Statistics Netherlands
Division KES
National Accounts

DATA REQUIREMENTS TO TRANSFORM ENERGY BALANCES INTO ENERGY ACCOUNTS

Sjoerd Schenau

1. Introduction

Last years, a lot of effort has been undertaken by the statistical community to streamline, revise and improve energy statistics, energy balances and energy statistics. The *International Recommendations for Energy Statistics* (IRES) has been developed by the Oslo Group. IRES intends to cover a broad range of issues from basic concepts, definitions and classifications to data sources, data compilation strategies, energy balances, data quality and statistical dissemination. Additional guidance to assist countries in the implementation of IRES will be provided in the *Energy Statistics Compilers Manual* (ESCM) which will be prepared by UNSD as a part of IRES implementation program. Furthermore, *energy accounts (SEEA-E)* is also being prepared by UNSD with assistance of the London group and will provide the international statistical standard for energy accounts consisting of agreed concepts, definitions, classifications and inter-related tables and accounts.

Energy statistics, balances and accounts are three statistical frameworks, which provide information on energy supply and energy use (SEEA-E, 8.182). Energy statistics deal with collecting and compiling information on production, imports, exports and domestic use of energy products on the basis of specific surveys and by using e.g. business statistics and foreign trade statistics. Energy balances re-organise the basic statistics by confronting and consolidating the supply and use

Project number:
BPA number:
Date: *30 August 2011*

side, and by highlighting the transformation of energy within the economy. Similarly, energy accounts, can be seen as a re-organization and supplement to the energy statistics and balances, which consistently uses national accounts classifications and definitions. Both energy balances and energy accounts apply the principle that supply equals use, but supply and use are defined in different ways.

The main difference between energy balances and energy accounts concerns how activities are classified and the scope with respect to which activities are included (boundary issues) (SEEA-E, 8.183). The energy accounts use the resident principle to determine whether a specific energy transaction should be included or not. The boundary of the energy balances follows the national territory principle just as energy statistics normally do so.

In chapter 6 of IRES (International recommendation for energy statistics) the statistical units and data items needed to construct the energy balances are described. These data items are also the prime source of information to construct physical flow accounts for energy. However, some additional data items are needed. In this short note an overview is provided of a) the most important data items from the energy statistics / energy balances needed to construct energy flow accounts and b) the specific extra data items that are needed to transform energy balances into energy accounts. In addition, some statistical data sources are described where the required extra data items can be found.

1. Data items for energy balances (IRES)

In chapter 6 of IRES the entities (statistical units) are described for which information is sought and for which energy statistics are ultimately compiled. It also provides a reference list of data items to be collected from those entities in order to assist countries in the organization of their data collection activities and ensure maximum possible comparability of the collected data with other economic statistics.

For each of the energy products classified according to SIEC, the following data items apply (IRES 2011, 6.39):

1.1	Production (differentiated into primary and secondary production)
1.2	Total Imports

1.2.1 Imports by origin

1.3 Total Exports

1.3.1 Exports by destination

1.4 International Marine Bunkers

1.5 International Aviation Bunkers

1.6 Stocks at the end of the period

1.7 Stock Changes

1.8 Transfers

1.9 Transformation (by transformation processes a)

1.10 Losses

1.11 Final Consumption

1.11.1 For Energy Use

1.11.1.1 Of which: for transport (by type of transport c)

1.11.2 Non-Energy Use

The definitions of these data items are described in chapter 5 of IRES. In addition, data items applicable to a specific group of energy products are identified in chapter 6 of IRES. For example, for electricity and heat the additional data items are a) Gross production, b) for own use, c) net production and d) use of energy products (IRES 6.55).

The data items described above are also the main ingredients for the compilation of the physical flow accounts for energy. In the figure below it is shown where the data items from IRES have to be inserted in the supply and use tables for energy[1].

