2 March 2017

English only
*(A summary document carrying symbol **ECE/CES/2017/3** is available in English, French and Russian on the CES 65th plenary session webpage)*

Economic Commission for Europe

Conference of European Statisticians

Sixty-fifth plenary session
Geneva, 19-21 June 2017
Item 7 (c) of the provisional agenda
Set of key climate change-related indicators

Set of key climate change-related statistics and indicators using the System of Environmental-economic Accounting

Note by the Secretariat

Summary

The document presents for your comments the final report of the *Task Force on a set of key climate-change-related statistics using the System of Environmental-Economic Accounting*.

The deadline for replies is **24 March 2017**. Please send your comments using the attached feedback questionnaire to michael.nagy@unece.org.

Subject to the positive outcome of the consultation, the report will be submitted to the 2017 CES plenary session (19-21 June, Geneva) for endorsement.

Contents

I. Executive summary

1. The *Task Force on a set of key climate change-related statistics using the System of Environmental-Economic Accounting* (SEEA) was created by the CES Bureau in 2014, based on a proposal for follow-up work identified in the Conference of European Statisticians' (CES) *Recommendations on Climate Change-related Statistics* (UNECE, 2014). Members of the Task Force represented the National Statistical Offices (NSOs) of 10 countries, and 8 international organisations[1]. The United Nations Economic Commission for Europe (UNECE) provided the secretariat of the Task Force. The work of the Task Force was guided and overseen by the CES Steering Group on Climate Change-related Statistics.

2. The objective of the Task Force was to define an internationally comparable set of key climate change-related statistics and indicators that can be derived from SEEA (to the extent possible) and other sources, such as the UN Framework for the Development of Environment Statistics (FDES). The work took into account the UN Sustainable Development Goals (SDGs), the Sendai Framework on Disaster Risk Reduction (Sendai Framework) and the requirements under the United Nations Framework Convention on Climate Change (UNFCCC), including, as appropriate, the recent Paris Agreement (agreed at COP21 in December 2015 and entered into force on 4 November 2016).

3. By applying a selection procedure that takes into consideration three criteria, relevance, methodological soundness and data availability the Task Force identified a set of 39 core[2] climate change-related indicators for five main areas:

- Drivers: 8 indicators
- Emissions: 7 indicators
- Impacts: 13 indicators
- Mitigation: 6 indicators
- Adaptation: 5 indicators

4. Nine of the proposed indicators are SDG indicators (or conceptually identical) and four are indicators which were derived from the recommended global indicators for measuring the targets of the Sendai Framework on Disaster Risk Reduction. Twenty two of the proposed indicators can be produced from accounts of the SEEA-Central Framework (SEEA-CF), several other indicators are related to SEEA Experimental Ecosystem Accounting (SEEA-EEA).

5. A survey among CES Member States showed that at least 15 of the indicators are already produced in more than 50% of the countries.

6. In March 2016, the UNECE work on climate change-related statistics was presented at the 47th Session of the United Nations Statistical Commission (UNSC). UNSC requested the UN Statistics Division to review and consider the work of the

---

[1] Italy (chair), Canada, Kyrgyzstan, Luxembourg, Mexico, Netherlands, Philippines, Romania, Russian Federation, Turkey, the European Environment Agency (EEA), the United Nations Food and Agriculture Organization (FAO), the Organisation for Economic Co-operation and Development (OECD), the Statistical Office of the European Union (Eurostat), the United Nations Environment Programme (UNEP), the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Population Fund (UNFPA) and the United Nations Statistics Division (UNSD).

[2] Considering the final number of selected indicators (39) and following the terminology used in other indicator frameworks (such as the OECD Environmental Indicators, OECD, 2003), the term 'core climate change-related indicators' was used for 'key' climate change indicators.

Task Force as a basis for developing a global set of climate change statistics and indicators, applicable to countries at various stages of development (see United Nations, 2016c).

7.   The Task Force suggests to continue its work to support pilot implementation of the set of 39 core indicators, develop further the methodologies, and develop operational and contextual indicators to accompany the recommend set of core indicators. The Task Force would also contribute to the development of a global set of climate change statistics and indicators.

II.   Introduction

8.   This final report presents the results of the work of the Conference of European Statisticians' (CES) Task Force on a set of key Climate Change-related Statistics using the System of Environmental-Economic Accounting (SEEA).

9.   The *Task Force on a set of key Climate Change-related Statistics using SEEA* was created by the CES Bureau in 2014, based on a proposal for follow-up work identified in the *CES Recommendations on Climate Change-related Statistics* (UNECE, 2014).

10.   The objective of the Task Force was to define an internationally comparable set of key climate change-related statistics and indicators that can be derived from SEEA (to the extent possible) and other sources, such as the UN Framework for the Development of Environment Statistics (FDES). The work took into account the UN Sustainable Development Goals (SDGs), the Sendai Framework on Disaster Risk Reduction (Sendai Framework) and the requirements under the United Nations Framework Convention on Climate Change (UNFCCC), including, as appropriate, the recent Paris Agreement (agreed at COP21 in December 2015 and entered into force on 4 November 2016).

11.   Members of the Task Force represent the National Statistical Offices (NSOs) of Italy (chair), Canada, Kyrgyzstan, Luxembourg, Mexico, Netherlands, Philippines, Romania, Russian Federation and Turkey. Furthermore, the following international organisations are members of the Task Force: the European Environment Agency (EEA), the Food and Agriculture Organization of the United Nations (FAO), the Organisation for Economic Co-operation and Development (OECD), the Statistical Office of the European Union (Eurostat), the United Nations Environment Programme (UNEP), the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Population Fund (UNFPA) and UNSD.

12.   To limit the size of the set, the Task Force decided at an early stage that the set of key climate change-related indicators should consist of maximum 40 indicators which serve multiple purposes:

    (a)   Painting the picture of the most relevant climate change-related issues;

    (b)   Addressing most relevant current policy questions;

    (c)   Helping to meet upcoming information needs.

13.   In March 2016, the UNECE work on climate change-related statistics was presented at the 47th Session of the United Nations Statistical Commission (UNSC). UNSC requested the UN Statistics Division to review and consider the work of the Task Force as a basis for developing a global set of climate change statistics and indicators, applicable to countries at various stages of development (see United Nations, 2016c).

III. Climate change-related statistics: Scope and relevant policy and statistical frameworks

14. One of the main starting points for developing the set of climate change-related indicators presented here are the *CES Recommendations on Climate Change-related Statistics (CES Recommendations)*. Section 0 in this chapter summarises the main issues covered in the CES Recommendations, including the definition of climate change-related statistics. The definition of the scope of climate change-related statistics in the CES Recommendations was an important step towards clarifying the data needs of national and international climate change-related policy frameworks and the role of NSOs in addressing those needs.

15. Understanding data needs of international policy frameworks is a prerequisite for the identification of a set of climate change-related indicators. Section 0 presents the most relevant recent climate change-related global policy initiatives and the related indicator frameworks:

- Sustainable Development Goals (SDGs)

- Sendai Framework for Disaster Risk Reduction (Sendai Framework)

- Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC)

16. In addition to identifying the potential demand for data on climate change, an internationally comparable set of indicators also needs to take into account the main reference frameworks for supplying the data. Section 0 describes the main statistical frameworks for the production of climate change-related statistics and indicators: the System of Environmental-Economic Accounting and the UN Framework for the Development of Environment Statistics.

A. Scope of climate change-related statistics

17. The CES Recommendations provide recommendations for improving the statistics related to climate change collected by national statistical systems and enhancing their utility for the compilation of greenhouse gas (GHG) emission inventories. While the CES Recommendations are aimed primarily at official statisticians, they are also intended as a tool to promote discussions with stakeholders, including agencies responsible for greenhouse gas emission inventories and other producers and users of climate change-related statistics.

18. The CES Recommendations address the following issues in detail:

- Improving the utility of official statistics for the compilation of GHG emission inventories;

- Improving the utility of official statistics for carrying out climate change-related analysis more generally; and

- Improving operational and statistical infrastructures to better support the production of official climate change-related statistics.

19. The Recommendations also provide a list of proposed next steps and unresolved issues, which include defining a set of key climate change-related statistics.

20. The scope of climate change related statistics is defined in the Recommendations as follows: "Environmental, social and economic data that measure the human causes of climate change, the impacts of climate change on human and natural systems, the efforts of humans to avoid the consequences as well as their efforts to adapt to the consequences".

21.   To narrow the scope in the context of the statistical system, it was recommended to focus on environmental, social and economic statistics that measure the following five climate change-related areas:

(a)   Drivers: human causes of climate change that deal with sources of emissions;

(b)   Emissions: GHG emissions and their human causes;

(c)   §Impacts: impacts of climate change on human and natural systems;

(d)   Mitigation: efforts of humans to avoid the consequences;

(e)   Adaptation: efforts to adapt to the consequences.

22.   The scope identified in the CES Recommendations and the five areas listed above were the starting point for the selection of the set of key climate change-related statistics and indicators (see chapter 0).

B.   Global policy initiatives related to climate change

1.   United Nations Sustainable Development Goals

23.   The 2030 Agenda for Sustainable Development was approved by the United Nations in 2015, setting 17 Goals and 169 targets for the eradication of poverty and the achievement of sustainable development. In March 2016 the 47th Session of the United Nations Statistical Commission (UNSC) agreed to a Global Indicator Framework, specifying 230 indicators for measuring progress towards the Sustainable Development Goals. SDG goal 13 ("Take urgent action to combat climate change and its impacts") is dedicated to climate change, but climate change related issues can be found also in other SDGs and targets.

