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SEEA Technical Note: Energy Accounting

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SEEA Technical Notes

This note is a part of a series of Technical Notes prepared to support the development of data based on the System of Environmental Economic Accounts (SEEA) Central Framework, the first international standard in environmental economic accounting. Since SEEA is not a single account but a series of modules, the accounts in each of the various modules can be developed separately in accordance with the priorities and the resource availability in each country.

The series of Technical Notes is comprised of one note addressing general issues that cut across domains focusing on processes and operational aspects that encourage efficient implementation of the standard and associated data compilation exercises and a number of notes on specific topics. It is recommended that those wishing to develop data related to any of these specific topics should read the general process note in conjunction with the note on the specific topic to be developed.

These notes summarize the data requirements and other operational considerations in 10-15 pages designed to provide sufficient guidance to initiate the development of the accounts. The notes also provide reference information for additional publications that will support the full development of the accounts and provide information on extensions and linkages that can be exploited once the accounts and tables are in place.

I. Introduction

1. Energy is integral to human existence and the way we use energy is an essential element to support human wellbeing. It is an important input in the production of goods, including food, and, among others, is used for transportation and heating. Energy is also one of the three components of the water-energy-food security nexus. As such, energy policy has implications on water and food security and vice versa.

2. The effect of energy supply and use on the environment has also emerged as a critical policy issue. There is a growing concern about the impact of rising energy use and of related emissions upon global and local environments. On the other hand, there is a recognition that the use of energy is necessary for human welfare and its continuing development.

3. This technical note provides an overview of energy accounting according to the System of Environmental Economic Accounting 2012 Central Framework (SEEA CF) which was adopted by the United Nations Statistical Commission in 2012 as the international statistical standard for environmental-economic accounts. The general purpose of SEEA Technical Notes is to summarise the key features for a given topic to support countries in the implementation of the SEEA.

4. The energy accounts are also supported by the *System of Environmental-Economic Accounting for Energy*[1] (SEEA-Energy), which is a subsystem of the SEEA Central Framework. The accounting approach of SEEA-Energy is based on the SEEA-CF, a conceptual framework that has been developed over the past two decades to integrate measurement of environmental and economic phenomena.

5. At the heart of SEEA-Energy is an accounting approach that records, as completely as possible, the stocks and flows of energy within the economy as well as energy-related aspects of environmental issues. It supports analyses of the role of energy within the economy and of the relationship between energy-related activities and the environment. The concepts and definitions that comprise SEEA-Energy are designed to be applicable across all countries, irrespective of how their energy is produced and used, their relative state of economic development, or the composition and state of their energy from natural inputs, and physical environment.

6. This technical note will describe the main features of the SEEA accounts for energy. The note also proposes core tables for energy that are structured so as to provide basic information on a number of areas including accessibility and affordability of energy, use and production patterns of energy, and the impact of energy production and use on the environment. The core tables provide an aggregated set of data which provides sufficient information to derive relevant indicators. Each country is encouraged to further disaggregate the rows and/or columns of the core tables based on local policy needs. The core tables for energy are closely related to other SEEA accounts, in particular the air emissions accounts and the material flow accounts.

[1] SEEA-Energy will be forthcoming in 2015.

Significant synergies can be achieved by considering the compilation of these accounts in an integrated way.

7. The development of core tables was requested by the UN Statistical Commission at its 44th session in February 2013. The core tables for energy, along with other core tables such as those for water, forests, and others, constitute the starting point in the development of common reporting tables and have been developed in close coordination with a number of international agencies.

8. This note is organized as follows. Section II briefly discusses SEEA-CF accounts and classifications for energy. Section III describes the Core tables for energy that will ultimately be important in developing international data sets. Section IV deals with the data sets required to produce the core tables including the main concepts, data sources and compilation methods. Section V describes how the SEEA accounts and related datasets may be extended to address broader issues and linked to other data sets. Section VI provides references and links to supporting material.

II. SEEA-CF accounts – Energy

9. The energy accounts as described in SEEA-energy comprise three types of accounts, namely physical supply and use tables, monetary supply and use tables and asset accounts.

Physical supply and use tables

10. The physical supply and use table is an accounting system for compiling and presenting all energy flows that enter, leave and are used within the national economy of a given country for a period of time. It necessarily expresses energy flows in a common unit (joules) and shows the relationship between inputs to and outputs from energy transformation processes. The physical supply and use table for energy aims to be comprehensive and records all energy flows within the economy and between the economy and the environment.

11. Energy statistics are compiled by converting physical measures of mass and volume such as tonnes, litres and cubic metres into a common unit representing energy content in net calorific terms. The use of the joule as a common measurement unit is recommended by the *International Recommendations for Energy Statistics* (IRES), and is used in the SEEA energy accounts when a common unit of measure is required.

12. Energy flows consist of flows of (i) energy from natural inputs, (ii) flows of energy products, and (iii) energy residuals. Flows of air emissions and solid waste generated by energy production and use are not included in these accounts[2] although all types of waste used as inputs in the production of energy are included.

[2] Air emissions and solid waste residuals are recorded in other SEEA accounts, in particular the SEEA Air Emissions and Waste Accounts.

13. **Energy from natural inputs** comprise flows of energy from the removal and capture of energy from the environment by resident economic units. These flows include energy from mineral and energy resources (e.g. oil, natural gas, coal & peat, uranium), natural timber resources, and inputs from renewable energy sources (e.g. solar, wind, hydro, geothermal).

14. **Energy products** are products that are used (or might be used) as a source of energy. They comprise (i) fuels that are produced/generated by an economic unit (including households) and are used (or might be used) as sources of energy; (ii) electricity that is generated by an economic unit (including households); and (iii) heat that is generated and sold to third parties by an economic unit. Energy products include energy from biomass and solid waste that are combusted for the production of electricity and/or heat. It should be noted that some energy products may be used for non-energy purposes.

15. Generally, physical and monetary flows of energy products should be classified using the *Standard International Energy product Classification* (SIEC) presented in the IRES. Often, monetary flows will be classified using the Central Product Classification (CPC). Since there is not a one-to-one relationship between SIEC and CPC categories, a correspondence between these classifications will be needed for detailed analysis of combined physical and monetary datasets[3].

