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

Draft Final Report

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1. Context:

1.1. MRV

Monitoring, 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 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 for the development of GHG emissions in the National Inventory Report (NIR). In the 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 Georgia in 2016 and ratified in 2017, was adopted with the objective to lower global emissions in a way that global temperatures will not rise above +2°C by 2050 (whilst aiming for a maximum of 1.5°C). It follows the Kyoto protocol, that was ratified by Georgia in 1999. 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 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.

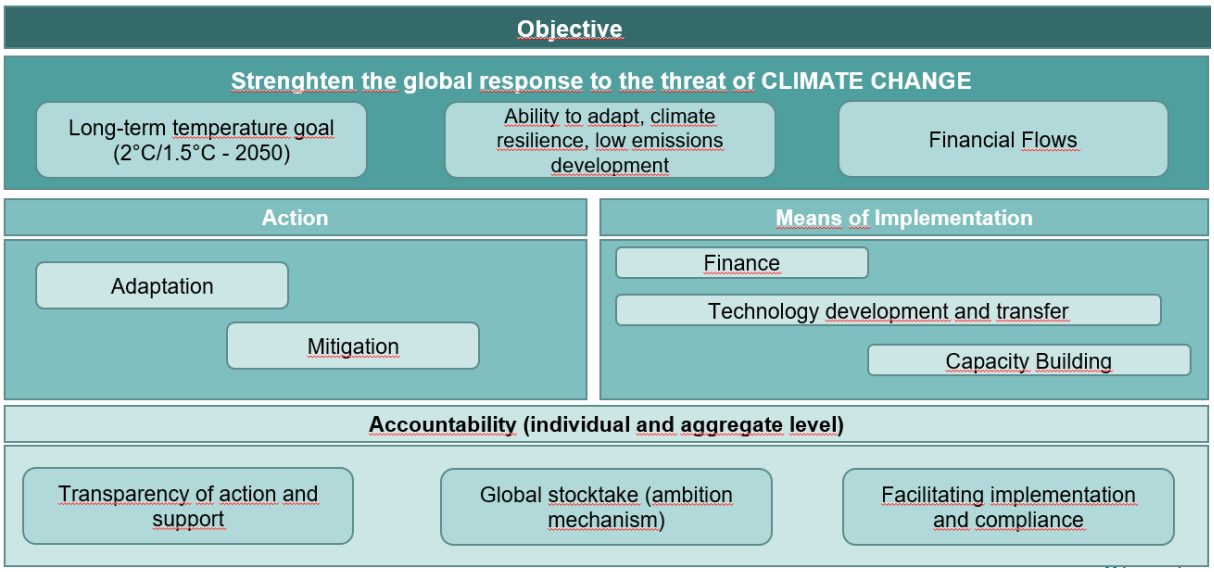

Figure 1: Paris Agreement: the bigger picture

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 every 5 years to cover the period of 10 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* Framework was decided upon, its *Modalities, Procedures and Guidelines (MPGs) for the Transparency*

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

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.

1.3. Reporting Obligations now and then

The UN Framework Convention on Climate Change, ratified by Georgia in 1994, split Parties 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] Non-Annex I Parties were mostly developing countries, but also countries that rely heavily on income from fossil fuel production and commerce, and might thus feel more vulnerable to the potential economic impacts of climate change response measures.

This meant that Georgia, as a non-Annex I country, so far had the following reporting obligations:

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 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. Georgia submitted four National Communications in 1999, 2009, 2016, and 2021.
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. Georgia has so far submitted two BURs; in 2016 and 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. Georgia underwent two ICA cycles in 2017 and 2020.

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

[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

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 (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 ETF will mean 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 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 BRT); the NDC tracking progress; Adaption, 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 Section 2.2.1).
4. Undergo a Technical Expert Review every two years, which is a facilitative, multilateral consideration of progress.
5. Review of the National Inventory every two years.

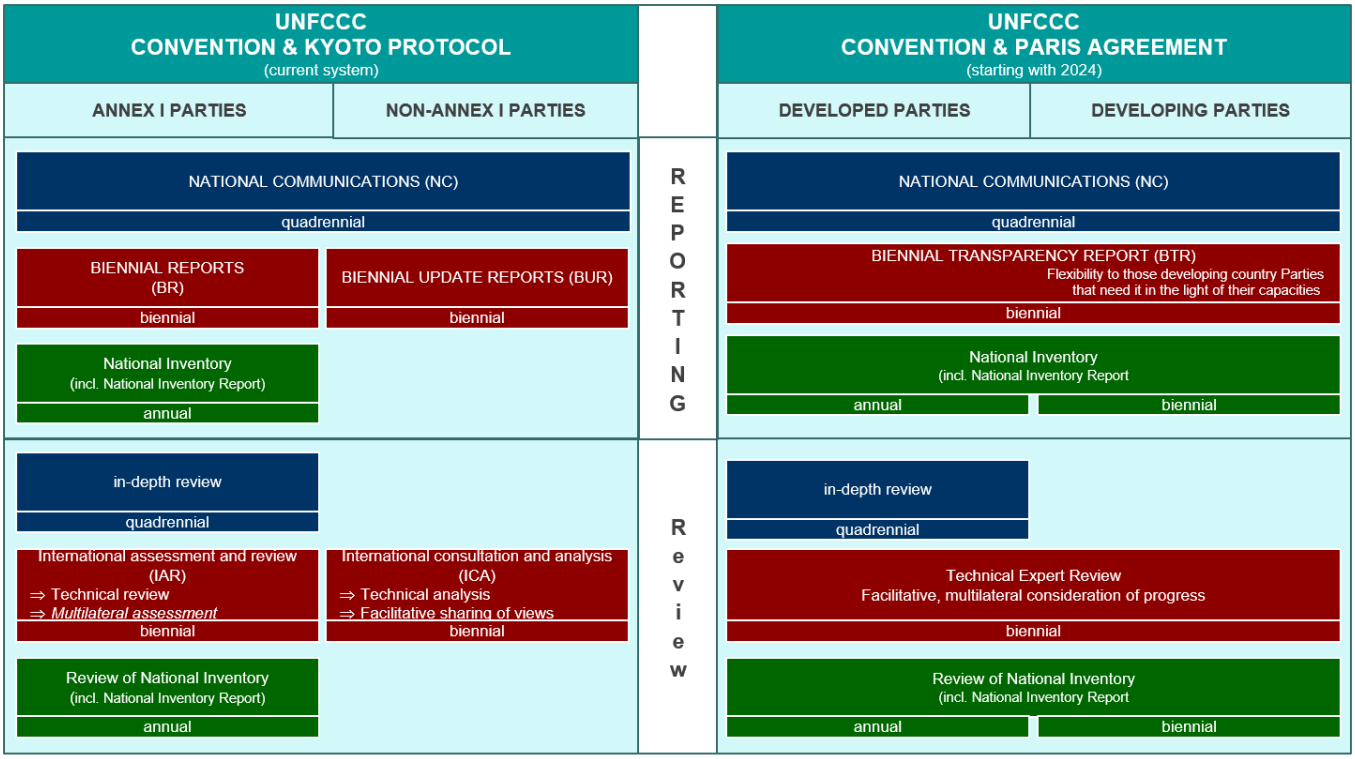

Figure 2: Reporting Requirements for developed and developing countries under the UNCCC Convention&Kyoto Protocol, and changes under the Paris Agreement, source: WRI (2017) Designing the Enhanced Transparency Framewrok, Part 2: Review under the Paris agreement, modified Source

