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Roadmap for the development of a functional National Greenhouse Gas Emissions Inventory System and MRV System for Moldova

Final Report

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List of Abbreviations:

BTR	Biennial Transparency Report
BUR	Biennial Update Report
CEPA	Comprehensive and Enhanced Partnership Agreement
CMA	Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement
COP	Conference of the Parties
CRF	Common Reporting Format
CTF	Common Tabular Format
EF	Emission Factor
ETF	Enhanced Transparency Framework
ETS	Emission Trading System
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
MPGs	Modalities Procedures and Guidelines
MRV	Monitoring, Reporting and Verification
NC	National Communication
NDCs	Nationally Determined Contributions
NIR	National Inventory Report
PA	Paris Agreement
QA/QC	Quality Assurance/Quality Control
RA	Republic of Armenia
UNFCCC	United Nations Framework Convention on Climate Change

1. Context:

1.1. MRV

Measuring, Reporting and Verification of GHG emissions is an important tool in combating climate change. MRV is a term used to describe all measures that countries take to collect data on emissions, mitigation action, and support. In order to be able to see progress of a country's struggle to lower emissions, and to compare its efforts with that of the global community, it is necessary to have an MRV system in place that adheres to the same principles as that of other countries.

The three letters stand for the following principles:

- Measure or monitor (M) data and information on emissions, mitigation actions and support. This can entail measured GHG emissions, estimating emissions or emissions reductions utilizing activity data and emission factors, calculating changes relevant to sustainable development, and collecting information about support for climate change mitigation
- Report (R) by compiling this information in inventories and other standardized formats to make it accessible to a range of users and facilitate public disclosure of information
- Verify (V) by periodically subjecting the reported information to some form of review or independent assessment to establish completeness and reliability. Verification helps to ensure accuracy and conformance with any established procedures, and can provide meaningful feedback for future improvement.

MRV can be applied to emissions of GHG, on a national, organizational and/or facility level, and can be reported in the form of an emissions inventory. However, MRV can also be applied to mitigation actions (e.g. policies or projects) in order to assess their effects on emissions, but also on sustainable development or the implementation of climate-related projects, without estimating emissions. This can also be applied to support tools, like climate finance, technology transfer and capacity building, in order to track provisions and receipt of climate support and in order to assess the impact of this funding.

This gap analysis focuses on the MRV of GHG emissions on a national level.

The basis for an MRV system is GHG emissions reporting which provides information on the development of emissions, which are published inthe National Inventory Report (NIR). In its NIR, a country provides information about the development of GHG emissions from the different source and sink categories, based on the methods outlined in the guidelines provided by the IPCC. As this is an international framework that's binding to all parties to the UNFCCC that have to report their emissions (with different reporting obligations for developed countries and those on the path of development, which will be described in the next chapter), emissions timelines are comparable between countries and allow for a global overview of emissions.

1.2. The Paris Agreement

The Paris Agreement, which was signed by Moldova in 2016 and ratified in 2017, was adopted with the objective to lower global emissions in a way that global temperatures do not rise above +2°C by 2050 (whilst aiming for a maximum of 1.5°C). It follows the Kyoto protocol, which was ratified by Moldova in 2003. The Paris Agreement aims to do so by strengthening the global response to climate change in general, including by: committing to a long-term temperature goal; enhancing adaptive capacity and climate resilience; and making finance flows consistent with low-emission development pathways. Differing national circumstances[1] will be taken into account, which is a shift away from the

[1] It should be noted that there is no definition of „national circumstances"

differentiation between developed and developing countries, which also increases obligations of developing countries.

Each Party to the Paris Agreement is obliged to determine at the national level the actions they are able and willing to take in order to achieve the objective of the Paris Agreement. These so called "Nationally Determined Contributions" (NDCs) can contain efforts on mitigation and adaption, but also by providing the means of implementation (finance and technology transfer, as well as capacity building) to developing countries.

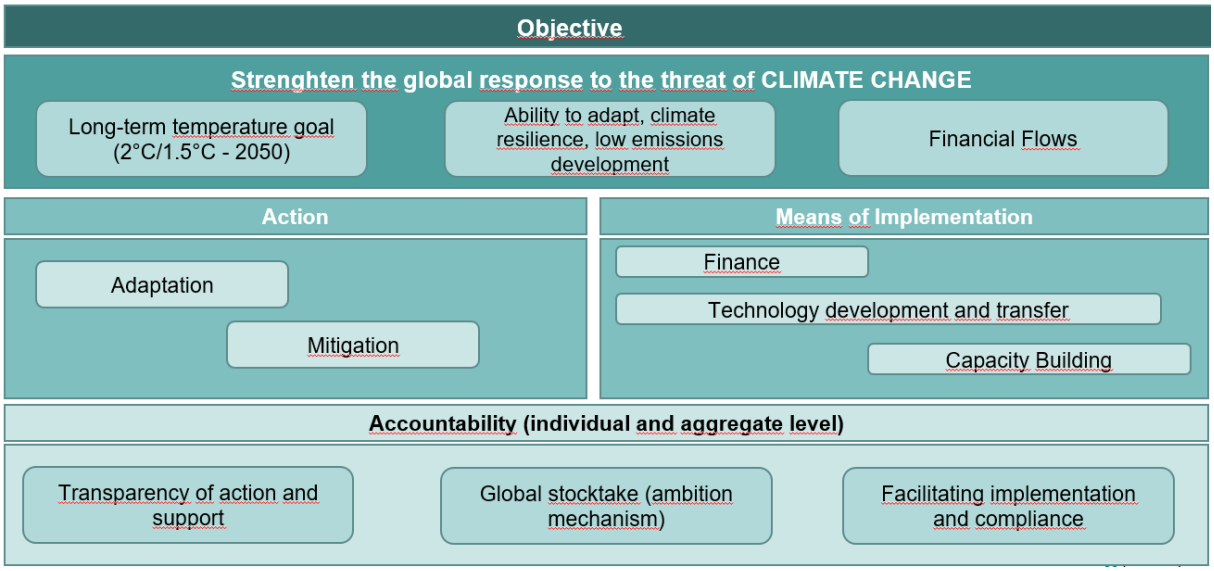


Figure 1: Paris Agreement: the bigger picture

Parties will have to report NDCs every five years and will have to put domestic mitigation measures into place in order to achieve them. Every five years, a global stocktake will take place, where the CMA[2] will take stock of the implementation of the Paris Agreement and assess the collective progress towards achieving the purpose of the PA and its long-term goals.

NDCs should be clear and transparent, in accordance with guidance from the CMA, while taking into account existing methods and guidance under the UNFCCC. NDCs will be recorded in a registry (handled by the UNFCCC Secretariat). Countries can always adjust their existing NDCs in order to enhance their level of ambition over time, but have to meet the minimum as described in their NDCs, that were put forward by the parties when joining the Paris Agreement (as Intended National Contributions, or INDCs). Depending on the timeframe of the INDC, parties will have to report new NDCs or updates of their NDCs in 2020 and every 5 years onwards.

