

Capacity gaps in climate change-related statistics¹

1. Introduction

This paper highlights the capacity gaps presented in the *Conference of European Statisticians' Recommendations on Climate Change-Related Statistics*². The Recommendations note that there are wide gaps in statistical organizations' capacity, resources and mandates to compile climate change-related statistics and provide data for greenhouse gas (GHG) inventories. These shortcomings make it difficult to assess the consequences and costs of climate change, and the effectiveness of adaptation and mitigation efforts.

Countries have a number of reporting requirements under the United Nations Framework Convention on Climate Change (UNFCCC). The Annex I parties report GHG information annually³. Non-Annex I parties have less stringent requirements, to submit GHG and other relevant climate change information through National Communications⁴(NCs) periodically, until now on average every four years. However, new reporting requirements to submit Biennial Update Reports (BURs), introduced in 2011, now require non-Annex I countries to provide more frequent information and data on climate change mitigation. There is, therefore, a strong need in non-Annex I countries to strengthen their capacity and institutional arrangements to improve their climate change-related statistics. National statistical offices (NSOs) of the Annex I parties and international statistical organizations are in a good position to provide statistical capacity building and support through expert networks and sharing knowledge and experience.

The demand for data relating to climate change, apart from data relating to GHG emissions or removals, is quickly increasing. It is expected to further expand as the post-2015 development agenda with Sustainable Development Goals (SDGs) and indicators is finalized and the new climate change agreement is reached in the UNFCCC Conference of Parties (COP21) in Paris, in December 2015. Information on the effects of mitigation policies, and data on vulnerability and adaptation to climate change are becoming more and more topical.

This paper aims to summarise where the key data and capacity gaps are and how NSOs can address countries' needs for transparent, comparable and accurate statistical data on climate change. Existing international funding, such as through the Global Environment Facility (GEF) trust fund or the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (UNREDD) does not necessarily aim at strengthening NSOs' capacity to provide climate change information. Additionally, countries may not be aware of funding opportunities.

¹ Note prepared by Anna Demidovich in collaboration with Anu Peltola, UNECE, and with substantive input from the Steering Group on Climate Change-Related Statistics.

² *Conference of European Statisticians' Recommendations on Climate Change-Related Statistics*: www.unece.org/index.php?id=37166

³ Information on Parties and observers can be found at: http://unfccc.int/parties_and_observers/items/2704.php

⁴ Information on National Communications for Annex I countries can be found at: http://unfccc.int/national_reports/annex_i_natcom/items/1095.php, and for Non-Annex I countries at: http://unfccc.int/national_reports/non-annex_i_natcom/items/2716.php

Session four of the Expert Forum for the producers and users of climate change-related statistics, on 2-3 September 2015, will discuss the way forward for improving the capacities of national statistical systems to provide information related to climate change.

2. Gaps in statistical capacity and data for greenhouse gas inventories

2.1 Key capacity gaps

In many countries **official statisticians lack knowledge of the general inventory system and its data needs**. The inventory compilers may also not be aware of the wealth of data and expertise they might obtain from NSOs. Given that the statistical system holds a lot of data with relevance to emission inventory compilation, this knowledge should be improved by allocating more resources to training and capacity building.

In some countries, the capacity of national inventory systems⁵ could be strengthened by increasing **the involvement of the NSO in the inventory process**. Sometimes the NSO is not even the source of activity data, which may increase inconsistencies between reported data and statistics, and lead to duplication of data collection. NSOs which are part of the national inventory system in Annex I countries could also help NSOs in non-Annex I countries to eventually get involved in the national system in their countries through bilateral cooperation projects.

The 17th UNFCCC Conference of the Parties in Durban (2011) launched a new negotiation (the Durban Platform on Enhanced Action) resulting in new data requirements. This new framework would lead to common quality assurance rules to increase accuracy, comparability and transparency of national information on emission trends and mitigation actions across all countries, including those that currently provide only limited information on their GHG inventories.

Implementing the recently introduced biennial update reporting requires non-Annex I Parties to further develop their inventories. The report includes for instance a summary of emissions by sources and removals by sinks, a National Inventory Report, information on mitigation activities, including programmes and measures to improve monitoring, reporting and verification. Direct NSO involvement in this new process could support more robust and sustainable reporting, further ensuring international comparability according to recognized statistical standards.

