COUNTRY PRACTICE IN ENERGY STATISTICS

Topic/Statistics: Energy Balance compilation

Institution/Organization: Statistics Mauritius

Country: Mauritius

Date: 27 March 2012

CONTENTS

Abstract

Write a short abstract of the statistics, and try to limit it to one page. The purpose of the abstract is to give the reader a general overview of the statistics/topic. It should therefore include a brief overview of the background and the purpose of the statistics, the population, the sample (if relevant), the main data sources, and the main users of the statistics. The abstract should also mention what is the most important contribution or issue addressed in the country practice (e.g. the practice deals with challenges of using administrative data, using of estimation, quality control, etc.). If there are other elements that are considered important, please feel free to include them in the abstract.

Keep in mind that all relevant aspects of the statistical production will be covered in more detail under the different chapters in the template. Therefore, the abstract should be short and focused on the key elements. What the most important elements are can vary from statistics to statistics, but as a help to write an abstract you can use the table below. The table can either replace a text or can be filled out in addition to writing a short text.

Information on energy production/imports, energy transformation and consumption are compiled in the national energy balance (NEB). The NEB allows analysis of energy requirements and demands. It is also used for energy modelling and for deriving most of the energy statistics. Another important use of the NEB is the compilation of the national greenhouse gas inventory.

The NEB has been compiled in Mauritius since the late nineties. The series from 1990 are available covering supply and use of all energy products in the Republic of Mauritius. The energy sources include coal, petroleum products, biomass and electricity. Most of the energy products are collected in mass as metric tonnes. Some are obtained as volume in litres and electricity in GWh. Country-specific conversion factors are used to convert physical values into energy unit of tonnes or kilotonnes of oil equivalent (toe or ktoe) and Terajoule (TJ). The available manuals on energy statistics from UNSD has been used in the initial works regarding the NEB.

Most of the data are from administrative sources. The data collection exercise covers nearly all the entities involved in the energy sector. These comprise the electricity producers, the petroleum companies and the external trade statistics unit, among others. The Reporting units and Observational units are normally identical and are the same, namely the establishments whose productions (Reporting units) and consumptions (Observational units) are surveyed. For the supply side of the NEB, the main data sources are the Trade Statistics and the national agency responsible for importing and stocking fuels. For the transformation, especially into electricity, the main data sources are the power producers, both public and private. Another Reporting unit which are the Petroleum companies provide sales data which forms the basis for estimations of Final Energy Consumptions (Energy Demand). The sole public electricity supplier (Reporting unit), which manages the national grid with all the distributions and sales, also provides consumptions grouped by users (Observational units) – be it domestic, industrial or commercial etc based on predefined sales tariffs which are fixed by government. Adjustments are mostly needed to allocate consumption of fuels to different economic sectors because all respondents do not report sectoral energy uses in the same format. Adjustments are based on total imports so that the NEB is balanced rightly in terms of productions/imports-transformations-consumptions.

Measurement errors can be considered negligible (<5%) for most of the items covered since the respondents keep good record of their dealings. Processing errors can also be considered to be minimal (<10%). Some of the errors are mainly due to allocations of energy items to end users for certain energy items. The time lag between the reference date and publication is around six months. The NEB is published according to an advance release calendar. Revisions are done in subsequent publications.

National and international organisations such as the International Atomic Energy Agency (IAEA), the SADC Regional Energy Planning Network (REPN), the African Energy Commission (AFREC), COMESA and UNSD make much use of the NEB. . Important national end users are the Ministry of Energy and Public Utilities (MEPU) and the Ministry of Environment and Sustainable Development (MOESD) which are responsible for energy and environmental policies respectively. University students in Mauritius and abroad often make requests for the NEB as well as NGOs and various local organizations. The Central Electricity Board (CEB), besides being a supplier of data, also applies the NEB for energy modeling and forecasting.
No classification of energy products are used for the moment. Some energy products such as bitumen, lubricants, white spirits as well as sources such as solar are under consideration and will be included when all data are available.

