. The lighting quality of LEDs also affects their acceptance and large scale diffusion. Customers mentioned that they are unsatisfied with the “lack of warmth” of the lighting source comparted to incandescent light bulbs.

2.3.4 Institutional barriers

Many efficient lighting projects are currently being planned or implemented in the Republic of Moldova. However, most of them are small in scale and some lack integrated planning and coordination among stakeholders who are active in this field. The scaling up of efficient lighting

9 https://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/Implementation/Moldova/Energy_Efficiency

activities under the NAMA framework will require good coordination and cooperation among ministries, local governments and donors.

An additional challenge will be the novelty of the NAMA concept and the requirement of long-term, cross-sectoral cooperation between a range of stakeholders.

A lack of commercial orientation of municipalities and public agencies as well as strict budgeting and procurement procedures complicates the implementation of efficient lighting projects in the public sector. Public procurement decisions right now are centred on assets rather than energy services and focus mainly on the best price without taking into account the lifecycle costs of new equipment.

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 need to strengthen the institutional, human and financial capacity of the Agency to enable it to have a leading role in implementing energy efficiency and renewable energy policies and regulations within the country. Also it was noted that there is limited institutional capacity of LPAs and unclear mandate for the Regional energy managers to be appointed, which results in limited identification and implementation of the energy efficiency measures at the local and regional level.

3. NAMA baseline and targets

3.1 GHG impact of the NAMA

Preliminary estimates of the direct GHG mission reduction potential of the NAMA cover street lighting as well as lighting in the public and residential sectors. Data for the calculation is taken from national statistics and energy audits carried out under the supervision of the Energy Efficiency Agency. Where national data is not available, data is taken from the *Modelling Methodology for Energy and Financial Savings Potential from Replacing All On-Grid Lighting in All Sectors"* provided by the UNEP/GEF en.lighten initiative (UNEP/GEF 2014). The methodology provides values for technical and financial parameters for all lighting sectors and different lamp technologies. In addition, the CDM methodology AMS-II.L *Demand side activities for efficient outdoor and street lighting technologies* is used as guidance for the selection of technical parameters for the development of baseline and NAMA scenarios (UNFCCC, 2011).

Depending on the adoption rate of LEDs within the framework of the NAMA, GHG emissions of lighting of the urban street, public buildings and residential building sectors could be reduced between 255162 tCO2 and 412624 tCO2 by 2029 (Table 3). The timeframe for the calculation of the GHG emission reduction potential of the NAMA is based on an average LED lifetime of 13 years, i.e. if the first LED bulbs are implemented in 2017, they would be used until 2029.

Table 3 GHG mitigation impact and electricity savings of different NAMA scenarios

	Street lighting		**Public buildings**		**Residential buildings**	
NAMA implementation scenario	**Conservative** **"6 cities by 2020"**	**Ambitious** **"10 cities by 2020"**	**Conservative** **"20% by 2020"**	**Ambitious** **"30% by 2020"**	**Conservative** **"5% by 2018"**	**Ambitious** **"10% by 2018"**
Electricity savings (GWh/yr)	13.42	22.36	34.00	51.00	6.10	12.20
GHG emission reductions (tCO2/yr)	5700	9500	14200	21400	5150	2575
Total accumulated	Conservative scenarios: 618					

electricity savings by 2029 (GWh)	Ambitious scenario: 977
Total GHG emission reductions by 2029 (tCO2)	Conservative scenarios: 255162 Ambitious scenarios: 412624

Source: own elaboration

While LPAs, administrators of public buildings, home owners, etc are be free to determine the appropriate efficient lighting technologies that fit their circumstances and requirements, for this analysis it is assumed that the introduced technology under the NAMA framework is LEDs. The calculations of the GHG emission reduction potential of the NAMA are preliminary and will be confirmed or adjusted during the monitoring phase.

3.1.1 Direct GHG emission reduction potential of energy efficient street lighting

Available national data on street lighting covers urban areas of the country and provides information on the total length of streets and the percentage of streets with illumination. The total length of the urban illuminated streets is 2264 km (Table 4).

