Annex 1

Resolution No. 10-A of 27 February 2020
of the State Council on Statistics
of the Republic of Armenia

Armenia: Road Map for the Development of Climate Change-related Statistics

Yerevan
2020

Preface

This road map for the development of climate change-related statistics in the Republic of Armenia has been developed with the support of the UNECE Statistical Division for which we express our gratitude. This is the first study conducted in Armenia where is an attempt to assess the current status of climate change-related national statistical system, the priorities and actions for the development of such system.
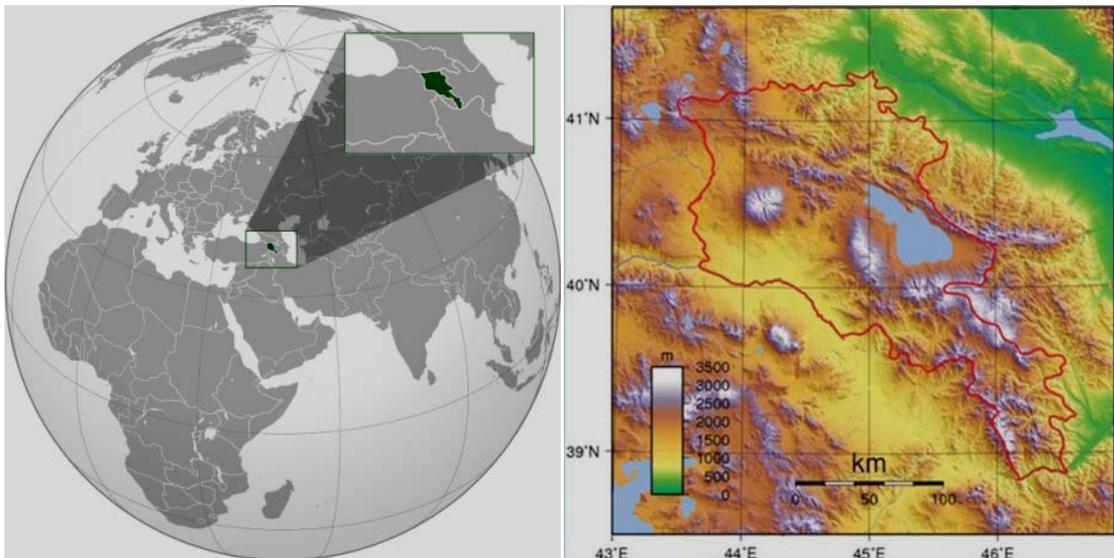
Abbreviations

CC	Climate Change
CES	Conference of European Statisticians (of the UNECE)
EU	European Union
GIS	Geographic information system
GEF	Global Environment Facility
GHG	Greenhouse gases
GDP	Gross domestic product
IPPU	Industrial processes and product use
AFOLU	Agriculture, Forestry and other Land Use
IPCC	Intergovernmental Panel on Climate Change
IBNPM	Inspection Body for Nature Protection and Mining
MoE	Ministry of Economy
ME	Ministry of Environment
MESCS	Ministry of Education, Science, Culture and Sport
NMVOC	Non-methane volatile organic compounds
PRECIS	Providing Regional Climates for Impacts Studies (Regional climate model of the United Kingdom Meteorological Office)
RA	Republic of Armenia
SEEA	System of Environmental-Economic Accounting
ARMSTAT	Statistical Committee
SCS	State Council on Statistics
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNDP	United Nations Development Program
FCCC	Framework Convention on Climate Change
NSO	National Statistical Office
MTAI	Ministry of Territorial Administration and Infrastructures
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
NO_x	Nitrogen oxides
N_2O	Nitrous oxide
SO_2	Sulphur dioxide

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1. Introduction

The Republic of Armenia is a landlocked country with a developing economy. Due to its relatively small economy, the country's contribution to the global climate change is negligible.

As a non–Annex I Party to UNFCCC the Republic of Armenia has no quantitative obligations to reduce its greenhouse gas emissions, however country has stated its position to limit GHG emissions in the Intended National Determined Contributions of Armenia under Paris Agreement (ratification of the Paris Agreement was done by National Assembly on February 8, 2017).[1]

As a Party to the UNFCCC Armenia has submitted its climate change related information including GHG Inventories starting from 1998, with First National Communication.

However only recently the Statistical Committee has started to include the data on Energy balance and GHG Inventory data in its publications. The main purpose of this first road map is to evaluate the status of climate change-related statistics in Armenia and its transparent reporting as part of regular statistical data and to define its further development. The road map has been developed following the methodological support of experts from the UNECE Statistical Division.

The roadmap has been developed according to the following scheme:
- identification of priority actions,
- definition of sectoral activities,
- identification of ways to improve administrative registers,
- development and implementation of tools and mechanisms for actions,
- monitoring of implementation of works, evaluation of results,
- ensuring information quality, transparency, accessibility and continuous flow.

The road map was developed by national expert group led by Mr. Yurik Poghosyan[2].

The working group[3] expresses its gratitude to Mr. Rob Smith of the UNECE Steering Group on Climate Change-related Statistics for his professional consultation and practical assistance during the implementation of the work.

The working group was able to identify the uncertainties and gaps in the statistical domain and offer relevant ways of addressing them. The more detailed road maps for different groups of stakeholders will be possible to develop if sufficient support and opportunities will emerge.

In the future versions of the Road Map the priorities and actions for climate change-related statistics will be revisited and detailed.

The source of information for the development of the road map was the Statistical Committee of the Republic of Armenia, unless otherwise noted.

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[1] See http://www.mnp.am/en/pages/148 and http://www.nature-ic.am/en/publication/GHG-National-Inventory-Report-of-the-Republic-of-Armenia-for-2012/7281

[2] During the implementation of this work Mr. Poghosyan was a member of the State Council on Statistics of RA, currently he acts as National Assistant for Armenia, European Neighbourhood Instrument Shared Environmental Information System II East Project (ENI-SEIS), European Environment Agency.

[3] Mr. Hamlet Melkonyan of the Armenian State Hydrometeorology and Environmental Monitoring Agency (ArmStateHydromet) was responsible for preparation of Chapter 2. Mr. Martiros Tsarukyan, formerly responsible for the Armenian national GHG emissions inventory, compiled the history of emissions inventory management in Armenia in Chapter 3. Mrs. Anahit Safyan and Ms. Ani Hambardzumyan from the Statistical Committee of RA participated in the development of actions for Chapter 4.

1.1 Armenia overview

The Republic of Armenia is a small landlocked country with a developing economy located in the eastern part of the Armenian Highland of Asia. It is a mountainous country with an average elevation of 1 800 meters above sea level; the highest point is 4 090 meters (Mount Aragats) and the lowest is 375 meters (Debed River Valley). The country's area is 29 743 square kilometers, over 90% of which is   1 000 m or more above sea level.

Armenia is a country of high seismic activity, earthquakes of different magnitudes were registered. The last major devastating earthquake, in 1988, with magnitude about 10 by the Richter scale caused major distraction to infrastructures and economy and cause death of more than 25 000 people. 222 cases were registered in 2011, 82 in 2015 and 47 in 2018.

The number of weather related extreme events as wildfires, hailstorms, frosts, strong winds and flush floods has increased in recent years.

The climate of Armenia varies from subtropical to high altitude. The average annual air temperature is 5.5℃.

Armenia is rich in non-energy minerals, including construction, decorative and semi-precious stones, non-ferrous, precious and rare metal reserves. The country has no significant reserves of natural energy carriers and relies on imported fuels from Russia (more than 84%) and Iran to meet its needs.

According to the national land balance in 2018, agricultural land makes up 68.7% of the country's total area; forested areas make up about 10% and protected natural areas account for more than 11%.

Armenia's average multi-year renewable water resources amount around 7 billion m³. Groundwater reserves are around 4 billion m³. For 2018, renewable water resource amounted to 6 571 million m³ and water abstraction amounted to 2 715 million m³ (1 523 million m³ from surface sources and another 1 192 million m³ from groundwater sources), water resources exploitation index makes 41.3%.

The largest lake in Armenia is Lake Sevan, which is one of the largest high mountain freshwater lakes in the region and the world. Historically, the lake had an average water level of 1 916 m above sea level, a volume of 55.8 billion m³, a water surface area of 1416 km² and a maximum depth of 99 m. To meet the   permanent increasing demands of the country's electricity (in particular the demands of chemical and non-ferrous metallurgy) since the 1930s in the result of the exploitation of the Sevan-Hrazdan hydroelectric cascade, as well as the non-sustainable use decline of Lake Sevan water for the irrigation of Ararat Valley its level has decreased by more than 19 meters from its historic level, causing a crisis for the Lake's ecosystem, in particular, the danger of eutrophication.

Since the 1980s, as a result of measures taken to improve the situation (transfer of Arpa River water to Lake Sevan by Arpa-Sevan Water tonnel, strict regulation of Lake water releases) at the end of 2018, the lake's average water level was increased and reached 1 900.4 m above sea level, its surface area was 1 277.5 km², its volume was 38.0 billion m³ and its maximum depth was 83.5 m. Further improvement of the lake is among the country's priorities.

In 2018, Armenia's permanent population was about 3 million, two thirds of which were urban residents. The largest city is the capital, Yerevan, where more than a third of the country's population and 57.0% of its urban residents live. The natural growth rate of the population was 3.7 per 1 000 people

and is trending downward over time. Population density in the plains of the country (areas up to 1 000 m in elevation) is more than 680 people per square kilometer, compared to 23 people per square km in mountainous areas. The literacy level of the population is 99.8%. One third of citizens 25 years and older has a medium to higher professional education.

The total labour force is 1.14 million and average annual employment is 903.3 thousand people, leaving 237 thousand people unemployed, or 20.8% of the labour force. The poverty rate is about 26%.

