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Requirements for energy statistics for the development of hybrid/NAMEA data systems

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Abstract

Specific system characteristics which are required to combine energy and economic data in a coordinated system such as hybrid-accounts (also called NAMEA-accounts) are described in the first section. Issues relevant to hybrid accounts for energy are described and a proposal for the contributions to be made in this area is presented. In Appendix A, experience at Statistics Norway with developing these types of accounts based on current statistical systems is described and some of the difficulties encountered are presented.

Introduction

Energy statistics and economic statistics have each been developed as independent statistical areas which are subject to their own conventions and classifications. Environmental accounting and specifically hybrid flow accounts, also known as "NAMEA[1] accounts" (System of Environmental and Economic Accounts (SEEA) 2003), combines two or more sets of data so that it is easier to see the links between the different types of data and also create a data set which can be the basis for more rigorous analyses. The starting point for NAMEA accounts is the national accounts and NAMEA accounts can also be considered as external satellite accounts to the national accounts. In NAMEA accounts, economic accounts are combined with physical flows such as energy, other materials and natural resources, and waste materials/pollution (also called "residuals") using a supply and use table format.

At Statistics Norway, air emissions data have been used to develop hybrid flow accounts (NAMEA-air). In order to do this we need to be sure that the air emissions data include and exclude the same units as the national accounts. Since the air emissions data rely heavily on energy statistics/balances/accounts it is necessary to ensure that the energy data used as a basis for the air emissions data conforms to the requirements of a NAMEA-system. In addition, creating NAMEA-energy accounts is also desirable. In the most recent NAMEA data collection exercise from Eurostat in September 2006, total energy use and energy use resulting in air emissions were part of the reporting tables. The demand for energy data that can be correctly combined with the national accounts is increasing but providing this data is not always that easy and the correspondence between these systems needs to be improved from today's status.

In this paper the requirements for hybrid or NAMEA-accounts are briefly presented and then the specific needs regarding further development for energy accounts are described. In the appendix some Norwegian experiences with regards to establishing these types of accounts for energy are given.

What are hybrid accounts (otherwise known as "NAMEA")?

Hybrid accounts or NAMEA-accounts use the supply and use tables of the national accounts as the starting point and expands these to include other physical and economic information. By using the national accounts framework and definitions, identifying what should be included and excluded in this system is already defined. The challenge is to fill in the picture with the appropriate information.

An important equality is that:

Supply = Use

Or more specifically, using national accounts terminology,

Domestic production + imports = Intermediate consumption + household final consumption + government final consumption + fixed capital formation + changes in inventories + exports

Supply and use tables have separate rows and columns for products and industries. It is products which are used for intermediate consumption, capital formation or exports but it is industries which use intermediate consumption, imports, and environmental resources and generate both value added and residuals. The term "residuals" is used to describe wastes of all types including emissions to air. Formally, residuals are the "incidental and undesired outputs from production and consumption processes that generally have no value (though the latter is not an absolute criterion). They may be

[1] NAMEA stands for National Accounting Matrix including Environmental Accounts.

collected, treated and temporarily stored within the economy but ultimately residuals are released to the environment." (SEEA-2003, page 69). In Table 1, a schematic diagram of a monetary supply and use table that has been extended to include environmental and energy data is presented. There are a number of different ways to set up these types of tables depending on the national accounts in a country and this is one possible example.

Table 1. Schematic diagram of a hybrid supply and use table. Monetary units in shaded areas in the middle and physical units (tonnes) in non-shaded areas wrapped around.

Use → ↓ Supply	Products (CPC)	Intermediate consumption by Industries (NACE/ISIC)	Consumption	Capital	Exports (ROW)	Residuals (Pollution)
Poducts (CPC)		(products used by industry and government)	Final Consumption (household final consumption)	Fixed capital formation (products converted to capital including changes in inventory)	Products exported	
Production by Industries (NACE/ISIC 2digit including government)	Domestic Production (products made by industry)					Residuals generated by industry and government
Consumption						Residuals (generated by households)
Capital						Residuals generated by capital
Imports (ROW)	Products imported					Residuals imported
Margins	Trade and transport margins					
Taxes less subsidies on products	Taxes less subsidies on products					
Value added		Value added by industry				
Monetary totals	Total products supplied	Total industry inputs	Total consumption by households	Total capital supplied	Total exports	
Natural resources		Naturally resources used by industry	Natural resources consumed by households		Natural resources exported	
Ecosystems inputs		Ecosystem inputs used by industry	Ecosystem inputs consumed by households		Ecosystem inputs exported	
Residuals		Residuals reabsorbed by industry		Residuals going to landfill	Residuals exported	
Other information		Employment ***Energy use in industry***	***Energy use by households***			

Source: Adapted from Table 4.1 SEEA-2003, page 137.
ISIC is the International Standard Industrial Classification of All Economic Activities; NACE is the Statistical Classification of Economic Activities in the European Community and is an abbreviation of the French title, Nomenclature statistique des activités économiques dans la Communauté européenne. This is the European version of ISIC. CPC is the Central Product Classification; ROW stands for the Rest Of the World

What are the requirements for data in a NAMEA system?

When developing a NAMEA data system, there are three particularly important system characteristics that need to be included. The first important system characteristic addresses the issue of which institutional units should be included and which ones should be excluded within the system boundaries. The second important system characteristic has to do with the groupings of the institutional units and the consistency of these groupings over time. The third important system characteristic has to do with assigning the different environmental, energy and economic components to the appropriate groups of institutional units.

First system characteristic: Residence principle

The definition of the system boundaries and which institutional units should be included and excluded is based on the national accounts definition of resident institutional units. From the System of National Accounts handbook (SNA 1993) resident units are defined as follows:

> The accounts of the System are compiled for resident institutional units grouped into institutional sectors and sub-sectors… An institutional unit is said to be resident within the economic territory of a country when it maintains the centre of economic interest in that territory – that is, when it engages, or intends to engage, in economic activities or transactions on a significant scale either indefinitely or over a long period of time, usually interpreted as one year. As an aggregate measure of production, the GDP of a country is equal to the sum of the gross values added all of all resident institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs). This is not exactly the same as the sum of the gross values added of all productive activities taking place within the geographical boundaries of the national economy. Some of the production of a resident institutional unit may take place abroad – for example, the installation of some exported machinery or equipment or a consultancy project undertaken by a team of expert advisers working temporarily abroad. Conversely, some of the production taking place within the country may be attributable to foreign institutional units.
>
> (Part E. Concepts and Classifications, Section 4. National boundaries, SNA 1993, §1.28)

In practical terms this definition means that corrections need to be made for the activity of resident units in the rest of the world and the activity of non-resident units on the domestic territory. For the NAMEA air emissions data set, the following corrections should be made. Analogous corrections would also need to be made for a NAMEA energy data set.

Air emissions (or energy use) on national territory
- (+) Residents in the rest of the world
  - Road transport
  - Air transport
  - Water transport
- (-) Non-residents on domestic territory
  - Road transport
  - Air transport
  - Water transport

= Air emissions (or energy use) by resident units (i.e., the national accounts definition)

Some examples of the types of information that are necessary to include are listed below.

