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

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
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 Azerbaijan
UNFCCC	United Nations Framework Convention on Climate Change

1. Introduction

The Paris Agreement establishes a new transparency regime, under which the countries will have to report progress on reducing GHG emissions and building climate resilience. The EU4Climate project works on strengthening the national systems for monitoring, reporting and verification, to assist the EaP countries to get on track with the Paris Agreement transparency requirements.

Monitoring, reporting and verification (MRV) 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.

The basis for an MRV system is GHG emissions reporting that provides information about the emission trends and is published in the 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 is binding to all parties to the UNFCCC that have to report their emissions, emissions timelines are comparable between countries and allow for a global overview of emissions. The reporting obligations for developed countries and those on the path of development are different, which will be described in the next chapter.

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

2. Paris Agreement Transparency Framework

2.1. The Paris Agreement

The Paris Agreement, which was signed by Azerbaijan 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 Azerbaijan in 2000. 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.

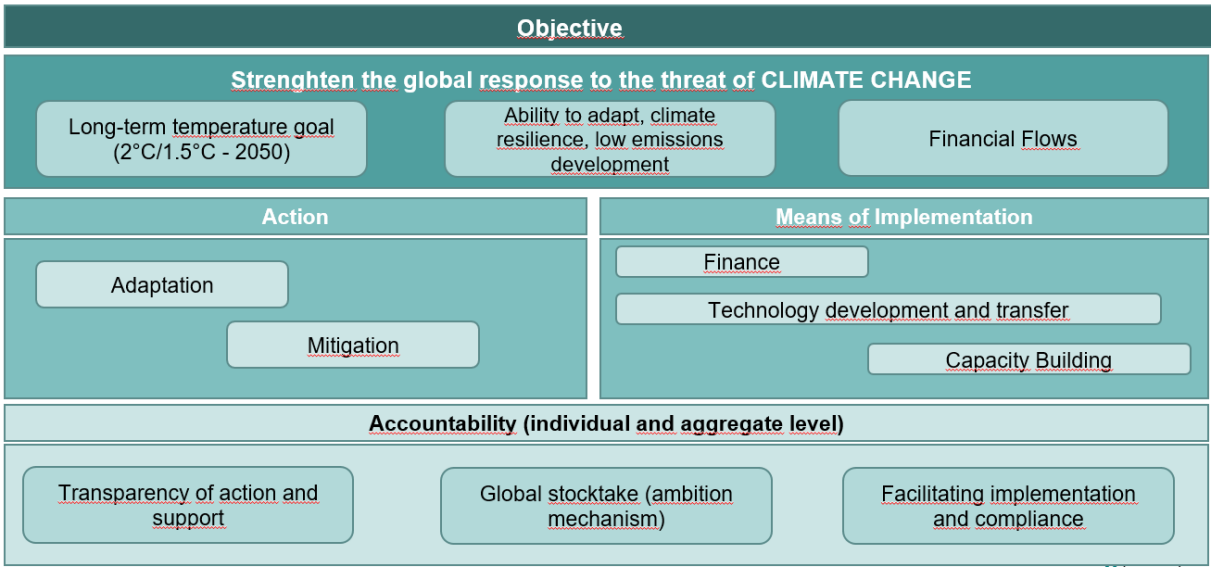

Figure 1: Paris Agreement: the bigger picture

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,

[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

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.

2.2. Reporting Obligations now and then

Under the current climate framework, the Kyoto Protocol, that was ratified by Azerbaijan in 2000, 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 Russion 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 Azerbaijan, 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 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. Azerbaijan submitted the first NC in 2000, the second in 2011 and the third in 2016.
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. Azerbaijan has so far submitted the first BUR in 2015, and the second in 2018.

[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

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. Azerbaijan underwent the first ICA cycle in 2016, information should be 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 (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.

