

**Economic Commission for Europe**

Conference of European Statisticians

Sixty-eighth plenary session

Geneva, 22-24 June 2020

Item 4 (b) of the provisional agenda

**Reports, guidelines and recommendations prepared under the umbrella of the Conference:
Climate change-related statistics and indicators****Updated set of core climate change-related indicators and statistics and its implementation guidelines¹ – short version****Note by the Task Force on core climate change-related indicators and statistics***Summary*

This document is an extract from “Updated set of core climate change-related indicators and statistics using the system of environmental-economic accounting” and “Implementation guidelines for the set of core climate change-related indicators and statistics” developed by the Task Force on this topic. The initial set of core climate-change related indicators and statistics was endorsed by the Conference in 2017.

The Task Force consisted of Italy (chair), Canada, Finland, Kyrgyzstan, Luxembourg, Mexico, Netherlands, Philippines, Romania, Russian Federation, Sweden, Turkey, the European Environment Agency (EEA), the Food and Agriculture Organization of the United Nations (FAO), the International Energy Agency (IEA), 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), the United Nations Statistics Division and the World Health Organization (WHO).

Part I of the document presents chapter 4 of the full report describing the main outputs of the Task Force. Part II includes a slightly shortened version of the implementation guidelines. The numbers of paragraphs and figures in this extract correspond to those in the full versions of the documents. The full versions of the document and indicator metadata sheets have been sent to all members of the Conference of European Statisticians (CES) for electronic consultation.

Subject to a positive outcome of the consultation, the CES plenary session will be invited to endorse the updated set of indicators and statistics and the implementation guidelines.

¹ This document was scheduled for publication after the standard publication date owing to circumstances beyond the submitter's control.



I. Updated set of core climate change-related indicators and statistics using the system of environmental- economic accounting

94. This chapter presents the output of the work of the Task Force. The output includes:

- (a) The refined set of core climate change-related indicators (section A.1), including an explanation of the main changes carried out during the refinement process;
- (b) Operational indicators (section B);
- (c) Contextual indicators (section C), including proxy indicators (section C.3); and
- (d) Core climate change-related statistics (section D).

A. Output 1: Set of core climate change-related indicators

1. The refined set of indicators

95. The total number of core climate change-related indicators is now 44, compared to 39 indicators² in the initial list of indicators. This number is slightly above the initial goal of the Task Force to have a maximum of 40 indicators. The higher number of indicators is mainly due to splitting of “dual” indicators into pairs of territory-based and residence-based indicators in the areas “Drivers” and “Emissions” and in some cases keeping both of them in the list (for more explanation, see paragraph 102 below).

96. 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).

Table 2

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

Sub-area	Areas				
	Drivers	Emissions	Impacts	Mitigation	Adaptation
National total	6	5	1		
Production	2	2	0		
Consumption	1	2	0		
Physical conditions			3		
Water resources			1		1
Land, land cover, ecosystems and biodiversity			3	0	0
Human settlements and human health			4	0	1
Agriculture, forestry and fishery	*	*	1	1	2
Energy resources				2	
Environmental governance and regulation				4	0
Expenditures				1	1
Total	9	9	13	8	5

* The set of core indicators intentionally does not breakdown drivers and emissions according to economic sectors.

² This included SDG indicator 15.2.1 (Sustainable forest management) whose 5 sub-indicators were not counted separately.

97. 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.

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

Table 3

Refined set of core climate change-related indicators

Area	Sub-area	ID	Indicator	Tier	Indicator conceptually identical with indicator from		Can be produced from SEEA
					SDGs*	SF DRR**	
Drivers	National total	1a	Total energy use by the national economy	III			Energy
		1b	Total primary energy supply (TPES)	I			
		2a	Share of fossil fuels in total energy use by the national economy	III			Energy
		2b	Share of fossil fuels in total primary energy supply (TPES)	I			
		3	Losses of land covered by (semi-) natural vegetation	III			Land
		4	Total support for fossil fuels in relation to GDP	II			Transactions
	Production	5a	Total energy intensity of production activities of the national economy	II			Energy
		6a	Total CO2 intensity of energy used in production activities of the national economy	II			Energy, air emissions
	Consumption	8a	Energy use by resident households per capita	I			Energy
Emissions	National total	9a	Total greenhouse gas emissions from the national economy	I			Air emissions
		9b	Total greenhouse gas emissions (excluding LULUCF) from the national territory	I			
		10a	CO2 emissions from fuel combustion attributable to the national economy	III			Air emissions
		10b	CO2 emissions from fuel combustion within the national territory	I			
		11	Greenhouse gas emissions from land use change (LULUCF)	I			Air emissions, carbon accounting
	Production	12	Total greenhouse gas emissions from production activities	I			Air emissions
		13	Greenhouse gas emission intensity of production activities	I			Air emissions
	Consumption	14	Direct greenhouse gas emissions from households	I			Air emissions
		15	Carbon footprint	II			Air emissions
Impacts	National total	24	Direct economic loss attributed to hydro-meteorological disasters in relation to GDP	II	11.5.2 (tier II)	C-1	

Area	Sub-area	ID	Indicator	Tier	Indicator conceptually identical with indicator from		Can be produced from SEEA	
					SDGs*	SF DRR**		
	Physical Conditions	16	Mean temperature anomaly (compared to climate normal 1961 - 1990)	I				
		17	Percentage of land area suffering from unusually wet or dry conditions (Standard Precipitation Index)	I				
		23	Occurrence of extremes of temperatures and precipitation	I				
	Water resources	18	Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	I	6.4.2 (tier I)		Water	
	Land, Land Cover, Ecosystems and Biodiversity			Placeholder for indicator on CC impact on biodiversity				
		20	Carbon stock in soil	III			Carbon accounting	
		21	Proportion of land that is degraded over total land area	I	15.3.1 (tier I)		Land and SEEA-EEA	
	Human settlements and human health	22	Number of deaths and missing persons attributed to hydro-meteorological disasters, per 100,000 population	II	1.5.1 (tier II), 11.5.1 (tier II) and 13.1.2 (tier II)	A-1		
		25	Number of people whose destroyed dwellings were attributed to hydro-meteorological disasters	II		B-4		
		26	Incidence of climate-related vector-borne diseases	II				
		27	Excess mortality related to heat	III				
	Agriculture, forestry and fishery	28	Direct agricultural loss attributed to hydro-meteorological disasters	II		C-2	Timber resources and aquatic resources	
	Mitigation	Energy resources	29a	Renewable energy share in total energy use by the national economy	III			Energy
			29b	Renewable energy share in the total final energy consumption within the national territory	I	7.2.1 (tier I)		
Expenditures		30	Share of climate change mitigation expenditure in relation to GDP	III			Transactions	
Environmental governance and regulation		31	Share of energy and transport related taxes in total taxes and social contributions	I			Transactions	
		32	Total climate change related subsidies and similar transfers in relation to GDP	III			Transactions	
		33	Average trading carbon price	I				
		34	Amounts provided and mobilized in United States dollars per year in relation to the continued existing collective mobilization goal of the \$100 billion commitment through to 2025	III	13a.1 (tier III)			

