

CONFERENCE OF EUROPEAN STATISTICIANS

Expert Forum for Producers and Users of Climate Change-Related Statistics

28-30 August 2023, Geneva

MAIN ISSUES OF AVAILABILITY AND RELIABILITY OF CLIMATE CHANGE RELATED STATISTICS IN
ARMENIA

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Abstract

Several meetings with users of climate change statistics have revealed that not only availability but also (even much more) the issue of reliability, completeness and quality of existing statistical data should be urgently addressed to meet the increased needs of policy makers, private sector, academic community and the public at large. The paper will present the experience and current efforts of the Statistical Committee of Armenia on implementing of specific institutional mechanisms for improvement of statistics on climate change.

A. The Institutional Framework of Climate Change Statistics

1. In February 2020, the State Statistics Council of the Republic of Armenia approved the "[Armenia: Road Map for the Development of Climate Change-related Statistics / Statistical Committee of the Republic of Armenia \(armstat.am\)](#)" and defined the list of necessary activities for the following five-year period. This is the first effort in Armenia, where an attempt was made to assess the current state of the national system of climate change (CC) statistics, and to identify its improvement priorities and actions.
2. The core of the Road Map includes the development of the statistical data necessary for the greenhouse gas emissions inventory of Armenia, as well as for the analysis of CC in accordance with international statistical methods and standards. Assessment of the needs of policy makers and analysts regarding CC indicators and data, and the review and development of respective statistical frameworks, registers, classification systems, and definitions are also among the 9 priority directions identified in this document.
3. Pursuant to the Decision of the Prime Minister of RA, in July 2021, an Inter-Agency Coordinating Council (IACC) chaired by the RA Deputy Prime Minister of RA on implementation of requirements and provisions of the UN Framework Convention on Climate Change and the Paris Agreement by the Republic of Armenia was established, and Armstat was also included in this Council. The statisticians are also represented in the Council's Working Groups on climate change mitigation/adaptation and country accountability under

the Convention. Thanks to the joint activities of statisticians and CC specialists, the statistical forms of data collection have been improved, indicators and their disaggregation by types of activities are still in progress.

B. Current climate change statistics (ArmStatBank)

4. The official website of the RA Statistical Committee includes several databases: one of them is [ArmStatBank](#) (Annex 1). The latter was developed in 2012 and also includes the Environment sector which is based on the principles and requirements of the Shared Environmental Information System (SEIS).

5. Indicators of the Statistical Departments on Air Pollution and Ozone Layer Depletion, Climate Change, Biodiversity, Water Resources and Water Accounts, Land Resources and Agriculture, Transport, Waste, Environment Protection Financing, as well as Quality of Life Dependent on the Environment are published and constantly updated by ArmStatBank.

6. 43 out of 138 UNECE indicators are published in ArmStatBank, including national indicators. The Climate Change Statistics sector presents 3 main indicators, including: (B1) Average temperature of air and deviation from norm of 1961-1990 by months and years (1990-2021); (B2) Amount of atmospheric precipitations and deviation from norm of 1961-1990 by months and years, and Concentration of controlled substances in atmospheric precipitations by substances and years (2009-2021); (B3) Greenhouse gas emissions by substances and sectors, and by years (1990-2017).

7. The Industry Sector of ArmStatBank includes the Energy Balance showing the energy balance of Armenia by energy carriers, by relevant indicators and by years (2015-2021). Since 2015, Armstat has started to include the Energy Balance and Greenhouse Gas Inventory data in its publications.

8. Climate change indicators of Sustainable Development Goals (SDG) have been developed on the basis of ArmStatBank and UNECE indicators, which are available on a separate [platform](#) of Armstat website. 13 global (Annex 2) and 5 national SDG indicators are available on the SDG platform.

9. The National Water Accounts have been compiled using the main dataset of water users, ArmStatBank and SEIS indicators which provide the user with up-to-date, complete, comparable and accessible information on water resources availability, effective management, consumption and renewable volumes. For hybrid tables indicators from National Accounts of Armenia are used. The dynamic series of Water Accounts for 2015-2021 are available in the Water Accounts (SEEA) sector of ArmStatBank, while the Handbook of "[Formation of the System of Water Satellite Accounts in Armenia \(Armenian\)](#)" (only arm. version) is available on the website of Armstat.

10. Starting from 2021, within the framework of the CEPA agreement, Armstat has initiated the compilation of the Atmospheric Air Emission Accounts, for which the main dataset of air emissions from stationary sources and two official national emission reporting systems have been considered as a

baseline: the Cadastre of Greenhouse Gas Emissions (reported under the UNFCCC) and the Cadastre of National Emissions (submitted under the Convention on Long-Range Transboundary Air Pollution (CLRTAP)). Atmospheric Air Accounts were compiled for 2017, and after the next report on the greenhouse gases, the Accounts will be drawn up for 2018-2019 and as a result there will be a 3-year times series which will be published on ArmStatBank.