Key elements	
Name of the statistics	National Energy Balance (NEB)
Background and purpose of the statistics	The NEB depicts the major energy flows in the country. The NEB also serves as a basis for obtaining most of the energy statistics.
Population, sample and data sources	A complete coverage is made for the electricity sector. Administrative data are obtained for others such as petroleum products. Some data are estimated from available proxies. No sample survey is carried out specifically for the NEB.
Main users	The main users are Ministry of Energy and Public Utilities (MEPU), University students and academics and Researchers .
Important contribution or issue addressed	Important contributions are obtained from the Central Electricity Board (CEB) which is the sole body responsible for electricity supply; the Independent Power Producers (IPPs), and the Petroleum Companies.
Other remarks	Further trainingis needed for instance on the use of classification of energy products, development of calorific values, energy modelling and specialised softwares such as the Energy Balance Studio (EBS) Software from IAEA.

1. General information

1.1. Name of the statistics/topic

The statistics/topic could either be a specific energy statistics (e.g. electricity production) or a topic within energy statistics (e.g. energy balances). For more information, please see Section III of the Instructions.

National Energy Balance (NEB)

1.2. History and purpose

State when the statistics were first published.

The currently available National Energy Balances (NEB) of Mauritius was officially published in in December 1999 in the Economic and Social Indicator series. The March 2000 issue of the volume 1 of the Digest of Energy Statistics (Now the Digest of Energy and Water Statistics – DEWS) subsequently included the NEB. The energy balances are however available for the year 1990 onwards.

Describe briefly the main purpose of producing the statistics and why it is relevant.

Most of the energy statistics can be derived from the NEB. Many information pertaining to energy production/imports, energy transformation and consumption are compiled in the NEB. The NEB allows analysis of energy requirements and demands. It is also used for energy modelling. The International Atomic Energy Agency (IAEA) recently used the NEB of Mauritius for training and capacity building purposes. The SADC Regional Energy Planning Network (REPN) has developed a software where data from the NEB is input. There are thus several national, regional and international organisations making use of the NEB of Mauritius.

1.3. Reference period

State the time period the data are collected for.

For the NEB, data are collected as from Jan to May each year. Reference period is from January to December on a yearly basis.

1.4. Frequency

Specify how often the statistics are disseminated (e.g. annually, monthly, quarterly, etc.). If the statistics are not produced at regular intervals, state at what times they have been produced in the past and the main reasons behind the irregularities.

The NEB is disseminated annually through two publications, namely the Economic and Social Indicators (ESI) and the Digest of Energy and Water Statistics (DEWS).

1.5. Dissemination

Describe how the statistics are published (e.g. printed publications, online publications, online databases, etc.). If applicable, include the web address to the main website of the statistics.

Printed copies of DEWS, as well as online versions, are available. For the ESI which is a summary, only online versions are available.
Link for ESI: http://www.gov.mu/portal/goc/cso/ei900/toc.htm
Link for Digest: http://www.gov.mu/portal/goc/cso/report/natacc/energy10/toc.htm

1.6. Regional level

State the lowest geographical level (e.g. administrative regions, municipalities, etc.) for which the statistics are made available to the public.

Only nationally aggregated statistics are published and available to the public.

1.7. Main users

Identify the key users of the data and the main applications. Include both internal and external users, and if possible try to distinguish between end users and others.

An important end user is the Ministry of Energy and Public Utilities (MEPU) and the Ministry of Environment and Sustainable Development (MOESD) which is responsible for energy and environmental policies respectively.

University students in Mauritius and abroad often make requests for the NEB as well as NGOs and various local organizations. The Central Electricity Board (CEB), besides being a supplier of data, also applies the NEB for energy modeling and forecasting. Among the external international organizations, there are the SADC, African Energy Commission (AFREC), COMESA and UNSD which regularly request data from the NEB.
Another important use of the NEB is the compilation of the national greenhouse gas inventory.

1.8. Responsible authority

Write the name of the institution and department/office with the main responsibility for disseminating the statistics (e.g.: Statistics Norway, Department of Economics, Energy and the Environment).

Statistics Mauritius

1.9. Legal basis and legally binding commitments

State the national legal basis for the data collection. Include a complete reference to the constitutional basis, and web address to an electronic version (e.g.: The Statistics Act of 16 June 1989 No. 54, §§2-2 and 2-3, http://www.ssb.no/english/about_ssb/statlaw/forskrift_en.html).

Statistics Act : http://www.gov.mu/portal/site/cso/menuitem.922af73ab9a84a9e965c062ca0208a0c/

If the data collection is not based on a legal basis, give a short description of other agreements or volunteer arrangements.

NA

If applicable, give reference to national and international commitments that are legally binding (e.g. EU statistical legal acts).