Area	Sub-area	ID	Indicator	Tier	Indicator conceptually identical with indicator from		Can be produced from SEEA
					SDGs*	SF DRR**	
	Agriculture, forestry and fishery	81	Net emissions/removals of carbon dioxide by forest land	I			
Adaptation	Expenditures	35	Share of government adaptation expenditure in relation to GDP	III			Transactions
	Water resources	36	Change in water use efficiency over time	I	6.4.1 (tier I)		Water
	Human settlements and human health	82	Share of green urban areas in the total area of cities	III			
	Agriculture, forestry and fishery	39	Placeholder for indicator on CC adaptation by forests Proportion of agricultural area under productive and sustainable agriculture	II	2.4.1 (tier II)		Land

* SDGs – Sustainable Development Goals, tier level as of 20 November 2019

** SF DRR = Sendai Framework for Disaster Risk Reduction 2015 – 2030

99. Eight of the proposed indicators are SDG indicators and four are global indicators for measuring the targets of the Sendai Framework on Disaster Risk Reduction (or conceptually identical³).

100. Twenty-five of the proposed indicators can be produced from SEEA-CF accounts or are related to the SEEA Experimental Ecosystem Accounts (SEEA-EEA).

101. The metadata of the indicators are maintained in a database. Metadata sheets have been extracted from the database and are added as Annex VII to the full version of the report. Each metadata sheet 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, Coverage, Spatial aggregation, Reference period, Update frequency, Base period, Related operational indicators, Other related indicators: contextual, proxy, core);
- (e) Relevance (Policy context and rationale, Link to SDGs, Link to Sendai Framework, Policy references);
- (f) Methodology (Methodology for indicator calculation, Methodology references, Classification systems);
- (g) Data sources (Main source, Data sources, SEEA Accounts that can serve as data sources, Reference to UN-FDES, International databases containing this indicator);
- (h) Comments.

2. Major changes compared to initial set of indicators

102. The major changes resulting from the refinement procedure are the following:

- (a) “Dual indicators” were split into residence-based and territory-based indicators: The previous set of indicators included so-called “dual indicators” which could be either calculated for the national economy (residence principle) or the national territory.

³ E.g. indicators 22 and 24 refer only to hydro-meteorological disasters, whereas the corresponding Sendai Framework (and SDG indicators) refers to all kinds of disasters.

To align the indicators with the SEEA approach priority was given to indicators which can be presented for the national economy. However, following consultation and advice from the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA), as some of these indicators are referred to in important policy frameworks traditionally calculated for the national territory (e.g. in national greenhouse gas inventories), important territory-based indicators were also kept in the set of core climate change-related indicators. For the indicators in Table 4, a clear distinction was made (name of the indicator and in the underlying calculation methodology) whether they apply the residence principle or the territory principle (All other indicators can only be calculated either for the national economy or the national territory).

Table 4

Residence- and territory-based indicators

<i>Residence principle applied</i>		<i>Territorial principle applied</i>	
1a	Total energy use by the national economy	1b	Total primary energy supply (TPES)
2a	Share of fossil fuels in total energy use by the national economy	2b	Share of fossil fuels in total primary energy supply (TPES)
8a	Energy use by resident households per capita	(8b – “Final energy consumption by households on the national territory per capita” is a contextual indicator)	
9a	Total greenhouse gas emissions from the national economy	9b	Total greenhouse gas emissions (excluding LULUCF) from the national territory
10a	CO ₂ emissions from fuel combustion attributable to the national economy	10b	CO ₂ emissions from fuel combustion within the national territory
29a	Renewable energy share in total energy use by the national economy	29b	Renewable energy share in the total final energy consumption within the national territory

(b) Core indicators were recategorized as contextual indicators:

- 7 – “Emission intensity of agricultural commodities”: This relevant indicator is calculated by FAO and made available on FAOSTAT for different agricultural commodities. It is in fact not one indicator, but it is a set of indicators and there is currently no proposed methodology to aggregate this information. In addition, the indicator is not intended to be produced by countries, which conflicts with the principles for selection of indicators adopted by the Task Force.
- 37 – Proportion of population living in dwellings with air conditioners or air conditioning: This indicator was considered controversial, because it shows maladaptation, as air conditioning contributes to increased energy use. It was therefore decided to remove it from the core set and include it as a contextual indicator for the core indicator 27 – “Excess mortality related to heat”.
- 38 - Progress towards sustainable forest management: This SDG indicator has now an internationally agreed methodology and it consists of 5 sub-indicators. None of these sub-indicators represents the contribution of forests to climate change adaptation; therefore, the indicator was removed from the list of core indicators.

(c) Redefining of indicators: Taking into account the expert feedback received during the consultation and developments made by international organisations, the following indicators were redefined, which is reflected in the change of their name and the underlying methodology:

- 16 – Mean temperature anomaly (compared to climate normal 1961-1990): This indicator replaces “Annual average surface temperature”. The new indicator is recommended in the “WMO Guidelines on Generating a Defined Set of National Climate Monitoring Product: (WMO, 2017) and can be calculated by countries themselves.

- 23 – Occurrence of extremes of temperatures and precipitation: This indicator replaces “Occurrence of extreme weather events”. The new indicator is recommended in the “WMO Guidelines on Generating a Defined Set of National Climate Monitoring Product: (WMO, 2017) and can be calculated by countries themselves.
- 26 – Incidence of climate-related vector borne diseases: This indicator replaces “Distribution of cases of vector borne diseases” and is now classified as Tier II. The indicator was redesigned to take into account the feedback from electronic consultation and additional materials from WHO. It now includes the list of climate-sensitive vector borne diseases with their ICD codes and provides the calculation methodology directly in the metadata sheet.
- 27 – Excess mortality related to heat: This indicator replaces “Heat-related mortality” and is now classified as Tier III. The indicator metadata were revised to reflect that although extreme high temperatures contribute directly to deaths from cardiovascular and respiratory diseases, this effect is difficult to measure directly and is usually estimated. The revised methodology includes information on an estimation method and the methodological challenges.

(d) New indicator:

- 82 – Share of green urban areas in the total area of cities: This indicator was added as a result of reviewing the set of adaptation indicators. The Task Force, after consulting with the “2019 Expert Forum on Climate Change-related Statistics”, decided to add this indicator which is relevant for climate change ecosystem-based adaptation in cities.