24.   SDG goal 13 has the following five targets:

- 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

- 13.2 Integrate climate change measures into national policies, strategies and planning

- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

- 13.a Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible

- 13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

25.   The following seven indicators were agreed by the UNSC to measure progress in achieving the above mentioned targets:

- 13.1.1 Number of countries with national and local disaster risk reduction strategies

- 13.1.2 Number of deaths, missing persons and persons affected by disasters per 100,000 people

- 13.2.1 Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and lower greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)

- 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula

- 13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions

- 13.a.1 Mobilized amount of United States dollars per year starting in 2020 accountable towards the $100 billion commitment

- 13.b.1 Number of least developed countries and small island developing States that are receiving specialized support, and amount of support, including finance, technology and capacity-building, for mechanisms for raising capacities for effective climate change-related planning and management, including focusing on women, youth and local and marginalized communities.

26.   Taking urgent action on climate change and its impacts is recognised as integral to the implementation of all SDGs. The following SDG targets relate specifically to climate change:

- 1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters;

- 2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality;

- 3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks;

- 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix;

- 7.3 By 2030, double the global rate of improvement in energy efficiency;

- 7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology;

- 7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support;

- 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of

clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities;

- 11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels;

- 12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities;

- 14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels;

- 15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

2. Sendai Framework for Disaster Risk Reduction 2015 – 2030

27. The *Sendai Framework for Disaster Risk Reduction 2015-2030* (Sendai Framework) was adopted at the Third UN World Conference in Sendai, Japan, in March 2015. It is the outcome of stakeholder consultations initiated in March 2012 and inter-governmental negotiations from July 2014 to March 2015, supported by the United Nations Office for Disaster Risk Reduction at the request of the UN General Assembly.

28. The Sendai Framework is the successor instrument to the *Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters*. The HFA was conceived to give further impetus to the global work under the International Framework for Action for the International Decade for Natural Disaster Reduction of 1989, and the Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation and its Plan of Action, adopted in 1994 and the International Strategy for Disaster Reduction of 1999.

29. The Sendai Framework has seven global targets. These targets will be measured at the global level and will be complemented by work to develop appropriate indicators. National targets and indicators will contribute to the achievement of the outcome and goal of the present Framework. The seven global targets are:

(a) Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rate in the decade 2020–2030 compared to the period 2005–2015;

(b) Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020–2030 compared to the period 2005–2015;

(c) Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030;

(d)   Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030;

(e)   Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;

(f)   Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the present Framework by 2030;

(g)   Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

30.   On 3 June 2015 the United Nations General Assembly adopted the establishment of the *Open-ended Intergovernmental Expert Working Group on indicators and terminology relating to disaster risk reduction* (OEIWG) via resolution 69/284. In three meetings held between September 2015 and November 2016, OEIWG developed the set of indicators to measure global progress in the implementation of the Sendai Framework and agreed on the related terminology.

31.   The report of OEIWG (Advance Unedited Version A/71/644):

- recommends 38 global indicators to measure the seven global targets of the Sendai Framework;

- recommends definitions for important terms and suggests a classification of hazards.

32.   Important in the context of climate change are the following definitions:

- **Disaster:** A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.

- **Hazard:** A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.

33.   Hazards include (as mentioned in the Sendai Framework) biological, environmental, geological, hydro-meteorological and technological processes and phenomena.

34.   The task force decided to consider only hydro-meteorological hazards (and their impacts) as relevant for the identification of climate change-related indicators. This class of hazards is defined as follows:

Hydro-meteorological hazards are of atmospheric, hydrological or oceanographic origin. Examples are tropical cyclones (also known as typhoons and hurricanes), floods including flash floods, drought, heatwaves and cold spells and coastal storm surges. Hydro-meteorological conditions may also be a factor in other hazards such as landslides, wildland fires, locust plagues, epidemics, and in the transport and dispersal of toxic substances and volcanic eruption material.

3.   Paris Agreement

35.   At the 21st Conference of the Parties (COP 21) in Paris (December 2015), the countries that are Parties to the United Nations Framework Convention on Climate Change reached a new, historic agreement on accelerating and intensifying the efforts to combat climate change. The Paris Agreement builds upon the Climate Change Convention. The work to develop modalities, rules and procedures for the implementation of the Paris Agreement will utilize the rich experience with the

reporting and review/analysis of climate-related information and data under UNFCCC. The Paris Agreement requires all Parties to put forward their best efforts to address climate change through "nationally determined contributions" (NDCs) and to strengthen these efforts in the years ahead. This includes the requirement that all Parties report regularly on their emissions and implementation efforts. There will also be a global stocktake every five years to assess the collective progress towards achieving the purpose of the agreement and to inform further individual actions by Parties. Following COP21, the ratification of the Paris Agreement at national levels unfolded at an unprecedented pace. The Agreement entered into force on 4 November 2016, thirty days after the date on which at least 55 Parties to the Convention accounting in total for at least an estimated 55 % of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the Depositary.[3]

36.   COP is only starting to define the technical requirements emerging from the Paris Climate Agreement. Therefore, the data requirements are not fully known yet. The requirements are likely to build on the existing reporting and review processes under UNFCCC, and therefore the existing experience and established national processes are likely to remain valid, with some necessary changes.

37.   The reporting will require data on GHG emission inventories, and data relating to mitigation measures and their effects, vulnerability and adaptation, as well as data on (provided and received) support for climate action. The requirement to prepare and submit NDCs and other communications is a new, important element of the reporting under UNFCCC as is the global stocktake under the Paris Agreement.

C.   Statistical frameworks supporting the production of climate change-related statistics

1.   System of Environmental-Economic Accounting

38.   The System of Integrated Environmental and Economic Accounting – Central Framework (SEEA-CF), has been developed collectively by the United Nations, the European Commission, the International Monetary Fund, the Organisation for Economic Cooperation and Development and the World Bank to integrate environmental and economic information in one common framework. In 2012 the United Nations Statistical Commission approved SEEA-CF as a statistical standard for environmental accounting and encouraged all countries to compile their environmental-economic accounts on the basis of it as well as to report statistics derived from it. An important characteristic of environmental accounting is that the data are consistent with the System of National Accounts (SNA) principles, definitions and classifications.

39.   Environmental accounting can be used to monitor and analyse a wide scale of environmental issues, including climate change, although no specific account for climate change exists within SEEA-CF.

40.   SEEA-CF presents the environmental accounts under three main accounts:

(a)   Physical flow accounts, recording the supply of resources - e.g. minerals, timber, fish - from the environment to the economy, the flows of products within the economy and the flows of residuals from the economy to the environment in the form of, for example, solid waste and air emissions;

---

[3] More information about the Paris Agreement is available on the UNFCCC website at http://newsroom.unfccc.int/paris-agreement/

(b)   Environmental activity accounts and related flows, concerning the monetary transactions between economic units whose primary purpose is environmental protection and preservation;

(c)   Asset accounts, measuring in quantity as well as monetary units, the stock of a specific environmental asset at the beginning and at the end of the accounting period and the changes (additions and reductions) during the accounting period; examples are asset accounts for land.

41.   All three types of accounts can be used to analyse climate change related issues, for example: physical flow accounts allow to identify GHG emissions caused by economic activities and households, the accounts for monetary transactions include expenditure for actions and activities to reduce, prevent or eliminate GHG emissions, water asset accounts describe the changes in precipitation regimes and their implications for water stocks.

2.   United Nations Framework for the Development of Environment Statistics

42.   The United Nations Framework for the Development of Environment Statistics is a multipurpose conceptual and statistical framework that provides an organizing structure to guide the collection and compilation of environment statistics.

43.   Due to its large coverage, FDES is a valuable tool providing a set of environmental topics and individual statistics to inform on climate change. FDES consists of six main components, each of which includes some climate-change related data:

(a)   environmental conditions and quality, which includes for example air temperature or precipitation;

(b)   environmental resources and their use, which includes land use change or non-renewable production;

(c)   residuals, which includes GHG released to the atmosphere;

(d)   extreme events and disasters, which includes the impact of droughts or floods;

(e)   human settlements and environmental health, which includes data on epidemic changes;

(f)   environmental protection, management and engagement, which includes cost of climate change mitigation and adaptation measures.

44.   Climate change-related statistics contained in FDES have already been identified and the results have been published as a cross-cutting application of FDES in section 5.3 of the document titled "Climate Change".

45.   In FDES, climate change-related statistics are organised in four blocks which are based on the sequence of climate change-related events used by the Intergovernmental Panel on Climate Change (IPCC):

- Climate process drivers
- Climate change evidence
- Climate change impacts and vulnerability
- Mitigation and adaptation

IV. Methodological approach for the selection of climate change-related statistics and indicators

A. Basic principles: hierarchical approach and definitions

46. As first step the Task Force agreed on a set of basic principles for its work, including the main terminology and the hierarchical relationship between the CES framework, policy questions, indicators and data sources (statistics and other data) (see Figure 1).

47. The basis for developing the methodology of indicator selection were the CES Recommendations and its five areas that define the scope of climate change related statistics (presented in the first row of Figure 1).

48. As a first step, the Task Force looked at policy questions and grouped the 'policy questions and other information demand' into the five areas to identify the data needs related to climate change (second row of Figure 1, 'PQ'). The relation between the areas of climate change-related statistics and policy questions is 1:n.

49. The policy questions are further broken down to indicators and the required underlying data. One or more policy indicators are needed to reply to a policy question (1:n relation) and more than one data source may be needed to inform an indicator (m:n relation). For each of the indicators the underlying data can originate from SEEA, other official statistics, or from data which is not part of the statistical system. In some cases the required data might not be available.

Figure 1
Hierarchical relationship of the scope of climate change-related statistics (CES Framework), policy questions and other information demand, Indicators and data sources (statistics and other data).