16. **Energy residuals** in physical terms comprise a number of components. Most focus is on energy losses. Particular examples of energy losses include flaring and venting of natural gas and losses during transformation in the production of primary energy products from natural inputs and in the production of secondary energy products. Energy losses during distribution may arise from the evaporation and leakages of liquid fuels, loss of heat during transport of steam, and losses during gas distribution, electricity transmission and pipeline transport. Energy residuals also include other energy residuals particularly heat generated when end users (either households or enterprises) use energy products for energy purposes (e.g. household lighting).

17. In order to fully balance the energy PSUT it is also necessary to record two other residual flows. The first relates to the energy embodied in energy products used for non-energy purposes which is shown as leaving the energy system as a residual flow. Non-energy purposes include the use of energy products to manufacture non-energy products (for example the energy product naptha is used in the manufacture of plastic, a non-energy product), and the direct use of energy products for non-energy purposes (for example, as lubricants, etc.). The second additional residual flow concerns the generation of energy from the incineration of solid waste. The energy embodied in solid waste is shown as entering the energy system as a residual flow before becoming an energy product. Neither of these residual flows are considered part of energy residuals.

18. Table 1 provides an overview of the PSUT for energy. The PSUT structure is similar to the monetary supply and use tables described in the next section with the PSUT containing extensions to incorporate rows for energy from natural inputs and energy residuals.

[3] For more on this see: The Standard International Energy Product Classification (SIEC) and its relationship with the Central Product Classification (CPC), http://unstats.un.org/unsd/class/intercop/expertgroup/2011/AC234-14.PDF

Account 1: Physical Supply and Use table for Energy

Physical supply table for energy

	Production (including household production on own-account); Generation of residuals							Accumulation	Flows from the rest of the	Flows from the environment	Total supply
	Agriculture, forestry and fishing ISIC A	Mining and quarrying ISIC B	Manufacturing ISIC C	Electricity, gas, steam and air conditioning supply ISIC D	Transportation and storage ISIC H	Other industries	Households		Imports		
Energy from natural inputs											
Natural resource inputs											
Inputs of energy from renewable sources											
Other natural inputs											
Energy products											
Production of energy products by SIEC class											
Coal											
Peat and peat products											
Oil shale/ oil sands											
Natural gas											
Oil											
Biofuels											
Waste											
Electricity											
Heat											
Nuclear fuels and other fuels nec											
Energy residuals											
Total energy residuals											
Other residual flows											
Residuals from end-use for non-energy purposes											
Energy from solid waste											
Total supply											

Physical use table for energy

	Intermediate consumption; Use of energy resources; Receipt of energy losses						Final consumption	Accumulation	Flows to the rest of the world	Flows to the environment	Total use
	Agriculture, forestry and fishing ISIC A	Mining and quarrying ISIC B	Manufacturing ISIC C	Electricity, gas, steam and air conditioning supply ISIC D	Transportation and storage ISIC H	Other industries	Households		Exports		
Energy from natural inputs											
Natural resource inputs											
Inputs of energy from renewable sources											
Other natural inputs											
Energy products											
Transformation of energy products by SIEC class											
Coal											
Peat and peat products											
Oil shale/ oil sands											
Natural gas											
Oil											
Biofuels											
Waste											
Electricity											
Heat											
Nuclear fuels and other fuels nec											
End-use of energy products by SIEC class											
Coal											
Peat and peat products											
Oil shale/ oil sands											
Natural gas (extracted)											
Oil (oil products)											
Biofuels											
Waste											
Electricity											
Heat											
Nuclear fuels and other fuels nec											
End-use of energy products for non-energy purposes											
Energy residuals											
Total energy residuals											
Other residual flows											
Residuals from end-use for non-energy purposes											
Energy from solid waste											
Total use											

19. The PSUT framework is basically a pair of tables which have the same format/structure. Row-wise, the two matrices show the various physical flow types, namely natural inputs, products, and residuals. Column-wise they show the various origins and destinations supplying and using the flow items, namely industries (i.e. production activities), households (i.e. consumption activities), accumulation (changes in stocks of produced assets and product inventories), rest of the world, and environment.

20. The physical *supply* table (top half of Table 1) shows which flow items are provided by which supplier (industries, households, accumulation, rest of the world and environment); in other words it shows the flows by origin.

21. The physical *use* table (bottom half of Table 1) shows who (i.e. production, consumption, accumulation activity etc.) is using or receiving the respective physical flow. In other words, it shows the flows by its destination. Like this, each flow is recorded twice: first at its origin, secondly at its destination. This way of recording is also referred to as "double-entry-bookkeeping". Given that one energy type can be transformed into other energy types, double entry system can lead to double counting and this should be avoided. Also, the distribution processes where a wholesaler may take energy from the producer and deliver it to the consumer could result in double counting if adjustments are not made.

22. The supply and use identity applies within the PSUT for energy. Thus as shown below, for each product measured in physical terms (for example joules of coal) the quantity of domestic production (output) and imports (total supply of energy products[4]) must equal the consumption (both intermediate and final), changes in inventories and exports (total use of products). The equality between supply and use also applies to the total supply and use of natural inputs and the total supply and use of residuals.

Total Supply of Energy Products = Production + Imports

is equal to

Total Use of Energy Products = Intermediate consumption[5] + Household Consumption + Changes in inventories + Exports

23. In addition to the supply and use identity, the PSUT incorporates an identity concerning flows between the environment and the economy. This second identity, known as the input-output identity, requires that the total flows into the economy (for example in the form of natural gas extracted from natural deposits) are, over an accounting period, either used in production processes, consumed by final users, accumulated as residuals in the economy or returned to the environment. The input-output identity also applies at the level of households and industries. Since natural inputs are transformed and combined in a wide variety of ways and multiple times, recording a full balance is difficult to achieve in practice.

Energy into the economy = Energy inputs from the environment + Imports + Energy residuals received from the rest of the world + Energy residuals recovered from the environment is equal to

Energy out of the economy = Energy residual flows direct to environment + Exports + Energy residuals sent to the rest of the world

plus

[4] Supply as defined in SEEA differs from that in energy balances where Total energy supply = Primary energy production +Imports of primary and secondary energy -Exports of primary and secondary energy -International (aviation and marine) bunkers -Stock (inventory) changes. As supply equals use in both SEEA and energy balances, if energy balance data are to be used as the basis of SEEA accounts both supply and use will have to be adjusted. SEEA-Energy (forthcoming) has a full discussion of the needed adjustments and a brief overview is included in the annex.

[5] Intermediate consumption as defined in SEEA, which includes some own account use not included in national accounts estimates.