(e) Deleted core indicators and placeholders

- Climate change impacts on biodiversity: The “Global Assessment Report on Biodiversity and Ecosystem Services” (IPBES 2019) considers climate change as the third largest threat to biodiversity, after changes of land and sea use and direct exploitation, but climate change will soon be the largest threat. Experts of IUCN are currently exploring methods to measure the impact of climate change on biodiversity, but the attribution of biodiversity change to climate remains a challenge. After consulting IUCN experts, the Task Force decided to remove indicator 19 – Cumulative number of alien species, and to add a placeholder for a future indicator on climate change impact to biodiversity instead.
- Contribution of forests to climate change adaptation: The forest sector contributes significantly to climate change adaptation in different ways, for example as protective forest, as an important regulator in the water cycle, by means of cooling and for recreation. The Task Force consulted the NSOs of Canada and Finland as well as experts from FAO and UNECE, and no appropriate indicator could be identified to represent the climate change adaptation function of forests. Therefore, the Task Force decided to add a placeholder for a future indicator. The initially recommended indicator 38 – Progress towards sustainable forest management (SDG indicator 15.2.1, now tier I) is actually a set of 5 sub-indicators and therefore does not fulfil the objective set by the Task Force of limiting the number of core indicators.

103. Removal of sub-area “Extreme events and disasters”: As “extreme events and disasters” is thematically overlapping with other sub-areas it was removed. The related indicators were allocated to other sub-areas as follows:

- Indicator 22 ‘Number of deaths and missing persons attributed to hydro-meteorological disasters, per 100,000 population’, moved to “Human settlements and environmental health”
- Indicator 23 ‘Occurrence of extremes of temperatures and precipitation’, moved to “Physical conditions”
- Indicator 24 ‘Direct economic loss attributed to hydro-meteorological disasters in relation to GDP’, moved to new sub-area “National total”

- Indicator 25 ‘Number of people whose destroyed dwellings were attributed to hydro-meteorological disasters’, moved to “Human settlements and environmental health”
- Indicator 28 ‘Direct agricultural loss attributed to hydro-meteorological disasters’, moved to “Agriculture, forestry and fishery”

3. Data availability

104. A survey on data availability for the initial set of core climate change-related 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.

105. It was not possible to assess the data availability for the refined set of indicators. However, the refinement procedure addressed mainly indicators which were reported by countries as problematic (because of the lack of agreed methodology or lack of data), and availability of data was one criterion for re-defining some of the indicators.

106. The following Figure 3 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.

107. One indicator (cattle stock) was removed from the list after the survey had been carried out. A new indicator “Emission intensity of agricultural commodities” calculated by FAO for all countries was added to the list. 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” changed to “Number of people whose destroyed dwellings were attributed to hydro-meteorological disasters”);

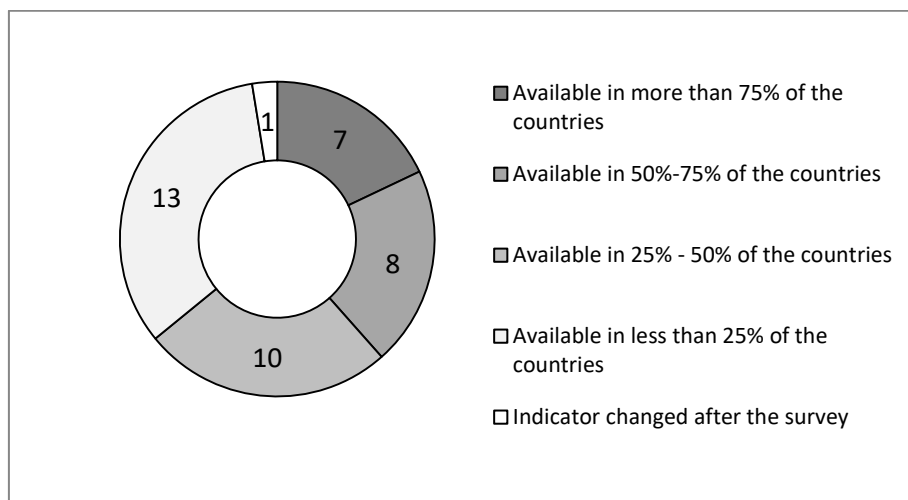
(b) Improved indicator definitions based on survey feedback and input of the Task Force (e.g. “Land use/cover change” changed to “Losses of land covered by (semi-) natural vegetation”);

(c) Change of the indicator name without changing the underlying methodology (e.g. “GHG emissions from LULUCF” changed to “GHG emissions from land use”).

108. 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 IV.

Figure 1

Availability of initial set of indicators in CES member countries (based on 41 replies)



109. Other results of the survey:
- About half of the indicators were reported by countries which produce it as fully mature in terms of relevance, methodological soundness and data availability.
 - 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.
 - NSO is not the producer of a vast majority of indicators mentioned as available: the compilation of climate change-related indicators requires an effective cooperation between NSO and other agencies.
110. More detailed results of the survey are presented in annex IV.

B. Output 2: Operational indicators

111. The development of a set of operational indicators is one of the objectives stated by the Task Force Terms of Reference. Operational indicators are needed to provide more details for analytical purposes, such as sectorial breakdown or important spatial or temporal extremes (for example seasonal or local water stress situations).

112. The Task Force identified the following possible types of relevant disaggregation for the core set of climate change indicators:

- Spatial: e.g. by administrative area or river basin
- Temporal: e.g. by month or season
- Gender, age group and disabilities
- Income group
- Energy product (SIEC)
- Economic sector (ISIC) and households
- Hazardous event
- IPCC sector
- Land cover class
- Product
- Disease
- Type of purpose: e.g. for heating, cooling, transport or other
- Type of tax: e.g. energy, CO₂, transport, etc.
- Type of hazard
- Type of affection: e.g. dead persons, missing persons
- Type of damage: e.g. agricultural, other productive assets, critical infrastructure, cultural heritage, etc.
- Type of mitigation expenditure type: e.g. renewable energy, energy saving, CO₂ abatement, etc.
- Type of transfer: e.g. subsidies, current transfer, capital transfer
- Type of adaptation measure: e.g. flood protection, improvement of irrigation efficiency, etc.
- Type of forest.

113. For each indicator, the Task Force identified a few relevant types of disaggregation out of the list above (for more information, see metadata sheets in annex V to the full version of the report). For SDG indicators and Sendai Framework indicators, this includes the recommended disaggregation specified in SDG indicator metadata and the technical guidelines for Sendai Framework indicators.