Residents in the rest of the world include activities such as:
- Bunkering abroad for ocean transport
- Fishing vessels abroad

- Tourists (households abroad) including purchasing fuel for vehicles
- Military bases on foreign territories
- National embassies abroad
- Lorries purchasing fuel abroad
- Aircraft bunkering abroad

Non-residents on domestic territory include activities such as:

- Bunkering of foreign ocean going vessels
- Foreign fishing vessels bunkering on national territory
- Tourism
- Foreign military bases on national territory
- Foreign land transportation units purchasing fuel: lorries and households (tourists)
- Foreign aircraft bunkering on national territory
- Foreign embassies on national territory

Theoretically these are the types of activities that need to be adjusted for when adapting any kind of statistics which are based on national territory/geographic definitions and not an economic or national accounts definition of the country.

When trying to make these types of corrections or adjustments the data availability is often a limiting factor. The details available, for example, in the land transport statistics or the fuel purchases data does not always allow for the distinction between resident units and non-resident units operating on the domestic territory. Estimates for these figures can perhaps be made using transportation statistics and tourism statistics.

Given that these types of corrections need to be made in order to establish the NAMEA accounts, it is necessary to identify what are the most important corrections that should try to be estimated and included.

Some types of considerations can be more important than others depending on a country's geographic location and industry structure. For example if there is a large airport with a great deal of international air traffic, making corrections for foreign aircraft bunkering on national territory could be important. One country that is making these types of corrections for their air emissions NAMEA is the Netherlands because of the international air traffic in Schiphol.

If tourism is a very important and large industry in a country then making corrections for tourism could be important.

In Norway bunkering abroad for ocean transport is very important to include in the energy accounts. Norway has a large ocean-going fleet and the purchases of fuel abroad by these vessels are significant. Just the opposite type of problem exists for Luxembourg and sales of petrol (gasoline). Due to the low taxes on gasoline and diesel fuels, foreigners fill up their vehicles in Luxembourg even though they immediately drive out of the country and use the fuel and cause air emissions in their home countries. Corrections for bunkering abroad and other types of fuel purchases by foreign units can be substantial. This is often the area that needs to have a special focus.

Seldom is it possible to make corrections for activities of embassies with regards to emissions or energy use. These types of activities are usually negligible although technically these activities should be corrected for.

As in all types of statistical work it is important to identify the area where the most gains will be obtained when trying to make adjustments and corrections.

Second system characteristic: Groupings of institutional units and consistency over time

Again, the definitions used by the system of national accounts are used for defining the groupings of the institutional units. More specifically this means the use of the ISIC (or NACE[2]) standard classifications of economic activities. It is very important that the same groupings are used in the two different statistical systems that are going to be combined. If the groupings are not the same, it then becomes necessary to aggregate the groupings until there can be an exact match between the two sets of data.

Sometimes the detail in the national accounts becomes the limiting factor whereas other times the detail of the groupings of the environmental or energy data are the limiting factors. Before the two sets of data can be linked together the aggregation levels must be consistent for the entire linked data set.

Another important factor is the consistency of these groupings of institutional units over time. Institutional units can change their industrial classification due to a number of different circumstances. Mergers, spin offs, and changes in main activity can all result in the reclassification of institutional units into different groups of economic activities. Maintaining a consistent time series within one set of statistics is challenge enough. When there are two or more linked statistical data sets, maintaining a consistent time series becomes even more challenging. When there is a major revision of a classification system, such as ISIC Rev. 4 and the corresponding NACE Rev. 2, the coordination task for NAMEA statistics is not non-trivial since the revision of all the data sets that contribute to the NAMEA statistics also need to be updated to the new classification system and consistent time series developed.

Third system characteristic: Attributing energy use to appropriate institutional units

Once the population of institutional units to be included in the NAMEA data set has been decided, then comes the challenge of attributing energy use to the appropriate group of institutional units.

The main principle used in this assignment process is that the institutional units that have the economic activity that is directly responsible for the energy use are assigned the energy use. Thus pollution generated from electricity production should be attributed to electricity suppliers and not to the electricity consumers. The same would be the case for the use of energy carriers, those that use the energy (no matter what the purpose) need to be attributed with that use.

The direct recording of residual flows and energy use is important for accurate and consistent connection of residual flows to material throughputs and economic transactions. The attribution of pollution or energy use to *final uses or products* should be considered as an analytical continuation of NAMEA-accounting. This information is not obtainable directly out of the supply and use NAMEA data sets but needs to be converted to input-output tables which are then used for further analyses.

Further development needs for energy accounts

Energy accounts have been developed in a number of different countries in addition to energy balances. Energy accounts were developed to respond to a variety of national needs which led to the development of different types of energy accounts systems. Based on this current situation some

[2] ISIC stands for International Standard Industrial Classification of All Economic Activities. NACE refers to the Statistical Classification of Economic Activities in the European Community and is an abbreviation of the French title, Nomenclature statistique des activités économiques dans la Communauté européenne.

specific issues have been identified and need to be resolved in order for energy accounts to be established in harmonized, internationally comparable statistical systems.

The following is a list[3] of areas that need additional work:

1. What are energy accounts / NAMEA/hybrid accounts for energy?
2. Are subsoil asset accounts for energy part of "energy accounts"?
3. Consistency with official statistics (energy balances) and bridge tables
4. Methodological issues: harmonisation of classifications, energy conversion factors, integration of various data sources
5. Treatment of statistical discrepancies
6. Treatment of import/export data
7. Treatment of renewable energy
8. Link with air emissions data and the need for emissions related energy use
9. Indicators
10. How to treat inconsistencies between energy balances and National accounts?

What are energy accounts / NAMEA/hybrid accounts for energy?

Energy accounts have been developed by different countries (for example Norway, Denmark and the Netherlands) and the presentation of information in these accounts all varies and the terminology used in the accounts is also not harmonized. The SEEA only shows a supply and use table with physical and monetary units as an example from Denmark and there are no general guidelines for the development or presentation for these types of accounts. In the Netherlands both gross and net supply and use tables are developed (the net energy use tables record only final energy use and conversion losses of energy).

A clear definition for NAMEA accounts for energy, what they need to include and guidelines or proposals for how to present the information needs to be established. Perhaps standard tables need to be proposed.

Are subsoil asset accounts for energy part of "energy accounts"?

Oil and natural gas asset accounts are often dealt with separately from energy statistics. Questions regarding asset reserves/stocks and the valuation of subsoil assets is a separate set of information from the official energy statistics and energy balances. Often it is not the national statistical institutes that have responsibility for this information.

For the valuation of subsoil assets, information regarding the stocks is important. Currently there are many national systems used for the classification of subsoil assets. The UN has had an initiate to harmonize these systems and the UN Framework Classification system is now being implemented. The UNFC needs to be the starting point for determining which portions of the assets should be included in the valuation calculations. Methodologies for the valuation of the assets in the SEEA need to be re-evaluated in light of the UNFC.

However asset accounts is a different area, with different methodologies than energy balances and the NAMEA-type energy accounts and should not be confused or included in the work of energy accounts.

[3] With thanks to Sjoerd Schenau, Statistics Netherlands, for contributing many of the points on this list!