Table 4 Illuminated urban streets in the Republic of Moldova

Location	Number of inhabitants (in thousand)	Streets with illumination (in km)	Streets with illumination as percentage of total street length
Chisinau municipality			
Chisinau	678.2	646.1	96.1
Codru	11.9	18.1	59
Cricova	8.7	11.9	38
Durlesti	20.1	12.3	16.5
Singera	8.5	96	61.5
Vadul lui Voda	5.2	46.6	100
Vatra	3.5	11.3	85
Total	**809.6**	**842.3**	**(Average) 65**

Balti municipality	150.2	209.7		95
Briceni	9.9	36		100
Lipcani	5.4	29.8		100
Donduseni	10.5	29.1		79.5
Drochia	20.5	47.5		97.9
Cupcini	7.6	23.6		57.7
Edinet	18.4	37.6		43
Falesti	16.9	26.9		100
Floresti	15.5	19.1		22.1
Ghindesti	2.1	5.7		35
Marculesti	2.1	7.8		60.9
Glodeni	11.4	7.5		19.6
Frunza	1.4	5.1		100
Ocnita	9.4	17.6		58.7
Otaci	8.4	6		21.9
Costesti	2.5	8.9		100
Riscani	13.3	38		50.8
Biruinta	3.9	5		41.7
Singerei	14.8	53		88.3
Soroca city	37.6	78.8		98.6
Total	**361.8**	**692.7**	**(Average)**	**68,5**
Central Region				
Anenii noi	11.4	4.3		15.6
Calarasi	16.5	22.7		33.6
Criuleni	8.5	24.3		100
Hincesti	17.3	16		25.8
Ialoveni	16.3	27.4		28.8
Nisporeni	14.4	42		78.4
Orhei	33.6	50.6		100
Rezina	12.8	19.8		58.6
Bicovat	1.4	4		37.7
Straseni	20.7	54.9		90.1
Soldanesti	7.5	15.7		76.2
Telenesti	8.2	28.8		95
Cornesti	2.8	5.4		19.6
Ungheni	38.4	105		80.8
Total	**209.8**	**420.9**	**(Average)**	**60**
Southern Region				
Basarabeasca	12.5	9		28.6

Cahul	39.6	106	88.4
Cantemir	5.8	7.2	94.7
Cainari	4.5	0	0
Causeni	19.9	35.2	61.9
Cimislia	14.4	33.2	56.5
Iargara	4.7	10.5	21.9
Leova	10.9	33.9	69.8
Stefan Voda	8.6	17.7	86.3
Taraclia	14.9	35.5	52.2
Tvardita	5.8	19.8	53.5
Total	**141.6**	**308**	**(Average) 61**
Total (all regions)	**1522.8**	**2263.9**	

Source:

The objective of the NAMA is to replace conventional lamps for street lighting by LEDs. Data from energy audits indicates that different high-pressure mercury (HPM) lamps are the most frequently installed lamp types on urban streets. Approximately 10% of conventional lamps have already been replaced by LEDs. For the installation of LEDs, other components of the lighting system have to be replaced as well as, for example, cables and control systems.

The CDM methodology on street lighting estimates the direct GHG emission reduction potential of replacing conventional lamps or fixture combinations by energy efficient lamps by calculating the net electricity savings of the intervention. The methodology refers to lamps and fixture combinations as luminaires, which encompasses all of the components in an individual assembly of street lighting equipment, including lamp, lens and reflector, fixture housing, wiring, and driver or ballast and individual and centralized controls systems. Technical parameters for the calculation of the GHG emission reduction potential of the NAMA are presented in Table 5.

Table 5 Technical parameters for the baseline and NAMA scenarios for urban street lighting

Parameter	Baseline value	Value for NAMA scenario

Lamps per road km	39	39
Average rated power of installed stock of lamps (in W)	312.5	132.6
Operating hours per year	3877	3877
Average annual technical grid loss (transmission and distribution)	10%, default value provided by the CDM methodology	
Average lamp lifetime in hours	12000	50000
CO2 emission factor (tCO_2/MWh)	until 2017: 0.4224 after 2017: 0.4434	

If all conventional urban street lighting systems were replaced by LED based systems, electricity savings would amount to approximately 68 GWh annually which is equal to a reduction of electricity consumption of lighting of about 58%. Through this intervention, annual GHG emissions of street lighting in urban areas would be reduced by 28,600 tCO_2.

Under the ***ambitious scenario*** that seeks to implement LED based street lighting in 10 cities or on 750 km of urban streets by the end of 2020, annual electricity savings are about 22.36 GWh which would result in GHG emission reductions of 9,500 tCO_2.

The replacement of conventional light bulbs by LEDs in 6 cities or on 450 km of streets under the ***conservative scenario*** would result in energy savings of 13.42 GWh per year and GHG emission reductions of 5,700 tCO2.

3.1.2 Direct GHG emission reduction potential of energy efficient lighting in public buildings

The estimation of the GHG emission reduction potential of replacing conventional lamps by more energy efficient lamps in public buildings is more difficult compared to the street lighting sector due to a lack of data. The National Bureau of Statistics does not provide detailed information on

buildings such as on the number of buildings per category, total floor area in m2 or energy consumption. With regard to public buildings, national statistics provide only limited information on the number of education and health institutions, and on the number of users at the national and district levels (GIZ, 2012).