Net additions to stock in the economy = Changes in inventories + Accumulation of energy residuals

24. More information on physical flows accounts for energy can be found SEEA-CF and SEEA-Energy.

Monetary supply and use tables

25. The basic form of a Monetary Supply and Use Table for Energy is shown in Table 2. Monetary supply and use tables in SEEA fully articulate in monetary terms the flows of energy products in an economy between different economic units. Monetary supply and use tables have their origins in economic accounting and the PSUT utilise the organisational principles and characteristics of these tables. Nevertheless, while the PSUT for energy contain three main types of flows i.e. energy from natural inputs, products and residuals, the monetary supply and use table for energy records only those flows related to energy products.

Account 2: Monetary Supply and Use Table for Energy

	Industries (by ISIC categories)							Rest of the world	Taxes less subsidies on products, trade and transport margins	Final consumption		Capital Formation	Total
	ISIC A	ISIC B	ISIC C	ISIC D	ISIC H	Other industries	Total industry			Households	Government		
Supply of energy products (Currency units)													
Coal													
Peat and peat products													
Oil shale/ oil sands													
Natural gas													
Oil													
Biofuels													
Waste													
Electricity													
Heat													
Nuclear fuels and other fuel nec													
Use of energy products (Currency units)													
Intermediate consumption and final use (Currency units)													
Coal													
Peat and peat products													
Oil shale/ oil sands													
Natural gas													
Oil													
Biofuels													
Waste													
Electricity													
Heat													
Nuclear fuels and other fuel nec													

26. Monetary supply and use tables for energy provide information on the energy sector and the level of activity in this sector. They also provide detailed information on the industries within the economy that are using these energy products. Monetary supply and use tables for energy can readily be linked with PSUT for energy to create a powerful analytical tool, for example to do price analyses.

Asset accounts

27. The purpose of asset accounts is to record the opening and closing stock of known assets and the various types of stock changes over an accounting period. A key motivation for accounting for mineral and energy resources is to assess to what extent current patterns of economic activity are depleting and/or degrading available mineral and energy resources. More broadly, information from asset accounts can be used to assist in the management of energy from natural inputs.

28. Known deposits are categorised into three classes, based on criteria from the UNFC-2009 (see Table 1).

i. Class A: Commercially Recoverable Resources. This class includes deposits for projects that fall in the categories E1and F1 and where the level of confidence in the geological knowledge is either high (G1), moderate (G2) or low (G3).

ii. Class B: Potentially Commercially Recoverable Resources This class includes deposits for those projects that fall in the category E2 (or eventually E1) and at the same time in F2.1 or F2.2 and where the level of confidence in the geological knowledge is either high (G1) moderate (G2) or low (G3).

iii. Class C: Non-Commercial and Other Known Deposits are resources for those projects that fall in E3 and for which the feasibility is categorised as F2.2, F2.3 or F4 and where the level of confidence in the geological knowledge is either high (G1), moderate (G2) or low (G3).

29. Known deposits exclude potential deposits where there is no expectation of the deposits becoming economically viable and there is a lack of information to determine feasibility of extraction or to have confidence in the geological knowledge. Table 1 gives an overview of how the classes of energy resources are defined based on the UNFC criteria.

Table 1: Categorization of Mineral and Energy Resources

<table>
<tr><th colspan="2">SEEA Classes</th><th colspan="3">Corresponding UNFC-2009 project categories</th></tr>
<tr><th></th><th></th><th>E
Economic and social viability</th><th>F
Field project status and feasibility</th><th>G
Geological knowledge</th></tr>
<tr><td rowspan="3">Known deposits</td><td>Class A: Commercially Recoverable Resources[1]</td><td>E1. Extraction and sale has been confirmed to be economically viable</td><td>F1. Feasibility of extraction by a defined development project or mining operation has been confirmed</td><td rowspan="3">Quantities associated with a known deposit that can be estimated with a high (G1), moderate (G2) or low (G3) level of confidence</td></tr>
<tr><td>Class B: Potentially Commercially Recoverable Resources[2]</td><td>E2. Extraction and sale is expected to become economically viable in the foreseeable future[3]</td><td>F2.1 Project activities are ongoing to justify development in the foreseeable future
Or
F2.2 Project activities are on hold and/or where justification as a commercial development may be subject to significant delay</td></tr>
<tr><td>Class C: Non-Commercial and Other Known Deposits[4]</td><td>E3. Extraction and sale is not expected to become economically viable in the foreseeable future or evaluation is at too early a stage to determine economic viability</td><td>F2.2 Project activities are on hold and/or where justification as a commercial development may be subject to significant delay
Or
F2.3 There are no current plans to develop or to acquire additional data at the time due to limited potential
Or
F4. No development project or mining operation has been identified</td></tr>
<tr><td>Potential deposits (not included in SEEA)</td><td>Exploration Projects
Additional quantities in place</td><td>E3. Extraction and sale is not expected to become economically viable in the foreseeable future or evaluation is at too early a stage to determine economic viability</td><td>F3. Feasibility of extraction by a defined development project or mining operation cannot be evaluated due to limited technical data
Or
F4. No development project or mining operation has been identified</td><td>Estimated quantities associated with a potential deposit, based primarily on indirect evidence (G4)</td></tr>
</table>

Notes

1. Includes on-production projects, projects approved for development and projects justified for development
2. Includes economic and marginal development projects pending and development projects on hold
3. Potential Commercial Projects may also satisfy the requirements for E1.
4. Includes unclarified development projects, non-viable development projects, and additional quantities in place

Source: UNFC-2009, Figures 2 and 3

30. The scope of known deposits is broader than the scope of deposits that underpins the measurement of energy resources in the SNA. In the SNA the scope is limited to deposits that are commercially exploitable given current technology and relative prices.[6] The broader scope of known deposits is applied in SEEA Central Framework and SEEA-Energy to ensure that as broad an understanding as possible is obtained on the availability of the stock of energy

[6] See 2008 SNA, paragraph 10.179.

resources. Issues associated with the scope of the valuation of energy resources are discussed below.

31. An asset account is structured as shown in Account 3[7] . In this example, only three resources have been included. Countries should focus on those energy resource most important for their economy. It starts with the opening stock of resources and ends with the closing stock of resources. In physical terms, the changes between the beginning and the end of the accounting period are recorded as either additions to the stock or reductions in the stock and wherever possible the nature of the addition or reduction is recorded.