In order for the CMA to be able to follow track on the implementation of NDCs, Parties to the PA will have to report on their progress in a transparent manner. This is why the *Enhanced Transparency Agreement* was decided upon, its *Modalities, Procedures and Guidelines (MPGs) for the Transparency of Action and Support* contain all necessary obligations for how, when and what parties will have to report.

A solid MRV system will help the country to be able to report on the implementation of its NDCs, the changes in emissions and also to report projections of emissions with measures in place.

[2] the Conference of the Parties serving as the Meeting of the parties to the Paris Agreement, so all states that are Parties to the Paris Agreement

1.3. Legislative Context

Within the national legislative and regulatory framework, Moldova has enacted regulatory provisions to assure the establishment, regular update and quality assurance of a national Greenhous Gas Emission Inventory. The Analysis Report of the National Legislation and Policy Framework for the Purpose of the Gap Analysis in the Republic of Moldova by Veronica Lopotenco as part of the EU4Climate project gives an extensive overview of the existing legal framework.

It notes Governmental Decision #1277/2018 regarding the establishment and functioning of the National System for monitoring and reporting of greenhouse gas emissions and other information relevant to climate change as the key regulatory document related to monitoring and reporting. The DG 1277/2018 transposes at the national level the Regulation (EU) No 525/2013. The GD 1277/2018 approves the following:

- procedures on establishment and functioning of the National System for monitoring and reporting of greenhouse gas emissions and other information relevant to climate change. National system consists on: (1) National Inventory System and (2) National System for Policies, Measures and Forecasts. It establishes the competent authority – Environmental Agency, instruments of reporting, format/structure of these instruments, deadline for presenting the reports to the secretariat of the UNFCCC etc.
- List of authorities and institutions which are part of the National System for monitoring and reporting of greenhouse gas emissions and other information relevant to climate change.
- List of GHG and their GWP which are taken into consideration within the National System for monitoring and reporting of GHG emissions.

The report also provides extensive and exhaustive suggestions for alignment of the national regulatory framework with the relevant EU legislation in relation to the Paris Agreement and the Montreal Protocol.

1.4. Reporting Obligations now and then

Under the current climate framework, Parties were split into two groups: Annex-I countries, i.e. industrialized countries that were members of the OECD in 1992 plus countries with economies in transition, like the Russian Federation, the Baltic States, and several Central and Eastern European countries.[3] By virtue of exclusion, all other countries obtained the status of Non-Annex I Parties. While most were developing countries, some were also in advanced stages of industrialization.

This meant that Armenia, as a non-Annex I country, so far had the following reporting obligations that were the key elements of the MRV Framework under the Climate Convention.

This meant that Moldova, as a non-Annex I country, so far had the following reporting obligations that were the key elements of the MRV Framework under the Kyoto Protocol.

1. National Communications (NC): which should be submitted every four years, and contain chapters on national circumstances and institutional arrangements; a National GHG inventory; a description of steps taken or envisaged to implement the Convention; other information

[3] A list of all parties to the Kyoto Protocol can be found here: https://unfccc.int/process/parties-non-party-stakeholders/parties-convention-and-observer-states

considered relevant to the achievement of the objective to the Convention, constraints and gaps, and related financial, technical, and capacity-building needs; and an optional technical annex. Moldova submitted the first NC in 2000, the second in 2010, the third in 2014 and the fourth in 2018. …..

2. A Biennial Update Report (BUR): which should be submitted every two years, with chapters on national circumstances and institutional arrangements relevant to the preparation of the national communications on a continuous basis; a National inventory of all GHG (except F-Gases), including a National Inventory Report (NIR) as a stand alone document or part of the BUR); Mitigation actions and their effects, including associated methodologies and assumptions, objectives, progress of the implementation and estimated outcomes, international market mechanisms and their measurement, reporting and verification; constraints and gaps, and related financial, technical and capacity needs, including a description of support needed and received; description of support needed and received, also information on support received for the preparation of the BUR; information on domestic MRV, any other information that the Party considers relevant to the achievement of the objective to the Convention; and an optional technical Annex. Moldova has so far submitted the first BUR in 2016, the second in 2019. …..
3. The BUR is then subjected to the International Consultation and Analysis (ICA), which is conducted in a manner that is non-intrusive, non-punitive and respectful of national sovereignty that aims to increase transparency of mitigation actions and their effects. It consists of two steps, namely a technical analysis by a team of technical experts in consultation with the Party, resulting in a summary report, and a facilitative sharing of views. Moldova underwent the first ICA cycle in 2017, and the second in 2019, information is available here.

The ICA, i.e. the review process, is an important part of reporting, when reports are subjected to a peer review. This should not be seen as an embarrassing test a country needs to pass, or a way of unveiling incompetence of inventory compilers, but as a chance to being able to improve the quality of inventories. In this process, reviewers, who themselves are inventory compilers of other countries, take a critical look at inventory reports of other countries and compare them to the reporting guidelines and rate them according to the "TACCC" principles of transparency, accuracy, completeness, consistency, and comparability (see next chapter for a description of inventory principles). Review findings always help an inventory team to increase transparency and the overall quality of their work. Becoming reviewers themselves help inventory compilers to understand their own work better, and to also tackle their own inventory report from the point of view of a reviewer, thus again increasing the quality of their own work.

Reporting under the Enhanced Transparency Framework (ETF) of the Paris Agreement means that current non-Annex I Parties will have the same reporting obligations as Annex I Parties, with a few flexibilities to those developing country parties that will need them in light of their capacities, and with longer intervals between reports.

From 2024 onwards, developing Parties will have to submit:

1. National Communications every 4 years, as a stand-alone report, or as an annex to the Biennial Transparency Reports (BTR)in those years a BTR is published. Differences between NCs under the Kyoto Protocol and the Paris Agreement are not yet finalized but can be considered minor;
2. Biennial Transparency Reports (BTR): will contain chapters on GHG emissions and removals (with the NIR as a stand-alone report, or part of the BTR); the NDC tracking progress; Adaptation, Support needed and received; and on areas of improvement where parties can improve their reporting;

3. National Inventories (incl. National Inventory Reports) every two years (see chapter on National Inventory Systems);
4. Undergo a Technical Expert Review every two years, which consists of a technical review of the consistency of the information submitted by Parties, taking into consideration the Party's implementation and achievement of its NDC, as well as information on support, etc. This means that the national inventory report will be reviewed, most probably similar to the reviews of Annex I countries that have been performed under the Kyoto protocol, as well as the information necessary to track progress made in implementing and achieving NDCs.