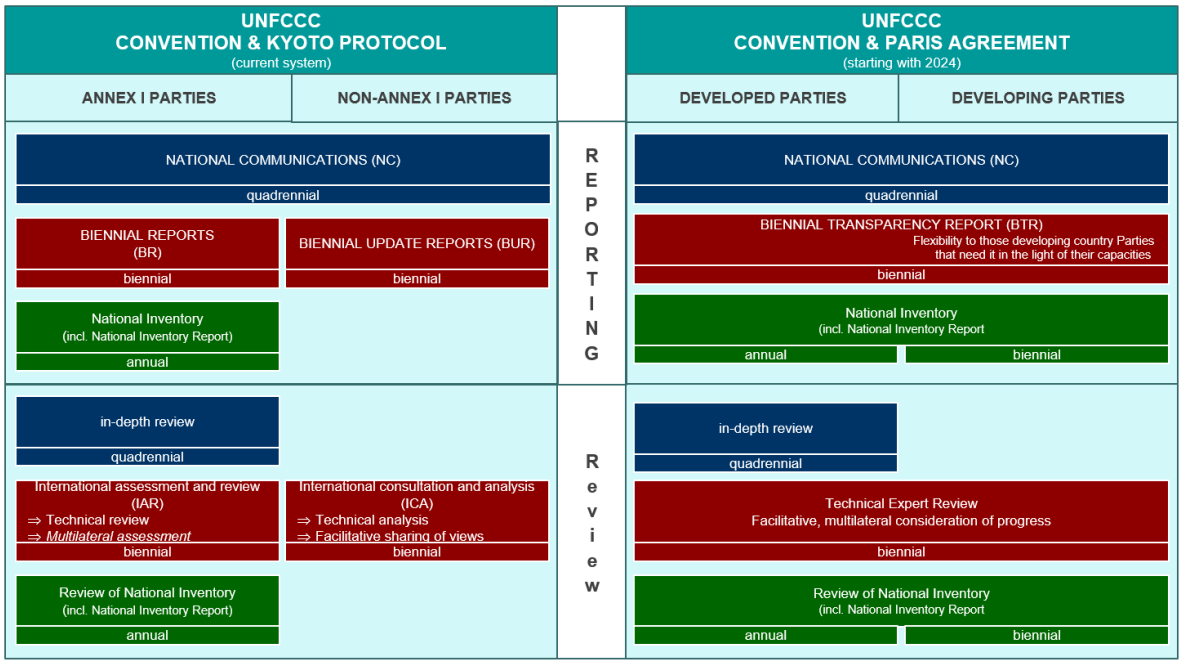

Figure 2: Reporting Requirements for developed and developing countries under the UNCCC Convention&Kyoto Protocol, and changes under the Paris Agreement, source: WRI (2017) Designing the Enhanced Transparency Framewrok, Part 2: Review under the Paris agreement, modified Source

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 chapter on Nis)
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

2.3. 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 anthropogenic emissions by sources and removals by sinks of greenhouse gases are laid out.

2.3.1. 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.[5]

[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] 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[6] and emissions are calculated using the IPCC reporting guidance.

2.3.2. 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)
(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.

2.3.3. 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.

3. Specific situation in Azerbaijan – The existing National System

The "Gap analysis of the existing legal framework in the Republic of Azerbaijan and development of a road map for approximation with the EU acquis related to climate action" by Svetlana Zhekova, as part of the EU4Climate project, provides an extensive overview of the existing reporting arrangements, abridged findings for which is presented here for easier reference.

[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

As part of its international commitments under UNFCCC, the Government of Azerbaijan (GoAZ) ensures regular reporting of climate change related trends and developments in the form of national communications and biennial update reports. With this respect, RAZ submitted its first, second and third National Communications (NC) in 2001, 2010 and 2016 respectively. In addition to the NCs, Azerbaijan has also presented its first and second Biennial Updated Reports (BUR) respectively in 2015 and in 2018. Currently, with the support of United Nations Development Programme (UNDP) and the Global Environment Facility (GEF), the country is developing its fourth National Communication.

Azerbaijan's Intended Nationally Determined Contribution (INDC) as a non-Annex I Party was presented to the UNFCCC on 29 September 2015, committing to a target of 35% reduction of GHG emissions by 2030, compared to the base year (1990), as its contribution to the global climate change efforts. Recent scientific studies show that current policies and mitigation measures are not enough to meet Azerbaijan's emissions reduction target to the Paris Agreement. Within the EU4Climate regional project the country is committed to update its NDC, in view of identifying realistic implementation strategy for GHG emissions reduction and prioritizing adaptation measures to strengthen climate change resilience of the country's economy.