1.4. Modalities, procedures and guidelines for the transparency framework

In order to make sure that all Parties to the PA report in a comparable and transparent manner, the CoP decided on modalities, procedures and guidelines for the transparency framework[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 chapter II, necessary information on national inventory reports of anthopogenic emissions by sources and removals by sinks of greenhouse gases are laid out.

During the 2021 CoP in Glasgow further provisions for most elements of the MPGs were decided upon. This includes an outline and common reporting tables for the National Inventory Document (which will replace the National Inventory Report), but also information that will be necessary to track progress and information on support, i.e. the common tabular formats. It was also decided on an outline of the technical expert review, and for future reviewers, outlines of a training programme. The Biennial Transparency Report was also outlined, it will contain all elements of action and support.[5]

1.4.1. GHG inventory principles

The GHG inventory principles as laid out in volume 1, section 1.4 of the IPCC 2006 Guidelines for National Greenhouse Gas Inventories 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 is 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.[6]

[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

[5] For a concise summary on the decisions of COP 26 in relation to transparency, and information on transparency under the Paris Agreement, please refer to Understanding Tranparency Guidance

[6] 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

Comparability: the inventory is reported in a way so that it can be compared with other national greenhouse gas inventories of other countries. This is the case, as long key categories are chosen appropriately[7] and emissions are calculated using the IPCC reporting guidance.

1.4.2. National circumstances and institutional arrangements

According to the MPGs, each Party should[8] 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)
(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.

1.4.3. Documentation and archiving, Quality Assessment

The MPGs in Chapter C point 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.

Also the MPGs state that a QA/QC system is 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 for a basic QA/QC system.

2. Roadmap for Georgia

[7] According to Volume 1, Chapter 4 of the 2006 guidelines
[8] 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

2.1. Aim

A strong National System with defined roles, functioning data flow, good quality data, a strong QA/QC system is paramount for TACCC. The aim of the proposed roadmap is to facilitate development of 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 would also aid 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.

It should be noted that this analysis deals with the MRV of national emissions only, i.e. the national GHG inventories and reporting of national emissions under the Transparency Framework. It specifically focuses on identifying and addressing missing gaps and avoiding redundancy between existing structures, as pointed out in Recommendation 1 of the EU Acquis Roadmap.[9]

2.2. Specific situation in Georgia - Legislative Context

The "Gap analysis of the current legislation in Georgia and development of a roadmap outlining EU4Climate support to Georgia in alignment with EU acquis included in Bilateral Agreements on Climate Action and/or Energy Community Treaty" produced by Irakli Samkharadze for the Energy Community Secretariat offers one of the most recent independent insights into the existing legal framework concerning GHG reporting in Georgia. Abridged findings of this study are presented here for easier reference.

Development and sharing of GHG emission data in Georgia, needed for implementation of the UNFCCC transparency requirements, is regulated by:

- ✓ Commitments under the UNFCCC, in particular articles 4.1 and 12.1, which provide the legal basis for developing the GHG inventory.
- ✓ Commitments under the Paris Agreement, particular article 13.

Interagency cooperation is regulated by Resolution 454 of the Government of Georgia, dated January 23, 2020, on the establishment of the Climate Change Council (CCC). The CCC, among other, is called upon to facilitate the national MRV system under the Paris Agreement Enhanced Transparency Framework and approves the relevant submissions and reports, including national communications and biennial update reports.

Extensive work has been undertaken to elaborate enhanced reporting arrangements, which are presented in detail in the second BUR. However, at this moment, the anticipated MRV system remains at the proposal stage.

[9] Gap analysis of the current legislation in Georgia and development of a roadmap outlining EU4Climate support to Georgia in alignment with EU acquis included in Bilateral Agreements on Climate Action and/or Energy Community Treaty (Lot1), Part III: Roadmap for the EU4Climate support to Georgia in the alignment with EU acquis (deliverable 3), by Irakli Samkharadze, p. 20

2.3. Specific situation in Georgia – The existing National System

The Ministry of Environmental Protection and Agriculture (MEPA) is responsible for GHG inventory development coordination, as well as in charge of the elaboration and implementation of climate change policies. The Climate Change Division, a subunit of the Department of Environment and Climate change, is responsible for the coordination of the inventory report, and its submission to the UNFCCC. The LEPL (Environmental Protection and Education Centre), an independent non-commercial legal entity under public law of Georgia, prepared the most recent the inventory report with the assistance of independent international and local expert. The inventory-related activities so far have mostly relied on the programme or project-based support, particularly the GEF of National Communications and BURs, with UNDP acting as the implementing agency.

On the operational level, a Memorandum of Understanding between MEPA and GeoStat has been in place since 2014 and there is a good understanding between the statistical agency and the inventory team. There is also reportedly a strong collaboration between the National Statistics office of Georgia, which acts as the main data provider, and other public and private entities. Data provided by the statistical agency is mostly related to the energy balance as well as the energy sector, there seem to be gaps in the IPPU, agriculture and waste sector (see Annex II for more information). The assessment performed under the EU Acquis analysis did not deem the Memorandum a stable and obligatory legal basis for fully operating national MRV system due to lack of explicit references to data provision and sharing.

There is also an internal cooperation between experts working on air pollutants under the CLRTAP convention and those on greenhouse gases. However, data used for reporting under CLRTAP often does not match that of reporting under the UNFCCC, which could lead to questions during the reviews for the respective reporting obligation.

At the same time, there is no legal instrument that could act as a basis for a national inventory system or that provides the inventory compilation team with a mandate to collect data. There are no specific legal obligations for data providers (including industrial companies and/or GeoStat) to transfer any information to the responsible bodies. All submissions of data from private companies are based on voluntary agreements and are provided on ad hoc basis, with no sustainable reporting system in place.