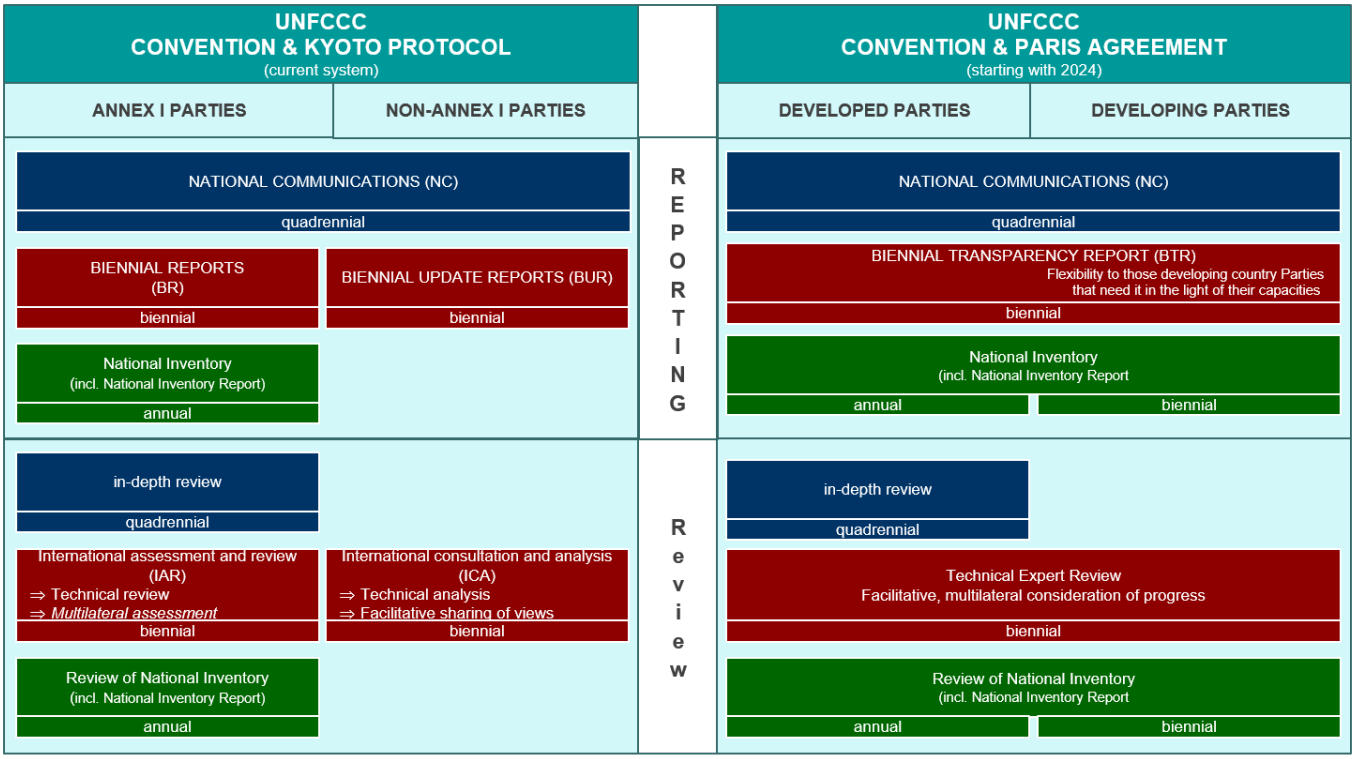


Figure 2: Reporting Requirements for developed and developing countries under the UNCCC Convention&Kyoto Protocol, and changes under the Paris Agreement, source: WRI (2017) Designing the Enhanced Transparency Framewrok, Part 2: Review under the Paris agreement, modified Source

1.5. Modalities, procedures and guidelines for the transparency framework

To ensure that all Parties to the PA report in a comparable and transparent manner, the Conference of the Parties (COP)s decided on modalities, procedures and guidelines for the transparency framework (MPGs)[4]. In it, all basic rules are put forward for all Parties on how to report from 2024 onwards. The MPGs provide a framework for the reporting obligations. in the chapter below, necessary information on national inventory reports of anthropogenic emissions by sources and removals by sinks of greenhouse gases are described.

[4] 18/CMA.1 Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement; Report on the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on the third part of its first session held in Katowice from 2 to 15 December 2018; Addendum, p. 18ff

1.5.1. GHG inventory principles

The GHG inventory principles as laid out in volume 1, section 1.4 of the IPCC 2006 Guidelines are still applicable. They provide the basis for transparent, accurate, complete, consistent and comparable inventory reporting, i.e. a high quality of reporting.

Transparency: information on the compilation of inventories should be available in a report, in such a way, that individuals or groups other than the inventory compilers can understand how the inventory was compiled, and that documentation and reporting is done according to the guidance in chapter 8 of volume 1, and that emissions were calculated using methods laid out in the IPCCC guidelines, volumes 2-6.

Accuracy: Emissions are estimated in a correct manner, with neither over- or underestimates, so far as can be judged.

Completeness: Estimates are reported for all relevant categories of sources and sinks, and gases, as well as for all relevant years. Where data is not available, the absence of this estimate should be clearly documented, together with justification for exclusion.

Consistency: Estimates for different inventory years, gases and categories are made in such a way that differences in the results between years and categories reflect real differences in emissions. Inventory annual trends, as far as possible, should be calculated using the same method and data sources in all years and should aim to reflect the annual fluctuations in emissions or removals and not be subject to changes resulting from methodological differences.[5]

Comparability: the inventory is reported in a way so that it can be compared with other national greenhouse gas inventories of other countries. This means the key categories need to be chosen appropriately[6] and emissions should be calculated based on the IPCC reporting guidance.

1.5.2. National circumstances and institutional arrangements

According to the MPGs, each Party should[7] implement and maintain national inventory arrangements, including institutional, legal and procedural arrangements for the continued estimation, compilation and timely reporting of national inventory reports in accordance with these MPGs. National inventory arrangements can vary by Party depending on their national circumstances and preferences, and change over time. Each Party shall report on the following functions related to inventory planning, preparation and management:

(a) Its national entity or national focal point with overall responsibilities for the national inventory;
(b) Its inventory preparation process, including division of specific responsibilities of institutions participating in the inventory preparation to ensure that sufficient activity data collection, choice and development of methods, emission factors and other parameters are in accordance with the IPCC guidelines referred to in the MPGs (§20);

[5] The IPCC guidelines provide guidance on data collection in chapter 2, methodological choice and identification of key categories in chapter 4, and time series consistency in chapter 5 of volume 1 of the 2006 guidelines
[6] According to Volume 1, Chapter 4 of the 2006 guidelines
[7] Please note: „should“, in the context of climate negotiations, means that an action is not required, but advised. “shall”, on the other hand, means that an action is required. More information on the terminology of climate negotiations can be found here: 10148IIED.pdf

(c) Its archiving of all information for the reported time series, including all disaggregated emission factors and activity data, all documentation about generating and aggregating data, including quality assurance/quality control (QA/QC) review results and planned inventory improvements;
(d) Its processes for the official consideration and approval of the inventory.

1.5.3. Documentation and archiving, Quality Assessment

The MPGs in Chapter C paragraph 6 refer to a QA/QC system, in which basic specifications are provided. Even though developing country Parties are given flexibility and are encouraged only to establish such a system, it should be noted that a QA/QC system with good documentation and archiving is not an unnecessary addition to a National System, but a foundation: the better a QA/QC system, the easier it becomes to enhance the quality of reports, to find references and to make sure that information does not get lost with changes in staff.