Development and sharing of GHG emission data in Azerbaijan, 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.
- ✓ Law of the Republic of Azerbaijan No. 109-IIG of March 27, 2001 About Protection of Atmospheric Air
- ✓ Decision № 17/12 of the State Statistical Committee (SSC) of Azerbaijan Republic on 28 of March, 2019 "Approval of the form of the annual official statistical report 2-TG (air) On Harmful Substances Released into Atmospheric Air and its reporting guidelines". Such reports should be provided on yearly basis by legal entities with stationary sources of air pollution, as well as by individuals engaged in entrepreneurial activities without establishing a legal entity. Part III of the form "On GHG emissions into the atmospheric air" should contain amount of CO2, CH4, N2O,SF6, hydrofluorocarbons (HFCs) and perfluorocarbons(PFCs) in unit of mass (in tonnes). All reports should be approved by MENR and then information added in online format of SSC.

It is acknowledged that as a non-Annex I Party to the UNFCCC Azerbaijan already has a national inventory system in place as the national inventory is prepared, coordinated and managed by the National Hydro-Meteorological Service (NHS), which is an institution under the Ministry of Ecology and Natural Resources. Two institutions, namely the Committee of Statistics and the Climate Change Centre (CCC), are the responsible institutions carrying out emissions calculations (for GHG as well as Air Pollutants).

Legal and contractual arrangements are in place to collect necessary data. However, there are some companies that lack data of good quality that can be used for the compilation of the inventory. There are also problems with the collection of data on HFCs and PFCs (alternatives to ozone depleting substances), and data on agriculture, specifically on methane emissions that are caused by livestock manure. Also, collection on LULUCF data has been described as challenging.

Data reporting in Azerbaijan are carried out on a national level, as well as on an organisational level (where inventory reports are included in the sustainability report of an organization, e.g. SOCAR, BP Azerbaijan), as well as on plant level. Plant level emissions inventories (2 TG air reports) provide information on air pollutants and main GHGs in units of mass on annual basis. Emissions estimated on

plant level are then collectively published in the statistical yearbook "Environment in Azerbaijan" in Tables 10.2. However, there is a lack of transparency when it comes to the methodology used for these emissions estimates, as there is a lack of relevant guidelines, especially on fugitive emissions from the oil and natural gas industry, and there is no reliable verification process.

Currently, there is a project-based approach to GHG inventories, and thus there is no reliable database or archiving of methods used in the CCC. Only tier 1 methodologies are being used at the moment, which is not in line with the good practice when it comes to key categories. Data used for the calculation is data that is publicly available from the State Statistical Committee. The QA/QC system is not yet in place in the CCC, which hinders transparent and accurate reporting of emissions, and does not help to increase trust between data providers (who will in most cases have to part with sensitive data) and inventory compilers. It also makes answering review questions impossible, as soon as there is a change in staff, as information will get lost, and therefore reasoning behind applied methodology etc. It is necessary to establish a viable and running QA/QC system, which will increase the quality of inventory compilation.

Personnel responsible for the inventory calculations for sectors IPPU and Energy have so far been informally appointed, but due to a restructuring in the NHS, not all roles are defined and certain. For past reports, the employees of the Ozone centre, with the support of independent experts, carried out inventory compilations.

4. Gap Analysis and potential way forward:

Although Azerbaijan prepares national inventories on a regular basis and the basic set-up for a national inventory system is already in place, there are a number of institutional, regulatory and capacity gaps that would need to be addressed enhance preparedness and improve the quality of reporting under the Paris Transparency Framework. These issues are described below, potential ways of addressing them are suggested in the roadmap that follows.

4.1. Monitoring of emissions

4.1.1. National System:

At the moment there is no fixed inventory team in Azerbaijan. The experts are informally appointed, and the inventory preparation follows a project-based approach. It is unclear, if and what trainings are necessary, or if sector experts are already experienced in inventory compilation. Also, it seems that there is no rigid QA/QC system in place yet.

Obligations of the various designated institutions for climate-related data reporting, collection, storage and exchange are not regulated by any legally binding instrument.

Because of the project-based approach to GHG inventories, there is no reliable database or archiving of methods used in the CCC. Only tier 1 methodologies are being used at the moment, which is not in line with the good practice when it comes to key categories.