The continuity is ensured by back-to-back UNDP-GEF funded projects and engagement of experts that participated in the preparation of previous inventories and are familiar with 2006 IPCC Guidelines and software. Similar approach applied to ensuring quality of the inventory process. There is no QA/QC plan, even though there are several checks in place, performed by the inventory compilers and data managers, but there is no overall QA/QC plan.

The 2nd BUR identifies the lack of resources and lack of supporting legal framework as the two major constraining factors affecting the national inventory system. The lack of resources primarily affects the training in inventory principles required in order to provide each sector expert with a deputy, sector specific problems connected to lack of data, as well as a the time period between inventory cycles, which will become more and more important under the PA with reviews and the necessity of improvement plans. The lack of legal framework is identified as the second main constraint, which affects primarily data collection. Providing more power to the inventory team for data collection would significantly improve the quality of the inventories.

The MRV implementation plan in Georgia's 2nd BUR elaborates plans for the establishment of a legal framework that would cover the necessary institutional arrangements of the MRV System. The MEPA

and the Office of the Prime Minister of Georgia are expected to facilitate consultations with relevant government entities to operationalise the proposed framework. The MRV system plans primarily cover institutional setup for future reporting, but also touch on MRV of mitigation action and finance that are not covered in this document. The BUR suggests a focal point per ministry responsible for providing data for the inventory and recommended changes to the charter of GEOSTAT that would be necessary for it to provide additional data.

2.4. Gaps and Barriers

A strong National System with defined roles, functioning data flow, good quality data, a strong QA/QC system is paramount for TACCC. This section of the report describes in detail each of the main gaps and barriers that have been identified in the general overview. The subsections cover different aspects of building a sustainable national system with a clear chain of command, where experts are nominated, trained, and can provide continuous work throughout the inventory cycle.

Figure 3: Inventory cycle: under the PA, Georgia will have to report every 2 years. This graph demonstrates the additional steps that will be required of the inventory team beyond the compilation of the inventory and the related report. These steps include implementation of the review findings, trainings of experts, and improvement of the processes before the next cycle.

2.4.1. Gaps in Legal Mandate and Delegated Responsibilities:

The Ministry of Environmental Protection and Agriculture of Georgia (MEPA) is nominated as the entity with the overall responsibility for the compilation of the national GHG inventory by a government decree. As described in section 2.3 above, the inventory team, however, is based at the LEPL and consists of experts from other entities that are recruited for each inventory cycle with funds from the GEF/UNDP.

The legal mandate delegates the MEPA the overall responsibility for the inventory, but provides no legal leverage to collect the data. This makes it difficult for the inventory team to collect some of the

data, especially data not otherwise available through central statistical services. Further issues arise with potential confidentiality of the data and procedures for their handover.

This analysis shows that the current MRV system is not built upon a clear structure. MEPA has the overall responsibility for the inventory, established by the government degree, however, the decree does not set out any personnel requirements or provisions, hence there are no arrangements for a long-term structured team, no clearly defined roles, or a chain of command. A project manager is appointed for each GEF activity financing the inventory cycle and there is a national GED/UNDP project director who must be a public servant from MEPA. Universities and international as well as national experts work on the inventory.

There is no QA/QC plan available, even though one is currently being developed, and, consequently, QA/QC responsibilities and roles are approached in the same project-based manner as the rest of the inventory preparation process.

At the end of the inventory cycle, experts submit information to the project manager for storage. If there are questions to review, the experts usually offer their expertise on a voluntary basis. This is due to the fact that experts are currently hired on project-basis for each inventory compilation and when the actual submission of the inventory is completed, any remaining tasks have to be performed on a voluntary basis. This means that recommendations or encouragements from the review cycle cannot be taken into account, and the time between the different inventories cannot be used for improvements, such as looking for new and better sets of data, contracting studies to acquire better data and improve emission factors, training experts, etc.

The Roadmap of the 2nd BUR specifically recommends to increase capacity of the inventory team, as currently there is only a very small number of experts working on the MRV system, and to provide sufficient legal and financial means to support it.

2.4.2. Issues related to data collection:

Quality of inventory data depends on the availability robust and accurate data. GEOSTAT is the main data provider, and the cooperation between the inventory team and the statistical agency is close and functional. However, there are still some obstacles to applying higher tier methodologies, which will become more important in reporting of key categories under the PA. Georgian experts underlined the following aspects:

- *Lack of data on land use change and forestry in the LULUCF sector.* The new forest inventory starts with 2019, and even though currently data on land use change are being tracked, there is a gap in data between 1990 and 2019. For some subcategories, such as soils and deforestation, the same data as in 2003 is used, which increases uncertainty. Land use change and forestry data are important to estimate carbon pools. This lack of data makes it difficult to calculate sources as well as sinks of CO_2 in this category. Carbon sinks are especially important for countries with vast forests.
- *Lack of disaggregated data in the transport sector.* Data in a certain state of disaggregation is not available, making it impossible to apply higher tier methodologies. This issue is currently under discussion with GEOSTAT, it might be necessary to commission studies on this important sector.
- *Need to improve data in the IPPU sector.* This in particular concerns data for metallurgy and ferroalloys, as well as the F-gases sector, where data is inaccessible. When it comes to F-gases,

statistical data often are of no use, as they only cover bulk imports, and are not split into the different blends of refrigerants.

- *Lack of data on landfills and wastewater.* Efforts are currently being undertaken to improve information on that sector.
- *Agriculture data need improvement.* Efforts are being undertaken to improve available data.
- *Lack of country-specific emission factors.* Country-specific emission factors are necessary for higher tier methodologies. In order to address this, studies need to be commissioned and supervised to ensure that necessary information becomes available in a structure that can be used for inventory compilation.

An exhaustive table of subsector specific data providers and lack of data can be found in Annex II.

2.4.3. QA/QC System:

Currently, no fixed QA/QC system is in place. GIZ as an external consultant did some checks at the end of the last inventory cycle. At the same time, universities, where some of the background calculations were performed, had no QA/QC tasks to follow. A QA/QC system is currently being established, the recommendations it should tackle are provided in Section 3 below.