The MPGs also stipulate a QA/QC system as a requirement for all parties when it comes to key categories and those categories where significant methodological changes and or data revisions have been applied. The IPCC guidelines provide information on what a basic QA/QC system should contain.

2. Roadmap for Moldova

2.1. Aim

The aim is to build a strong, competent and sustainable National System with defined roles, and experts that are able to provide the necessary reporting at a high standard. A well-established National System will assure long lasting quality, with increasing competence from experts. Depending on financial and legal backing of the country, this should be a team with clearly defined roles and rights, which is also important when it comes to data collection. A thorough QA/QC system that includes documentation and archiving is necessary as a foundation for continuous improvement, ensuring that the system survives changes in staff, as well as making quick and concise responses during a review process possible.

2.2. Specific situation in Moldova – The existing National System[8]

A strong National System with defined roles, functioning data flow, good quality data, a strong QA/QC system is paramount for TACCC. Moldova already reports on a very high standard.

Legislative background exists in Moldova, which nominates the Environment Agency of the Republic of Moldova as the national authority responsible for the National System for Monitoring and Reporting (NSMR) for Greenhouse Gas Emissions and Other Information Relevant to Climate Change. [9]
The Moldovan Environment Agency is responsible also for QA/QC and reporting, which is also set out in the same governmental decision as for the National System. So are the different roles and responsibilities in the inventory preparation. It used to be in the hands of MARDE (Ministry of Agriculture, Regional Development and Environment), but has now been assigned to the Environment

[8] For additional information please refer to the Report "Consolidated Final Report on the Execution of the Assignment, Covering Aspects Related To The Analysis Of The National Legislation And Policy Framework For The Purpose Of The Gap Analysis Against The EU Acquis Included in the Bilateral AGR Element On Climate Action And To The Elaboration Of the Roadmap And/Or Proposals For Legislative Alignment" by Veronica Lopotenco

[9] http://clima.md/lib.php?l=en&idc=276).

Agency. There used to be two teams appointed by MARDE, one dealing with GHG, the other with air pollutant inventories.

Overall, Moldova has an extensive system in place to assure an inventory of high quality. However, always appointing external experts rather than a fixed team will mean that ownership of data, as well as the information necessary on how estimates were done, is not with the national authority. However, there is no predefined team of inventory experts, nor is there a plan of establishing one in the near future. Currently, a team of experts (external consultants) that are paid through funds from GEF provides reports. It is also unclear, how this knowledge is passed on to the Environment Agency, or the experts responsible for taking part in the CoPs and decision makers. It is also unclear, how data is stored, and how it can be ensured that no information that might be necessary for future reviews, can be made available when needed.

3. Identified gaps

The two main issues identified as the limiting factors are data accessibility/quality, as well as the capacity of the Environment Agency. Both of these issues are interlinked. Currently, the Environment Agency is collecting data, but the inventory is compiled by a team consisting of independent experts that are recruited via a GEF funded project. This system could weaken the quality of the inventory in several ways that need to be counteracted.

The following issues need to be tackled:

1. *No fixed inventory team*: even though there is a functioning recruitment cycle for experts working on inventories and this approach appears to be performing well in Moldova, the question arises if this system leads to possible losses of information due to potential changes in staff in the future, when any handovers of knowledge, data and information would, to a large extent, depend on former experts.

2. *Data is collected by staff not directly involved in the inventory compilation*. In order to understand the data needed, and in order to constantly look for improvement of data, experts need to be trained in inventory compilation and understand the complexity of the sector, and what good data consists of. This is key for constant improvement of the inventory.

3. *The Environment Agency has no legal basis for data collection*: this is an additional problem, as accessible data, often statistical data, is compiled with other uses in mind. Statistical data often needs to be reported above a certain threshold, which increases uncertainty , and is often aggregated in a way that prevents its use for a higher tier methodology (which has to be applied for key sources). A law should provide the Environment Agency (and other Agencies, if necessary) with the necessary power to obtain data. This will become especially urgent when facility-level emission data under the ETS MRV system becomes available. This is the most accurate data inventory compilers can access. However, even if no facility-level emission data is available, data and information necessary for inventory compilation should be accessible and the necessary provisions should be formalised in the legal framework as part of a relevant law.

4. *All inventory compilers should be trained in the QA/QC system*: the longer inventory compilers are involved in the process, the better they become. Trainings should be mandatory, as should be adherence to a stringent QA/QC plan. This is necessary not just for the documentation of data and information that become part of the inventory, but also for improving the staff's appreciation for the importance of processes. Should, for instance, a simple Excel database (rather than a programmed database) be used for data storage, it is necessary that experts understand the importance of not changing or altering data and/or information in the database, and that the person in charge of data storage has some automated checks in place and can rely on plausibility checks by other experts.

5. *Synergies with the team reporting under LRTAP* should be used in every way possible. Calculation of air pollutants is based on the same logic as GHG inventory compilation. Thus, experts should work together and approach data providers together, aware of the needs of the other party.

The following decisions are necessary for a way forward:

1. Decision on the structure and the future of the inventory team, as described above. The National System can also be described in a law, which should provide the team with the necessary power to obtain data, even if it is confidential. The arrangements for the National System should also provide for the opportunity to use the time between review cycles for improvements based on review recommendations or on achieving a higher tier methodology for key categories.
2. Capacities and powers of the Environment Agency should be also enhanced in the law.
3. Nomination of experts: Sectoral experts should be nominated from within the Environment Agency, either with the aim of establishing a fixed inventory team or to provide support and guidance to the inventory compilers. The experts should be designated fixed roles and assigned deputies. They should also be provided with trainings on sector-specific calculations, general inventory guidelines, and the QA/QC system.
4. Synergies should be used, coupling CLRTAP and UNFCCC reporting in order to avoid differing sets of activity data, and to avoid double effort. Calculation of air pollutant inventories is very similar to that of GHG emissions, and a lot of information can be shared. Data for both calculations very often comes from the same data providers. Therefore, the approaches should be concise to avoid additional strain on the data providers that could potentially undermine established relationships. Also, information on processes is necessary for both inventories, as in both approaches the EFs are based on technologies used. Experts on CLRTAP reporting, if different from the ones working on GHG inventories, should be included in and should follow the same QA/QC procedures. They should also be in very close contact with their counterparts reporting under the other convention.

4. Proposed workshops

The following workshops are based on the needs taken out of the questionnaire (see Annex), and address the problems mentioned above. They meant as suggestions, some building upon another, and some stand alone. The actual content of the workshops can change according to additional information that becomes available throughout the process. They can be done on a national level or combining several countries with similar issues that are involved in the EU4Climate project.

1. National Consultation Workshops for Moldovan Experts

The aim of these online workshops in 2021 – with guidance by Environment Agency Austria under its current assignment for the EU4Climate project – is to on the one hand present this document to different stakeholders, as well as to assess the status quo and define a clear way forward in terms of what kind of training workshops are needed.

The first workshop will be with stakeholders from several ministries and the inventory team This workshop should consist of presentations of the fundamentals of an MRV system, why it is important, and the key points of this Road Map.