In 2018, the trade and services sectors of the economy accounted for 50.7% of GDP. The manufacturing and energy share in GDP is 18.4%; agriculture, forestry, fishing – 13.7%; construction – 6.6%; taxes on production less subsidies – 10.6%.

In 2016, energy intensity was about 310 kg of oil equivalent per US 1 000 of GDP (in constant prices of 2011). $CO_{2eqv.}$ emissions amounted to 123kg per US$1 000 of GDP.

The share of households with primary dependency on clean fuel technology was 57.1%.

The main sources of energy in Armenia are totally imported natural gas and liquid fuel for motorized transport. According to the national GHG emissions inventory, in 2016, 61% of primary energy use and 84.2% of fossil fuel use and about 83% of energy-related CO_2 emissions came from natural gas. This is explained by the high level of gasification of the republic (95%) and large-scale use of natural gas for heating and other household purposes. The largest energy consumers are households (38%), motor transport (29%), trade and services (17%), industry (14%). Most automobiles use natural gas as a motor fuel.

The electricity production structure in 2016 was as follows: 7 776.9 million kilowatt-hours of electricity were generated, of which 43.4% was generated at natural gas-powered thermal plants, 26.7% in nuclear power plant, 29.8% in hydropower plants and 0.1% from other renewable sources.

2. Climate change overview of Armenia

Armenia is a mountainous country, with altitudes ranging from 375 to 4 090 m above sea level. There are 6 climatic zones in the country: dry subtropics, semi-desert, steppe, forest, alpine and cold high mountainous.

The average multi-year temperature in Armenia is 5.5℃. The lowest temperature on record is -42℃ (1961) and the highest is +43.7℃ (2011). In high mountainous regions, the average temperature in June and August is 10℃, and 24-26℃ in the plains. The average air temperature for January, ranges from -13℃ to +1℃ depending on the altitude. January is the coldest month of the winter, the average temperature is -6.7℃. Winter is moderate in the northeastern and southeastern regions of Armenia and cold in the north-western region.

The climate in Armenia is relatively dry, with annual average precipitation of 592 mm on average across the country. Maximum annual precipitation of 800 to 1 100 mm is observed in the wet high mountainous areas. April and May are the months of greatest precipitation. In summer, precipitation in the plains is low (32 to 36 mm).

Annual average wind speeds vary across the country from 1.0 m/sec to 8.0 m/sec; in some regions, wind speeds can reach 20 m/sec and more.

The Armenian highland is sunny, with the annual average duration of sunshine reaching 1 600 to 2 800 hours. The maximum number of cloudy days is during the winter (9-12 days). The solar irradiance in Armenia varies from 120 to 160 kcal/cm².

2.1 Trends in temperature and precipitation

Based on data from 47 meteorological stations operating over the period 1929-2016, deviations of ground temperature and sammuary precipitations for 1935-2016 were evaluated for different periods (Table 1). The results indicate that both temperature and precipitation deviations have increased in recent years. Average temperature for the period 1929-1996 was 0.4℃ above the normal, while for the period 1929-2016 it was 1.23℃ above the normal (5.5℃). In the case of precipitation, the average for the period 1935-1996 was 35 mm below the base period (592 mm), while for the period 1935-2016, it was 50 mm below the normal.

Table 1 – Temperature and precipitation deviations from the 1961-1990 base period in Armenia

| Period	Temperature ,℃	Period	Precipitations (mm)
1929-1996	+0.4	1935-1996	-35
1929-2007	+0.85	1935-2007	-41
1929-2012	+1.03	1935-2012	-59
1929-2016	+1.23	1935-2016	-50

Source: ArmStateHydromet

The data in Figure 1 shows that the deviation of the annual average temperature from the 1961-1990 was positive for every year since 1994 with the exception of 2011. The greatest deviation was in 2010 (2.7°C higher than the normal).

Figure 1 – Deviation of annual average temperature from the 1961-1990 normal, Armenia – 1929-2016
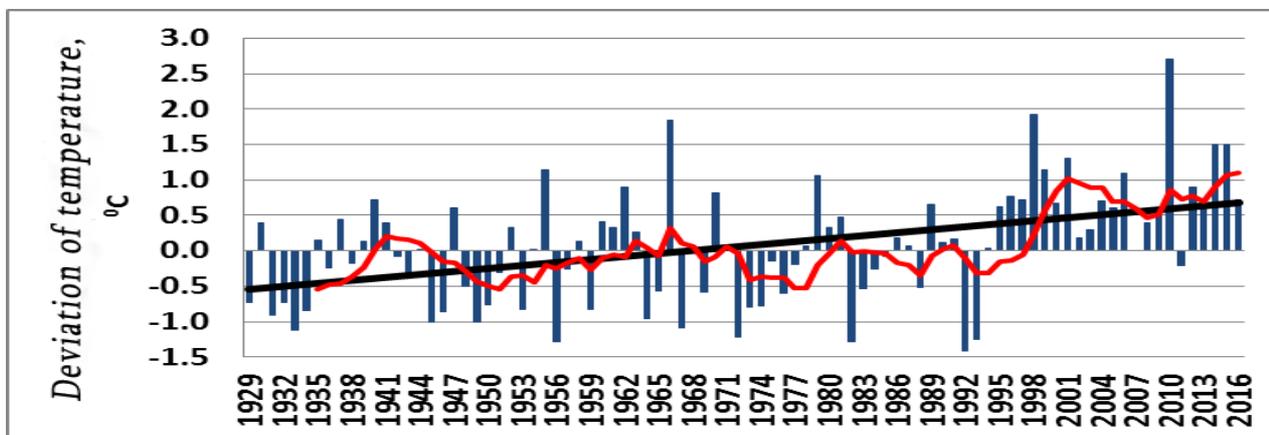
Temperature changes in different seasons have different trends. For example, over the period 1966-2016, the average summer temperature increased about 1.3°C, by the way in the last century extremely hot summers were observed in Armenia (Figure 2) over the past 20 years. Deviation in average winter temperatures have followed a different pattern, with a deviation of just 0.4°C from the normal. Very mild winters were observed in 1966 and 2011; the coldest winter was in 1972.

Figure 2 – Deviation of annual average precipitation from the 1961-1990 normal, Armenia – 1935-2016
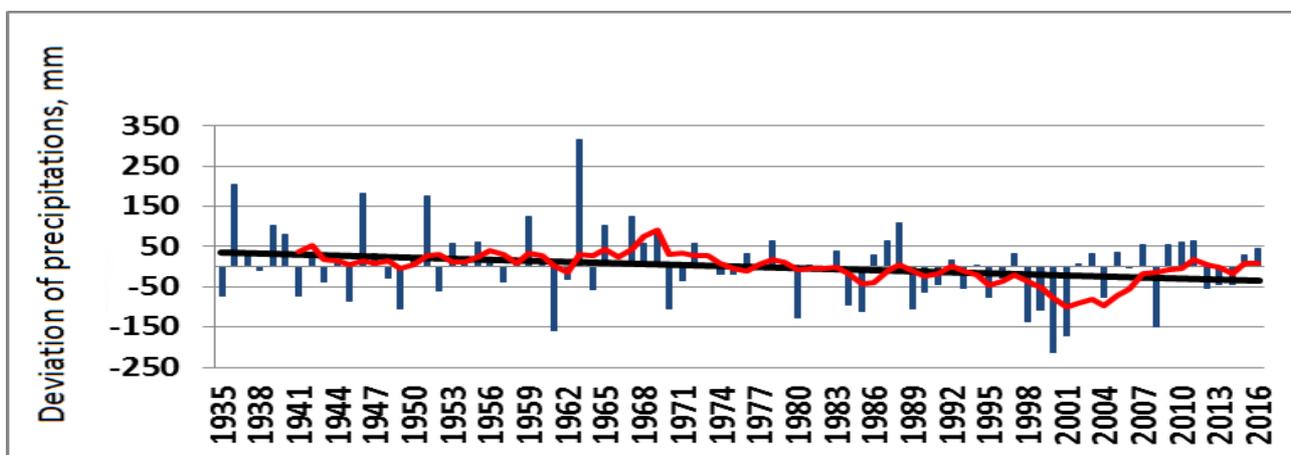
2.2 Trends in extreme weather events

Over the last decades, the frequency and intensity of natural disasters have increased dramatically both globally and in Armenia as a result of climate change.[1] In particular, extreme hydrometeorological events (hail, extreme cold, strong winds, heavy rainfall,roughts, heat waves) have

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[1] See Third National Climate Change Communictaion of Armenia under UNFCCC, 2015.

increased, which have exacerbated natural disasters such as landslides, avalanches, forest fires, the spread of infectious diseases and so on.

Over the period 1975-2016, the annual number of extreme weather events (Figure 3) in Armenia (hail 20 mm and greater in diameter; winds of 25 m/s and higher; frost during the crop growing season; and precipitation of 30 mm and greater during 1 hour) increased by about 40 cases per year, or 23.5%, compared to the 1975-2016 average (in average168 casesper year).