The boxes with "…" are placeholders for the two areas impacts and adaptation, their policy questions and indicators (which are not displayed due to space limitations)
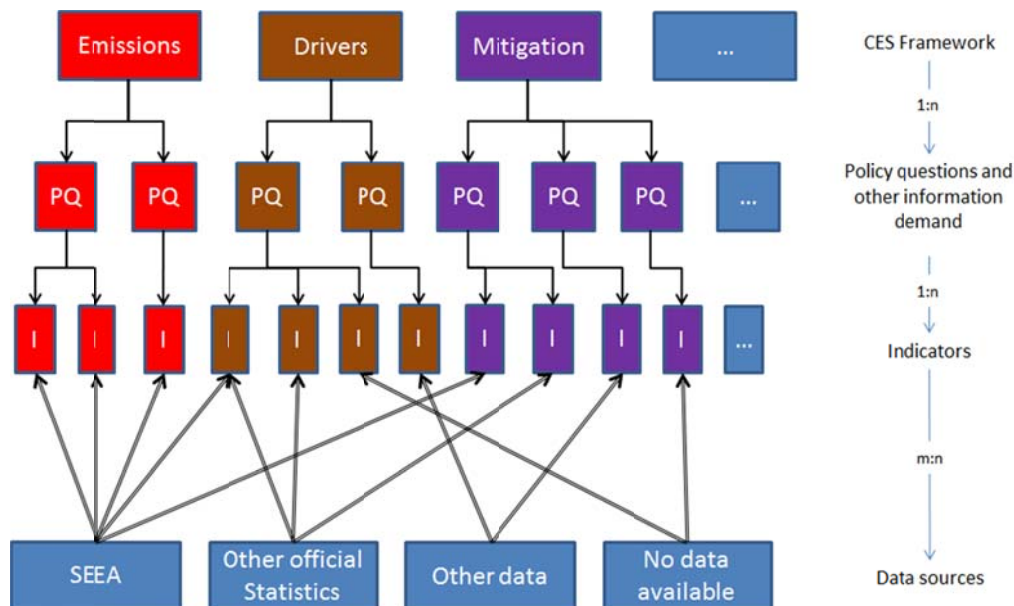
50. The Terms of Reference of the Task Force use the terms "key climate change-related indicators" and "key climate change-related statistics" for which

clear definitions were needed. The Task Force agreed on the following two definitions:

(a)   Key climate change-related indicators were defined as indicators which are needed to respond to key climate change policy questions and which help to paint the big picture of climate change-related phenomena. The latter takes into consideration that policy questions might change over time, but the set of key climate change-related indicators must be more resilient. Considering the final number of selected indicators (39) and following the terminology used in other indicator frameworks (such as the OECD Environmental Indicators, OECD, 2003), the term core climate change-related indicators was adopted for 'key' climate change indicators. This term will be used in the remainder of this report. According to OECD (2008), key indicators would be a shortlist of the chosen core indicators to inform civil society and to support wider communication with the public. This shortlist could be identified once the selected core climate change-related indicators have been pilot tested.

(b)   Key climate change-related statistics were defined as those basic statistics, which are needed to derive the core climate change-related indicators and those statistics which are needed to compile emission inventories. In analogy with the term "core indicators" the report uses the term core climate change-related statistics in the report.

51.   Inspired by Eurostat's publication *Towards a harmonised methodology for statistical indicators* (Eurostat, 2014) the Task Force suggests to develop an accompanying set of operational and contextual indicators, which can better address more specific information needs and provide a certain context:

(a)   Operational indicators include indicators providing a sectorial or spatial breakdown of a given core indicator (e.g. GHG emissions per economic activity);

(b)   Contextual indicators provide important background information (e.g. consumption of fossil fuels as contextual information for a core indicator on GHG emissions).

52.   Identifying operational and contextual indicators was not in the scope of the activities of the Task Force and is one of the proposed follow-up activities (see chapter 6.

B.   Selection procedure

53.   The selection procedure for the core climate change-related indicators included the following steps:

(a)   Identification of a first set of policy questions and related indicators derived from the most important climate change-related frameworks, studies, reports and international and national climate change-related indicator sets (e.g. the targets and their proposed indicators or the climate change indicators of the European Environment Agency (EEA)) (see chapter 0 for a full list of reference documents). 140 policy questions and 205 related indicators were identified in this step.

(b)   Grouping the policy questions under the so-called "umbrella questions" with a broader scope; this reduced the 140 policy questions to 39 umbrella questions. Each umbrella question was assigned to one of the five areas - drivers, emissions, impacts, mitigation and adaptation.

(c)   Ranking the set of umbrella questions by relevance; the ranking was the output of a survey presented to the participants of the Expert Forum for producers and users of climate change-related statistics (Geneva, 2-3 September 2015).

(d)   Selection of a preliminary set of core indicators related to policy questions with higher ranking on the basis of the criteria specified in the Eurostat (2014) methodology for the identification of headline indicators: relevance, soundness and measurability. Whenever possible, indicators having high relevance, sound methodology and high measurability (i.e. data availability) were selected as core indicators.

However, the Task Force acknowledged that for several policy relevant indicators either no internationally agreed methodology exists and/or data availability is poor. Given the high relevance of these indicators for policy makers, and to encourage countries to initiate data production, both the Expert Forum on Climate Change-related Statistics and the UN Committee of Experts on Environmental-Economic Accounting (UNCEEA) encouraged the Task Force to keep all relevant indicators in the set and recommended further work to develop methodologies and data sources. Therefore, also indicators without internationally agreed methodologies and/or poor data availability were kept in the list of indicators. The different degree of maturity of the selected indicators is identified by means of a "tier approach" similar to the one used for SDG indicators (see section 0).

(e)   Split of the 5 areas (drivers, emissions, impacts, mitigation adaptation) into sub-area**s** (see section 0), which represent the most relevant themes per area; the aim of the sub-areas was to improve the comprehensiveness of the set, with a view to develop a coherent set of indicators, painting the "(big) picture of climate change-related issues". In the case of sub-areas with no core indicators originating from the steps above, the Task Force tried to fill gaps with appropriate indicators which had been identified at earlier steps.

(f)   Further revisions were carried out based on feedback received from the Steering Group and UNCEEA.

54.   As a result of the steps described above, by July 2016 the Task Force had identified 39 core climate change-related indicators (8 indicators for drivers, 7 for emissions, 13 for impacts, 6 for mitigation, and 5 for adaptation). A survey on data availability for these indicators in CES member countries was carried out in August/September 2016. The 41 responses were used for a final review and to identify issues related to implementation and follow-up work. Before presenting the final list of indicators (see chapter 0), the next section describes some basic methodological choices taken during the selection procedure.

C.   Specific methodological choices

1.   Coverage issues

A.   *Disaggregation*

55.   Some indicators can be broken down according to different parameters (e.g. economic activities or products), e.g. GHG emissions for selected economic activities or households. The Task Force recommended as a general rule to classify these kinds of indicators (the sectorial breakdowns) as operational or explanatory indicators rather than core indicators and to exclude them from the list of selected core indicators.

B.   *Relevant indicators without agreed international methodology or where data are lacking*

56.   As described in section 0, core indicators were selected from among those having high relevance, sound methodology and high measurability (i.e. data availability). However, for a number of highly relevant indicators, methodological soundness and/or measurability are not rated high. Examples are the share of climate

change-related subsidies and similar transfers per GDP and share of climate change mitigation expenditure to GDP where data are available only for a few countries. In these latter two cases, the Task Force considered these as very important mitigation indicators that should remain in the list of core indicators. The same applies to indicators referring to adaptation expenditures which are important, but not well defined. To keep these indicators among the set while at the same time identifying the different features of indicators, a tier approach used for SDG indicators was introduced:

- Tier 1: Indicator conceptually clear, established methodology and standards available and data regularly produced by countries.

- Tier 2: Indicator conceptually clear, established methodology and standards available but data are not regularly produced by countries.

- Tier 3: Indicator for which there are no established methodology and standards or methodology/standards are being developed/tested.

57.   Data availability can be heterogeneous in countries, depending on national circumstances. For the purposes of this work data availability is ranked high when several countries (but not necessarily all) produce the data. For other countries the list of core indicators could provide an incentive for starting to produce the necessary data on a regular basis.

C.   SDG indicators

58.   The Task Force took into account SDGs and relevant issues raised in the context of the 2030 Agenda both in the process and in the outcome of the work. In the process, the Task Force considered all the proposed SDG indicators (February 2015) which were related to climate change in the initial set of 205 indicators. The set was later checked against the final list of SDG indicators (March 2016). As an outcome, the set of core climate change-related indicators includes a number of SDG indicators. However, all climate change-related SDG indicators are not automatically part of the set of core climate change-related indicators. Reasons for that are:

- Several of the climate change-related indicators are global indicators, which cannot be applied on the national level.

- The criteria for the selection of SDG indicators are different from those for the set of core climate change-related indicators.

- Many of the proposed SDG indicators are climate change-related but focus on one specific topic (such as poverty or health). Therefore, they do not qualify as core indicators according to the chosen criteria, but would rather qualify as explanatory or operational indicators.

- Taking all of them on board in the set of core indicators would lead to a much bigger set and the indicators would be unevenly distributed across the five main areas. This would also undermine some of the agreed concepts (such as the criteria of relevance, soundness and measurability, or providing activity breakdowns only according to ISIC).

2.   Data sources: dual measurement

59.   The terms of reference of the Task Force explicitly mention that the internationally comparable set of key climate change-related statistics and indicators should be derived from the System of Environmental-Economic Accounting and other sources.

