United Nations ECE/CEP-CES/GE.1/2018/4

Economic and Social Council

Distr.: General
16 August 2018

Original: English

Economic Commission for Europe

Committee on Environmental Policy Conference of European Statisticians

Joint Task Force on Environmental Statistics and Indicators

Fifteenth session
Geneva, 25–26 October 2018
Item 4 of the provisional agenda
Amendment of the Guidelines for the Application of Environmental Indicators

Aligning recommended United Nations Economic Commission for Europe environmental indicators with corresponding Sustainable Development Goal indicators

Note by the secretariat

Summary

The document presents the results of a comparison of the methodologies and data requirements for selected Sustainable Development Goal (SDG) indicators with the set of indicators of the United Nations Economic Commission for Europe (ECE) online *Guidelines for the application of environmental indicators* (http://www.unece.org/env/indicators.html). The purpose is to propose a process for the review of all ECE environmental indicators concerning their compatibility with SDG indicators.

For this comparison the ECE secretariat chose the following three SDG indicators which are classified by the Inter-agency and Expert Group on SDG Indicators as tier I and tier II indicators, meaning they are using an internationally established methodology and standards: 6.4.1 (Change in water-use efficiency over time), 6.4.2 (Level of water stress: freshwater withdrawal as a proportion of available freshwater resources) and 7.2.1 (Renewable energy share in the total final energy consumption).

The paper recommends some changes in the metadata of the production sheets for ECE environmental indicators, but also identifies some methodological problems in the metadata sheets for SDG indicators 6.4.1 and 6.4.2.

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I. Introduction

1. At its fourteenth session, the Joint Task Force on Environmental Statistics and Indicators emphasized the need to keep the United Nations Economic Commission for Europe (ECE) guidelines on environmental statistics and indicators under review and work towards the alignment of the guidelines with the 2030 Agenda for Sustainable Development.

2. An analysis carried out by the secretariat and presented at the eleventh session of the Joint Task Force in June 2016 showed that 29 of the indicators of the ECE online *Guidelines for the application of environmental indicators (see http://www.unece.org/env/indicators.html)* could be used or are supporting the production of Sustainable Development Goals (SDG) indicators.

3. Based on this request the secretariat has chosen the following three SDG indicators for which internationally established methodologies exist to showcase whether the relevant indicators in the *Guidelines for the application of environmental indicators* need to be better aligned and revised:

- SDG indicator 6.4.1: Change in water-use efficiency over time.
- SDG indicator 6.4.2: Level of water stress: freshwater withdrawal as a proportion of available freshwater resources.
- SDG indicator 7.2.1: Renewable energy share in the total final energy consumption.

4. Indicators 6.4.1 and 6.4.2 are part of a pilot of data flows from countries to custodian agencies which is currently being carried out by the Conference of European Statisticians' (CES) Steering Group on Statistics for SDGs. Some countries mention in their comments that some methodological questions remain open in the metadata sheets for these two indicators. The analyses by the ECE secretariat also identified some inconsistencies and methodological problems related to the metadata for these two indicators.

II. Tiers of the selected SDG indicators

5. To facilitate the implementation of the global SDG indicator framework, all indicators are classified by the Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs) into three tiers on the basis of their level of methodological development and the availability of data at the global level, as follows:

- Tier I: Indicator is conceptually clear, has an internationally established methodology and standards are available, and data are regularly produced by countries for at least 50 per cent of countries and of the population in every region where the indicator is relevant.
- Tier II: Indicator is conceptually clear, has an internationally established methodology and standards are available, but data are not regularly produced by countries.
- Tier II: No internationally established methodology or standards are yet available for the indicator, but methodology/standards are being (or will be) developed or tested.

6. As of 11 May 2018, the updated tier classification contains 93 tier I indicators, 72 tier II indicators and 62 tier III indicators. In addition to these, there are 5 indicators that have multiple tiers (different components of the indicator are classified into different tiers) (see https://unstats.un.org/sdgs/iaeg-sdgs/tier-classification/).

7. The SDG indicators selected for showcasing the possible need to revise the ECE Guidelines have internationally established methodologies and are classified by the IAEG-SDGs as shown in table 1.

