



**Republic of Macedonia
MINISTRY OF
ENVIRONMENT AND
PHYSICAL PLANNING**



**United Nations
Development Programme**

Report on the Results of the Mapping of the Existing Relevant MRV Systems

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CONTENTS

<u>CONTENTS</u>	<u>I</u>
<u>USED ABBREVIATIONS</u>	<u>IV</u>
<u>LIST OF FIGURES</u>	<u>VI</u>
<u>1 INTRODUCTION</u>	<u>1</u>
<u>2 LEGAL AND INSTITUTIONAL BASIS FOR MONITORING AND REPORTING</u>	<u>4</u>
2.1 ENERGY SUPPLY SECTOR	4
2.1.1 STRATEGY FOR ENERGY DEVELOPMENT IN THE REPUBLIC OF MACEDONIA.....	5
2.1.2 STRATEGY FOR THE USE OF RENEWABLE ENERGY SOURCES IN THE REPUBLIC OF MACEDONIA.....	7
2.2 BUILDINGS SECTOR	7
2.2.1 THE STRATEGY FOR ENERGY EFFICIENCY OF THE REPUBLIC OF MACEDONIA	8
2.3 TRANSPORT SECTOR	9
<u>3 ELECTRONIC SYSTEMS FOR MONITORING AND REPORTING</u>	<u>11</u>
3.1 SYSTEM FOR THE PREPARATION OF ENERGY BALANCE	11
3.2 MONITORING AND VERIFICATION PLATFORM	12
3.3 EXCITE.....	13
3.4 WEB PLATFORM FOR MONITORING THE FUNCTIONING OF ENERGY MARKETS	15
3.5 EMISSION MONITORING IN INDUSTRY – EMI	16
3.6 REGISTER OF VEHICLES.....	18
<u>4 NATIONAL MRV OBLIGATIONS</u>	<u>20</u>
4.1 OBLIGATIONS IN THE CONTEXT OF THE UNFCCC.....	20
4.2 OBLIGATIONS IN EU CONTEXT	21
4.2.1 EU REGULATION 525/2013	22
4.2.2 REGULATION 749/2014	25
<u>5 RECOMMENDATIONS FOR ESTABLISHING A SYSTEM FOR MONITORING, REPORTING AND VERIFICATION OF POLICIES AND MEASURES TO MITIGATE CLIMATE CHANGE IN MACEDONIA</u>	<u>26</u>
5.1 MRV ON ADAPTATION	28
<u>6 ANNEX 1. QUANTITATIVE INDICATORS FOR MONITORING THE PROGRAM FOR IMPLEMENTATION OF THE STRATEGY FOR ENERGY DEVELOPMENT IN THE REPUBLIC OF MACEDONIA FOR THE PERIOD UNTIL 2017</u>	<u>30</u>
<u>7 ANNEX 2: PART OF EU LEGISLATION, WHICH IS ACCEPTED BY ENC</u>	<u>31</u>
<u>8 ANNEX 3: ANNEX XI OF THE REGULATION EC 749/2014</u>	<u>32</u>
<u>9 ANNEX 4: ADDRESSING THE RECOMMENDATIONS OF THE TECHNICAL ANALYSIS OF FBUR</u>	<u>34</u>

10 ANNEX 5: LIST OF INTERVIEWS WITH RELEVANT AND RESPONSIBLE STAKEHOLDERS IN THE INSTITUTIONS AND ORGANIZATIONS COMPETENT FOR IMPLEMENTING OR HAVE ALREADY IMPLEMENTED ACTIVITIES THAT CONTRIBUTE TO CLIMATE CHANGE MITIGATION..... 37

11 ANNEX 6: A DEMONSTRATION EXERCISE FOR MRV 38

11.1 INSTITUTIONAL SETUP 38

11.2 REPORTING PURSUANT TO MMR REGULATION 41

USED ABBREVIATIONS

AP	Action Plan
EARM	Energy Agency of the Republic of Macedonia
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EMI	Emission Monitoring in Industry
EnC	Energy Community
ERC	Energy Regulatory Commission of the Republic of Macedonia
EU	European Union
ExCITE	External Energy Efficiency Tool for Climate Change and Inventory
GEF	Global Environment Facility
GHG	Greenhouse gases
GIZ	German Society for International Cooperation
GoM	Government of the Republic of Macedonia
HMS	Hydro Meteorological Administration
HPP	Hydroelectric Power Plants
ICA	International Consultation and Analysis
INDC	Intended Nationally Determined Contribution
IPA	Instrument for Pre-Accession
IPCC	Intergovernmental Panel on Climate Change
ktoe	ton of oil equivalent
LSGU	Units of the local self-government
MMR	Regulation (EU) 525/2013 on the mechanism for monitoring and reporting of greenhouse gas emissions
MoE	Ministry of Economy
MoEPP	Ministry of Environment and Physical Planning
MoF	Ministry of Finance
MOI	Ministry of Internal Affairs
MRV	Monitoring, reporting and verification
MTC	Ministry of Transport and Communications
MVP	Monitoring and verification platform
NAMA	National appropriate mitigation actions
NEEAP	National Energy Efficiency Action Plan
PAM	Policies and mitigation measures
PE MZ-I	Public Enterprise Macedonian Railways - Infrastructure
PE MZ-T	Public Enterprise Macedonian Railways - Transport
PRTR	Pollutants Release and Transfer Register
PV	Photovoltaic Power Plants
REC	Regional Environmental Center, Macedonia
RES	Renewable energy sources

SHPP	Small hydro power plants
SSO	State Statistical Office of the Republic of Macedonia
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
WAM	Scenario With Additional Measures
WEM	Scenario With Existing Measures
ZELS	Association of the Units of Local Self-Government

LIST OF FIGURES

Figure 1 Types of MRV systems on mitigation (source: WRI) 2

Box 1 Content of the Rulebook on the information system for monitoring and managing the energy consumption at the public sector entities**Error! Bookmark not defined.**

Figure 2 Form for data input for a particular measure 13

Figure 3 Homepage of ExCITE system at the ZELS server 14

Figure 4 EMI – Emissions Monitoring in Industry..... 17

Figure 5 Register of Vehicles (existing condition) 19

Figure 6 Proposed organization of MRV on policies and measures..... 28

Figure 7 Scheme of MRV for Measure 4 - Expansion of electricity production in photovoltaic power plants..... 40

1 INTRODUCTION

Within the development of the First Biennial Updated Report on Climate Change, prepared with technical and financial support of the United Nations Development Program (UNDP) and the Global Environment Facility (GEF), institutional arrangements and processes for monitoring, reporting and verification (MRV) of mitigation activities in Macedonia, were proposed in 2015, including proposals for legal regulation of this issue¹.

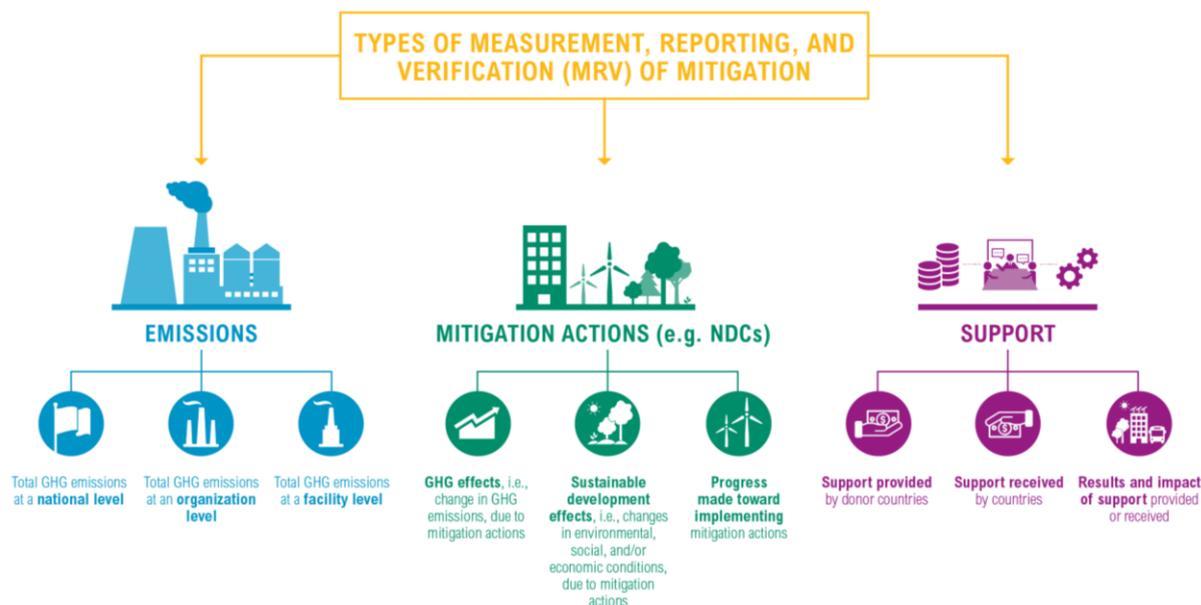
However, until present, these proposals have not been implemented, i.e. no comprehensive national MRV system has been established. In its absence, within the framework of this Second Biennial Updated Report on Climate Change, which is also being prepared with technical and financial support from UNDP and GEF, it is envisaged to carry out activities that will map the existing domestic monitoring systems, which are relevant to MRV. The interest is focused on the sectors identified in the GHG Inventory, including energy, waste, industrial processes, agriculture, forestry and land use change.

Namely, if such systems exist, to determine in which manner the implementation of the activities (projects or policies) is followed, whether it is reported about that, to whom and how often it is done and, of course, whether there is a certain way of verifying those reporting.

Here it is very important to distinguish what types of MRV systems are concerned, as basically national MRV systems usually involve a set of policies, processes and organizations that enhance transparency by monitoring three types of MRV systems (Figure 1):

- MRV of historical emissions and removals of greenhouse gas emissions, in order to understand the national emission profile and to report them in the form of an emission inventory (MRV of national GHG emissions levels).
- MRV of policies and measures for mitigation, as well as the projections of anthropogenic emissions of greenhouse gases by sources and removals by sinks, to monitor their implementation (MRV of mitigation activities).
- MRV of support (e.g. Financing of mitigation of, and adaptation to climate change, technology transfer and capacity building) to identify the provision and receipt of appropriate support, to monitor the results achieved and of course, to evaluate their effect (MRV of support).

¹ Conceptual framework for monitoring, reporting and verification of actions to mitigate climate change in Macedonia;
http://www.unfccc.org.mk@unfccc.org.mk/content/FBUR/MRV_Conceptual_Framework_FBUR.pdf



*For simplicity, this graphic uses the term "emissions" as shorthand for "emissions and removals."

Figure 1 Types of MRV systems on mitigation (source: WRI²)

Having in view such systematization of the MRV systems, in the context of the project task, the consultant focuses on identifying existing systems of the second type, that is, those that would monitor the mitigation activities. The reason for this approach in completing the project task, is that the main concern at this point, is to determine whether there is a monitoring and reporting on the measures and policies that are included in the Intended Nationally Determined Contributions (INDC)³. This document, together with the list of activities the Country intends to carry out as a national contribution, was adopted by the Government of the Republic of Macedonia (GoM) on 28 July 2015 and submitted to the Climate Change Secretariat on 4 August 2015.

The projects and measures that are part of the INDC decision are grouped into three sectors: energy supply, buildings and transport. Also, it needs to be mentioned that this list includes 17 projects and policies that are part of the scenario with existing measures (WEM)⁴, and nine projects and policies that are part of the scenario with additional measures (WAM)⁵.

In a methodological sense, the consultant carried out two types of activities:

- Desk research covering domestic and international publications and other information available on the Internet, including the relevant domestic and EU legislation, and
- Individual interviews with a wide range of relevant and responsible stakeholders in institutions and organizations that are responsible for implementation or are already implementing activities that contribute to mitigating climate change, and are included on the INDC list.

The purpose of this approach is twofold:

² World Resources Institute

³ Intended Nationally Determined Contributions; http://www.klimatskipromeni.mk/content/Documents/mk_final.pdf

⁴ WEM – With Existing Measures

⁵ WAM – With Additional Measures

- Identifying legal obligations for the establishment of monitoring and reporting systems and the state of their practical implementation. In other words, are there established systems, which in an organized manner, i.e. on the basis of established criteria, metrics and defined indicators, perform monitoring and reporting.
- Identifying the institutions or organizations that are in charge of implementing a particular specific activity, the way in which those institutions / organizations monitor the implementation, to whom and how they report, how information and data are verified, etc.

The results of these surveys and analyzes are presented below in this report, and the detail of the information and the data is dependent on their availability.

2 LEGAL AND INSTITUTIONAL BASIS FOR MONITORING AND REPORTING

The Law on Environmental⁶, at present, has regulated the issue of monitoring of anthropogenic emissions by sources and sinks of greenhouse gases. Namely, pursuant to Article 186-a, the MoEPP should establish, develop, manage and coordinate a National System for Inventory of GHG emissions. This system will provide data for the preparation of the GHG inventory, as well as for monitoring the implementation of the National Plan for Climate Change (Article 187), which is adopted for a period of six years and, inter alia, should include:

- Economic analysis of the proposal for measures to prevent the causes and to mitigate climate change,
- Competent authorities, institutions and other legal entities for implementation of the national plan, action plan and measures for prevention of causes and for mitigation of climate change,

However, the Law on Environment has not yet regulated in detail the issue of MRV on policies and measures. The First Biennial Update Report on Climate Change, prepared a proposal for its amendment in order to complete the legal basis. Also, in the same report, a proposal for a bylaw was prepared, which closely defines the system of MRV on policies and measures.