Figure 3. The annual number of extreme weather events in Armenia over the period 1975-2016

$$y = 0.9482x - 1724.2$$
$$R^2 = 0.1187$$
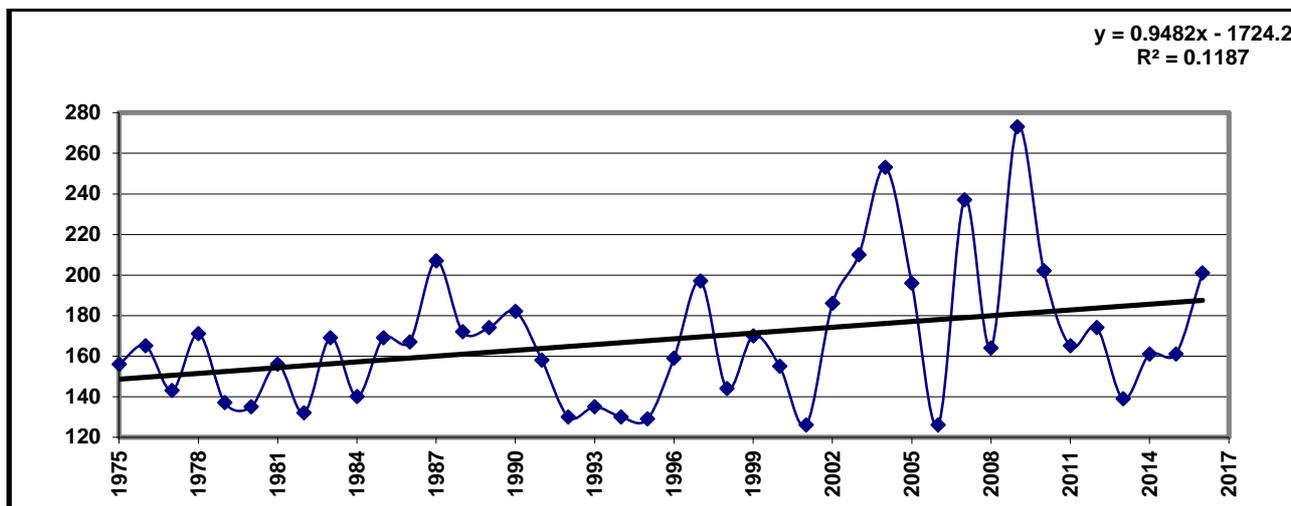
Droughts are one of the most common forms of extreme weather in Armenia, with the potential to cause considerable damage to the economy depending on their intensity, timing, duration and extent. Droughts are observed in plains of Armenia almost every year and in the foothills about half of the time. The annual number of intense and very intense droughts over the period 2000-2017 increased by 33, or 38%, compared with the 1975-2016 average (87) [2].

Heat waves are defined as a period of at least 5 consecutive days during which the daily maximum temperature exceeds the 1961-1990 normal by 5°C. According to estimates, in 1966-1990 5 cases of heat waves were observed in Yerevan, while during the 1991-2015 - 41 heat waves were observed.

2.3 Predicted changes in ecosystems

Assuming an increase in annual temperature of 1.5-2.0°C and a decrease in annual precipitation of 10%, the following changes in Armenia's ecosystems are expected:

- Soil moisture is expected to increase in spring and decline in summer relative to the 1961-1990 normal. Summertime soil moisture will decrease by 10-30% and the moisture deficit will increase by 25-50 mm, resulting in losses in the moisture content of plants by 15-20%. This is expected to have a significant impact on crop yields.
- Snow cover is expected to decrease by approximately 20-40% by 2071-2100 compared to the 1961-1990 normal.

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[2] See Third National Climate Change Communication of Armenia, 2015.

- By 2071-2100, surface water flow is expected to decrease by 15-20% compared with the 1961-1990 normal.
- Lake Sevan outflows are predicted to reduce and make 220-225 million m³ compared with 252 million m³ currently.

3. National Greenhouse Gas Inventories

Article 4 of the United Nations Framework Convention on Climate Change states that a primary obligation of the Parties to the convention is to "develop, periodically update, publish and make available to the Conference of the Parties national inventories of anthropogenic emissions and absorptions". This article obliges countries to develop national cadastres using comparable methodologies approved by the Conference of the Parties.

3.1. Inventory preparation – past and current processes

The first official GHG emissions inventory of the Republic of Armenia was developed during 1996-1998 within the context of the project UNDP-GEF "*Armenia – Country Study on Climate Change*", with 1990 as the reference year.[1] GHG emissions and absorptions were estimated for 1990 and 1994-1996 following the IPCC methodology (1995). The years 1991-1993 could not be included in the inventory because of data quality concerns during the country's transitional period and economic crisis.

In 2004, a UNDP-GEF Regional GHG Capacity Building Program was launched, within the framework of which efforts were made to improve Armenia's first national GHG inventory and to develop and reinforce technical and institutional capacities. As a result, the quality of the GHG inventory was increased, a group of trained experts was developed, the emission coefficients were adjusted and the methodology was revised. A group of trained experts and a national GHG inventory manual were also established.

To date, five national GHG inventories have been developed:
- first national inventory published in 1998 covering 1990 with reference year 1990,
- second national inventory published in 2010 with reference year 2000,
- third national inventory published in 2014 with reference year 2010,
- fourth national inventory for 2011 and 2012 published in the framework of Armenia's first Biennial Update Report,
- fifth national inventory for 2013 and 2014 published in the framework of Armenia's Second Biennial Update Report,
- sixth national inventory for 2015 and 2016 published in the framework of Armenia's Second Biennial Update Report.

The Ministry of Environment (ME) of the Republic of Armenia, as the UNFCCC National Focal Point, coordinates the preparation of the GHG inventories and national communications and update reports of Armenia.

In 2019 Climate Change policy department has been established within the ME staff, which is one of the main professional structural units of the ministry. The functions of this department are to coordinate the development of national communications and biennial reports to ensure consistent, complete and timely presentation of the UNFCCC implementation.

An Inter-agency Coordination Council for the Implementation of the UNFCCC was established by Prime Minister Decree N 955-A, 2012. The council comprises representatives of 11 ministries, the

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[1] See https://unfccc.int/resource/docs/natc/armnc1e.pdf

Public Service Regulatory Commission and the Statistical Committee, as well as the UNFCCC Focal Point. It is chaired by the Minister of Environment. The Council is an interdepartmental body and aims to ensure inter-sectoral coordination. A working group has been set up to assist the Council comprising representatives from ministries and state agencies,, as well as climate change experts and consultants. The Working Group includes representatives of all the organizations, who provide support in meeting UNFCCC reporting obligations of Armenia as a Party, including development of national GHG emissions inventories.

Figure 4 – Management of GHG inventory development in Armenia
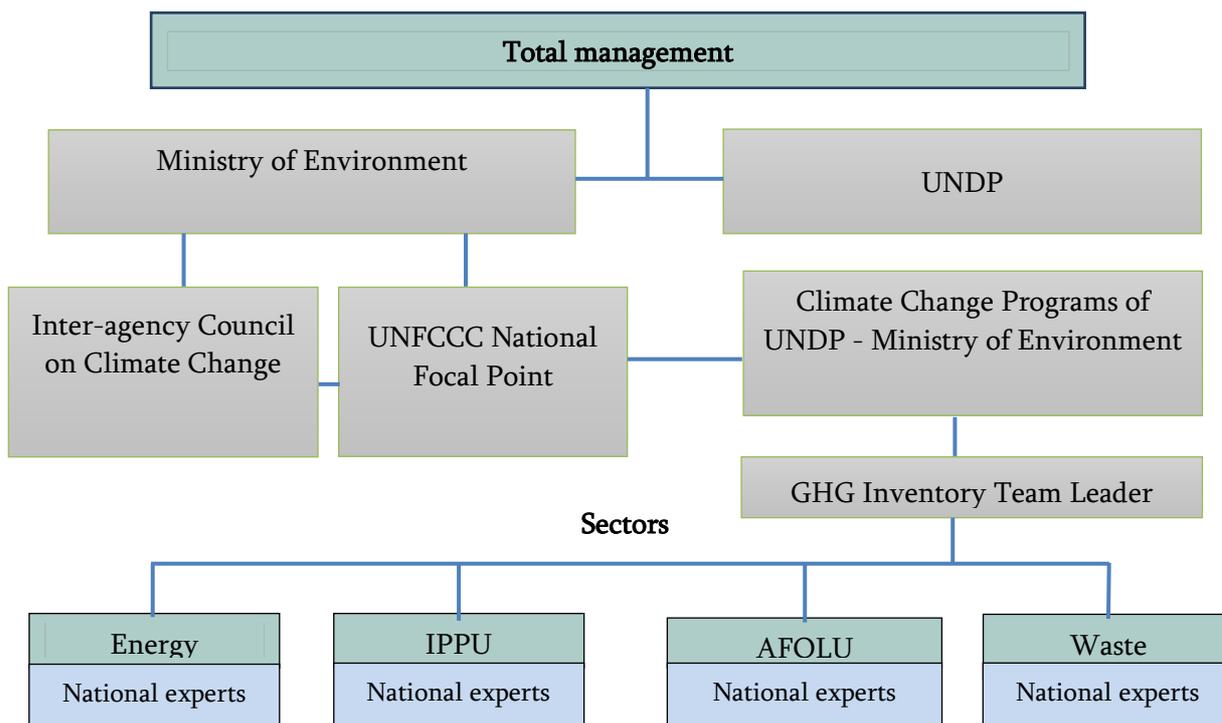
The development of the inventory includes the following steps:
• methodology selection,
• data collection,
• data entry and emission calculation,
• preparation of the report.

Methodology selection depends on whether or not the emissions category in question is a main source of emissions in Armenia. Clear reference is made in all methodology selection to the first, second and third level methodologies of the IPCC's 2006 inventory preparation guidelines. Priority is given to use of national data sources and emissions coefficients. Methodologies related to direct greenhouse gases (CO_2, CH_4 and N_2O) and fluorinated compounds (HFCs) from key emission sources are given the highest priority.

Data collection consists of the following steps:
• definition of data requirements based on the selected calculation methodology,
• official data collection and receipt by the ME,
• data verification for completeness and accuracy carried out by relevant experts.

Data entry and emission calculation is carried out in relevant administrative registers If the data collection is carried out specifically for purposes of inventory compilation, data entry is carried out by members of the inventory team. Emissions calculations are carried out by relevant experts.

Preparation of the report consists of the following steps:

- preparation and editing of the overall inventory report based on sectoral reports developed by relevant experts,
- discussion of the draft report with the members of the working group of the Inter-agency Coordination Council and relevant specialists of the ME,
- posting of the draft report on Armenia's Climate Change Information web-site for public discussion,
- provision of the draft report to stakeholder ministries and agencies,
- presentation and finalization of the report with the Inter-agency Coordination Council,
- translation and submissions of the report to UNFCCC,
- archiving.

