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Scope of energy accounts in the revised SEEA

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1 Introduction

1 Energy accounts are an integral part of environmental-economic accounting. In the SEEA-2003 (UN et al. 2003[2]), the energy accounts are presented in several chapters describing the various modules of environmental-economic accounts, namely asset accounts in physical and monetary units, physical flow accounts, hybrid flow accounts as well as accounts for economic activities and products related to the environment including taxes, subsidies, licenses etc.

2 The elevation of the SEEA to the level of an international statistical standard presents a challenge and an opportunity to elevate the energy accounts to the level of a statistical standard. The UNCEEA at its last two meetings considered that the energy accounts are a mature subject matter to be elevated to the level of a statistical standard and recommended that they feature prominently in the revised SEEA. This recommendation calls for the international community to work expediently on developing definition, classification, tables and accounts that are internationally agreed.

3 To meet this request UNSD has put additional resources to work on the development of energy accounts as indicated in Section 3. UNSD will work in consultation and close cooperation with the Oslo Group on Energy Statistics and London Group on Environmental Accounting to avoid duplication of work and ensure consistency between energy statistics and accounts.

4 This note is in response to the request of the London Group at its 10th Meeting to further discuss the scope of the energy accounts in the revised SEEA and the links with energy statistics

[1] The views expressed in the paper are of the authors only and do not necessarily represent those of the United Nations.

[2] United Nations, European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, World Bank (2003): *Handbook of National Accounting: Integrated Environmental and Economic Accounting 2003*. Final draft circulated for information prior to official editing.

and balances. It draws the attention to selected issues that help define the scope of energy accounts, in particular asset accounts and supply and use tables.

2 Energy accounts in the revised SEEA

5 In the context of environmental-economic accounting, the term "energy accounts" is used as a short cut for "integrated environmental-economic accounts for energy resources". "Energy accounts" cover the whole suite of environmental-economic accounts, that is:

- Asset accounts in physical and monetary units,
- Supply and use tables in physical and monetary units and hybrid accounts
- Accounts for economic activities and products related to the environment and other environmentally-related transactions (such as specific taxes, subsidies, permits licenses and property rights).

6 The same terminology convention is used for other natural resources accounts. "Water accounts", for example, denote the whole sets of environmental-economic accounts for water, namely: asset accounts, physical supply and use tables, hybrid accounts, monetary accounts, emission accounts etc. Similarly in the case of fisheries and forest accounts, stock and flow accounts in physical and monetary units as well as other relevant accounts are discussed in the publications (e.g. environmental protection expenditure accounts) (see the publication "System of environmental-economic accounting for Water; Integrated Environmental and Economic Accounting for Fisheries, Economic and Environmental Accounting for Forestry: Status and Current Efforts).

7 To ensure consistency between stocks and flows, standard accounts for energy have to be developed for all the modules of accounts. In particular, classifications, definitions and the recording of transactions have to be consistent between the accounts for stocks and flows.

8 The revised SEEA will include agree classifications of industries, products, transactions and assets, which will form the basis for the standard tables and accounts. The level of detail of these classifications presented in the tables will depend on considerations of relevance and data availability and will be discussed at a later stage.

9 Selected issues that may help to define the scope of the energy accounts in the revised SEEA are presented below. This is not intended to be a comprehensive list but a starting point for discussion.

a. Asset Accounts - selected issues

10 Asset accounts record the opening and closing stocks and the changes therein. Assets accounts are compiled for both produced and non-produced assets. Some issues defining the scope of the energy asset accounts are presented separately below for non-produced and produced assets.

Non-produced energy assets

11 The asset classification for Mineral and energy resources (category EA.11) in the SEEA-2003 expands the 1993 SNA classification by including not only those resources that have a market value but also those resources in physical units that may not have a market value. The definition and classification of mineral and energy resources is still under discussion and it will take into account the development of the United Nations Framework Classification for Fossil Energy and Mineral Resources.

12 Another issue is whether there exits a stock of renewable energy resources. With the increase interest in renewable energy resources, some have argued that for renewable energy resources there may be a stock which would be the expected generation of renewable energy depending on the technology. Not including the stock of renewable resources in the stock may provide an unbalanced view of total stock of energy available in the country.

Produced energy assets

13 Asset accounts for produced asset related to energy are part of the conventional System of National Accounts. Produced assets for energy include inventories of mineral and energy products that have entered the economy. They have either been only extracted or transformed/converted before being stored prior to their being further processed, sold, delivered to other units or used in other ways and stocks of products acquired from other units that are intended to be used for intermediate consumption or for resale without further processing (these are also referred to as inventories). A portion of the inventories of selected products is referred to as strategic stock.

14 Infrastructure for the exploration, exploitation, transportation and distribution of energy products is part of the conventional SNA produced asset accounts. In the SEEA it may be useful to separately identify these assets for analytical purposes.