Hybrid/NAMEA-energy consistent with official statistics

It is also important that the hybrid/NAMEA statistics are consistent with the official statistics published in the areas included in the NAMEA systems. It is important that the main figures from the NAMEA system can be fairly easily recognized and linked back to the main figures for the respective statistics. To make sure that the NAMEA statistics are consistent with the original statistics, it is often good to be able to check that especially the totals are the same in both the NAMEA and the original official statistics – such as the national accounts and energy balances. If these totals are not the same, then it is often helpful to have bridge tables which can inform the user how it is possible to convert from one set of statistics to the other. In this case this would be from the energy statistics/balances which have a national territory definition to the NAMEA-energy which use a national accounts/residency principle definition. Also needed are which products in the national accounts are included in the calculations of the monetary values to be included in the NAMEA tables.

Methodological issues: harmonisation of classifications, energy conversion factors, integration of various data sources

There are a variety of methodological issues that need work. The energy products from the energy statistics system need to be harmonized with the product groups in the national accounts. A correspondence table between these two systems needs to be developed. The energy conversion factors need updating. And recommendations for the integration of various types of data sources also need to be included.

Several of these are tasks to be undertaken by the Oslo Group since these are specific to energy statistics. The London Group can contribute to this work by participating in the discussions of the various discussion groups of the Oslo Group.

Treatment of statistical discrepancies

In some countries (for example Norway, Denmark and Canada) there are statistical discrepancies, some of which are substantial, especially for some of the energy products. When there are statistical discrepancies in the national accounts, typically stocks are used to balance the system as a method to get rid of the statistical discrepancies. In the supply and use tables in a NAMEA-system, statistical discrepancies need to be eliminated by some method (adjusting stocks, assigning the discrepancy across industries, etc.).

In some countries the stocks of energy products are adjusted. This adjustment however makes the physical stocks information incorrect. Since information regarding energy stocks is important with regards to national security and national supply of energy as well as including market sensitive information, using stocks for adjusting is not recommended by the energy statistics experts. If this cannot or should not be used, in what other ways can this be handled? Recommendations need to be made so that this is done consistently and appropriately.

Treatment of import/export data

Import and export of energy products is accounted for to a large degree in the foreign trade statistics. However, purchases of fuel by resident units abroad and by foreign units on the national territory need to be included/excluded in the energy accounts. Determining these transactions (“special trade” vs. general trade) can be a challenge – both in terms of physical and monetary units. How this is done in the different countries needs to be examined and perhaps this could help to identify ways that this can be improved in national systems.

Treatment of renewable energy

Including renewable energy sources in the energy balances, energy accounts and in the monetary accounts related to energy becomes more important as the use of renewable energy increases in importance. The energy statistics need to capture the production and use of these types of energy and the national accounts needs to capture the monetary component of this energy use. The current physical and monetary data sources often do not encompass renewable energy in adequate ways.

The physical side of this problem needs to be addressed by energy statistics. However some work regarding the monetary side of renewable energy could have a focus from the London Group since there are so many different subsidies concerning renewable energy and capturing the use of renewable energy in the national accounts is currently fairly weak. The product groups in the national accounts need to be examined and proposals for changes could be suggested. In the Norwegian national accounts the use of wood and the incineration of waste are included but for example the use of residential heating pumps is poorly covered.

Link with air emissions data and the need for emissions related energy use: Eurostat reporting for NAMEA-energy

Reporting energy use to Eurostat as part of the biannual NAMEA reporting cycle began in the reporting made in September 2006. For this reporting, total energy use and energy use resulting in air emissions were to be reported at the two digit NACE level for the period 1995-2004. See Appendix B for a general description of the data to be included in the reporting tables. The intention for reporting this type of data is to provide information which could be used to identify how economies are consuming energy with respect to their economic growth. This type of data can be used to identify if there is a decoupling of economic growth from energy use. Developing national systems to meet these reporting requirements are needed and guidelines for developing these types of statistics is also needed. This is another user need that needs to be described in detail so that the Oslo Group can also include the needs of this system in the energy statistics manuals.

How to treat inconsistencies between energy balances and National accounts?

In many countries, when the physical data from the energy balances is compared with the monetary data from the National Accounts often many kinds of inconsistencies can be identified. How should these be treated?

In the Netherlands, the physical data from the energy balances is used to calculate the monetary values for energy products, so a harmonised dataset is created. In Norway a combination of approaches is taken. The physical data for oil and natural gas are used to calculate the monetary values in the national accounts so this is harmonised but for other energy products the monetary data is taken from the accounting data reported to the tax authorities and the physical data is taken from other sources. This leads to inconsistencies between the two sets of data. The inconsistencies are balanced using stocks. Currently Statistics Norway is focusing on resolving this problem for electricity since there are no stocks for electricity the general approach for balancing was not appropriate. It is felt that for some types of energy products the physical data is the most reliable, whereas for other products it is felt that the monetary data is of higher quality.

It is unclear if this is a problem that can be resolved at the international level or whether this is a national level problem.

Indicators

Energy statistics have established sets of indicators that are regularly developed and used. These indicator sets could be examined to be sure that decoupling indicators that combine energy and national accounts statistics are also included (energy per value added and energy per unit intermediate consumption).

Who works on what?

There are currently two city groups that have interests in energy statistics, the Oslo Group and the London Group. Sorting out which group has the responsibility and the expertise to contribute to the various aspects of the work with energy statistics is important so that progress in this area can be made. The following attempts to provide some guidance for further work by these two groups:

Table 2. Working areas for the London Group and the Oslo Group

Issue	London Group	Oslo Group
Valuation of energy (sub-soil) assets (including the classification of the subsoil assets)	The classification of the subsoil assets should use the UN Framework Classification as the starting point. Which portions of this system to include need to be determined in consultation with UNFC experts. The valuation of the subsoil energy assets is in the mandate of the London Group as part of subsoil assets.	Outside the mandate of the Oslo group.
Definition of NAMEA-Energy / "Energy Accounts"	Makes proposals to the Oslo Group for standard NAMEA/hybrid tables to indicate the user needs for this system. System specifications need to be clearly communicated (Oslo Group discussion forum 2. User Needs or 4 Energy Supply and Use).	In the multi-purpose supply and use energy statistical system to be developed by the Oslo Group and presented in the revised UN manuals on energy statistics the user needs will be covered. .
Consistency with official statistics	Makes proposal to the Oslo Group for a bridge table that shows the data needed to convert between a geographic definition and an economic definition of a country. System specifications need to be clearly communicated (Oslo Group discussion forum 2. User Needs or 4 Energy Supply and Use).	In the multi-purpose supply and use energy statistical system to be developed by the Oslo Group and presented in the revised UN manuals on energy statistics the user needs will be covered.
Statistical discrepancies	Makes proposal for how to balance the NAMEA-energy system since statistical discrepancies are not allowed as a line in the NAMEA tables.	Will hopefully solve this by eliminating these discrepancies by improving the physical data.
Methodological issues: harmonisation of classifications, energy conversion factors, integration of various data sources	(1) Energy products to national accounts products – participate in the Oslo group discussion forum 6. Definitions and conversion factors (2) Energy conversion factors – participate in the Oslo group discussion forum 6 Definitions and conversion factors. (3) Integration of various data sources – participate in the Oslo group discussion forum 3. Basic Energy Statistics.	(1) Energy products to national accounts products – leads the discussion and included in the energy statistics manuals (2) energy conversion factors – leads the discussion and included in the energy statistics manuals (3) Integration of various data sources – leads the discussion and included in the energy statistics manuals
Treatment of import/export data	Contribute to this by participating in the Oslo Group discussion forum 3. Basic Energy Statistics	Leads the discussion and included in the energy statistics manuals
Treatment of renewable energy data – physical	Participate in the Oslo group discussion forum 3 Basic Energy Statistics	Leads the discussion and included in the energy statistics manuals