NA

1.10. Resource requirements

Specify how the production of the statistics is financed (e.g. over the ordinary budget, project based support, financial support from other institutions or organization). If applicable, state the contracting entity (e.g.: Ministry, EU Commission, OECD). A contracting entity is any entity which is ordering a survey or the compilation of a statistics, and paying for it

National budget (ordinary budget) earmarked for Statistics Mauritius for its routine business. No specific budget is available for NEB.

Specify the resource requirements for producing the statistics (e.g. man-labour days, number of workers involved in the statistical production process of the statistics/topic in question).

There has been no assessment per se of the man-labour days required specifically to produce the NEB. However, to produce the Energy and Water Statistics on an annual basis, including the NEB, the Staffing involved are as follows: 1 Statistician (part time/also looking at Environment Statistics); 1 Senior Statistical Officer (full time) and 1 Statistical Officer (full time).

1.11. International reporting

List any international organizations and names of reporting schemes that the statistics are reported to. If available, also include the website where the reported data are published (e.g. International Energy Agency, Monthly Oil Statistics, UNSD, etc.).

International organizations include: UNSD, SADC Regional Energy Planning Network (REPN) Annual, International Renewable Energy Agency (IRENA) and African Energy Commission (AFREC) and COMESA. The International Energy Agency (IEA) also contacted us to include Mauritius in its publications.

2. Statistical concepts, methodology, variables and classifications

2.1. Scope

Describe the scope of the statistics (e.g. the statistics cover supply and use of all energy products in Norway, classified according to International Standard Industrial Classification of All Economic Activities – ISIC).

The statistics cover supply and use of all energy products in the Republic of Mauritius. No classification of energy products are used for the moment. Some energy products such as bitumen, lubricants, white spirits as well as sources such as solar are under consideration and will be included when all data are available.

2.2. Definitions of main concepts and variables

Describe the main concepts (e.g.: territory principle, resident principle, net calorific value, gross calorific value).

The territorial principles are used. Local conversion factors are used for converting mass (tonnes) into energy units of toe. Work is underway to collect data on Net Calorific Values (NCVs).

Describe the main variables (e.g. how are the different energy products defined in the statistics? How are production, intermediate consumption, final consumption, transformation, feed stock, the energy sector, etc. defined?).

In the publications mentioned above (DEWS), a glossary is included to describe the terms used in the NEB such as Primary Energy Requirement and Final Energy Consumption.

2.3. Measurement units

Describe in what unit the data is collected (e.g. physical unit (m3, metric tons), monetary unit (basic prices, market prices)). Describe in what unit the data is presented. Describe if the calorific values are collected (e.g. on a net vs. gross basis) and how they are used.

If applicable, describe the density of the energy product(s) and the estimated *thermal efficiency coefficients* of different energy products and consumer groups or by appliance. Thermal efficiency coefficient indicates the share of the energy products which is actually usable for end consumption. Descriptions of density and thermal efficiency coefficient could alternatively be put in an annex.

Most of the energy products are collected in mass as metric tonnes. Some are obtained as volume in litres and electricity is in GWh. The conversion factors used are published in the publications mentioned above (DEWS) and are used to convert physical values into energy unit of tonnes or kilotonnes of oil equivalent (toe or ktoe). A NEB in units of Terajoule (TJ) has also been worked out since year 2010 using conversion factors available in the International Recommendation for Energy Statistics (IRES) from UNSD.

2.4. Classification scheme

Include references to relevant international and national standard classifications. If national, give a brief description of the standards. If available, include web addresses to the electronic version of the standards).

No standard classification schemes like the ISIC, CPC or SIEC has been used in collecting or compiling energy products. The use of SIEC classification is under consideration.

2.5. Data sources

Give an overview of the different data sources used in the collection and compilation of the statistics/topic (e.g. household survey, enterprise/establishment survey, administrative data/registers, foreign trade statistics, production statistics and other primary/secondary data sources).

Examples of administrative sources/registers are: business register for enterprises and establishments, population register, land register, housing and building registers, tax registers, international trade registers, etc.

For the supply side of the NEB, the main data sources are the Trade Statistics and the national agency responsible for importing and stocking fuels. For the transformation, especially into electricity, the main data sources are the power producers, both public and private. Petroleum companies which sell their products to their sales partners (e.g at pump stations) provide most of the data on final consumption.