Table 1
SDG indicators selected

Indicator	*Tier*	*Metadata (all accessed on 14 August 2018)*
6.4.1: Change in water-use efficiency over time	II	https://unstats.un.org/sdgs/metadata/files/Metadata-06-04-01.pdf
6.4.2: Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	I	https://unstats.un.org/sdgs/metadata/files/Metadata-06-04-02.pdf
7.2.1: Renewable energy share in the total final energy consumption	I	https://unstats.un.org/sdgs/metadata/files/Metadata-07-02-01.pdf

III. Comparing data, definitions and methodologies of environmental indicators of the United Nations Economic Commission for Europe guidelines with the corresponding Sustainable Development Goals indicators

A. Sustainable Development Goals indicator 6.4.1: Change in water-use efficiency over time

1. Calculation of the indicator

8. According to its metadata the indicator “change in water use efficiency over time” (CWUE) measures the relative change of Water Use Efficiency.

9. Water Use Efficiency (WUE) is defined as the volume of water used divided by the value added of a given major sector. Following the International Standard Industrial Classification (ISIC) 4 coding, sectors are defined as:

(a) Agriculture; forestry; fishing (ISIC A), hereinafter “agriculture”.

(b) Mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; constructions (ISIC B, C, D and F), hereinafter “MIMEC”.

(c) All the service sectors (ISIC E and ISIC G-T), hereinafter “services”.

10. Following its original definition the unit of the WUE should be volume/value, commonly m3/USD. It needs to be noted that the metadata sheet for this indicator states that the unit of measurement is value/volume, commonly USD/m3.

11. Furthermore, to maintain consistency with the System of Environmental-Economic Accounts for Water (SEEA-Water), the terms “water use” and “water abstraction” are used. In particular, “water abstraction” must be considered synonym of “water withdrawal”.

12. Water use efficiency is computed as the sum of the three sectors listed above, weighted according to the proportion of water used by each sector over the total use. In formula:

$$WUE = A_{we} \times P_A + M_{we} \times P_M + S_{we} \times P_S$$

Where:

WUE = Water use efficiency

A_{we} = Irrigated agriculture water use efficiency

M_{we} = MIMEC water use efficiency

S_{we} = Services water use efficiency

P_A = Proportion of water used by the agricultural sector in the total use

P_M = Proportion of water used by the MIMEC sector in the total use

P_S = Proportion of water used by the service sector in the total use

13. It is important to note that for the agricultural sector only the water use efficiency for irrigated agriculture is taken into consideration. This requires a calculation of the agricultural gross value added (GVA) produced by irrigated agriculture. The SDG metadata sheet recommends a calculation of the agricultural GVA produced by irrigated agriculture based on statistics about irrigated land, total arable land and permanent crops.

14. The data needed for calculating this indicator are therefore:

(a) The annual quantity of water use for the sectors “agriculture, forestry and fishing”, “mining and quarrying, electricity gas, steam and air conditioning supply and constructions” and services (all classified according to ISIC rev.4).

(b) Value added for each of the sectors.

(c) For the calculation of the GVA produced by irrigated agriculture additional statistics on the irrigated land, total arable land and permanent crops are needed.

15. Even if the SDG indicator is classified as tier II the metadata sheet leaves a couple of questions open:

(a) It is not clear if and how water used for cooling and hydropower generation is taken into account.

(b) There is a slight inconsistency in how the sectors are defined in the SDG metadata document. In section “definition” it is according to ISIC rev. 4, but in section “concepts” MIMEC and services sector are distinguished differently, i.e. whether a connection to the public water supply network exists or not.

2. Data available from the ECE Guidelines

16. Indicator sheet C3 (Total water use) provides statistics for the calculation of SDG indicator 6.4.1. Table 2 compares it with the data needs and the concepts used for the SDG indicator.

17. Data on irrigated area, total arable land and permanent crops is not available in the ECE Guidelines and has to be taken from agriculture statistics. Statistics on GVA has to be obtained from the National Accounts.

18. The ECE indicator sheet C3 also calculates automatically a water use efficiency indicator “total freshwater use per unit of GDP” by dividing the total freshwater use by gross domestic product (GDP) (purchasing power parity at constant prices 2011). It needs to be noted that this differs from the methodology used for SDG indicator 6.4.1.

19. The SDG metadata sheet does not clarify if and how water used for cooling and hydropower is taken into account. As many water use indicators consider cooling water and hydropower water in different ways, it is recommended to separate this information in indicator sheet C3. However, currently indicator sheet C3 excludes water used for hydropower generation from its definition of water use (as most international water questionnaires do, but it is e.g. needed for compiling flow accounts within the System of Environmental-Economic Accounts for Water).