3. Roadmap for the MRV System:

3.1. Overview:

The first step necessary as a foundation for all future developments is the decision on the structure of the MRV system. On an operational basis, depending on the structure, experts will have to be nominated, and a team structure and chain of commands will have to be decided on. This provides a basis for the QA/QC system, where all decisions will be collected. This QA/QC system will serve as a basis for data processing, archiving, and avoidance of mistakes, but also as a basis for a training plan for experts. On a legal basis, institutional procedures that were decided upon, will be set in a legal text, which can first provide the inventory team with a mandate, either via a bylaw of decree, which can – in the future – be changed into a law. This should contain clear definitions of who does what, and provide institutions involved in the MRV system with a legal mandate that helps to obtain data, even if it is sensitive.

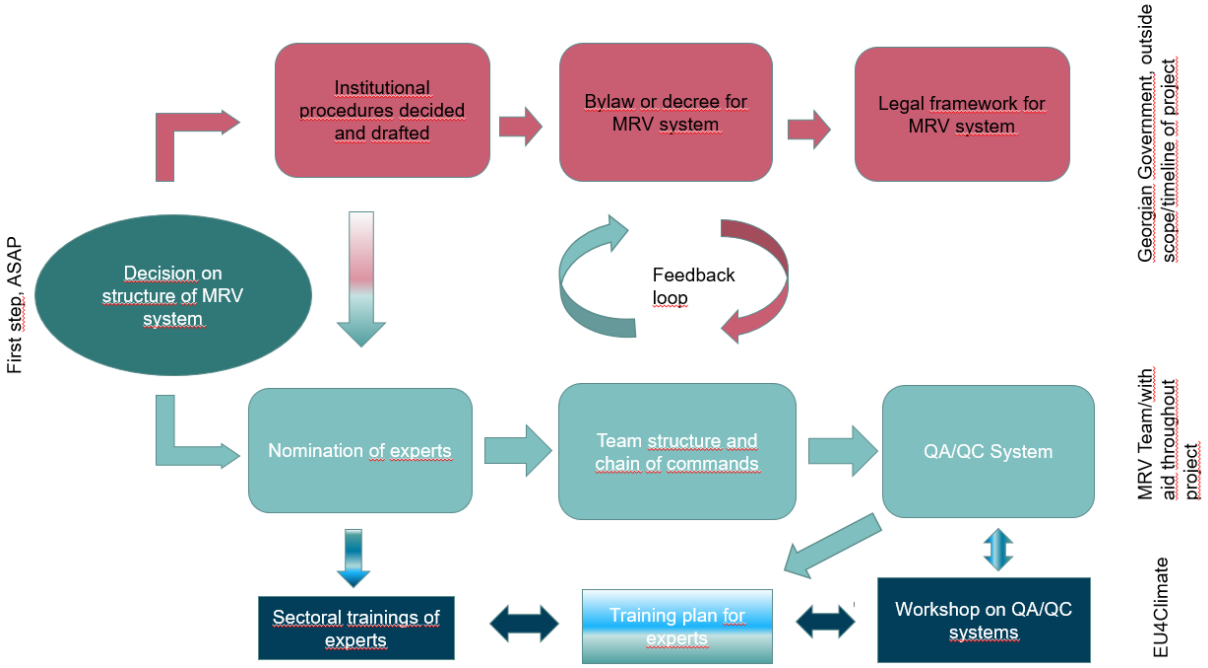

Figure 4: Overview of the different aspects of the Roadmap, as well as their interactions.

3.2. Structure and Legal Mandate

In the second BUR, the suggested outline of a law foresaw a focal point per ministry. Such a focal point to support inventory compilers, could ease data collection. It was also suggested that the analysis by GIZ for the institutional setup should be reworked, taking into account changes that have taken place since that survey took place. Independently, a general decision should be taken of how the inventory system should work in future, by either extending contracts of existing inventory compilers, or by setting up a fixed team inside MEPA or LEPL that focus on inventory compilation. Their work should continue after publication of the inventory report, by improving methods used. This would include searching for country specific, or plant specific data between inventory cycles, as well as commissioning and overseeing studies on country specific emission factors.

The institutional setup in Georgia seems to work well, and there are no procedures restraining the compilation of an NIR. However, considering the fact that experts are hired on project basis only, and there is no archiving of data in place, the following points should be taken into account regarding for reporting under the PA:

The inventory cycle currently established in Georgia does not allow for long-term improvements (either based on review recommendations or simply because inventory compilers were made aware of new data sources), which usually take place between inventory cycles. This poses no problem during the current reporting and reviewing system but could become apparent during reporting under the Paris Agreement. Trainings of sector experts can also be seen as an improvement, and would also take place between inventory cycles. These

trainings could provide sector experts with additional ideas on how to tackle problems and where to look for additional data, which improves inventory quality.

➔ The improvement process should be taken into account when planning the inventory process, and additional funds should be requested for sectoral experts to continue their work between inventory cycles. This would also benefit their availability during the review process.

Under the PA, Georgia will also undergo reviews on a biennial basis. These reviews will go more into depth regarding the quality of the inventory, and recommendations will eventually include aspects that higher tier methodology will have to be applied for key categories etc. In any case, information on the methodology used should be available, and stored, because details can be forgotten. Therefore, in addition to the points raised above, each sector expert should have a deputy that can provide information and answers to questions, if the main sectoral expert is not available, for whatever reason. Information on methodologies used should be available to everyone involved in the review process, in order to be able to trace information and reasoning of applied methodologies, literature used, emails from companies etc. that might contain necessary information that happened to not be included in the NIR.

➔ Each sector expert should have a deputy that is trained in the basics of the respective sector, and a QA/QC system needs to be in place that allows for central storage of information (see chapter on QA/QC system below)

If focal points are provided per ministry, and if GEOSTAT's charter is changed to aid the Georgian MRV system, experts within ministries should be trained in inventory compilation in order to understand what is needed. It would be possible to have a hybrid system of hired experts, and experts from ministries, but in any case, there should be a strong collaboration between those experts.

Given the importance of MRV in the future, and in order to make sure that a team of well-trained experts exists, trainings in the basics of each inventory sector could be provided. Training could be targeted for inventory compilers, future deputies, but also for those people identified as focal points (as suggested in the roadmap of the 2nd BUR) in different ministries, so that they can understand the logic behind inventory compilation and what kind of data is needed. A list of trainings is provided in the next chapter, proposed workshops.

➔ A law or an amendment to an existing law is required to allow the inventory team to access sensitive data from companies, enterprises etc., as well as data reported under other laws. An emphasis should be made on LULUCF data, possibly with external help, to get data, to find surrogate data to close gaps, and to work on establishment of data collection on those sources and sinks that are not available yet.

➔ Legal support by focal points in different ministries and amendment of GEOSTAT's charter as suggested in the 2nd BUR would definitely improve access to more robust data and thus increase the overall quality of the inventory.