Net electricity savings from the replacement of conventional light bulbs by LEDs in public buildings are therefore calculated based on estimates of the annual electricity consumption of lighting in public buildings and on national data from energy audits on lamp types and total average power of installed baseline lamps (Table 6).

Table 6 Technical parameters for the baseline and NAMA scenarios for the public sector

Parameter	Baseline value	Value for NAMA scenario
Share of electricity consumption of lighting of total electricity consumption of the public sector (%)	15	-
Type of luminaires and percentage of total amount of installed luminaires (%)	FL lamps (18 W): 65% Incandescent lamps (100 W): 35%	LED (9 W): 100%
Operating hours per year	1239	1239
Average annual technical grid loss (transmission and distribution)	10%, default value provided by the CDM methodology	
Average lamp lifetime in hours	FL lamps: 7500 Incandescent lamps: 1200	LED: 50000
CO2 emission factor (tCO_2/MWh)	until 2017: 0.4224 after 2017: 0.4434	

The replacement of all conventional light bulbs by LEDs in public buildings could generate

electricity savings of 169 GWh per year which is equal to a reduction of electricity consumption of about 75%. This reduction would reduce annual GHG emissions of lighting in the public sector by 71,000 tCO_2.

The replacement of 30% of conventional light bulbs by LEDs by the end of 2020 under the ***ambitious scenario*** would result in electricity savings of 51 GWh per year and GHG emission reductions of 21,400 tCO_2.

Under the ***conservative scenario*** that seeks to replace 20% of LEDs in public buildings by 2020, annual electricity savings are about 34 GWh which reduces GHG emissions by 14,200 tCO_2.

3.1.3 GHG emission reduction potential of energy efficient lighting in residential buildings

For the calculation of the GHG emission reduction potential of the energy efficient lighting in residential buildings, a similar approach is taken as in the calculation for public buildings since the sector is constrained by a similar lack of data. Technical baseline and NAMA scenario parameters are presented in Table 7.

Table 7 Technical parameters for the baseline and NAMA scenarios for the residential sector

Parameter	Baseline value	Value for NAMA scenario
Share of electricity consumption of lighting of total electricity consumption of the residential sector (%)	15	-
Type of luminaires and percentage of total amount of installed luminaires (%)	CFL lamps (20 W): 50% Incandescent lamps (100 W): 50%	LED (9 W): 100%
Operating hours per year	1278	1278
Average annual	10%, default value provided by the CDM methodology	

technical grid loss (transmission and distribution)		
Average lamp lifetime in hours	CFL lamps: 8000 Incandescent lamps: 1200	LED: 50000
CO2 emission factor (tCO_2/MWh)	until 2017: 0.4224 after 2017: 0.4434	

The replacement of all conventional light bulbs by LED lighting systems in residential buildings would result in annual electricity savings of 122 GWh which is equal to a reduction of electricity consumption of about 82%. Through this intervention, annual GHG emissions of street lighting in urban areas would be reduced by 51,500 tCO_2.

Under the ***ambitious scenario*** that seeks to replace 10% of conventional light bulbs by LED bulbs in residential buildings by 2018, annual electricity savings are about 12.2 GWh which would result in GHG emission reductions of 5,150 tCO_2.

The replacement of 5% of conventional light bulbs by LEDs under the ***conservative scenario***, would result in energy savings of 6.1 GWh per year and GHG emission reductions of 2575 tCO_2.

3.2 Co-benefits of the NAMA

The NAMA on Promoting energy efficient lighting will have an important impact on sustainable sustainable development in the Republic of Moldova by delivering tangible socio-economic and environmental benefits to the population.

The replacement of conventional lighting systems by LED luminaires will result in a significant reduction of electricity consumption in the target lighting sectors. Preliminary calculations of the savings potential indicate that electricity consumption could be reduced by about 58% in the street lighting sector and by about 75% - 80% in the public and residential building sectors. Given an average annual increase of electricity prices of 10% over the last years, the

implementation of LEDs will result in significant savings for households and communities.

The replacement of conventional lighting systems by energy efficient lighting technologies will promote the creation of new jobs in all sectors that are relevant for planning, financing, implementation and monitoring of efficient lighting projects.