32. There are three types of additions to the stock of energy assets:

(*a*) Discoveries. Discoveries should incorporate estimates of the quantity of new deposits found during an accounting period. To be regarded as a discovery the new deposit must be a known deposit – i.e. in Class A, B or C. In situations in which a quantity of potential deposits becomes known to a higher degree of confidence, this increase should be treated as discoveries. Discoveries should be recorded by type of resource and by category of resource.

(b) *Upward reappraisals.* Reappraisals should only pertain to known deposits. They will relate to additions in the estimated available stock of a specific deposit, or to changes in the categorization of specific deposits between Class A, B or C based on changes in geological information, technology, resource price or a combination of these factors.

(c) *Reclassifications.* Reclassifications may occur if certain deposits are opened or closed to mining operations due to a government decision concerning the access rights to a deposit. All other changes in the quantity of known deposits should be treated as reappraisals. Reclassifications may conceivably be recorded if asset accounts for energy resources are being compiled by institutional sector.

33. There are four types of reductions in the stock of energy assets:

(*a*) *Extraction.* Estimates of extraction should reflect the quantity of the resource physically removed from the deposit. It should exclude mining overburden, i.e. the quantity of soil and other material moved in order to extract the resource. The quantity should also be estimated before any refinement or processing of the resource is undertaken. Estimates of extraction should include estimates of illegal extraction, either by residents or non-residents, as these amounts reduce the availability of the resource.

(b) *Catastrophic losses*. Catastrophic losses are rare for most energy resources. Flooding and collapsing of mines does occur but the deposits continue to exist and can, in principle, be recovered. The issue in this example is one of economic viability of extraction rather than actual loss of the resource itself. An exception to this general principle concerns oil wells that can be destroyed by fire or become unstable for other reasons leading to significant losses of oil

[7] See SEEA-CF section 5.5.3.

resources. Losses of oil and related resources in this situation should be treated as catastrophic losses.

(c) *Downward reappraisals*. Reappraisals should only pertain to known deposits. They will relate to reductions in the estimated available stock of a specific deposit, or to changes in the categorization of specific deposits between Class A, B or C based on changes in geological information, technology, resource price or a combination of these factors.

(d) *Reclassifications*. Reclassifications may occur if certain deposits are opened or closed to mining operations due to a government decision concerning the access rights to a deposit. All other changes in the quantity of known deposits should be treated as reappraisals. Reclassifications may conceivably be recorded if asset accounts for energy resources are being compiled by institutional sector.

Account 3: Physical Asset Account for Energy

		Type of energy resource (Class A: Commercially recoverable resources)		
		Oil resources ('000 barrels)	Natural gas resources (m3)	Coal & peat resources ('000 tonnes)
Opening stock of mineral and energy resources		800	1 200	600
Additions to stock				
	Discoveries			
	Upwards reappraisals		200	
	Reclassifications			
	Total additions to stock		200	
Reductions in stock				
	Extractions	40	50	60
	Catastrophic losses			
	Downwards reappraisals			60
	Reclassifications			
	Total reductions in stock	40	50	120
Closing stock of mineral and energy resources		760	1 350	480

34. Monetary asset accounts for mineral and energy resources provide a market based valuation of physical stocks of mineral and energy resources and the changes in the value of these stocks over time. These estimates can be related to both physical asset accounts for energy and the asset accounts and national balance sheet of the SNA.

35. All known deposits of mineral and energy resources could potentially be included in the monetary asset accounts. If market values for stocks of mineral and energy resources can be observed and quantified, these observed values should be used for the accounts.   However, in practice, many deposits of mineral and energy resources are seldom if ever exchanged on a market and therefore, even if the resources have a market value, these cannot be observed. Thus,

under these circumstances a market valuation of the mineral and energy resources must be based on assumptions of what the market prices would have been, if the resources were traded in a market.

36. A full description of the methods of estimating these values is beyond the scope of this report. SEEA-Energy (forthcoming) describes the methods based on estimating the net present value of these stocks.

37. While the physical asset account records stocks across Classes A, B and C, the monetary asset account only records the values for Class A stocks, those that are commercially viable.

38. The Monetary asset account has the same line entries but an additional term is included to record revaluations to the resource stocks. This entry accounts for changes in the value of assets over an accounting period due to price movements for the resources.

Account 4: Monetary Asset Account for Energy

	Type of mineral and energy resource (Class A: Commercially recoverable resources)
	(000's currency units
Opening value of stock of resources	
Additions to value of stock	
Discoveries	
Upwards reappraisals	
Reclassifications	
Total additions to stock	
Reductions in value of stock	
Extractions	
Catastrophic losses	
Downwards reappraisals	
Reclassifications	
Total reductions in stock	
Revaluations	
Closing value of stock of resources	

39. The capacity to account for levels of energy resources and changes in these levels, and to analyse the state of these reserves, is a fundamental role of SEEA. There are however many conceptual and practical measurement challenges, which are discussed in more detail in Chapter 5 of SEEA-CF.

III. Core Tables and Aggregates / Indicators for energy

40. The core table for energy presents an aggregated set of data which provides enough information to derive relevant indicators. The data in the core table come directly from the energy accounts, but are combined with other relevant data sources such as the national accounts and labour statistics. For users of the accounts (i.e. researchers, policymakers, etc.) the core table thus presents an overview of the key data that can be derived from the accounts

Core Table for Energy

	Industries (by ISIC categories)							Rest of the world	Final consumption Households	Total
	Agriculture, forestry and fishing	Mining and quarrying	Manufacturing	Electricity, gas, steam and air conditioning supply	Transportation and storage	Other industries	Total industry			
	ISIC A	ISIC B	ISIC C	ISIC D	ISIC H					
1. Supply of energy products (Currency units)										
Total energy products										
Total (energy and non-energy products)										
2. Intermediate consumption and final use (Currency units)										
Energy products										
Total (energy and non-energy products)										
3. Gross value added (Currency units)										
4. Employment										
5. Total extraction of natural energy inputs										
Of which: from renewable sources										
6. Supply of energy products (PJ)										
Coal										
Peat and peat products										
Oil shale/ oil sands										
Natural gas										
Oil										
Biofuels										
Waste										
Electricity										
Heat										
Nuclear fuels and other fuel nec										
7. End-use of energy products (PJ)										
Coal										
Peat and peat products										
Oil shale/ oil sands										
Natural gas										
Oil										
Biofuels										
Waste										
Electricity										
Heat										
Nuclear fuels and other fuel nec										
8. Net domestic energy use (PJ)										
9. Total energy requirement(PJ)										
10. Closing stocks of natural energy resources (currency units)										
11. Closing stocks of natural energy resources (PJ)										
12. Depletion of natural energy resources (PJ)										
13. Gross fixed capital formation for energy supply (currency units)										

41. While countries should strive to populate the core table to the greatest extent possible, they might wish to focus initially on one or more of the accounts that provide the data for the core table. The decision on which accounts to populate first should take into account policy demands and data availability. Even if the initial exercise of populating these accounts results in a largely incomplete table, such information is important in and of itself in providing a partial view of the energy situation and in determining data gaps. Furthermore, in the first phase it may be possible to make estimates using existing information and relationships between the variables. Finally it should be noted that for many countries only a small number of cells in the accounts presented here have significant values. For example, in most cases, energy in physical terms is supplied from only a few ISIC divisions for only a few energy products. Countries are encouraged to focus their initial efforts in measuring those flows that are most significant.