Having in mind that, on the one hand, the Law on Environment does not sufficiently regulate the issue of MRV on policies and measures, and on the other, those identified as the Intended Nationally Determined Contribution of the Republic of Macedonia are grouped into three sectors: energy supply, buildings and transport, the first step in the implementation of this project task is to establish the existing legal arrangements for monitoring and reporting of issues that govern those sectors.

2.1 Energy Supply Sector

Basic law that regulates energy issues, is the Energy Law⁷. This law regulates a number of issues, including:

- The goals of the energy policy and the manner of its realization
- Construction of energy facilities
- Conditions for achieving energy efficiency and promotion of the use of renewable energy sources, etc.

The manner of realization of the energy policy, in fact, means how the strategic and other policy documents in the energy sector in Macedonia are implemented. Subsequently, the Law regulates, albeit incompletely, the issues of monitoring, reporting and verification of the implementation of strategic documents, including the institutional competence.

⁶ („Official Gazette of the Republic of Macedonia“ 53/2005, 81/2005, 24/2007, 159/2008, 83/2009, 48/10, 124/10, 51/11, 123/12, 93/13, 42/14 and 44/2015)

⁷ „ Official Gazette of the Republic of Macedonia“ 16/2011, 136/2011, 79/2013, 164/2013, 41/2014, 151/2014, 33/2015, 192/2015, 215/2015, 6/2016 and 53/2016

In this sense, the following is an overview of the key strategic documents for the energy policy, their legal basis, manner of adoption, obligations and mechanisms for monitoring and reporting on their implementation.

2.1.1 Strategy for Energy Development in the Republic of Macedonia⁸

The Strategy for Energy Development (Article 10, Law on Energy) is adopted every five years and refers to the next 20 years. At present, in force is the Strategy adopted by the GoM in 2010, which is valid until 2030⁹.

The measures, conditions, manner and the pace of implementation of the Strategy, as well as obligations of state authorities, local government units (LGUs) and operators in energy activity are determined by the Program for Implementation of the Strategy for Energy Development in the Republic of Macedonia¹⁰. The Program, which is adopted by the GoM, determines the necessary financial resources for the realization of the Strategy, as well as the sources and the manner of their provision. In accordance with the law, the Ministry of Economy (MoE) is obliged to monitor the implementation of the Program, for which it prepares annual reports that it submits to the GoM, by July 31 at the latest.

Details of this responsibility of MoE are regulated in the Rulebook on Energy Balances and Energy Statistics¹¹. Besides the content and the manner of preparing the energy balance, the Rulebook prescribes the content, the manner and the deadline for submitting the data necessary for the preparation of the Strategy, as well as for the preparation and monitoring of the accomplishments of the Program for realization of the Strategy.

Though this issue is not sufficiently elaborated in the Rulebook, as it is unclear what it should contain and how to prepare the Annual Report for the Implementation of the Program, the Program itself has been elaborated in detail. Namely, in the chapter "Manner of monitoring the realization of the Program", the structure of the annual report is determined, which should contain:

- Quantitative indicators for implementation of the Program
- Evaluation of the implementation of the Program
 - Consistency with the timeframe
 - Financial report (funds, use of resources)
 - Development of capacity building
 - Achievements of the goals
- Barriers to the implementation of the Program
 - External impacts

⁸ „Official Gazette of the Republic of Macedonia“ 61/2010, http://arhiva.vlada.mk/registar/files/ME_Strategija_za_energetika_2030_22.12.2009.pdf

⁹ The Strategy for Energy Development in the Republic of Macedonia for the period until 2035, is prepared as draft in 2016, however due to the political situation in the country, its adoption is delayed; https://www.archive.economy.gov.mk/files.php?force&file=sektori/Nacrt_tekst_strategija_854918556.pdf

¹⁰ The Program for implementation of the Strategy for Energy Development in the Republic of Macedonia for the period 2013 – 2017; „Official Gazette of the Republic of Macedonia“ 50/2013

¹¹ „Official Gazette of the Republic of Macedonia“ 140/2015, http://archive.economy.gov.mk/files.php?force&file=sektori/energetika/Pravilnik_bilans_443539633.pdf

- Report on barriers in administrative procedures
 - Other barriers
- Recommendations for improving the implementation of the Program on all grounds
 - A brief overview of strategic studies and analyzes developed in the year of reporting
 - Summary of comments from public discussions on the draft report

The Program also establishes indicators for evaluating the use and the effects of its implementation, as well as the competence to monitor each individual indicator (Annex 1).

According to verbal information provided by the responsible persons in MoE (see Appendix 5), the Annual Report¹² contains information on the progress of each singular measure, which is envisaged in the Program, while the data are provided from already prepared reports by other institutions or MoE. The latest report is prepared for 2015, while the process for preparing the report for 2016, as of preparation of this document, has not yet begun.

The two key documents, on the basis of which the MoE prepares the annual report for the realization of the Program, are the report on the realization of the energy balance, prepared by the State Statistical Office (SSO) and the Annual report on the performance of the Energy Regulatory Commission (ERC).

In calculating energy balances, SSO use the methodology of Eurostat¹³, while energy balances are prepared in accordance with the European Regulation on energy statistics¹⁴.

The annual report on the performance of the ERC contains detailed information on monitoring the functioning of energy markets, as well as other information on its operation. The report is submitted for adoption to the Parliament no later than March 31, and for information to the GoM and MoE. However, it should be noted that the Report does not contain direct data on GHG emissions, although based on data on production, distribution and consumption, it is undoubtedly that emissions can be calculated.

Monitoring of the markets, pursuant to the Rulebook for monitoring the functioning of energy markets¹⁵, is a set of actions related to the collection, processing and analysis of data and information, as well as dissemination of information. The data and information shall be submitted to the ERC in electronic format and on the forms stipulated by the Rulebook.

¹² Despite all efforts, the consultant failed to ensure detailed information on the manner of preparation of the report nor a copy of the last report prepared

¹³ Energy Statistics Methodology Eurostat F4, 1998

¹⁴ Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics

¹⁵ „Official Gazette of the Republic of Macedonia“ 207/2016, http://erc.org.mk/odluki/MM_RulebookV47_MK_Final.pdf

2.1.2 Strategy for the Use of Renewable Energy Sources in the Republic of Macedonia¹⁶

The Strategy for the use of renewable energy sources in the Republic of Macedonia (Article 144, Law on Energy) is adopted every five years and refers to the next 10 years. At the moment, valid is the Strategy adopted by the GoM in 2010, with a validity until 2020.

For the realization of the Strategy, an Action Plan for Renewable Energy Sources of the Republic of Macedonia is adopted. The AP has a validity of 10 years, and the current¹⁷ was adopted in 2015, with a validity until 2025. Among other things, the AP contains information about the responsible entities and the deadlines for realization of the envisaged activities.

The monitoring of the implementation of the Action Plan is an obligation of the MoE, which is obliged to prepare two-year reports that it submits to the GoM. The content, manner and deadline for submitting the data required for the preparation of the two-year report for the implementation of the AP is not prescribed by law or by-law. However, as a response to the obligation of the Republic of Macedonia to the Energy Community Treaty (EnC), the report is prepared according to the template recommended by the EC, in accordance with Article 22 of the Directive 2009/28/E¹⁸.

According to information received by the responsible persons in MoE (Appendix 5), based on existing reports from other authorities, in April 2017 the latest two-year report¹⁹ on the implementation of the Action Plan for RES, for the period 2015-2016, was prepared.

2.2 Buildings Sector

The most important issues for the Sector Buildings are also regulated by the Energy Law, including: the competencies and obligations of the LSGs, energy suppliers and public sector entities. The specific policies are determined by the Strategy for Energy Efficiency of the Republic of Macedonia. Its implementation has been operationalized with the National Energy Efficiency Action Plan. Important instruments, both for the implementation of the Strategy and reporting on the implementation of the measures, are the three-year Energy Efficiency Improvement Programs within the LSGs, energy suppliers and public sector entities. These entities have an obligation to submit annual information on the implementation of programs to EARM.

¹⁶ Strategy for utilization of renewable energy sources in the Republic of Macedonia until 2020; „Official Gazette of the Republic of Macedonia“ 125/2010; http://arhiva.vlada.mk/registar/files/ME_Strategija_za_iskoristuvanje_na%20obnovljivi_izvori_na_energija_vo_RM_do_2020_07.09.2010.pdf

¹⁷ „Official Gazette of the Republic of Macedonia“ 207/2015, http://archive.economy.gov.mk/files.php?force&file=sektori/energetika/d5ffe318c59f4f99944a9aafac9f55db_578640829.pdf

¹⁸ Pursuant to Article 15 of the EC Decision (2012/04/EnMC), Macedonia is obliged to prepare a two-year progress report on the promotion and use of energy from renewable sources

¹⁹ Despite all efforts, the consultant failed to ensure detailed information on the manner of how preparation of the report, nor a copy of the last report prepared

2.2.1 The Strategy for Energy Efficiency of the Republic of Macedonia²⁰

The Strategy for Energy Efficiency of the Republic of Macedonia (Article 130, Law on Energy) is adopted by the GoM for a period of 10 years, and the current one is adopted in 2010 and is valid until 2020. However, for its implementation, every three years a National Energy Efficiency Action Plan (NEEAP) is adopted. To date, three NEEAPs are prepared, and the last one in 2016 with validity period up to 2018²¹. Pursuant to the Law, among other things, NEEAP contains an analysis and report on the implementation of measures and activities from the previous action plan, necessary funds for implementation of proposed new measures and activities, and responsible institutions thereof.

The monitoring of the implementation of measures and activities is entrusted to the Energy Agency of the Republic of Macedonia (EARM), for which it has to prepare and submit annual reports to the MoE, by 31 March at latest. Unfortunately, in this case too, the Law failed to stipulate or refer to a by-law, which will prescribe the content, manner and deadline for submission of data required for the preparation of the annual report on the implementation of the NEEAP.

In the context of monitoring and reporting on energy efficiency, of great importance is the amendment to the Energy Law²², which further regulates the obligations of the public sector entities and LSGs to monitor and manage energy consumption in buildings and for public lighting. Namely, this amendment of the law, stipulated adoption of a by-law for detailed regulation of the issue, which is done two years

The Rulebook on the information system for monitoring and managing the energy consumption at the public sector entities, prescribes:

- the content and format of the information system for monitoring and managing energy consumption
- the way of establishing, keeping and maintaining the information system
- the manner, procedure and deadlines for entering and approving data in the information system
- users of the information system and the manner of using and publishing and access to information from the information system
- an indicative list of public sector entities that have an obligation to enter data in the information system
- users of the information system and their capacity, as well as the authorizations of the persons responsible for collecting, inputting and approving data in the information system, and
- the type and content of data from the information system that the users of the information system collect, input and approve

The information system, in addition to data on the general characteristics of the buildings, contains data on the energy consumption and costs of energy consumed in buildings and public lighting, as well as climatological data necessary for calculating the energy performance of buildings. These data are used for preparation of plans and programs for energy efficiency and for calculation of greenhouse gas emissions in the atmosphere. The monitoring, reporting to the information system and verification of data, is a duty of the public sector entities. The Hydro-Meteorological Administration (HMA), however, is obliged to enter the climatological data in the information system.

Box 1 Content of the Rulebook on the information system for monitoring and managing the energy consumption at the public sector entities

²⁰ Energy Efficiency Strategy of the Republic of Macedonia until 2020; „Official Gazette of the Republic of Macedonia“ 143/2010, [http://www.ea.gov.mk/images/stories/E_Izdanija/Regulativa/Strategija_za_unapreduvanje_na_EE_vo%20RM_do_2020_godina_SV%20143-2010%20\(1\).pdf](http://www.ea.gov.mk/images/stories/E_Izdanija/Regulativa/Strategija_za_unapreduvanje_na_EE_vo%20RM_do_2020_godina_SV%20143-2010%20(1).pdf)

²¹ [http://www.economy.gov.mk/Upload/Documents/Tret%20NEEAP_V02%20\(MKD\).pdf](http://www.economy.gov.mk/Upload/Documents/Tret%20NEEAP_V02%20(MKD).pdf)

²² „Official Gazette of the Republic of Macedonia“ 79/2013

later, with the adoption of the Rulebook on the information system for monitoring and managing energy consumption at the public sector entities²³ (Box 1).

The establishment and maintenance of the single information system for monitoring and managing of energy consumption at the public sector entities, is the responsibility and obligation of EARM.

Despite this bylaw, aimed at energy efficiency and energy savings, the Energy Law prescribed two more rulebooks to regulate the issues of energy audits and energy performance of buildings. The first is the Rulebook on Energy Audits²⁴, which prescribed the content and the format of the annual report on conducted energy audits in the public sector entities in the previous year and obliged EARM to submit it to the MoE. The second is the Rulebook on Energy Performance of Buildings²⁵, which in turn prescribed methodology for determining the energy performances, as well as the form and content of the energy certificate, which shall include a number of parameters, including two very important indicators of the energy efficiency of the building, as follows:

- Specific primary energy consumption expressed in kWh/m²/year, and
- Specific emission of CO₂ for the calculated primary energy expressed in kg CO₂/m².