A fixed inventory team with clearly defined roles would mean that:

- Experts could improve their skills and to help their peers in improving their part of the inventory, and possibly to have two sector experts working on it.

- Data collection and surveillance of data quality is only possible, if inventory processes are understood. The more knowledge an expert has of inventory compilation and sectoral needs, the more it is possible for them to look for other data sources that might be more feasible, thus increasing the quality of the inventory and accuracy of inventory preparation.
- There would be room for improvement of the inventory between cycles, by looking for additional data sources, in order to apply higher tier methodologies for all sectors
- Stability in the team leaves room for additional trainings for team members, which will also improve answers to the review team.
- Synergies with the team reporting under the LRTAP convention could be used, which could benefit both inventories, as data very often comes from the same data providers. This would lead to more streamlined efforts, which are also beneficial in building trust and support with data providers.
- The overall quality of the inventory would be improved, as each party knows what to do.

It is paramount that the team is supported by enabling legislation obligating other government agencies to share information and provide the data necessary for the preparation of the inventories. Such legislation or regulations should include inclusion of reporting obligations in appropriate framework laws as well as enabling executive decisions setting up the necessary procedures and addressing issues such response timelines and confidentiality concerns.

A legal/formal mandate is needed to assign specific roles to each appointed institution and to facilitate the various stages of the process. A legal/formal mandate can also help the coordinating body to mobilize necessary expertise, in particular through appointment of the focal points among the stakeholders concerned.

4.1.2. Data collection:

No legal or contractual arrangements have been reported for data collection in the framework of the Paris Agreement Transparency Framework. Problems with data collection have been identified in IPPU sector (HFCs and PFCs), agriculture, specifically on methane emissions that are caused by livestock manure, and LULUCF.

A legal mandate for the inventory team or the entity would allow the inventory team to access data more easily. Data collected and published by the Statistical Committee often differs to the needs of inventory compilers. Information on technologies used is usually necessary to report using a higher tier methodology, which is necessary for so called key categories (the biggest polluters). Often, measured data is available in different facilities and this information should also always be accessible to the inventory team.

The data that is currently reported as part of air pollutant reporting obligations lacks transparency when it comes to the methodologies used for these emissions estimates, as there is a lack of relevant guidelines, especially on fugitive emissions from the oil and natural gas industry, and there is no reliable verification process.

A good understanding with official data providers is also important as often publication of statistical data can be used by the inventory team. This could be achieved by means of a Memorandum of Understanding, or a similar document.

4.2. Reporting:

Report compilation, other than that of the NIR, which should be provided by the inventory team, is an important part of the requirements of the obligations under the UNFCCC. Roles need to be defined in advance, the tasks should clearly be assigned to individual experts that also get the chance to participate in trainings for report compilation. Reports undergo a review, which means that improvement of reports should also be part of the verification process.

4.3. Verification:

Verification in the context of the national GHG inventories strongly depends on the existence of a QA/QC system. The QA/QC procedures in Azerbaijan have not yet been established formally, although information arrangements to ensure quality of the submissions are in place.

Lack of the QA/QC system in place in the CCC currently hinders transparent and accurate reporting of emissions and does not help to increase trust between data providers (who will in most cases have to part with sensitive data) and inventory compilers. It also makes answering review questions impossible, because as soon as there is a change in staff, as information will get lost, and therefore reasoning behind applied methodology etc. It is necessary to establish a viable and running QA/QC system, which will increase the quality of inventory compilation.

This QA/QC system constitutes the backbone of a national system, which means that several issues are being taken care of:

1. **Safe data storage and handling:** in order to calculate a robust inventory, sensitive data is often necessary to describe production processes, and the amount of product produced, as well as other information. Often, data providers do not feel at ease to share such data with inventory compilers. IPCC guidelines suggest possible ways of reporting sensitive data. However, in order to be able to work with sensitive data, 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 calculation sheets, need to be stored in an orderly manner, with calculation sheets 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 emission factors (EFs) used, the rational behind applying a particular EF, or information on the emission data used. Anything that could be of use for future years, even thoughts on amelioration of calculation methodologies etc. should be written down and stored centrally. This documentation can also help to facilitate answering questions during a review.
3. **Checks and improvements:** there should always be a 4-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 to avoid mistakes during transferral of data.
5. **Organisation of the team:** the team for inventory compilation should be structured, roles should be clear, and also communication to the data providers should be coordinated 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. 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 to make sure that information in the chapters is correct and concise. As reports are the basis for reviews, this approach ensures that minimum information gets lost, which will then make future reviews easier.