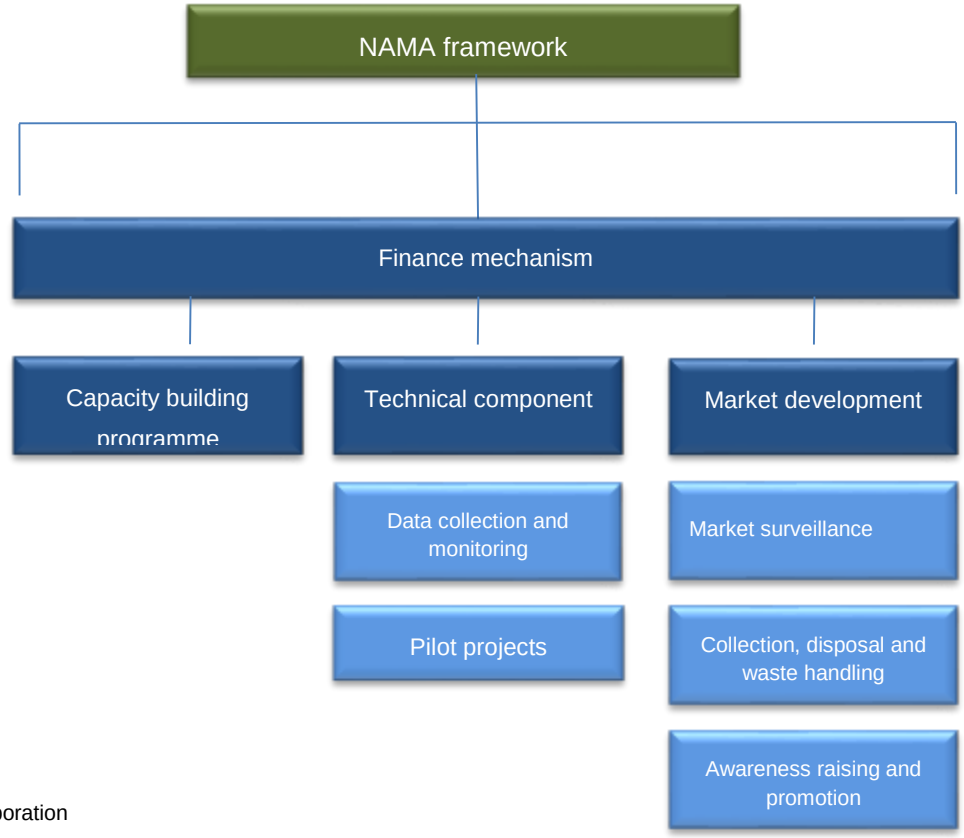
The replacement of conventional lamps by LEDs will help to reduce emissions of other pollutants such as mercury. This is especially relevant for the replacement of light bulbs in the street lighting and public sectors were light bulbs dominate that contain mercury.

4. Measures & interventions under the NAMA

Activities that will be implemented under the NAMA framework have the objective to complement existing activities and resources for energy efficient lighting in Moldova and to remove barriers for the implementation of a national efficient lighting programme. The NAMA framework is designed on the basis of the analysis on barriers and existing programmes and activities presented in previous chapters of this document. Activities will be promoted to strengthen local and national capacities to develop, finance and implement efficient lighting projects. The activities will be targeted at the needs of a range of different stakeholders including national and local governments, the financial sector, project developers, energy service providers and the education sector. To ensure efficient use of available capacities and resources, measures on energy efficient lighting will be integrated into existing programmes and initiatives to promote energy efficiency in Moldova, and only in cases where this is not feasible, stand-alone measures will be designed.

The NAMA framework has three components each of which consists of a set of measures to promote the large-scale implementation of efficient lighting (Figure 5). The components include (1) a **Capacity Building Programme** to enhance the skills and knowledge of national stakeholders to develop and implement efficient lighting activities; (2) a **Technical Support Programme** to promote the implementation of pilot projects on energy efficient lighting and (3) a **Market Development Programme** to increase the demand for efficient lighting projects and to enable the supply side to offer relevant products and services. A **finance mechanism** will be implemented as an overarching component to secure long-term funding for efficient lighting projects and to increase their profitability.

Figure 5 Components of the NAMA on Energy Efficient Lighting



Source: own elaboration

4.1 Capacity building programme

To enhance the knowledge on energy efficient lighting, a capacity building programme will be designed and implemented under the NAMA framework. The core element of the programme will be a set of training courses which cover different aspects of efficient lighting based on the specific needs of a range of stakeholders. For each course and target group, training materials will be prepared. Moreover, each course will have sessions in which participants can exchange first-hand experience from their involvement in efficient lighting projects. This will provide information on barriers and best practices which can be used to better adapt training materials to local circumstances.

The programme will be developed and rolled out during Phase I of the NAMA and will target the following stakeholders:

- **Training of trainers.** A requirement for the implementation of the NAMA on energy efficient lighting is sufficient local capacity to plan, implement and monitor efficient lighting activities. A training-for-trainers programme will be implemented to build the skills of key experts to transfer knowledge and expertise to other stakeholders. The programme will target representatives from the Energy Efficiency Agency, universities and ministries which participate in the implementation of the NAMA.