2.3 Transport Sector

Measures and policies that are part of INDC in the transport sector are fewest, only five, two of which are part of the WAM scenario. Two of the measures are in the rail transport, two in the road transport, while one measure is related to alternative modes of transport.

The issues on rail transport are regulated by the Law on Railway System²⁶. From the viewpoint of the measures envisaged in INDC, it is important to establish that they originate from the National Transport Strategy for the period 2007 - 2017²⁷ and the National Program for Railway Infrastructure for the period 2014-2016²⁸ (Article 26, Law on Railway System).

National Program is adopted by the Parliament at the proposal of the GoM, for a period of three years, and the last valid is for the period 2014 - 2016. Based on the Program, the Public Enterprise Macedonian Railways - Infrastructure (PE MZ-I) prepares an annual program for financing of railway infrastructure that is adopted by GoM. The financing of railway infrastructure is responsibility of the central budget, but since often those are major capital investments, funding is provided from other sources too, such as loans and credits from domestic and foreign financial institutions.

In the context of monitoring and reporting, the law stipulated a responsibility for PE MZ-I, in the first quarter of the year to report to the GoM, on the implementation of the annual program. However, it should be noted that the Law does not stipulated any methodology for preparing the annual report,

²³ „Official Gazette of the Republic of Macedonia“ 125/2015

²⁴ „Official Gazette of the Republic of Macedonia“ 94/2013

²⁵ *ibid*

²⁶ „Official Gazette of the Republic of Macedonia“ 48/10, 23/11, 80/12, 155/12, 163/13, 42/14, 130/14, 152/15, 31/16 и 178/2016

²⁷ www.amerit.org.mk/pdf/nacrstrategija.doc

²⁸ <http://www.slvesnik.com.mk/Issues/e7894ff1966d4f72953a83c3490352e1.pdf>

nor the establishing of a system for monitoring and reporting on implementation of the annual program for financing the railway infrastructure.

According to the law, the railway system in the Republic of Macedonia is based on the principle of separation of railway transport from railway infrastructure. For the shipping responsible are railway carriers, which can be either public or private organizations. Currently, the largest and the only railway carrier is the PE Macedonian Railways - Transport (PE MZ-T), whose founder and owner is GoM. They deal with the transport of passengers and goods, and that means that the responsibility for implementing the measure for better use of railways, falls within the competence of this enterprise.

Pursuant the law, PE MZ-T is obliged to prepare a business plan for the operations, which should include the investment (three year) and financial (annual) programs, for which the GoM is giving a consent. However, the Law does not prescribed an obligation for preparation of reports on the implementation of the programs, so it remains unclear how their implementation is monitored.

In terms of measures relating to road transport, relevant is the Law on Vehicles²⁹, which among other things regulates the issues of market release and start of operation of vehicles, registration and roadworthiness, as well as the data registry for vehicles. The most important part of the Law is the data registry for vehicles that is run by the Ministry of Interior, which inter alia, contains data on:

- Approved types of vehicles
- Issued certificates of compliance and consents for registration
- registered vehicles
- wrecked vehicles

Unfortunately, although the law is in force for almost a decade, the by-law that should prescribe the form, the content and the manner of keeping the registry, and the manner of input and release of data, has not yet been enacted.

²⁹ „Official Gazette of the Republic of Macedonia“140/2008, 53/2011, 123/2012, 70/2013, 164/2013, 138/2014, 159/2015, 192/2015 and 39/2016)

3 ELECTRONIC SYSTEMS FOR MONITORING AND REPORTING

In the previous chapter of this report, the legal obligations for monitoring, reporting and verification (where possible), as well as the responsible institutions and organizations that are competent to carry out these obligations, were identified.

However, though the legislation most clearly point to the establishment of monitoring systems, according to a consultant's research, at present, none of the competent institutions are yet having operational systems or they are under development or in phase of testing. Even so, the competent institutions partially exercise their responsibilities for the preparation of certain reports that are prepared on the basis of available information, which are collected on an ad-hoc base or pursuant to the legal competences, but also based on certain engineering estimates and calculations in cases where data and information are missing.

From the information provided in the framework of the implementation of this project task, it can be concluded that the competent institutions undertake accelerated steps to establish formal systems, mostly in electronic format. Following is an overview of the systems that are under construction or testing.

3.1 System for the preparation of energy balance

According to information received by the responsible persons in the MoE (Appendix 5), and in accordance with the requirements of the Rulebook on energy balance and energy statistics³⁰, a software tool that should provide a partial automation of the data collection necessary for the preparation of the energy balance of the country is developed. This software tool should start to be used from 2018. Albeit for the purposes of this report, no specific information on the contents of the tool, are provided³¹, it is most logical to conclude that it will have such content as stipulated in the Rulebook. Namely, the Rulebook stipulates that data for the preparation of the energy balance is collected in writing and in electronic format using forms that are an integral part of this Rulebook. The data should be presented in natural units in ktOE (kilo ton of oil equivalent), whereby the conversion from natural units in ktOE is performed according the specific energy values of different fuels, which are also set out in the Rulebook or by specific values of data submitted in electronic forms.

Among other data, the Rulebook stipulated the need for collecting data on greenhouse gas emissions in kt CO₂, but cumulatively by types of fuel: coal, crude oil, motor gasoline, diesel oil, LNG, fuel oil, kerosene and natural gas. These data should provide information about the realized emissions in the year preceding the year of the reporting (n-1), an estimate of the expected emissions in the year of the reporting (n), and a plan for emissions in the year following (n + 1).

³⁰ „Official Gazette of the Republic of Macedonia“ 140/2015, http://archive.economy.gov.mk/files.php?force&file=sektori/energetika/Pravilnik_bilans_443539633.pdf

³¹ The consultant was unable to obtain information from the MoE on the content of the tool, the manner it will operate, and other information related to system

3.2 Monitoring and Verification Platform

According to information obtained from the relevant persons involved in the project (Appendix 5), with the technical assistance from the GIZ's Open Regional Fund for Energy Efficiency, during 2016 a software tool that will allow effective monitoring of the implementation of measures and activities from NEEAP, was developed. Project activities are part of the work program of the Group for the coordination of energy efficiency within the Energy Community Secretariat in Vienna.

It is a monitoring and verification web platform (MVP), which is specifically designed to monitor the implementation of the NEEAP and will facilitate the reporting to national and international institutions and organizations, too.

With this innovative web platform, one can monitor the energy efficiency and plans to reduce emissions of CO₂, at different levels of policy, i.e. one can monitor national plans, but also municipal plans for energy efficiency. The platform should serve as registry of implemented projects and will contain the following data: general data, energy savings [KWh] and CO₂ [t], as well as costs and calculations data (Figure 2).

General data includes the name of the measure and its description, type, location and sector, the institution responsible for the implementation and timeframe of implementation. The data on energy savings, reduction of emissions of CO₂, are obtained automatically based on general data and calculations data using the "Bottom - Up" methodology, while the cost of implementation should be entered based on the value of the investment. Calculations data are provided based on the appropriate formula for the relevant measure, while determined values of the variables should be used as input data, if such exist. Otherwise the recommended values that are already part of the system, shall be used.

Every measure that will be registered in the MVP system, will be linked to a specific NEEAP, regardless if it was originally envisaged by that plan or not. Regarding the monitoring of the emissions of greenhouse gases that come from measures which are not envisaged with the specific NEEAP, it should be noted that their entry into the MVP system should be done upon previous harmonization among relevant institutions, primarily between the MoE (as a manager of the MVP system) and MoEPP (as a manager of the future MRV system).

Obviously, the most important module of the MVP, as with any other software tool, is the one on reporting, which will display the information from the database in a comprehensible and rational way. The MVP tool does not contain any predefined templates for reporting, in order to make it most flexible for users who can design reports to their needs. In other words, MVP uses the approach: draw a form and export data to Microsoft® Excel. That, in turn, enables further processing of this data, like any common Excel file.

Implemented measure

General data

Measure title	<input type="text"/>
Measure desc	<input type="text"/>
Measure type	Refurbishment measures in existing buildings (M1) ▼
Location	<input type="text"/> 🔍
Sector	BUILDINGS ▼
Fuel type (before)	<input type="text"/> ✖ ▼
Fuel type (after)	<input type="text"/> ✖ ▼
Entity	<input type="text"/> ✖ ▼
Responsible	<input type="text"/> ✖ ▼
Implementation date	<input type="text"/> ▼
Valid to	<input type="text"/> ▼

Documents

Savings and costs

Energy savings (kWh)	<input type="text" value="0.00"/>
CO2 savings (t)	<input type="text" value="0.00"/>
Cost of measure	<input type="text" value="0.00"/>

Calculation data

Formula

Specific heat demand (old)

Specific heat demand (new)

Seasonal efficiency of old heating system

Seasonal efficiency of new heating system

Heated area (m2)

$$UFES = \frac{SHD_{old}}{\eta_{old}} - \frac{SHD_{new}}{\eta_{new}}$$

📄 Insert

🧮 Calculate

Figure 2 Form for data input for a particular measure³²

This tool, unfortunately, has not yet been put into use. The most important operational issues are the lack of capacities, both financial and human. Also, it needs to be underlined that there are no legal grounds for the use of this tool, since no legislation is stipulating its establishment and maintenance.

The MVP tool will be used by EARM, but it will be installed on existing servers of the MoE, which, according to the responsible persons in the MoE (Appendix 5), are currently being installed.

3.3 ExCITE³³

Back in 2010, based on best practices for monitoring of energy consumption in municipalities, UNDP supported the development of a software tool ExCITE³⁴. The software (Figure 3), was installed on the information platform of the Association of Local Government Units (ZELS), and training on how to use it, was conducted for municipal employees as well as for the institutions of the central government. In

³² Monitoring and Verification Platform, Manual for MVP training exercise, Armin Teskeredzic; http://multee.eu/system/files/MVP_Training_Manual.pdf

³³ External Climate and Inventory Tool for Energy efficiency

³⁴ Verbal information from Mr. Trajce Andreevski, head of the project "Improving energy efficiency in public buildings", implemented by UNDP Macedonia

the first half of 2011, the municipalities show great interest and high level of use of the tool, but after the free support from UNDP expired, its use was virtually halted.

However, after the amendments of the Energy Law from 2013, UNDP provides additional support to the MoE for development of a new version of the software tool, which is fully tailored to the Rulebook on Information System.

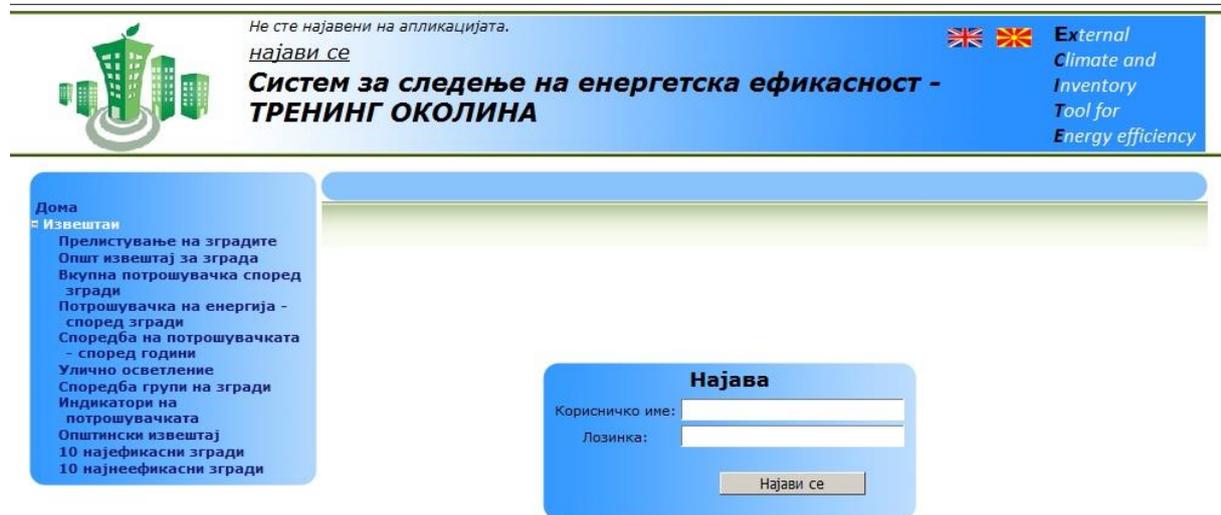


Figure 3 Homepage of ExCITE system at the ZELS server

This electronic software tool has many benefits, including:

- greater transparency and monitoring of energy costs, which will improve the budget management
- facilitating the process of drawing up programs and plans for energy efficiency and reporting on their implementation
- facilitating and accelerating the collection of data for implementation of mandatory energy audits in the public sector
- measurement and verification of energy savings achieved

The database collected information on:

- General data (e.g. name of the building, settlement and address, type of ownership, user of the object, etc.)
- Construction Data (e.g. a certificate of energy performances, year of construction / renovation, area in m², number of floors, type of construction, the predominant construction material, the predominant type of windows, geographical orientation of the building, total heated / cooled surface m² and heated / cooled volume m³),

- Thermal data (e.g. type of heating fuel, heat capacity of the boiler in kW, capacity of the heat pump in kW, installed capacity of electric heaters in kW, installed capacity of the central heating system in kW, etc.) ,
- Lighting data (e.g. the number of lamps of different type (incandescent, halogen, metal halogen, mercury lamps, neon lamps, etc.) according to intensity in W and the total power in kW),
- Data for public lighting (e.g. the municipality, settlement, type of lamps (total number and total power in kW) and contact person).

