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Items for discussion and decision: climate change statistics

Climate change statistics

Report of the Secretary-General

Summary

In accordance with Economic and Social Council decision 2015/216 and past practices, the report was prepared by the Statistics Division of the Department of Economic and Social Affairs of the Secretariat in its capacity as Secretariat of the Statistical Commission, in collaboration with the United Nations Economic Commission for Europe (UNECE). The report contains a discussion of climate change statistics and it highlights their relevance and need. It builds upon the Statistical Commission programme review on climate change at its fortieth session in 2009, and upon two previous related conferences on climate change and official statistics organized by the Statistics Division. The report elaborates on the demand and supply of climate change statistics describing the situation around the world with particular emphasis on the constraints that developing countries face. Responding to increasing demand from countries, the present report summarizes the work on climate change statistics in the Statistics Division, including methodological guidance, technical assistance and training, as it pertains to three key climate change relevant statistical domains, namely environment statistics, geospatial statistics and environmental-economic accounts. Complementarily, it describes the progress made in the UNECE work on climate change-related statistics and indicators. The Commission is invited to express its views on the report and discuss the way forward.

* E/CN.3/2016/1.

Report of the Secretary-General on Climate Change Statistics

I. Introduction

1. Climate change affects all countries and remains one of the most important development challenges facing humanity. It disrupts national economies and affects lives, costing people, communities and countries significantly today and in the future. The main impacts of climate change are observed through both slow-onset events (e.g., sea level rise, increasing temperatures, ocean acidification, forest degradation, biodiversity loss, and desertification) and sudden extreme weather events.¹

2. Building on the experience of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto protocol, countries and the UN reached a new universal agreement in Paris in 2015 to reduce emissions, keep global warming below 2°C compared with the pre-industrial era (about 1850)², and mobilise resources to finance adaptation, as societies move towards a low carbon economy base. The twenty-first Session of the Conference of the Parties to the UNFCCC (COP21/CMP11) was hosted by France in Paris, from 30 November to 11 December 2015. COP21 and its outcome Paris Agreement were critical, as for the first time humanity reached a landmark universal agreement on the climate. As the UN Secretary General expressed

¹ Inter-Governmental Panel on Climate Change (IPCC) Fifth Assessment Report.

² <http://www.cop21.gouv.fr/en/cop21-cmp11/cop21-main-issues>

after the signature of the Paris Agreement, “This is truly a historic moment [...] For the first time, we have a truly universal agreement on climate change, one of the most crucial problems on earth.”³

3. The 2030 Agenda for Sustainable Development addresses climate change in its thirteenth Goal of the Sustainable Development Goals, which reads, “take urgent action to combat climate change and its impacts”. This goal contains five targets that will be monitored through indicators and will thus require statistics for its compilation.

4. Climate change is a cross-cutting issue involving complex dynamics that include economic, social and environmental factors which affect each other and pose a considerable statistical challenge to both countries and agencies. The statistical community around the world will undoubtedly face increasing demands for data from diverse stakeholders. Preparations need to be made to properly inform societies about climate change in terms of emissions, occurrence, impacts, mitigation and adaptation, so that policy-making and monitoring can be more robust and evidence-based.

II. Statistical Commission programme review on climate change

5. In its multi-year programme of work, the Statistical Commission 2015-2019

³ NY Times http://www.nytimes.com/2015/12/13/world/europe/climate-change-accord-paris.html?_r=1

[E/CN.3/2015/39] agreed in its forty-sixth session in 2015 that climate change statistics should be on the agenda of the Commission approximately every five years, with 2016 as the next occasion.

6. The Commission at its fortieth session in 2009 carried out a programme review on climate change and official statistics. The objective of the review was “to specify how official statistics may be used for climate change measurement and analysis and to identify recommendations and actions to mainstream the climate change aspect in official statistics, thus strengthening the role of official statistics and national statistical offices (NSOs) in this area.”⁴

7. The Commission in its Decision 40/101, inter alia: welcomed the high-quality programme review; recognised that climate change is an important global issue with social, economic and environmental impacts; noted that it is a new area of official statistics and where data are needed by various stakeholders; recognised that many of the statistics needed are already being produced by national statistical systems; noted the interest of countries to develop a framework of environmental statistics to facilitate the understanding of the phenomenon of environmental and climate change; and stressed the importance of training and capacity-building particularly for developing countries.