➔ Should data collection be performed by a different entity, it is important to train data collectors in inventory preparation and the principles of good practice, so that good quality data is collected together with necessary information for the sectoral experts.

3.3. Data collection

Data should be collected by trained experts, who know what to look for. For the sector specific issues described in chapter 3.3.2. resources should be made available that allow for closing the identified gaps. This can be done by contracting studies, as well as help from the outside. Sectoral experts should be able to provide their input in what is needed. In the cases where data is not provided due to data sensitivity, bilateral talks between data provider, MEPA, the head of the MRV team, and sectoral experts should take place, where handling of confidential data is discussed (security of data storage, options in reporting sensitive data etc.). Where this does not work, the ministry should have a mandate (see chapter 4.2) in obtaining data.

In order to obtain the best available data, all experts involved in data collection need to be trained in inventory compilation and understand the sector at hand. All experts involved in a sector should work closely together, which would allow for quick responses to questions during the review process, and take recommendations and encouragements of a review as an incentive to improve the quality of their respective sectoral chapters.

In any case, synergies should be used and CLRTAP and UNFCCC reporting should be coupled in order to avoid differing sets of activity data, and to avoid double work, in those sectors where calculation is based on the same activity data. Studies should be commissioned to improve data situation for those sources where it is necessary.

3.4. QA/QC System:

A QA/QC system which assures a higher quality of inventories needs to be put into place. Even though procedures should be written down and the compliance with those rules should be checked on a regular basis, it is not necessarily resource intensive or expensive, only a secure server needs to be available for the storage of data. This QA/QC system, as a minimum, needs to take into account the following issues:

1. *Safe data storage and handling:* in order to calculate a robust inventory, often sensitive data is necessary that provides information on production processes, and the amount of product produced, as well as other information. Often, data provider do not feel at ease to hand over such data to the inventory compilers. There are ways of reporting for sensitive data, that are described in the IPCC guidelines, however, in order to be able to work with sensitive data, the data storage needs to be secure and in a centralized place. This concerns not just sensitive data, but all data that goes into the inventory: reviews take place years after the compilation of the NIR, and even though something seems to be clear at the time of inventory compilation, this memory tends to get lost quickly. Thus, all data that goes into the inventory, plus the calculation sheets, need to be stored in an orderly manner, while the calculation sheets should be set to read-only at the end of an inventory cycle.
2. *Documentation:* thorough documentation makes it easier to follow-up calculation processes after the end of the inventory cycle. This documentation should contain information on where data was obtained, additional information from the data providers, e.g. on unusual

fluctuations, and information on recalculations. It should also contain information on EFs used, the rationale behind applying this particular EF, or information on the emission data used. Anything that could be of use for future years, even thoughts on improvement of calculation methodologies, should be written down and stored centrally. This documentation can also help facilitate providing responses to questions during a review.

3. *Checks and improvements:* there should always be a four-eye principle involved in order to avoid mistakes, either in calculation or in reporting. Thus, sector experts should always have a counterpart, either a deputy or another expert from another sector, who basically does an internal audit of the calculations or report chapters. This is to avoid petty mistakes that lead to a multitude of recommendations or encouragements. The better the report, the more constructive review recommendations will be, because they will address a higher level of reporting. Report recommendations should then be collected in an improvement list, which allows sector experts to work on improvements of methodologies, data or approaches used between the different reporting cycle, thus improving the overall quality of the reports.
4. *Data transfer:* inventories consist of a huge amount of different data. A way should be found of compiling and storing data, and transferring it into the CRF reporter or its replacement, the common tabular format (CTF). This should be done in an organised and structured manner, in order to avoid mistakes during the transfer of data.
5. *Organisation of the team:* the team for inventory compilation should be structured, roles should be clear, and communication to the data providers should be bundled and concise. This means that the team should have a good understanding of processes, and their continuing training in issues close to the inventory should be ensured. Each sector expert needs a deputy, in case one is unavailable for either inventories or reviews. QA/QC plans should be established, and performed during each and every inventory cycle, to ensure that all data is kept and can be accessed in the future.
6. *Reporting:* roles should be established for the compilation of reports, and it should be clear how responsibilities are shared, down to the layout of the report. Sectoral chapters should be cross checked by deputies or other sector experts, in order to make sure that information in the chapters is correct and concise. As reports are the basis for reviews, this approach ensures that the minimum on information gets lost, which will then make future reviews easier.
7. *Capacity:* The capacity for MRV described in the 2nd BUR is low, due to the very small number of MRV experts. This number should be increased, in order to allow for at least 2 experts per sector, and to assure that there is a clear chain of command and clearly defined roles. It is also necessary to make sure that at least one expert per sector is available during the review process, and that sufficient means are available to allow for improvement work between inventory cycles.

No additional software is necessary in order to implement a QA/QC system. Rather, it is based on team structure, certain rules that should be laid down in a manual, and a clear chain of command. This includes two sectoral experts (one with the main responsibility, and a deputy) per sector to allow for cross checking of calculations and as a fall-back option in case one is not available. The Energy Sector, which usually accounts for the biggest share of emissions, might need to be split into subsectors, with several experts working on it. The LULUCF sector, which in the case of Georgia is also of great importance, similarly might need to be split into subsectors, or on external data providers. All correspondence related to the collection of activity data, the applied EF, and emission data need to be stored systematically, with one document per (sub)sector, containing hyperlinks to stored data sources

(emails, reports, studies etc.). Calculation files need to be collected centrally, and stored on a secure, central server, with access only by the people working on the inventory. Clear guidelines need to be applied on how to deal with confidential data. The team working on the LRTAP convention should be in close exchange with people working on the GHG emissions inventory, and should adhere to the same QA/QC plan. Synergies should be used where possible, and in the case of the same data provider, requests should be bundled. Every person with access to the data needs to understand the importance and the reason of the QA/QC system.

Data that will be published needs to be stored centrally and in a single format for all sectors, and a data manager needs to be appointed, who will transfer all information to the CTF tables, and then submit data to the UNFCCC. Sector experts need to be involved in the whole inventory process, including reviews and must be allocated time to enhance inventories afterwards, taking into account improvements suggested by the review team.

Anyone involved in inventory and report compilation should be trained in the QA/QC system's structure, their roles should be clear and concise, and the chains of command defined. Experts working on reports and the inventory need to understand the importance of such a system. Each sector expert works with at least one deputy, who is involved in inventory preparation and report compilation, either as a backup, or as an equal sector expert, each dealing with their respective sub-sectors. In any case, a four eye principle for calculations as well as chapter writing needs to be performed for the work of the other.