11. In 2020-2021, "Implementation of the National Strategy Program for Strengthening of the National Statistical System" within the framework of the "Environment-related life quality indicators" component of the ECASTAT program, Armstat has carried out a very interesting work, as a result of which [the "Methodological Report on Environmental Quality of Life Indicators"](#) and the [Glossary of Terms](#) have been developed: 19 life quality indicators are available on ArmStatBank (Annex 1), where 17 of them are disaggregated by Yerevan city and regions. These Indicators reflect the impact of the changing environment on the human health and activities. [Composite indicators](#) for each region and Yerevan city have been calculated for 2012-2018.

C. Strengthening the "indicator-policy" link in climate change

12. In order to strengthen the "indicator-policy" link in CC, Armstat, together with international and local experts, are actively discussing the list of CC statistics and indicators based on the country's CC peculiarities, CC policy priorities, institutional and resource capacities, as well as on national CC reporting requirements. Armstat also participated in the development of an expanded list of CC statistics and indicators implemented by the United Nations Statistical Department. In 2020, Armstat, among the relevant institutions of the remaining 85 countries, filled out a questionnaire on 134 CC indicators, according to which 35 indicators were assessed according to "compliance", 31- according to "calculated by a justified methodology", and 33 - according to "available".

13. It is worth to note, that Armstat is responsible for only 9 of the 35 calculated indicators, which are obtained as a result of households and other surveys. The rest of the indicators and data are mainly collected through administrative registers managed by 3 Ministries. Thus, the Ministry of Environment collects a total of 8 CC indicators (water resources, atmospheric air, forest, greenhouse gases, etc.); the Ministry of Territorial Administration and Infrastructure - 5 CC indicators (mainly on energy sector); the Ministry of Internal Affairs - 2 CC indicator (on natural disasters).

14. In addition to agriculture, households, poverty, access to services and other indicators, Armstat also provides data on population size and composition, GDP volume and structure, household consumption and other data necessary for the calculation of relative indicators. Additionally, Armstat is also summarizing and calculating some relative indicators and publishing them.

15. The challenges related to CC statistics become "visible" when sectoral policy makers and decision-making bodies try to review/analyze the studied phenomena under the influence of CC. In particular, the following questions arise:

- Is the positive or negative trend of the phenomenon/sector due to climate change?
- To what extent has climate change affected the observed phenomenon/sector?
- Is the CC effect direct or indirect (mediated)?
- How could be separated the CC impact from the influence of other factors, etc.

The abovementioned triggers the following question: What kind of disaggregation of data and indicators is needed in the existing statistical forms or what additional questions are needed in the conducted surveys to strengthen the "climate change-policy" evidence base?

16. Issues related to climate change statistics were discussed at the workshop on "The Problems of Accessibility and Quality Assurance of the Statistical Data for Climate Change National Report" ([Climate Change Information Center \(nature-ic.am\)](#)), during which, based on climate change statistics developed by UNECE/UNDS and the complete list of indicators (158 indicators) and taking into account the country's CC specifics, the sector experts assessed and compiled a list of 43 indicators, which are mostly requested by researchers and policy makers (Annex 3).

D. Developments in National Climate Change Statistics

17. Thanks to the joint work of Armstat and the RA Ministry of Environment, and based on the statistical data provided by the bodies maintaining the administrative register, the "Greenhouse Gas Emissions" and "Land Cover Classification" publications will be regularly included in "[Environment and natural resources in the Republic of Armenia](#)" annual statistical report in Armstat. They have already been included in the [2023 Statistical Program \(Armenian\)](#).

18. Armstat jointly with the Yerevan Municipality has developed a reporting format on green urban areas, which will also enable to calculate or adjust indicators aimed at sustainable development goals (SDGs 11, 13 and 15). Currently the draft of this reporting format is being discussed with the RA Ministry of Territorial Administration and Infrastructure. Indicators of the reporting format will be included in the greenhouse gases (GHG) cadastre and will be used for the calculation of GHG removals by green urban areas.

19. Based on the need in complete information in the GHG cadastre on emissions from the use of fertilizers, Armstat has initiated the process of developing a statistical reporting form on imported pesticides and fertilizers, as well as on their safe use in the public and private sectors. As for providing Armstat with information on the pesticides and fertilizers used in general, it became clear from the discussions with the experts of the Ministries maintaining the relevant registers that it is not possible to report on the quantities of pesticides and fertilizers used, so it is possible to present the quantity of imported pesticides and fertilizers only as a statistical indicator.