⁴ Report of the Australian Bureau of Statistics on Climate Change and Official Statistics, pg.3 E/CN.3/2009/2

8. The Commission built on the two conferences organised by Statistics Division on climate change and official statistics held in Oslo and Seoul in 2008.

III. Demand and supply of climate change statistics

A. Current situation

9. Currently, demand for data on climate change is greater than its supply, particularly in the environmental domain. If the statistical community does not take decided action, this gap will increase. The gap is evidently deeper in developing and least developed countries facing critical resource constraints, limited technical capacities, institutional weakness, and lack of coordination among national institutions. The systematic production of basic statistics is important yet difficult in the developing world, where prioritisation and flexibility of this production is key.

10. Available official data and statistics pertaining to the more important aspects of both climate change and sustainable development is insufficient, thus requiring the development of spatially relevant statistics and indicators in order to produce quantitative evidence at the national level.

11. Depending on the productive structure and the environmental dynamics of each country, data needed to inform about climate change thus varies among countries. Greenhouse gas (GHG) emissions are a major driver of climate change. The most significant activities responsible for these emissions are agriculture, land use changes, forestry, energy, manufacturing and transportation. The relative significance of each activity varies among countries, which should be reflected in the relevance of the corresponding statistics. While manufacturing and energy are the most significant sources of emissions of industrialised countries, agriculture and forestry are more important in developing countries. Impact and adaptation statistics are also crucial in developing countries. Statistics are also needed to report to climate-related conventions. Such conventions require baseline data for emission projections and statistics on national circumstances, measures taken in climate change adaptation and mitigation, technological exchange, financial resources and education.

12. With the increase in frequency and intensity of extreme climate-related meteorological events and natural disasters there are emerging data needs. Increased data will also be needed to respond to the Sendai Framework for Disaster Risk Reduction. Cumulative changes in climate, precipitation, ice cover, drought and sea level are already affecting for example, agriculture, human health, water availability, conditions in human settlements and natural resources. Adaptation and mitigation measures are needed and are now becoming key aspects of national policy.

Consequently, there is a need to develop basic statistics on these aspects to inform stakeholders.

13. At present, the availability of relevant climate change statistics varies depending on the stage of the climate change process. Bearing in mind the gap in the availability of statistics among developed and developing countries, data on drivers of climate change and on climate change evidence are relatively more available. Socio-economic and environmental data should be made more easily available to analyse the impacts of climate change. Mitigation statistics are less often produced and more difficult to capture statistically, because of the insufficient resources invested in their measurement and the lack of methodological guidance. Furthermore, despite their importance, statistics on vulnerability and adaptation (as well as resilience) are still in a developmental stage and require investment in methodological development and capacities to be produced. The recent Conference of Parties in Lima in 2014 and Paris in 2015 stressed the importance of moving towards tackling the mitigation and adaptation of climate change.

B. Methodological Guidance

14. Strengthening statistics by using international recommendations in agriculture, energy, industry and environment (including extreme events and disasters) statistics is conducive to the compilation and dissemination of better climate change statistics and

indicators. Relevant basic statistics are critical to develop indicators, compile environmental-economic accounts, and produce reports and assessments.

15. To guide the production of basic statistics relevant to climate change in different domains, the Statistics Division has produced internationally agreed upon recommendations (e.g., the Framework for the Development of Environment Statistics (FDES 2013), International Recommendations for Energy Statistics (IRES), and International Recommendations for Industrial Statistics (IRIS)) and various hands-on guidance manuals. In turn, the United Nations Economic Commission for Europe (UNECE) has produced the Conference of European Statisticians' (CES) Recommendations on Climate Change-Related Statistics, aiming at improving existing official statistics to support climate change analysis and reporting on greenhouse gas emissions under the UNFCCC. The focus is on statistics that are relevant for analysing climate change, its causes and impacts rather than on scientific or meteorological data describing changes in weather and climate (see section V).