60.   For indicators related to air emissions and energy the choice of the data source is not straightforward. In the case of indicators related to air emissions, on the

one hand SEEA based data availability is improving since more and more countries are implementing SEEA Air Emission Accounts. On the other hand most international and national GHG-related policy targets and their measurement refer to GHG inventories reported under UNFCCC. These GHG inventories record GHG emissions on the national territory (territorial principle) and use a specific sector classification. SEEA Air Emission Accounts follow the residence principle (emissions are allocated to the country of residence, even if it physically happens outside the national territory) and activities are classified according to the ISIC economic activity classification. When deciding on the recommended data source for the core set of indicators (GHG inventories or SEEA Air Emission Accounts), the following should be taken into consideration:

(a)   The indicator should be defined on the information need rather than the underlying data sets. Climate change-related information needs can refer to both GHG emissions on the national territory (e.g. GHG reduction goals usually refer to emissions generated on the national territory) and GHG emissions of its resident entities (e.g. GHG emission intensities and carbon footprint can benefit from statistics following the residence principle)

(b)   There is an ongoing process to align SDG indicators with SEEA.

(c)   Conceptual differences between GHG inventories and SEEA Air Emission Accounts can be shown via bridge tables.

(d)   Any sectorial breakdown which is not compliant with ISIC will hinder further data integration (e.g. with economic statistics) and would not be in line with international statistical frameworks (such as SEEA or FDES).

(e)   SEEA Air Emission Accounts are among the priority accounts to be implemented (priority by international organisations and many countries). If SEEA Air Emission Accounts are recommended as data source for certain core climate change-related indicators, it could be an incentive for countries to start or accelerate the implementation.

61.   Similar issues apply to energy-related indicators: energy data can originate either from energy balances of the International Energy Agency (IEA) following the territorial principle and a specific industry classification, or national energy statistics and/or SEEA Energy Accounts that follow the residence principle and ISIC.

62.   Taking into consideration the above, and comments received from UNCEEA and the Steering Group, the Task Force adopted a dual approach: for all indicators that can be derived also from other sources than SEEA a dual measurement should be foreseen in the short term. This is consistent with the ongoing process of aligning SDG indicators with SEEA.

3.   **Thematic coverage within the five areas (drivers, emissions, impacts, mitigation and adaptation) and links between the areas**

63.   One of the goals of the list of core indicators was to "paint the (big) picture of the most relevant climate change-related issues". Considering the small number of core indicators to be selected, it was critical to sub-divide each of the five areas into thematic sub-areas of highest priority and to find at least one indicator representing each sub-area. By using identical sub-areas across the five areas (as far as possible) conceptual links between the areas can be shown. However, for drivers and emissions it was decided to only distinguish between production, consumption and national total[4]. A further disaggregation of drivers and emissions according to

---

[4] "National total" in the context of drivers and emissions means that both production and consumption activities are included in the indicator.

economic activities would have resulted in either a large set of indicators or, when using only a small set of indicators, in imbalances when comparing countries with a different socio-economic structure (which have different main drivers for GHG emissions). The chosen sub-areas per area are presented in the following Table 1:

Table 1
Areas and sub-areas of climate change-related indicators [5]

Sub-areas	Areas				
	Drivers	Emissions	Impacts	Mitigation	Adaptation
National total	X	X			
Production	X	X			
Consumption	X	X			
Physical conditions			X		
Land, land cover, ecosystems and biodiversity			X		
Extreme events and disasters			X		
Water resources			X		X
Human settlements and environmental health			X		X
Agriculture, forestry and fishery			X		X
Expenditures				X	X
Energy resources				X	
Environmental governance and regulation				X	

4. Special case: adaptation indicators

64. Selecting indicators for climate change adaptation proved to be challenging since there is no internationally harmonised set of adaptation indicators available. After consulting with experts of the European Environment Agency (EEA) and UNFCCC different opinions emerged on how to develop a set of adaptation indicators. As an interim solution the Task Force agreed on the following principles:

- To adopt the EEA conceptual distinction of process-based and outcome-based indicators[6],

- To show the close relation between impact and adaptation indicators by using the same set of sub-areas (see Table 1 above);

- To present outcome-based indicators in the area "impacts" only without repeating them in the adaptation area. Ideally, there would be a pair of indicators (a process-based one under adaptation and a corresponding outcome-based one under impact); however, this was not possible in all cases for practical reasons. Therefore, the pairing is mainly represented by using the same sub-areas as explained above.

65. To find appropriate adaptation indicators, the following steps were taken:

---

[5] X indicates that this particular sub-area is used for the area shown in the column and at least 1 core indicator could be found; grey cells indicate that this particular sub-area does not apply for the area in the column

[6] The framework for developing adaptation indicators (EEA, 2009) shows the relationship between adaptation indicators that are process-based (i.e. indicators for monitoring the development of adaptation policies and measures) and those that are outcome-based (i.e. indicators for measuring the effectiveness of adaptation actions, which are themselves determined by policies and measures). Process-based indicators can be differentiated into 'adaptation policy indicators' and 'adaptation measure indicators'.

(a)   The starting point for identifying a set of adaptation indicators were the sub-areas. They defined which kind of information (i.e. indicators) should be available.

(b)   A literature review was carried out (as recommended by the European Environment Agency: UK adaptation indicators, German Strategy for Adaptation to Climate Change and an EEA technical paper for the development of adaptation indicators).

(c)   Some sub-areas were added based on the literature review.

(d)   Finally, appropriate indicators for each sub-area were taken from the list of indicators collected by the Task Force at the beginning of its work and the above-mentioned literature.

66.   It was not possible to find appropriate indicators for all sub-areas.

67.   The Task Force acknowledged that more work is needed by international organisations to develop a set of internationally agreed indicators on climate change adaptation. The proposed set of core adaptation indicators may contribute to this work and may be revised at a later stage.

5.   Number of core indicators, spatial and temporal references

68.   The Task Force set the total maximum number of core indicators at 40. An important target was to find at least one indicator per sub-area. An even distribution across the five areas (drivers, emissions, impacts, mitigation, adaptation) was not deemed crucial. The actual distribution, with a larger number of indicators for the 'impact' area, is due to the specific features of this area.

69.   The spatial reference of the indicators is national and the temporal reference is annual. A better consideration of sub-national and seasonal phenomena, where relevant, can be part of future work (see chapter 0).

D.   Role of SEEA Central Framework (SEEA-CF) and FDES in the selection procedure

1.   SEEA-CF

70.   Consistently with the Task Force's mandate (see Annex I) that explicitly mentions SEEA as one of the main sources, SEEA was used in the selection procedure during three steps:

- First, SEEA-CF was thoroughly analysed to identify policy questions and related indicators. In particular the UNCEEA paper *SEEA as a framework for assessing policy responses to climate change* (Statistics Netherlands, 2010) provided an important source for policy questions and possible indicators derived from the SEEA Central Framework;

- Second, the corresponding SEEA account was identified for all the selected policy questions and related indicators. The link is also maintained in the survey on data availability carried out in summer 2016 (see section 0);

- Third, following the Terms of Reference of the Task Force and the recommendations of UNCEEA (June 2016), SEEA was used as a basis for all indicators, where feasible. For all indicators that can be derived also from other sources than SEEA a dual measurement is foreseen in the short term. This is consistent with the ongoing process on aligning SDG indicators with SEEA.

71.   The main reasons for using SEEA as a basis for the indicators are the SEEA's specific features presented in section 0 and the need to ensure the harmonisation of the indicator compilation between countries. Additional reasons relate to the possible future extension of the current list of indicators to include operational indicators.

72.   In this regard, SEEA provides a suitable framework for identifying operational indicators since the ISIC breakdown of several SEEA accounts allows integration with economic data.

2.   FDES

73.   Many topics and individual statistics that fall under different components of FDES may be used to provide information on the different aspects of climate change, in particular for those indicators that are not included in SEEA or other frameworks. FDES, and more specifically the statistics identified as having a link with climate change (contained in FDES section 5.3 "Climate Change"), was used in the selection procedure to carry out a cross-check of the completeness of the list of core indicators. Consistency of thematic coverage of the climate change-related statistics was ensured by verifying if the main sub-components mentioned in FDES section 5.3 were represented in the preliminary list of core climate change-related indicators.

V.   Output of the work: Set of core climate change-related statistics and indicators

74.   This chapter presents the output of the work of the TF on CCRSI. The output includes both core climate change-related indicators (section 0) and statistics needed to derive the indicators (section 0). The definitions provided in section 0 of core climate change-related indicators and core climate change-related statistics apply. The chapter also presents the main results of a survey on data availability for the set of core indicators.

A.   Core climate change-related indicators

75.

76.   Table 2 shows the breakdown of the selected core climate change-related indicators per area and sub-area. A grey cell indicates that the specific combination area-sub-area does not apply. "0" indicates that no indicators were found according to the set criteria. The table highlights some important links between the areas (e.g. the same set of sub-areas apply to drivers and emissions, sub-areas for impacts and adaptation overlap to a certain extent).

77.   Indicators on "impact" are slightly over-represented in the set. This can be explained by the bigger number of sub-areas to be addressed by impact indicators. Several of the impact indicators also serve as outcome based adaptation indicators.

78.   The complete list of indicators and their link to global policy frameworks and statistical frameworks is presented in Table 3.