2.2 Key data gaps

The *CES Recommendations* included an analysis of user needs from the viewpoint of inventory compilers, reviewers and analysts. The key data gaps include:

- For national inventory compilers: knowing what data are available from the statistical system and accessing these data at the required level of detail;
- For national inventory reviewers: matching the quality of source data with inventory data requirements, especially concerning data on waste, energy, land use and forestry;
- For national policy analysts: timeliness of data, length of time series, access to disaggregated data and possibilities of linking emissions with other statistics.

⁵ "National systems" comprise all the institutional arrangements within a country put in place to ensure the compilation of greenhouse gas emission inventories.

The *inventory review reports*, prepared annually for developed countries by international *expert review teams* (ERTs) under the UNFCCC coordination, are good information sources to learn about specific national data improvement needs. General areas for improvement noted in inventory reviews can be summarized as follows:

- **Source data:** availability, access to data, accuracy and timeliness of source data;
- **Quality of results:** completeness, level of detail, accuracy of results and consistency;
- **Communication:** transparency of methods used, documentation and archiving;
- **Methodology:** use of comparable methods, time series consistency and quality assurance;
- **Organization and capacity:** descriptions of institutional arrangements and capacity;
- **Confidentiality:** the discrepancy between the level of detail in data needed for emissions calculations and the level of detail in which data can be disseminated.

What data exactly need to be improved, depends on each country.⁶ Quality gaps in **energy statistics** have high importance for inventories, given the share of energy-related emissions in total national emissions. **Agriculture, forestry and other land use (AFOLU) data** are often regarded as an area for significant improvement, first because of significant data gaps, second because of uncertainties in the data, often influencing also the uncertainty of national totals. Furthermore, many non-Annex I countries' emissions from AFOLU are significant, often representing more than 50% of total emissions. Improved data are needed on the **production of heat and electricity for own use** by households and enterprises, and on **renewable energy sources** to facilitate analysis of their contribution to mitigating GHG emissions. It is also necessary to overcome data consistency problems by using reconciliation items. Collaboration with non-NSO institutions on data collection and dissemination in this case could prove to be useful as these institutions are often key data providers.

3. Gaps in climate change-related statistics (other than GHG)

3.1 Key capacity gaps

The *CES Recommendations* note that the demand for information on other aspects of climate change than emissions is mostly unmet, as more data is needed on social and economic impacts of climate change, mitigation and adaptation. The statistical system has a largely unused comparative advantage in the area; namely its **capacity to access large and diverse microdata sets, and to combine** various types of data relevant for climate change analysis. It is also important to improve the methodology to match data from multiple sources, such as archives, administrative sources and Big Data⁷, and to integrate these with data from sample surveys or censuses.

⁶ For more information on data gaps, see: IPCC key category analysis: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_4_Ch4_MethodChoice.pdf, and different approaches to data collection: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_2_Ch2_DataCollection.pdf

⁷ Data sets of increasing volume that are produced at a high frequency and have a high level of variety are referred to as Big Data.

This requires enhancement of NSOs' **IT capacity to improve inter-functionality** of database systems to permit the linking of different types of data from different sources.

Furthermore, internationally comparable statistics on the wider aspects of climate change are rarely available. This is another unused potential of the statistical system which has a strong **network and routines in place for developing internationally comparable statistics**, definitions, classifications and methods.

Despite several success stories in the **use of geo-referencing**, most NSOs still have limited capacity to provide geospatial data which would be a precondition for spatial analysis of the impacts of and vulnerability to climate change.

Statisticians will need to build **new kinds of expertise** to produce climate change-related statistics. This includes building capacity to produce geo-referenced data; learning new methods for dealing with spatial statistics; improving capacity to link data from multiple sources; and building substantive knowledge in climate issues. **Closer networking** with other organizations involved in climate issues would be helpful to fill these gaps.

The capacity to produce the required data is also limited by the fact that **work related to climate change is spread around many agencies**, ministries and research institutes. At the moment, most NSOs do not mention climate change as one of the statistical topics they work on even though their data and experience in coordination of statistical work would be useful.

As NSOs cannot fill in all relevant data gaps, climate change knowledge could be increased by **making data more easily available for researchers** and developing new types of services such as search-engine type of access to statistical microdata.

3.2 Key data gaps

Non-Annex I countries are now requested to report on their Nationally Appropriate Mitigation Actions (NAMAs) referring to policies and actions aimed at reducing emissions. Annex I countries have already been reporting such data since the late 1990s. Due to shortcomings in data, there are difficulties in assessing the related adaptation costs, funding and investment, which are already subject to reporting requirements or expected to be so in the near future. Therefore, new and better data will be required to estimate the **effects of mitigation policies and measures**, assess **vulnerability and adaptation to climate change**, and describe **the financial flows** relating to climate change.