➔ The establishment of a QA/QC plan would allow for data to be stored and help secure information on how the inventory was compiled and the rationale behind it. It would improve the overall quality of the inventory and the related reports. The QA/QC system should ensure archiving, providing minimum requirements for information stored in calculation files, an archive for relevant correspondence with data providers, clear roles and chain of commands, training plans for sector experts (e.g. becoming reviewers themselves), a structured and robust system of ensuring timely and concise response to review questions (by making sure that sector experts or deputies are available, and necessary information can be accessed, even years later). This last point is also necessary for ensuring time series consistency of calculations.

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. Training Workshop on QA/QC, with a follow up

The aim of this online workshop in 2022 – with guidance by Environment Agency Austria under its current assignment for the EU4Climate project - is to present the Austrian QA/QC system and the experiences of over 20 years of inventory work. Lessons learnt might help with the undergoing

establishment of a Georgian QA/QC system, and some ideas from the Austrian way forward could help with the ongoing process.
As this workshop can be applied to all countries in this project, this would be planned as a regional workshop, with a follow-up national workshop, where ideas and problems can be discussed. This workshop should also be used to plan for sector specific workshops, wherever necessary.

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

1. 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.

2. 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 I: Georgia - Questionnaire on National Inventory System as a basis for gap analysis

National System	
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.	The Climate Change Service structured under the Integrated Management Department of MEPA is proposed to be designated as the coordinating entity for the MRV system. [Role includes:] Develop and oversee the implementation of a QA/QC system Currently, there is a proposal that is being discussed in Georgia to establish a Climate Change Agency. If the proposal is adopted by the Government of Georgia, the proposed units under the Climate Change Service can also be established under the new structure to be developed for the new Climate Change Agency. (GIZ Institutional Arrangements P9)
Is the single national entity also responsible for QA/QC and reporting?	
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.	• There is no legal instrument in place to mandate different entities to report to the MEPA. • Existing legal framework provides limited environment for coordination on MRV issues across the key line entities. • A legal instrument is needed for the implementation of the proposed institutional structure of the MRV system. (GIZ Concept Note T1) By law, all ministries are obliged to submit annual data to GeoStat, which qualifies this institution perfectly for being the data hub for inventory preparation. Existing data collection forms can be modified or amended to additionally include data needed for GHG inventory preparation from different ministries/sectors. Capacity building for personnel responsible for data collection from relevant sectors is essential to understand the type of data required and why such data is important. (GIZ Institutional Arrangements P15) Currently in Georgia there is a lack of normative framework that will act as a basis for a binding MRV system in the national legislation. (Background Paper P7)

~ Does an inventory compilation team exist? Or are new consultants contracted for each reporting year? Please describe the set-up, whichever is the case.	
~ Are emission inventories for GHG estimated within the same team or project as the emission inventory for air pollutant?	
~ 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?	It is proposed to appoint a GHG inventory coordinator from the existing staff members of CCS (GIZ Institutional Arrangements P10)
~ 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.	• There are no formal methods to regularly obtain data from relevant Ministries (data is obtained on ad-hoc basis when needed). • Weak involvement of several Ministries in MRV activities. • Limited coordination across key line stakeholders • Lack of data collection system for some sectors (specifically the waste sector). (GIZ Concept Note T1) • MEPA is clearly seen by all other entities as the coordinating and responsible agency for MRV. • GeoStat is the main source of information and has comprehensive data management procedures. • Several Ministries and Organizations have comprehensive sets of data applicable for GHG inventory. • Willingness to cooperate to enhance the MRV system. (GIZ Institutional Arrangements P11) There is no legally binding obligation of data providers to provide any information to the Climate Change Unit. If the information needs to be collected or created data providers are reluctant to assist. (Background Paper P11) We have problems with data gathering, with identifying adaptation activities and with assessing mitigation actions. The challenge is that every sector needs a different approach in the MRV sector, and this unified common framework does not work for all sectors.

	[Minutes EU4Climate WS 2020]
~ 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?	GeoStat is the main source of information and has comprehensive data management procedures. Law exists which mandates reporting of some data to Geostat and to Atmospheric Air Protection Service (MEPA). (GIZ Institutional Arrangements P11)
~ Which institution/department is responsible for the preparation of your BUR, NC (and NIR, if stand alone report).	The coordinating entity is responsible for all coordination activities for the MRV system in addition to the compilation of all reports required under the UNFCCC e.g. BUR, NCs, or future reporting requirements under the Paris Agreement. (GIZ Institutional Arrangements P9)
~ 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 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?	
~ What is, in your view, the most crucial improvements needed to establish a functioning national inventory system?	GIZ Concept Note T3 and T4: Identified Priority Capacity Gaps range from very basic technical aspects as GHG emission estimation over institutional aspects like defining roles and responsibilities up to legal aspects to operationalize the institutional setup.
ELEMENTS OF A QA/QC AND VERIFICATION SYSTEM	
Is a person responsible for coordinating QA/QC activities designated?	Lack of QA/QC system (GIZ Concept Note T1) We would also need QC checklists for all sectors.
Is there a QA/QC plan?	

Are general quality control procedures that apply to all inventory categories and the national total estimates in place?	[Minutes EU4Climate WS 2020]
Are category specific quality control procedures in place and documented (performed by the inventory experts during inventory preparation)?	
Are quality assurance and review procedures, e.g. a peer review prior submission, in place and documented?	
Are verification activities planned/undertaken and documented?	
Is there a procedure for official approvement before submission?	
Are reporting, documentation and archiving procedures defined?	There is no database for archiving of data. (GIZ Concept Note T1) So, we would like to learn about documentation and archiving, MRV for adaptation and also finance. [Minutes EU4Climate WS 2020]
Is a list of terms, definitions and abbreviations available?	Lack of QA/QC system (GIZ Concept Note T1)
Is the QA/QC system following or in line with international standards or comparable requirements?	
Is the QA/QC system audited in any way, and if yes, following which procedures?	
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?	GIZ Concept Note T2: Energy Sector well documented, other sectors partly documented.
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?	