Table 2
Number of core climate change-related indicators per area and sub-area

Sub-areas	Areas				
	Drivers	Emissions	Impacts	Mitigation	Adaptation
National total	4	3			
Production	3	2			
Consumption	1	2			
Physical conditions			2		
Land, land cover, ecosystems and biodiversity			3	0	0
Extreme events and disasters			4		0
Water resources			1		1
Human settlements and environmental health			2	0	1
Agriculture, forestry and fishery			1	0	2
Expenditures				1	1
Energy resources				1	
Environmental governance and regulation				4	0
Total	**8**	**7**	**13**	**6**	**5**

Table 3
Core climate change-related indicators

Area	Sub-area	No.	Indicator	Tier	Indicator conceptually identical with		Can be produced from SEEA-CF accounts
					SDGs	SF DRR*	
Drivers	National total	1	Total primary energy supply (TPES)	I			Energy
		2	Share of fossil fuels in total primary energy supply (TPES)	I			Energy
		3	Losses of land covered by (semi-)natural vegetation	III			Land
		4	Total support for fossil fuels / GDP	II			
	Production	5	Total energy intensity of production activities	II			Energy
		6	CO2 intensity of energy for the economy	II			Energy, air emission
		7	Emission intensity of agricultural commodities	II			AFF**
	Consumption	8	Energy consumption by households / capita	I			Energy
Emissions	National total	9	Total GHG emissions	I			Air emission
		10	CO2 emissions from fuel combustion	I			Air emission
		11	GHG emissions from land use	I			AFF
	Production	12	Total GHG emissions of production activities	I			Air emission
		13	GHG emission intensity of production activities	I			Air emission
	Consumption	14	Direct GHG emissions from households	I			Air emission
		15	Carbon footprint	III			Air emission

Area	Sub-area	No.	Indicator	Tier	Indicator conceptually identical with		Can be produced from SEEA-CF accounts
					SDGs	SF DRR*	
Impacts	Physical conditions	16	Annual average surface temperature	I			
		17	Percentage of land area suffering from unusual wet or dry conditions (Standard Precipitation Index)	I			
	Water resources	18	Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	I	6.4.2 (tier 1)		Water
	Land, land cover, ecosystems and biodiversity	19	Cumulative number of alien species	III			
		20	Carbon stock in soil	III			
		21	Proportion of land that is degraded over total land area	III	15.3.1 (tier 3)		Land
	Extreme events and disasters	22	Number of deaths and missing persons attributed to hydro-meteorological disasters, per 100,000 population	III	1.5.1 (tier 2), 11.5.1 (tier 2), 13.1.2 (tier 2)	A-1	
		23	Occurrence of extreme weather events	II			
		24	Direct economic loss attributed to hydro-meteorological disasters in relation to GDP	III	11.5.2 (tier 2)	C-1	
		25	Number of people whose destroyed dwellings were attributed to hydro-meteorological disasters	III		B-4	
	Human settlements and environmental health	26	Distribution of cases of vector-borne diseases	I			
		27	Heat-related mortality	II			
	Agriculture, forestry and fishery	28	Direct agricultural loss attributed to hydro-meteorological disasters	III		C-2	
Mitigation	Energy resources	29	Renewable energy share in the total final energy consumption	I	7.2.1 (tier 1)		Energy
	Expenditures	30	Share of climate change mitigation expenditure relative to GDP	III			Transactions
	Environmental governance and regulation	31	Share of energy and transport related taxes as percentage of total taxes and social contributions	I			Transactions
		32	Total climate change related subsidies and similar transfers / GDP	III			Transactions
		33	Average carbon price	I			
		34	Mobilized amount of USD per year starting in 2020 accountable towards the USD 100 billion commitment	III	13a.1 (tier 3)		

Adaptation	Expenditures	35	Share of government adaptation expenditure to GDP	III			Transactions
	Water resources	36	Change in water use efficiency over time	III	6.4.1 (tier 3)		Water
	Human settlements and environmental health	37	Proportion of population living in dwellings with air conditioners or air conditioning	III			
	Agriculture, forestry and fishery	38	Progress towards sustainable forest management	III	15.2.1 (tier 3)		
		39	Proportion of agricultural area under productive and sustainable agriculture	III	2.4.1 (tier 3)		

* SF DRR = Sendai Framework for Disaster Risk Reduction 2015 – 2030
** AFF = SEEA Agriculture, Forestry and Fisheries

79. Nine of the proposed indicators are SDG indicators (or conceptually identical[7]) and four are indicators which were derived from the recommended global indicators for measuring the targets of the Sendai Framework on Disaster Risk Reduction.

80. Twenty two of the proposed indicators can be produced from SEEA-CF accounts, several other indicators are related to the SEEA Experimental Ecosystem Accounts (SEEA-EEA).

81. For each of the proposed indicators a metadata sheet was produced, which contains the following information:

(a) Indicator (Number, Name);

(b) Versioning (First publication, Last update);

(c) Area and subarea;

(d) Presentation (Tier, Indicator definition and description, Unit of measure, Classification systems, Coverage, Spatial aggregation, Reference period, Update frequency, Base period, Related operational indicators, Related contextual indicators);

(e) Relevance (Policy context and targets, Link to SDGs, Link to Sendai Framework, Other, Policy references);

(f) Methodology (Methodology for indicator calculation, Methodology references);

(g) Data sources (Main source, Data sources, Reference to UN-FDES, Reference to SEEA-CF, Geo-referenced data, Data availability, International databases containing this indicator);

(h) Comments.

B.   Core climate change-related statistics

82. Core climate change-related statistics consist of the set of basic statistics needed to produce GHG inventories and to produce the identified core indicators.

83. According to the CES Recommendations, the following activity data are needed for GHG inventories:

---

[7] E.g. indicators 22 and 24 refer only to hydro-meteorological disasters, whereas the corresponding SDG indicators refer to all kinds of disasters.

- Energy production and consumption

- Agriculture

- Forestry

- Mining

- Waste generation

- Transportation

- Land cover

84. The GHG emission data for the GHG inventories can be calculated by applying emission factors to activity data. This is usually not done by NSOs. The results are also often used for statistics on air emissions (which include other relevant pollutants).

85. The basic data needed to produce the core climate change-related indicators overlaps to a large extent with those needed for GHG inventories. Since the scope of climate change related-statistics is wider than GHG inventories, data from several additional statistical domains are needed.

86. Many of the proposed indicators can be derived from SEEA. If the relevant SEEA accounts are in place, the indicators can be produced with little additional effort. The required basic statistics are already processed to produce the accounts, and do not need to be processed again.

87. The following Table 4 gives an overview which basic statistics and which SEEA accounts support the production of the indicators for each of the 5 areas.

Table 4

Statistics and accounts needed to produce the set of core climate change-related indicators

Statistics and SEEA Accounts needed for production of the indicators /area	Drivers	Emissions	Impacts	Mitigation	Adaptation
STATISTICS					
Energy	x	x		x	
Air emissions		x			
Agriculture	x	x	x		x
Forestry	x	x			x
Mining	x	x			
Waste	x	x			
Transport	x	x			
Land cover	x	x			
Physical conditions			x		
Water			x		X
Biodiversity			x		
Land			x		X
Extreme events and disasters			x		
Health			x		
Economy, National Accounts				x	x
SEEA ACCOUNTS					
Physical flow accounts for energy	x			x	
SEEA Agriculture, Forestry and Fishery	x		x		
Physical flow accounts for water			x		x

Statistics and SEEA Accounts needed for production of the indicators /area	Drivers	Emissions	Impacts	Mitigation	Adaptation
Asset accounts for water			x		
Environmental activity accounts and other transactions related to the environment	x			x	x
Accounting for air emissions		x			
Asset accounts for land	x		x		
Accounting for soil resources			x		
Experimental ecosystem accounts			x		x

C. Data availability for the set of core climate change-related indicators

88.   A survey on data availability for the draft set of indicators was carried out in August 2016. The survey was sent to NSOs of all CES member countries. The aim of the survey was to identify the availability of data to produce the proposed set of core climate-change related indicators and to get information about possible alternative and additional indicators which are used by countries.

89.   The following Figure 2 shows the availability of indicators in the 41 countries that responded to the survey. Seven of the indicators are already available in more than 75% of the countries and 15 indicators in more than 50% of the countries.

90.   One indicator (cattle stock) was removed from the list after the survey had been carried out. However, the new indicator "Emission intensity of agricultural commodities" is calculated by FAO for all countries. The names and/or definitions of 11 other indicators changed slightly after the survey was carried out for the following reasons:

        (a)   Change of definitions and names of indicators derived from the Sendai Framework (e.g. "Number of housing units damaged and destroyed by climatological, hydrological and meteorological disasters" → "Number of people whose destroyed dwellings were attributed to hydro-meteorological disasters");

        (b)   Improved indicator definitions based on survey feedback and input of the Task Force (e.g. "Land use/cover change"→ "Losses of land covered by (semi-) natural vegetation");

        (c)   Change of the indicator name without changing the underlying methodology (e.g. "GHG emissions from LULUCF" → "GHG emissions from land use").

91.   It is assumed that this does not change the survey results significantly. The clearer definitions may even lead to better data availability. More detailed information on each indicator can be found in Annex II.

Figure 2
Availability of indicators in CES member countries (based on 41 replies)

Legend:
- ■ Available in more than 75% of the countries
- ■ Available in 50%-75% of the countries
- ■ Available in 25% - 50% of the countries
- □ Available in less than 25% of the countries
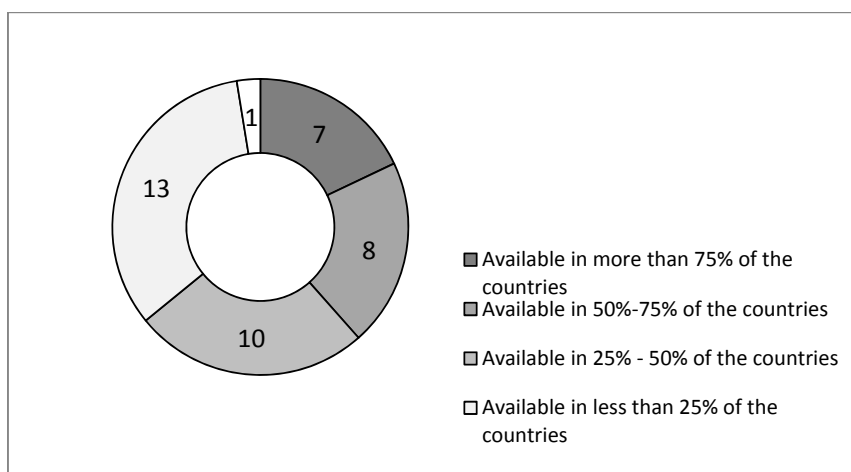
92.   Other results of the survey:

• About half of the indicators were reported by countries which produce it as fully mature.