3.2. Legislative basis for climate change-related statistics in Armenia

Official statistics are regulated by the Law of the Republic of Armenia **"On Official Statistics"** (March, 2018), by decision of State Council on Statistics, by other legal acts and by the country's international agreements.

The Law "On Official Statistics" regulates the operation of the Statistical Committee, including the development, production and dissemination of official statistics; the drafting and adoption of annual and five-year statistical programs; statistical confidentiality; quality assurance; and conducting of censuses.

In addition to the Statistical Committee, other producers of official statistics in Armenia include units of state and local government bodies charged with the development, production and distribution of official statistics. Data collected for administrative purposes by state and local bodies are also used in the preparation of official statistics. The legal basis for collecting such data is different from statistical legislation.

Development and sharing of GHG emission data, including the national inventory, in Armenia is regulated by:

- Commitments under UNFCCC, ratified by the Republic of Armenia in 1993; in particular, Articles 4.1 and 12.1, which provide the legal basis for developing the GHG inventory.
- Article 34 of the Law of the Republic of Armenia "On Atmospheric Air Protection", which allows public and private bodies to "artificially transform" (pollute) the atmosphere as a result of economic purposes only with the permission of the ambient air protection authorities and only on condition that no adverse effects on weather or climate are caused.
- Article 36 of the of the Law "On Atmospheric Air Protection" requires that the types and quantities of substances emitted to air and their impacts (including climate change) are registered according to the procedure established by the government.

In addition, the following codes, laws, decrees, resolutions and protocols are relevant to the commitments under the UNFCCC; in particular, to the reduction of greenhouse gas emissions:

- Water Code of the Republic of Armenia (2002)
- Land Code of the Republic of Armenia (2001)
- Forest Code of the Republic of Armenia (2005)
- Republic of Armenia Law on Environmental Impact Assessment and Expertise (2014)
- Republic of Armenia Law on Energy Efficiency and Renewable Energy (2004)
- Decree of the Government of the Republic of Armenia of April 22, 1999 No 259 "On Approval of the State Register of Hazardous Impacts on Atmospheric Air", which defines the content, goals and objectives of the registration system for atmospheric emissions and their impacts
- Resolution No 974-N "On Implementation of Projects under the Clean Development Mechanism of the Kyoto Protocol attached to the Framework Convention on Climate Change" approved by the Government of the Republic of Armenia on July 13, 2006
- Decree No. 49 of the Republic of Armenia of December 8, 2016, which includes measures to ensure both the implementation of the Paris Agreement and the UNFCCC, as well as measures to ensure the implementation of commitments under the Vienna Convention for the Protection of the Ozone Layer, the UN Convention on Biological Diversity, Cartagena Protocol on Biosafety and other conventions.
- Resolution No 860-N of the Republic of Armenia of July 20, 2017 "On Approval of Permitted Level of Emissions of Motor Vehicles Operating on the Territory of the Republic of Armenia and on recognition of the Resolution No N 965-N invalid."
- Protocol N2 of the Republic of Armenia of 18 January, 2007 "On Approval of Energy Saving and the National Renewable Energy Program of RA".
- The Tax Code of the Republic of Armenia (2016) as a legal basis for the application of economic mechanisms to reduce emissions.

In addition, the ME has developed and submit to the Government of RA draft law "On Environmental Policy", the adoption of which will provide for improved environmental reporting based on internationally accepted key indicators (including for climate change); timely identification and forecasting of changes in environment, as a result of natural and anthropogenic impacts; comprehensive, reliable, comparable and accessible information for environmental assessments.

4. Armenia's Road Map for the Development of Climate Change-related Statistics

This section presents Armenia's road map for development of its climate change-related statistics. The road map was prepared by the Statistical Committee following the 2014 *Conference of European Statisticians Recommendations on Climate-change Related Statistics* (the CES recommendations)[1], taking into account the requirements of the international climate change conventions and agreements to which Armenia is a signatory, including the Paris Agreement. The document recommended by them "Example Road Maps for Developing Climate Change-related Statistics" and an accompanying spreadsheets are giudances for determining statistical priorities related to the Roadmap for climate change-relates statistics, as well as for their development (both prepared by the UNECE Statistical Division in Geneva)[2].

In accordance with the CES recommendations, the road map focuses on priorities that are:

1) directly related to the statistics required for the compilation of Armenia's GHG emissions inventory,
2) related to other statistics required for climate change analysis,
3) related to the statistical "infrastructure" (e.g., statistical methods and standards) required to produce climate change-related statistics.

Also in keeping the with the CES recommendations, the road map does not deal with scientific data related to climate and weather directly; for example, data on temperature and precipitation. Rather, it focuses on environmental, social and economic data that measure the human causes of climate change, the impacts of climate change on human and natural systems and the efforts of humans to avoid and/or adapt to the consequences of climate change. The following spheres of statistics are included in the Road Map:

- statistics of GHG emissions,
- statistics measuring human activities that are the source of GHG emissions (e.g., industry),
- statistics measuring impacts of climate change on human and natural systems (e.g., damages to infrastructure from disasters),
- Climate Change mitigation statistics (e.g., installation of solar, wind, geothermal power),
- statistics measuring efforts to adapt to the consequences of climate change (e.g., installation of residential air conditioning).

The main functions of the Statistical Committee in developing this road map are to:

- assist compilers of Armenia's national GHG inventory by assessing the usefulness of the official statistics for inventory compilation,
- improve the quality of statistics used in the GHG inventory; for example, based on the recommendations of inventory review reports,

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[1] See http://www.unece.org/fileadmin/DAM/stats/publications/2014/CES_CC_Recommendations.pdf
[2] See
http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/2017/Road_maps_for_climate_change_statistics.pdf and
http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/2017/Tool_to_prioritize_recommendations_on_climate_change.xlsx

- analyze the statistical needs related to the Kyoto Protocol and other global or regional agreements on climate change,
- ensure the provision of new data to meet the needs of climate change analysts.

Further, the Statistical Committee recognizes the need to acquire new knowledge and expertise through training, hiring and, above all, building partnerships with other information providers and experts. It also recognizes that, in the long term, there may be a need for organizational changes to support the development of climate change-related statistics across the entire statistical system.

Armenia's priorities for the development of climate change-related statistics are presented in the tables that follow. The priorities are structured around the defined 9 main CES recommendations:

- NSOs must improve statistics required for GHG inventories,
- NSOs, especially UNFCCC Annex I Parties, should proactively reach out to agencies responsible for greenhouse gas inventories and, ideally, be considered official institutions in the national systems of greenhouse gas inventories,
- the international statistical community should take an active role in contributing to the global GHG inventory system,
- NSOs must improve the contribution of official statistics to climate change analysis by, for example, facilitating access to data,
- the usefulness of existing environmental, social and economic statistics for climate change analysis should be improved,
- NSOs should consider development of new statistics based on a review of the key data needs of climate change policy makers and analysts in their country,
- existing classification systems, registers, definitions, statistical frameworks, products and services need to be reviewed to see that needs related to climate change analysis are appropriately addressed,
- statisticians should gradually develop new partnerships, expertise and ability to adopt new methodologies for producing climate change-related statistics,
- organizational changes may be needed in NSOs, the national statistical system and the national system for greenhouse gas inventories to support the production of climate change-related statistics.

The road map has been developed on the basis of discussions with stakeholders. During these discussions, the current status of climate change-related statistics in Armenia was analyzed with the goal of identifying gaps in existing data and the priority actions required to address them. Decisions regarding the priorities outlined in the road map were made on the basis of consensus.

Discussions at the initial stage of roadmap development were held with specialists and representatives of sectoral stakeholder governing bodies, such as the Ministries of Environment, Economy, Territorial Administration and Infrastructures on relevant statistical indicators, their sources, collection and provision mechanisms and tools. Appropriate solutions to meeting statistical needs were identified and subsequently agreed to with heads of the relevant bodies and the RA State Council on Statistics. These will be included in annual and five-year statistical work programs. The discussions are on-going and will continue until final agreements are reached. One of the important preconditions of

the discussions is that indicators must be multipurpose; that is, collected once and accessible for multi-use by all stakeholders.

The priorities identify actions to be taken by the Statistical Committee and by other Armenian organizations in the state governmental, academic, educational, commercial and non-governmental, etc. organization spheres as they relate to the production of climate change-related statistics. In particular, stakeholders were asked to identify priorities for improving administrative data related to climate change collected by Armenian institutions and agencies.

However, it should be taken into consideration that for some of these activities, ratings and implementation times may change, so they have a timely and situational dependency. Regardless of the above-mentioned fact, the purpose is the following - improvement of the statistics, provision of demand of stakeholders.

As a result, the priorities for the improvement of climate change-related statistics in Armenia have been identified. Once these priorities have been approved by the Government, the activities required to implement them, including improvement of administrative data, will be initiated. Capacity-building in the Statistical Committee and in organizations responsible for administrative data will be one of the focuses of these efforts.

The GEF is supporting non-Annex I countries in capacity building for information transparency system under Paris Agreement Article 13. Armenia has applied for the project funding under the GEF window.

It is expected that Armenia's participation in the Shared Environmental Information System project of the European Environment Agency will greatly contribute to the implementation of the road map.[1]

Another important aspect of realizing the road map's objectives will be implementation of the United Nations *System of Environmental-Economic Accounting* (SEEA) within the Statistical Committee*'s System of National Accounts*. Implementation of the SEEA will have a positive impact on the quantity and quality of statistics related to climate change available in Armenia; for example, SEEA-based water accounts will allow evaluation of changes in water resources and the effectiveness of water   management   activities.