15 The choice of the products to include in the standard table for produced assets will depend on the relevance and data availability and will be discussed later.

b. Supply and use tables – selected issues

16 Supply and use tables record flows of goods and services. They are based on the principle that the total supply of each product is equal to its total uses. They are used to derive value added and final demand in constant and current prices in a very detailed, integrated and consistent manner. They are also used, among other things, to derive input-output tables for the purpose of economic impact analysis and forecast.

17 The supply table presents by row the different kind of products produced by domestic industries (consisting of residents in the economic territory of a country) and supplied by the rest of the world (imports). The use table presents the use of the same products (shown by row) for intermediate consumption by the different industries, for final consumption, gross capital formation and for use by the rest of the world (exports).

18 For ease of reference, Tables 1 and 2 present the SNA structure of the supply and use tables. They are the starting point for the development of standard tables for [illegible] accounts. Note that the disaggregation of the industries reflects that of the standard tables of the SEEAW.

Disaggregation of ISIC for energy-related industries

Table 1: Supply table

	Output of industries (by ISIC categories)							Imports	Taxes less Subsidies on products	Trade and transport margins	Total supply at purchaser's price
	1-3	5-33, 41-43	35	36	37	38,39, 45-99	Total output, at basic prices				
1. Total output											
of which:											
1.a CPC …											
1.b CPC ….											
…											

Classification and definition of energy (related) products

Table 2: Use table

	Intermediate consumption of industries (by ISIC categories)							Final consumption	Capital formation	Exports	Total uses at purchaser's price
	1-3	5-33, 41-43	35	36	37	38,39, 45-99	Total industry				
2. Total use											
of which:											
1.a CPC…											
1.b CPC…											
…											
3. Total value added											

Type of uses to include

19 In energy statistics and balances a distinction is generally made in the use of energy products between "non-energy use", "final energy use" and "transformation input". Non-energy use (of energy products) refers to the use of energy products as raw materials in the chemical, petrochemical and other industries, not for the purpose to produce energy (e.g. bitumen used for asphalt). Final energy use refers to the use of energy products for energy purposes. It excludes the use of energy product for transformation into other forms of energy. Transformation input refers to the conversion of primary forms of energy to secondary and further transformation (e.g. coking coal to coke, crude oil to petroleum products, and heavy fuel oil to electricity).

20 One question that should be address is whether the energy flow accounts (i) should cover and distinguish the three different types of uses of energy products or (ii) should exclude the non-energy use of energy products and cover only the final energy use (final energy consumption) and transformation inputs.

21 Including (and explicitly identifying) all three types of uses in the SUT has the advantage of providing a complete picture of the demand of energy products by the economy as well as providing necessary information for the calculation of energy-related air emission. However, they may require more detailed information.

Energy losses (e.g. in distribution, storage, etc.)

22 Losses of energy (in the storage, distribution system, transformation) are an important indicator of the efficiency of the distribution/storage/transformation system and allow for a mass balance of the energy flow. The question is should the physical supply and sue table record explicitly these flows and how to record them. In the case of water, the supplementary physical supply and use tables explicitly identify the losses in distribution which are allocated to the supplier. The same should be done for energy.

Classification/disaggregation of economic activities

23 In the SUT for energy, the relevant breakdown of industries for the standard and supplementary tables has to be identified and mapped to the International Standard Industrial Classification of All Economic Activities, Revision 4 (ISIC Rev. 4). The breakdown has to include the relevant economic activities on the supply side, such as, for example, economic activities for the extraction of energy resources, transformation/conversion of primary energy products and supply of energy products and the relevant activities on the use side.

24 The starting points should be the detailed industry breakdown used in energy statistics which distinguishes three groups of industries (which are called in energy statistics terminology "sectors") and within each group a detailed list of industries is identified. The main groups are: the 'transformations sector" (broadly corresponding to activities dealing with the conversion of energy to other forms), "energy sector" (corresponding to energy producing activities - e.g. for

heating, lighting and operation of all equipment used in the extraction process, for traction and for distribution). in the supply of energy) and "end-user sector" (industry, transport, residential, commercial/public services, agriculture/forestry, fishing and non specified).

Classification/disaggregation and definition of energy products

25 In Tables 1 and 2 the list of energy products for which it is important and relevant to record the supply and use has to be identified and mapped into international classifications of products such as the Central Product Classification (CPC ver. 2) and the Harmonized System Codes (HS).

26 There may be the need to develop a classification of energy products by purpose, for example, to distinguish energy and non-energy use of energy products, and main non-energy products used for energy purposes (see para. 29). It would also be useful to distinguish policy relevant energy-uses such as heating, lighting and transport, etc. Supplementary tables could be compiled to address specific policy needs.

27 There may be also the need to develop additional classifications for energy in the case, for example, of renewable resources since these are well developed in the existing classifications of products.