Treatment of renewable energy data – monetary	Makes proposals to the city group dealing with the National Accounts and the CPC-products list if this needs revision.	Outside the mandate of the Oslo Group
Link with air emissions data and the need for emissions related energy use	Makes proposals to the Oslo Group for standard emissions related energy use tables to indicate the user needs for this system. System specifications need to be clearly communicated (Oslo Group discussion forum 2. User Needs)	In the multi-purpose supply and use energy statistical system to be developed by the Oslo Group the user needs will be included in the multi-purpose system.
How to treat inconsistencies between energy balances and National accounts?	London Group members probably have more experience with this. Unclear if this is a national problem or if international guidelines can be developed.	Outside the work plan of the Oslo Group.
Indicators	Make proposals to the Oslo group after examining established energy indicators. Energy indicators such as energy per value added and energy per unit intermediate consumption are part of the use of energy statistics	Currently not clear if section on “use” of data in indicators will be included in the manuals – perhaps as part of best practices.

Conclusion

There is a demand for energy data that conforms to the definitions of the national accounts and that can be used to develop hybrid type/NAMEA-energy accounts. This type of data can be used for analyses which help to provide insights into developments in national economies. For the European countries there will most likely be a need to report annual NAMEA-energy data to Eurostat in the future on most likely a biannual reporting schedule as part of the NAMEA-air emissions reporting tables.

In working towards the establishment of energy data which conform to the needs of a NAMEA-type data set, the conversion from established energy statistics that use a geographic definition needs to be clear. The terminology for energy data that conforms to the national accounts definitions also needs to be considered.

Also the methodology for converting between the different types of energy statistics (energy statistics/balances, energy accounts, NAMEA-total energy use and NAMEA-air emissions relevant energy use) needs to be clarified. There is a need to develop bridge or conversion tables to help users understand how to go from one system to the other. This could also help to illustrate what the differences are, add additional quality checks into the statistical systems and indicate how to reconcile these differences.

In Norway, the energy produced by the hydroelectric power plants are included in the energy accounts but other types of emissions-free energy generation and renewable energy are not that easily identified in the main tables. Although Statistics Norway publishes figures for renewable energy generation (in units of 1000 t.o.e) from wind, solid biomass, biogas and liquid biogas, and industrial and municipal waste, these energy carriers are not easily identifiable in the standard statistical tables. These types of energy types need to be included in the NAMEA/hybrid accounts in a more obvious way.

With regards to the national accounts, correspondence information between the energy product groups and the product groups used in the national accounts also needs to be clear in order to combine these two systems and obtain the national accounts data that is included in the NAMEA-energy tables.

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Appendix A: Converting energy data into NAMEA-energy data in Norway[4]

There are two types of energy statistics produced by Statistics Norway regarding total energy figures; energy balances and energy accounts. The energy sources balance sheet and the energy accounts are based on different principles and definitions, for this reason some of the figures differ. It is important to consider which of the two presentations are the most relevant as determined by how the figures will be used. One should, however, avoid mixing figures from the two sets of statistics.

Two different approaches are used to compile the two different NAMEA tables for total energy consumption and emissions relevant energy consumption. The energy data source for the "emissions relevant energy use" is based on a special version of the energy accounts that covers energy consumption related to combustion of fuels and is specifically used in connection with the Norwegian emission model (see Hoem, 2006).

Energy balances and energy accounts

The energy sources balance sheet is based on international standards and is meant to be comparable to international statistics in this area. It monitors the flow of energy in Norway, irrespective of the nationality of the users. The balance sheet has a separate item for energy used for non-energy purposes (energy not used as fuel, but as input in industrial production). Regardless of this, all industrial consumption of coal and coke is considered as energy consumption because it is difficult to distinguish between raw material consumption and energy consumption. All energy used for transport purposes is also placed in a separate item in the balance, irrespective of user group. The energy balances basically use the geographic/territorial definition of Norway.

The energy accounts are based on the definitions in the national accounts, which is an economic definition of Norway where the residence principle is important. Energy used by Norwegian transport services and Norwegian tourists abroad are included, while energy consumed by foreign transport industries and tourists in Norway are excluded. Energy used for non-energy purposes is distributed by user group together with other types of energy consumption. Energy used for transport purposes is placed in the user group that actually uses it. The energy accounts should in principle be comparable to the national accounts because the sector classification and principle/definitions are approximately similar. However, there have been some discrepancies because different sources are used for quantity figures in the energy accounts and value figures in the national accounts.

In Norway, it is the energy accounts, and not the energy balances, that provide the starting point for developing the NAMEA-energy accounts since these are the official energy statistics that are closest to the definition of the national accounts.

Norwegian building blocks for the energy accounts and balances

The basis for the energy data at Statistics Norway that is published as official statistics is organized into the following five separate subsets of data (known as EDAT):

- Norwegian energy use outside of the energy sectors (resident units on domestic territory)
- Norwegian energy use outside Norway (resident units in rest of world)
- Foreigners' energy use in Norway (non-resident units on domestic territory)
- Energy use in the energy sectors (resident units on domestic territory)

[4] This section was developed together with Kristine E. Kolshus, Division for Environment Statistics, Statistics Norway.

- Consumption of energy raw materials in Norway (resident units on domestic territory)

Figure 1. Schematic diagram of the subsets of energy data and how they are combined into the existing energy balances and energy accounts

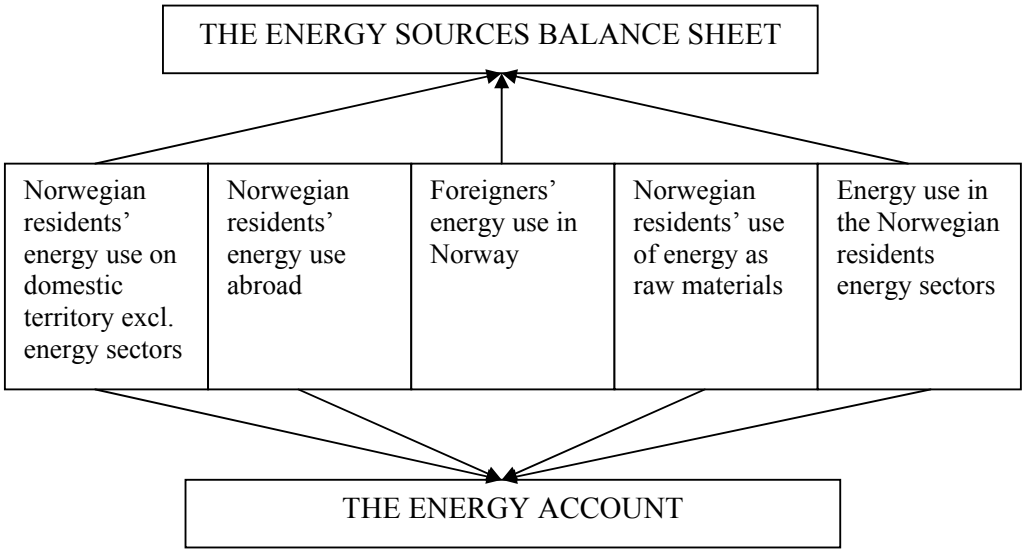

Figure 1 illustrates how the energy data at Statistics Norway is organized. By organizing the data in this way, it is possible to develop statistics according to different definitions and for different types of reporting and user groups.