42. Each of the energy accounts discussed in the previous section contains sufficient information in and of itself to derive a number of useful aggregates and indicators as is discussed below. Should countries be interested in a more detailed presentation of information, the data can be further disaggregated; in particular data could be presented at a more detailed level of industries as needed (e.g. 3 digit ISIC level) and/or additional data items could be added to the rows of the tables to provide a finer level of detail. For example, if the generation of electric

power is important, data corresponding to Electric power generation, transmission and distribution (ISIC 351) can be presented as an "of which" column within Electricity, gas, steam and air conditioning supply (Section D).

43. The top of the core table (row items 1-4) comes from Table 2, the supply and use of energy products in monetary terms and from data items from the national accounts. Note that while the core table only has the aggregates total intermediate consumption and final use, in Table 2 data are also presented by energy product. Countries could further disaggregate the data by showing intermediate consumption separately from final use. Table 4 provides a good starting point for those countries interested in better understanding the relationship between the energy sector and the economy as a whole.

44. The physical supply and use tables for energy (Table 1) provide the data for the part of the core table focusing on physical flows, in particular the supply and end use of energy products(row items 6-10). For each energy product, the top half of table 4 provides information on what industry is supplying what energy products; the bottom half shows end use of energy products by industry and by households. It should be noted that "End-use of energy products" records the use of energy products to produce goods and services other than energy products and includes energy consumption of energy producers on own account and for purposes other than as an input into transformation.

45. Furthermore the difference between supply of energy and end use of energy as shown in table 4 is equal to transformation (which includes transformation losses) of energy products from one form to another (e.g. coal into electricity), losses during distribution and storage, and end use of energy products for non-energy purposes (e.g. use of oil as a lubricant) with the later often being not significant[8]. Countries who are interested in how energy is distributed among the different energy products and industries/households should consider commencing work by compiling Table 1.

46. An important energy aggregate that can be derived from the energy PSUT is Net Domestic Energy Use. Net Domestic Energy Use reflects the net amount of energy used in an economy through production and consumption activity and can be used to assess trends in energy consumption by resident units. Net Domestic Energy Use is defined as the end-use of energy products (including changes in inventories of energy products) less exports of energy products plus all losses of energy (losses during extraction, losses during transformation, losses during storage and losses during distribution). Separate analysis of the components of Net Domestic Energy Use (e.g. total end-use of energy products less exports, and total energy losses) can also provide important information concerning energy use.

47. Gross Energy Input is another aggregate from the PSUT which reflects the total energy captured from the environment, energy products that are imported and energy from residuals within the economy (e.g. from incinerated solid waste). It can therefore provide an indicator of the pressures placed on the environment (or other countries' environments) in the supply of

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[8] However, can be quite significant in some cases such as when a petrochemical industry is present.

energy to the economy. In terms of entries contained in the energy PSUT, Gross Energy Input is equal to Energy from Natural Inputs plus Imports of energy products plus Energy from waste.

48. Last but not least, the bottom 4 lines of Table 4 focus on the stocks of natural energy resources and capital used in the supply of energy. This table is particularly relevant for energy resource rich countries. The table not only has information on the stocks of natural energy resources in monetary and physical terms, but also on the value of gross fixed capital formation used for the extraction/capture and delivery of energy products. The information on investments in infrastructure is useful for policy makers working on policies for meeting energy related development goals. This table also contains information on the depletion of natural energy resources in physical terms which is closely linked to depletion in monetary terms in Table 2.

49. A major objective in designing the core tables is to support the preparation of indicators useful for environmental, economic and social policy. The energy accounts information is important in informing at least four of the proposed indicators for the Sustainable Development Goals currently under discussion for the post 2015 agenda. The five currently identified as potential indicators are:

i. Proposed Indicator for Target 7.2: Renewable energy share in the total energy final energy consumption (%)
ii. Proposed Indicator for Target 7.3: Rate of improvement in energy intensity (%) measured in terms of primary energy and GDP
iii. Proposed Indicator for Target 7.3: Composite Energy Efficiency Improvement Index built up of sub-indicators measuring transport energy efficiency, industrial energy efficiency, power generation energy efficiency, buildings energy efficiency and agricultural energy efficiency
iv. Proposed Indicator for Target 7.b: Rate of improvement in energy productivity (the amount of economic output achieved for a given amount of energy consumption).
v. Proposed Indicator for Target 9.4: Energy intensity per unit of value added (international dollars)

50. All five of these indicators are directly informed by the Energy Core table, only the third indicator requires significant additional information from other accounts and databases.

IV. Compilation of energy accounts

NOTE: Section to be redrafted using the format used in the EGSS note.

51. The initial compilation of energy accounts will require several steps that may not need to be undertaken for each data cycle but should be revisited periodically in conjunction with longer term planning cycles. In this paragraph the different compilation steps for energy accounts are discussed in detail.

i. Define the accounts of interest, the desired geographical scope, the frequency of reporting, the temporal basis and the desired level of disaggregation and considering other data to be linked (e.g. economic statistics, social statistics, population).

52. Setting out the specific accounts and the dimensions of each account that would best respond to the information needs of the country should be done at this stage. This will provide a basis to examine the adequacy of the existing data and assess where additional information may be required.

ii. Identify potential data sources and assess their suitability for accounts and associated metadata

53. The existence of established energy data programs at the international level[9] generally means that basic data on energy supply and use is available for most countries. Since these sources will likely cover the major energy flows (with possible exception of within enterprise flows and goods for processing) these data in most cases will be sufficient to form the basis for estimating an initial PSUT for energy. For example, if a country has already estimated energy balances, these estimates will generally provide much of the data needed to estimate SEEA energy accounts. Data from energy balances will require adjustments to conform to SEEA accounting rules. These adjustments are presented in SEEA-Energy (forthcoming).