Do these issues - if justified - trigger improvements of the GHG inventory? Who has the responsibility to define, implement and document the measures?	
Please provide information on any potential improvement that you think are especially important.	GIZ Concept Note T3 and T4: Identified Priority Capacity Gaps range from very basic technical aspects as GHG emission estimation over institutional aspects like defining roles and responsibilities up to legal aspects to operationalize the institutional setup.
Resources (Personnel and facilities and equipment) and resource planning	
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 (c) the preparation of reports?	Understaffing of the climate change service of the MEPA. / Awareness on MRV system and on GHG reporting is limited among several institutions. (GIZ Concept Note T1) There is a lack of resources in CCU to perform Treaty obligations and the current structure hinders CCU's ability to benefit from international financing available from GEF or GCF (Background Paper P12) We, at the Ministry of Environmental Protection, are aware of the MRV framework, but it is not fully implemented yet, due to a lack of human resources. Regarding the capacity, the lack of human resources with climate knowledge is also a problem in other ministries. [Minutes EU4 Climate WS2020]
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?	
Are duties, responsibilities and authorizes of the different roles defined? Can you provide a responsibility matrix for the different steps in inventory preparation?	

Has the personnel involved in inventory preparation adequate education, training, skills and experience and where is this documented (e.g. personal file, CV)?	CCU does not participate in the selection of experts for the preparation of NCs or BURs, while the result of expert's work has to be used by CCU. There is no structure to retain the knowledge brought by experts (Background Paper P11)
Is a fallback option defined in the case of sudden and unexpected absence of personnel, e.g. such as designation of deputies?	
How is it ensured that the personnel / inventory team is informed about the latest updates / versions of the guidelines, reporting requirements etc.?	
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?	
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?	
What kind of data integrity and security measures are taken by the National Inventory Compiler and each member of the inventory team?	
Is there an annual process for resource planning, e.g. in the process of an annual management review?	
Subcontracting	
Are parts of the inventory contracted out/prepared by someone not within the inventory team?	
If yes, are quality procedures describing the process for contracting out studies in place?	

If yes, how is ensured that the quality objectives and the requirements for the preparation of emission inventories are followed by the subcontractor?		
If yes, is there a procedure regarding the handling with confidential data?		See T4 GIZ Concept Note: „Legal instrument to ensure confidentiality for data obtained from industrial establishments" is a Priority Capacity Building Need.
If yes, is a procedure defined regarding the handling of results and reports (ownership/publication)?		
Contacts for further questions:		
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?		
Head of Inventory Team	Please insert contact data	
QA/QC responsible	Please insert contact data	
Responsible for reporting	Please insert contact data	

Annex II: Overview of Data Providers and Sources – empty cells indicate a lack of data:

Information Needed to Develop a National GHG Inventory

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
Energy Sector					
1.	Natural gas consumed in the energy system according to thermal power plants.	mln.m^3	GEOSTAT		Upon the official request from the ministry
2.	Average annual physical and chemical indicators of natural gas transmitted by gas transmission and distribution systems.	mol. % kg/m^3 kcal/m^3	GGTC	Published https://e-platform.ggtc.ge/gasanalisis.aspx	
3.	The main indicators of the gas supply system: Imported natural gas; Taken from gas pipelines and Gas Underground Storage Facility (GUSF); Gas for own needs in the transmission system; Gas losses in the transmission system; Injected into gas pipelines and GUSF; The volume of gas transmitted; Gas for own needs in the distribution system; Gas losses in the distribution system; Gas disposed in the distribution system by sectors.	mln.m^3	GEOSTAT	Published ენერგეტიკა საქართველოს სტატისტიკის ეროვნული სამსახური (geostat.ge)	Part of the data is requested (ex. gas losses)
4.	Fuel consumed in the sub-sectors of the industry and construction category [natural gas, coal, diesel (for energy purposes and transport), gasoline, Liquefied Petroleum Gas (LPG), fuelwood, manure and other biofuel, etc.]. 1.A.2.a - Iron and Steel 1.A.2.b - Non-Ferrous Metals 1.A.2.c - Chemicals	mln.m^3, thousand liters, tonnes	GEOSTAT	Published Energy Balance of Georgia საქართველოს ენერგეტიკული ბალანსი - საქართველოს სტატისტიკის	

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
	1.A.2.d - Pulp, Paper and Print 1.A.2.e - Food Processing, Beverages and Tobacco 1.A.2.f - Non-Metallic Minerals 1.A.2.g - Transport Equipment 1.A.2.h - Machinery 1.A.2.i - Mining (excluding fuels) and Quarrying 1.A.2.j - Wood and wood products 1.A.2.k - Construction 1.A.2.l - Textile and Leather 1.A.2.m - Non-specified Industry			ეროვნული სამსახური (geostat.ge)	
5.	Aviation fuel imported, consumed, stored in the country.	tonnes	GEOSTAT	Published Energy Balance of Georgia საქართველოს ენერგეტიკული ბალანსი - საქართველოს სტატისტიკის ეროვნული სამსახური (geostat.ge)	
6.	Fuel consumed by road transportation (compressed natural gas, diesel fuel, gasoline, LPG), total and according to the subcategory of vehicles: • Trucks (including pickups, scooters); • Buses (including minibuses); • Light passenger cars (taxis and official cars), • Special cars.	mln.m^3, thousand liters, tonnes	Currently we do not have disaggregated data of fuel consumption by type of vehicle		
7.	Average annual physicochemical indicators and density of road transport fuel imported to the country (diesel fuel, gasoline, LPG).	kg/m^3	Not available such average annual indicator. Importing		

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
			companies have some certificates and might also measuring the quality in the Samkharauli or other laboratories but it is confidential and not accessible for us.		
8.	Fuel consumed in the commercial / institutional sphere [natural gas, coal, diesel fuel (for transport and energy purposes), gasoline, LPG, fuelwood, manure, and and other biofuel, etc].	mln.m^3, thousand liters, tonnes	GEOSTAT	Published Energy Balance of Georgia საქართველოს ენერგეტიკული ბალანსი - საქართველოს სტატისტიკის ეროვნული სამსახური (geostat.ge)	
9.	Fuel consumed by the population [natural gas, coal, diesel fuel] (for transport and energy purposes) gasoline, LPG, biofuel (except for fuelwood and manure)].	mln.m^3, thousand liters, tonnes	GEOSTAT	Published Energy Balance of Georgia საქართველოს ენერგეტიკული ბალანსი - საქართველოს სტატისტიკის ეროვნული სამსახური (geostat.ge)	

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
10.	Fuelwood consumed by the population (procured fuelwood and illegal logging).	mln.m^3	GEOSTAT	Published Energy Balance of Georgia საქართველოს ენერგეტიკული ბალანსი - საქართველოს სტატისტიკის ეროვნული სამსახური (geostat.ge)	
11.	Manure used by the population (manure excretion per cow).	tonnes	GEOSTAT	Aggregated consumption data of manure by the residential sector for energy purposes is Published in the Energy Balance of Georgia საქართველოს ენერგეტიკული ბალანსი - საქართველოს სტატისტიკის ეროვნული სამსახური (geostat.ge)	