As well, this tool is adjusted to be utilized by all public sector users and not just in municipalities.

Based on the data in the database of the information system, depending on the status of the user of the system, a variety of reports can be generated, including:

- Indicators of specific emissions of CO₂ (kgCO₂/m²)
- General and individual report on greenhouse gas emissions from building or construction units and public lighting and other reports.

Pursuant to the Rulebook, the information system should be set up, kept and maintained by the EARM, starting from 2016. However, the use of the software tool ExCITE, can only start after adequate spatial, technical and human resources in EARM, are provided, and those until present have not yet been provided³⁵.

3.4 Web platform for monitoring the functioning of energy markets

During 2016, the ERC with the financial support from Norway, in cooperation with national experts, has developed a special tool to monitor energy market in Macedonia³⁶. The tool is based on the spreadsheets program – Microsoft® Excel, and for data input the program version 2007 or higher, can be used, but also the open source program LibreOffice® Calc5. The use of the tool will be supported by the web portal interface, where every user can log-in with its own user name and password assigned by the ERC. The tool is in the testing phase and its official use is expected from the beginning of 2018. For the use of this tool, the ERC has prepared special Guideline³⁷, which, for all users, is available on the website of the ERC.

The tool uses general rules for used measuring units, as follows:

- Electricity
 - Active energy in kWh, prices in MKD/kWh
 - Active power in MW, prices in MKD/MW
- Natural gas
 - Quantities in m³, prices in MKD/m³

³⁵ In 2016 EARM failed to procure servers to install the tool, while the budget for 2017, does not foresee funds for such purposes

³⁶ Verbal information obtained from relevant persons in the ERC (see Annex 5)

³⁷ <http://erc.org.mk/odluki/3mm-manual.pdf>

- Oil and oil derivatives
 - Quantitates in t, prices in MKD/t
- Heating energy
 - Quantitates in kWh, prices in MKD/kWh

3.5 Emission Monitoring in Industry – EMI³⁸

The software tool EMI (Figure 4) is developed partly under the Third National Communication on Climate Change, but entirely within the First Biennial Update Report, which should enable the industry to meet its legal obligations for reporting of annual emissions of greenhouse gases and air pollutants in accordance with the Intergovernmental Panel on Climate Change (IPCC) and the methodology of CORINAIR. The obligations are arising from the four international conventions on climate change and air pollution.

The EMI portal was developed with the help of Java software platform (Enterprise Edition) and MySQL database, and is installed on an open source server Apache Geronimo. Modular implementation allows this tool to be upgraded, horizontally and vertically, allowing further extension, if necessary.

³⁸ Emission Monitoring in Industry

EN | MK
Logout
General
Reporting
History
Help

Step 1: General
Step 2: Technical details
Step 3: Reporting forms
Step 4: Preview

Technical data - 2013, Semiannual 1

Total installed capacity [MW]:*

Type of industrial activity:*
 Energy production plant
 Manufacturing industry plant

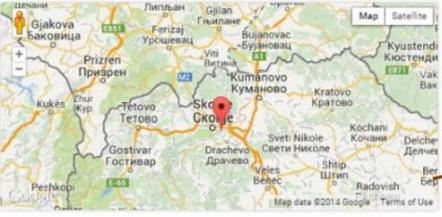
Insert the processes that are executed in the industrial plant (ordered by priority):* Remove process Add new process

1.

2.

Exhaust: Remove exhaust system Add new chimney

Exhaust name:* <input type="text" value="EX0101"/>	
Chimney height [m]: <input type="text" value="100"/>	
Internal diameter of the chimney at the top [m]: <input type="text" value="23"/>	
Latitude: <input type="text" value="41.981981041160935"/> *N	
Longitude: <input type="text" value="21.481856927275658"/> *E	
Temperature [*C]: <input type="text" value="60"/>	
Flow [Nm3/h]: <input type="text" value="56"/>	
Flow speed [m/s]: <input type="text" value="60"/>	




Exhaust name:* <input type="text" value="EX01012"/>	
Chimney height [m]: <input type="text" value="70"/>	
Internal diameter of the chimney at the top [m]: <input type="text" value="50"/>	
Latitude: <input type="text" value="42.014583092697684"/> *N	
Longitude: <input type="text" value="21.503829583525658"/> *E	
Temperature [*C]: <input type="text" value="56"/>	
Flow [Nm3/h]: <input type="text" value="60"/>	
Flow speed [m/s]: <input type="text" value="55"/>	

Purification system: Add new purification system

Purification system type:

Purification system utilization rate:

Description:

Information about the exceptional situation (disorder):

Back
Next

Site map

- [General](#)
- [Reporting](#)
- [History](#)
- [Help](#)

About EMI

- [About us](#)
- [Contact](#)
- [Terms of use](#)

Supported Browsers






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Figure 4 EMI – Emissions Monitoring in Industry

The tool consists of different forms suitable for various kinds of industrial production (metallurgy, production of minerals, ceramics, etc.). In the background it contains algorithms that perform calculations to automatically assess emissions (CO₂, CH₄, N₂O, CO, SO₂) in accordance with input data. Then, data is transmitted and imported into a central database to enable reporting and presentation. The administrative panel includes interactive tools that allow tabular representation and graphical visualization of greenhouse gas emissions from industrial facilities. The tool provides data on emissions from industrial processes, as well as some emissions from the energy and waste sectors. The

portal offers options for annual and multiannual analysis, with additional options for selection of certain periods and gases of interest.

EMI is operational database, designed to provide links and to systematize collection of data from the industrial sector, to prepare three inventories that are the responsibility of the MoEPP. Those are:

- Inventory of greenhouse gases
- Cadaster of air pollutants and
- Cadaster of pollutants

3.6 Register of Vehicles

The current system for monitoring the status of the car fleet, i.e. the Register of Vehicles (Figure 5), is extremely outdated, complex and closed, and does not allow easy monitoring and reporting on progress in terms of fleet renewal or electrification of transport. However, the existing system provides a lot of technical information, including information on factory specified i.e. measured emission of CO₂.

However, according to information obtained from the relevant people in the REC Macedonia, with the project support³⁹, there are activities for drafting of a new Rulebook on the register of vehicles with which a new electronic register of vehicles, should be established, which will collect data from the registration process, including technical inspection, but also data from the approval procedure and identification. The proposal envisages that the data will be available via an online connection to the MoEPP, too, which would provide continuous and timely information about the state of the car fleet in Macedonia.

³⁹ "Stabilization of greenhouse gas emissions from the transport sector globally by doubling the economic car's fuels: Regional implementation of the Global Initiative for Economy Vehicles" Regional Environmental Center, Macedonia

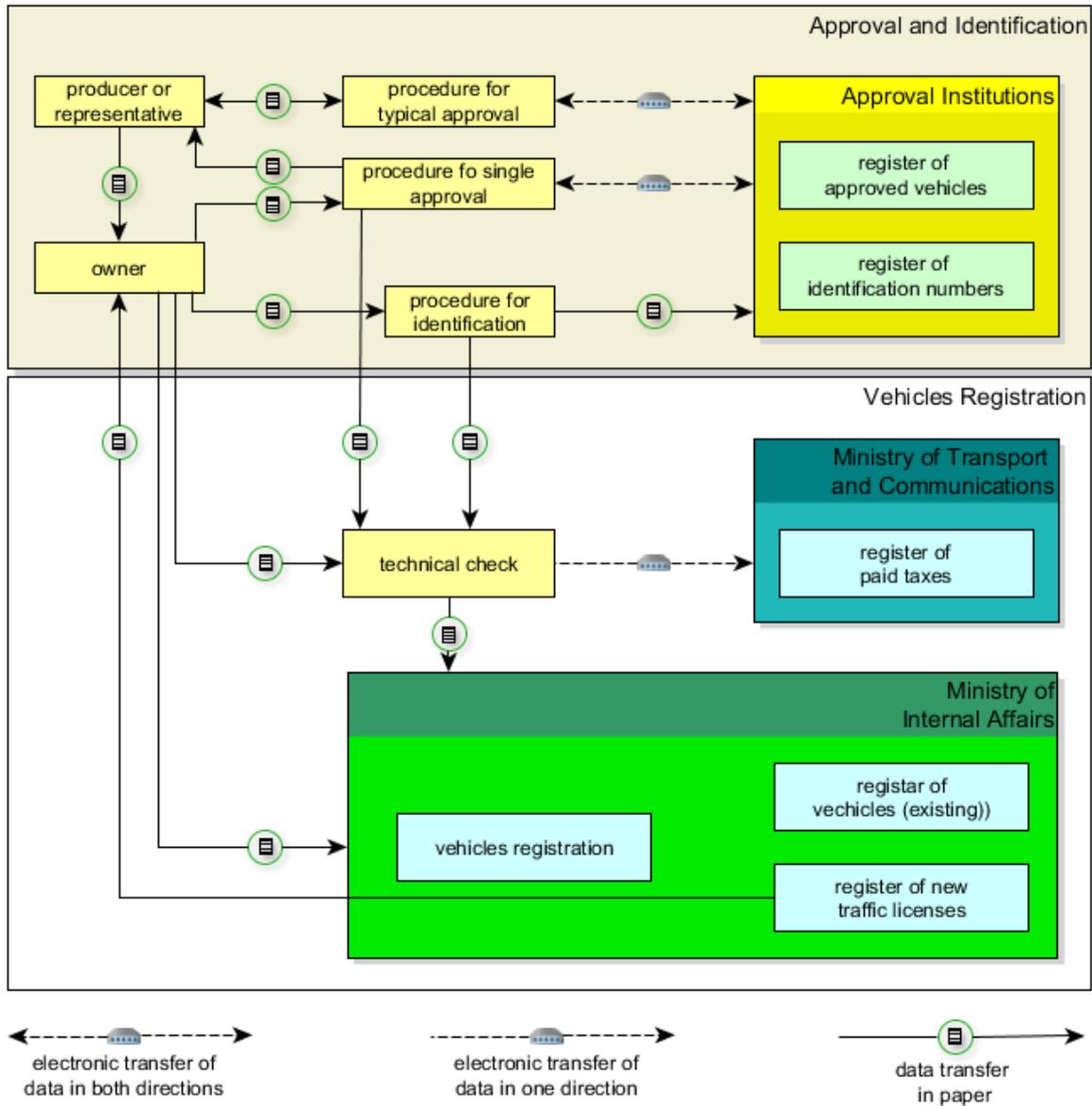


Figure 5 Register of Vehicles (existing condition)

4 NATIONAL MRV OBLIGATIONS

The Republic of Macedonia is in a specific situation when it comes to its international obligations regarding the monitoring, reporting and verification. Namely, Macedonia is a Party to the Convention on Climate Change, but is not part of Annex 1, i.e. it does not have quantified commitments. On the other hand, the Country has the status of a Candidate Country for EU membership, which carry certain obligations in the context of the accession process, which will especially get in importance at the moment when membership negotiations will be open. On third side, Macedonia is a member of the Energy Community, which very rapidly implements many policies that are directly related to the issue of the MRV (Annex 2).

4.1 Obligations in the context of the UNFCCC

As a Party to the Convention, Macedonia already has enough experience in preparing national GHG inventory, as well as National Communications and Biannual Updated Report to the UNFCCC. However, after the Treaty of Paris, the Country is on the verge of a major transition in terms of MRV obligations, because now for it will apply the same rules as for the countries on Annex 1.

Exactly Biannual Updated Reports from countries that are not part of Annex 1, should provide information on national systems for MRV, especially with regard to activities that are designated as nationally appropriate mitigation actions (NAMA⁴⁰). In other words, Biannual Updated Reports should provide information on the overall institutional arrangements, for access to measure domestically supported NAMA activities, as well as on the approaches being used to implement the national verification of information.

The monitoring, reporting and verification is the central element of the framework for the transparency of the Climate Change Convention and the Treaty of Paris. MRV framework for the Convention on Climate Change is characterized by a clear division of the Parties as developed and developing countries, as provided in Annex 1. Although all countries have an obligation to inform the Convention on their GHG inventories and for actions they are implementing, the content and timing for submission of these reports is different for developed and developing countries, in accordance with the principle of "common but differentiated responsibilities", which is embedded in the Convention.