C. Output 3: Contextual indicators

114. The development of a set of contextual indicators is one of the objectives stated by the Task Force Terms of Reference. The Task Force recommends distinguishing general contextual indicators and specific contextual indicators:

(a) General contextual indicators help the user to better understand and interpret the entire set of core indicators in the context of the given country and in relation to global phenomena. General contextual indicators include indicators on the geographical, climatological, environmental, economic and social situation of the country. They also include some global indicators such as worldwide GHG-emissions and global temperature change.

(b) Specific contextual indicators provide context for a given core indicator or for a group of core indicators.

1. General contextual indicators

115. For general contextualisation of the set of core climate change-related indicators the Task Force recommends the use of the following statistics and indicators:

- (a) Global context:
 - Global GHG emissions (CO₂ equivalents)
 - Global temperature change (°C)
- (b) Geographical information (FDES 1.1.3):
 - Area of the country (1,000 km²)
 - Length of marine coastline (km)
- (c) Atmosphere, climate and weather (FDES 1.1.1):
 - Monthly average temperature (°C)
 - Minimum monthly average temperature (°C)
 - Maximum monthly average temperature (°C)
 - Long-term annual average precipitation (mm)
- (d) Land cover (FDES 1.2.1):
 - Area by land cover categories
- (e) Population:
 - Total population
 - Urban population
 - Population density
- (f) Economy:
 - GDP per capita
 - GDP by main economic sectors: Agriculture/forestry/fishing, manufacturing industry, mining and quarrying, service sector
 - Unemployment rate

2. Specific contextual indicators

116. Depending on the national conditions, some core indicators require more additional information (context) than others.

117. In some cases, context is already given in the set of core indicators itself (for example the core indicators on energy consumption, the share of renewable energy etc. can be seen in close relation with the core indicators on GHG emissions).

118. In other cases, additional contextual indicators are needed for a better interpretation of a core indicator. For example, in countries with high water stress (core indicator 18 – Level of water stress) more information would be needed to understand the main causes of the water stress. This could be derived from a spatial and temporal disaggregation of the indicator (operational indicators), but also with additional contextual information (contextual indicators), for example on the share of water uses among different economic activities and households or on the percentage of water lost in transport.

119. In some cases, an indicator can be produced for the national territory (territory principle) and for the national economy (residence principle), for example GHG emissions. If the core indicator is based on the residence principle, then the indicator calculated for the national territory will provide an important additional information, thus will be a contextual indicator (and can also serve as proxy indicator, see below).

3. Proxy indicators

120. Proxy indicators are a special set of contextual indicators which can be used by countries as long as indicator methodologies are not finalised (tier III indicators) or, if data is missing to calculate the core indicator. Proxy indicators can be found in the metadata sheets and are shown in Table 5 below.

Table 5

Core indicators and proxy indicators

<i>Core indicator</i>	<i>Proxy indicator</i>
5a - Total energy intensity of production activities of the national economy	Energy intensity of GDP
6a - Total CO ₂ intensity of energy used in production activities of the national economy	Carbon intensity of TPES
8a - Energy use by resident households per capita	Final energy consumption by households on the national territory per capita
16 - Mean temperature anomaly (compared to climate normal 1961 - 1990)	Temperature change compared to pre-industrial levels Temperature change (compared to base period 1951 - 1980)
18 - Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	Water exploitation index

D. Output 4: Core climate change-related statistics

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

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

- Energy production and consumption
- Agriculture
- Forestry
- Mining
- Waste generation

- Transportation
- Land cover
- Manufacturing industries
- Households

123. 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).

124. The refinement process of the set of core indicators also resulted in minor changes of the list of core climate change-related statistics.

125. The following Table 6 gives an overview of which basic statistics and which SEEA accounts support the production of the refined set of indicators for each of the five areas.

Table 6

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

<i>Statistics and SEEA Accounts needed for production of the indicators / area</i>	<i>Drivers</i>	<i>Emissions</i>	<i>Impacts</i>	<i>Mitigation</i>	<i>Adaptation</i>
STATISTICS					
Energy	x	X		X	
Air emissions*	X	X		X	
Agriculture	X	X	X		X
Forestry	X	X		X	X
Land and land cover	X	X	X	X	X
Physical conditions			X		
Water			X		X
Biodiversity			X		
Hazardous events and disasters			X		
Health			X		
Economy, National Accounts	X	X	X	X	X
SEEA ACCOUNTS					
Physical flow accounts for energy	X			X	
SEEA Agriculture, Forestry and Fishery			X	X	X
Physical flow accounts for water			X		X
Asset accounts for water			X		
Environmental activity accounts and other transactions related to the environment	X			X	X
Accounting for air emissions	X	X		X	
Asset accounts for land	X		X	X	X
Accounting for soil resources			X		
Experimental ecosystem accounts			X		X

* Statistics on air emissions are understood to be built upon other statistics, such as activity data on energy consumption by different economic activities, waste, transport etc. These areas are not explicitly mentioned here.

II. Implementation guidelines for the set of core climate change-related indicators and statistics introduction

A. Introduction

1. Purpose of the CES set of core climate change-related indicators

8. The main purpose of the *CES indicator set* is to provide the foundation for the development of national sets of climate change-related indicators. These sets of indicators could serve multiple purposes:

- (a) Paint a picture of the most relevant climate change-related issues;
- (b) Address the most relevant current policy questions;
- (c) Help to meet upcoming information needs.

9. The *CES indicator set* is the recommended set of climate change-related indicators to be compiled and published by the statistical community in the CES region. National Statistical Offices (NSOs) who are already engaged in activities to support climate action have found the *CES indicator set* and the accompanying metadata sheets very useful.

10. The *CES indicator set* is not developed as an additional reporting requirement. It is rather a suggested set of climate change-related indicators for NSOs who want to engage more actively in this highly policy-relevant area. However, all countries are encouraged to implement the *CES indicator set*, because it is internationally comparable and has been carefully chosen based on the criteria of relevance for the region, methodological soundness, and data availability.

11. The *CES indicator set* complements other important climate change indicator sets such as statistics and indicators reported to the United Nations Framework Convention on Climate Change (UNFCCC)⁴ and the Sustainable Development Goals indicators. The *CES indicator set* is not meant as a replacement for reporting on progress towards achieving SDG 13 (Take urgent action to combat climate and its impacts) or as an alternative to UNFCCC reporting requirements.

12. The *CES indicator set* does partially overlap with these other indicator sets. This ensures consistency of the information and reduces the burden to produce the set of indicators. At the same time, it can be presented as a stand-alone product of the statistical community for all users looking for climate-change related information.

13. The *CES indicator set* covers five main areas: emissions, drivers, impacts, mitigation and adaptation, and currently includes 44 indicators, which are distributed as follows:

- Emissions: 9 indicators
- Drivers: 9 indicators
- Impacts: 13 indicators
- Mitigation: 8 indicators
- Adaptation: 5 indicators

14. Countries can decide to add indicators to their national set to better reflect national circumstances or address specific national policy information needs.