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[1] The EU-funded project *European Neighbourhood Instrument (ENI) Shared Environmental Information System (SEIS) II EAST* aims to extend the shared European environmental information system to the six EU eastern partnership countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine). The aim is to improve the collection, exchange and use of environmental data and information across countries by simplifying and modernising existing information systems and processes. The second phase of the project will run from 2017 to 2020.

Priority 1 - Improve statistics for the national GHG emission inventory

Table 1.1. Summary of actions and expected results related to Priority 1

Gaps identified	• Employees of the ARMSTAT are not well enough informed about the use of official statistics for national GHG inventory and climate reporting • Insufficient support for application of non-relevant methodologies in administrative data • Access to administrative data is inadequate
Actions to be taken	• Discussions with heads of departments of ARMSTAT on capacity building and training needs • Review the gaps in administrative data with the GHG inventory compilers • Introduce list of newly suggested administrative data	• Revision and standardization of climate change-related statistics • Monitoring of compliance with statistical procedures and rules • Standardization of release schedules and processes for statistics
Responsible bodies	• ARMSTAT	• State Government bodies • GHG inventory compilers
Deadlines	• Regular	• 2-3 years
Expected outputs	• Better-informed employees • Broader involvement of stakeholders in the maintenance of administrative data • Improved administrative data	• Expanded range of high-quality statistics for GHG inventory compilation • Improved administrative data

Table 1.2. Details of actions and expected results related to Priority 1

	CES Recommendation	Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency
1	NSOs must improve data and statistics required for GHG inventories						
	1.1 Enhance awareness in the national statistical systems of how official statistics are or could be used for GHG inventories	Discussions with the heads of divisions of the ARMSTAT on the importance of climate change-related statistics	ARMSTAT	GHG inventory	Immediately	N/A	On-going
	1.2 Ensure that GHG inventory	Close cooperation with the	SCS	State government	2020		On-going

	CES Recommendation		Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency
			calculations use existing official statistics as much as possible	ARMSTAT units responsible for CC statistics and state government bodies and GHG inventory to ensure full reporting of activity data necessary for GHG inventory	GHG inventory	bodies			
	1.3		Improve the quality of official statistics used for GHG inventories	For comparability and quality assurance, implement periodic monitoring of the use of shared methodologies, classifications in administrative information databases for improving the primary data quality	ARMSTAT	State government bodies GHG inventory	2020		At least once two years
		1.3.1	Improve coherence of GHG inventories and official statistics where possible	Active support from the SCS for the preparation and approval of administrative statistical reporting forms in public administration bodies	ARMSTAT	State government bodies GHG inventory	2020		On-going
		1.3.2	Improve the quality of energy statistics	ARMSTAT has to participate in compiling the energy balance of Armenia and help ensure its timely and complete publication	ARMSTAT	MTAI ME GHG inventory	2020		On-going
		1.3.3	Fill gaps related to, among others, the agriculture, forestry and other land use sector	Develop and put into circulation: - Reporting form for register and use of agricultural waste (in particular, manure) - Reporting form on firewood use by households - Reporting form for household alternative production and use of biofuels	SCS	Municipalities International investors MoE ME Cadastre Committe	2020		Each two years
		1.3.4	Improve data on municipal	Carry out comparative analysis	ARMSTAT	IBNPM			Every year

	CES Recommendation		Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency
		solid waste morphology and on liquid and solid waste generation and disposal	between annual summary reports and summary data of annual household surveys conducted by the ARMSTAT		Municipalities			
	1.3.5	Improve the timeliness of activity data	Provision of recommendations on methodology for information collection and delivery	ARMSTAT Municipalities GHG inventory	IBNPM Activity data holders (public and private)	2020		To be reviewed depending on requirements under UNFCCC
	1.3.6	Build longer and more consistent time series of official statistics	Periodic publication of relevant information on the ARMSTAT website, ensuring accessibility, as well as ensure that the same methodology has been applied for the time series of the official statistics	SCS	State government bodies	2020		On-going
1.4		Draft, together with the agencies responsible for GHG inventories, a prioritized list of national data gaps and a road map on data development to improve the national GHG inventory	Assist in compiling GHG Inventories improvement progress reports	ME ARMSTAT	GHG inventory	2020		Review as needed each 2 years

Priority 2 – Increase the Statistical Committee's role in the GHG inventory production system

Table 2.1. Summary of actions and expected results related to Priority 2

Gaps identified	• Insufficient involvement of ARMSTAT specialists in GHG inventory system • Insufficient involvement of the statisticians in GHG activity data quality monitoring • Insufficient involvement in the GHG inventory activity data quality monitoring	
Actions to be taken	Active and practical participation in the certification processes of GHG information sources	Permanent involvement in the working groups of GHG inventory information sources certification
Responsible bodies	• ARMSTAT • SCS • Coordinating environmental sphere	• ME • GHG inventory
Deadlines	Ensuring permanent involvement	Ensuring permanent involvement
Expected outputs	Required quality of information	Effective cooperation

Table 2.2. Details of actions and expected results related to Priority 2

		CES Recommendation	Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency	Note
2		NSOs should be proactive in reaching out to national agencies responsible for greenhouse gas inventories							
	2.1	Facilitate collaboration between the statistical system and national inventory system	• Active participation in development of data collection, quality assurance of activity data, generalization, ensuring consistency of time series, provision and other similar practical work	ARMSTAT	• Ministries • GHG inventory	2020		On-going	
	2.2	Create a national working group between the NSO, the GHG inventories agencies and other relevant organizations	• Establish an informal working group in the ARMSTAT system to ensure the collection of climate change-related statistics by	ARMSTAT	• ME • GHG inventory	2020		On-going	

	CES Recommendation	Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency	Note
		its units • Identify and provide training to contact persons in subdivisions of the ARMSTAT dealing with GHG inventory and involve them in relevant works on the provision with necessary information						
2.3	Clarify the NSO's role in providing statistics and assist, as needed, in GHG inventory calculations	• Thematic targeted discussions between the Members of the SCS and the GHG inventory • Discussions on the quality and integrity of data, organized by the Members of SCS and with the participation of the representatives of other structures	ARMSTAT	• ME • GHG inventory	2020		On-going	May also include publishing and accessibility
2.4	Support efforts at strengthening the quality of GHG inventories in line with the IPCC's guidelines on quality control and quality assurance and to ensure application of country – specific methods for calculation	Discuss with the GHG inventory the possible approaches for quality control and quality assurance, as well as application of the country – specific methods for additional activity data.	ARMSTAT	• ME • GHG inventory	2020		At least once every two years	

Priority 3 – Increase and deepen cooperation with international statistical community on climate change-related statistics

Table 3.1. Summary of actions and expected results related to Priority 3

Gaps identified	• Lack of involvement of the ARMSTAT in applied requirements to local adaptation by international organizations' • Lack access to international experience and practice for the ARMSTAT	
Actions to be taken	• Study of the requirements of international non-statistical organizations • Implement statistical works in accordance with these requirements	• Study the requirements of international non-governmental organizations • Compliance with their requirements • Proper knowledge of international organizations' requirements and, where necessary, adaptation of them to local context
Responsible bodies	• ARMSTAT • International organizations	• State government bodies • International organizations
Deadlines	On-going	On-going
Expected outputs	Locally adapted international requirements	Locally adapted requirements

Table 3.2. Details of actions and expected results related to Priority 3

	CES Recommendation	Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency
3	Increase and deepen cooperation with international statistical community on climate change-related statistics						
3.1	Seek closer collaboration of the statistical community and international organisations working on climate adaptation issues	• Continuously follow the actions and requirements of the relevant international organizations and match them with local functions • Request international organizations to provide active cooperation and support	SCS	International organisations	2020		On-going
3.2	Actively engage, at national level, with the national representatives delegated to the relevant UNFCCC forums and follow up on the outcomes of the UNFCCC conferences of the parties to the convention	Request national delegations to the Conference of Parties to report on statistics related process outcomes, particularly during the Inter-agency CC meetings	• ME • ARMSTAT	International organisations, projects under implementation in Armenia	2020		On-going

		CES Recommendation	Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency
	3.3	NSOs to be actively involved at the outset of work when countries need to respond to new data needs from the convention	Establish regular communication with UNFCCC Focal Point and ARMSTAT	• ME • ARMSTAT	International organisations	2020		On-going

Priority 4 – NSOs must improve the contribution of official statistics to CC analysis by, among other things, facilitating access to existing statistics

Table 4.1. Summary of actions and expected results related to Priority 4

Gaps identified	• Inadequate involvement in preparation of climate change-related reports and assessments	
Actions to be taken	• Review the demand for statistical information for analysis and reports on climate change • Preparation of new data set for use in analysis • Discussions with scientific community, universities, Public Council on Users of Official Statistics	• Demand study • Preparation of new information for analysis; • Discussions in Public Council on Users of Official Statistics • Active participation of statisticians in the preparation of analysis and reports • Preparation of general-purpose statistical analysis
Responsible bodies	• SCS • ME • ArmStateHydromet	• SCS • State government bodies
Deadlines	On periodic base	• Ensuring permanent involvement
Expected outputs	• Information required for analysis and reports identified • The indicators for qualitative analysis in climate change-related systems agreed with users and SC	• Qualitative analysis in CC-related system • Participation in the collection and publication of data • Effective cooperation • Qualitative and comprehensive statistics • Various statistical analyses

Table 4.2. Details of actions and expected results related to Priority 4

	CES Recommendation	Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency
4	NSOs must improve the contribution of official statistics to CC analysis by, among other things, facilitating access to existing statistics						
4.1	Create national forums or events for discussions between users and producers of CC statistics	• Active participation in sessions of Public Council on Users of Official Statistics, scientific community, Inter-agency Council on CC, international and local CC-related forums, to identify data demands and the means of meeting them	• ARMSTAT • Relevant member of SCS	• Organizations implementing relevant events • International organizations	2020		On-going
4.2	Provide access to CC-related statistics and	• Assistance in improving access to	ARMSTAT	• State government	2020		On-going

		indicators (including scientific data collected by others) using NSOs' dissemination channels, improve access to microdata for researchers working on CC.	administrative registers • Support to administrative registers to provide stakeholders with free access to their websites, publications • Acquisitions resulting from discussions with administrative bodies on the publication of their administrative information on their sites • An agreement with the administrative registers to ensure the publishing of microdata by them		bodies • GHG inventory			