[1] At this moment there are still some considerable differences in the setup of energy flow accounts as presented in the draft chapters of SEEA (chapter 3) and SEEA-E. Here the set up of the SEEA is followed

SUPPLY TABLE

	Industries	*Households*	*ROW*	*Changes in inventories*	*Environment*
Natural inputs					Primary production (totals)
Products	Secondary production		Imports		
Residuals	Losses	Losses			

USE TABLE

	Industries	Households	ROW		Environment
Natural inputs	Primary production				
Products: transformation us	Transformation input	Transformation input	Exports	Stock changes	
Products: end use	Final consumption	Final consumption		Stock changes	
Residuals					Losses (totals)

This provides a rough picture how to compile energy flow accounts from the data from the energy statistics/ energy balances, and of course some fine tuning is needed. For example, some extra care has to be taken how to treat the data items transfers (part of transformation input) and how to treat own use of energy. Additional adjustments for imports and exports are described below.

2. Extra data items required for the compilation of energy flow accounts

A) Adjustments with regard to residence and territory

The main conceptual difference between energy balances and accounts is the geographical coverage (IRES 11.11; SEEA-E 5.186). The reference territory for the energy balances is the national territory and statistics are compiled for all the units physically located on the territory. Units physically located outside the territory are considered as part of the rest of the world. This coverage is referred to as the territory principle. The energy accounts, on the other hand, use (consistent with the national accounts) the concept of the economic territory with statistics compiled for all the units resident of that economy (independently on where they are physically located). Units resident outside the territory are considered as part of the rest of the world. This coverage is referred to as the residence principle.

The use of the residence principle implies that data from the energy balances has to be adjusted in order to compile energy flow accounts. For this the following extra data items are required:

Item number	Data item
1	International Marine Bunkers: deliveries to resident units
2	International Marine Bunkers: deliveries to non resident units
3	International Aviation Bunkers: deliveries to resident units
4	International Aviation Bunkers: deliveries to non resident units
5	Fuel for transportation purchased abroad by resident units
6	Fuel for transportation purchased by non resident units
7	Other energy products purchased abroad by resident units
8	Other energy products purchased by non resident units

Data items 1-4 are a further disaggregating of data items 1.4 and 1.5 from IRES. Data items 5 includes bunkering by resident units abroad (jet fuel, fuel oil etc.). Data items 6 excludes bunkering (jet fuel, fuel oil etc.) to non resident units as this is included in data items 2 and 4. Data items 7 and 8 are usually small and may not always be relevant to collect. These include among others energy purchased by national embassies or military bases.

Using this data items, imports, exports and the end use for the relevant energy products may be adjusted according to the residence principle:

Imports (SEEA-E)
Imports (energy balances) +
- Fuel for transportation purchased abroad by resident units
- Other energy products purchased abroad by resident units

Exports (SEEA-E)
Exports (energy balances) +
- International Marine Bunkers: deliveries to non resident units
- International Aviation Bunkers: deliveries to non resident units
- Fuel for transportation purchased by non resident units
- Other energy products purchased by non resident units

End use (products) (SEEA-E)
Use for final consumption (energy balances) +
- International Marine Bunkers: deliveries to resident units
- International Aviation Bunkers: deliveries to resident units
- Fuel for transportation purchased abroad by resident units
- Other energy products purchased abroad by resident units

Data sources

The extra data items described above are usually not directly available and may have to be deduced form various data sources. Often these data sources provide an estimate for the total energy use of resident units as this is the underlying population of these statistics. Additional information is then needed to determine a) the part that was purchased abroad and b) the energy use of non residents.

This may also be obtained by combining information from different data sources.

1) Traffic statistics

Traffic statistics provide information on kilometres driven/sailed/flown. Using information on the specific energy use (i.e. energy use per kilometre) the energy use can be calculated. Traffic statistics may be based on surveys or registers. They often provide information on resident units which can be directly used to estimate the total energy end use in the use table. Survey data may provide additional information on the part that was driven/sailed/flown abroad and traffic by non residents.

2) Transport statistics

Traffic statistics provide information on the total cargo or persons transported. This is usually expressed in tons / persons or in ton kilometres / person kilometres. It is more difficult to deduce energy use from transport statistics as more assumptions are needed, i.e. what energy is needed to transport 1 ton over 1 kilometre etc.

3) Monetary data

Monetary data on energy use may be obtained from the National accounts (monetary supply use tables). Using price information the physical energy use may be calculated. Accordingly, the total use of residents may be determined. Additional information in the supply and use tables may be provided on the amount bunkered abroad by residents.