• Indicators on drivers and emissions are well available, but indicators on impacts, mitigation and adaptation need more work.

• For many of these indicators (in particular in the areas impact, mitigation and adaptation), the compilation methodology is not considered fully mature: international organizations have a role to play in this domain.

• For a vast majority of indicators mentioned as available, NSO is not the producer of these indicators: the compilation of climate change-related indicators requires effective cooperation between NSO and other agencies.

93.   More detailed results of the survey are presented in Annex III.

VI.   Follow up work

94.   The subsequent follow-up activities have been identified by the Task Force, taking into consideration recommendations of the Steering Group on Climate Change-related Statistics, the Expert Forum on Climate Change-related Statistics and UNCEEA. The activities are grouped into three main areas:

• Pilot implementation of the set of core climate change-related indicators;

• Further work on indicators;

• Support to other global processes.

A.   Pilot implementation of the set of core climate change-related indicators

95.   At the 2016 Expert Forum on Climate Change-related statistics, many countries expressed interest in testing the set of indicators nationally, for example Finland, Kyrgyzstan, Mexico, Mongolia, Poland, the Russian Federation and Ukraine.

96.   The results of the pilot implementation will help to

(a)   Assess the usefulness of the chosen indicators, and carry out further refinements where necessary;

(b)   Revise and complete the proposed calculation methods;

(c)   Explore available data sources;

(d)   Identify capacity building needs.

B.   Further work on indicators

97.   Further work on indicators includes:

(a)   Identification of appropriate indicators for certain sub-areas of "mitigation" and "adaptation";

(b)   Revision of the set of proposed adaptation indicators (as soon as better adaptation indicators are available);

(c)   Identification of operational and contextual indicators, to complement the set of core indicators;

(d)   Identification of appropriate methodologies for tier II and tier III indicators, based on international developments (e.g. for SDG indicators, SEEA research agenda) and methodologies used by countries, international organisations, research institutes or NGOs. Individual core indicators may be replaced if indicators are identified which are more relevant and for which methodologies and data are available;

(e)   If necessary, minor revisions of the presentation of the set of indicators according to areas and sub-areas.

98.   The results of the pilot implementation (see above) will provide an important input on the further work on indicators.

VII.   References

Australian Bureau of Statistics (2012): Completing the Picture - Environmental Accounting in Practice, http://www.abs.gov.au/ausstats/abs@.nsf/primarymainfeatures/4628.0.55.001?opendocument

Bordt, M. and R. Smith (2008): Measuring the Impacts of Climate Change - Are Central Statistical Offices Prepared to Track the Impacts of Climate Change?, http://unstats.un.org/unsd/climate_change/docs/papers/CCPaper_CanadaREVISED.pdf

Constantino, S., Steinbach, N., and Cederlund M. (2013): CREEA - Compiling and Refining Environmental and Economic Accounts - D6.4 Taxes and Subsidies, project funded by the EU's Seventh Framework Program, http://mospi.nic.in/Mospi_New/upload/climate_change_29nov13.pdf

Costantino, C. and A. Tudini (2013): Climate Change and European Official Statistics, Statistika, Statistics and Economy Journal, Czech Statistical Office, Vol. 93 (2) 2013, https://www.czso.cz/documents/10180/20550305/180213q2100.pdf/325ac030-6153-4d88-be5b-5282c677e203?version=1.0

European Environment Agency (EEA, 2012): Climate change, impacts and vulnerability in Europe 2012, EEA Report No 12/2012, http://www.eea.europa.eu/publications/climate-impacts-and-vulnerability-2012

European Environment Agency (EEA, 2014): Trends and projections in Europe 2014 - Tracking progress towards Europe's climate and energy targets for 2020, EEA Report No 6/2014

Eurostat (2010): Using official statistics to calculate greenhouse gas emissions, A statistical guide

Eurostat (2011): Expenditure related to Climate Change Mitigation, http://www1.unece.org/stat/platform/download/attachments/107416104/ENV_ERT_RUMEA_TF_03%282011%29%20Climate%20change%20mitigation%20related%20expenditure.pdf?version=1&modificationDate=1427818776885&api=v2

Eurostat (2014): Towards a harmonised methodology for statistical indicators, http://bookshop.europa.eu/en/towards-a-harmonised-methodology-for-statistical-indicators-pbKSGQ14011/?CatalogCategoryID=zx8KABstS0cAAAEjr5EY4e5L

IPCC: 2006 IPCC Guidelines for National Greenhouse Gas Inventories – Chapter 4, Methodological choice and identification of key categories, http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_4_Ch4_MethodChoice.pdf

Ministry of Statistics and Programme Implementation of India (2013): Statistics Related to Climate Change – India, http://www.indiaenvironmentportal.org.in/files/file/climate%20change%20related%20statistics%20-%20india%2029nov13.pdf

Organisation for Economic Development and Co-operation (OECD, 2003): OECD Environmental Indicators – Development, Measurement and Use, http://www.oecd.org/env/indicators-modelling-outlooks/24993546.pdf

Organisation for Economic Development and Co-Operation (OECD, 2008): OECD Key Environmental Indicators, https://www.oecd.org/env/indicators-modelling-outlooks/37551205.pdf

Statistics Sweden (2012): Climate change adaptation expenditure – A proposal for a methodology to compile, define and classify national and EU economic information as statistics, http://www.scb.se/statistik/_publikationer/mi1301_2012a01_br_mift1201.pdf

Sue Wing, I. and E. Lanzi (2014), "Integrated Assessment of Climate Change Impacts: Conceptual Frameworks, Modelling Approaches and Research Needs", OECD Environment Working Papers, No. 66, OECD Publishing, http://dx.doi.org/10.1787/5jz2qcjsrvzx-en

UNCEEA (2010): SEEA as a Framework for Assessing Policy Responses to Climate Change, prepared by Statistics Netherlands for the Fifth Meeting of the UN Committee of Experts on Environmental-Economic Accounting, http://unstats.un.org/unsd/envaccounting/ceea/meetings/UNCEEA-5-13.pdf

UNECE (2014): Conference of European Statisticians Recommendations on Climate Change-Related Statistics, http://www.unece.org/fileadmin/DAM/stats/publications/2014/CES_CC_Recommendations.pdf

UNFCCC (2015): Adoption of the Paris Agreement, FCCC/CP/2015/L.9/Rev.1, http://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf

United Nations (2012): System of Environmental-Economic Accounting – Central Framework, http://unstats.un.org/unsd/envaccounting/seeaRev/SEEA_CF_Final_en.pdf

United Nations (2013): Framework for the Development of Environment Statistics, http://unstats.un.org/unsd/environment/FDES/FDES-2015-supporting-tools/FDES.pdf

United Nations (2016a): Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators, E/CN.3/2016/2/Rev.1,

http://unstats.un.org/unsd/statcom/47th-session/documents/2016-2-IAEG-SDGs-Rev1-E.pdf

United Nations (2016b): Report of the Open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction, A/71/644,
http://www.preventionweb.net/files/50683_oiewgreportadvanceuneditedversion.pdf

United Nations (2016c): Statistical Commission, Report on the forty-seventh session (8-11 March 2016), E/2016/24-E/CN.3/2016/34,
http://unstats.un.org/unsd/statcom/47th-session/documents/Report-on-the-47th-session-of-the-statistical-commission-E.pdf

Virola, R.A., Domingo, E.V., Talento, R.J., Amoranto , G.V. and E. P. Lopez-Dee (20xx): Gearing a National Statistical System Towards the Measurement of the Impact of Climate Change: The Case of the Philippines,
http://unstats.un.org/unsd/environment/FDES/Philippines_paper.pdf

VIII. List of abbreviations

CES:	Conference of European Statisticians
COP:	Conference of Parties
EEA:	European Environment Agency
Eurostat:	Statistical Office of the European Union
FAO:	Food and Agriculture Organization of the United Nations
FDES:	United Nations Framework for the Development of Environment Statistics
GHG:	Greenhouse gas
HFA:	Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters
IPCC	Intergovernmental Panel on Climate Change
NDCs:	Nationally determined contributions (Paris Agreement)
NSO:	National Statistical Office
OECD:	Organisation for Economic Co-operation and Development
OEIWG:	Open-ended Intergovernmental Expert Working Group on indicators and terminology relating to disaster risk reduction
SDGs:	United Nations Sustainable Development Goals
SEEA:	United Nations System of Environmental-Economic Accounting
SEEA-EEA:	United Nations System of Environmental-Economic - Experimental Ecosystem Accounting
SEEA-CF:	United Nations System of Environmental-Economic Accounting – Central Framework
SNA:	System of National Accounts
ToR:	Terms of Reference
UNCEEA:	United Nations Committee of Experts on Environmental-Economic Accounting
UNECE:	United Nations Economic Commission for Europe
UNEP:	United Nations Environment Programme
UNFCCC:	United Nations Framework Convention on Climate Change
UNFPA:	United Nations Population Fund
UNSC:	United Nations Statistical Commission
UNSD:	United Nations Statistics Division

Annex I

Terms of Reference of the Task Force on a Set of Climate Change-related Statistics using SEEA (approved by the CES Bureau in October 2014)

A.   Background

1.   In April 2014, the Conference of European Statisticians (CES) endorsed the *CES Recommendations on climate change-related statistics* targeted to national statistical systems. The Conference underlined as a priority the need to develop an internationally comparable set of key climate change-related statistics and indicators. The set should provide flexibility for taking into account national circumstances and priorities.