Priority 5 – Improve the usefulness of existing environmental, social and economic statistics for climate change analysis

Table 5.1. Summary of actions and expected results related to Priority 5

Gaps identified	• Insufficient effort to collect missing information with statistical agencies • Infrequently updated databases for CC impact assessment • Insufficient use of GIS	
Actions to be taken	• Intensify cooperation with governing bodies for the full inclusion of CC indicators in statistical work programs • Initiation widespread use of GIS statistical analysis	• Initiate cooperation for inclusion of all CC indicators in statistical work programs • Introduce GIS in analytical and assessment publications
Responsible bodies	ARMSTAT	State government bodies
Deadlines	2-3 years	2-3 years
Expected outputs	• Have quality assured/ quality controlled and complete CC data in both official and administrative registers • Introduction of GIS	• Qualitative statistical databases in CC assessment system • Introduction of GIS

Table 5.2. Details of actions and expected results related to Priority 5

	CES Recommendation	Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency
5	The usefulness of existing environmental, social and economic statistics for climate change analysis should be improved						
5.1	Review statistical programs and data collections from the viewpoint of the data needs for CC analysis and indicators	• Review stakeholders' needs to adjust the range, volume, quality, tools and mechanisms of current and planned annual statistical surveys • Ensure stakeholders' need are met before making final decisions as to content of annual statistical surveys	ARMSTAT	• State government bodies • GHG inventory	2020		On-going
5.2	Address the difficulties in matching data from different statistical domains	• Provide effective practical cooperation between statistical divisions • Ensure access to information needed to assess the impact of CC	ARMSTAT		2020		On-going
5.3	Geo-reference all relevant data to support analysis of the spatial dimension of data	• Ensure extensive use of GIS in estimating processes	• ARMSTAT • International and	• State government bodies	2020		On-going

		linked to CC		donor organisations	• Administrative statistical registers			
	5.4	Produce statistics for new geographical areas	• Enhance cooperation with other bodies to create statistical databases for river basin management bodies; for example, soil erosion databases of the MoE and databases of the Water Committee on water abstraction and water use	• SCS • International and donor organisations	• Administrative statistical registers	2020		On-going

Priority 6 – NSOs should consider development of new statistics based on a review of the key data needs of CC policy makers and analysts in their country

Table 6.1. Summary of actions and expected results related to Priority 6

Gaps identified	• Inadequate accounting of expenditures related to environmental protection	
Actions to be taken	• Introduction of environmental protection expenditure accounts • Expanded environmental accounts for air, water, land, etc.	• Introduction of environmental protection expenditure accounts • Expanded environmental accounts (air, water, soil, etc.)
Responsible bodies	ARMSTAT	ARMSTAT
Deadlines	Three to five years, on-going	Three to five years, on-going
Expected outputs	• Environmental expenditure accounts • Expanded environmental accounts	• Environmental expenditure accounts • Expanded environmental accounts

Table 6.2. Details of actions and expected results related to Priority 6

		CES Recommendation	Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency
6		NSOs should consider development of new statistics based on a review of the key data needs of CC policy makers and analysts in their country						
	6.1	Improve data for analyzing drivers of climate change	• Introduction of environmental satellite accounts in the national accounting system in Armenia. As a first step, introduce a comprehensive system of environmental-economic accounting	ARMSTAT	• International donor institutions • Administrative statistical registers	2020	2025	On-going
	6.2	Develop statistics on the use of economic instruments	• Development of environmental protection expenditure accounting	ARMSTAT	State government bodies	2020	2020	On-going
	6.3	Develop statistics to address CC related loss and damage	• Assist government bodies in development and identification of the climate change vulnerability related statistics • Assist state bodies in the formulation of the vulnerability statistics	ARMSTAT	State government bodies	2020	2020	On-going
	6.4	Consider how to contribute to the on-going efforts to monitor biodiversity and ecosystems	• Participation in development of information management issues in biodiversity programs and methodological assistance in the	ARMSTAT	ME Biodiversity Agency	2020	2022	On-going

			implementation of accounting systems • Assistance to the Biodiversity Agency of the Ministry of Environment of RA to develop statistical reporting forms.					

Priority 7 – Existing classification systems, registers, definitions, statistical frameworks, products and services need to be reviewed to see that needs related to CC analysis are appropriately addressed

Table 7.1. Summary of actions and expected results related to Priority 7

Gaps identified	Insufficient coordination between different databases	
Actions to be taken	• Participation in of EU-funded Shared Environmental Information System project • Creation of an ecoportal	• Participation in of EU-funded Shared Environmental Information System project • Creation of an ecoportal
Responsible bodies	• ARMSTAT • Relevant member of SCS	• ARMSTAT • Relevant member of SCS
Deadlines	2-3 years	2-3 years
Expected outputs	Shared Environmental Information System	Shared Environmental Information System

Table 7.2. Details of actions and expected results related to Priority 7

	CES Recommendation	Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency
7	Existing classification systems, registers, definitions, statistical frameworks, products and services need to be reviewed to see that needs related to CC analysis are appropriately addressed						
7.1	Give consideration in future revisions of international statistical standards and classifications to the data needs of CC analysis	• Participation in the information management system of biodiversity, forest resources, land use change, pollution implemented by the ME, their compliance with international and national requirements. • Identify gaps and develop programs to improve these statistics	ARMSTAT	ME	2020		Once every five years
7.2	Identify and address the obstacles to linking statistics across domains	Training on the importance of cooperation for subdivisions of the ARMSTAT	ARMSTAT	ME	2020		As required
7.3	Consider new approaches to preserving confidentiality	• Support integration of relevant administrative registers and their dissemination, accessibility requirements for transparency under Paris Agreement	ARMSTAT	• GHG inventory • Ministries • Legal entities	2020		On-going

	7.4	Consider the inclusion of explicit references to environmental statistics, including CC-related statistics, in statistical laws	• Discuss the issue of publication of nominal information in interdepartmental commission sessions • Taking into consideration the specific nature of ecological problems, discuss this issue in the SCS	• ARMSTAT • SCS	• GHG inventory • Ministries • Legal entities	2020		As required

Priority 8 – Statisticians should gradually develop new partnerships, expertise and ability to adopt new methodologies for producing CC-related statistics

Table 8.1. Summary of actions and expected results related to Priority 8

Gaps identified	• Lack of climate-related knowledge • Lack of skills/knowledge and motivation for self-evaluations • Insufficient knowledge of CC activities in Armenia	
Actions to be taken	• Training workshops for ARMSTAT staff • Assistance in preparation of CC-related skills/knowledge assessment and self-evaluation reports	• Training workshops for the staff conducting administrative statistics • Assistance in preparation of climate change-related skills/knowledge assessment and self-evaluation reports
Responsible bodies	• ARMSTAT • ME as UNFCCC implementation coordination national authority • Relevant member of SCS	Administrative statistic bodies
Deadlines	Regular	Regular
Expected outputs	Better trained staff	Better trained staff

Table 8.2. Details of actions and expected results related to Priority 8

		CES Recommendation	Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency
8		Statisticians should gradually develop new partnerships, expertise and ability to adopt new methodologies for producing CC-related statistics						
	8.1	Build knowledge and understanding of the CC- related information importance within NSO staff	• Training seminars on possible changes required for transition to new methodologies for the ARMSTAT staff • Establish cooperation with relevant agencies and universities	• ARMSTAT • Relevant member of SCS	• ME • MESCS	2020		As required
	8.3	Develop knowledge, methodologies and tools for producing and using geo-referenced data across the statistical system	• Employ GIS in relevant publications • GIS training courses	• ARMSTAT • Relevant member of SCS	• International sponsors • Stakeholders	2020		As required
	8.4	Ensure the effective transfer of knowledge and skills among NSOs internationally	• Participate in international events to share Armenia's experience	• ARMSTAT		2020		As required

Priority 9 – Make organizational changes in the Statistical Committee, the broader national statistical system and the national system to support the production of CC-related statistics

Table 9.1. Summary of actions and expected results related to Priority 9

Gaps identified	• Lack of strategy for improvement of CC-related statistics	
Actions to be taken	• Include provisions relating to CC-related statistics in the five-year strategic programs of the ARMSTAT	SCS decisions
Responsible bodies	• ARMSTAT • Relevant members of SCS	Administrative statistic bodies
Deadlines	Regular	Regular
Expected outputs	Improved CC-related statistics	Improved CC-related statistics

Table 9.2. Details of actions and expected results related to Priority 9

		CES Recommendation	Actions to be taken	Primary responsible bodies	Co-responsible bodes	Deadline to begin implementation	Deadline for completion	Frequency
9		Organizational changes may be needed in NSOs, the national statistical system and the national system for GHG inventories to support the production of CC-related statistics						
	9.1	Assign a person or group with the responsibility for ensuring the quality and availability of CC-related statistics	• Hold working discussions with the corresponding specialists of administrative registers on the issues of selecting responsible specialists for improving CC-related statistics	ARMSTAT	• GHG inventory • State government bodies	2020		As required
	9.2	Modify, in the longer term, the NSO's organizational structure	• Discussions in the sessions of SCS on the formation of new administrative databases, selection of new formats for summaries and publications, etc. • These may arise in connection with the global changes in the state or administrative management system, changes in the administrative subordination of the administrative registries and other reasonable reasons.	ARMSTAT	• Ministries • Legal entities • GHG inventory	As needed		
	9.3	Define and clarify, if needed, the division of work and responsibilities between the	• Improvement of cooperation framework and content within the ARMSTAT system and beyond	ARMSTAT	• Ministries • Legal entities	As needed		

	different producers of CC- related statistics and GHG inventories	its competence • Establishment of new contractual relationships, publication of relevant targeted references in shared system, etc.		• GHG inventory			
9.4	Earmark sufficient resources for the development of environmental statistics and CC-related statistics	• Discuss distribution and redistribution of statistical resources through to possible administrative or other changes	ARMSTAT	• State government bodies • International and donor organisations	As needed		