16. The Intergovernmental Panel on Climate Change (IPCC) conceptual and analytical framework was developed to describe the sequence of events that occur which includes Climate Process Drivers, Climate Change, Impacts and Vulnerability, Mitigation and Adaptation. Additionally, the internationally agreed methodology for estimating GHG emissions is provided by the IPCC guidelines for national greenhouse

gas inventories. Emission inventories are compiled in most developed countries (Annex 1 countries as in UNFCCC and Kyoto protocol) and some developing countries by different agencies depending on each country.

17. The System of Environmental-Economic Accounting (SEEA, 2012) integrates economic and environment statistics using the System of National Accounts (SNA) accounting framework, guiding the production of accounts that can be used for informing about the environment-economic intersection of climate change. In particular, it offers guidance to construct the air emission accounts (see section IV. C).

18. A key framework that identifies and organises a wide range of environment statistics also needed for climate change statistics is the FDES 2013⁵. It is a multi-purpose, conceptual and statistical framework to guide practitioners to organize and structure environment statistics, including those needed for climate change (see section IV. A).

19. Despite the existence of methodological guidance, developing countries with many competing needs for scarce resources find it difficult to sustain regular production of key climate change statistics.

⁵ The FDES was endorsed by the Statistical Commission in 2013. For the relevant statistic topics and individual statistics, see Chapter 5, section 5.3 Climate Change statistics, Figures 5.8 and 5.9. (<http://unstats.un.org/unsd/environment/FDES/FDES-2015-supporting-tools/FDES.pdf>)

C. Need for environment statistics

20. Climate change statistics span across a great proportion of the scope of environment statistics. A critical statistical development challenge when informing about climate change lies in the insufficiently developed environment statistics domain, particularly in developing countries. In turn, this negatively affects the compilation of environmental sustainability and sustainable development indicators, as well as environmental-economic accounts.

21. The environmental pillar of sustainable development is the weakest in terms of monitoring and measurement, when compared to the economic and social pillars. This is due to the relative novelty of this statistical domain and the general insufficiency of dedicated regular resources invested in developing and strengthening environment statistics programmes at the national, regional and global levels. Environment statistics often competes with social and economic statistics for limited resources. Some countries do not yet have an established environment statistics programme. Furthermore, the production of environment statistics is often scattered across various agencies.

22. Key environment statistics needed to inform about climate change include GHG emissions, atmospheric conditions and change, use of environmental resources, forest

cover, land use change, energy (production and use, intensity, efficiency and renewability), biodiversity, water (availability, quality), waste and extreme events (occurrence and impact). The FDES identifies the necessary statistics in Chapter 5.3 on Climate Change and Environment Statistics (see section IV.A).

IV. Statistical work on climate change in Statistics Division

A. Environment statistics

23. In 2008 the Statistics Division organised two conferences on climate change and official statistics in Oslo⁶ and Seoul⁷, where the statistical implications of the emergence of climate change in the policy realm, as well as the challenges and the road ahead were discussed.

24. In subsequent meetings and workshops, the Statistics Division has produced documentation and training material describing the interlinkages among climate change and environment statistics using chapter 5.3 of the FDES and other relevant sources. This chapter adds statistical value to guide countries, as it identifies and describes the many environment statistics needed to inform about climate change, organized in the climate change sequence of events based on the IPCC framework. Countries can use

⁶ http://unstats.un.org/unsd/climate_change/default.htm

⁷ http://unstats.un.org/unsd/climate_change/Korea/default.htm

these documents as a reference to adapt and select their most relevant statistics and underlying data sets to work towards developing climate change statistics. The stages defined in sequence of climate change and its corresponding statistical topics are as follows: (a) Climate Process Drivers (which include GHG emissions and use of ozone depleting substances (ODS)); (b) Climate Change Evidence (including atmosphere, climate and weather, hydrographical characteristics and occurrence of natural extreme events); (c) Climate Change Impacts and Vulnerability (including impact of extreme events and disasters and environmental problems, human settlements, changes in land cover, biodiversity, marine and terrestrial ecosystems); and (d) Mitigation and Adaptation (energy renewability/carbon intensity, environmental protection expenditure, regulation and instruments and disaster preparedness). Each group of statistics can be used as numerators and denominators of various climate change indicators.