This system is profoundly changed with the Treaty of Paris, which contains provisions for transparency of climate actions, applicable to all countries. The Treaty of Paris entered into force in October 2016, but its practical operation is expected in 2020 because it needs appropriate technical rules. This means that by then the current system of transparency, will apply, which brings obligations for MRV on two levels:

- International level

⁴⁰ Nationally Appropriate Mitigation Actions

- Reporting through national communications and biannual updated reports
 - Process of international consultation and analysis (ICA⁴¹)
- National level
- Establishment of a national system for MRV
 - Implementation of international obligations on MRV

MRV systems represent the spine of the Treaty of Paris. In its Article 13, it sets a common international system on MRV based on flexibility in terms of the capacity of different countries, without taking into account their status with respect to Annex 1. In this way, the Treaty sets out common provisions on transparency, which are applicable to all Parties. In fact, the agreement requires all countries to provide information on:

- National emission inventories of GHGs, based on appropriate methodology of the International Panel on Climate Change (IPCC⁴²)
- Monitoring the progress in the implementation and achievements of the national determined contributions, pursuant to Article 4 of the Agreement
- Impact and adaptation to climate change, financial costs, technology transfer, and received support for capacity building

The submission of these information is mandatory for all countries every two years.

The Treaty of Paris also establishes international verification process for the information that countries would submit with their reports. This process will now be harmonized for all countries and will be able to follow their responsibility in meeting obligations

All this will require from Macedonia to build capacities within the relevant national institutions that can meet the requirements of the obligations to the UNFCCC. At the same time, Macedonia must harmonize existing or build new systems for collecting and reporting data on emissions, so that they would be compatible with the systems used for reporting to the EU, i.e. they must comply with EU MMR Regulation.

4.2 Obligations in EU context

All EU Member States are obliged to monitor their emissions in accordance with their own mechanism for monitoring of GHGs, which established internal rules for reporting, which are based on international commitments.

The Republic of Macedonia is a Candidate Country for EU membership, but in terms of the MRV, of bigger importance is its status as a Contracting Party to the Energy Community, which since its establishment until present, more and more intensively accepts the EU acquis in many areas (Annex 2) including the energy, the environment, the energy efficiency and the renewable sources. In that sense, EnC has so far ever accepted several directives and regulations adopted by the EU, which are

⁴¹ International Consultation and Analysis

⁴² International Panel on Climate Change

part of EU legislation relevant to climate change. In the context of the MRV, of particular importance are:

- Directive 2009/28 / EC on the promotion of the use of energy from renewable sources, for which the deadline for implementation by the Contracting Parties of the EnC, was January 1, 2014,
- Directive 2012/27 / EU on energy efficiency, for which the deadline for implementation by the Contracting Parties of the EnC, is October 15, 2017,
- Directive 2010/31 / EU on the energy performance of buildings, for which the deadline for implementation by the Contracting Parties of the EnC, was September 30, 2012,

As a first step towards full application in EnC, at the last Ministerial Council (16 October 2016), a non-binding recommendation for the implementation of Regulation (EU) 525/2013 on the mechanism for monitoring and reporting of greenhouse gas emissions, was adopted.

Closely related to this Regulation, are two more regulations which operationalize its implementation. The first is Regulation 666/2014 on establishing the essential requirements for the system of inventories in the Union, taking into account changes in the potential of global warming and internationally agreed guidelines on inventories. The second, is Regulation 749/2014 on the structure, format, processes of submission and review of the information reported by the Member States.

4.2.1 EU Regulation 525/2013

This regulation is of particular importance for the Republic of Macedonia because of the recommendation of the Ministerial Council of the Energy Community, adopted in October 2016, which recommends the Contracting Parties to ensure the legal and institutional conditions for the implementation of the essential elements of this Regulation.

The essence of Regulation 525/2013 is simple - the establishment of accurate monitoring, reporting, and regular assessment of greenhouse gas emissions, but also the efforts of the EU and its Member States in the fight against climate change.

In fact, the main purpose of the Regulation is creation of a mechanism for monitoring and reporting of greenhouse gas emissions in a timely, transparent, accurate, consistent, complete and comparable manner. This includes the substances listed in Annex I of the Regulation, substances not covered by the Montreal Protocol, and the emissions that are not included in the Emissions Trading Scheme of the EU.

The EU reporting system established by the Regulation 525/2013, includes:

- Inventory of emissions of GHG from all seven sectors: energy, industrial processes, land use, land use changes and forestry, waste, agriculture etc.
- Projections, policies and measures to reduce GHG emissions
- National measures to adapt to climate change
- Financial and technical support for developing countries and similar obligations pursuant to the agreements of Copenhagen and Cancun

- Use of revenues from the sale of licenses in the Emissions Trading Scheme of the EU (Member States have committed to spend at least half of these revenues for climate measures within the EU and outside of it)
- Other information related to the UNFCCC and the Kyoto Protocol

To achieve this objective, the Regulation relies on several basic principles, tools and measures for implementation. The basic principles include transparency in the publication of the development strategies of Member States and the EU, cooperation and coordination between Member States and the EU, constant revision of the Regulation in the context of the development of the UNFCCC, the Kyoto Protocol or the EU legislation.

The tools that are envisaged for the implementation of the Regulation include national systems for inventories of emissions by sources and removals of greenhouse gases listed in Annex I, inventory system of the EU, as well as registers to issue, maintain, transfer, acquisition, cancellation, transfer, replacement or change of the date of expiry of the various units (AAU, RMU, ERU, CER, tCER and ICER)

Measures that ensure implementation of the Regulation include establishing institutional, legal and procedural arrangements necessary for the operation of the EU system and the national systems for reporting on policies and measures and on projections of anthropogenic greenhouse gas emissions by sources and removals by sinks. Also, the EU and Member States must submit to the UNFCCC Secretariat biennial reports and national communications in accordance with the relevant provisions and decisions of the Convention. In addition, Member States shall provide copies of these documents to the EC.

Implementation of the Regulation will mostly depend on the institutional structure, for which the Regulation stipulates that the competent authorities for inventory, are responsible for the preparation of national systems for inventory and for annual consistency checks in accordance with the regulations of the EC. That means they must have access to data and the reported methods for activities and installations covered by the Emissions Trading Scheme of the EU, to data collected through the reporting systems on fluorinated gases in various sectors, the emissions data and methodologies related to the European PRTR register, as well as to the data on energy statistics.

On the other hand, the EC will create, maintain and improve the system for inventory of the EU and shall adopt delegated acts on essential requirements for these systems, including:

- implementation of the program for quality assurance and quality control and assistance to Member States in implementing their programs
- evaluation of any information which may lack in national inventories (in consultation with the relevant Member State)
- review of national inventories of greenhouse gases

EC also conducts comprehensive reviews and annual reviews, starting with data reported for 2013 (Article 19), of national inventories submitted by Member States, in order to monitor their progress towards achieving the goals of reducing or limiting emissions of greenhouse gases (Articles 20 and 27).

In performing all these tasks, the Commission is assisted by the European Environment Agency (Article 24), as well as by the Committee on Climate Change

In light of the recommendation of the Energy Community for acceptance of this Regulation, the Working Group on Environment has already proposed appropriate adjustments to the text of the Regulation, which include adjusting the time commitments.

According to date experience in the Energy Community, when adopting EU legislation, the text is usually adjusted so that what applies to Member States, becomes the obligation of the Contracting Parties. Important adjustments are made in respect of the reference to the obligations from the Kyoto Protocol, which in the adjusted text is replaced by the Treaty of Paris, which in turn is linked to national contributions.

Some of the important time obligations in the proposal to adjust the Regulation prepared by EnC, include the following deadlines for Contracting Parties:

- January 1, 2020 – submission of a report to the Secretariat of EnC on the status of implementation of the national low-carbon development strategies (Article 4.2)
- January 15 each year (year X), starting from 2019 – submission to the Secretariat of EnC
 - review of anthropogenic emissions of greenhouse gases from Annex 1 (Article 7.1 a)
 - data in accordance with the reporting obligations towards the UNFCCC, consistent with the data submitted to the Convention on Transboundary Air Pollution (year X-2) (Article 7.1.b)
- March 15 each year – submission to the Secretariat of EnC, complete updated report on inventory (Article 7.3)
- April 15 each year – submission to the Secretariat of the UNFCCC, national inventories of Article 7.3, on a voluntary basis (Article 7.4)
- March 15, 2019 – the establishment of national systems for reporting on policies and measures, as well as on projections of anthropogenic GHG emissions by sources and sinks (Article 12.1)
- March 15, 2019, and thereafter every two years (Article 13.1)
 - Description of national reporting systems from Article 12.1
 - Updated report on low carbon development strategies
 - Information on national measures and policies
- March 15, 2019, and thereafter every two years – submission to the Secretariat of EnC, national projections of anthropogenic greenhouse gas emissions by sources and removals by sinks, structured by gases and sectors (Article 14.1)
- March 15, 2019, and thereafter every two years – submission to the Secretariat of EnC, information on national strategies and plans for adaptation, in accordance with the communication to UNFCCC (Article 15)

It seems that these deadlines may be too heavy for Macedonia, especially the obligations of Articles 12.1 and 13.1, concerning the MRV systems on policies and measures, as well as on strategies for adaptation. Namely, if these deadlines remain in the final decision of the Council of Ministers of the EnC, then it will be required by the end of this 2017, all monitoring systems described in chapter 3 of this report, to be fully operational, in order to allow for development of a comprehensive system for MRV on policies and measures that are part of the list of national contributions of Macedonia.

4.2.2 Regulation 749/2014

Of particular importance for the implementation of EU Regulation 525/2013, as outlined above, is the Regulation 749/2014 on the structure, format, the processes of submission and review of the information reported by the Member States, which actually determines the rules for implementing MMR Regulation for several issues, including:

- Reporting on greenhouse gas inventories of Member States, preliminary inventory of greenhouse gases, information on policies and measures, as well as on projections for the use of revenues from auctions and credits from projects, in accordance with Articles 7, 8, 12, 13, 14 and 17 of the Regulation
- The notification by the Member States in accordance with Decision 529/2013/EU, which applies to the land use and land use changes and forestry
- The timetable and steps for implementation of the overall and annual reviews of greenhouse gas inventories of Member States, in accordance with Article 19 of MMR Regulation
- Timescales for cooperation and coordination between the EC and Member States in the preparation of the report of the EU on inventory of GHG

In terms of policies and measures, Regulation 749/2014 distinguished reporting on national systems of policies and measures and projections of anthropogenic GHG emissions by sources and removals by sinks, as well as reporting on national policies and measures.

In the part on national systems, Regulation 749/2014 (Article 20) requires notification to include:

- Description of the relevant institutional, legal and procedural aspects for policy evaluation of the respective Member State and for projections of anthropogenic greenhouse gases
- Description of the relevant procedural arrangements and timetables for ensuring the timeliness, transparency, accuracy, consistency, comparability and completeness of information on policies and measures and projections
- Description of the entire process of collection and use of data
- Description of the process for selecting the assumptions, methodologies and models for evaluating policies, and making projections of anthropogenic emissions of greenhouse gases
- A description of the quality assurance and quality control

Article 22 of the Regulation 749/2014 applies to national policies and measures, and it is determined that notification should be made in tabular form that is given in Annex XI of the Regulation – Table 2.

Although this Regulation has not yet been discussed in EnC, the expectation is that in accordance with Article 12.3 of the Regulation 525/2013, the Secretariat of EnC will very soon adopt guideline which would practically impose the application and the Regulation 749/2014, especially its Annex XI.

5 RECOMMENDATIONS FOR ESTABLISHING A SYSTEM FOR MONITORING, REPORTING AND VERIFICATION OF POLICIES AND MEASURES TO MITIGATE CLIMATE CHANGE IN MACEDONIA

Bearing in mind the situation and Macedonia's status as Party to the Convention on Climate Change, which is not part of Annex I, then its status of Candidate Country for EU membership and finally, as Contracting Party of the Energy Community, it seems that a common denominator in view of the MRV may constitute the MMR Regulation of the EU.

In that regard, and particularly taking into account the current activity of EnC for adoption of the adjusted Regulation 525/2013, Macedonia must immediately start adjusting the national legislation in order to adopt the provisions of this Regulation. Within the First Biennial Update Report a framework for development of a national MRV system, was prepared, and were also prepared proposals for the creation of a legal basis for it, i.e. relevant amendments to the Law on Environment and the draft Rulebook on MRV, were proposed.

Given that so far neither the Law has been amended nor the proposed Rulebook has been adopted, there are two alternatives available:

- The first alternative is to immediately prepare an amendment to the Law on Environment, which will fully approximate the Regulation 525/2013 as is adjusted by EnC, which will create a legal basis for establishing the national system for MRV. Since MMR Regulation already has an implementing regulation, namely Regulation 749/2014, in parallel with the drafting of amendments to the Law, a secondary legislation (decree or rulebook) should be drafted, which will adopt detailed methodologies and requirements for establishing of the national MRV system.
- The second alternative is to immediately start the process of drafting an integral law on climate action, in which, among other issues, obligations for the establishment of the MRV system, will be regulated, i.e. will adopt the provisions of the adjusted Regulation 525/2013 while in a secondary act, the provisions of the Regulation 749/2014, too.

The first alternative is much faster because it will focus only on two key EU regulations. On the other hand, the second alternative will be comprehensive and long-term because it can cover other legal texts of EU legislation, which does not necessarily have to be adopted at this time.

Both of the alternative must thoroughly fit the current systems for monitoring and reporting, as described in chapter 3 of this report.