Therefore most of the data are from administrative sources. Only the Independent Power Producers (IPP) are surveyed through a mail questionnaire.

2.6. Population

Describe the entire group of units which is the focus of the statistics (the population).

For the NEB, wherever a survey is carried out, all the units are covered in the country. The Reporting units and Observational units are normally identical and are the same, namely the establishments whose productions (reporting units) and consumptions (observational units) are surveyed. The group of units are as described in section 2.5 above.

Specify the following statistical units:

- Reporting unit
- Observational unit
- Analytical unit

Examples of different kind of statistical units include: enterprise, enterprise group, kind-of-activity unit (KAU), local unit, establishment, homogeneous unit of production.

In most cases the reporting unit, observational unit and analytical unit are identical, but there are examples where this is not the case. In electricity statistics, you may find that energy companies (the reporting unit) provide data about different consumers like the individual household or manufacturing company (the observational unit). The analytical unit may be a group of energy consumers, defined by the ISIC.

The sole public electricity supplier (Reporting unit), which manages the national grid with all the distributions and sales, also provides consumptions grouped by users (Observational units) – be it domestic, industrial or commercial etc based on predefined sales tariffs which are fixed by government. Another Reporting unit which are the Petroleum companies provide sales data which forms the basis for estimations of Final Energy Consumptions (Energy Demand).

2.7. Sampling frame and sample characteristics

Describe the type of *sampling frame* used in the collection and compilation of the statistics (e.g. list, area or multiple frames). A sampling frame is the source material or device from which a sample is drawn. Note that the sampling frame might differ from the population.

Since all entities are normally covered, no sampling frame per se is needed. However, a list of all respondents (establishments or companies) to be covered is always available and updated as appropriate.

For each survey(s) used for the compilation of the statistics, specify the *sampling design* (e.g. random, stratified, etc.). Describe the routines employed for updating the sample. Include information about the sample size, and discuss to what extent the sample covers the population (e.g. energy consumption in the sample compared to total energy use by the population).

Note that chapter *2.7: Sample frame and sample characteristics* may overlap with chapter *3.4: Grossing up procedures.*

No sampling design is used since all entities are covered. However, for some of the minor parts of the NEB, Housing and Population Census data are used for grossing up and modelling estimations.

2.8. Collection method

For each survey used for the compilation of the statistics/topic, describe how the data are collected (e.g. face-to-face, telephone, self-administered, paper and internet-based questionnaires, or administrative data and registers).

For the survey, the questionnaires are sent through emails. For the administrative reporting units, tables are attached in emails for updating.

2.9. Survey participation/response rate

For each survey used for the compilation of the statistics/topic, specify the average response rate, or refer to response rates for specific surveys conducted.

A 100 percent response is normally obtained for the survey after close follow up. This is facilitated by the small number of units available for survey (around 20).

3. The statistical production process

3.1. Data capture and storage

Describe how the data is captured and stored (e.g. if the respondent replies using Internet-based questionnaire, the received data are electronically transferred to the production database. Paper questionnaire responses are keyed manually to the production database).

Most of the data are obtained via emails. All the data collected are then entered into Excel for processing.

3.2. Data editing

Describe the regular routines employed for detecting and correcting errors. This may include:

- Manual routines for detecting and correcting errors
- Automatic error-detection (and correction)
- Micro- and macro editing procedures
- Data validation procedures
- Outlier identification
- Processes and sources used for quality controls

The editing is done through routine checks to look for outliers, inconsistencies, etc. For instance, while comparing the data with previous year's figures, it is sometimes found that there are sudden jumps or drops and the respondents are queried to clear any discrepancies.

3.3. Imputation

Describe the principles for imputation and the assumptions that these principles are based on.
Note that this chapter may overlap with chapter *3.2: Data editing* and chapter *5.2: Accuracy*

Not much imputation as such is made since nearly all the data are obtained quite reliably from the data sources.

Some imputations that are sometimes required, involves merging two or more data sets to get a single figure. Therefore, two or more data sources have to be consistently combined, to have productions and/or consumptions. The most important fuel requiring such imputations is bagasse which is used to produce electricity. The estimations require that we use power plant efficiencies, in terms of electricity produced per unit of fuel and where imputations need to done based on age of plant. Other sources of information are therefore required to confirm any values obtained.

3.4. Grossing up procedures

Describe how the population is divided into strata and what statistical models the estimations in the strata are based on. Describe how sub-indices are combined into aggregate indices and how uncertainty is estimated.