15. Lack of data may be a reason for not including some of the recommended indicators, but countries are encouraged to plan the production of all indicators of the *CES indicator set* in the future.

⁴ See the UNFCCC pages on transparency and reporting for more information:
<https://unfccc.int/process-and-meetings#:0c4d2d14-7742-48fd-982e-d52b41b85bb0>

16. If data is not available, or if established national methodologies differ from the methodology recommended in the metadata sheets, compilers of the national set may decide to develop proxy indicators that approximate the ones in the *CES indicator set*.

17. As with any statistical product, providing documentation of the proxy indicators and/or newly developed indicators is important (e.g. in form of metadata, statistical articles or methodological reports). However, using proxy indicators or developing alternative indicators should be a temporary and well documented solution. Compiling and publishing the *CES indicator set* has the advantage of building upon internationally harmonised methodologies and allowing for international comparison.

18. The implementation of the *CES indicator set* is not only an important contribution of the national statistical system (NSS) to climate action, but also strengthens NSOs capacities to produce the needed statistics and supports collaboration and coordination with other stakeholders. Text box 1 gives an overview of possible additional benefits from implementing the *CES indicator set*.

Text box 1

Benefits of implementing the CES indicator set

The development and implementation of the *CES core set of climate change-related indicators and statistics* can accelerate the progress in different areas*, for example:

- Increase the relevance of official statistics for climate change reporting and analysis
 - Increase awareness of what the statistical system has to offer to meet climate change-related information needs
 - Promote the use of existing official statistics in climate change reporting and analysis
 - Improve access to statistics relevant for climate change reporting and analysis
 - Review statistical programs and data collections from the viewpoint of the data needs of climate change analysis
 - Identify and address the obstacles to linking statistics across domains
 - Consider developing new statistics
 - Develop longer and more consistent time series of climate change-related statistics
 - Promote cooperation across different statistical domains
 - Address data gaps in the relevant underlying statistical data collections, including energy, agriculture, forestry, waste, and land use statistics
- Increase the skills and capabilities of the statistical community in the climate change domain
 - Statisticians to become more knowledgeable on the topic of climate change: the GHG inventory methodologies, natural sciences and policy processes driving climate action
- Build on and improve existing statistical infrastructure and networks with other communities:
 - Provide access to climate change-related statistics using NSOs' dissemination channels
 - Improve collaboration with GHG inventory compilers and other producers of climate change-related data, including defining and clarifying the division of work and responsibilities, if needed
 - Collaborate more closely on climate issues at the international level to coordinate efforts, build partnerships, and transfer knowledge and skills among the statistical community and other networks where statisticians participate in internationally.
 - Review existing statistical frameworks, such as SEEA and FDES, from the perspective of climate change-related information needs.

* Recalling, with some freedom of expression, recommendations from the *CES*

Recommendations on Climate Change-Related Statistics:

http://www.unece.org/fileadmin/DAM/stats/publications/2014/CES_CC_Recommendations.pdf

2. Purpose of the implementation guidelines

19. The purpose of this document is to offer practical guidance by providing a step-by-step action plan to implement a core set of climate change-related indicators. The focus is on the process of implementing a national climate change-related indicator (CCRI) set based on the *CES indicator set*. The national CCRI set may slightly differ from the *CES indicator set*,

taking into account national policy priorities and data availability. However, it is recommended to include most of the indicators of the *CES indicator set* as they are considered as relevant for most countries of the CES region and are internationally comparable.

20. As such, this document gives guidance for implementing a national climate change-related indicator set that fits national circumstances in terms of policy relevance, resources and data availability.

21. The target audience of this document includes NSOs, statistical service units and other agencies which plan or already contribute to developing climate change-related statistics.

22. This is a stand-alone document, complementing the detailed information on the individual indicators in the metadata sheets accompanying the *CES indicator set*. The metadata sheets provide the definitions of the indicators, explain their policy relevance and give methodological information on how to compile them.

23. The following chapter 2 discusses the process of implementing a national indicator set. The activities and practices described build upon experience gained so far by pilot implementers of the indicator set. The guidelines can be used as an inspiration and a checklist of activities to be kept in mind while developing the national CCRI set.

24. Chapter 2 also includes several practical examples from different countries of the region (presented in text boxes).

B. Process of implementing a national indicator set

25. This section describes the process of implementing a national CCRI set step by step. Depending on the national circumstances, some of the steps may be done in parallel or even in a different order.

26. The first step is to start the process and the final step is to end the cycle and plan for future cycles. The implementation steps outlined in this chapter are the following:

Step 1: Initiating the process

- (a) Getting the mandate and obtaining the support of main stakeholders
- (b) Creating a stakeholder platform
- (c) Developing a road map

Step 2: Forming a technical working group

Step 3: Developing an action plan with timeline

Step 4: Selecting the indicators and statistics for the national set

- (a) Analyse the core set
- (b) Select the indicators

Step 5: Planning the production with available data

Step 6: Implementing the plan

Step 7: Evaluating the production plan, process and outputs

Step 8: Following-up on the evaluation

27. These process steps are roughly based on the Generic Statistical Business Process Model (GSBPM)⁵. However, there is no need to strictly follow these steps in a consecutive

⁵ More information can be found via: <https://statswiki.unecce.org/display/GSBPM>.

order. The process steps proposed in this implementation guide represent the most important tasks and can also be seen as a checklist of action points for implementing a national set of CCRI. Some steps may be interrelated or can be done simultaneously, for example analysis of data availability and selection of indicators, or iteratively like designing the end products in consultation with stakeholders.

28. The implementation of a national climate change-related indicator set can be done on a project basis (e.g. as a pilot implementation) or it can be a start of a regular production of the indicator set. This will typically depend on user demand and available resources. If the process starts as a project, depending on the experience build up in the process and the possibility of securing resources, the project can still become a regular production process. In either case, the first cycle will include most if not all of the steps described in this section. Even if the aim is only to explore the need and/or possibility of setting up a national indicator set, this document provides useful information to get started.

C. Step 1: Initiating the process:

1. Getting the mandate and obtaining the support of main stakeholders

29. The initialization usually starts with the willingness of a national organisation to respond to a public demand for high quality information on climate change. This national organisation can be a member of the national statistical system, but it can also be a government-related organisation, or part of the government itself.

30. The national statistical system's objective is to produce official statistics, which offer high-quality information that is reliable, timely, consistent and comparable. Therefore, it is recommended that the national statistical office coordinates the implementation. NSOs are in the best position to guarantee the quality of the methods used and the results produced, but also to take responsibility for regular production of the indicator set. When government initiates the process and enlists NSO to coordinate the implementation, this implies that political support is ensured and that a mandate is given to NSO.