5. Roadmap for Azerbaijan

In order to allow for continuity and an increasing quality of inventory and reports, a strong, competent and sustainable National System is required, with defined roles, and experts that are able to provide the necessary reporting on a high standard. A national MRV roadmap is proposed in this document to build such National System.

A strong National System with defined roles, functioning data flow, good quality data, a strong QA/QC system is paramount for developing national inventories in line with the TACCC principles. A well-established National System will assure long lasting quality of national GHG reporting, 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. The team should be trained in inventory compilations and understand the importance of TACCC. It is also recommended to plan to make auxiliary capacities available for QA/QC, such as a deputy for each sector. A thorough QA/QC system is necessary as a foundation for continuous improvement and ensuring that the system survives changes in staff.

The team of the CCC should be trained in data collection. This could be done in a workshop with experts from the Centre of Statistics, as well as company representatives, and possibly university professors and other scientists who could have information on livestock and spatial data of Azerbaijan. They also need to understand the concepts of inventory compilation, and what data is necessary. If a good understanding is established, this could enhance the quality of available data.

This team could only concentrate on GHG emissions reporting, in which case, emissions of air pollutants should be estimated by a different team, but synergies should be used[8]. As approaches are

[8] Synergies between the air pollution database and GHG emissions reporting should be used wherever possible, which would allow for combined efforts in those areas where it is possible (e.g. industrial processes, the private

quite similar, both calculations could be performed by one team, or two teams working closely with each other.

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 should be mandated by law, which should provide the team with the necessary power to obtain data, even if it is confidential. This should also include the time between review cycles that should be used for improvements based on review recommendations or on achieving a higher tier methodology for key categories.
2. *Nomination of experts:* Nominations of sectoral experts, their roles and also their deputies. Information on the necessary trainings should also be available. Nomination of the head of the QA/QC system, and other roles should be defined.
3. *Establishment of a QA/QC system:* this should be written down and accessible, templates of forms and calculation sheets should be established, as well as of necessary documentation.
4. *Training of experts:* depending on the experience of experts involved, modular trainings can be provided. Depending on the experience, experts could start at a beginners level, and later join trainings for more advanced levels. This should include general aspects of inventory and report compilation, but also the QA/QC system.
5. *Regulatory basis for access to data for inventory compilers:* data collection is at the heart of each inventory. Whilst measured data on emissions (from e.g. production sites) are the best available, it is not always possible for inventory compilers to get access to data sets. Thus regulation should give inventory compilers access to data sets that might be obtained from different reporting obligations (e.g. pollution permits), or to include GHG emissions to the mandatory data for sites having to report under these obligations. In cases where no measured data is available, accurate activity data is necessary, as well as information on technical processes and possible abatement methods in place, in order to be able to apply a higher tier methodology. This information very often includes sensitive data, thus data providers often do not want to part from it. A certain level of trust can be built by providing information on a good QA/QC system, but regulatory provisions for inventory compilers can facilitate data transfer.

Above all, there needs to be detailed regulatory framework that

1) appoints a national entity responsible for the compilation of the inventories and submission of reports under the Paris Agreement's Enhanced Transparency Framework,
2) establishes procedures and principles for their preparation, and
3) assigns clear responsibilities and obligations among the government agencies as well as from the private sector to facilitate preparation of such reports through provision of data and information.

6. Capacity-building activities proposed in the support of the roadmap

sector, as it will allow cross checking on technologies applied, as well as the forestry and land use monitoring system). In any case, the air pollution team should be included in the QA/QC system.

The following workshops are based on the needs defined by experts of Azerbaijan, and address the problems mentioned above. They are a suggestion only, some are building upon another, and some are stand alone. The actual content of the workshops can change according to additional information that becomes available throughout the process.