25. A new knowledge platform dedicated to climate change statistics is being developed on the Environment Statistics Section's website (<http://unstats.un.org/unsd/environment/climatechange.html>). It includes various documents, tools and resources including: (a) a fact sheet on Climate Change Statistics based on FDES/IPCC; (b) detailed lists of environment statistics of the Basic Set of Environment Statistics (BSES) of the FDES needed to inform about climate change organized in the FDES/IPCC sequence; (c) the Statistical Note prepared for the Open Working Group (OWG) on Sustainable Development Goals (SDGs) on climate change and disaster risk reduction; (d) relevant links to climate change-related indicators; (e) a

fact sheet about SDG13 and environment statistics; (f) a set of methodological guidance tools about climate change statistics (including methodology sheets of the BSES related to climate change, and explanations and links to the IPCC and FAO emission methodologies); (g) the CES Recommendations on Climate Change-related Statistics; (h) presentations identifying the environment statistics needed to inform about climate change; (i) links to the two international climate change and statistics conferences; and (j) an inventory of current related work on climate change statistics by partner organisations.

B. Geospatial work and the UNGGIM

26. The United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM), for which the Statistics Division is Secretariat, is the apex intergovernmental mechanism for making joint decisions and setting directions with regard to the production and use of geospatial information within national and global policy frameworks. Geospatial information is a critical tool to support national development, economic growth, improved decision making and policy formulation. It has enhanced the capability for governments, international organizations and researchers to analyse, model, monitor and report on sustainable development, climate change, disasters, and other global development challenges. As geospatial information is so integrative and cross-cutting across many sectors of industry and government, as well as

all three pillars of sustainable development, UN-GGIM does not focus specifically on climate change issues in isolation. It takes a more holistic approach to data and geospatial frameworks to build decision and policy making capacity and capability for governments. This includes national spatial data infrastructures (NSDI) and the provision of reliable and authoritative fundamental geospatial data themes – geodetic positioning, elevation, water and oceans, land use and cover, transport, infrastructure, administrative areas, population, imagery, etc. as means to support and inform national development.

27. The NSDI, supported by consistent and ‘best available’ fundamental geospatial data, provides the means to ‘organize and deliver’ core geographies for many local to global outcomes – including to measure and monitor climate change. For example, when assessing the impacts of climate change due to sea level rise or more severe meteorological events in the coastal zones of many island States, geospatial information is able to integrate and model many data inputs across many scenarios. The types of geospatial data inputs include: (a) Profile of the land: topography, bathymetry, river systems, coastline shape, geomorphology, etc.; (b) Hazard: characteristics, frequency, intensity, extent of flood/storm events, IPCC scenarios, etc.; (c) Exposure: location of people and community elements that are exposed, location of homes, buildings, critical facilities and infrastructure (roads, schools, hospitals, power, gas, water, etc.); and (d) Vulnerability: such as spatially located demographic information of the community. Where and who are the most vulnerable (children, elderly, handicapped, etc.).

28. The geospatial information becomes the vital integrator of the many disparate datasets and allows the risk or impact from climate change scenarios to be modelled, visualised and understood, and thus enables policy and decision makers to make better, more informed decisions. Such methods and approaches are being directly applied in countries to support more rigorous climate change outcomes.