Annex 1 - Statistical tables

Water resources and water abstraction, Armenia, 1990-2018, mln.cub.m

	Average multi-year values	1990	1995	2000	2005	2010	2015	2016	2017	2018
Precipitations	17 640	15 794	15 407	11 264	18 714	19 447	18 506	19 012	14 335	18059
Total evaporation	11 323	10 426	10 526	9 032	11 320	12 549	12 827	12 928	10 382	12120
Internal flow	6 317	5 368	4 881	2 232	7 394	6 898	5 678	6 084	3 953	5939
Surface and groundwater inflow	940	1 442	1 189	641	1 063	1 783	763	798	710	632
Renewable water resources	7 257	6 810	6 070	2 873	8 457	8 681	6 441	6 882	4 663	6571
Water abstraction		3 942.0	2 531.0	1 871.2	2 770.6	2 126.4	3 271.7	3 181.9	2 865.4	2 714.4
Water abstraction from surface sources		2 616.6	1 680.0	1 338.2	1 967.6	1 250.6	1 967.3	2 045.6	1 710.9	1 522.8
Water abstraction from groundwater sources		1 325.4	851.0	533.0	803.0	875.8	1 304.4	1 136.3	1 154.5	1 191.6
Water resources exploitation index (WREI),%		50.7	32.6	24.1	35. 7	27.4	42.1	41.0	36.9	34.9

Population, Armenia, 1990-2018, thousand persons

Indicator	1990	2000	2010	2012	2014	2015	2016	2017	2018
Number at the end of the year	3 575	3 215	3 035	3 027	3 011	2 999	2 986	2 973	2 965
Natural increase per 1000 people	16.3	3.1	5.5	4.9	5.1	4.6	4.1	3.5	3.6

Main macroeconomic indicators, Armenia, 1995-2018

Indicator	1995	2000	2010	2012	2014	2015	2016	2017	2018
GDP (billion AMD)	522	1.031	3.460	4.266	4.829	5.044	5.067	5.564	6.005
GDP (million 2010 USD)*	3.357	1.912	9.260	10.394	11.123	11.479	11.502	12.365	13.008
GDP PPP (million 2011 USD)*	6.992	8.978	19.286	21.646	23.166	23.907	23.955	25.752	27.091
GDP per capita PPP (2011 USD)*	2.173	2.925	6.703	7.505	7.954	7.172	8.159	8.745	9.178
Inflation (% per year)	176	-0.8	8.2	2.6	3.0	3.7	-1.4	1.0	2.5
Export (million USD)	271	301	1. 041	1. 380	1.547	1. 485	1.792	2.238	2.412
Import (million USD)	674	885	3. 749	4. 261	4. 424	3. 239	3.274	4.097	5.016

* World Bank data.

GDP structure, Armenia, 1990-2015, %

Components	1990	2000	2005	2010	2012	2014	2015	2016	2017	2018
Industry, including energy	30.1	25.2	21.8	15.5	16.1	16.0	16.3	17.8	18.5	18.4
Agriculture, forestry, fishing	16.0	23.2	19.0	17.0	17.9	18.1	17.2	16.4	15.0	13.7
Construction	17.6	10.2	19.6	17.3	11.7	9.3	9.4	7.8	7.3	6.6
Trade and Services	28.3	32.3	31.0	39.0	43.6	45.3	46.5	48.0	48.9	50.7
Net taxes	8.0	9.1	8.6	11.2	10.7	11.3	10.6	10.0	10.3	10.6

## Total primary energy supply, Armenia, 1990-2018, thousand tonnes of oil equivalent, % of total

Resource	1990	1995	2000	2005	2010	2012	2013	2014	2015	2016	2017	2018
Natural gas	3 608.2	1 029.2	1 122.4	1 394.6	1 459.0	1 924.5	1 971.2	2 008.0	1 935.5	1 851.6	1 948.6	2 043.8
	44.8%	55.5%	50.1%	50.4%	51.6%	63.1%	62.8%	62.9%	59.2%	59.3%	59.1%	64.9%
Oil products	3 887.6	508.6	322.3	372.5	388.2	294.3	292.3	293.2	317.7	305.2	325.1	321.8
	48.2%	27.4%	14.4%	13.5%	13.7%	9.7%	9.3%	9.2%	9.7%	9.8%	9.9%	10.2%
Hydroelectric energy	160.0	169.5	107.5	152.8	245.9	198.8	186.9	171.3	189.6	202.2	195.1	199.3
	2.0%	9.1%	4.8%	5.5%	8.7%	6.5%	6.0%	5.4%	5.8%	6.5%	5.9%	6.3%
Nuclear energy	0.0	52.5	518.2	702.0	649.5	602.3	614.8	642.2	834.0	713.8	784.2	602.6
	0.0%	2.8%	23.1%	25.4%	23.0%	19.8%	19.6%	20.1%	25.5%	22.9%	23.8%	19.1%
Coal	320.6	9.5	0.0	0.0	0.7	2.4	1.0	0.8	0.8	1.3	1.1	1.1
	4.0%	0.5%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.02%	0.04%	0.03%	0.03%
Biomass	2.1	83.6	210.0	212,5	152.8	163.1	171.2	172.3	95.9	128.8	135.6	96.3
	0.0%	4.5%	9.4%	7.7%	5.4%	5.4%	5.5%	5.4%	2.9%	4.1%	4.1%	3.1%
Electricity import/ export	79.0	1.0	-40.0	-67.0	-68.0	-137.0	-100.2	-95.3	-107.5	-82.0	-96.3	-122.4
	1.0%	0.1%	-1.8%	-2.4%	-2.4%	-4.5%	-3.2%	-3.0%	-3.3%	-2.6%	-2.9%	-3.9%
Total	8 057.5	1 853.9	2 240.4	2 767.4	2 828.1	3 048.4	3 137.3	3 192.7	3 267.6	3 123.2	3 296.6	3 149.6

Energy Consumption, Armenia, 1990-2018

Indicator	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total primary energy supply (thousand tonnes of oil equivalent)	8.058	1.854	2.240	2.767	2.828	2.966	3.048	3.137	3.193	3.268	3.123	3.297	3.150
Final Energy Consumption (thousand tonnes of oil equivalent)	5.345	1.260	1.801	1.927	1.948	2.030	2.047	2.139	2.144	2.149	2.124	2.239	2.194
Primary energy supply per capita	2.29	0.57	0.70	0.86	0.93	0.98	1.01	1.04	1.06	1.09	1.05	1.11	1.06
Energy intensity of GDP (tonnes of oil equivalent per thousand 2010 USD)		0.55	0.52	0.36	0.31	0.306	0.293	0.292	0.287	0.65	0.62	0.59	0.52

Annex 2 - Statistical graphs and charts

Greenhouse gas emissions, Armenia, 2000-2016 (gigagrams of CO_2 equivalent)
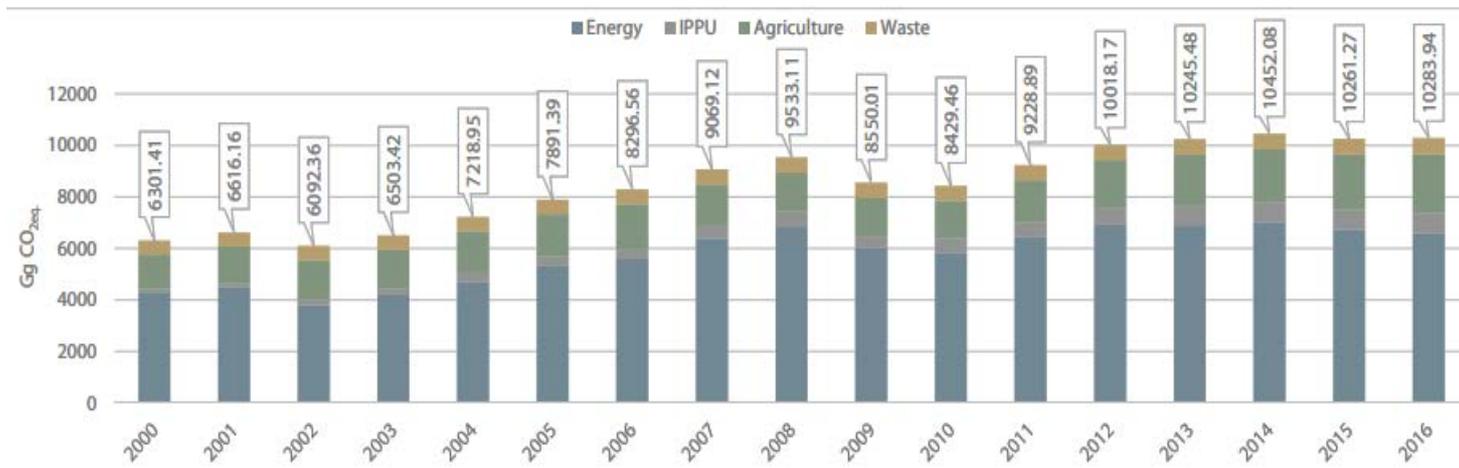
Spatial distribution of a) the number of days annually with 25°C and higher temperature (SU25) and b) the number of days with 1 mm and less precipitation (CDD), Armenia, 1935-2016
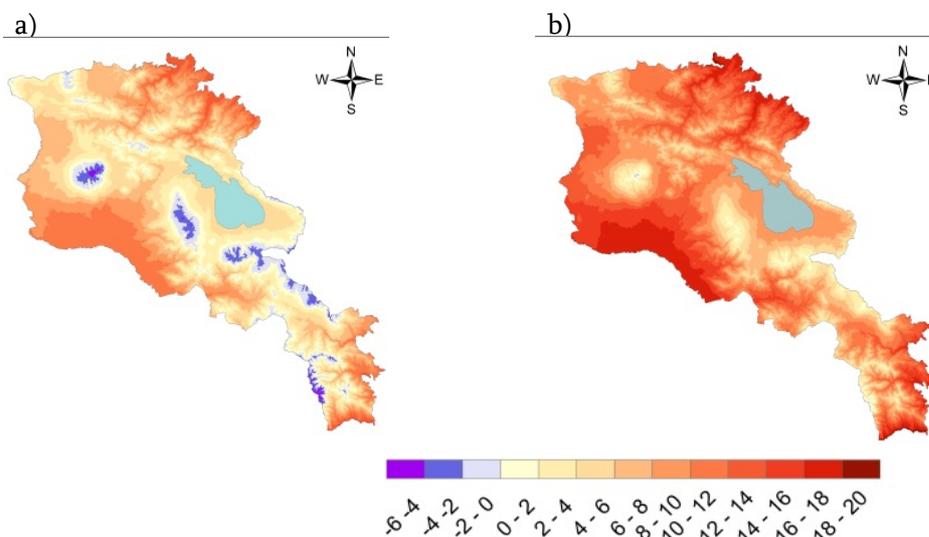
a)