Table 2
Indicator C3 (Total water use) data needs and concepts

SDG 6.4.1 data requirement	*Statistics available from ECE Indicator sheet C3 (Total water use)*	*Comments*
Annual quantity of water used in agriculture, forestry and fishing (ISIC A)	Row 12: Water used by agriculture, forestry and fishing (ISIC 01-03)	Conceptually identical, data from the ECE indicator production sheet can be used directly.
Annual quantity of water used by mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; constructions (ISIC B, C, D and F), hereinafter "MIMEC"	Row 14: Manufacturing (ISIC 10-33) Row 15: Electricity industry (ISIC 351) Row 16: Other economic activities	It is not possible to compile this from the ECE indicator production sheet as the economic activities gas, steam and air conditioning supply as well as mining and construction are aggregated together in row 16. Furthermore, it remains unclear how the SDG indicators treats water used for cooling and for hydropower generation.
Service sectors (ISIC E and ISIC G-T),	Row 16: Other economic activities	It is not possible to compile this from the ECE indicator production sheet as "service sectors" is not shown separately.

3. Conclusions for SDG indicator 6.4.1

20. In the SDG metadata sheet some conceptual questions remain open. However, one could expect that the statistics on water use quantities needed for the calculation of SDG indicator 6.4.1 are available from ECE indicator sheet C3. Currently, it cannot be confirmed that the used definitions, concepts and classifications are fully aligned. In any case, the calculation of the SDG indicator requires more disaggregation of the water use by different economic sectors than currently available from the ECE indicator sheet.

21. Statistics on irrigated areas, total arable land, crops and GVA has to be taken from agriculture statistics and national accounts.

22. It is therefore recommended, to clarify the open questions with the custodian agency of the SDG indicator (the Food and Agriculture Organization of the United Nations) and to consider this in the concepts used in the ECE indicator sheet C3. Furthermore, it is needed to revise the existing disaggregation of water use by economic activities in indicator sheet

C3 and to develop the indicator sheet F1 – irrigation, which currently only exists as placeholder in the ECE Guidelines. This would allow to take almost all necessary physical data for the calculation of the SDG indicator from indicator sheets of the ECE Guidelines.

B. SDG indicator 6.4.2: Level of water stress: freshwater withdrawal as a proportion of available freshwater resources

1. Calculation of the indicator

23. According to its metadata the indicator is defined as the ratio between total freshwater withdrawn by all major sectors and total renewable freshwater resources, after taking into account environmental water requirements. Main sectors, as defined by ISIC standards, include agriculture; forestry and fishing; manufacturing; electricity industry; and services. This indicator is also known as water withdrawal intensity.

24. It needs to be noted that the selected main sectors are different from those used for SDG indicator 6.4.1.

25. The indicator is computed as the total freshwater withdrawn (TWW) divided by the difference between the total renewable freshwater resources (TRWR) and the environmental water requirements (Env.), multiplied by 100.

26. The calculation formula is:

$$Stress\ (\%) = TWW / (TRWR - Env.) * 100$$

27. The total freshwater withdrawn (TWW) refers to annual values and the total renewable freshwater resources (TRWR) to long-term average annual values.

28. Environmental water requirements (Env.) are the quantities of water required to sustain freshwater and estuarine ecosystems, but currently there are no recommendations available on how to calculate them.

29. As water stress can be a sub-national phenomena and it may be important to show the respective contribution of different sectors to the country's water stress it is important to have data available that allows a disaggregation by economic sectors and on the level of appropriate hydrological units (river basins, aquifers).

30. Similar to SDG indicator 6.4.1 the metadata sheet leaves open some conceptual and methodological questions such as:

(a) Are water abstractions for cooling and hydropower generation included in the calculation of the indicator?

(b) How to calculate the environmental water requirements?

2. Data available from the ECE Guidelines

31. Indicator sheets C1 (Renewable freshwater resources) and C2 (Freshwater abstraction), provide statistics for the calculation of SDG indicator 6.4.2.. However, even if indicator sheet C1 (Renewable freshwater resources) provides statistics on the annual renewable freshwater resource, there is no statistics available for the LTAA (long-term average annual) as required for the calculation of the SDG indicator.

32. It needs to be noted that the automatically calculated water exploitation index in the ECE indicator production sheet C2 (Freshwater abstraction) (row 14) is different from SDG indicator 6.4.2 as it is not based on LTAA and it does not consider the environmental water requirements.

3. Conclusions for SDG indicator 6.4.2

33. In the SDG metadata sheet some conceptual questions remain open. However, one could expect that the statistics on water abstraction quantities and total renewable water resources needed for the calculation of SDG indicator 6.4.2 are available from the ECE indicator sheets C1 and C3. Currently, it cannot be confirmed that the used definitions, concepts and classifications are fully aligned.

34. In any case, indicator sheet C1 would need an additional column to provide information on LTAA values (similar to the OECD/Eurostat Joint Questionnaire in Inland Waters).