4) Annual reports of large transport companies

Annual reports of large transport companies, for example large airlines, may provide information on their energy use.

5) Tourism statistics

Tourism statistics may provide a variety of information on traffic by residents and non residents. As tourism statistics usually only provide indirect information on energy use, several assumptions need to be made to use this data source.

B) Adjustments with regard to reallocation data to ISIC classification

In the energy flow accounts, the presentation of statistics for economic activities and households strictly follows the principles of classification and the structure of the International Standard Industrial Classification of All Economic Activities (ISIC Rev. 4). Thus, information on any specific enterprise/establishment (be it on the production or on the consumption side) is presented under the ISIC division/class of the principal activity of the unit involved. The energy balances, however, do not follow the same principle as information on a specific enterprise/establishment is not explicitly linked to the relevant ISIC division/class of the unit involved, rather it is presented in different section of the balances depending on the type of use and the ISIC division/class of the unit involved (SEEA-E, 5.192).

Accordingly, additional information is needed to regroup data from the energy balances to the ISIC classification. Usually, production and use of energy in the mining, manufacturing and electricity production (ISIC 6-35) is already classified to ISIC in the energy balances (see IRES 5.25 and 5.73). Also agriculture and Forestry (ISIC 1-2) and Fishing (ISIC) are separately identified (IRES 5.73). The extra required additional information thus focuses on the energy consumption by commerce and public services (ISIC 33, 36-39, 45-47, 49-51, 52-53, 55-56, 58-66, 68-75, 77-82, 84-88, 90-96 and 99) and the energy use by transport activities.

In the energy balances, transport is defined as the consumption of fuels and electricity used in transport of goods or persons between points of departure and destination within the national territory irrespective of the economic sector within which the activity occurs (IRES 5.80). In the energy accounts the energy use for transport activities are attributed to the industry where the energy use actually takes place. For road transport, these are all ISIC classes and households. For water transport and air transport this is usually restricted to some specific ISIC classes.

With regard to energy use by the service industries, particularly electricity use and energy use for heating purposes (natural gas, etc) are important.

Data sources to allocate energy use for transport activities to ISIC/households

1) Traffic statistics

Traffic statistics usually yields information on the mode of transport (i.e. cars, lorries busses etc) which may be used to allocate the kilometres travelled to ISIC/households. In addition some direct information may be available to allocate the energy use. For example, the distinction between private and business use could be available.

2) Transport statistics

Transport statistics may yield information whether the transport is done by specialised producers (i.e. ISIC49-51) or not.

3) Structural business statistics

Structural business statistics (based on survey information) may provide monetary information on fuel use. Using price information the physical fuel use may be calculated. However, often this information is available for only a limited number of industries.

4) National accounts

Supply and use tables provide information on the monetary fuel use by ISIC and households. However, this data is often not based on direct observation (i.e. structural business statistics) but is compiled during the integrating phase.

5) Stock of motor vehicles

If no direct information on energy use for transport by ISIC is available from the sources above, the stock of motor vehicles may be used as a key to allocate fuel use.

Data sources to allocate energy use to service industries to ISIC/households

1) Structural business statistics

Structural business statistics (based on survey information) may provide monetary information on energy use. Using price information the physical fuel use may be calculated. However, often this information is available for only a limited number of industries.

2) National accounts

Supply and use tables provide information on the monetary energy use by ISIC and households. However, this data is often not based on direct observation (i.e. structural business statistics) but is compiled during the integrating phase.

3) Customer registers from energy companies.

Customer registers from energy companies provide direct information on who purchases and uses the energy. Problems here are a) obtaining access to the customer registers and b) allocating the information from the registers to the right ISIC / households.

4) Employment data

When the above data sources are not available / do not provide reliable data, employment data may be used as an key to allocate energy use to ISIC. For example, in most service industries the energy use for heating purposes may be considered proportional to the number of employees. However, care must be taken using this kind of auxiliary data as this only provides a very rough estimate and other factors have to be taken into account, such as the overall size of the businesses, extra number of people (customers, patients, students), differences in office space, use of different energy sources, other specific conditions (i.e. energy-intensive branches like public swimming pools) etc.