2.   The Conference also emphasized that the new indicators should be derived from the System of Environmental-Economic Accounting Central Framework (SEEA-CF) to the extent possible so as to make optimal use of existing data systems. SEEA-CF provides a useful framework for deriving coherent indicators in line with internationally agreed concepts, definitions and classifications. While SEEA-CF is not intended explicitly for climate change analysis, it includes a number of relevant components.

3.   Some other statistical frameworks also provide relevant data for a set of climate change-related indicators, such as the Framework for the Development of Environment Statistics (FDES). The *CES Recommendations on climate change-related statistics* provide an analysis of both SEEA-CF and FDES in terms of their ability to cover issues relevant to climate change, and list relevant variables that could be derived from these frameworks. To cover the key issues related to climate change, these frameworks need to be complemented with some additional data, for example on economic activity associated with adaptation to climate change, population, migration and health.

4.   Statistics and indicators pertaining to climate change, on its causes and impacts as well as on the efforts to mitigate it and adapt to it, need to be improved to enable measuring, monitoring and reporting progress against Sustainable Development Goals (SDGs), especially the SDG 13: "Take urgent action to combat climate change and its impacts".

B.   Mandate

5.   The work of the Task Force is conducted within the framework of CES and its Bureau. The Task Force will be created for a period of two years, after which it will submit a final report. The Steering Group on climate change-related statistics will guide and oversee the work of the Task Force.

C.   Objective

6.   The objective of the Task Force will be to define an internationally comparable set of key climate change-related statistics and indicators that can be derived from the System of Environmental-Economic Accounting and other sources. The work should take into account the SDGs and relevant issues raised in the context of the Post-2015 Development Agenda.

D. Planned activities and outputs

7. Building on the work accomplished to date, the Task Force will undertake the following activities:

(a) Take as a starting point the *CES Recommendations on climate change-related statistics,* work in line with the definition of climate change-related statistics and make use of the inventory of data needs and existing statistics described in the Recommendations;

(b) Review other related indicator initiatives and take them into account;

(c) Agree on issues to be covered by a set of key climate change-related statistics and indicators;

(d) Explore which statistics or indicators could be derived from SEEA-CF and identify the necessary additional data existing in the statistical system or outside;

(e) Define a key set of coherent and internationally comparable climate change-related statistics and indicators considering availability of data and feasibility of production;

(f) Provide definitions and suggested data sources for each indicator in line with SEEA-CF, FDES and other international statistical standards that relate to the chosen set.

8. The output will be a key set of climate change-related statistics and indicators with definitions and data sources recommended for production by CES member countries.

E. Timetable

9. The activities of the Task Force are planned for the period from end-2014 to end-2016, according to the following tentative timetable:

Nov-Dec 2014	Draft a work plan with activities, timing and division of work
Jan-Mar 2015	Explore statistics and indicators that could be derived by using SEEA-CF and other statistics
Apr-Jun 2015	Face-to-face meeting to agree on preliminary issues to be covered by the set of statistics and indicators, possibly back-to-back with a meeting on SEEA
Jul-Sep 2015	Select the key set of statistics and indicators considering availability of data and feasibility of production
Oct-Dec 2015	Consult the key set of statistics and indicators with the Steering Group on climate change-related statistics and/or the related expert meeting
Jan-Mar 2016	Prepare definitions for the selected key set of statistics and indicators in line with SEEA-CF, FDES and other statistical standards
Apr-Jun 2016	Define data sources for the set of statistics and indicators by exploring the use of SEEA-CF, FDES and other existing statistics

Jul-Sep 2016	Prepare a brief report with the key set of climate change-related statistics and indicators, data sources and definitions for consultation with the Steering Group
Oct 2016	Submit the report to the CES Bureau.
Nov-Dec 2016	Finalise the report and/or revise the set of statistics and indicators based on feedback received

F.   Methods of work

10.   The Task Force will primarily work via email and telephone conferences. Face-to-face meetings may be organized, preferably on the occasion of events attended by a significant number of Task Force members. Participation to the meetings will be self-funded.

11.   The Task Force will report to the Steering Group on climate change-related statistics and submit its findings for consultation with the expert meeting for producers and users of climate change-related statistics that involves national statistical offices, greenhouse gas inventory producers and key organizations active in the measurement of climate change and related phenomena.

G.   Membership

12.   The following countries and international organisations have expressed interest in participating in the Task Force: Canada, Italy, Kyrgyzstan, Luxembourg, Mexico, Netherlands, Philippines, Romania (greenhouse gas inventory authority), Russian Federation, Turkey and European Environment Agency, Eurostat, Food and Agriculture Organization of the United Nations, OECD, United Nations Framework Convention on Climate Change, United Nations Population Fund and United Nations Statistics Division.

13.   UNECE acts as Secretariat to the Task Force.

Annex II

Survey on data availability and its main outcomes

The survey questionnaire was sent out in August 2016. The survey questions for each of the proposed 39 indicators were the following:

Group	No.	Question			Possible answers
Indicator availability	1	1. Is this indicator available in your country?			yes / no
If the indicator is available	2	2. What is the development stage of the indicator?			fully mature / under development / pilot
	3	3. Do you expect that the compilation and dissemination will be continued in the foreseeable future?			yes / no
	4	4.1 Is this indicator compiled by the NSO?			yes / no
		If 4.1 is no: 4.2 Which institution compiles this indicator in your country?	Ministry Please specify		yes / no text
			Institution/ Agency Please specify		yes / no text
			Research/ University Please specify		yes / no text
			Other Please specify		yes / no text
	5	5. Is this indicator available on regular basis?			Available every year / every 2 years / more than 2 years
	6	6. Which are the available reference years?	6.1. First available year		year
			6.2. Most recent year		year
	7	7.1 Is the indicator reported to international organizations?			yes / no
		7.2 If YES, which international organizations?			text
	8	8. Do you have official publications or websites which are using or releasing this indicator?			yes / no
If the indicator is not available	9	9. Which are the main problems in developing this indicator?			text
	10	10. Which data are missing?			text
	11	11. In your opinion, can this indicator be available in the next few (maximum 3) years in your country?			yes / no
	12	12. Please specify what would be required to have the indicator available (e.g. revised statistical law or statistical programme, country examples, guidelines, clarification of the role of NSO, coordination, capacity building, technical assistance, etc.).			text
	13	13. Do you produce and/or publish a similar alternative indicator? If yes, which one?			text

Responses were received from the following 41 countries: Albania, Austria, Azerbaijan, Belarus, Belgium, Canada, Chile, Colombia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Georgia, Germany, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, the Former Yugoslav Republic of Macedonia, Mexico, Republic of Moldova, Montenegro, Netherlands, Poland, Portugal, Romania, Russian Federation, Serbia, Slovakia, Spain, Sweden, Switzerland, Ukraine, United Kingdom

The main results regarding data availability are presented in the following Table 5. Some of the indicator names and/or definitions changed after the survey was carried

out (see column "After revision"). Therefore, the results for these indicators are not fully applicable.

Figure 3 provides an overview on the percentage of countries producing or able to produce a specific indicator within 3 years according to the survey results.

Table 5
Main survey results (number of answers) regarding data availability

Note: Some indicator names and definitions have changed after the survey (see column "After revision"). NA = No answer received.

N.	Name of indicator		Is this indicator available in your country?			What is the development stage of the indicator?				If the indicator is not available in the country: In your opinion, can this indicator be available in the next few (maximum 3) years in your country?		
	As in survey	After revision	NA	no	yes	NA	fully mature	pilot	under development	NA	no	yes
1	Total primary energy consumption	Total primary energy supply	2	4	35	7	32	1	1	34	3	4
2	Share of fossil fuels in primary energy consumption	Share of fossil fuels in total primary energy supply	3	6	32	10	30	1		33	3	5
3	Land use/cover change	Losses of land covered by (semi-) natural vegetation	10	6	25	18	18	1	4	35	1	5
4	Total support for fossil fuels / GDP		15	19	7	36	3	1	1	29	2	10
5	Total energy efficiency of the economy	Total energy intensity of production activities	8	8	25	17	20	1	3	37	2	2
6	Carbon intensity of energy for the economy	CO2 intensity of energy for the economy	14	11	16	25	14	1	1	32	1	8
7	Cattle stock	Emission intensity of agricultural commodities	6	1	34	8	33			39	1	1
8	Energy consumption by households / capita		3	7	31	10	26	2	3	30	5	6
9	Total GHG emissions		2		39	4	36		1	39		2
10	CO2 emissions from fuel combustion		3	2	36	7	32		2	38		3
11	GHG emissions from LULUCF	GHG emissions from land use	4	3	34	8	31	1	1	37	1	3
12	Total GHG emission of production activities		3	8	30	11	24		6	33	4	4

| N.	Name of indicator		Is this indicator available in your country?			What is the development stage of the indicator?				If the indicator is not available in the country: In your opinion, can this indicator be available in the next few (maximum 3) years in your country?		
	As in survey	After revision	NA	no	yes	NA	fully mature	pilot	under development	NA	no	yes
13	GHG emission intensity of production activities		4	10	27	15	22		4	32	3	6
14	Direct GHG emissions from households		3	9	29	12	23		6	34	3	4
15	Carbon footprint		6	20	15	26	4	5	6	25	10	6
16	Mean temperature	Annual average surface temperature	10	1	30	13	27		1	38		3
17	Change of precipitation pattern	Percentage of land area suffering from unusual wet or dry conditions	12	3	26	17	23		1	36	2	3
18	Level of water stress: freshwater withdrawal as a proportion of available freshwater resources		10	9	22	21	11	2	7	33	3	5
19	Cumulative number of alien species		9	14	18	24	8	2	7	35	5	1
20	Carbon stock in soil		16	15	10	32	3	2	4	33	5	3
21	Proportion of land that is degraded over total land area		16	15	10	32	4	1	4	33	5	3
22	Number of deaths, missing, injured, affected by climatological, hydrological and meteorological disasters	Number of deaths and missing persons attributed to hydro-meteorological disasters, per 100,000 population	14	11	16	28	11		2	34	4	3
23	Occurrence of extreme weather events		16	9	16	25	14		2	35	1	5
24	Direct Economic loss due to hazardous climatological, meteorological and hydrological events in relation to GDP	Direct economic loss attributed to hydro-meteorological disasters in relation to GDP	18	18	5	36	4		1	28	7	6