A second workshop in late summer/early autumn of 20201 should deal with staff from the Environmental Agency of Moldova, the experts of the team(s) dealing with issues related to those of the RoadMap, and should contain a more in-depth analysis from a technical level, also including information on data needed, and the basics of a QA/QC system, and what is needed to establish one. Participants should be from the Agency responsible for inventory compilation, colleagues from LRTAP convention, Ozone Unit etc. After the presentations it should contain breakout rooms where problems should be discussed and then brought forward. The outcome of this workshop could be an Annex to this RoadMap (or a stand-alone document), containing ideas for future workshops and a list of skills and things still needed for the establishment of a National System.

The following workshops should be part of a MRV RoadMap, but might be outside the scope of the EU4Climate Project:

2. Workshop topic – methods for GHG estimation (could be done with sector experts from all involved countries)

   Based on the findings of workshop 1, preparation of targeted trainings with inventory experts. This should be a modular approach per sector, starting on beginners level and also offering one for more advanced sector experts. Aim: inventory compilers are able to compile future inventories, and also be able to apply higher tier methodologies, should better data become available

   - Sectoral workshops on GHG estimation
   - Available data, data gaps, and reaching out to data providers
   - Time series consistency and splicing techniques
   - Writing of NIR chapter
   - Review of NIR chapter of another sector and vice versa, in order to start understanding review processes and necessary contend.
   - Working with the Common reporting tables (CTR) and the CRF reporter
   - Review suggestions: discussion of a way forward.

   Workshops on data availability (on a national level, however, the IPPU – Ozone Unit discussion could be done for all countries at the same time) and synergies with other reporting systems: whatever issue of synergies between CLRTAP and UNFCCC could not be discussed in the first workshop, this should be discussed here, on a sectoral basis, in case problems persist. Otherwise, this should aim at Ozone Units and IPPU experts, in order to define gaps and assess the availability of data on the use of F-gases, as those are usually difficult for sector experts to get access to.

   Synergies in activity data – what is there, what is needed, who gets what?

   - Definition on gaps, decision on moving forward in getting data that is necessary.
   - Are there country specific emission factors and parameters available? If yes, additional information for the others could be available
   - Is information on underlying technologies available? In both conventions, this information can be used for applying tier 2 EFs.
   - Additional workshops depending on sectors, depending on necessity
   - Special workshop with Ozone Unit and IPPU sector experts, in order to define gaps, and assess availability of data.

3. Elements of a QA/QC and verification System (international):

The outcome should be a centralised QA/QC system, where data is securely and safely stored, and all information is available. This can be done in workshops for all interested countries, with a final workshop on a national basis, in order to allow for an adaption of necessary tools to the national circumstances.
For the following processes, methodologies will have to be worked out, and put together in a QA/QC handbook that is the basis for a QA/QC system:

- Collection of activity data, selection of emission factors and methods, determination of emission data;
- identification of key categories;
- recalculation of emission data;
- quality management (quality objectives, quality control, quality assurance);
- (internal and external) verification of emission data;
- handling of confidential data
- data storage and management

(1) Necessity of a QA/QC system
Establishment of a basic QA/QC system with all involved experts, also for those working on the LRTAP convention, definition of necessary tools and internal auditing processes. This will have to go hand in hand with preconceived definitions of roles and responsibilities, and the preconceived structure of the QA/QC system. This also includes a training manual for new staff and handover procedures in case of experts leaving.

(2) Tools of a QA/QC system: this needs to involve data storage, documentation of work steps, conservation of calculation files, etc.

(3) Workshop topic - Preparation of "country specific" checklists –general quality control procedures after the trainings on sector specific calculation methods
- Preparation of country specific (tailor-made) checklists category specific quality control procedures
- tailor-made for each sector / category

ANNEX: Moldova - Questionnaire on National Inventory System as a basis for gap analysis

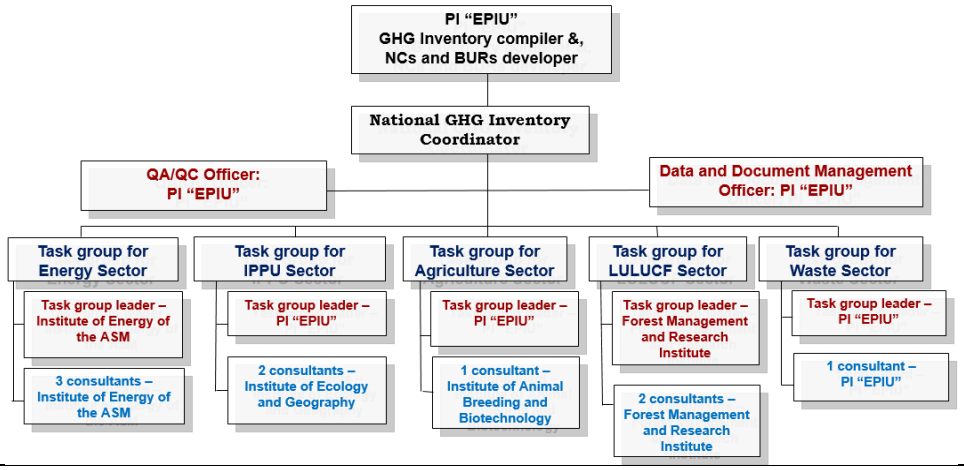
I. National System	
1. Is a single national entity with overall responsibility for the national inventory designated? If yes, what is the name of the institution and what is the legal basis? If not, please explain how the national system works in your country.	According to the Governmental Decision No. 1277 as of 26.12.2018 on establishing the National System for Monitoring and Reporting (NSMR) Greenhouse Gas Emissions and Other Information Relevant to Climate Change, the **Environment Agency of the Republic of Moldova** was designated as the national authority responsible for NSMR management and implementation, respectively as the single national entity with the overall responsibility for the national inventory (see for details http://clima.md/lib.php?l=en&idc=276). The latter has been created through the GD No. 549 as of 13.06.2018 on creation, organizing and functioning of the Environment Agency. According to the respective GD, the Environment Agency has been assigned with the following competencies in the field of *atmospheric air protection and climate change*: • implementing the provisions of policy documents and international environmental treaties to which the RM is a part in the field of protection of atmospheric air quality and ozone layer, *GHG emissions reductions and adaptation to climate change*, the elaboration and presentation to the MARDE of information on their implementation (point 9 (2), let. c); • participation to the works of the *National Commission for Climate Change* (point 9 (2), let. j); • ensuring the implementation of the *monitoring, reporting and verification system for GHG emissions* (point 9 (2), let. k); • performing the *process of collecting, centralizing, validating and processing data and required information for the inventories and reports on atmospheric pollutants and GHG emissions* (point 9 (2), let. l); • providing technical support to MARDE for the development of *national communications* and *biennial update reports* according to UNFCCC provisions (point 9 (2), let. o).
2. Is the single national entity also responsible for QA/QC and reporting?	Indeed, the Environment Agency is responsible also for QA/QC and reporting (see for details Annex 1 of the GD No. 1277/2018 'Regulation on the Establishment and Functioning of the National System for Monitoring and Reporting Greenhouse Gas Emissions and other Information Relevant to Climate Change', ' Section 2 'National Inventory of Greenhouse Gas Emissions', para 17-19, http://clima.md/lib.php?l=en&idc=276).
3. Are roles and responsibilities in the inventory preparation, QA/QC and reporting process defined? This definition shall specify the roles of, and cooperation between, government agencies and other entities involved in the preparation of the inventory, as well as the institutional, legal and procedural arrangements made to prepare the inventory.	The different roles and responsibilities in the inventory preparation, QA/QC and reporting process are defined in the Governmental Decision No. 1277 as of 26.12.2018 on establishing the National System for Monitoring and Reporting (NSMR) Greenhouse Gas Emissions and Other Information Relevant to Climate Change (see for details http://clima.md/lib.php?l=en&idc=276). This definition specify the roles of government agencies and other entities involved in the preparation of the inventory, as well as the institutional, legal and procedural arrangements made to prepare the inventory.