54. Economic data programs maybe a good source of data on energy use or a basis for estimating missing components of supply and use in physical terms. For example, the monetary supply and use tables from the National accounts may contain information on the use of energy products, which can be used to distribute the physical use of energy to the different users.

55. It is important to thoroughly asses the metadata for the available datasets. First, do the dimensions conform or support those set out for the required accounts in step i. above. If not, is the shortcoming important or can it be overcome with estimates based on alternate sources? Also, key at this stage is to clearly ascertain the classification, conceptual and coverage differences across the various data sets to be used as basic inputs. It is important to assess whether there are readily available concordances between the classification systems and sources that can be used to estimate adjustments for conceptual and coverage difference.

56. If insufficient basic data is available to produce one or more of the accounts, it may be necessary to initiate a project to generate the missing data. The Annex has a table showing examples of potential data sources for energy accounts. This may well mean that account development splits into two paths, one for the accounts that can be initiated with existing data and one where development will have to await the availability of basic data.

57. In some cases where partial data exists but there are some important data gaps it may be a good idea to construct a preliminary account filling in the missing data with the estimates based on related flows or modelling. While such an exercise may not produce a viable account, it may well reveal more about the extent and importance of data gaps thus providing a better foundation for the development of these missing basic data.

58. In the case where basic data must be developed, it is recommended that a separate project be initiated to develop the necessary data. This project should follow the steps in the Generic

[9] UNSD Annual Questionnaire on Energy Statistics, the International Energy Agency (IEA), the Statistical Office of the European Communities (Eurostat), the International Atomic Energy Agency (IAEA), the Organization of the Petroleum Exporting Countries (OPEC), and the Organización Latinoamericana de Energía (OLADE).

Statistical Business Process Model[10] (GSBPM) and generic principle as set out in the first note in this Technical Note series. Depending on the organization of responsibilities within the statistical infrastructure of the country this step may involve additional agencies or sectors of the NSO.

iii. Secure access to data, associated metadata and the rights to disseminate the accounts that are derived from that data.

59. SEEA compilers will at an early stage need to assure access to these data if it doesn't already exist. A key consideration is the terms of access under current institutional arrangements. These should support cooperative working arrangements and the release of the energy accounts with sufficient detail to address the policy issues important for the country.

60. In cases where institutional arrangements are not yet established, it should be noted that this step can take considerable effort and time as it will be important for all agencies involved to clearly appreciate the mandate of the other agencies and associated constraints.

61. Establishing and maintaining good working relations with the agencies that are the source for basic data can pay dividends later in the production process when estimation challenges can benefit from expertise in all concerned agencies.

iv. Set out a plan for the progressive implementation of SEEA based on the availability of resources and basic data.

62. Databases for the basic data and the accounts must be established. Given the SEEA links to the SNA, existing database structures and associated processing systems may be a good source for this development. Some adjustments will be required to add components not in the SNA such as intra-enterprise flows.

63. Use of the same systems and processes will facilitate aligning of data sets and should help reduce the development costs for the new accounts and facilitate the integration of data for the production of indicators.

v. Import data and process data including applying concordances that may be required between the classifications used in the imported data and the classifications to be used in the SEEA based accounts, Estimate adjustments for difference in concepts, coverage (including units of observation), and timing.

vi. Prepare, edit and balance accounts, including the estimation of data for any data gaps and develop aggregates and associated tables and indicators.

vii. Analyse accounts tables and graphic representations including undertaking an analysis of time series where possible and recognising the likely need for multiple iterations of this and the previous step. Data quality should be assessed and documented at this stage.

64. These three steps are the core activities in building the accounts and will be repeated in cycle during each production period. This allows the strength of the accounting approach to be

[10] United Nations Economic Commission for Europe (UNECE), Generic Statistical Business Process Model (GSBPM) (Version 5.0, December 2013)

used to confront the various data sources and check for consistency and reasonableness in comparison to other datasets such as the related national accounts values.

65. The first time accounts are estimated for a new program, particular attention needs to be made with regard to adjustments required to the source data to ensure the methods used are appropriate and sound. Since these accounts deal with physical flows and stocks, care must be taken to fully understand the challenges in converting estimation methods from other domains where the focus has been economic values.

66. However, there are some differences in coverage between the SNA and SEEA and these will have to be implemented. For example, the residency principle and trade in goods for processing. Also, the residuals associated with these physical flows are not generally measured in the economic accounts and thus additional information and processes will need to be developed.

67. It is also recommended to construct bridge tables to show the conceptual difference between the energy accounts and the basic energy statistics. For example, a bridge table may show the difference between net domestic energy consumption from the energy PSUT and the energy use as derived from the energy balances[11].

68. It is recommended that in cases where significant basic data come from other agencies that staff of those agencies be asked to participate in the analysis of the estimates. These experts often have in depth knowledge that can allow the identification and resolution of inconstancies.

viii. Disseminate accounts, including material to assist interpretation such as indicators, methodological notes and statements of data quality.

69. The dissemination of data should always be accompanied by sufficient documentation and metadata to allow users to fully understand the information being disseminated. This is particularly important for the initial dissemination of a new program of data where one might want to identify the initial data as ‘experimental’ or ‘preliminary’ and make it clear that user input is being sought in order to improve future releases.

ix. Archive data and related methodological and other documentation.

x. Review accounts, data sources, methods and systems, including actively seeking user feedback.

70. These last two steps are very important for all statistical programs but when initiating a new program of data, seeking user feedback is crucial. This in turn depends on the existence of good documentation on the methods and systems so as to properly inform users and assess their feedback.

[11] An example of such a bridge table can be seen in the Annex.

V. Extensions and links

71. Links to other SEEA accounts should also be considered. In the case of energy, an obvious linkage is to the air emission accounts and MFA and waste accounts. In building the energy accounts one should be sure to develop the databases and accounts such that these linkages can be easily made, integrating the data from multiple accounts to further inform policy makers.

72. On the environmental dimension, the energy accounts again play a key role in filling the information gaps required not only for the derivation of the indicators but also by providing necessary background and contextual information. For example, the core table not only contains information that aids in the calculation of emissions by energy product but also by industries using the ISIC classification. Such information allows for a more complete understanding of emissions not only by energy product but also by industry. It supports the formulation of strategies and policies that target emitters and does so in a way that could address the larger emitters.