31. NSOs need a mandate for producing a national set of CCRI, which is usually through its annual work programme.

32. Depending on the level of freedom of the national statistical system, a statistical organisation, for example NSO, could initiate the process itself by registering this objective in its annual work program. Alternatively, NSO may need to request an official mandate from the government or a ministry to embark on this work or allow a dependent agency to initiate the work. In either case, it is recommended to obtain political support to undertake the work. It will help towards increasing the relevance of the work, securing the needed resources, and developing the institutional framework for regular production.

33. For organising the work within NSO, senior management should assign responsibility to a focal point, which could be an individual or unit.

34. The identification of stakeholders and establishing a stakeholder platform is one of the first activities of the focal point. Main stakeholders are the institutional producers of information for compiling climate-related statistics as well as the main users.

35. Text Box 2 provides some national examples for starting and organising the process.

Text box 2

National examples for starting and organising the process***Luxembourg***

In 2019 STATEC (NSO Luxembourg) started the development of its national list on climate change-related indicators. In the beginning, there was no official obligation or official mandate from the government to initiate the process. Nevertheless, more recently, the government has started the drafting of a climate law, which should be adopted in first semester 2020. The law proposal includes the creation of a “climate observatory”, which should follow the progress made in this domain. The detailed work program is not available yet, but one of its expected tasks will be to evaluate the trends base on the national set of climate change-related statistics and indicators.

Kyrgyzstan

Taking into account that climate change is a complex and multidisciplinary phenomenon, a platform has been created to bring together stakeholders from eight governmental institutions to know national political demands and organize the work between data producers and users.

Nowadays, the development of a national indicator set, on a regular basis, was included in the annual Statistical Plan and the 5-year Strategy for Development of State Statistics.

2. Creating a stakeholder platform

36. Climate change policymaking and production of climate change-related information are related to many disciplines, and the relationships between these multiple domains are often complex. Therefore, establishing a platform that brings together all the stakeholders, including producers and users of climate change information is key. The aim of such a platform is to identify the needs of users and the constraints of producers and, from other side, to establish the rules of a good collaboration between all partners.

37. The stakeholder platform could be for example a newly established inter-agency working group or an already existing platform getting an extension of its mandate for climate change-related statistics and indicators. For example, the work could build upon existing multi-stakeholder platforms on SDG indicators.

38. Due to its central role in the national statistical system, it is recommended that NSO coordinates the stakeholder platform.

39. Many NSOs have well established statistical councils representing the most important user groups. The stakeholder platform for CCRI could be identical with the statistical council or a sub-group of it.

40. Before setting-up the stakeholder platform answering of the following guiding questions by NSO could be useful:

- (a) Is political climate ready? Would someone potentially give a mandate?
- (b) Are there processes to tie in with or to profit from?
- (c) Is there already a mandate to produce a national set of climate change-related statistics and indicators?
- (d) Is it possible to carry out quick evaluation of the data availability?
- (e) Is there already and existing steering group which could take up this task?
- (f) Can the implementation be started as a small project and can grow over time?
- (g) Which roles and responsibilities need to be clarified?

41. The existing or newly established stakeholder platform should include both policy makers and technical stakeholders. The natural role of policy makers would be to guide the

work and define priorities and needs. Technical stakeholders would bring in methodological, statistical and thematic expertise. If needed, technical experts in specific fields could be temporarily involved in the stakeholder platform. This combination is a successful way to ensure stakeholder commitment to the process and to facilitate collaboration among political, scientific, governmental and private stakeholders.

42. In some countries, a policy-related working group on climate change action may already exist. This working group may focus its activities on the definition of a climate plan, including effective responses to climate change (mitigation or adaptation). Representatives of this dedicated working group should be invited to the stakeholder platform to present their views on the required statistics.

43. When reaching out to relevant stakeholders, it could be useful to present the national initiative in a broader international context. References can be made to several international policy frameworks, indicator frameworks and recommendations. The main climate change-related global policy frameworks are presented in Text Box 3. Specific references to climate change-related indicators and statistics are presented in Text Box 4.

44. The main objective of the stakeholder platform is to develop an implementation roadmap and to agree on the expected outputs of work.

45. The stakeholder platform could also be the steering body for the implementation. This would ensure alignment between (changing) information needs and outputs of work. Furthermore, the stakeholder platform has to play a role in the evaluation process.

46. Another important task of the stakeholder platform is the development of a communication strategy and agreeing on the dissemination of the national set of climate change-related indicators. The communication strategy should build upon the main audience and the available, or to be developed, tools of communication. It is highly recommended to provide open and free access to the climate change-related indicator dataset, including their metadata. Furthermore, the indicator set should be complemented with graphs, maps and analytical texts to allow for better interpretation. Text Box 5 presents a few national examples of dissemination of sets of climate change-related statistics and indicators.

Text box 3

The bigger picture: relevant international initiatives

Global climate change-related policy frameworks and their reporting systems

The main reference for the set of indicators is the Paris Agreement aiming to keep the global temperature rise well below 2 degrees Celsius above pre-industrial levels. To monitor progress, Parties to the Agreement will regularly report information to the United Nations Framework Convention on Climate Change (UNFCCC) as described in the ‘Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement⁽¹⁾. Several indicators from the CES indicator set are compiled from greenhouse gas inventories reported to UNFCCC. In addition, the nationally determined contributions of Parties⁽²⁾ will have to be monitored and new indicators needed for this purpose can overlap with, or could be integrated into the national set of climate change-related indicators.

Furthermore, there is a close link with Sustainable Development Goal 13 ‘Take urgent action to combat climate change and its impacts’⁽³⁾. Progress towards this goal is monitored with an indicator set linked to the following targets:

13.1) Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries. Some of these indicators are also used to measure progress in the implementation of the Sendai Framework for Disaster Risk Reduction⁽⁴⁾.

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.

SDG indicators are published by UNSD⁽⁵⁾ and metadata descriptions for all indicators are available⁽⁶⁾.

EU Member States can refer to the Energy Union Governance Regulation⁽⁷⁾ that requires the Member States to report National Energy and Climate Plans⁽⁸⁾ and the European Green Deal⁽⁹⁾.