4. Does an inventory compilation team exist? Or are new consultants contracted for each reporting year? Please describe the set-up, whichever is the case.	There is not a fixed inventory team and are there any no plans of establishing one in the nearest future in the frame of the Environment Agency. Instead, through a Cooperation Agreement, the Environment Agency has agreed that the inventory compilation tasks will be undertaken by the new created Public Institution "Environmental Projects Implementation Unit" (PI "EPIU"), which will contract consultants on competing basis for each reporting cycle on biennial basis (i.e., for compilation of BURs once in two years and NCs once in four years). The former seven legal entities of the MARDE (Climate Change Office, Carbon Finance Office, Environmental Pollution Prevention Office, Ozone Office, Biodiversity Office, Biosecurity Office and Environmental Projects Consolidated Implementation Unit) have been reorganized through absorption by the Public Institution "Persistent Organic Pollutants Sustainable Management Office" through the Government Decision No. 1249 as of 19.12.2018 on organization and functioning of the Public Institution "Environmental Projects Implementation Unit". The latter is the successor of rights and obligations of all above-mentioned legal entities of the MARDE. The GD No. 1249/2018 entered into force on 01.01.2019.
5. Are emission inventories for GHG estimated within the same team or project as the emission inventory for air pollutant?	The Environment Agency is now responsible for both inventories. In the past, the Climate Change Office of the MARDE was responsible for compiling the GHG Inventories, while the National Institute of Ecology and Geography used to be responsible for compiling the emission inventory for air pollutants. As the number of inventory experts in the country is limited, in most inventory cycles, the same experts used to be contracted on competing basis by both public institutions.
6. Who is currently in charge of the Inventory Management? Is this the same person for subsequent years, or is someone new nominated for each inventory round?	Following the results of the latest competition, launched in April 2020 by the Public Institution "Environmental Projects Implementation Unit" (PI "EPIU") for the position of the National Coordinator of the GHG Inventory Working Group, the person who used to be the inventory compiler within the 2000-2019 periods won the competition and was appointed in the respective position for the next inventory cycle (2020-2021), during which the BUR3 will be developed and submitted to the UNFCCC by the end of 2021 year.
7. Are the legal and contractual arrangements in place sufficient to collect data and information needed for inventory preparation? In other words: does obtaining data work in your country, or do you have problems in getting data? Please identify those sectors where this is working well, and those, where problems are occurring.	In accordance with the Governmental Decision No. 1277 as of 26.12.2018 on establishing the National System for Monitoring and Reporting (NSMR) Greenhouse Gas Emissions and Other Information Relevant to Climate Change, the Environment Agency of the Republic of Moldova has launched in February 2020 the process of data collection for the current inventory cycle. The list of entities pertaining to the National System for Monitoring and Reporting of Greenhouse Gas Emissions and other Information Relevant to Climate Change is included into Annex 2 of the GD No. 1277/2018 (see for details http://clima.md/lib.php?l=en&idc=276). By the end of March 2020, around 60% of the enlisted entities provided the requested information, the other 40% did not responded yet and/or requested more time for providing the requested information, inclusive due to difficult situation in the country as result of the emergency situation set up for the period 17 March - 15 May 2020 as result of COVID-19 pandemic.

8. Does the inventory agency (single national entity) have a good understanding with the national agency for statistics? Does the inventory team obtain data from them? Is the statistical agency ready to provide data in a way the inventory team can use them?	In accordance with the Governmental Decision No. 1277 as of 26.12.2018 on establishing the National System for Monitoring and Reporting (NSMR) Greenhouse Gas Emissions and Other Information Relevant to Climate Change, the **Environment Agency of the Republic of Moldova** has submitted on 11.02.2020 to the National Bureau of Statistics and official request and solicited the need information for compiling the GHG Inventory for the period 1990-2019. Most of the requested information has been provided by the BNS on 28.02.2020. Additional clarifications are needed on some agricultural statistical indices, as some requested information was not provided in full extent. Due to the emergency situation set up in the Republic of Moldova for the period 17 March - 15 May 2020 as result of COVID-19 pandemic, the staff of all public institutions was not activating since end-March to mid-May 2020. Thus, at this moment still there are some unclarified issues with NBS. However, due to the fact that there is established a very good relationship between the National Bureau of Statistics and the Environment Agency of the Republic of Moldova, there are envisaged no difficulties in obtaining the needed data and/or information.
9. Which institution/department is responsible for the preparation of your BUR, NC (and NIR, if stand alone report).	According to the Governmental Decision No. 1277 as of 26.12.2018 on establishing the National System for Monitoring and Reporting (NSMR) Greenhouse Gas Emissions and Other Information Relevant to Climate Change, the Environment Agency of the Republic of Moldova is responsible for the preparation of the BURs, NCs and NIRs. The Public Institution "Environmental Projects Implementation Unit" (PI "EPIU") is supporting the Environmental Agency in implementing these tasks.
10. Is there a plan on how any national system will transition into the Enhanced Transparency Framework from 2024 onwards? If yes, please provide information on this plan.	In the frame of the EU4Climate Project, it is currently ongoing the process of revising the Governmental Decision No. 1277 as of 26.12.2018 on establishing the National System for Monitoring and Reporting (NSMR) Greenhouse Gas Emissions and Other Information Relevant to Climate Change to adjust it to the ETF requirements, as per Article 13 of the Paris Agreement (see for details the Decision 18/CMA.1 'Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement').
11. In case of an encountered problem, what is the chain of command, and who is responsible for whom in order to find a solution for that problem?	If a problem is identified by the members of the GHG Inventory Working Group, the chain of command is as following: the problem is raised to the National Coordinator of the GHG Inventory Working Group, who is formulating it and is discussing solutions with the Manager of the BUR3/NC5 Projects, when solutions are agreed, an information note and a draft letter is submitted to the Director of the Public Institution "Environmental Project Implementation Unit", upon being signed by the Director of the PI "EPIU", the letter is submitted for coordination to the Head of the Environmental Policies Implementation Direction of the Environmental Agency, responsible for NSMR implementation, or depending on the complexity, it may be submitted directly to the Director of the Environment Agency; if the problem is related with the international relations of the Republic of Moldova under the UNFCCC, the Head of Air and Climate Policies Division of the Ministry of Agriculture, Regional Development and Environment / UNFCCC Focal Point might be implied as well in the process, as well as the State Secretary in the area of Environment Protection and Mineral Resources of the Ministry of Agriculture, Regional Development and Environment, and in most complex situation even the Minister of Agriculture, Regional Development and Environment might be involved as well.