Since Mauritius is a small country, the whole population is normally covered for the NEB. Simple ratios are used to produce indicators and indices. No uncertainty assessment are deemed necessary for the current exercise, though in the future, such assessments can be looked into.

3.5. Analytical methods

Give a description of any analytical methods used to adjust the data (e.g.: seasonal adjustment and temperature adjustment). A more detailed description of the analytical method can also be included as an annex.

Adjustments are mostly needed to allocate consumption of fuels to different economic sectors. This is so because all respondents do not report in the same format for sectoral uses. Adjustment are based on total imports so that the NEB is balanced rightly in terms of productions/imports-transformations-consumptions.

4. Dissemination

4.1. Publications and additional documentation

Describe the form of dissemination of the statistics/topics in question (e.g. printed publications, website, etc.). Please provide relevant website link(s) if available.

Printed copies of DEWS, as well as online versions, are available. For the ESI which is a summary, only online versions are available. The publications are annual.
Link for ESI: http://www.gov.mu/portal/goc/cso/ei900/toc.htm
Link for Digest: http://www.gov.mu/portal/goc/cso/report/natacc/energy10/toc.htm

Give a complete reference to publicly available statistics databases where data from the statistics can be extracted. Include web addresses if available online.

Databases per se are not available for extracting the NEB. The NEB is ready for use from the above publications.

Indicate whether you charge users for access to the statistics at any level of aggregation.

For the online versions, no charge is required. Paper copies are sold, except for certain categories of users such as government officials.

4.2. Revisions

Describe the current revision policies. E.g.: Is historical data revised when new methodology, new definitions, new classifications etc. are taken into use? Is the data continuously revised, or is the data revised at certain points in times (e.g. every third year, annually, etc.)?

Data are revised annually if previous data used are provisional or if a revision is carried out by data providers. Revisions due to methodological changes are on ad-hoc basis, depending on the necessity for revision.

If applicable, describe any major conceptual or methodological revisions that have been carried out for this statistic/topic in the past.

The method to estimate bagasse use has been updated to take into account the efficiencies of individual power plants in electricity productions. Some conceptual changes were made to split the energy items into renewable/non renewable and petroleum/others.

4.3. Microdata

Describe how microdata are stored.

Microdata are stored in Excel spreadsheets for internal use only.

Specify if microdata are available for scientific and/or public use. If so, describe under what conditions these are made available.

Requests for micro data have seldom been received for the NEB. However, microdata (anonimised) from general surveys (not energy ones) are available after proper official requests and oath for specific uses. Microdata such as households energy use which is available in aggregated form in NEB can be obtained from household surveys for detailed analysis.

4.4. Confidentiality

Describe the legal authority that regulates confidentiality, and what restrictions are applied to the publication of the statistics.

The Statistics Act 2000 regulates confidentiality and only aggregated data are disseminated.

Describe the criteria used to suppress sensitive data in statistical tables (cell suppression).

No cell suppression is necessary as data are already aggregated prior to publication.

Describe how confidential data are handled.

Data are kept within the Energy Statistics Unit in soft copies.

Describe any confidentiality standards that go beyond what is legally required.

Not applicable.

5. Quality

5.1. Relevance

State to which degree the statistical information meet the real needs of clients/users.

The NEB is used mainly by the line Ministry for energy policies. It appears that the content of the NEB satisfies the needs of all users since no comments have been obtained, especially from a user survey carried out a few years ago.

5.2. Accuracy

State the closeness of computations or estimates to the exact or true values that the statistics were intended to measure.

Since an almost complete coverage is made for most of the energy items, the accuracy of the values in the NEB can be considered high.

Measurement and processing errors

Discuss the measurement and processing errors that are relevant for the statistics. Try as far as possible to give an estimation of the size and scope of the errors.

Measurement errors can be considered negligible for most of the items covered (<5%) since the respondents keep good record of their dealings. Processing errors can also be considered to be minimal (<10%).Some of the errors are mainly due to allocations of energy items to end users for certain energy items. For instance the use of fuel oil by the different manufacturing industries might not be exact as the data suppliers (petroleum companies) do not keep detailed database by end users.

Non-response errors

State the size of the unit non-response and the item non-response, distributed by important variables in the population (e.g. region, industry). Consider if the non-response errors are systematic, and if so, describe the methods used to correct it. Indicate whether the effects of correcting non-response errors on the results have been analysed, and, if so, describe them.