(1) <https://unfccc.int/es/node/184700>

(2) <https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs>

(3) <https://www.un.org/sustainabledevelopment/climate-change/>

(4) Sendai Framework Indicators: <https://www.preventionweb.net/sendai-framework/sendai-framework-monitor/indicators>

(5) <https://unstats.un.org/sdgs/indicators/database/>

(6) <https://unstats.un.org/sdgs/metadata/>

(7) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0001.01.ENG&toc=OJ:L:2018:328:FULL

(8) <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/national-energy-climate-plans>

(9) https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

Text box 4

National examples of dissemination of climate change-related indicators

Open data access in Switzerland

In July 2019, the Swiss Federal Statistical Office published a set of around 20 climate change-related indicators on its website. More detailed data tables and links for further information complete the offering. The indicators are available in French and German and can be viewed under <https://www.bfs.admin.ch/bfs/fr/home/statistiques/espace-environnement/indicateurs-lies-au-climat.html>

Related publication in Luxembourg

To promote the use of the climate change-related statistics, STATEC (NSI Luxembourg) has published, in October 2019, a short paper (4 pages) presenting and analysing the 25 indicators nationally selected. At the same time, STATEC has published the time series on national data web portal. The publication (in French) and the associated data table are available under <https://statistiques.public.lu/fr/actualites/territoire/territoire-climat/2019/10/20191001/index.html>

Dedicated section on website in the Russian Federation

Since 2017, a new section “Climate Change” has been created on the website of the Russian Federal State Statistics Service. In this section are presented official statistics on greenhouse gas emissions, temperature and precipitation, hazardous hydrometeorological phenomena (provided by the Federal Service for Hydrometeorology and Environmental Monitoring) and statistics on the total number of natural emergencies (provided by the Ministry of the Russian Federation for Civil Defence, Emergencies and Elimination of Consequences of Natural Disasters).

The publication (in Russian) is available at <https://www.gks.ru/folder/11194>

3. Developing a roadmap

47. A roadmap will help to organise and monitor the work. The roadmap should specify the expected outcomes, timeline, as well as the role and contributions from each stakeholder. Ideally, the roadmap should cover both the development phase of indicator set, the regular updates and revisions. The roadmap, even if it does not need an official adoption, will constitute a useful framework for the establishment of the action plan (see section E).

48. Examples of roadmaps to developing climate change-related statistics have been published by the UNECE Steering Group on Climate Change-related Statistics in 2017⁶.

D. Step 2: Forming a technical working group

49. The main task of the technical working group is to implement the actions outlined by the Stakeholder Platform roadmap. Therefore, the mandate and the composition of the working group have to be different from the mandate and the composition of the stakeholder platform.

50. The inter-agency technical working group in the context of a Stakeholder Platform is needed to develop and implement the action plan within the boundaries set by the roadmap. The technical working group should involve technical experts from all partners inside the national statistical system (including agencies and ministries). Experts and agencies participating in the working group should cover with their expertise and data all substantive areas needed to compile the indicators and set up the necessary data flow mechanisms. In addition, other experts (e.g. from academia) could be invited to participate on an ad-hoc basis when their expertise is needed.

51. A standard composition of this technical group is difficult to recommend, because national statistical systems can be very different. However, at a minimum, expertise in the following areas should be covered by members of this technical working group: hydrometeorology, energy, greenhouse gas (GHG) emissions, agriculture, forestry, environment, and hazardous events. Due to its multi-disciplinary scope, an NSO is an essential member, ideally also the coordinator, of this group.

52. The technical working group can be an informal group where members are free to exchange data without hierarchical supervision. However, such a working group is usually regulated by a mandate of a higher-level group or a Memorandum of Understanding that defines the framework of the activities of the group.

E. Step 3: Developing an action plan with timeline

53. Developing an action plan is an important factor in guaranteeing the success of the project. This action plan must be in line with the timeline of the roadmap. The action plan defines intermediate working steps and related deliverables.

54. It is recommended to link the finalisation of the process and the publication of the indicator set with an important meeting, event or policy action. This will provide an impetus for the implementation of the process and there will likely be communication synergies so that the publication of the indicator set will receive more attention than it would generate on its own.

55. The action plan is an important tool for ensuring that the necessary resources are secured and adequate for the required workload. The plan should not underestimate the time needed for the validation of the set of indicators or the necessary translation to various national languages.

6

http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/2017/Road_maps_for_climate_change_statistics.pdf

56. Text Box 6 presents national examples of action plans / main steps taken by NSOs to implement a national set of climate change-related indicators.

Text box 5

National examples of action plans

Switzerland

The Swiss Federal Statistical Office has not established any initial action plan, but the implementation took place “along the way”. The main steps have been:

- August 2018: Collection of potential indicators from various sources (national and international);
- September to December 2018: Two workshops with internal specialists were organized to discuss the structure of the set and possible indicators as well as to clarify data availability;
- January 2019: Final selection of indicators based on predefined criteria;
- March to April 2019: Editing with occasional involvement of specialists;
- May 2019: Internal consultation and revision of the manuscript;
- June 2019: Translation, quality control;
- July 2019: Publication of indicators.

Luxembourg

In Luxembourg, the initiative to create a national CCRI list has been taken by STATEC (NSO Luxembourg) who has been strongly involved in the CES work on climate change-related statistics since 2014. In June 2018, during the biannual meeting of the environment experts national working group, STATEC proposed to members of that group to integrate the topics “climate change” and “extreme events” in the statistical programme, which imply a regular production of statistics on these topics. During this same meeting, STATEC mentioned its intention to implement an action plan aiming to publish a first indicator list in 2019. This action plan has not been formalized officially but has received the voluntary agreement of working group members.

The timeline of this action was to select the national climate change-related indicators during the first quarter of 2019 and to produce time series during the second quarter. As a deadline, it was decided to present, for adoption, a first indicator list at the working group meeting in June 2019. Following the adoption of the national CCRI list, a publication was published in September 2019.

Two main deliverables planned and published are: a short publication (4 pages) which explains the main trends shown by some national indicators and a numeric table with all indicators, which will be uploaded on the national web portal. These two dissemination tools have been prepared to only present the historical trends: neither comparison with future objectives nor governmental actions has been planned.

F. Step 4: Selecting the indicators and statistics for the national set

1. Analyse the CES core set of climate change-related indicators

57. The first activity of the action plan will be to get familiar with the *CES indicator set* (e.g. by reading the metadata sheets).

58. National experts should understand the characteristics of each indicator, including:

- Rationale for selection of the indicator, definition and the recommended calculation method

- Development level of the indicator (Tier)
- References to international methodologies, and classifications and guidelines
- Possible international data sources, which could be used in case national data are not available
- Proposals on related operational and contextual indicators.

2. Select the indicators

59. The second activity is to review to which extent the CES indicator set can be implemented, considering national policy priorities and data availability. It is recommended, as far as possible, to implement all indicators from the core CES indicator set, and to add more if needed.

60. Clear selection criteria must be identified. Often used criteria are:

- Relevance of the indicator compared to national priorities and/or political demands
- Data availability (at national or international level)
- Acceptance of the proposed methodology
- Ease of interpretation of the indicator (definition and data)
- A balanced representation of the sub-areas of climate change-related statistics (emissions, drivers, impacts, mitigation, adaptation)
- Presence of indicator in another existing indicator set.