Figure 6 shows the proposal of the organizational scheme for establishing the national system for MRV on policies and measures to mitigate climate change. This organizational scheme will require intervention in the national legislation, to enable to incorporate existing monitoring systems, which should be obliged to report to the MoEPP, but also some of them will need to adjust its current set-up, so they can provide the necessary information in the format and standards required in the context of Macedonia's international obligations.

In terms of the required information and the format for their reporting, it is recommended to follow the guidelines i.e. provisions of the Regulation 749/2014/EU, specifically its Annex XI.

Such a scheme necessary assumes serious interventions aimed at strengthening the institutional capacity of the MoEPP. Primarily it is necessary within the internal organization of the MoEPP, to make interventions that will raise the hierarchy of the current unit, which is responsible for issues of climate change, at the higher level, i.e. at the level of department. Even more important is to immediately undertake actions for recruitment of several highly qualified profiles that will be able to cope with challenges, not only of establishing the MRV system, but also with other issues that necessarily arise from the adoption of EU legislation, as well as from the future ratification of the Treaty of Paris.

Specific responsibilities of this organizational unit should be defined by a thorough functional analysis, which will result in a detailed organizational structure, as well as with job descriptions, including the profile of the necessary human resources.

At the same time, it will be required to make an accurate plan for development and training of human resources, not only in this organizational unit, but also in other structures of the MoEPP that will be involved in carrying out these responsibilities, primarily Macedonian Environment Information Center.

Within the current project for preparation of the Second Biennial Update Report, it is good to make a pilot exercise whose purpose would be one to two activities from the list of national contributions or from the mitigation policies and measures. Through this exercise, one can specifically test how the proposed scheme for establishing national MRV system will work, as well as the opportunities for collecting data required in accordance with Annex XI, of Regulation 749/2014.

In this sense, it is very important that such pilot exercise shows full compliance with the recommendations of the Technical Analysis of the First Biennial Update Report (Appendix 4). Namely, the Technical Analysis very precisely pointed to gaps in reporting on policies and measures for mitigation. Appendix 4 provides detailed comments on the recommendations contained in the Technical Analysis.

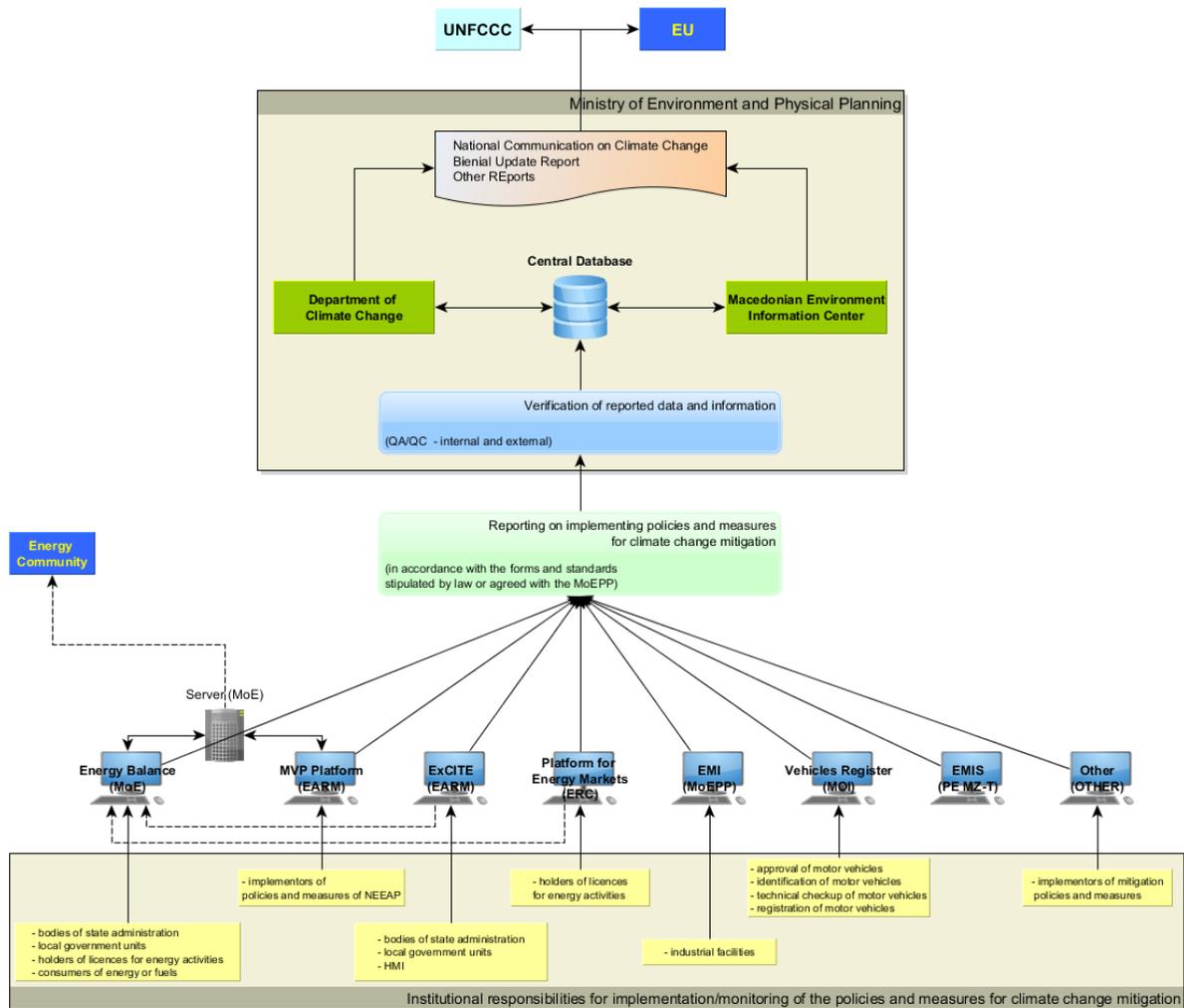


Figure 6 Proposed organization of MRV on policies and measures

To stimulate the institutions and organizations that enforce policies and mitigation measures, the legislation may introduced special labeling for climate action (Climate Action Label - CAL), which would be awarded to each policy and measure that would contribute to climate change mitigation. Such labeling can also significantly contribute to raising public awareness about the issue of climate change, and to increase in the transparency of the MoEPP and other state institutions.

5.1 MRV on Adaptation

Besides that the Republic of Macedonia is obliged in the international context to report on GHG emissions and on the measures and policies to mitigate climate change, it should also inform on the measures and policies that (will) undertakes to adapt to climate change, already evident today.

In this context, it is advisable that authorities begin immediately to take certain actions in this course, which may include, but are not necessarily limited to, the following activities:

- Preparation and adoption of the National Plan for Adaptation to Climate Change. Preparation of the plan should be organized and conducted by the MoEPP, but because of its importance, it should be adopted by the Government, which will provide a broad consensus for its implementation.
- Preparation and development of appropriate MRV system on measures and policy for adaptation, including monitoring of financial investments for adaptation. This system should be compatible with the systems that have been developed or are being developed in EU Member States, taking into consideration the fact that Macedonia is a Candidate Country for EU membership. In this sense, it is advisable to follow the directions given in the MMR Regulation.
- The Government, through the competent ministry, to prepare and submit an updated submission to the Secretariat for Climate Change, which in addition to measures and policies for mitigation will include a distinct set of measures and policies for adaptation, particularly of the most vulnerable systems.
- The MoEPP should undertake activities to encourage and support local governments, and the private sector to take steps for the development and preparation of suitable strategic or other policy documents, which will be aimed at identifying measures and policies to mitigate climate changes and adapting to them. In this context, the MoEPP may provide a separate budget program, which will enable financial support for the preparation of these documents, as well as for their implementation, especially on most priority and most effective actions to adapt to climate change.

6 ANNEX 1. Quantitative indicators for monitoring the Program for Implementation of the Strategy for Energy Development in the Republic of Macedonia for the period until 2017

Strategic objective / priority	Indicator [unit]	Data sources (competence)
Improving energy efficiency	Energy savings [ktoe]	Ministry of Economy Energy Agency of the Republic of Macedonia
Increasing the share of renewable energy sources in total final energy consumption	RES share in: The total final energy consumption [%] Electricity production [%] Energy consumption in transport [%]	Ministry of Economy Energy Agency of the Republic of Macedonia
Reducing the negative impact of the energy sector on the environment	Greenhouse gas emissions from the energy sector [kt] Emissions of NO _x [t] Emissions of SO ₂ [t] Emissions of particles from combustion [t]	Ministry of Environment and Physical Planning
Improving the security of energy supply (reducing dependence on energy imports and increasing the diversity of energy sources)	Import of energy by fuels [KWh, t, KJ, Nm ³]	Ministry of Economy Macedonian Electrical Transmission System Operator Custom Administration
	Energy composition – share of fuels the primary energy [%]	Ministry of Economy
Improving the overall competitiveness of the economy - energy intensity	Primary energy consumption per unit of GDP [toe / EUR] Final energy consumption per unit of GDP [toe / EUR]	Ministry of Economy State Statistical Office
Establishing of functional energy markets	Prices of primary energy (domestic production and imports) [EUR/natural unit] and [EUR/toe], their ratio and their comparison with the EU27 Prices of final energy consumption (by sector) [EUR/natural unit] and [EUR/toe], their ratio and their comparison with the EU27 Quantity of electricity delivered to final consumers by suppliers on the free market, as a share of total electricity consumption [%] Quantity of natural gas delivered to final consumers by suppliers on the free market, as a share of total consumption of electricity or natural gas [%] Number of consumers supplied with electricity via suppliers at the free market, in relation to the total number of electricity consumers [%] Number of consumers supplied with natural gas via suppliers at the free market, in relation to the total number of consumers of natural gas [%]	Energy Regulatory Commission Custom Administration
Increasing support for sustainable energy development	Support from the state for energy efficiency and RES [EUR]	Ministry of Economy Macedonian Electrical Transmission System Operator Ministry of Finance

7 ANNEX 2: Part of EU legislation, which is accepted by EnC

Document title	The general deadline for implementation
Environmental legislation	
Directive (EU) 2016/802 relating to a reduction in the sulphur content of certain liquid fuels	June 30, 2018
Commission Implementing Decision (EU) 2015/253 laying down the rules concerning the sampling and reporting under Council Directive 1999/32/EC as regards the sulphur content of marine fuels	January 1, 2019
Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment	January 1, 2019
Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control of pollution)	January 1, 2018 ⁴³
Directive 2004/35/EC on environmental liability with regard to preventing and remedying of environmental damage	January 1, 2021
Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants	December 31, 2017
Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment	March 31, 2018
Directive 1999/32/EC relating to a reduction in the sulphur content of certain liquid fuels	December 31, 2011
Article 4 (2) of Directive 79/409/EEC on the conservation of wild birds	July 1, 2006
EnC Council of Ministers in October 2016, adopted a non-binding recommendations for the implementation of Regulation (EC) 525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change	
Legislation on RES	
Directive 2009/28/EC on the promotion of the use of energy from renewable sources	January 1, 2014
Legislation on energy efficiency	
Directive 2012/27/EU Energy Efficiency	October 15, 2017
Directive 2010/30/EU on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products	December 31, 2011
Directive 2010/31/EU on the energy performance of buildings	September 30, 2012
Directive 2006/32/EC on energy end-use efficiency and energy services	December 31, 2011

⁴³ Based on the Decision of the Ministerial Council 2013/06/MC-EnC, only Chapter III, Annex V and Article 72 (3) - (4) are applicable in EnC. New facilities must comply by January 1, 2018, while the Decision 2015/06/MC-EnC, designates January 1, 2028 as the deadline for implementation of Directive 2010/75/EU

Reporting information on policies and measures pursuant to Article 22

Table 1: Sectors and gases for reporting on policies and measures and groups of measures, and type of policy instrument

PAM number	Name of policy or measure	Sector(s) affected	GHG(s) affected	Objective	Quantified objective	Short description	Type of policy instrument	Union policy which resulted in the implementation of the PAM		Status of implementation	Implementation period		Projections scenario in which the PAM	Entities responsible for implementing the policy		Indicators used to monitor and valueate progress over time				Reference to assessments and underpinning technical reports	General comments	
								Union policy	Other		Start	Finish		Type	Name	Description	Values					
																	[Year]	[Year]	[Year]			[Year]

Notes: Abbreviations: GHG = greenhouse gas; LULUCF = land use, land-use change and forestry.

Table 2: Available results of ex-ante and ex-post assessments of the effects of individual or groups of policies and measures on mitigation of climate change

Policy or measure or groups of policies and measures	Policy impacting EU ETS or ESD emissions (both can be selected)			Ex-ante assessment												Ex-post assessment				Documentation/Source of estimation if available provide a web link of the report where the figure is referenced from			
				GHG emissions reductions in t (kt CO ₂ -eq/year)			GHG emissions reductions in t+5 (kt CO ₂ -eq/year)			GHG emissions reductions in t+10 (kt CO ₂ -eq/year)			GHG emissions reductions in t+15 (kt CO ₂ -eq/year)			Year for which reduction applies	Average emission reduction (kt CO ₂ -eq/year)	Explanation of the basis for the mitigation estimates	Factors affected by PAM				
	EU ETS	ESD	LULUCF	Total	EU ETS	ESD	Total	EU ETS	ESD	Total	EU ETS	ESD	Total	EU ETS	ESD								

Table 3: Available projected and realized costs and benefits of individual or groups of policies and measures on mitigation of climate change

Policy or measure or groups of policies and measures	Projected costs and benefits						Realized costs and benefits				
	Costs in EUR per tonne CO ₂ eq reduced/sequestered	Absolute costs per year in EUR (specify year cost has been calculated for)	Description of cost estimates (Basis for cost estimate, what type of costs are included in the estimate, methodology)	Price year	Year for which calculated	Documentation/Source of cost estimation	Costs in EUR per tonne CO ₂ eq reduced/sequestered	Price year	Year for which calculated	Description of cost estimates (Basis for cost estimate, what type of costs are included)	Documentation/Source of cost estimation

Note: Member States are to include all the policies and measures or their groups where such assessment is available.