Non response is not an important issue in the NEB but late responses are. Some item non response do occur occasionally but they are minimised by regular contacts with respondents.

Sampling errors

Discuss the size of the sampling errors. Compare the population and sample with regards to important properties (e.g. coefficient of variance).

Since near complete coverage is made, there has not been any need to compute sampling errors.

Other sources of error

Discuss other sources of errors that might be relevant for the statistics. E.g.: Model assumption errors, coverage errors

There might be some model assumption errors, such as while estimating use of renewable energy (biomass) and while allocation energy use by end users. These errors are minimised by cross checking results with different sources of information relevant to the item (benchmarking).

5.3. Timeliness and punctuality

Specify the time between the end of the reference period and publication.
If the statistics are published both as preliminary and final figures, specify the time between publication of preliminary and final figures. You should also point out whether the publication date is set according to certain rules (e.g. advance release calendar, a specific day or prior to other publications).

The time lag between the reference date and the publication is around six months. We publish according to a advance release calendar. In the first instance, we publish in the ESI then in the Digest (see 4.1 above). If ever there is any revision, it is done in the Digest and in the next year's issues of the publications.

Point out if there have been any major discrepancies between the planned publication date and the actual publication date in recent years. If so, state the length of this discrepancy and its cause.

No discrepancy has occurred in recent years.

5.4. Accessibility

Describe how easily accessible the statistics are. In particular, is there an advance release calendar to inform the users about when and where the data will be available and how to access them?

Are metadata and other user support services easily available? Are there particular groups that don't have access to the published statistics (e.g.: visually disadvantaged)?

As pointed out in section 4 above the NEB is easily available on line. There is an advance release calendar which is available on the website to inform the users about when the data will be available. Metadata and other user support services are not currently available .Support is provided to access data by the publication unit. Confidential data on individual establishments are not made available to any third party. No request has yet been made for micro data.

5.5. Comparability

Discuss the comparability of the statistics over time, geographical areas and other domains.

Comparability over time

Discuss comparability over time and include information about whether there have been any breaks in the time series of the statistics and why. Also describe any major changes in the statistical methodology that may have had an impact on comparability over time.

The data is consistent over time and there has not been any impact on comparability.

Comparability over region

Discuss comparability over geographical areas, and include information about whether the statistics are comparable to relevant statistics published by other countries and/or international organisations.

There is no geographical delineation at the local level for the NEB. It is widely used by regional and international organisations like the International Atomic Energy Agency (IAEA). Further harmonisation according to international practice is underway.

Comparability over other domains

Discuss comparability over domains, and include information about whether the statistics are comparable between different industries, different types of households etc.

Though there has not been any disaggregation by detailed industry groups or household types, the data in the NEB is comparable over domains.

5.6. Coherence and consistency

Discuss the coherence/consistency between preliminary and final figures.

The data is most of the time coherent and consistent between preliminary and final results, except in the unlikely and rare cases of revision from the data supplier.

Discuss the coherence/consistency between monthly, quarterly or yearly statistics within the same subject area. Can the results of different frequencies for the same reference period be combined in a reliable manner?

Though data more disaggregated than annual (monthly or quarterly) are not published, we obtain coherent results most of the time. For inconsistencies/incoherence, the data suppliers are contacted.

Discuss the coherence/consistency with other related statistics (also those produced by other institutions/organisations on the same subject).

Other organisations seldom publish the same type of data as in the NEB. Those that are published, e.g electricity production and consumptions in the annual report of the sole utility authority, are compared for consistency/coherence and any discrepancy is sorted out.

6. Future plans

Are there any current or emerging issues that will need to be addressed in the future? These could include gaps in collection, timeliness issues, data quality concerns, funding risks, confidentiality concerns, simplifications to reduce respondents' burden etc.?

It is envisaged to code the data used in the compilation of the NEB according to the Standard International Energy Classification (SIEC Additional and emerging energy items will be incorporated, such as solar.

More data need to be collected to account for the energy content of fuels in terms of the calorific values. This would provide more accurate and detailed data for uses such as for compiling greenhouse gas (GHG) inventories of emissions from energy sector. Data suppliers would be provided with assistance to keep a good database of fuels and customers.

Additional tools and sofwares is envisaged to be used for the NEB, such as the IAEA Energy Balance Software.