1. National Consultation Event

The aim of this workshop should be a list of topics for trainings for establishing an MRV system in Azerbaijan with representatives of the CCC, the NHS, and stakeholder involved in the Road Map for relevant approximation with the EU acquis, in order to avoid double work, as well as redundancies and gaps.

This workshop should focus on the

- modalities, procedures and guidelines of the enhanced transparency framework (ETF) under the Paris Agreement (Decision 1/CP.24 Decision 3/CMA.1), and
- EU Governance of the Energy Union and Climate Action 1999/2018[9].
- Institutional setup and competences of different institutions.
- Convention on Long-range Transboundary Air Pollution (LRTAP) and its protocols
- National Emissions Ceilings (NEC) Directive (2016/2284/EU)[10]
- IED directive for measuring GHG emissions. [11]
- Review of the voluntary quality assessment with UNFCCC, and the suggested inventory improvement plan.
- Methodology used and data available should be reviewed.

2. Workshop topic – methods for GHG estimation

Based on the findings of workshop 1, preparation of targeted trainings with inventory experts. After those workshops, inventory compilers should be 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

3. Workshop on data availability (with members of the statistical committee, the biggest industrial plants, and inventory compilers): the theory behind emissions estimations should be explained, the use of confidential data and reporting of such data, and presentation of a database and the QA/QC system established. (this workshop will have to take place after workshops of the next chapter, QA/QC).
   - Needs of activity data provider of each sector

[9] REGULATION (EU) 2018/1999 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2018 on the Governance of the Energy Union and Climate Action
https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=CELEX%3A32018R1999

[10] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2016.344.01.0001.01.ENG&toc=OJ:L:2016:344:TOC

[11] Connection tot he UNECE LRTAP reporting on air pollutants should always be connected to those trainings, as estimation of emissions of air pollutants goes hand in hand with estimation of GHG

- Elaboration of questionnaires with data providers - to be able to discuss the importance of data quality and availability of data
- Using plant specific data, or development or improvement of questionnaires
- Preparation of country specific emission factors and parameters
- Calculation of uncertainties of methods – especially when it comes to plant specific data, this will have to be done in close cooperation with data providers.

4. Workshop topic - Estimation of uncertainties and key categories
   - Estimation of uncertainties associated with activity data and emissions factors with all activity data provider
   - Key Category analysis

5. Elements of a QA/QC and verification System:

With the responsible staff at the NHS and the CCC. The quality management system should cover all processes concerning
- 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 experts from the Climate Change Center, definition of necessary tools and internal auditing processes. This will have to go hand in hand with preconceived definitions of roles and responsibilities. This also includes a training manual for new staff and handover procedures in case of experts leaving.

(2) 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: AZERBAIJAN - 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 national inventory is prepared, coordinated and managed by the National Hydrometeorological Service (NHS) under the Ministry of Ecology and Natural Resources.
Is the single national entity also responsible for QA/QC and reporting?	Newly created Center on "Climate Change and Scientific Research" (CCSR) under the National Hydrometeorological Service (NHS) is responsible for QA & QC, documentation and archiving works
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.	Personnel responsible for Inventory on IPPU and Energy sectors have been informally appointed. However, as the restructuring is underway within the NHS, it is at the moment challenging to define the roles and responsiblities of the entire national government team responsible for the Inventory.
~ Does an inventory compilation team exist? Or are new consultants contracted for each reporting year? Please describe the set-up, whichever is the case.	Due to current restructuring process within NHS, it is difficult to address this question now. The national inventory processes in previous years were carried out by the employees of the Ozone center with the support of independent experts. From now on, all the inventory-related works will be coordinated and carried out by the respective employees of the newly created center on "Climate Change and Scientific Research" (CCSR). Additionally, independent experts may be hired to assist the center's assigned employees with the specific tasks during the inventory process.
~ Are emission inventories for GHG estimated within the same team or project as the emission inventory for air pollutant?	The entire process of GHG inventory preparation and reporting will be managed by the newly created center of (CCSR) under the NHS.
~ 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?	Unfortunately, this is not defined for now yet. The persons who are in charge of GHG inventory process will be identified and formalized once the restructuring within the NHS is finalized. The process of restructuring is currently underway.