C. Environment-economic accounts

29. The programme review: climate change and official statistics, prepared by the Australian Bureau of Statistics, recognized the SEEA as an important “statistical framework for climate change statistics and analysis and noted that it has considerable potential to add value in many areas of environmental-economic analysis and is a most practical way forward”.⁸ It further recommended that the mandate of the Committee of Experts on Environmental Economic Accounting be expanded to also include climate change and requested the Committee of Experts to start consultation with the UNFCCC. As a result of this request, the Committee of Experts included climate change statistics as part of its area of work on formulation of a statistical response on emerging policy

⁸ See Report of the Australian Bureau of Statistics on Climate Change and Official Statistics to the fortieth session of the Statistical Commission (E/CN.3/2009/2), para 40.

issues through the amendment of its mandate⁹ and endorsed by the Statistical Commission at its forty-first session¹⁰.

30. The SEEA Central Framework has been adopted as a statistical standard in February 2012. Together with the SEEA Experimental Ecosystem Accounting, it provides the integration framework to monitor and evaluate the drivers, impacts, mitigation and adaptation, bringing together basic statistics, including geo referenced data, through its thematic accounts statistics and indicators. The SEEA Central Framework is also accompanied by the SEEA Applications and Extensions which describes the application of the SEEA Framework for climate change statistics and analysis.

V. Climate change-related statistics work in UNECE

31. The UNECE CES launched work in 2011 to improve the use of official statistics for providing information on climate change, its drivers, impacts, mitigation and adaptation.

⁹ See United Nations Committee of Experts on Environmental Economic Accounting – Mandate and governance. Background paper 41st session of the Statistical Commission, agenda item 3(h), para 3.

¹⁰ See United Nations Statistical Commission Report

32. NSOs and environmental agencies hold a huge variety of information that, if correctly combined and evaluated, could be more useful for analysing the various aspects of climate change. UNECE is leading work to make these statistics fit for this purpose. The work is undertaken in close collaboration with NSOs, agencies in charge of emission inventories, international statistical organizations and agencies involved in measuring climate change, including UNFCCC, IPCC, World Meteorological Organization (WMO), Directorate-General for Climate Action of the European Commission, European Environment Agency (EEA), International Energy Agency (IEA), the UN Statistics Division, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Office for Disaster Risk Reduction (UNISDR) and the United Nations Population Fund (UNFPA).

33. A dedicated UNECE Task Force developed the CES Recommendations on climate change-related statistics¹¹ which the CES plenary session unanimously endorsed in April 2014. The CES Recommendations define for the first time what is meant by climate change-related statistics, and suggest a course of action to make official statistics more useful for analysing the causes and impacts of climate change, and its mitigation and adaptation efforts. The CES Recommendations define the scope of climate change-related statistics to include environmental, social and economic data that measure: (a) emissions: GHG emissions and their human causes; (b) drivers: human causes of climate

¹¹ www.unece.org/publications/ces_climatechange.html

change that deal with sources of emissions; (c) impacts: impacts of climate change on human and natural systems; (d) mitigation: efforts of humans to avoid the consequences; and (e) adaptation: efforts to adapt to the consequences.

34. The CES Recommendations suggest priorities and practical steps in three areas: (a) official statistics need to be improved to support GHG inventories as they (can) provide a substantial part of the activity data needed for GHG inventory calculation; (b) the availability and usefulness of official statistics should be improved to support analysis of climate change impacts, mitigation and adaptation efforts; and (c) this all requires a review of the current statistical infrastructure – classifications, definitions, data collections, organizational structures, knowledge, products and services – so that statistical offices can provide a suitable context for compiling climate change-related statistics. Statisticians should form new partnerships and exchange knowledge with the relevant data producers nationally and internationally.

35. Currently, the focus of the work is on the implementation of the CES Recommendations. A UNECE Steering Group was set up to guide the implementation and promote further harmonization and coherence between the greenhouse gas inventory data and official statistics. Regular UNECE Expert Forums for producers and users of climate change-related statistics will provide a platform for sharing experience, advancing work on conceptual and measurement issues, and collaborating with key

organizations involved in the measurement of climate change. The Expert Forum in September 2015 brought together experts representing NSOs, environment agencies and ministries, meteorological services, disaster risk agencies, research institutes and international organizations. Work has been started to collect practical examples and good practices to illustrate ways of implementing the CES Recommendations, and to develop a road map that allows countries to prioritize their actions to improve their climate change-related statistics in response to increasing demands from the COP21, SDGs and the Sendai Framework.