N.	Name of indicator		Is this indicator available in your country?			What is the development stage of the indicator?				If the indicator is not available in the country: In your opinion, can this indicator be available in the next few (maximum 3) years in your country?		
	As in survey	After revision	NA	no	yes	NA	fully mature	pilot	under development	NA	no	yes
25	Number of housing units damaged and destroyed by climatological, hydrological and meteorological disasters	Number of people whose destroyed dwellings were attributed to hydro-meteorological disasters	18	14	9	34	5		2	35	5	1
26	Incidence and distribution of vector-borne diseases (e.g. West Nile virus, malaria, Lyme disease)	Distribution of cases of vector-borne diseases	19	10	12	29	11		1	37		4
27	Heat-related mortality		13	12	16	27	12	1	1	33	4	4
28	Agricultural losses from droughts, floods and other severe weather events	Direct agricultural loss attributed to hydro-meteorological disasters	15	20	6	35	4		2	33	7	1
29	Renewable energy share in the total final energy use/consumption	Renewable energy share in the total final energy consumption	3	5	33	11	27		3	35	2	4
30	Share of climate change mitigation expenditure relative to GDP		12	25	4	36			5	24	9	8
31	Share of energy and transport related taxes as percentage of total taxes and social contributions		9	14	18	24	15	1	1	32	2	7
32	Total climate change related subsidies and similar transfers / GDP		12	23	6	34	1	1	5	26	7	8
33	Average carbon price		15	17	9	33	6		2	34	3	4
34	Mobilized amount of USD per year starting in 2020 accountable towards the USD 100 billion commitment		20	19	2	39	2			33	2	6

N.	Name of indicator		Is this indicator available in your country?			What is the development stage of the indicator?				If the indicator is not available in the country: In your opinion, can this indicator be available in the next few (maximum 3) years in your country?		
	As in survey	After revision	NA	no	yes	NA	fully mature	pilot	under develo pment	NA	no	yes
35	Share of government adaptation expenditure to GDP		14	25	2	39			2	27	10	4
36	Change in water use efficiency over time		13	18	10	32	7		2	29	5	7
37	Proportion of population living in dwellings with air conditioners or air conditioning		16	12	13	29	10	1	1	35	3	3
38	Progress towards sustainable forest management		12	18	11	31	6		4	31	4	6
39	Proportion of agricultural area under productive and sustainable agriculture		12	19	10	33	7		1	31	7	3

Figure 3: Overview on percentage of countries already producing a certain indicator or who consider themselves being able to produce it within 3 years.
* = indicator name or methodology slightly changed, ** = indicator was replaced after the survey
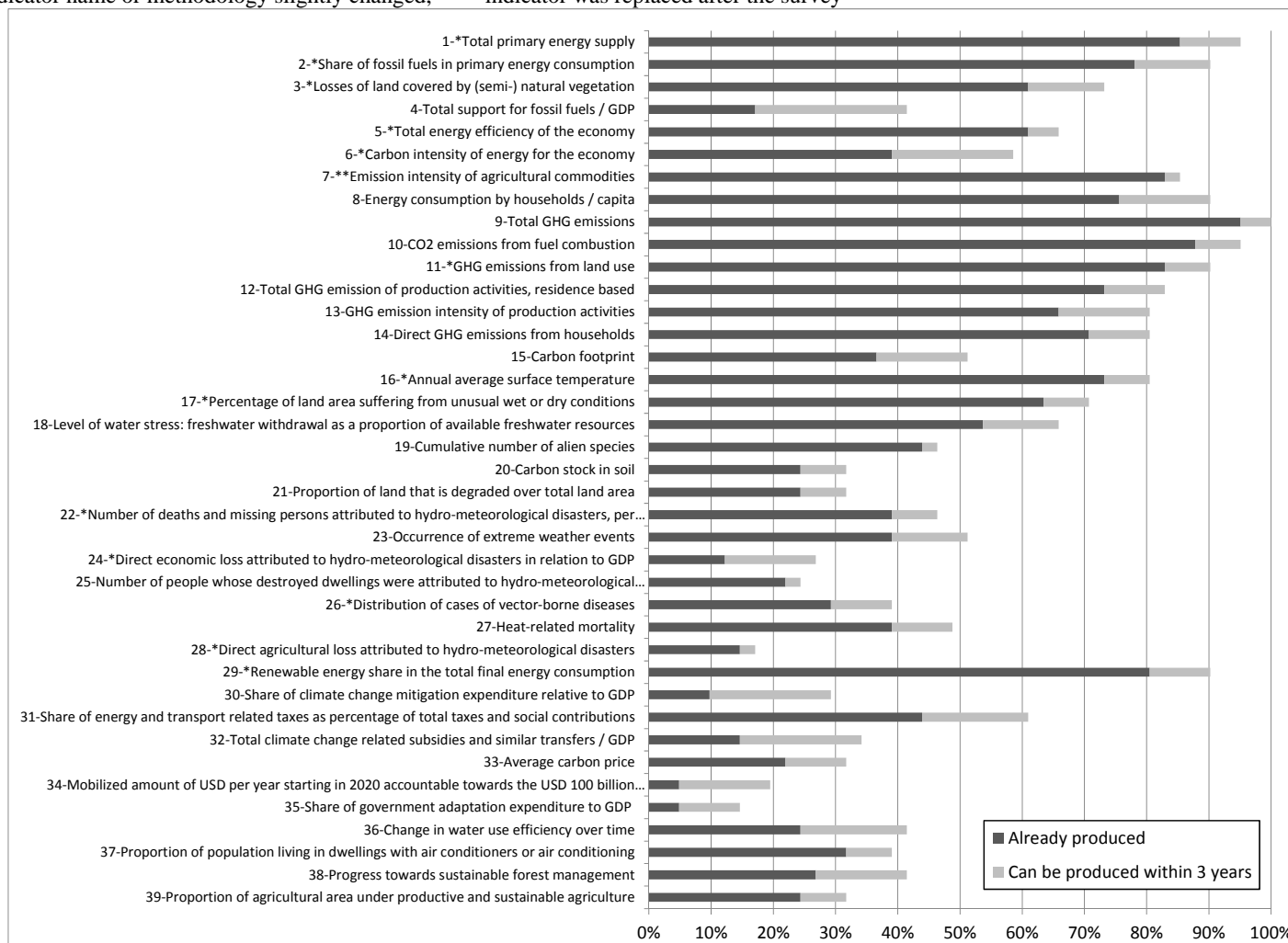
Annex III

Metadata sheets of the 39 core climate change-related indicators

1   Total primary energy supply (TPES)
2   Share of fossil fuels in total primary energy supply (TPES)
3   Losses of land covered by (semi-) natural vegetation
4   Total support for fossil fuels / GDP
5   Total energy intensity of production activities
6   CO_2 intensity of energy for the economy
7   Emission intensity of agricultural commodities
8   Energy consumption by households / capita
9   Total GHG emissions
10   CO_2 emissions from fuel combustion
11   GHG emissions from land use
12   Total GHG emissions of production activities
13   GHG emission intensity of production activities
14   Direct GHG emissions from households
15   Carbon footprint
16   Annual average surface temperature
17   Percentage of land area suffering from unusual wet or dry conditions (Standard Precipitation Index)
18   Level of water stress: freshwater withdrawal as a proportion of available freshwater resources
19   Cumulative number of alien species
20   Carbon stock in soil
21   Proportion of land that is degraded over total land area
22   Number of deaths and missing persons attributed to hydro-meteorological disasters, per 100,000 population
23   Occurrence of extreme weather events
24   Direct economic loss attributed to hydro-meteorological disasters in relation to GDP
25   Number of people whose destroyed dwellings were attributed to hydro-meteorological disasters
26   Distribution of cases of vector-borne diseases
27   Heat-related mortality
28   Direct agricultural loss attributed to hydro-meteorological disasters
29   Renewable energy share in the total final energy consumption
30   Share of climate change mitigation expenditure relative to GDP
31   Share of energy and transport related taxes as percentage of total taxes and social contributions
32   Total climate change related subsidies and similar transfers / GDP
33   Average carbon price
34   Mobilized amount of USD per year starting in 2020 accountable towards the USD 100 billion commitment
35   Share of government adaptation expenditure to GDP
36   Change in water use efficiency over time
37   Proportion of population living in dwellings with air conditioners or air conditioning
38   Progress towards sustainable forest management
39   Proportion of agricultural area under productive and sustainable agriculture

**All metadata sheets are provided in the attached Excel file
and can be found under the following link:
https://dl.dropboxusercontent.com/u/22532542/19-Add.1-
Climate%20indicator%20metadata%20sheets.xlsx**

_____