~ 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.	Legal and contractual arrangements are in place to collect necessary data. In general, there are no major challenges with the data collection. The problem lies specifically with some enterprises which do not have necessary data to share with us. In Energy and IPPU sectors, the situation with the data collection is well managed. The challenges occur during the inventory process on alternatives to ozone depleting substances. It is difficult to collect data on agriculture, specifically on methane emissions which are caused by livestock manure. Collection of data on Land Use and waste management are quite challenging and it is very difficult to receive reliable data.
~ 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?	The communication between the State Statistics Committee and NHS which is the leading organization responsible for an inventory process has been established well. The data in State Statistics Committee are accessible.
~ Which institution/department is responsible for the preparation of your BUR, NC (and NIR, if stand alone report).	The CCSR center under the NHS is responsible for the preparation of the inventory-related reports.
~ 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.	Unfortunately, there is no such plan yet. The transition into the Enhanced Transparency Framework along with other priority plans/activities will be discussed and solved as soon as the restructuring process finalizes.
~ 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?	The "Climate Change and Scientific Research" (CCSR) center is under the direct management of the NHS (National Hydrometeorological Service) and this service in its turn reports directly to the Ministry of Ecology and Natural Resources of Azerbaijan Republic.
~ What is, in your view, the most crucial improvements needed to establish a functioning national inventory system?	The most important factors for the improvement of the national inventory system is to enhance the personnel capacity and data base.

ELEMENTS OF A QA/QC AND VERIFICATION SYSTEM	
Is a person responsible for coordinating QA/QC activities designated?	At present, Ms. Jamila Mammadova fulfils the duties of a person responsible for QA/QC activities. However, her candidacy hasn't been formalized yet. She is an employee of the CCSR center under NHS and tentatively responsible for coordinating all QA/QC activities.
Is there a QA/QC plan?	The plan is under preparation. It is difficult to indicate the exact date of plan's finalization.
Are general quality control procedures that apply to all inventory categories and the national total estimates in place?	General inventory QC checks included routine check of the integrity, correctness and completeness of the data, as well as identification of errors. This was done by the sectoral experts and data manager. [NIR2014 p6]
Are category specific quality control procedures in place and documented (performed by the inventory experts during inventory preparation)?	Category-specific QC checks including technical reviews of the source categories, activity data, emission factors and methods were applied on a case-by-case basis focusing on key categories and on categories where significant methodological and data revision have taken place. This was done by the sectoral experts and task lead expert. QC checks included internal review of the draft NIR by the MNP and by the working group of the Inter-agency Coordinating Council. The working group of the Inter-agency Coordinating Council comprising from representatives of the state agencies, ministries as well as climate change experts and consultants conducts technical analysis of the draft NIR (national trend tables) as contribution to the QC procedure. [NIR2014 p6]
Are quality assurance and review procedures, e.g. a peer review prior submission, in place and documented?	The following step was handover of the draft NIR to the stakeholder ministries and organizations. Received comments and recommendations were taken into account. The QA review was performed after the implementation of QC procedures concerning the finalized inventory. The draft NIR was submitted to and verified by the Inter-agency Coordinating Council for ensuring QA procedure followed by the final step of handover to the UNFCCC and inclusion the summary in the BUR [NIR2014 p6]

Are verification activities planned/undertaken and documented?	There are some verification activities planned, however, in line with restructuring, all these activities, including planning and documentation should be improved and/or modified.
Is there a procedure for official approvement before submission?	? Internal review by the GHG expert team followed by the review of the task leader expert ? Review of the draft NIR by the MNP and the working group of the Inter-agency Coordinating Council ? Circulation of the draft NIR among the stakeholder ministries and organizations for review ? Review and verification of the draft NIR by the Inter-agency Coordinating Council; [NIR 2014, p2]
Are reporting, documentation and archiving procedures defined?	The reporting, documentation and archiving procedures are defined, however needs further improvement and/or modification.
Is a list of terms, definitions and abbreviations available?	The inventory-related terms, definitions and abbreviations are available, however, there is no concrete document which can include all of them into one document. Instead, all of these terms, definitions and abbreviations are included into the inventory or other similar reports and should be complied and developed under one and unique list or simple program can be developed to search them very easily.
Is the QA/QC system following or in line with international standards or comparable requirements?	Yes. QA/QC is in line with the international standards. This system is mostly developed and based on IPCCC methodology.
Is the QA/QC system audited in any way, and if yes, following which procedures?	For now, there is no specific audit system in place on QA/QC system. According to the recent undergoing changes within the NHS, there are plans to develop a proper QA/QC auditing and documentation system.
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?	All the inventory estimations, sources, methods and calculations were documented in the reports. However, there is no guarantee when a new expert is hired, he or she will easily understand the methods used, data sources and other related information available. In the meantime, peers are capable of helping of assisting and guiding a newly hired or involved expert to understand the whole methodology, data sources and other relevant information.
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?	No significant feedback was received and recorded by the NHS on the national GHG inventory up until now.

