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Session 4: Updating of UNSD handbooks and manuals on energy statistics

Recommendations for energy statistics contained in *Concepts and Methods in Energy Statistics, With Special Reference to Energy Accounts and Balances: A Technical Report*

UNSD Report

1. The purpose of this report is to draw the attention of the Oslo Group to a set of recommendations on energy statistics which are contained in *Concepts and Methods in Energy Statistics, With Special Reference to Energy Accounts and Balances: A Technical Report*; Studies in Methods (Series F No. 29). One of the tasks which have to be accomplished during the current revision process is to evaluate these recommendations and formulate proposal to confirm, amend or withdraw them. Such a proposal has to be a part of the report to the UN Statistical Commission which will introduce the final draft IRES for adoption. F29 is available on the UNSD website at **http://unstats.un.org/unsd/publication/SeriesF/SeriesF_29E.pdf.**

2. UNSD would appreciate it if this task is added to the work programme of the Oslo Group. Members may provide their comments by filling in the "Remarks" column of the table. The Oslo Group secretariat and UNSD will make arrangements for the comments analysis and incorporation in the future draft publications.

3. In F29 the recommendations were made as and when the argumentation lead logically to a recommendation. In the following list, the order of recommendations has been changed to group together those relating to the same broad subject area.

#	Recommendation	F29 reference	Remarks
	Concepts and terminology		
1	(1) Primary energy should be used to designate those sources that only involve extraction or capture, With or without separation from contiguous material, cleaning or grading, before the energy embodied in that source can be converted into heat or mechanical work.	(para. 29; see also (16) below).	
2	(2) Secondary energy should be used to designate all sources of energy that result from transformation of primary sources. Fuels, alone, should be used only when describing those energy sources, whether primary or secondary, that must be subjected to combustion or fission in order to release for use the energy stored up inside them.	(para. 29)	
3	(3) Imports, exports and stock changes in secondary energy should be treated in an energy balance in the same way as to changes in the supply and use of primary energy. These flows of secondary energy should be designated as primary energy equivalent. Bunkers should be treated in the same way, as part of the “primary equivalent flows”.	(para. 30)	
4	(29) In order to avoid possible confusion between the meanings of "final" (and "intermediate") in national accounts, input/output and other economic analyses on the one hand and in energy balances on the other, table and texts that refer to the flows involving the energy transformation industries and/or final users of energy should always make clear what is meant by "final" (and - if the term is used - "intermediate").	(para. 315)	
	Energy balance coverage		
5	(7) (a) An overall energy balance should cover all flows of energy including the so-called "non-commercial" sources. Coverage of such sources should be as extensive as possible. When such sources are known to be important but little data exist, such steps as sample surveys should be instituted to improve the amount and quality of data; (b) Autogeneration of electricity from purchased fuels, with or without the joint production of heat, should be treated as part of the transformation sector; (c) Autogeneration from industry's own hydropower	(e) (para. 62)	

	should be treated as primary production of electricity; (d) Steam or hot water produced by the combustion of industrial (or urban) wastes or by exothermic or other heat recovered within industry, should be recorded as primary production; (e) Each method of electricity generation contributing a significant amount of the total supply of electricity should be assigned a separate row in an energy balance.		
6	(6) Energy balances should cover only all the supplies and uses of primary and secondary energy sources, showing clearly the non-energy use of such sources.	(para. 54; see also (8) below)	
7	(8)(a) Energy balances should only cover all the hydrocarbon commodities as defined by a list either embodied in or accompanying the balance table. (b) The problems of defining and obtaining more complete data on the gross and net energy flows between oil refineries on the one hand and petrochemical plants on the other should be investigated more fully. Satellite tables to an overall energy balance should usefully show as fully as possible at least the more important flows of energy by-products (and recovered heat) within the major branches of the chemical industry.	(a) (chap. V) (b) (para. 65; see also (6) above)	
8	(13) An energy balance should show all flows at each level that can be adequately recorded with existing data, so that the relationships between primary energy inputs to transformation, secondary energy outputs from transformation and transformation, losses can be clearly seen. For some purposes, as a supplementary statistic, primary fuel input equivalent of secondary energy sources delivered to final energy users is useful, but may be difficult to estimate because of lack of sufficient data.	(para. 92)	
9	(27) National and international statistical offices should consider publishing estimates of the quantities of useful energy consumed by each final consumption sector. Such estimates should be accompanied by details of the methodology used.	(para. 292)	
Primary energy inputs for the generation of electricity in nuclear and hydropower plants and to renewable forms of energy			
10	(14) The primary energy input to nuclear electricity should in principle be defined as the heat released by reactors during the accounting period. In practice, a proxy for this may need to be used, namely the figure obtained by dividing generation of nuclear electricity by the average efficiency of all nuclear power stations.	(para. 99)	