20. In order to improve the data quality from electricity/power sector necessary for GHG inventory and to ensure international comparability of indicators, Armstat has revised the form of statistical report on "Electricity balance and divided by sectors of economy". It also derives from the requirements for the preparation of the energy balance of the Republic of Armenia, according to which disaggregation of energy consumption data should be carried out in accordance with the types of activities listed in the Statistical Classification of Types of Economic Activities (NACE Rev. 2) . The reporting form is still under discussion with the relevant specialists of the "Electric Networks of Armenia" CJS Company.

21. The semi-annual statistical reporting form "On the reported emergency events" is under review, as a result of which the number of reported emergency events and the number of victims by types of emergency will be available for each marz/regions and Yerevan city. The number of victims will also be separately presented by gender.

22. From the GHG inventory perspective the complete information on manure and firewood still remains as a challenge. Armstat obtains this information from the Household's Integrated Living Conditions Survey, which contains data only on the consumed quantities. Another source of information on firewood is the administrative register (forest management) of the Ministry of Environment, but these two data vary widely and are not comparable.

23. In 2022 the experts from the Statistical Office of the European Union (Eurostat) visited the Statistical Committee to assess the status of the Environmental Statistics Sector. The experts developed a set of recommendations ("[Sector Review of Environment Statistics](#)") for the improvement of environmental statistics in compliance with European statistical standards, as well as CC-related information, calculation and publication of global and national SDG indicators, which will serves as a basis for the planning and implementation of Armstat's activities in that direction.

Annex 1. Access to climate change indicators on the Armstat website (ArmStatBank)

The screenshot shows a web browser window with the following elements:

- Browser tabs: "Statistical Committee of the Repu...", "PX-Web - Select table", and "Google Переводчик".
- Address bar: "0d1-2ff8-40fa-a309-fae01ea885bb".
- Page header: "ArmStatBank" with a navigation path: "1 Choose table", "2 Choose variable", "3 Show table".
- Search bar: "Search in ArmStatBank:" with a "Search" button.
- Main content: A hierarchical list of indicators under the "Environment" category, specifically focusing on "Climate change".
- Footer: A logo of the European Union and text stating: "ARMSTATBANK.ASI has been functioning since 14th September 2012. Developed with the support of Statistics Denmark within the framework of EU Twinning project 'Forwarding Armenian Statistics Through Twinning'."

ArmStatBank

Search in ArmStatBank:

- 1. Economy and finances
- 2. Population and social processes
- 3. Industry (including Energy), construction, trade and services
- 4. Transport, communication and tourism
- 5. Foreign trade
- 6. Agriculture, forestry and fishing
- 7. Food Security
- 8 Environment
 - (A) Emissions of pollutants into the atmospheric air
 - (B) Climate change
 - (B2) Atmospheric precipitation, by years
 - Amount of atmospheric precipitations and deviation from norm of 1961-1990 by months and years
 - Concentration of controlled substances in atmospheric precipitations* by substances and years
 - (B3) Greenhouse gas emissions
 - Absolute values of Greenhouse gas emissions* (Gg CO2 eq) by Greenhouse gases and years**
 - Aggregated emissions of Greenhouse gas (Gg CO2 eq) by sectors and years*
 - (B1) Average temperature of air and deviation from norm of 1961-1990 by months and years
 - (C) Water resources
 - (D) Biodiversity
 - (E,F) Land and Agriculture
 - (H) Transport
 - (I) Waste
 - (J) Environmental financing
 - Mining of solid minerals by indicators and years
 - Environmental economic accounts
 - Life quality
 - Mortality rate attributed to household and ambient air pollution* by marzes and years
 - Environmental satisfaction of population* by type of complaint, marzes and years
 - Annual mean levels of fine particulate matter in cities* by cities and observation stations and years
 - Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene* by marzes and years
 - Mortality rate attributed to unintentional poisoning* by marzes and years
 - Number of deaths, persons missing, who survived and evacuated attributed to disasters* by type of disaster, marzes and years
 - Proportion of population using safely managed drinking water services* by marzes and years
 - Proportion of population attributed to exceedance of air quality standards in urban areas* by ambient air pollutants, marzes and years
 - Proportion of population using safely managed sanitation services* by type of service, marzes and years
 - Composite indicator of Life Quality related to the environment by marzes and years

Annex 2. Climate change indicators on the Armstat SDG platform

The screenshot shows the Armstat SDG platform interface. At the top, there is a navigation bar with 'Reporting Status', 'About', 'Guidance', and 'FAQ'. Below this, the text reads '17 goals to transform our world' and provides a brief introduction to the Sustainable Development Goals (SDGs). A circular graphic of the 17 goals is displayed. The main content area is titled 'Armenia data for the Sustainable Development Goals' and includes a sub-link: 'Click on each goal to see statistics for Armenia Sustainable Development Goal global indicators.' Below this, a grid of 17 goal icons is shown, each with its corresponding number and title.