- **Energy managers and energy auditors.** Energy managers and energy auditors will be offered training on energy efficient lighting for all lighting sectors. Objective of the training is to enable energy managers and auditors to identify energy saving opportunities through efficient lighting and to enhance their skills in project proposal preparation and project management. Guidance on how to formulate energy efficient lighting activities for the inclusion in annual action plans will be another important element of the training that will be specifically offered to energy managers.

- **Technicians.** Provide technical assistance and improve the capacity of private testing laboratories to help them identify which equipment and procedures are needed to fully comply with existing and new EE lighting quality standards developed by this project.

The NAMA capacity building programme could be administered by the Energy Efficiency Agency. The Agency has offered many trainings in recent years to a wide audience, including energy managers, energy auditors and government officials, to comply with capacity building targets set out in the National Energy Efficiency Programme and National Energy Efficiency Plans. A diverse range of other institutions offer capacity building support, for example the

Technical University of Moldova and the Academy of Sciences of Moldova, which can support the EEA with the implementation of the capacity building programme.

4.2 Technical support programme

4.2.1 Data collection and monitoring

Development of a database on energy efficient lighting projects. To track the development of energy efficient lighting projects and to facilitate the monitoring of their performance, a centrally coordinated database will be set up within the framework of the NAMA. Moreover, the aggregation of project level data at the national level will be an important tool to better coordinate the efforts of different stakeholders and to evaluate the progress in the implementation of efficient lighting activities that are included in national energy efficiency action plans and programmes.

The database is proposed to be hosted by the Energy Efficiency Agency and could be integrated into the agency's website on energy efficiency and renewable energy activities. Moreover, the website could be used as an information hub for energy efficient lighting, providing information on topics such as available technologies, service providers, training opportunities and guidelines for project developers.

4.2.2 Pilot projects

The NAMA will promote the implementation of pilot projects on energy efficient lighting in the urban street lighting, public buildings and residential sectors. Pilot projects will be supported during the Pilot Phase (2016-2018) and the Scale-up phase (2019-2020) of the NAMA. During the first two phases, the target of the NAMA is to improve street lighting in up to 10 cities, to install LEDs in up to 30% of public buildings and to replace up to 10% of incandescent light bulbs by LEDs in the residential sector.

Pilot projects targeting street lighting and the public sector will be chosen through a competitive application process which will include criteria such as the presentation of a technically and financially viable proposal, proposed financial contribution by the proponents, willingness to implement the proposal, and backing of the proposal by local stakeholders.

To support energy efficient lighting in the residential sector, a giveaway programme will be implemented during the Pilot Phase of the NAMA. The giveaway programme will promote the

rapid installation of efficient lamps by distributing them free of charge to residential customers. The giveaway programme will be implemented during the Pilot Phase of the NAMA and has the objective to distribute 185000 LED bulbs among households.

4.3 Market development programme

4.3.1 Market surveillance

A market surveillance project will be implemented to protect the market from products that fail to perform as declared or required; guarantee that consumer satisfaction is in line with their expectations; and, ensure that policymakers, government regulators, programme administrators and other officials meet their programme objectives. Without continuous compliance procedures, non-compliant products compromise the effectiveness of efficient lighting programmes and policies.

Market surveillance is particularly applicable to labelling programmes for lighting products because there is a significant amount of declared information provided directly on the label itself, or available indirectly via registration or self-certification schemes. Market surveillance includes visual checks in retail outlets or other distribution points to verify that lamps available in the market carry a label that is compliant with the applicable regulations or programme rules. Products in the market must also be sampled and tested to verify that they do meet the label claims. Following the initial checks, cases of non-compliance can be identified for follow-up.

4.3.2 Collection, disposal and waste-handling

A scheme for the collection, disposal, and waste-handling of e.g. CFLs and other potentially hazardous lighting products will be developed. The scheme will be harmonized with European standards and norms for EE lighting and usage of such products.