9 ANNEX 4: Addressing the recommendations of the Technical Analysis of FBUR

Table 2: Identification of the extent to which the elements of information on mitigation actions are included in the first biennial update report of the Republic of Macedonia

Decision Reporting requirements	Yes/ Partly /No	Comments on the extent of the information provided Response to the comments
<p>Decision 2/CP.17, annex III, paragraph 12 For each mitigation action or groups of mitigation actions including, as appropriate, those listed in document FCCC/AWGLCA/2011/INF.1, developing country Parties shall provide the following information to the extent possible:</p>		<p>It seems that at this stage too, for one part of the mitigation activities these information will remain "Partly" or "No" indicated. The reason for this can be traced to the lack of a comprehensive and operational MRV system, on the one hand, and incomplete operation of other systems for monitoring and reporting, as described in Chapter 3 of this report.</p>
<p>(a) Name and description of the mitigation action, including information on the nature of the action, coverage (i.e. sectors and gases), quantitative goals and progress indicators</p>	Partly	<p>Mitigation measures are described in section 4.3 and annex 3 to the BUR. In some instances, information is missing on quantitative goals or it is not explicitly stated. SBUR will get a similar assessment of this obligation. Progress indicators associated with mitigation actions are not consistently explained (e.g. they are missing for action 4.3.2, or mitigation action 11 in annex 1)</p>
<p>(b) Information on methodologies and assumptions:</p>		<p><input checked="" type="checkbox"/> Methodologies</p> <p>The tabular presentation of mitigation actions in annex 1 contains a field to describe methodologies to complement descriptions in section 4.3. However, the methodologies describe steps envisaged, along with enabling conditions to implement actions, rather than of the used methodology. In this sense, for each PAM, describing the methodologies chosen to estimate reductions</p> <p>This comment refers to the manner of presentation of information. Although in FBUR the tabular view is correctly assembled, following the requirements of the Decision 2/CP.17, still it lacks a more detailed explanation clear and concise explanation of the used methodology is necessary, in this case modeling "bottom – up" and optimization at the lowest costs using a model MARCAL with consistent following of the IPCC methodology.</p>

Decision Reporting requirements	Yes/ Partly /No	Comments on the extent of the information provided	Response to the comments
☑ Assumptions	Partly	Similar to methodologies above, the tabular presentation of mitigation actions in annex 1 contains a field on need to explain the economic, but also social, financial, assumptions describing enabling conditions to environmental and other assumptions, existence of implement potential actions. Economic assumptions which is necessary to achieve the objectives of each PAM. related to modelling individual mitigation actions and associated reductions are described in section 4.3	This comment, same as the previous one, indicates the need to explain the economic, but also social, financial, assumptions, existence of environmental and other assumptions, which is necessary to achieve the objectives of each PAM.
(c) Objectives of the action and steps taken or envisaged to achieve that action:			
☑ Objectives of the action	Yes	A field within the tabular format is not provided, but objectives can be inferred from the descriptions of future, the objectives of the activities to be inserted in actions in section 4.3 and annex 1	As indicated by the comment, all that is necessary in the tabular view, which will achieve greater clarity and consistency in reporting. In order to unify the reporting to UNFCC and EnC, it is good to use the wording as required by Regulation EC 749/2014, in which for each sector there are "typical" objectives.
☑ Steps taken or envisaged to achieve that action	Partly	A field within the tabular format provides this information in annex 1, but information is not consistently provided across the proposed or planned mitigation actions in section 4.3 and annex 1. In addition, each PAM. information related to steps taken or envisaged to achieve actions is included in the descriptions of the methodologies section of annex 1 for each action	The inconsistency in providing information for each PAM will be improved only if a single system for the MRV is established, which will define common standards for
(d) Information on the progress of implementation of the mitigation actions and the underlying steps taken or envisaged, and the results achieved, such as estimated outcomes (metrics depending on type of action) and estimated emission reductions, to the extent possible:			

Decision Reporting requirements	Yes/ Partly /No	Comments on the extent of the information provided	Response to the comments
☑ Progress of implementation of the mitigation actions	Partly	Implementation status (conceptual, planned, adopted, etc.) can be inferred through the descriptions in section 4.3 and annex 1 tabular format for most actions. However, information on progress, such as time frames for implementation, is not consistently or clearly provided for all actions (e.g. provided for actions 4.3.2 and 4.3.6, but not provided for action 4.3.12; provided generally for the WEM scenario in annex 3)	This comment clearly indicates the need for inserting additional field in the table, which will contain short but clear information on the status of individual PAM. Comment proposes adopting the following classification status: idea, planned, implemented. However, Regulation EC 749/2014, in turn, requires to use the following classification: planned, approved, implemented, completed. Given that decision 2/CP.17, is not explicit about classification, it would be better to adopt a classification required by the Regulation 749/2014/EC in order to avoid double reporting or possible misunderstandings.
☑ Underlying steps taken or envisaged	Partly	Information is provided via descriptions in the annex 1 tabular format, in addition to this information being included within the methodology field in annex 1. In some instances, this information is also provided in descriptions within section 4.3, but information is not consistently or clearly provided for all actions (e.g. missing for some actions such as actions 4.3.11 and 4.3.12 (mitigation actions 3 and 9))	The comment indicates inconsistency in providing information for individual PAM. Overcoming this observation will be possible only when a comprehensive national MRV system is established, which would set uniform standards for all PAM.
☑ Results achieved, such as estimated outcomes (metrics depending on type of action) and estimated emission reductions, to the extent possible	Yes	The projected emission reductions are provided for each mitigation action in kt CO2 eq in section 4.3 and annex 1. For mitigation actions where implementation is under way, some interim results are provided that are consistent with progress indicators identified (e.g. action 3.3 or mitigation action 13)	
(e) Information on international market mechanisms	Partly	Section 2.3.1 indicates a national CDM strategy. Some mitigation actions in annex 1 include a field on international market mechanisms (e.g. mitigation actions 35, 37 and 38)	Given that not all PAM are related to certain international market mechanisms, probably it's better this information to be included in the section describing the measure or policy.
Decision Parties should provide information on the 2/CP.17, annex III, paragraph 13 description of domestic measurement, reporting and verification arrangements	Yes	This information is provided in section 7 of the BUR	

10 ANNEX 5: List of interviews with relevant and responsible stakeholders in the institutions and organizations competent for implementing or have already implemented activities that contribute to climate change mitigation

#	Date	Name and Surname	Institution
1	21.4.2017	Bojan Durnev	Administration for water-management
2	24.4.2017	Vojo Gogovski	Ministry of Agriculture, Forestry and Water-management
3	24.4.2017	Teodora Obradovich – Grncharovska	Ministry of Environment and Physical Planning
4	25.4.2017	Ismail Luma	Ministry of Economy
5	25.4.2017	Draganche Jovev	Ministry of Transport and Communication
6	25.4.2017	Biljana Zdraveva	Ministry of Transport and Communication
7	26.4.2017	Dejan Madzunkovski	PE Macedonian Forests
8	26.4.2017	Aleksandar Dukovski	Energy Agency of the Republic of Macedonia
9	3.5.2017	Ilija Sazdovski	GIZ, Open Regional Fund for SEE on Energy Efficiency
10	3.5.2017	Martin Martinoski Natasha Veljanovska	Energy Regulatory Commission
11	17.5.2017	Valentina Stardelova	Ministry of Economy
12	18.5.2017	Zoran Nikolovski	PE Macedonian Railways – Transport
13	19.5.2017	Gligorche Vrtanoski	Faculty of Mechanical Engineering
14	22.5.2017	Ana Petrovska Jozhe Jovanovski	Regional Center for Environment Macedonia

11 ANNEX 6: A demonstration exercise for MRV

The idea of the demonstration exercise, within this project task, is through an actual example of a selected policy or measure for climate change mitigation, to explain how the proposed system for the MRV will work. In consultation with the competent ministry, the project office and the team of experts engaged in this project, the measure number 4 - Solar power plants was selected.

11.1 Institutional setup

What are the aspects or issues that are important in the development of the MRV system? In order to report properly, it is necessary to determine the following element:

- Reporting obligations

As elaborated in Chapter 4 of this Report, Macedonia has an obligation to report to the Climate Change Secretariat to the EnC, and at the moment it becomes a Member State, to the EU as well.

- Reporting Format

Since current commitments towards UNFCC and EnC, that is in the future towards EU, are virtually identical, as elaborated in the Chapter 5 of this report, for collecting the required information and the format for their reporting, it is recommended to follow the guidelines or regulations of the Implementing Regulation 749/2014/EU, specifically its Annex XI. Namely, the information structure for mitigation policies and measures required by the MMP Regulation is precisely defined by this Regulation of the European Commission. In particular, in its Annex XI, the necessary data and information are presented in three tables.

- Build an (IT) database

In order to reach the outcome result, that is, to properly and correctly fill in tables of Regulation 749/2014/EU, it is necessary to provide the required data and information. This is the essential part of the work, because the diversity and the number of stakeholders, their different capacities and needs, can be a serious obstacle to the development of the system.

Therefore, it is necessary for each policy and measure to prepare an individual plan for its inclusion in the MRV system, following the institutional and organizational set up presented in Figure 6 of this Report. In the present case, the institutions and organizations involved in the planning, implementation and reporting on the measure 4 - Solar power plants, should first be identified.

Policies for the development of this measure are defined in several strategic documents adopted in the past period, starting with the Energy Development Strategy, through the Strategy for the Utilization of Renewable Energy Sources, operationalized through the Action Plan for Renewable Energy Sources. These policies regarding photovoltaic power plants (PV), as a renewable energy

source, have been translated into the legal norms of the Energy Law. Namely, in order to stimulate the construction of new power plants that will use renewable energy sources, such plants are enabled to acquire the status of preferential producers, who will be able to sell the electricity so produced at subsidized prices, so called Feed-in tariffs. Pursuant to the Energy Law, as explained in Chapter 2.1 of this Report, the Ministry of Economy is responsible for the preparation of the strategic documents, but also for the preparation of the biennial Report on the implementation of the action plan for renewable energy sources.

Hence, it is logical to draw the conclusion - the Ministry of Economy should be obliged to provide the information and data necessary for completing the Table no. 1.

The development of the PV, however, is mainly the interest of private companies, independently or on the basis of a model for a public-private partnership agreement. Yet, according to the regulations, the ERC adopts a decision for acquiring the status of preferential producer and maintains a register of preferential producers obligated to conclude a contract with MEPSO, which in turn is obliged to take over the entire generated electricity. In addition, the Energy Law prescribed obligations for electricity producers to submit reports, data and information to the ERC and to the operator of the electricity transmission system (MEPSO) or the distribution system operator.

Among the information and data reported by the producer are the total installed power of the PV, the total production at monthly and annual level, based on which it has the right to claim for collection from MEPSO.

Since the interest at the national level is to obtain cumulative data and information on measure no. 4, it is clear to draw a conclusion – MEPSO or ERC, not electricity producers, to be obliged to provide the information required to fill in the Table no. 3.

– Standards, Metrics

The key parameter that is necessary in every policy and measure is the GHG emission savings. It is therefore very important to establish a standard methodology for calculating the GHG emissions reduction⁴⁴, resulting from the use of renewable sources for electricity production. In the present case, it is a matter of the grid factor, according to the national mix of fuels used for the production of electricity. However, it should be emphasized that this factor is necessary to be unified for all other policies and measures, for consistency of information.

For these analytical calculations, it is logical to entrust MANU, which has a long-standing experience gained through several projects related to mitigation of climate factors. In other words, MANU may be obliged of providing the data needed to complete the first part of Table no.2 (Ex-Ante assessment). The second part of the table can also be produced by MANU, based on calculations for emission reductions derived from data and information on actual quantities of electricity produced by PV, reported by MEPSO or ERC.