To arrive at the energy balances, three of the five data sets are used. Excluded are the data for energy use by Norwegian residents abroad, as well as energy use in the energy sectors. To arrive at the energy accounts five of the six data sets are used, only foreigners' energy use in Norway (non-resident units on domestic territory) is excluded.

In addition, there are some other main differences between the energy balances and the energy accounts. The use of coal and coke is included in the energy balances regardless of the user. The energy sources balance sheet has a separate item for energy sources consumed for transportation purposes. The energy accounts place the consumption of all energy under the relevant consumer sector, regardless of whether the consumption refers to transportation, heating or processing.

For developing the NAMEA account for total energy consumption, the starting point is the data that are used for the energy accounts. The definition of the energy accounts follows that of the national accounts and should therefore equal the requirements in the NAMEA account for total energy consumption. In order to arrive at a NAMEA account for total energy consumption, the energy accounts need to be reorganized and classified slightly differently. This process is underway currently at Statistics Norway and some aggregated preliminary results are presented below.

Energy data in the Norwegian emission model.

Combustion of fossil fuels and biomass leads to emissions of greenhouse gases acidifying pollutants, NMVOC, particular matter, heavy metals, PAH and dioxins. Small amounts of NH_3 can also be

emitted. In Norway a special version of the energy accounts covering energy consumption related to combustion of fuels is used when calculating emissions to air.

Fuel consumption figures in the Norwegian emissions model are, with only a few exceptions, taken from the Norwegian energy accounts. The energy accounts include energy carriers used as raw materials and reducing agents, which are subtracted in the data used to estimate emissions from combustion. Some emissions vary with the combustion technology; therefore a distribution between different sources is required. Total use of the different oil products is based on the Norwegian sales statistics for petroleum products. For other energy carriers, the total use of each energy carrier is determined by summing up reported/estimated consumption in the different sectors.

In order to compile emissions relevant energy use, the energy consumption data in the Norwegian emissions model "Kuben" (the "Cube") form the basis for the input to the NAMEA-account (see Hoem, 2006).

However, not all energy use causing emissions to air will be covered using the energy-data in the Norwegian emissions model. For some major manufacturing plants (in particular offshore activities, refineries, gas terminals, cement industry, production of plastics, ammonia production), emissions of one or more compounds, reported to the Norwegian Pollution Control Authority from the plants, are used instead of calculating emissions on the basis of energy use figures for these manufacturing plants. In these cases, the energy consumption of the plants in question is subtracted from the total energy use before the general method is used to calculate the remaining emissions of the compound in question, in order to prevent double counting. For these manufacturing plants, the emissions factors from the Norwegian emissions model have to be used to calculate the energy use that corresponds to the emissions from these point sources reported to the Norwegian Pollution Control Authority.

Challenges in going from energy accounts to NAMEA accounts in Norway

At this time Statistics Norway has not yet fully developed the NAMEA-energy accounts as an official statistical area. We are currently working on developing these accounts.

A major portion of the work has already been accomplished since Statistics Norway publishes energy accounts which are according to the definitions for the national accounts. The energy accounts data sets are also developed using the industry groupings according to the NACE standard for the classification of economic activities. So much of the groundwork has already been established which facilitates the development of NAMEA accounts in Norway.

At this time the appropriate data sources for developing the main NAMEA accounts for total energy use and emissions relevant energy use has been identified. In essence the sources data that is used simply needs to be reorganized into the different detailed 2-digit NACE categories. Whenever the statistics are being developed based on existing data sets it is important to check that the reorganized information corresponds with the officially published data.

The sources to fill in the NAMEA table for total energy consumption is the 4 subsets of data from the EDAT (all in excel-format) that form the energy accounts (see figure 1). In this case, from the energy accounts data that is officially published, it is actually difficult to find the total energy use as the officially published tables are organised differently than the five separate subsets of data in the EDAT.

The source to fill in the NAMEA table for emissions relevant energy use is taken from the energy data specifically related to Norwegian emissions model. The variables from the Norwegian emissions model used to compile the NAMEA table for "emissions relevant energy use" are fuel types (energy carriers), industries and year. All data in the Norwegian emissions model are in SAS, and a SAS-program is under development in order to extract the data needed for NAMEA table for emissions

relevant energy use. As there are no officially published statistics covering emissions relevant energy use, there are no other official sources with which to directly compare these data. Before reporting emissions relevant energy use by NACE 2 digit level, it will be necessary to discuss whether this kind of data can be published as official data at Statistics Norway.

The NAMEA energy use data reported to Eurostat is to be given in one uniform unit; Giga Joule. Although the energy accounts and the energy source balance sheet also are given in Peta Joule both in EDAT and in officially published tables, we cannot take advantage of these data in Peta Joule. We need to use the subsets in the EDAT in order to obtain detailed enough data required for the emissions relevant energy use as well for all data when it comes to the decoupling analysis, and the energy use data in the subsets are given in ktonnes, GWh or Sm^3. It is the same situation for the energy use data in the Norwegian emissions model.

Conversion factors for the energy content of each energy carrier is used to convert the consumption of the energy carriers to one uniform unit.

We are using the Eurostat reporting tables for NAMEA as a framework for development. In our opinion however these tables do not contain enough detail to be particularly useful for analytical work. We would like to be able to develop these types of tables in much more detail and not just total energy consumption and emissions relevant energy use. Our goal is to establish tables which include the energy consumption of industries (at the 2-digit NACE level) according to detailed types of energy carriers.

Once we have established the NAMEA energy accounts we also need to evaluate the results in light of the official energy statistics. One problem which may need to be discussed in further detail before NAMEA-energy can be established as official statistics is the sometimes large statistical discrepancies that exist in the energy statistics. At a highly aggregated level these statistical errors are not as important. However since NAMEA accounts need detailed industry level (such as the 2-digit NACE/ISIC) data which is then combined with detailed energy source data, these statistical errors can become important.

For some types of energy carriers, for example crude oil, natural gas and other gases and LPG, the statistical errors are significant in relation to intermediate consumption and household use. In 2004 the statistical error for petrol was approximately 25 per cent of intermediate consumption and household use. The same figure for coke was 23 per cent, for natural gas 19 percent and for other gases and LNG approximately 80 per cent. The issue of the quality of the NAMEA-energy data comes into question when such high levels of statistical error exist since such high levels of energy consumption cannot be linked to the industry responsible for this consumption. We do not know whether the statistical errors are linked to errors in the data material on the supply or the user side. These are some of the issues that need to be discussed further before detailed NAMEA energy accounts can be developed as official statistics, published with confidence and used in analyses.

Aggregated preliminary figures for NAMEA-energy accounts

Although all of the aggregation, statistical error, publication and quality issues have yet to be fully dealt with, some preliminary figures at an aggregated level have been developed using the energy accounts data at Statistics Norway.