36. An area requiring further work is identifying an internationally comparable set of key climate change-related statistics and indicators using the SEEA Central Framework, the FDES 2013 and other statistical frameworks as a source of information. A dedicated Task Force is developing the indicator set. The work also takes into account the relevant indicators for the monitoring of progress towards SDGs. A draft set is expected in 2016.

37. A related issue to climate change is the measurement of extreme events and disasters. UNECE launched work through a Task Force that is working to clarify the role of official statistics in this area and identify practical steps on how NSOs can support disaster management and risk reduction. The work is being done in close collaboration with the Economic and Social Commission for Asia and the Pacific (ESCAP) Expert Group on Disaster-related Statistics in Asia and the Pacific. It will feed into the

monitoring of progress towards the Sendai Framework for Disaster Risk Reduction, agreed upon in March 2015. A final report is expected in 2017.

38. A background document from UNECE provides more detail on the CES Recommendations on climate change related statistics, and on UNECE activities in this area.

VI. The way forward

39. The COP21's produced the landmark Paris Agreement, a universal agreement that sets the path to enable humanity to combat climate change effectively and boost the transition towards resilient, low-carbon societies and economies around the globe. The Paris Agreement enhances the implementation of UNFCCC and aims to strengthen global response to the threat of climate change in the context of sustainable development and the eradication of poverty. To do so, it aims at: a) holding the increase in global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit this temperature increase to 1.5°C; recognizing that this would significantly reduce the risks and impacts of climate change; b) increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development; and c) making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development. There are to be

nationally determined ambitious contributions in terms of decreasing net emissions every five years, in order to collectively achieve the purpose of the Agreement. The contributions will be informed on and evaluated in a transparent manner. The agreement includes provisions on mitigation, adaptation and capacity building, that directly relate to the information and statistics requirements onwards and addresses the capacity building needs of developing countries, LDCs and SIDS.

40. Similarly, the SDG 13 and its targets on Climate Change will undoubtedly require the production of relevant data and statistics covering the sequence of climate change so that countries can inform on the indicators of this Goal in line with the Paris Agreement.

41. To better inform about climate change, countries and international organisations need to strengthen the production of environment statistics and promote them to the same status as economic and social statistics.

42. Countries have expressed that in order to produce more and better statistical evidence about the different aspects of both climate change and sustainable development, they need further statistical capacity building and training, according to their priorities and circumstances. They have called upon the international statistical community to provide more training and technical assistance opportunities at the national level so that they can more actively involve their institutional partners from

various national and sub-national agencies. Countries and agencies also need to regularly invest adequate resources to sustain production of these statistics as part of national statistical systems.

43. The Statistics Division of the Department of Economic and Social Affairs of the Secretariat, UNECE and partner agencies are committed to technically assisting countries, particularly developing countries, in strengthening their capacities to produce statistics on the environment and climate change. The expertise and the guidelines are available to foster these efforts. However, key statistical programmes, for example environment statistics, in international organizations face resource constraints to adequately respond to the increasing demand from countries and to assist them technically. To achieve a substantial improvement in statistics on the environment and climate change, more donor support is needed to benefit member States, in particular their NSOs and national partners.

VII. Points for discussion

44. The Statistical Commission is invited to:

- (a) Express its views on the report and discuss the way forward, in particular on the coordination of the various initiatives;**
- (b) Urge the international statistical community to expand their capacity building efforts in climate change statistics;**

- (c) Strongly encourage national statistical systems to invest in the development of climate change statistics, in particular, environment, energy, agriculture and industry statistics, in their respective countries;**
- (d) Urge the donor community to mobilise additional/substantial resources to enable capacity building in environment and climate change statistics in developing countries; and**
- (e) Express its views on the work being undertaken by the UNECE Task Force on Climate Change-Related Statistics and Indicators in particular their efforts to develop a set of climate change-related statistics and indicators, and discuss to what extent this work can serve as a basis for developing a global set of climate change statistics and indicators .**