11	(15) The primary energy input to hydroelectricity should be defined as the energy value of the electricity itself. The energy equivalent in fossil fuel should be recorded as an additional statistic, using, for simplicity either the average thermal efficiency of all classical thermal stations in the country concerned or a standard efficiency of (say) 35%.	(para. 105)	
12	(16) The primary energy corresponding to the so-called renewable sources of energy should be defined as follows and applied to the output of the first stage in an energy-capturing process that yields a measurable output of heat, electrical or mechanical energy: Solar: Biomass — Heat output of the fermentation, distillation or combustion device Photovoltaic cell — Electric energy output Other collecting device — Heat output of the device Water and air: — Mechanical, heat or electrical output of the device Geothermal and ocean thermal: — Heat of output of capturing installation Economists and engineers working on the conversion efficiencies of these techniques may need, in addition, to assess the "potentially recoverable energy" that is awaiting "capture".	(para. 114)	
	Imports and exports		
13	(17) Imports and exports of secondary sources of energy should be recorded for an overall energy balance in terms of the energy content of the fuels (or electricity) that actually flows across national frontiers. If a more detailed analysis is needed of the primary energy input to foreign trade, such an analysis can be made, but it should be additional to, and not part of, the overall energy balance. Trade in non-energy products derived from primary energy sources (e.g. lubricants, carbon black, electrodes) should be recorded in the main energy balance.	(para. 127)	
14	(18) International trade in embodied energy is a proper subject for a detailed assessment of energy problems. Nevertheless an overall energy balance should be constructed in the first place on the basis of, among other flows, only visible trade in energy sources.	(para. 130)	

Accounting units and conversion factors			
15	(25) Energy balances should contain in the column headings for each energy source the average conversion factor (appropriate for expressing the original units in (or underlying) that column in terms of the common accounting unit as shown in the balance). Such average factors should be complemented in foot-notes, or accompanying text; with clear descriptions of the routes and stages followed in any conversions that are not adequately defined by the average factors.	(para. 268)	
16	(5) National and international statistical offices, and bodies that advise them or undertake work for them, should always define clearly the accounting units or presentation units employed in published analyses. The conversion factors and the route used to convert original physical units into the chosen common accounting unit or units should also be stated, or readily available published sources where they may be found should be cited. It should also be made clear whether energy units are defined on a gross or net calorific basis.	(para.48; see also (19) and (20) below)	
17	(19) When expressing the energy content of primary and secondary fossil energy sources in terms of a common energy accounting unit, net calorific values (NCV) should be used in preference to gross calorific values (GCV). If and when recuperation of a significant part of the difference between GCV and NCV from exhaust gases becomes a practical possibility and seems likely to become a reality, this recommended basis may need to be reconsidered.	(para. 135)	
18	(20) Given that the joule, and multiples of it by raising it to powers of 10^3, is the only energy unit in the SI, international and national statistical offices should consider adopting the joule (1 joule = 0.239 calorie) as the rigorous accounting unit for energy balances. The TOE (1 TOE - 10^7 kcal NCV) and/or TCE (l TCE= 7 x 10^6 kcal NCV) may be used as supplementary presentation units. Whenever they are used, they should be clearly defined in terms of the joule, and the route used for converting original data to TOE or TCE should be clearly described.	(para. 157)	
Accuracy of data			
19	(4) National and international statistical offices should consider seriously attempting to assess the sensitivity of each major published aggregate in their energy statistics to errors of plus and minus (say) 5 or, 10% in the less reliable components of such aggregates.	(para. 43)	

20	(24) The relationship between the original-unit data, as used for an energy balance and as published in the usual statistics about each energy industry, should always be made clear.	(para. 267)	
Energy balance structure and classifications			
21	(21) Over-all energy balances should be constructed in the matrix form with the following characteristics: Columns show energy sources (energy commodities) Rows show flows from origins to uses of energy (energy transactions) Separate sub-matrices show, respectively: (a) Supplies of primary sources, and equivalents; (b) Transformation inputs (with negative signs) and outputs (with positive signs); transformation losses in the total column (with negative signs); energy industries' own use; transmission and other losses; (c) Final uses.	(c) (para. 253)	
22	(26) Existing classifications and definitions of crude hydrocarbons and derived products should be examined with a view to establishing an agreed international set of designations, groupings and definitions.	(para. 286)	
23	(28) National statistical offices should consider constructing end-use analyses of the type illustrated in the table paragraph 306.	(table para. 306)	
Coverage of particular flows			
24	(9) Published energy balances, whether for particular energy sources or for all energy sources in a single table, should always make clear whether flows represent production, deliveries, receipts or consumption, and the coverage of stock changes (and stock levels) should make clear whether or not they cover producers, importers, transformers, distributors and final users' stocks.	(para. 69)	
25	(10) Production of coal should be defined as extraction from the ground less waste and screenings plus recoveries from the waste pit.	(para. 76)	

26	(11) All production of associated gas should be treated as part of production of gas, and that part that is flared should be so described. In this way, the change in the output of-the production of oil and gas will not show a "step-change" when the use of part of the gas changes. By analogy, total production of oven gas and blast furnace gas should be recorded in an energy balance, with amounts bled to waste shown as losses.	(para. 78)	
27	(12) All production of gas, either associated or non-associated with crude petroleum, should be recorded net of injection of gas into gas or oilfields. If injected gas is later extracted for a second time, it should be treated as produced then for the first time.	(para. 80)	
28	(22) Electricity output from pumped storage should not be added to electricity produced by other methods (because the latter already includes the electricity that is redistributed through time by means of pumped storage) when compiling an energy balance. The difference between the input to and the output from pumping should be treated as part of the electricity industry's own use.	(para. 264)	
29	(23) Materials returned to oil refineries should be included as inputs to refining, even though such materials have previously been accounted for in refinery output. Refinery fuel should also be included both as part of output and as part of own use.	(para. 265)	