Based on the input data used to compile NAMEA total energy use we have organised this data in a Supply and Use Table. Table 4 explains the links between the variables in the NAMEA Supply and Use table with the variables in the officially published energy accounts data.

As mentioned before, the NAMEA total energy use accounts table would look different from the currently published energy accounts tables. Table 5 and Table 6 show the current official energy accounts tables. It is not easy initially to know which figures to check in order to know whether the figures compiled to the NAMEA total energy use accounts equals the officially published energy figures.

The main differences between the NAMEA way of organising the energy data and the way energy data is officially published by statistics Norway are:

- NAMEA combines consumption figures for all industries together, while the officially published energy data differ between energy sectors and others, as well as between primary and secondary production within the energy sectors.
- NAMEA shows detailed industry breakdown for consumption figures by NACE industries, which not necessarily are easily recognizable in the officially published energy figures although these figures are also published on a relative detailed industry level.

As seen in Table 3, supply of "Other gases and LPG" does not equal the use of these energy goods. This is due to conversions needed to calculate the different gases included in this energy group into one uniform energy unit. This means that for this energy group the normal method used to compile figures for NAMEA total energy use accounts is not preferable. Conversion factors for the gases included in "Other gases and LPG" are given from the EDAT.

Table 3 also includes economic information from the National Accounts. Since NAMEA accounts combine environmental and economic data, it is important that the information included about the quantity of energy produced or consumed is comparable to the similar information about energy produced or consumed in value. The first challenge is to define what energy-products in the national accounts that are equivalent to the energy-products included in the NAMEA energy accounts. A bridge table between the energy products of these two accounts should be developed. The next challenge is to check the comparability between the energy accounts and the national accounts. Although the energy accounts follow national accounts definitions, it is not given that the information included in these two sets of data is comparable. For example electricity use in GWh may not match with the economic consumption data from the national accounts.

Table 3: Supply and use table for energy consumption according to NAMEA-accounts. 2004

NAMEA - SUT energy 2004	Coal	Coke[1]	Fuel wood, black liquor, waste	Crude oil	Natural gas	Other gases[2] and LPG	Petrol	Kerosene	Middle distillates [3]	Heavy fuel oil[4]	Electricity	National accounts
SUPPLY TABLE	*1 000 tonnes*	*1 000 tonnes*	*1 000 toe*	*1 000 tonnes*	*Mill Sm^3*	*1 000 toe*	*1 000 tonnes*	*1 000 tonnes*	*1 000 tonnes*	*1 000 tonnes*	*GWh*	*Mill nok*
a. Domestic production	2 904	173	1 194	138 732	83 204	6 944	11 961	670	6 329	1 913	110 671	162 353
b. Imports	766	810	32	501	0	345	551	264	805	1 422	15 309	13 313
c. Direct purchases abroad	0	0	0	0	0	0	27	124	1 943	1 355	0	7 715
d. Total supply (a+b+c)	**3 670**	**983**	**1 226**	**139 232**	**83 204**	**7 289**	**12 539**	**1 058**	**9 078**	**4 690**	**125 980**	**183 381**
USE TABLE												
e. Intermediate consumption	839	796	600	12 590	5 808	2 027	1 170	585	5 722	2 994	78 583	76 372
Agriculture, forestry and fishing	0	0	2	0	7	2	10	1	601	6	2 095	2 999
Mining and extraction	0	0	0	0	4 357	1	0	0	379	3	1 096	1 720
Manufacturing	812	861	375	12 590	1 421	1 992	806	19	387	1 366	50 779	20 511
Energy and water supply and construction	27	0	217	0	7	15	15	0	202	1	2 475	3 305
Wholesale, maintenance, hotels and restaurants	0	0	0	0	2	5	39	0	111	0	6 143	9 088
Transport	0	0	0	0	11	2	59	496	3 772	1 616	788	18 881
Services	0	0	0	0	0	0	156	2	68	0	2 551	9 617
Education, health and social work	0	0	0	0	0	0	83	7	87	1	5 611	3 276
General government	0	0	6	0	4	10	1	61	114	0	7 045	6 975
f. Inventory changes	15	-15	0	-152	0	-33	-104	19	-65	-16	0	10 528
g. Private households	2	1	626	0	3	13	1 271	116	304	0	32 405	48 008
h. Export	2 741	19	0	124 383	76 272	3 761	9 572	89	2 732	1 742	3 854	43 631
i. Losses in distribution	0	0	0	0	9	44	0	0	0	0	11 138	2 407
j. Foreign purchases in Norway	0	0	0	0	0	0	27	193	128	74	0	2 435
k. Total use (a+b+c+d+e+f)	**3 598**	**866**	**1 226**	**136 822**	**82 092**	**5 812**	**11 935**	**1 002**	**8 821**	**4 793**	**125 980**	**183 381**
l. Statistical differences	72	182	0	2 410	1 112	1 678	603	56	257	103	0	
m. Supply minus use incl. Statistical discrepancy	0	0	0	0	0	-200	0	0	0	0	0	

(1) Incl. Coke and petrol-coke
(2) Refinery gas, fuel gas and methane.
(3) Incl. autodiesel, marine gassoljer, tungdestillater og tungolje
(4) Incl. waste oil, paints and varnish etc.

Table 4: The linkage between NAMEA SUT and the officially published energy accounts statistics

NAMEA Supply and use tables (Report table 3: Supply and Use table for energy consumption according to NAMEA)	**Official published statistics by Statistics Norway (Report tables 5: Energy accounts. Extraction, conversion and use of energy goods[1] and 6: Energy accounts. Use of energy goods outside the energy sectors, by industry[2])**
SUPPLY	
a. Domestic production	Primary production + secondary production + other supply (production outside the energy sector)
b. Imports	Imports
c. Production abroad for Norwegian consumers.	Direct purchases abroad
d. Total supply (a+b+c)	
USE	
e. Intermediate consumption (equals NAMEA total energy use excl. HH consumption	Use outside the energy sectors + input in oil refineries + input in Thermal power plants + input in gas supply + input in Dual purpose power plants and district heating plants excl. HH consumption (Energy consumption in households[2]).
f. Inventory changes	Stocks
g. Private households	HH consumption (Energy consumption in households[2])
h. Export	Export
i. Losses in distribution	Registered losses
j. Foreign purchases in Norway	Foreign purchases in Norway
k. Total use (a+b+c+d+e+f)	
l. Statistical differences	Statistical differences
m. Supply minus use incl. Statistical discrepancy	

[1] http://www.ssb.no/english/subjects/01/03/10/energiregn_en/tab-2006-10-20-11-en.html
[2] http://www.ssb.no/energiregn_en/tab-2006-10-20-12-en.html

Table 5. Energy accounts. Extraction, conversion and use[1] of energy goods. 2004