b)
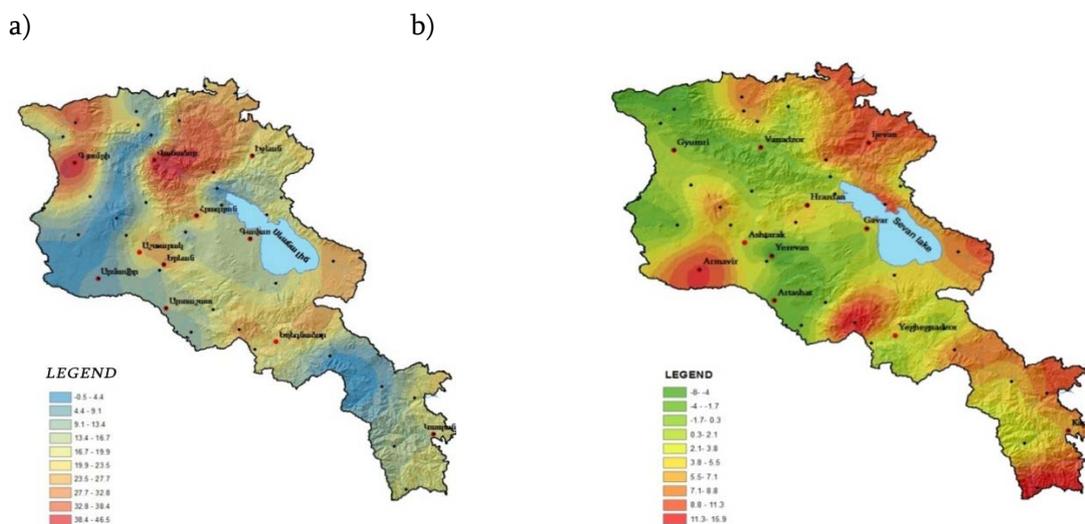
Temperature distribution of a) 1961-1990 and b) forecast for 2071-2100, Armenia RCP8.5 scenario

a)

b)

Annex 3 - Priorities for climate change-related statistics development as identified by UNECE methodology

This annex presents the results of Armenia's application of UNECE methodological recommendations designed to assist countries in identifying priorities for the development of climate change-related statistics aligned with the CES recommendations. The priorities identified for Armenia were incorporated into Armenia's road map presented in Section 4 of this report.

		CES Recommendations on Climate Change-related Statistics	Cost to implement	Time to implement	Impact on data quality if implemented	Recommended timeframe for implementation
			Rating 1= low 2=medium 3=high	Rating 1= low 2=medium 3=high	Rating 1= high 2=medium 3=low	
1		NSOs must improve data and statistics required for GHG inventories				
	1.1	Enhance awareness in the national statistical systems of how official statistics are or could be used for GHG inventories	1	1	2	Start immediately
	1.2	Ensure that GHG inventory calculations use existing official statistics as much as possible	1	1	2	Is used and is reported to UNFCCC
	1.3	Improve the quality of official statistics used for GHG inventories, as follows:	3	2	2	Start within three years
		1.3.1 Improve coherence of GHG inventories and official statistics where possible	2	2	2	Start within two years
		1.3.2 Improving the quality of energy statistics in particular	2	2	2	Start within two years
		1.3.3 Fill gaps related to, among others, the agriculture, forestry and other land use sector	2	2	2	Start within two years
		1.3.4 Improve data on waste municipal solid waste morphology and on liquid and solid waste generation and disposal	3	3	3	Start within three years
		1.3.5 Improve the timeliness of activity data	2	2	2	Start within two years
		1.3.6 Build longer and more consistent time series of official statistics	2	2	2	Start within two years
	1.4	Draft, together with the agencies responsible for GHG inventories, a prioritized list of national data gaps and a road map on data development	1	1	3	Start as soon as possible
2		NSOs, should be proactive in reaching out to national agencies responsible for greenhouse gas inventories				
	2.1	Facilitate collaboration between the statistical system and national inventory system	2	1	2	Start as soon as

						possible
	2.2	Create a national working group between the NSO, the GHG inventories agencies and other relevant organizations	1	1	3	Start as soon as possible
	2.3	Clarify the NSO's role in providing statistics and assist, as needed, in GHG inventory calculations	1	1	3	Start as soon as possible
	2.4	Support the efforts at strengthening the quality of GHG inventories in line with the IPCC's guidelines on quality control and quality assurance	1	2	2	Start as soon as possible
3	The international statistical community, including national statistical systems and international statistical organisations, should take an active role in contributing to the global GHG inventory system					
	3.1	Seek closer collaboration between the statistical community and international organisations working on climate issues	1	1	3	Start as soon as possible
	3.2	Actively engage, at national level, with the national representatives delegated to the relevant UNFCCC forums	1	1	3	Start as soon as possible
	3.3	Follow up on the outcomes of the UNFCCC conferences of the parties to the convention	1	1	3	Start as soon as possible
	3.4	Involve NSOs at the outset of work when countries need to respond to new data needs from the convention	1	1	3	Start as soon as possible
	3.5	Existing international networks of NSOs could facilitate the exchange experience	1	1	3	Start as soon as possible
4	NSOs must improve the contribution of official statistics to climate change analysis by, among other things, facilitating access to existing statistics					
	4.1	Create national forums or events for discussions between users and producers of climate change statistics	1	2	2	Start as soon as possible
	4.2	Provide access to climate change-related statistics and indicators (including scientific data collected by others) using NSOs' dissemination channels	1	2	3	Start as soon as possible
	4.3	Improve access to microdata for researchers working on climate change	3	2	3	Start within three years
5	Improve the usefulness of existing environmental, social and economic statistics for climate change analysis					
	5.1	Review statistical programs and data collections from the viewpoint of the data needs of climate change analysis and indicators	1	2	3	Start within two years
	5.2	Address the difficulties in matching data from different statistical domains	3	2	3	Start within three years
	5.3	Geo-reference all relevant data to support analysis of the spatial dimension of data linked	3	3	3	Start within three

		to climate change				years
	5.4	Produce statistics for new geographical areas	3	2	3	Start within three years
6		NSOs should consider development of new statistics based on a review of the key data needs of climate change policy makers and analysts in their country				
	6.1	Improve data for analyzing drivers of climate change	3	2	2	Start within three years
	6.2	Develop statistics on the use of economic instruments	3	2	2	Start within three years
	6.3	Develop statistics to address climate change related loss and damage	3	2	3	Start within three years
	6.4	Consider how to contribute to the on-going efforts to monitor biodiversity and ecosystems	3	2	3	Start within three years
7		Existing classification systems, registers, definitions, statistical frameworks, products and services need to be reviewed to see that needs related to climate change analysis are appropriately addressed				
	7.1	Give consideration in future revisions of international statistical standards and classifications to the data needs of climate change analysis	3	2	2	Start within three years
	7.2	Identify and address the obstacles to linking statistics across domains	3	2	2	Start within three years
	7.3	Consider new approaches to preserving confidentiality	3	2	2	Start within three years
	7.4	Consider the inclusion of explicit references to environmental statistics, including climate change-related statistics, in statistical laws	1	2	3	Start within two years
8		Statisticians should gradually develop new partnerships, expertise and ability to adopt new methodologies for producing climate change-related statistics				
	8.1	Build knowledge and understanding of the climate change related information importance within NSO staff	2	2	2	Start within two years
	8.2	Familiarize NSO staff with GHG inventory methodologies	2	2	2	Start within two years
	8.3	Develop knowledge, methodologies and tools for producing and using geo-referenced data across the statistical system	2	2	2	Start within two years
	8.4	Ensure the effective transfer of knowledge and skills among NSOs internationally	2	2	2	Start within two years
9		Organizational changes may be needed in NSOs, the national statistical system and the national system for greenhouse gas inventories to support the production of climate change-related statistics				

9.1	Assign a person or group with the responsibility for ensuring the quality and availability of climate change-related statistics	1	1	3	Start as soon as possible
9.2	Modify, in the longer term, the NSO's organizational structure	2	2	2	Start within two years
9.3	Define and clarify, if needed, the division of work and responsibilities between the different producers of climate-change related statistics and GHG inventories	2	2	3	Start within three years
9.4	Earmark sufficient resources for the development of environmental statistics and climate change-related statistics	3	2	3	Start within three years