4.3.3 Awareness raising and promotion

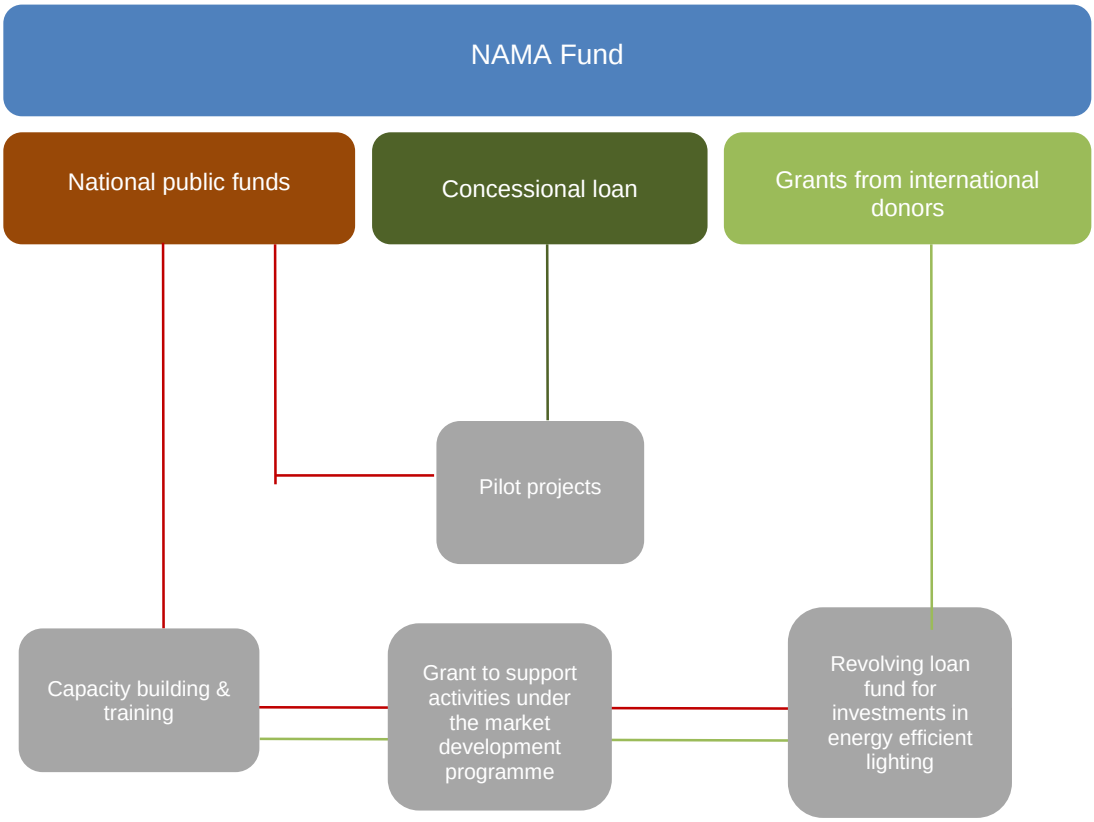
An awareness raising campaign on energy efficient lighting will be designed and launched in parallel with the implementation of demonstration projects and the giveaway programme. The purpose of the campaign is to raise awareness among end users, promote energy efficient

lighting policies, and educate the general public. Accurate information will help end users understand the long-term impact that using efficient lamps will have on their energy bills.

5. NAMA financial mechanism and requirements

The implementation of the NAMA on Promoting energy efficient lighting will require significant funding to overcome market barriers and to establish supporting infrastructure. Resources, primarily financial, but also human, technological and institutional, are required to effectively implement an integrated policy approach. Funding from national and international sources is needed to finance the implementation of the NAMA components and related activities (Figure 6).

Figure 6 Structure of the NAMA finance mechanism



Source: own elaboration

The cost of the implementation of the NAMA is about € 52,25 million. This covers part of the costs of implementing the Capacity Building Programme, the Technical Support Programme and the Market Development Programme during the Pilot Phase (2016-2018) and the Scale-up Phase (2019-2020). NAMA activities to be carried out under the three NAMA components during the Transformation Phase and their respective costs will be determined during the first two NAMA Phases. The implementation costs of the NAMA for the Pilot and Scale-up Phase are distributed among the NAMA components as follows:

Capacity Building Programme: € 2 million (Pilot Phase)

Technical Support Programme: € 47.75

- **Street lighting:** € 6.60 million (Pilot Phase), € 18.68 million (Scale-up Phase)
- **Public sector:** € 6.63 million (Pilot Phase), € 13,26 million (Scale-up Phase)
- **Residential Sector (Give-away programme**): € 2.58 million (Pilot Phase)

Market Development Programme: € 2.5 million (Pilot Phase)

The incremental cost of implementing the NAMA is € 30 million which is distributed between the three NAMA components as follows:

Capacity Building Programme: € 2 million

Technical Support Programme: € 27.5 million

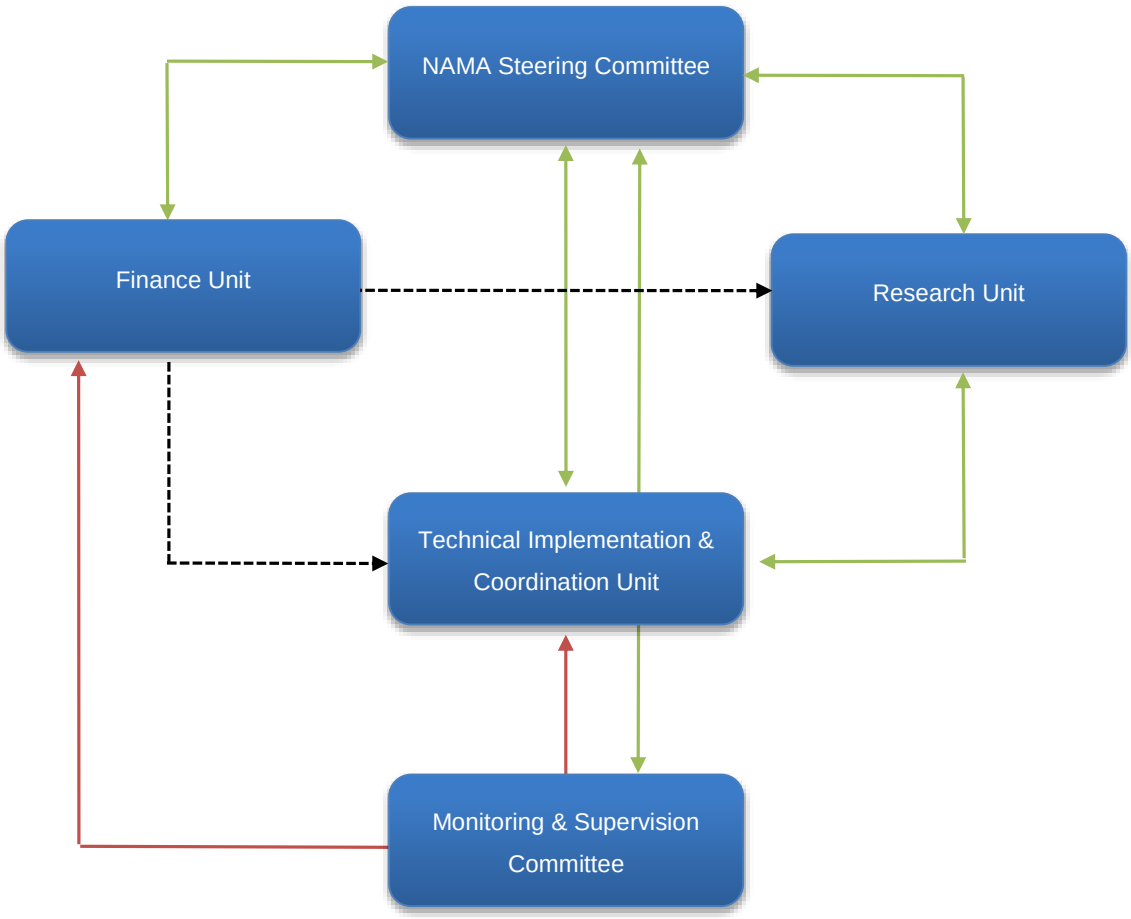
Market Development Programme: € 2.5 million

The finance mechanism of the NAMA will comprise different instruments and funding sources to finance the implementation of the NAMA components during the Pilot and Scale-up Phase. A grant will be used to finance activities to be implemented under the Capacity Building Programme and the Market Development Programme and to set-up a revolving loan fund for investments in energy efficient lighting projects. A concessional loan will be used to provide funding for capital investments in energy efficient lighting infrastructure

6. Institutional set-up for NAMA implementation and operation

The institutional framework for the implementation of the NAMA on Promoting energy efficient lighting in the Republic of Moldova will have to reflect the complexity of the NAMA programme which is cross-sectoral and includes a broad range of topics such as energy efficiency, mitigation of climate change, market development and financing. For the implementation and operation of the NAMA, a multidimensional institutional framework is proposed consisting of i.) a ministerial steering committee, ii.) a technical coordination and implementation unit, iii.) a research and technical guidance unit, iv.) a finance unit and v.) a monitoring and supervision committee (Figure 7).

Figure 7 Proposed structure of the operational framework of the NAMA



Source: own elaboration

NAMA Steering Committee. The NAMA Steering Committee oversees and guides the NAMA implementation process, sets the objectives and prepares the implementation plans for the three

phases of the NAMA, selects implementing partners for the different NAMA components and is responsible for obtaining finance from national and international sources for NAMA implementation.

The NAMA Steering Committee should consist of representatives of all ministries that will have a role during the implementation of the NAMA. This includes the Ministry of Environment, the Ministry of Economy, the Ministry of Regional Development and Construction, the Ministry of Finance as well as relevant subordinated institutions such as the Energy Efficiency Agency. Since the Climate Change Office has the mandate to promote and implement climate change related programmes and projects, it could lead the NAMA Steering Committee. The lead of the NAMA Steering Committee could also be shared between two parties who take over different areas of responsibility. The Climate Change Office could be responsible for environmental and climate change related activities and for communicating and reporting NAMA relevant activities at the international level, for example, to the UNFCCC and international donors. The Ministry of Economy could take the lead for all activities related to the development and implementation of energy efficient lighting activities, including communication to stakeholders at the national, regional and local level.