	Coal	Coke[2]	Fuel wood, black liquor, waste	Crude oil	Natural gas	Other gases[3] and LPG	Petrol	Kero-sene	Middle distillates	Heavy fuel oil[4]	Electricity	District heating
	1000 tonnes		*1000 toe*	*1000 tonnes*	*Million Sm³*	*1000 toe*	*1000 tonnes*				*GWh*	
SUPPLY												
Coal mines												
Output	2 904	0	0	0	0	0	0	0	0	0	0	0
Input	0	0	0	0	0	0	0	0	0	0	-35	-1
Production of crude oil and natural gas												
Output	0	0	0	138 732	83 204	[5]6197	[6]7339	0	0	0	0	0
Input	0	0	0	0	[7]-4 871	0	0	0	[8]-313	0	-587	0
Hydroelectric power plants												
Output	0	0	0	0	0	0	0	0	0	0	109291	0
Input	0	0	0	0	0	0	-1	0	-5	0	-1266	0
Primary production	***2 904***	***0***	***0***	***138 732***	***78 333***	***6 197***	***7 338***	***0***	***-318***	***0***	***107 403***	***-1***
Imports	766	810	32	501	0	376	551	264	805	1 422	15 309	0
Exports	-2 741	-19	0	-124 383	-76 272	-4 099	-9 572	-89	-2 732	-1 742	-3 854	0
Direct purchases abroad	0	0	0	0	0	0	27	124	1 943	1 355	0	0
Foreign purchases in Norway	0	0	0	0	0	0	-27	-193	-128	-74	0	0
Stocks (+Decrease, -Increase)	-15	15	0	152	0	36	104	-19	65	16	0	0
Primary supply	***914***	***806***	***32***	***15 000***	***2 062***	***2 511***	***-1 579***	***88***	***-364***	***977***	***118 858***	***-1***
USE												
Energy Sectors												
Oil refineries												
Output	0	173	0	0	0	1 126	4 594	670	6 329	1 850	0	0
Input	0	0	0	-12 590	0	-722	-796	-19	-91	-1 085	-526	0
Thermal power plants												
Output	0	0	0	0	0	0	0	0	0	0	974	0
Input	0	0	-24	0	0	0	0	0	-8	0	-5	0
Gas supply												
Output	0	0	0	0	0	0	0	0	0	0	0	0
Input	0	0	0	0	-1	0	0	0	0	0	0	0
Dual purpose power plants & district heating plants												
Output	0	0	0	0	0	0	0	0	0	0	155	[9]2 947
Input	-27	0	-190	0	-6	-2	0	0	-20	-1	-655	-6
Other supply[10]	0	0	1 194	0	0	358	28	1	0	63	252	0
Registered losses	..	..	..	..	[11]-9	[12]-70	0	0	0	0	-11 138	-608
Statistical differences	-72	-182	0	-2 410	-1 112	-1 678	-603	-56	-257	103	0	0
Use outside the energy sectors	814	[13] 797	1 012	0	934	1 524	1 643	683	5 590	1 908	[14] 107 915	2 332
Domestic consumption[12]	814	797	1 012	0	934	1 524	1 616	559	3 381	380	107 915	2 332
Of which												
Non-energy purposes/reducing agents	679	779	0	0	687	979	0	0	11	23	0	0

[1]Also including energy goods used for non-energy purposes
[2]Including petrol coke.
[3]Refinery gas, fuel gas and methane.
[4]IIncluding waste oil, paint and varnish etc.
[5]Natural gas liquids
[6]Condensate
[7]Including gas terminals
[8]Including consumption by supply boats and in crude oil transport
[9]Including waste heat from manufacturing, 86 GWh.
[10]Production outside the energy sectors.
[11]Flaring outside the energy sectors
[12]Flaring of methane from waste disposals
[13]Of which 356 000 tonnes petrol coke
[14]Of which 4 322 GWh non-priority power
[15]Including Norwegian air transport abroad

Source: http://www.ssb.no/english/subjects/01/03/10/energiregn_en/tab-2006-10-20-11-en.html

Table 6. Energy accounts. Use of energy goods outside the energy sectors, by industry[1]. 2004

	Coal	Coke	Fuel wood, wood waste, black liquor, waste	Gas[2] and LPG	Petrol	Kerosene	Middle distillates	Heavy fuel oil[3]	Electricity
	1000 tonnes		*1000 toe*	*1000 toe*	*1000 tonnes*				*GWh*
TOTAL	***814***	***797***	***1 012***	***2 410***	***1 643***	***683***	***5 590***	***1 908***	***107 915***
Agriculture, forestry and fishing		**-**	**2**	**9**	**10**	**1**	**601**	**6**	**2 095**
Mining and quarrying	**-**	**-**	**0**	**3**	**0**	**0**	**54**	**3**	**474**
Manufacturing	**812**	**796**	**375**	**2 329**	**10**	**0**	**309**	**281**	**50 253**
Manufacture of food products	0	0	0	29	4	0	114	18	2 956
Manufacture of textiles, leather and leather products	0	0	0	1	0	0	5	1	172
Manufacture of wood products	0	0	76	0	0	0	13	10	705
Manufacture of paper and paper products	0	0	273	22	0	0	13	147	6 373
Printing, publishing etc.	0	0	0	3	1	0	1	0	380
Manufacture of industrial chemicals	209	86	0	2 109	0	0	19	47	6 482
Manufacture of chemical products and products of mineral oil, coal, rubber and plastic	0	0	0	4	0	0	15	1	611
Manufacture of cement and lime	125	3	16	5	0	0	1	29	228
Manufacture of other mineral products	92	33	0	68	0	0	32	28	626
Manufacture of iron and steel and ferro-alloys	383	388	5	13	0	0	11	0	6 693
Manufacture of primary aluminium	0	155	0	57	0	0	16	0	21 196
Manufacture of other metals	0	0	0	0	0	0	2	0	1 221
Water supply	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**
Construction	**0**	**0**	**3**	**15**	**14**	**0**	**167**	**0**	**549**
Wholesale and retail trade, restaurants and hotels	**0**	**0**	**0**	**7**	**39**	**0**	**111**	**0**	**6 143**
Wholesale and retail trade	0	0	0	3	35	0	101	0	4 679
Operation of hotels and restaurants	0	0	0	4	4	0	11	0	1 464
Transport, storage and communication	**0**	**0**	**0**	**12**	**157**	**496**	**3 811**	**1 616**	**1 477**
Rail transport, scheduled bus transport etc.	0	0	0	2	0	0	122	0	591
Taxi	0	0	0	2	9	0	47	0	0
Other transport by road	0	0	0	0	46	0	1 059	0	0
International maritime transport	0	0	0	0	0	0	2 155	1 528	0
Coastal and inland water transport	0	0	0	7	0	0	390	88	10
Air transport	0	0	0	0	4	496	0	0	187
Services related to transport	0	0	0	0	19	0	33	0	338
Postal and telecommunication services	0	0	0	0	79	0	6	0	350
Financing, insurance and business services	**0**	**0**	**0**	**0**	**58**	**1**	**30**	**0**	**1 862**
Other private services	**0**	**0**	**0**	**0**	**83**	**7**	**87**	**1**	**5 611**
Public services	**0**	**0**	**6**	**16**	**1**	**61**	**114**	**0**	**7 045**
Public administration, excluding defence	0	0	3	0	1	0	6	0	2 022
Educational and research services	0	0	2	0	0	0	29	0	2 067
Medical and veterinary services, social care etc.	0	0	1	4	0	0	30	0	1 729
Other sectors of public administration	0	0	0	12	0	60	48	0	1 228
Private households	**2**	**1**	**626**	**18**	**1 271**	**116**	**304**	**0**	**32 405**

[1]Includes energy goods used for non-energy purposes. District heating is not included.
[2]Natural gas, fuel gas and methane
[3]Including waste oil, paint and varnish etc.
Source: http://www.ssb.no/energiregn_en/tab-2006-10-20-12-en.html

Appendix B: NAMEA-energy instructions from Eurostat NAMEA reporting tables

The questionnaire contains 2 data sheets to report data on energy use by industries and households:
-- Emission-relevant energy use
-- Total energy consumption

Emission-relevant energy use:

The purpose of this data sheet is to show the [amount of] energy used by resident units that is directly linked to air emissions reported in the previous 13 data sheets on air emissions. To that end, only the data related to the combustion of fuels causing air emissions are to be reported - i.e. combustion of primary energy forms (lignite, coal, natural gas, wood and other biofuels, peat, waste) and combustion of secondary energy forms (coal coke, coke gas and other gases, petroleum products such as fuel oil, diesel oil, motor gasoline, LPG, jet fuel and kerosene, and other petroleum products).