12. What is, in your view, the most crucial improvements needed to establish a functioning national inventory system?	The NSMR is already functioning in the Republic of Moldova. The most crucial improvement is related with strengthening the capacities of the Environment Agency for ensuring it proper implementation as per the GD No. 1277/2018 requirements.
II. ELEMENTS OF A QA/QC AND VERIFICATION SYSTEM	
13. Is a person responsible for coordinating QA/QC activities designated?	See p. 228 (chapter 3.3) of the NIS (these arrangements existed before 31.12.2018; new arrangements have to be established in accordance with GD No. 1277/2018).
14. Is there a QA/QC plan?	Described in the NIS from p. 230 onwards (the previous version of the QA/QC plan was approved before 31.12.2018; new QA/QC arrangements might be needed in accordance with GD No. 1277/2018).
15. Are general quality control procedures that apply to all inventory categories and the national total estimates in place?	See Chapter 3.5 of the NIS, respectively see Annex 1 of the GD No. 1277/2018 'Regulation on the Establishment and Functioning of the National System for Monitoring and Reporting Greenhouse Gas Emissions and other Information Relevant to Climate Change', ' Section 2 'National Inventory of Greenhouse Gas Emissions', para 17-19, http://clima.md/lib.php?l=en&idc=276.
16. Are category specific quality control procedures in place and documented (performed by the inventory experts during inventory preparation)?	See Chapter 3.6 of the NIS, respectively see Annex 1 of the GD No. 1277/2018 'Regulation on the Establishment and Functioning of the National System for Monitoring and Reporting Greenhouse Gas Emissions and other Information Relevant to Climate Change', ' Section 2 'National Inventory of Greenhouse Gas Emissions', para 17-19, http://clima.md/lib.php?l=en&idc=276.
17. Are quality assurance and review procedures, e.g. a peer review prior submission, in place and documented?	See Chapter 3.7 of the NIS, respectively see Annex 1 of the GD No. 1277/2018 'Regulation on the Establishment and Functioning of the National System for Monitoring and Reporting Greenhouse Gas Emissions and other Information Relevant to Climate Change', ' Section 2 'National Inventory of Greenhouse Gas Emissions', para 17-19, http://clima.md/lib.php?l=en&idc=276.
18. Are verification activities planned/undertaken and documented?	Yes, verification activities re undertaken, see for details the latest NIR: 1990-2016 (see sectoral chapters 3-7) (http://clima.md/doc.php?l=en&idc=82&id=4319).
19. Is there a procedure for official approval before submission?	Yes, see for details GD No. 1277/2018 'Regulation on the Establishment and Functioning of the National System for Monitoring and Reporting Greenhouse Gas Emissions and other Information Relevant to Climate Change', http://clima.md/lib.php?l=en&idc=276.
20. Are reporting, documentation and archiving procedures defined?	Yes, see NIS chapter 4, respectively see Annex 1 of the GD No. 1277/2018 'Regulation on the Establishment and Functioning of the National System for Monitoring and Reporting Greenhouse Gas Emissions and other Information Relevant to Climate Change', ' Section 2 'National Inventory of Greenhouse Gas Emissions', para 19, http://clima.md/lib.php?l=en&idc=276.
21. Is a list of terms, definitions and abbreviations available?	Yes, see NIRs, BURs and NCs, as well as Annex 1 of the GD No. 1277/2018 'Regulation on the Establishment and Functioning of the National System for Monitoring and Reporting Greenhouse Gas Emissions and other Information Relevant to Climate Change', ' Section 1 'Definitions', para 7, http://clima.md/lib.php?l=en&idc=276.
22. Is the QA/QC system following or in line with international standards or	Yes, see Annex 1 of the GD No. 1277/2018 'Regulation on the Establishment and Functioning of the National System for Monitoring and Reporting Greenhouse Gas Emissions and other Information Relevant to Climate Change', ' Section 2

comparable requirements?	'National Inventory of Greenhouse Gas Emissions', para 18, http://clima.md/lib.php?l=en&idc=276.
23. Is the QA/QC system audited in any way, and if yes, following which procedures?	Not yet, but this might be undertaken in the future, see also Annex 1 of the GD No. 1277/2018 'Regulation on the Establishment and Functioning of the National System for Monitoring and Reporting Greenhouse Gas Emissions and other Information Relevant to Climate Change', ' Section 2 'National Inventory of Greenhouse Gas Emissions', para 17-19, http://clima.md/lib.php?l=en&idc=276.
24. How well are your inventory estimations documented? If one expert leaves, and another one takes over, would expert no.2 be able to understand methods and data sources of his or her predecessor?	Yes. In this regard, various approaches are used, including elaboration and periodical updating of the 'Report on National GHG Inventory System in the RM' (NIS), drawing on 6 templates worked out by US EPA in November 2007 and updated in December 2011.
25. Is any feedback on the national GHG inventory such as complaints and appeals from national players or issues raised during the review process documented? Are procedures for this inventory improvement process defined and is the outcome documented?	The issues raised during each review process are documented, being it undertaken nationally as it is described in the NIR: 1990-2016 and NIS-2018 (see Chapter 3: Description of QA/QC Procedures), or being it undertaken internationally in the frame of the International Consultation and Analysis (ICA) process, consisting of two steps: (i) the technical analysis of BUR1 and BUR2; (ii) the facilitative sharing of views among Parties on BUR1 and BUR2 contents and the results of technical analysis of BUR1 (https://cop23.unfccc.int/ICA-cycle1) and BUR2 (https://unfccc.int/ICA-cycle2).
26. Do these issues - if justified - trigger improvements of the GHG inventory? Who has the responsibility to define, implement and document the measures?	Indeed, if justified, and if financial resources allows, the raised issues triggered improvements of the GHG Inventory. Specific examples are provided in various chapters of the NIRs and NIS. The National GHG Inventory Compiler used to have the responsibility to define measures to be implemented, while member of the GHG Inventory Working Group used to have responsibility for implementing and documenting the measures.
27. Please provide information on any potential improvement that you think are especially important.	In the case of the Republic of Moldova, the potential improvements are listed in Chapter 6.4 'Potential Sector and Category Improvements' of the NIS-2018 (http://clima.md/doc.php?l=en&idc=82&id=4334)
III. Resources (Personnel and facilities and equipment) and resource planning	
28. Are sufficient resources (personal / time) available/allocated for the (a) preparation of the emission inventory, (b) performing/conducting QA/QC activities and implementing appropriate measure and	There are sufficient resources (personnel and time) available for the (a) preparation of the emission inventory, (b) performing/conducting QA/QC activities and implementing appropriate measure and (c) the preparation of reports, in the case of the GHG Inventory Working Group under the BUR3/NC5 Project implemented by the PI "EPIU". However, a more difficult situation is within the MADRM and Environment Agency, which indeed face the lack of resources (personnel and time), have very small teams and are looking on receiving support from external experts. Under such circumstances, additional in-house experts and regular training are needed.