⁴⁴ For this purpose the UNFCCC Methodology may be used, utilized by EnC as well: “Methodological tool: Tool to calculate the emission factor for an electricity system”, Version 04.0, EB 75 annex 15, 2013

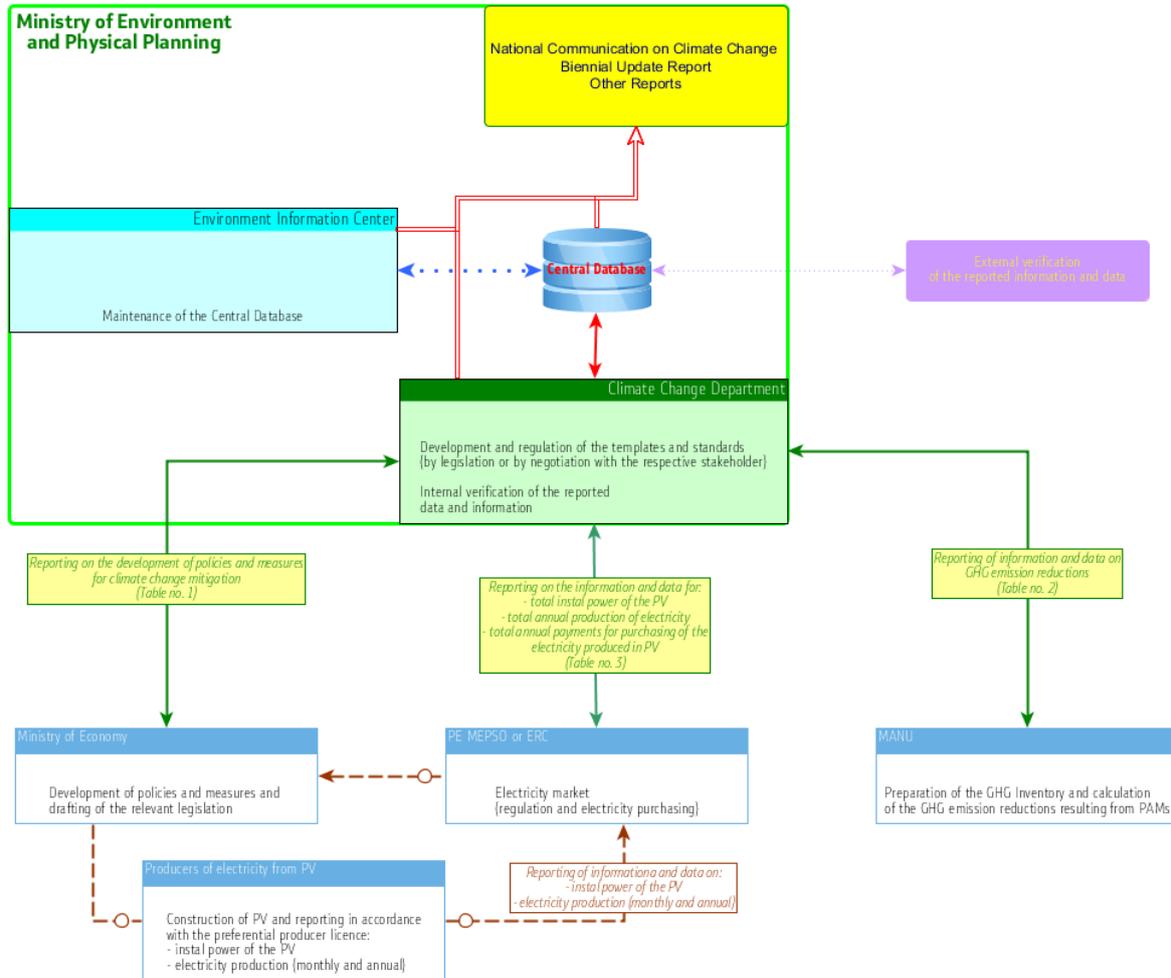


Figure 7 Scheme of MRV for Measure 4 - Expansion of electricity production in photovoltaic power plants

– Verification of information and data

As explained in the Report on MRV prepared within the First Biennial Update Report, verification can be performed by the future Climate Change Department at MoEPP or external institutions and organizations, including MANU. Once the data and information have been verified, in the sense that they have been submitted in scope and format previously determined, they are input and stored in the Central Database.

– Reporting

Finally, on the basis of the collected information and data stored in the Central Database, the MoEPP can prepare reports that will respond to international and domestic obligations.

This process of identifying a particular policy or mitigation measure and its inclusion in the MRV system can be shown graphically as in Figure 7.

11.2 Reporting pursuant to MMR Regulation

As part of the preparation of this demonstration exercise, an attempt has been made to fill these tables according to the available information and data used in analyzes made by the expert team of MANU within the Second Biennial Update Report. Practically, the information and data shown in the tables below are identical to those shown in the tables and the mitigation action plan, which are part of the Second Biennial Update Report.

As can be seen from the tables below, in part of the fields, the mark "n/a" is inserted (not applicable), for the reason that these data or information are currently not applicable to Macedonia, taking into account its status as a Candidate country for EU membership. This applies in particular to data related to the EU Emissions Trading Scheme (ETS) and the Effort Sharing Decision (ESD), which sets national emission reduction targets for each Member State. Links to these two EU systems have virtually been omitted from the adapted MMP Regulation, which, as a proposal, was submitted to the EnC Contracting Parties in June 2017.

This demonstration exercise clearly confirms that the past analyzes of climate change mitigation policies and measures, which have been prepared under the First and Second Biennial Update Reports, are extremely detailed and comprehensive. Also, the exercise confirms that the selected approach with scenarios (WOM, WEM, WAM) is compatible with the requirements imposed by the MMR Regulation.

This in practice enables Macedonia, even in the absence of an integral MRV system, to be able to respond to reporting obligations pursuant to the MMP Regulation. Of course, this should in no case be a mitigating circumstance, which should be used to postpone the process of legally and institutionally establishing a comprehensive MRV system, as elaborated in the separate report within the First Biennial Update Report, but also in this Report too.

Table 1: Sectors and gases for reporting on policies and measures and groups of measures, and type of policy instrument

PAM number	Name of policy or measure	Sector(s) affected ⁱ	GHG(s) affected ⁱⁱ	Objective ⁱⁱⁱ	Quantified objective ^{iv}	Short description ^v	Type of policy instrument ^{vi}	Union policy which resulted in the implementation of the PAM		Status of implementation ^{vii}	Implementation period	
								Union policy ^{viii}	Other ^{ix}		Start	Finish
4	Photovoltaic Power Plants	Power supply	CO ₂ , CH ₄ , N ₂ O	Increase renewable energy	<ul style="list-style-type: none"> ▪ 17 MW and 23 GWh in 2025 ▪ 60 MW and 84 GWh in 2030 ▪ 100 MW and 140 GWh in 2035 	Construction of photovoltaic power plants and introduction of flexible premium feed-in tariffs to stimulate their development	Economic; Fiscal; Regulatory;	n/a	Quantified targets designated by the EnC	Adopted	2017	2035

Projections scenario in which the PAM is included	Entities responsible for implementing the policy ^x		Indicators used to monitor and valuate progress over time				Reference to assessments and underpinning technical reports	General comments
	Type	Name	Description	Values ^{xi}				
				2025	2030	2035		
WEM	<ul style="list-style-type: none"> ▪ National - Government of Macedonia ▪ National – Energy Regulatory Commission ▪ National – Ministry of Economy ▪ National – Energy Agency ▪ Companies / Business – Private investors 	<ul style="list-style-type: none"> ▪ Increase of the installed capacity (MW) ▪ Increase of the production of electricity (GWh) ▪ Emission reduction (Gg CO₂-eq) 	17	60	100	Implementation Reports on: <ul style="list-style-type: none"> ▪ Strategy for Energy Development ▪ Strategy for RES ▪ Action Plan for RES 		

Notes: Abbreviations: GHG = greenhouse gas; LULUCF = land use, land-use change and forestry.

Table 2: Available results of ex-ante and ex-post assessments of the effects of individual or groups of policies and measures on mitigation of climate change^{xii}

Policy or measure or groups of policies and measures	Policy impacting EU ETS or ESD emissions (both can be selected)			Ex-ante assessment											
				GHG emissions reductions in t (kt CO ₂ -eq/year)			GHG emissions reductions in t+5 (kt CO ₂ -eq/year)			GHG emissions reductions in t+10 (kt CO ₂ -eq/year)			GHG emissions reductions in t+15 (kt CO ₂ -eq/year)		
	EU ETS	ESD	LULUCF	Total	EU ETS	ESD	Total	EU ETS	ESD	Total	EU ETS	ESD	Total	EU ETS	ESD
Photovoltaic Power Plants	n/a		n/a	n/a	n/a	n/a	15	n/a	n/a	84	n/a	n/a	90	n/a	n/a

Notation: t signifies the first future year ending with 0 or 5 immediately following the reporting year

Ex-post assessment				
Year for which reduction applies	Average emission reduction (kt CO ₂ -eq/year)	Explanation of the basis for the mitigation estimates	Factors affected by PAM	Documentation/Source of estimation if available provide a web link of the report where the figure is referenced from
n/a	n/a	n/a	n/a	n/a

Table 3: Available projected and realized costs and benefits of individual or groups of policies and measures on mitigation of climate change

Policy or measure or groups of policies and measures	Projected costs and benefits						Realized costs and benefits				
	Costs in EUR per tonne CO ₂ eq reduced/sequestered	Absolute costs per year in EUR (specify year cost has been calculated for)	Description of cost estimates (Basis for cost estimate, what type of costs are included in the estimate, methodology)	Price year	Year for which calculated	Documentation/Source of cost estimation	Costs in EUR per tonne CO ₂ eq reduced/sequestered	Price year	Year for which calculated	Description of cost estimates (Basis for cost estimate, what type of costs are included)	Documentation/Source of cost estimation
Photovoltaic Power Plants	-1,4 €/t CO ₂ -eq	<ul style="list-style-type: none"> ▪ until 2025, 15 M€; ▪ 2026 – 2030, 39 M€; ▪ 2031 – 2035, 31,6 M€ 	Projections, design, capital investments, installation, maintenance	Discounted at 2012		Mitigation analysis in the Second Biennial Update Report					

Note: Member States are to include all the policies and measures or their groups where such assessment is available

ⁱ Member States must select from the following sectors: energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production), energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture), transport, industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon), agriculture, forestry/LULUCF, waste management/waste, cross-cutting, other sectors.

ⁱⁱ Member States must select from the following GHGs (more than one GHG can be selected): carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulphur hexafluoride (SF₆), nitrogen trifluoride (NF₃).

ⁱⁱⁱ Member States must select from the following objectives (more than one objective can be selected, additional objectives could be added and specified under 'other'):

For energy supply — increase in renewable energy; switch to less carbon-intensive fuels; enhanced non-renewable low carbon generation (nuclear); reduction of losses; efficiency improvement in the energy and transformation sector; carbon capture and storage; control of fugitive emissions from energy production; other energy supply.

For energy consumption — efficiency improvements of buildings; efficiency improvement of appliances; efficiency improvement in services/tertiary sector, efficiency improvement in industrial end-use sectors, demand management/reduction; other energy consumption.

For transport — efficiency improvements of vehicles; modal shift to public transport or non-motorized transport; low carbon fuels/electric cars; demand management/reduction; improved behaviour; improved transport infrastructure; other transport.

For industrial processes — installation of abatement technologies; reduction of emissions of fluorinated gases; replacement of fluorinated gases by other substances; improved control of fugitive emissions from industrial processes; other industrial processes.

For waste management/waste– demand management/reduction; enhanced recycling; enhanced CH₄ collection and use; improved treatment technologies; improved landfill management; waste incineration with energy use; improved wastewater management systems; reduced landfilling; other waste.

For agriculture — reduction of fertilizer/manure use on cropland; other activities improving cropland management, improved livestock management, improved animal waste management systems; activities improving grazing land or grassland management, improved management of organic soils,; other agriculture.

For forestry/LULUCF — afforestation and reforestation; conservation of carbon in existing forests, enhancing production in existing forests, increasing the harvested wood products pool, enhanced forest management, prevention of deforestation, strengthening protection against natural disturbances, substitution of GHG intensive feedstocks and materials with harvested wood products; prevention of drainage or rewetting of wetlands, restoration of degraded lands, other LULUCF.

For cross-cutting –framework policy, multi-sectoral policy, other cross-cutting.

For Other Member States must provide a brief description of the objective.

^{iv} Member States must include the figure(s) if the objective(s) is(are) quantified.

^v Member States must indicate in the description if a policy or measure is envisaged with a view to limiting GHG emissions beyond Member State commitments under Decision No 406/2009/EC in accordance with Article 6(1)(d) of Decision No 406/2009/EC.

^{vi} Member States must select from the following policy types: economic; fiscal; voluntary/negotiated agreements; regulatory; information; education; research; planning; other.

^{vii} Member States must select from the following categories: planned; adopted; implemented; expired.

Expired policies and measures must be reported in the template only if they have an effect, or they are expected to continue to have an effect, on greenhouse gas emissions

^{viii} Union policy implemented through the national policy or where national policies are aimed directly at meeting objectives of Union policies. Member State should select a policy from a list provided in the electronic version of the tabular format

^{ix} Secondary Union policy: Member State must indicate any Union policy not listed in the previous column or an additional Union policy if the national policy or measure relates to several Union policies.

^x Member States must enter the name/s of entities responsible for implementing the policy or measure under the relevant headings of: National government; Regional entities; Local government; Companies/businesses/industrial associations; Research institutions; Others not listed (more than one entity can be selected).

^{xi} Member States must provide any indicator used and values for such indicators that they use to monitor and evaluate progress of policies and measures. Those values can be either ex-post or ex-ante values and Member States must specify the year for which the value applies.

^{xii} Member States are to include all the policies and measures or their groups of policies and measures for which such assessment is available.