Technical Implementation and Coordination Unit. The Technical Implementation and Coordination Unit is the executive body of the NAMA. It will be responsible for implementing the three components of the NAMA: the the Capacity Building Programme, the Technical Support Programme and the Market Development Programme. The Unit develops the content of the three NAMA components based on the guidelines provided by the NAMA Steering Committee and prepares detailed plans of activities for each component and NAMA phase.

The Energy Efficiency Agency and the Ministry of Economy would have a leading role in the development and implementation of the NAMA components.

Research Unit. The research unit will have an advisory role for the NAMA Steering Committee and the Technical Implementation and Coordination Unit throughout the entire NAMA implementation process. It will provide scientific guidance based on existing research and it will support NAMA implementation and evaluation through research on a number of relevant topics. Moldova Academy of Sciences and national universities and research programmes would be part of the Research Unit.

Finance Unit. The Finance Unit will oversee all financial transactions carried out under the NAMA Finance Mechanism and will approve annual budgets and allocate funds to each NAMA

component according to annual budget plans. The Finance Unit could be composed of the Energy Efficiency Fund, the Ministry of Finance and international donors that provide funding for the implementation of the NAMA.

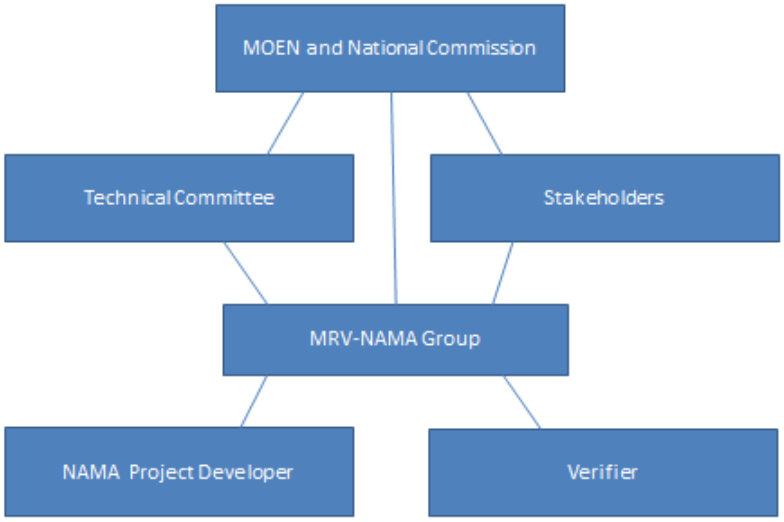
Monitoring and Supervision Committee. The Monitoring and Supervision Committee will be responsible for the MRV of NAMA activities and for ensuring that the objectives of the NAMA are met. The committee will consist of the entities that are part of the institutional framework for MRV (see chapter 7). These entities are lead by the MoEN and include a National Committee for MRV, a Technical Committee and a NAMA MRV Group.

7. Measuring, Reporting & Verification

The Republic of Moldova has developed a draft institutional framework for a NAMA MRV system (Pedersen, M. 20015) (Figure 8). The country has already a well-functioning MRV system for CDM projects which served as guidance for the set-up of the NAMA MRV scheme. The proposed institutional framework consists of MoEN, a National Commission, a Technical Committee and a MRV-NAMA Group.

In the proposed scheme, MoEN will have the overall responsibility for the MRV of NAMAs and an existing National Commission will be delegated the responsibility to prioritize, evaluate, approve NAMAs and carry out MRV of NAMAs. The National Commission was established in 2003 (GD No. 1574 from 26.12.2003) with the mandate to communicate with the UNFCCC on CDM related matters, to evaluate CDM projects and to issue national Letters of Approval for CDM projects. At present, the National Commission does not yet have the mandate to engage in respective NAMA activities.

Figure 8 Proposed institutional set-up for a NAMA MRV scheme



Source: Pedersen, M. (2015)

A Technical Committee will be established to support the National Commission and its main task will be to evaluate NAMAs during all phases of NAMA development and implementation. The Technical Committee should have permanent experts which cover key aspects of a NAMAs related to i) legal and administrative aspects, ii) policy and strategy, iii) financing, iv) technical aspects and v) MRV.

Moreover, it is proposed to establish a MRV NAMA Group which would have the specific function to carry out all activities related to the MRV of NAMAs. The Group is proposed to consist of 10-15 experts.

References

Harvard style of referencing should be used along with the Word Citation function (under "References" and "Citations & Bibliography").

Guidance on the Harvard style can be found here
http://libweb.anglia.ac.uk/referencing/harvard.htm