Indicator's number in the Global Set	SDG indicator
1	Total greenhouse gas emissions per year
14	Energy intensity measured in terms of primary energy and gross domestic product
31	Forest area as a proportion of total land area
42	Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population
81	Prevalence of undernourishment
95	Proportion of population with access to electricity
97	Proportion of population using (a) safely managed sanitation services and (b) a hand - washing facility with soap and water
98	Proportion of population using safely managed drinking water services
101	Proportion of the population living below the international poverty line by sex, age, employment status and geographic location (urban/rural)
103	Proportion of urban population living in slums, informal settlements or inadequate housing
110	Renewable energy share in the total final energy consumption
112	Proportion of population with primary reliance on clean fuels and technology
158	Proportion of domestic and industrial wastewater flows safely treated

Annex 3. Climate Change Indicators prioritized by areas of the Global Set

The list of indicators presented below was compiled based on estimations of experts participated in the Workshop on “The problems of accessibility and quality assurance of the statistical data for climate change national reports” conducted under the framework of the “**Building Armenia’s National Transparency Framework under the Paris Agreement**” UNDP-GEF Project in August 11, 2022. The UNECE/UNDS Global Set of climate change statistics and indicators was served as a basis for selection and prioritization of indicators by national experts. In total, 39 experts estimated the indicators by criteria of importance, compliance and relevance to the country national economy’s context.

<i>Indicator’s number in the Global Set</i>	<i>Priority Indicators by the Global Set areas</i>	<i>Availability of Indicator</i>
1. Drivers – 8 indicators		
1	Total greenhouse gas emissions per year	Ministry of Environment
3	Greenhouse gas emissions from land use, land use change and forestry	Ministry of Environment
4	Total greenhouse gas emissions from the national economy	Ministry of Environment
10	Total primary energy production from fossil fuels	Statistical Committee, Ministry of Territorial Administration and Infrastructures
13	Final energy consumption per capita	Statistical Committee, Ministry of Territorial Administration and Infrastructures
17	Population growth	Statistical Committee
19	Number of (fossil-driven) vehicles per capita	-----
21	Intensity of use of forest resources	-----
2. Impacts – 7 indicators		
27	Direct agricultural loss attributed to disasters	-----
28	Crop loss due to climate extremes	-----
29	Impact of climate change on livestock productivity	-----
36	Renewable freshwater resources per capita	Ministry of Environment
38	Water quality	Ministry of Environment
46	Climate-induced air pollution	-----
61	Change of land area affected by soil erosion	-----
3. Vulnerability – 8 indicators		
81	Prevalence of undernourishment	Statistical Committee
83	Customer price of drinking water	Statistical Committee
86	Population relying on subsistence and pastoral farming	Statistical Committee
91	Infrastructure vulnerable to climate change	-----
96	Proportion of population served by municipal waste collection	-----
97	Proportion of population using (a) safely managed sanitation services and (b) a hand - washing facility with soap and water	Statistical Committee
98	Proportion of population using safely managed drinking water services	Statistical Committee

101	Proportion of the population living below the international poverty line by sex, age, employment status and geographic location (urban/rural)	Statistical Committee
4. Mitigation – 9 indicators		
109	Production of renewable energy as a proportion of total energy production	Ministry of Territorial Administration and Infrastructures
110	Renewable energy share in the total final energy consumption	Ministry of Territorial Administration and Infrastructures
111	Non-fossil fuel energy consumption as a proportion of final energy consumption	Ministry of Territorial Administration and Infrastructures
116	Share of climate change mitigation expenditure in relation to gross domestic product	-----
120	Climate change mitigation technology	-----
122	Greenhouse gas intensity of the economy (including transport)	Ministry of Environment
123	Rate of decrease of greenhouse gas emissions per unit of gross domestic product	-----
125	Increase in forest area	Ministry of Environment
126	Progress towards achieving the nationally determined contribution	Ministry of Environment
5. Adaptation – 11 indicators		
127	Proportion of sectors planning, budgeting and implementing climate change adaptation actions	-----
136	Coverage of early warning systems	Ministry of Internal Affairs
138	Proportion of population with access to climate information	-----
141	Number of reports on climate change statistics and indicators	Statistical Committee
145	Share of green urban areas in the total area of cities	-----
149	Progress towards sustainable forest management	Ministry of Environment
151	Meteorological monitoring network	-----
152	Air quality monitoring systems	-----
153	Water monitoring systems	-----
156	Municipal waste collected per capita	-----
158	Proportion of domestic and industrial wastewater flows safely treated	Statistical Committee, Environmental Protection and Minig Inspection Body
Grand Total - 43 indicators		

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