Excluded are:

- inputs of fuels that are transformed from one form into another (e.g. refining of crude oil into petroleum products, conversion of coal into coke);
- fuels used as raw materials, such as petroleum products in the chemical and plastics industries or wood for construction;
- changes in inventories of energy products.

For all these reasons, energy accounts for NAMEA are not the same as the traditional energy use table (in monetary units) available in national Accounts which record the total purchases of all energy products.

Total energy consumption:

This data sheet reports the total energy use for each industry and households. In addition to the combustion of fuels (as reported in the previous data sheet) it should include air-emission free energy forms and net balances:

- the use of primary electricity that is not based on fuel consumption, such as hydro (incl. pumped storage), nuclear, tidal, wave, geothermal, wind and solar electricity;
- other non-fuel related energy generated (any other form of energy production - steam and hot water and heat - that is not based on fuel combustion. For example, geothermal steam and hot water and heat from nuclear power plants or solar panels); and
- the net balance of purchased minus sold electricity, heat and hot water.

Appendix C: List of issues that need to be addressed by the Oslo Group – 2007

At the Oslo Group meeting in India, in February 2007, a list of issues was discussed in order to make a work program for the Oslo Group on Energy Statistics in 2007, before the third meeting. The list is organized according to the draft disposition for the revised UN manual on energy statistics.

The manual – history, framework etc.
This is not part of the manual, but will give the framework for the manual, covering the questions of how it will be built up, and how it shall be made available to the users?

a. Create a detailed disposition for the new manual – based on the proposal presented at the second meeting

b. Propose how an electronic, searchable solution for the manual can be built.

0. Background, settings, borderlines
This part will cover the history, basic principles and rhetoric, and the framework for the contents of the manual.

a. History. What was the process behind the first version of the UN manuals on energy statistics? What has happened since the first version of the manual?

b. Principles/rhetoric. Create a proposal for definitions and explanations of central terms related to the work with the manual: What is energy statistics, what are basic energy statistics, what are energy accounts, energy balances and energy supply and use? What systems are in physical terms, what are in value terms and what are in both? Today both the terms energy accounts and energy balances are used. The Oslo Group wants to identify the differences between these systems. If possible the aim is to develop one common system of supply and use tabulations that will cover both the contents of energy balances and accounts

c. Introduction to the manual. Specifying the aim for the manual: The main objective is to build a multipurpose and coherent system for official energy statistics to monitor the yearly supply and use of energy in a country, and to address all user needs.

d. Stocks. Stocks of products will be included in the manual. Why do we not give priority to reserves/physical revenue, subsoil assets etc. in the manual?

1. Official statistics
The element of official statistics is essential in the new manual. It is important that energy statistics is further developed as Official Statistics in accordance with the standard quality claims.

a. Analyze the UN survey on official energy statistics.

b. Are there specific requirements for official energy statistics?

c. Data collection strategies (from production and use (for instance households consumption, energy in business surveys etc))

d. Quality and assessment

e. Dissemination. Principles, equal access, free (public good)

f. Evaluation, monitoring by whom? Evaluation followed up by whom?

2. User needs

In order for the manual to give the reader an overview of the complexity of energy statistics, it is important to clarify the user needs. The user needs will explain the need for data on production, transport, end use, user group distribution etc.

a. User needs, taking into account international standard for National Accounts, emission to air, international organizations, governmental use in energy planning, SEEA etc.

3. Basic energy statistics

This part of the manual is to cover basic energy statistics, or primary statistics on energy. This means statistics on production, use and imports/exports of energy. Some of these data are collected through basic energy statistics (mainly production), and others are collected as part of other business statistics (mainly use). Some energy sources need better methods for data collection, and they are given special attention at this stage.

a. Geothermal (Heating pumps). Should they be included? How? Important link between energy in physics and energy in statistics

b. Solar energy. Should they be included? How? Important link between energy in physics and energy in statistics

c. Wind. Important link between energy in physics and energy in statistics

d. Biomass. How to treat biomass in official energy statistics

e. Renewable and non-renewable energy – analyze aggregate of energy forms

f. Tracking. Should tracking and counting of chemical/radioactive materials be part of official statistics and the manual?

4. Energy supply and use

The Oslo Group aims to identify the differences between energy balances and energy accounts and to explore the possibility/ propose solution to make an energy supply and use system that serves all user needs.

a. Today both the terms energy accounts and energy balances are used. The Oslo Group wants to identify the differences between these systems. If possible the aim is to develop one common system of supply and use tabulations that will cover both the contents of energy balances and accounts. The system should be consistent with the system of National Accounts, with some deviation if and when necessary. Definitions of production, intermediate and final consumption, imports and exports should be based on agreed international standards (1993 SNA and International Merchandise Trade Statistics). The same should hold to energy products classification, which further disaggregation if necessary.

b. What are the energy components in National Accounts?

5. **Development of a core set of tables**
   According to the mandate, the Oslo Group is to recommend a core set of tables as minimum requirement at national and international level to satisfy major user needs. This set of tables must be based on the system for energy supply and use in part 4, and will hence come later.

6. **Definitions, Conversion factors etc**
   Definitions have been a topic for discussion for a long time. Here the most important part is to go through existing lists of definitions, conversion factors etc. to identify inconsistencies, and to propose solutions to these inconsistencies.

   a. Go through list of definitions, conversion factors etc. to see where there are inconsistencies, and to propose solutions to these inconsistencies.

   b. Renewable and non-renewable energy – analyze aggregate of energy forms

   c. Gross or net calorific values. According to international guidelines, energy consumption should be presented in net calorific value. Still, not all countries follow these guidelines. A chapter should be written to give a recommendation for this, with an argument of why.

7. **Best practices**
   An important part of the Oslo Group mandate is to identify and collect national and international best practices. Best practices will be integrated in the different parts of the manual.

   a. Develop a "form" for description of best practices.

   b. Write best practices as chapters in the new manual

   c. Best practice strategy for dissemination

   d. Best practice Statistical Bank

It was proposed that all papers/presentations at the third meeting of the Oslo Group are to have the form of chapters for the new manual. The detailed disposition will be available at the Oslo Group discussion forum by May 2007.

The responsibility of each issue will be assigned, and will be made available later.