C. Sustainable Development Goals indicator 7.2.1: Renewable energy share in the total final energy consumption

1. Calculation of the indicator

35. According to its metadata the indicator is defined as the percentage of final consumption of energy that is derived from renewable resources.

36. Renewable energy consumption includes consumption of energy derived from: hydro, solid biofuels, wind, solar, liquid biofuels, biogas, geothermal, marine and waste. The total final energy consumption is calculated from national balances and statistics as total final consumption minus non-energy use.

37. This indicator is based on the development of comprehensive energy statistics across supply and demand for all energy sources – statistics used to produce a national energy balance. Internationally agreed methodologies for energy statistics are described in the "International Recommendations on Energy Statistics" (IRES), adopted by the United Nations Statistical Commission, available at: https://unstats.un.org/unsd/energy/ires/.

2. Data available from the ECE Guidelines

38. Typically, countries will use their Energy balances to calculate this indicator. However, one would expect full alignment of the relevant ECE indicator sheets with the SDG indicator.

39. The relevant ECE indicator sheets are G1 (final energy consumption) and G4 (renewable energy supply). Indicator sheet G1 provides statistics on the total final energy consumption, the consumption by households and selected economic activities as well as non-energy uses. Indicator sheet G4 provides statistics on the renewable energy supply by energy product (hydropower, biomass, biofuels, wind power, solar power, geothermal energy and other renewables).

40. It is not possible to calculate the SDG indicator directly by using these two indicator sheets as additional calculation steps are required to calculate the final consumption of energy from indicator sheet G4 which is about renewable energy supply.

3. Conclusions for SDG indicator 7.2.1

41. As recommended in the metadata SDG indicator 7.2.1 should be calculated from the energy balances. The ECE indicator sheets can be considered as another product that can be produced from energy balances, but full consistency is needed.

42. Better alignment of ECE indicator sheets G1 and G4 with Energy Balances and SDG indicators has already been discussed in detail in the Recommendations for revising the ECE set of environmental indicators: Energy and Biodiversity (ECE/CEP-CES/GE.1/2017/3), and can be summarized as:

(a) Revising the currently used definition for final energy consumption.

(b) Separating the non-energy uses from final energy consumption.

(c) Reviewing the used classification of energy products to be fully consistent with the Standard International Energy Product Classification (SIEC).

(d) Considering imports and exports of electricity and heat separately.

IV. Overall conclusions

43. Currently none of the selected SDG indicators can be solely calculated from the ECE environmental indicator production sheets due to the following reasons:

(a) Some methodological questions remain open, even if the SDG indicators are based on internationally established methodologies and standards.

(b) Non-environmental statistics is needed in addition to compile the indicator (e.g. GVA).

(c) Further disaggregation of the used industry classification (ISIC rev.4) would be needed.

(d) Some aggregates are missing (e.g. LTAA in indicator C1).

(e) Alternative (better) data sources exist to calculate the indicator (e.g. energy balances).

44. There are considerable synergies between the SDG indicators and the ECE environmental indicators and underpinning data. There is a lot of value in fully aligning the ECE indicator production sheets with the SDG indicators:

(a) In many countries the ECE *Guidelines for the application of environmental indicators* have been implemented and provide the only source for official environment statistics. Thus, they are the source for producing any kind of environment-related indicators, including environment-related SDG indicators;

(b) The ECE indicator production sheets have been designed for multi-purpose use and efforts made by ECE member States in establishing a Shared Environmental Information System in Europe and Central Asia ensure that environmental indicators are readily available and accessible for various users and reporting purposes. Alignment with the SDG indicators will therefore ensure full consistency and avoid duplication of efforts in production of environmental data and indicators and their use.

45. As a consequence, some modifications of the ECE indicator production sheets are recommended, mainly regarding the better clarification of some of the used concepts and how they relate to the concepts used for SDG indicators (e.g. definition of water use),

further disaggregation of sectors, review of the used classifications (e.g. SIEC) and adding of additional data items (e.g. LTAA).

46. More work needs to be done to review all ECE indicator production sheets and to make them consistent with SDG data requirements. It is recommended to start with ECE indicators which are linked to tier I SDG indicators, and to also provide feedback to the relevant custodian agencies.

47. As other international organisations, including Eurostat, the Organisation for Economic Co-operation and Development, the United Nations Statistical Division and the International Energy Agency are currently also revising their data collections towards SDG compatibility it is important to take these processes also into account when revising the ECE Guidelines.

48. The pilot of data flows from countries to custodian agencies may provide additional information which is useful for improving both the SDG metadata sheets and the ECE online *Guidelines for the application of environmental indicators*.