(c) the preparation of reports?	
29. Are roles within the inventory team defined (e.g. quality manager, inventory expert, data manager)? Can you provide an organisational chart to describe the hierarchical structure within the inventory team?	Roles within used to exist within the inventory before 31.12.2018 are described in the NIS-2018. Most of these roles were covered by experts hired as external consultants. The current inventory cycle for compiling the BUR3 has just started, as already mentioned above. The organisational chart describing the hierarchical structure within the inventory team is provided below: 
30. Are duties, responsibilities and authorizes of the different roles defined? Can you provide a responsibility matrix for the different steps in inventory preparation?	The duties and responsibilities are defined and described in the NIR: 1990-2016, see specifically Chapter 1.2.2 'Institutional and legal Arrangements', Chapter 1.3 'Process for Inventory Preparation" and Chapter 1.6 'Quality Assurance and Quality Control'. As the GHG Inventory Working Group consists from external experts, the roles, responsibilities and duties of contracted national GHG inventory consultants are also described in their Terms of References. The responsibilities for different steps in inventory preparations are divided between the national consultants → task leads or sector leads and → national GHG inventory coordinator.
31. Has the personnel involved in inventory preparation adequate education, training, skills and experience and where is this documented (e.g. personal file, CV)?	Most of national GHG Inventory consultants are nominated in the UNFCCC Roster of Experts (their latest actualized CVs have been provided to UNFCCC Secretariat during 2019 year) and have already passed multiple training courses organized by UNFCCC, in some cases in cooperation with IPCC. 3 members of the GHG Inventory Working Group have already participated as international reviewers in the review of NCs, BRs and GHG inventories of the Annex I Parties, two of them have also participated in the technical assessment of the BURs of non-Annex I Parties. The majority of the national GHG Inventory Consultants have PhD degree in various relevant areas (energy and industrial engineering, agriculture, biology, forestry and environmental protection). The minimum educational level allowing the candidates to become members of the GHG Inventory Working Group is Master Degree level. The PI "EPIU" keeps and storages the CVs and personal files of all members of the GHG Inventory Working Group. When new on-line training courses are announced by UNFCCC, all our national GHG inventory experts are encouraged to apply. Also, the Global Support Programme is organizing on regular basis training courses for national experts from non-Annex I Parties and Moldova is participating to such trainings if the available budgets allows it with one to two national experts per each organized training, upon preliminary coordination with

	the GEF Implementing Agency, which in our case is the United Nations Environmental Programme (UN Environment).
32. Is a fallback option defined in the case of sudden and unexpected absence of personnel, e.g. such as designation of deputies?	Each contracted consultant has to announced at least two weeks in advance upon his or her decision to from the held position. If such a case exist, a new competition is launched for respective position under the BUR/NC Projects implemented by the PI "EPIU".
33. How is it ensured that the personnel / inventory team is informed about the latest updates / versions of the guidelines, reporting requirements etc.?	It is the duty of the GHG Inventory Coordinator, as well as of task leads to inform the inventory team about the latest updates / versions of the guidelines and reporting requirements. There is also another channel of informing the inventory team, this is done by the UNFCCC Focal Point who is participating to the UNFCCC Meetings and has the obligation
34. Is it ensured that the personnel responsible for inventory preparation, QA/QC and reporting is free from any commercial, financial and other pressures that might influence their technical judgment?	As you may see from the organizational chart provided above, most of the personnel responsible for inventory preparation, QA/QC and reporting is activating in various research institutes of the Academy of Sciences of Moldova and/or are directly contracted by the PI "EPIU". Thus, they are free from any commercial, financial and other pressures that might influence their technical judgment.
35. In order to ensure the planning, preparation and management of the emission inventory in a timely and professional manner are all technical resources necessary (personal computers and supporting IT infrastructure (providing data security and a backup system) provided and maintained?	As already mentioned above, the personnel responsible for inventory preparation, QA/QC and reporting are external experts working following part-time arrangements. As the respective personnel is not working in one premises and there is also no any IT supporting infrastructure involved in the process, the planning, preparation and management of the emission inventory is ensured individually by each staff member. The data security and the use of backup systems is also the individual responsibility of each staff member. The PI "EPIU" is responsible for managing the inventory archive, more details on this issue may be find in the NIS-2018 (see Chapter 4: Description of Archiving System) (http://clima.md/doc.php?l=en&idc=82&id=4334).
36. What kind of data integrity and security measures are taken by the National Inventory Compiler and each member of the inventory team?	National consultants are providing progress reports on quarter basis to task leads. The Task Leads are submitting to the National Inventory Compiler on quarter basis aggregated progress reports for each sector. Respective reports and files are kept and stored both in the PI "EPIU" computers, as well as on external hard drives and memory supports, thus ensuring the data integrity and minimal security measures.
37. Is there an annual process for resource planning, e.g. in the process of an annual management review?	The resource planning is project based. As generally, BURs projects have a two years cycle and NCs projects have a three years cycle, the resource planning process is undertaking periodically during the implementation phase in coordination with the GEF implementing agency, which is the UN Environment in the case of the Republic of Moldova.
IV. Subcontracting	
38. Are parts of the inventory contracted out/prepared	NO.

by someone not within the inventory team?		
39. If yes, are quality procedures describing the process for contracting out studies in place?		N/A.
40. If yes, how is ensured that the quality objectives and the requirements for the preparation of emission inventories are followed by the subcontractor?		N/A.
41. If yes, is there a procedure regarding the handling with confidential data?		N/A.
42. If yes, is a procedure defined regarding the handling of results and reports (ownership/publication)?		N/A.
Contacts for further questions:		
43. All questions are necessary for tier 1 of our gap analysis. Depending on your answers, we might have to ask further questions. Could you please provide names and contact detail of the following roles, and information, whether we can contact them directly for an interview, or if those questions should be sent to the UNDP coordinator?		
Coodinator of the GHG Inventory Team	Please insert contact data	Mr. Marius Țăranu, tsaranu@yahoo.com / marius.taranu@clima.md (PI "EPIU")
QA/QC responsible	Please insert contact data	Mr. Marius Țăranu, tsaranu@yahoo.com / marius.taranu@clima.md (PI "EPIU") Ms. Raisa Leon, r_leon@mediu.gov.md (Environment Agency of the Republic of Moldova)
Responsible for reporting	Please insert contact data	Mr. Marius Țăranu, tsaranu@yahoo.com / marius.taranu@clima.md (PI "EPIU") Ms. Valentina Tapis, valentina.tapis@madrm.gov.md (UNFCCC Focal Point, Ministry of Agriculture, Regional Development and Environment)