28 The distinction between primary and secondary energy products is often made in energy statistics to distinguish energy products that are "either extracted or captured directly from natural resources such as crude oil, hard coal, natural gas – primary; or are produced from primary sources – secondary" (OECD/IEA/Eurostat 2005[3]). Some countries distinguish between primary and secondary products in their energy accounts. It may be relevant to have this distinction in the standard tables for energy accounts.

Coverage of products in the SUT

29 Depending on how energy products are defined, there may be the need to cover in the supply and use table not only the supply and use of 'energy products' (as output of the 'energy industry'), but also the supply and use of (the main) non-energy products which are used for energy purposes. In this regard it is particularly important to develop a classification of products by purpose (i.e. for energy and non-energy purposes) and to define the boundary of the non-energy products to consider. It should be said that the supply and use tables for non-energy products will include only the part of non-energy products used for energy purposes.

"Transport sector"

30 Energy statistics refers to the fuel consumed in the transport sector irrespective of the economic activity in which the transportation activity occurs. In national and environmental-economic accounts, we need to allocate the use of fuel to the industries that use it for intermediate consumption. In addition in national and environmental-economic accounts, only the use of fuel by resident units is recorded as intermediate or final consumption. The use of fuel by non-resident units is recorded as export.

Definitions of transactions

31 The hybrid supply and use tables for energy juxtapose physical and monetary information to allow for integrated analysis. The definitions of transactions such as production, changes in inventories, imports, exports, use etc. in the monetary tables follow the 1993 SNA definitions. To juxtapose the physical flows to monetary flows the definitions of transactions have to be consistent. An analysis of the existing differences in definitions of transactions used in energy

[3] 2005, OECD/IEA/Eurostat *Energy Statistics Manual.*

statistics and a comparison with the national accounts definitions has \to be developed together with suggestions on how to move this forward.

Double counting

32 Detailed supply-use tables include all types of energy, i.e. primary energy products as coal and crude oil on one hand and transformed/converted types of energy like petrol and heating and electricity. This leads to a double counting of all uses of energy are added in the sense that the same energy is counted more than once. The question is whether additional energy accounts showing the net energy use (avoiding the double counting) should be included as well.

Statistical discrepancy

33 The basic identity of the supply and use tables is supply equals use. However, in practice this is not often the case because, for example different data sources are used for the compilation of the supply table and the use table and sampling errors easily add up. Thus often there may be some discrepancies between the supply and use. These are also issues of data quality.

34 The issue is whether the standard tables should explicitly allow for an item called "statistical discrepancy", and provide guidance on how to allocate it.

Links with energy statistics and balances

35 Energy statistics (and resource extraction statistics) is the main source of data and forms the main building blocks for energy accounts. Energy accounts - intended as the whole suite of environmental-economic accounts for energy - and energy statistics have to be as much as possible aligned so that countries compiling energy statistics can more easily organize the information according to the environmental-economic accounting framework.

36 Energy balances are a form of accounting for energy supply and use. They differ form the environmental-economic accounting with respect to the geographical coverage (territory principle vs. residence principle) and with respect to the link to the economic information of the SNA. It is important that they are not viewed as competing systems of accounting. Developing bridge tables that clearly show ho to go from one to another and which additional information is needed for this transition is crucial in understanding the differences.

3 Way forward

37 Two groups have been created to address specific issues related to energy. The Oslo Group on Energy Statistics addresses "issues related to energy statistics and contributes to improved international standards and improved methods for official energy statistics". It is working towards the revision of the UN manuals on energy statistics, namely the International Recommendations on Energy Statistics (IRES) and the Compilation Manual of Energy Statistics. The London Group on Environmental Accounting continues the theoretical and practical development of environmental-economic accounting in particular for those components that will allow the elevation of the SEEA to the level of an international statistical standard. It created a subgroup on Mineral and Energy Accounts to address more specifically issues related to mineral and energy accounts.

38 UNSD is involved in the preparation of international recommendations on energy statistics in cooperation with the Oslo Group and the preparation of the elevation of the SEEA to the level of an international statistical standard in close cooperation with the London Group and other relevant experts groups (in this case, for energy, the Oslo Group) under the overall coordination of the UNCEEA.

39 The work on these two projects is being carried out in parallel and it will benefit from a strong cooperation between the two projects in order to ensure the maximum consistency, to the extent possible, and integration between energy statistics and accounts

40 UNSD is prepared to draw from the expertise of all these groups to advance expediently the development of the statistical standard for environmental-economic accounting for energy. In this regard, UNSD propose the following action plan to be carried out in cooperation the Oslo Group and the London Group:

(a) draft standard tables for the whole suite of environmental-economic accounts for energy (asset accounts in physical and monetary units, physical and monetary supply and use tables; hybrid tables, and other economic/monetary accounts for energy);

(b) draft bridge tables linking energy balances to the energy accounts;

(c) draft classifications/definitions of transactions

41 The London Group is invited to provide its views on the issues mentioned in this paper that define the scope of environmental-economic accounting for energy. This will provide guiding principles to the development of standard tables and better define the links with energy statistics.