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
12.	Fuel consumed in the field of agriculture / forestry / fishing [natural gas, coal, diesel fuel (for transport and energy purposes), gasoline, LPG, fuelwood, manure and other biofuel].	mln.m^3, thousand liters, tonnes	GEOSTAT	Published Energy Balance of Georgia საქართველოს ენერგეტიკული ბალანსი - საქართველოს სტატისტიკის ეროვნული სამსახური (geostat.ge)	
Industrial Processes and Product Use Sector					
1.	Cement production • List of main raw materials for cement production, their chemical composition • Annual use of basic raw materials • Annual cement production • Annual clinker production • Efficiency of the oven dust extraction system • Dust captured and stored, (tonnes / year) • Dust returned to the stove	weight percentage tonnes / year tonnes / year tonnes / year % tonnes / year tonnes / year			
2.	Lime production • Annual lime production	tonnes / year			

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
3.	Glass production • Annual glass production • Average Annual Cullet Ratio (Fraction)	tonnes / year %			
4.	Copper production (SO_2 emissions) • Annual use of copper concentrate • Chemical composition of copper concentrate • Chemical composition of the product / copper • Annual amount of copper produced	tonnes / year %			
5.	Ferroalloys production (SO_2 emissions) • Annual production of Ferroalloys	tonnes / year %			
6.	Bitumen/Asphalt Production and Use (NMVOC emissions) • Annual amount of bitumen used (assuming that practically all imported bitumen is used in asphalt production)	tonnes / year %			
1.	Lubricants and Paraffin Wax consumed/used for non-energy purposes (CO2 emissions)	tonnes	GEOSTAT	Published Energy Balance of Georgia საქართველოს ენერგეტიკული	

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
				ბალანსი - საქართველოს სტატისტიკის ეროვნული სამსახური (geostat.ge)	
2.	Solvents, produced, exported and imported to the country (NMVOC emissions)	tonnes			
3.	Bitumen imported	tonnes	GEOSTAT	Published Energy Balance of Georgia საქართველოს ენერგეტიკული ბალანსი - საქართველოს სტატისტიკის ეროვნული სამსახური (geostat.ge)	
4.	Foods and beverages produced	tonnes, liters			
5.	Population	thousand/people	GEOSTAT	Published მოსახლეობა და დემოგრაფია - საქართველოს სტატისტიკის ეროვნული სამსახური (geostat.ge)	

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
1.	Import / Export of Ozone Depleting Substances and products containing substitutes according to the developed modality. 2.F.1 - Refrigeration and Air Conditioning 2.F.1.a - Refrigeration and Stationary Air Conditioning 2.F.1.b - Mobile Air Conditioning 2.F.2 - Foam Blowing Agents 2.F.3 - Fire Protection 2.F.4 - Aerosols	kg/unit			
1.	Electrical Equipment Containing SF6 in the energy system according to the developed modality.	tonnes			
Agriculture, Forestry, and Other Land Use					
Agriculture					
1.	**Livestock Annual Average Population** • Cows • Bulls	heads			
2.	Sheep • Ewes • Other sheep	heads			
3.	Goats	heads			
4.	Asses	heads			
5.	Mules	heads			
6.	Horses	heads			
7.	Buffaloes	heads			
8.	Poultry • Laying hens • Broiler	heads			
9.	Swine • Sows	heads			

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
10.	Rabbits	heads			
11.	Fur bearing animals	heads			
12.	Slaughtered cattle population (monthly) • Cows • Bulls	heads			
13.	The number of lost animals (monthly)	heads			
14.	Lost sheep (monthly)	heads			
15.	Lost swine (monthly)	heads			
16.	Cows average live weight	kg			
17.	Bulls average live weight	kg			
18.	Growing cattle average live weight (up to one year old)	kg			
19.	Heifers and bulls average live weight	kg			
20.	Growing cattle daily average growth of weight	grams			
21.	Cows digestion energy	%			
22.	Bulls digestion energy	%			
23.	Growing cattle digestion energy	%			
24.	Milk fatness	%			
25.	Livestock regime • Nursery • Grazing	days			
26.	Exertion for 1 cow	kg/year			
27.	Manure left in the pasture	%			
28.	Import of mineral fertilizer	tonnes			
29.	Production of mineral fertilizer	tonnes			

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
1.	Agricultural lands	ha			
2.	Cereal crops sown area	ha			
3.	Leguminous crops sown area	ha			
4.	Vegetable crops sown area	ha			
5.	Garden crops sown area	ha			
6.	Industrial crops sown area	ha			
7.	Potatoes sown area	ha			
8.	Forage crops sown area	ha			
9.	Forage crops Gross harvest	tonnes			
10.	**Perennial plans** Orchards	ha			
11.	Berries	ha			
12.	Grape vines				
13.	Hay-land, of which:	ha			
13.1	Managed (used) hay-land	ha			
14.	Pastures, of which:	ha			
14.1	Managed (used) pastures	ha			
15.	Separation and wind protection forest area	ha			
16.	Burned grassland area	ha			
17.	Wetlands, of which	ha			
17.1	Peat soils used for turf extraction	ha			
18.	The volume of extracted turf	tonnes			
19.	The area of artificial reservoirs	ha			
20.	Artificial ponds area used for fish farming (soil-based artificial ponds)	ha			
1.	Total forest land	ha			
2.	Wood resources in forest covered areas	m^3			

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
3.	Data on changes in forest covered areas	ha			
4.	The area of forest crops by tree species transferred to forest area	ha			
5.	Volumes of stored timber by fuelwood, construction wood and timber	m^3			
6.	Volumes and quantities of illegal logging recorded	m^3			
7.	Data on damage caused by recorded fires	ha, m^3			
1.	DOCf (fraction of degraded organic carbon) from Municipal Solid Waste (MSW)	Gg C/Gg			
2.	CH4 gas capture	Gg			
3.	Coefficient of MSW generation per capita in the capital	tonne/per capita/year			
4.	Coefficient of MSW generation per capita, waste proportion transferred to other cities and landfills	tonne/per capita/year			
1.	The total rural and urban population at the beginning of the year	mln.			
2.	For the calculation of methane emissions from industrial wastewater	kg, tonnes, liters			
3.	Annual protein intake per person	g/person/day			

No	Category name	Unit of Measurement	Data Provider	Data Source	
				Published	Obtained through Survey
4.	Official information on the current condition of wastewater treatment plants (planned)				