61. The selection process should be based on objective criteria and should not be politically biased (e.g. by only selecting indicators that may show only “good” or “bad” values). The aim is to present the status and trends of main phenomena of climate change with a suite of national indicators for each of the main areas: drivers, emissions, impacts, mitigation and adaptation.

62. In addition to national core climate change-related indicators, countries could decide to produce additional indicators which will help users to better understand the (usually highly aggregated) core indicators. Two types of indicators can support users to address better more specific information needs and to present a broader background:

- (a) Operational indicators – provide 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).

63. It is recommended to select all relevant operational and contextual indicators in line with the core indicators that are produced and published. At this stage of the process, it is not always easy to determine which indicators will be needed in the analysis phase. Integrating operational and contextual indicators in a national database does not imply that all these indicators must be published.

64. In selecting contextual indicators, it is important to keep in mind that the nature of the indicators could also be a selection criterion: qualitative indicators may be important to provide relevant background information.

65. Text box 7 provides a national example for the selection of operational and contextual indicators.

Text box 6

National example of operational and contextual indicators

Luxembourg

In the national indicators set, some core indicators were disaggregated to offer more detailed information (operational indicators):

- Total energy use by the national economy has been split between industries, services, agriculture and households
- Total GHG emissions of the national economy have been split between industries, services, agriculture and households
- Share of energy and transport related taxes as percentage of total taxes and social contribution has been split between energy and transport
- Change in water use efficiency over time has been split between industries, services, agriculture and households.

Some core indicators have been also complemented with contextual indicators in the aim to inform on national specificities:

- Share of fuel sales to non-residents in total fuel sales
- Number of permits given for free
- Number of permits sold by auctioning.

G. Step 5: Planning the production with available data

66. NSOs regularly produce new statistics or accounts on request by stakeholders. The production process often refers to GSBPM, which can also help to organise the production plan.

67. Three important elements may require detailed discussions within the technical working group to facilitate the methodological development and regular production of the indicator set:

(a) Assignment and definition of the roles and responsibilities of the different partners. It is crucial to clearly assign and define roles by eliminating any ambiguity that may arise. Where possible, these arrangements should be captured in an official agreement to ensure that resources are allocated timely and adequately.

(b) Detailed description and agreement on the mechanism for data sharing and /or centralisation.

(c) Clarification of the validation and dissemination procedure: The validation of indicators has to be carried out independently by an NSO in consultation with subject matter experts. NSOs will disseminate the set of indicators after passing quality assurance as part of their regular statistical production.

68. The higher the number of contributors involved, the more important are the agreement and clarification among the different participants of the production process. The complexity increases further when contributors from different units, departments or directorates within the organisation or from other organisations are involved. With many contributors across multiple institutions, the efficiency of the process is highly determined by the clear description and agreement on roles, responsibilities and data flow organisation.

69. Text box 8 presents national examples of production plans.

Text box 7

National examples of production plans

Luxembourg

The Luxembourg production plan has been structured in five steps:

- Phase 1: test last version of recommended CES indicator set
- Phase 2: select national key indicators based on two criteria: relevance for the country and quality of data set
- Phase 3: define contextual indicators to complement the national key indicators
- Phase 4: validate selected indicators by the Working Group of Environment Statistics (June 2019)
- Phase 5: implement regular production of this new national indicators list

Kyrgyzstan

Kyrgyz Republic conducted the work on developing a national set of CCRI in 4 stages, as follows:

- 1) analysis and inventory;
- 2) adaptation of metadata indicators;
- 3) pilot testing (assessment) of indicators;
- 4) based on the result of pilot testing, a “Roadmap for Improving Statistics Related to Climate Change in the Kyrgyz Republic” was developed.

H. Step 6: Implementing the plan

70. The production plan will be implemented with the following consecutive action points:

- (a) Collect the needed data;
- (b) Calculate the indicators following the methodology mentioned in metadata sheets;
- (c) Analyse the results with the aim to:
 - Check the consistency of historical series and between related indicators
 - Prepare an explanation on “intended inconsistencies” and important data gaps, e.g. the difference between territory and residence-based indicators
 - Identify responses to policy questions and develop the “story”
- (d) Disseminate in the form of desired products.

71. For transparency and traceability, it is recommended to prepare national metadata sheets. These sheets can be based on metadata sheets of the *CES indicator set* but would have to be complemented with national references for data sources and legal acts.

I. Step 7: Evaluating the production plan, process and outputs

72. After the production and the dissemination of a first set of indicators, it is a good practice to carry out an evaluation. Both the internal production process, as well as the external output should be evaluated.

73. Internally, the production plan and process should be discussed in the technical working group.

74. In addition, the disseminated product should be evaluated. Final users of the output are important sources of information for this evaluation. The aim is to verify the satisfaction of stakeholders with the product delivered. This task could be done within the stakeholder platform.

75. The production process is an iterative exercise: by asking the final users for feedback, requests for more disaggregated statistics and/or additional information and/or new requests related to policy questions may be received. These aspects may then be addressed by developing new operational, contextual or core indicators.

76. A systematic way of obtaining feedback from final users is to organise a user survey. The aim should be to elicit a response from, at the minimum, the main intended institutional user of the indicator set and the other institutions that participate in the stakeholder platform. In addition, new potential users who have expressed their interest after the publication of the indicator set can be surveyed.

77. In addition to asking for feedback, a broader review of the indicator set may be organised, that would again cover elements of the specify needs and design phase to see if:

- There are new information needs
- New statistics or indicators have become available that can be included
- There are methodological developments or new data available that may allow the production of a new indicator.

J. Step 8: Following-up on the evaluation

78. The technical working group can draft a list of planned improvements to serve as input for the next round of indicator production.

79. A specific type of improvement would be source data availability, especially in cases where data gaps prevent the compilation of a relevant indicator.

80. The production of the source data set is most likely covered by a separate production plan. Hence, improvements to the source data would have to be introduced to that production plan. Depending on who is responsible for the production of the source data, meetings with the responsible statisticians may be needed. If the data are sourced from another part of the organisation, potentially higher levels of management may need to be informed and involved. If the data are sourced from outside the organisation, the stakeholder platform may be the right forum to discuss these improvements.

81. In addition to improving an existing dataset, the evaluation and review of the indicator set may also result in the need to reinforce the core indicator set by extending an existing data collection or even creating a new data collection. Due to the resource impact, this would likely need to be confirmed by the stakeholder platform, agreed to by higher management, included in budgets and annual working plans. In case of a new data collection, a full cycle of setting up a new collection would have to be carried out, again going through all phases of GSBPM.