Official statistics are not collected specifically for climate analysis. Therefore, contacts with users are essential for understanding their data needs. In-depth reviews of National Communications also reflect data needs for wider climate change-related statistics and can help understand country-specific data gaps. The *CES Recommendations* identified the following **key data gaps**:

- **Drivers & Impact**: access to data on economic sectors (e.g. on tourism), social issues and household energy consumption to link them with climate data;
- **Mitigation**: cost and effect of policies and measures across sectors, financial resources for mitigation and technology transfer;

- Adaptation: measures taken to minimize adverse impacts of climate change and extreme events, vulnerability estimation (for example, of the health sector and biodiversity; populations at risk), financial resources for adaptation, investment, etc.

NSOs also need to invest in improving geo-referencing of basic statistics. The relevant data would be **most useful for climate analysis if geo-referenced**:

- Socio-economic data: drivers of climate change (production, consumption), economy (gross value added, output by industries, costs, prices), employment, population (density, household structures, health, migration, urbanisation), transport, infrastructure networks and tourism, taxation and subsidies, financial support, innovation and technology diffusion;
- Biophysical data: soil (land use, vegetation, droughts, floods, soil quality), use of resources (water consumption, energy use, sources), waste generation, agriculture (crop production), extreme weather events (type, intensity, magnitude) and environmental protection (project, region).

The ability to link geo-referenced emissions data with economic statistics would **increase the analytical value of data**. This could enable research and analysis of “green” jobs; “green” economy; low-carbon industries; sustainability of energy and resource use; impacts of climate change on population, agricultural productivity, tourism, costs and prices; vulnerability of regions to the effects of climate change; as well as analysing the possible impacts of adaptation and mitigation activities.

Further, **building on existing statistics**, NSOs could improve the value of their data for climate policy work **by compiling derived indicators** from air emissions accounts; producing environmentally-extended supply-use and input-output tables to develop carbon footprint indicators; and agreeing on a set of key indicators relevant to climate change mitigation and adaptation.

4. Conclusions and recommendations

Capacity building is needed especially, but not only, in countries that have not yet produced GHG inventories, regularly or at all. Especially the capacity of low- and middle-income countries to respond to climate change-related data needs is limited. There is, therefore, an important call for closer **collaboration between NSOs to build capacity** in countries to improve the monitoring and reporting of GHG emissions, but also to promote the development of other climate change-related statistics. NSOs can play a supporting role in developing transparent, robust and sustainable national inventories and other climate change-related data provision.

There are currently **no recognized good practices for NSOs in GHG inventory compilation**, as their roles vary across countries and there is no forum for sharing experience on the topic. It would be in the interest of both NSOs and the agencies responsible for greenhouse gas inventories to consider what these good practices are. Additionally, there is a need to interact with IPCC to clarify the role of NSOs in the national inventory systems and provide practical guidance in the future GHG Guidelines. A session on the first day of the Expert Forum will consider the possible roles of NSOs in relation to inventory compilation as part of the work towards “responding to data needs of the climate agreement”.

A good starting point for improving NSOs' contribution to inventory compilation would be to draft, together with the agencies responsible for greenhouse gas inventories and as suggested in the *CES Recommendations*, **a list of national priorities and a road map on national data gaps and development needs for inventories**. Peer NSOs or international organizations, including the Conference of European Statisticians and the United Nations Statistical Commission could possibly support this work.

The UNECE Task Force on a set of key climate change-related statistics, launched in October 2014, is expected to take the first steps to develop **an internationally comparable key set** of indicators on the wider aspects of climate change. Further work may also be needed to agree on comparable definitions and methods to be applied.

A lot needs to be done to **improve geo-referencing**, starting by increasing the number of statistical variables that are geo-referenced. A key issue will also be to ensure the quality of geo-referencing. This gap is first being addressed by the United Nations Statistics Division (UNSD), which established an expert group composed of representatives of both the statistical and geospatial communities to develop a global standard for the integration of statistical and geospatial information. In addition, all NSOs need to invest in this work to actually increase the amount of geo-referenced data.

Countries would benefit from having a mechanism for improving the capacity of national statistical systems to provide climate change-related information. Since NSOs form an international network for statistical development and sharing of experience, their network would be a valuable platform for such capacity building work.

The following issues could be discussed at the Expert Forum, at session four on capacity building:

- a) What are the most important gaps for which capacity building should be provided first?
- b) How to organize possible capacity building activities? Who should be involved? How to find sources of funding for capacity building?
- c) How to use the forums, expert groups and networks to support capacity building?