73. In order to shed light on the factors behind the changes in energy use, structural decomposition analysis based on input-output modelling can be applied. Structural decomposition analysis is a well-established method and reference can be made to a large number of articles and reports describing the method and presenting results.[12]

74. The data in the accounts can be used to properly understand how final demand drives energy use. In particular, input-output analysis gives the allocation of energy use by final use categories or specific products.

75. Extensions to energy accounts can relate to the spatial disaggregation of data contained in other accounts of the SEEA Central Framework and the national accounts, as well as to the SEEA Experimental Ecosystem Accounting.

76. The accounts described in the SEEA Central Framework largely relate to specific materials, substances and resources, and the various stocks and flows recorded for a country as a whole. However, all materials, substances and resources are found in particular locations and, from a policy perspective, knowledge of the location of various stocks and flows may be of particular relevance. Indeed, national averages usually hide important local variations and spatially disaggregating data can help to better identify environmental spatial patterns. For example, some regions may have supplies of electricity based on a renewable source such as hydro whereas other parts of the country may be depended on fossil fuels for electricity.

77. The quality of spatial coding must be assessed carefully as additional datasets are linked and integrated with the energy accounts. The original purpose and sources may not provide precise locational information in all cases. For example, data for many economic data programs are gathered by enterprise, usually though the head office, head offices are often not located where the majority of material flows occur, particularly in large scale manufacturing of energy

[12] Potential links to economic models are described further in SEEA Applications and Extensions.

operations. It may be necessary to pursue more precise locations for some economic activities to fully exploit such data integration.

78. There may also be interest in further splitting out energy products into finer categories to allow more detailed analysis of the relative costs and benefits of these various products.

79. Increasingly there is interest in linking many of these data sets with social indicators. The access of household of various classes to energy and other resources may be of interest. This would include access to energy of households by income status or data on the type of energy use by households for example for transportation. Also, the extent to which household are producers of energy may become a topic of interest in some cases.

VI. References and links

Eurostat (2014). Physical Energy Flow Accounts Manual. AIR EMISSION ACCOUNTING Background note

Organisation for Economic Co-operation and Development (2014).

OECD/IEA/Eurostat (2005): Energy Statistics Manual. IEA, Paris. http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=NRG-2004

IEA/Eurostat Annual Energy Statistics Questionnaires 2012 & explanatory notes http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/publications/archives

IEA/Eurostat Annual Energy Statistics Questionnaires 2013 & explanatory notes http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/questionnaires

OECD/IEA/Eurostat (2005): Energy Statistics Manual. IEA, Paris. http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=NRG-2004

Schenau, S. (2012): Compilation of physical energy flow accounts (PEFA) for the Netherlands. https://circabc.europa.eu/w/browse/ad2ff2b8-f9cc-4d3d-b76e-499e09ed01b1 or http://epp.eurostat.ec.europa.eu/portal/page/portal/environmental_accounts/documents/Catalogue_of_pilot_study_reports.pdf

Statistics Netherlands (2012). Compilation of physical energy flow accounts (PEFA) for the Netherlands

SEEA Central Framework (2012): http://unstats.un.org/unsd/envaccounting/seearev/

SEEA Energy (2013) draft http://unstats.un.org/unsd/envaccounting/energy.asp and

http://unstats.un.org/unsd/envaccounting/seeae/chapterList.asp

SNA 2008: System of National Accounts https://unstats.un.org/unsd/nationalaccount/sna2008.asp

VII. Annex

Definitions

The following is a list of energy products (at the top level-sections) as defined in IRES.

0 Coal

This section includes coal, i.e. solid fossil fuel consisting of carbonized vegetal matter, and coal products derived directly or indirectly from the various classes of coal by carbonization or pyrolysis processes, by the aggregation of finely divided coal or by chemical reactions with oxidizing agents, including water.

Remark: There are two main categories of primary coal, hard coal (comprising medium and high-rank coals) and brown coal (low-rank coals) which can be identified by their Gross Calorific Value - GCV and the Vitrinite mean Random Reflectance per cent - Rr. Peat is not included here.

1 Peat and peat products

This section comprises peat, a solid formed from the partial decomposition of dead vegetation under conditions of high humidity and limited air access (initial stage of coalification) and any products derived from it.

2 Oil shale / oil sands

A sedimentary rock which contains organic matter in the form of kerogen. Kerogen is a waxy hydrocarbon-rich material regarded as a precursor of petroleum.

Remark: Oil shale may be burned directly or processed by heating to extract shale oil.

3 Natural gas

A mixture of gaseous hydrocarbons, primarily methane, but generally also including ethane, propane and higher hydrocarbons in much smaller amounts and some non-combustible gases such as nitrogen and carbon dioxide.

Remark: The majority of natural gas is separated from both "non-associated" gas originating from fields producing hydrocarbons only in gaseous form, and "associated" gas produced in association with crude oil.

The separation process produces natural gas by removing or reducing the hydrocarbons other than methane to levels which are acceptable in the marketable gas. The natural gas liquids (NGL) removed in the process are distributed separately.

Natural gas also includes methane recovered from coal mines (colliery gas) or from coal seams (coal seam gas) and shale gas. When distributed it may also contain methane from anaerobic fermentation or the methanation of biomass.

Natural gas may be liquefied (LNG) by reducing its temperature in order to simplify storage and transportation when production sites are remote from centres of consumption and pipeline transportation is not economically practicable.

4 Oil

Liquid hydrocarbons of fossil origins comprising (i) crude oil;(ii) liquids extracted from natural gas (NGL); (iii) fully or partly processed products from the refining of crude oil, and (iv) functionally similar liquid hydrocarbons and organic chemicals from vegetal or animal origins.

5 Biofuels

Fuels derived directly or indirectly from biomass.

Remark: Fuels produced from animal fats, by-products and residues obtain their calorific value indirectly from the plants eaten by the animals.

6 Waste

This section includes waste, i.e. materials no longer required by their holders.

Remark: For the purposes of energy statistics, waste refers to the part of these materials that is incinerated with heat recovery at installations designed for mixed wastes or co- fired with other fuels.

The heat may be used for heating or electricity generation. Certain wastes are mixtures of materials of fossil and biomass origin.

7 Electricity

This section includes electricity, i.e. the transfer of energy through the physical phenomena involving electric charges and their effects when at rest and in motion.

Remark: Electricity can be generated through different processes such as: the conversion of energy contained in falling or streaming water, wind or waves; the direct conversion of solar radiation through photovoltaic processes in semiconductor devices (solar cells); or by the combustion of fuels.