Do these issues - if justified - trigger improvements of the GHG inventory? Who has the responsibility to define, implement and document the measures?	As there was no feedback received on GHG inventory, no significant improvements were reported. The CCSR center is in charge of defining, implementing and documenting all the measures.
Please provide information on any potential improvement that you think are especially important.	At present, the most important potential improvement required is the establishment of an MRV system to increase the quality of the inventory process.
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?	Generally, we have a lack of experts, especially for assessing mitigation measures. [Minutes EU4Climate WS 2020]
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?	At the moment, it is dfficult to address this question because of the current restructuring proccess.
Are duties, responsibilities and authorizes of the different roles defined? Can you provide a responsibility matrix for the different steps in inventory preparation?	At the moment, it is dfficult to address this question because of the current restructuring proccess.
Has the personnel involved in inventory preparation adequate education, training, skills and experience and where is this documented (e.g. personal file, CV)?	At the moment, it is dfficult to address this question because of the current restructuring proccess.
Is a fallback option defined in the case of sudden and unexpected absence of personnel, e.g. such as designation of deputies?	There is no specific fallback option yet because of the ongoing restructuring process. However, as a quick solution, an independent expert or a person under the service agreement can be temporarily contracted.
How is it ensured that the personnel / inventory team is informed about the latest updates / versions of the guidelines, reporting requirements etc.?	Brief training sessions and seminars are conducted by the international or local consultants to enhance the capacity and knowledge of the personnel. For the guidance on the inventory process and reporting requirements, IPCCC 2006 is currently used.

Is it ensured that the personnelresponsible for inventory preparation, QA/QC and reporting is free from any commercial, financial and other pressures that might influence their technical judgment?	There is no such pressure observed as the inventory team are not in direct communciation with the enterprises submitting the inventory related data.
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?	All the technical resources have been supplied and maintained in order to ensure the planning, preparation, and management of the emission inventory are conducted in a timely and professional manner.
What kind of data integrity and security measures are taken by the National Inventory Compiler and each member of the inventory team?	Contracts of the hired personnel include sections on maintaining data integrity and security.
Is there an annual process for resource planning, e.g. in the process of an annual management review?	There may be a resource planning once a year, however, it again depends on the need and management's requirements.
Subcontracting	
Are parts of the inventory contracted out/prepared by someone not within the inventory team?	Additional personnel are outsourced by the NHS to help with the inventory process. In addition, the experts hired by the projects implemented by the international agencies assist the inventory team with the inventory process.
If yes, are quality procedures describing the process for contracting out studies in place?	Due to restructuring, all the procedures and personnel hiring processes are expected to be updated and modified.
If yes, how is ensured that the quality objectives and the requirements for the preparation of emission inventories are followed by the subcontractor?	Subcontractors are requested to develop monthly and yearly reports to describe the overall progress made on the inventory results and/or personal contributions.
If yes, is there a procedure regarding the handling with confidential data?	There are no specific instructions on handling confidential data, however, contracts include all the terms and conditions, including section with treating confidential information.
If yes, is a procedure defined regarding the handling of results and reports (ownership/publication)?	Please, refer to the response above.

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?		Please see below the contacts of the personnel responsible for the inventory process.
Head of Inventory Team	jeyhun.eco@gmail.com	**Mr. Jeyhun Hasanov**
QA/QC responsible	jamila.ozone@gmail.com	**Ms. Jamila Mammadova**
Responsible for reporting	dilber-zamanli@mail.ru	**Ms. Dilbar Shahpalangova**