8 Heat

This section includes heat, i.e. is the energy obtained from the translational, rotational and vibrational motion of the constituents of matter, as well as changes in its physical state.

Remark: Heat can be produced by different production processes.

9 Nuclear fuels and other fuels n.e.c.

This section includes nuclear fuels including uranium, thorium, plutonium and derived products that can be used in nuclear reactors as a source of electricity and/or heat as well as fuels not elsewhere classified.

Possible Sources for Energy Accounts

Data source	Supply	Use	Asset
Administrative data of regulators (e.g. oil and gas)	Supply of oil and gas	Producer consumption (e.g. venting and flaring), use of natural inputs	Reserves, extraction, depletion
Industry associations data	Value of production	Costs	Extraction, depletion, reserves
Vehicle registries		Kilometres driven an fuel use data can be basis for road fuel estimates	
Annual reports of companies		May contain physical data on energy use (e.g. airlines on total fuel use)	Reserves
International trade statistics	Imports of fuel products	Exports of fuel products	
Tax data		Possible source of data on fuel expenditures or taxation that can be used to derive volumes.	
Energy commodity surveys	Surveys of energy producers can provide production estimates in physical units.	Energy producers (e.g. electric utilities) may provide data on use by class of user, however, re-sellers are not final users	
Electricity production survey	Supply of electricity	Fuel transformation in produce electricity, producer own consumption, estimates of use by customers	

Secondary distributor surveys		Use by wholesalers and estimates of the use by their customers (e.g. households)	
Mining industry survey	Supply of fossil fuels (e.g. coal, uranium), value of production	Use of natural inputs, fuel use in mining industries, cost of production	Extraction, depletion, reserves
Manufacturing survey		Use of fuel products in manufacturing (in monetary or physical terms), non-energy uses for some industries (e.g. fertiliser, chemicals)	
Construction survey		Fuel use in the construction industries	
Transportation surveys		Fuel use, important for airline fuel purchased abroad. Pipeline data may be useful for disposition information.	
Survey of household expenditures		Monetary estimates of fuel consumption (can be used for allocations, e.g. with unit prices)	
National accounts	Monetary data with price data can be used to calculate volumes	Monetary data with price data can be used to calculate volumes	Asset values
Input-output tables		Monetary estimates of fuel consumption (can be used for allocations, e.g. with unit prices)	
Energy balances	Total extraction, production, imports for all fuel products. Benchmark for domestic availability/consumption.	Producer consumption, non-energy use, transformation, and end use for broad industry classes for all fuels. Exports, final consumption by households, stock changes.	Extraction data

Adjustments to imports/exports. In order to include imports and exports from the energy balances onto an energy accounts basis, adjustments are needed to relate them to transactions between resident and non-resident units independently of the location at which the transaction takes place.

Other adjustments for geographical coverage. In order to compile energy accounts, a number of items in the energy balances, in addition to imports and exports, need to be adjusted for the residence of the units involved. This is the case for international marine bunkering and for the items in the bottom block of the energy balances related to 'final consumption' (IRES, paragraphs 8.33 – 8.34, and Table 8.1). In fact, the different uses of energy products of the energy balances need to be disaggregated so that they can be recorded as intermediate/household consumption when the unit is resident – or exports when the unit is non-resident and need to be complemented with the use by resident units abroad. This is similar to the case of international bunkering.

It should also be noted that, in principle, there might be some additional adjustments necessary to the geographical coverage to exclude and/or include territorial enclaves in the rest of the world. These areas are clearly demarcated land areas (such as embassies, consulates, etc.) located in other territories and used by governments that own or rent them for diplomatic, military or scientific purposes. These areas are excluded from the basic statistics and energy balances, while they are included in the statistics presented by the accounting framework.

Reallocation/regrouping of data to the relevant ISIC division/class. In order to compile the energy accounts, information has to be regrouped according to the different ISIC divisions/classes. Information on 'transport', 'non-energy use', 'energy industry own use' and 'primary production' are example of items that need to be reallocated in order to present information on an ISIC-based tabulation such as that used in SEEA-Energy.

Additional data items necessary for the compilation of energy accounts

In order to compile energy accounts, it is important to have information that allows for the adjustments presented. Such information includes, for example, the breakdown of the deliveries for international bunkering of resident and non-resident units; deliveries to resident and non-resident final consumers; and use of energy products by resident units abroad. The additional data items depend to some extent on the methods used to make adjustments to the energy balances.

In view of the above differences countries are encouraged to clearly document and make available the methods used for the reallocation and adjustments of data provided by basic energy statistics and balances to the energy accounts. Details on good country practices in this respect will be provided in the forthcoming Energy Statistics Compilers Manual.

Source: International Recommendations for Energy Statistics (IRES, 2011), Chapter 11.

Bridge table for domestic supply and total supply[13]

	Supply (Energy Balances)	+losses during generation of secondary production	+international marine bunkers	Exports	Accumulations	Purchased by residents abroad	Supply (SEEA-Energy)
Coal	244.1			1.9	- 21.0		225
Peat and peat products							
Oil shale/ oil sands							
Natural gas (extracted)	395						395
Natural gas (distributed)	166.1			201.0	2.0		369.1
Oil (e.g. conventional crude oil)	360			361.0			721
Oil (oil products)	996		44	80.0	- 3.0	160	1277
Biofuels	7						7
Waste	109.1			1.0	0.3		110.4
Electricity	134			100.0			234
Heat	78.5						78.5
Nuclear fuels and other fuels nec							

BRIDGE TABLE FOR FINAL CONSUMPTION AND END USE OF ENERGY

	Final consumption (energy balances)	+international marine bunkers	Exports	Accumulations	Energy sectors use of energy for supporting activities	Purchased by residents abroad	End use (SEEA-Energy)
Coal	21.1		1.9	- 21.0			2
Peat and peat products							
Oil shale/ oil sands							
Natural gas (extracted)							
Natural gas (distributed)	77.1		201.0	2.0	2.0		282.1
Oil (e.g. conventional crude oil)	930		361.0				1291
Oil (oil products)	44	44	80.0	- 3.0	6.0	160	331
Biofuels	7						7
Waste	78.1		1.0	0.3			79.4
Electricity	131		100.0		3.0		234
Heat	76.5				2.0		78.5
Nuclear fuels and other fuels nec							

[13] Exports are removed prior to the calculation of net supply or availability in the energy balances and hence need to be added back.