Annexes

SEE FOLDER Annex to Template for questionnaires

Illustrations and flowcharts

Illustrations and flowcharts are useful to summarize information and to get a better overview of the statistical production process. Illustrations and flowcharts can either be places in annexes or be included under relevant paragraphs in the template.

E.g.:

- A conceptual flowchart which illustrates the flow of data in the production of the statistics.
- A flowchart which illustrates the main tasks in the production process and the dependency between them.

Time schedule

Include a time schedule for the different phases of the statistical production process. The statistical production process *may* be divided into the following phases. Phase 1-3 may only be relevant for when a new statistics/survey is set up.

1. **Clarify needs** (e.g. map users needs, identify data sources)
2. **Plan and design** (e.g. plan and design population, sample size, how to analyze and edit data)
3. **Build** (e.g. build and maintain production system, test production system)
4. **Collect** (e.g. Establish a frame, draw the sample, collect data)
5. **Edit** (e.g. identify and code micro data, edit data, imputation)
6. **Analyse** (e.g. quality evaluation, interpret, analyse)
7. **Disseminate** (e.g. publish data, user contact)

Questionnaires

Include the complete questionnaire(s)/survey form(s) used

Example of publication tables

Include an example of a typical table published for the statistics. Include web addresses if available online.

Detailed description on analytical methods

If relevant, a detailed description of analytical methods used in the statistical production (like seasonal adjustment, temperature adjustment etc.) may be described in an annex. A short description can also be included in chapter 3.5: Analytical methods or under other suitable chapters.

Statistics Mauritius

ENERGY AND WATER UNIT

Sales of Petroleum Products 2011

Company: ……. **Quarter 1**

Unit: Metric Tons

	Mogas	Gas Oil	Kerosene	Fuel Oil	LPG
Stock					
Opening stock					
Imports					
Total Stock					
Sales					
A. Internal Sales					
(a) Retail sales					
(i) Filling Stations					
LPG for motor vehicles					
Other					
(ii) Other Resellers					
(b) Bus Industry					
(c) Other Transport Industry					
(d) Government					
(e) C.E.B.					
(f) Other Parastatal bodies					
(g) Manufacturing Industries					
(i) Sugar industry					
(ii) Tea industry					
(iii) EPZ					
(iv) Bakery					
(v) Other manufacturing ind.					
(h) Hotels and Restaurants					
(i) other community/social services					
(j) Agricuture (Poultry breeding, etc)					
(k) Rodrigues/outer islands					
(i) Local Bunkers					
(j) Other					
Total Internal Sales					
B. External Sales					
(a) Jet fuel					
(b) Bunkers					
Total External Sales					
Total Sales					
Closing Stock					

Contact person: …….

Title: …… Phone no. ……. Signature: …….

Address…….. Fax no. ……. Date: ……..

…… E-mail…….

……

Energy commodity balance

Description

Energy balance presents an overview of the energy flows from primary requirement, transformation to final Consumption for a specific period. Quantities are expressed in a single accounting unit for ease of comparison and aggregation The ton of oil equivalent (toe), already established in the unit. Conversation factors for each energy source are given at annex.

Source

Flow	Coal	Gasolene	Diesel	Aviation Fuel	Kerosene	Fuel Oil	LPG	Fuelwood	Charcoal	Hydro	Wind	Bagasse	Electricity
Local production	-	-	-	-	-	-	-	estimate	-	Generation CEB + Annual Energy survey	Generation CEB	Estimed from Annual Energy survey figures	-
Imports	Trade Unit							-	-	-	-	-	-
Re-exports and bunkering	-	-	Bunkering fig from STC	Airports of Mauritius	-	Bunkering fig from STC	-	-	-	-	-	-	-
Stock change / Statistical error	Primary energy req - imports							-	-	-	-	-	-
Total Primary Energy Requirement	**Estimated from imports, Transformation and Final Consumption**							**estimate**	**-**	**CEB + Annual Energy survey**	**CEB**	**Estimated from Annual Energy survey figures**	-
Public electricity generation plant	-	-	Oil consumption CEB	-	Oil consumption CEB		-	-	-	Generation CEB		-	Genration CEB
Autoproducer plants	Annual Energy Survey	-	Annual Energy Survey	-	-	-	-	-	-	Annual Energy Survey	-	Annual Energy Survey	Generation CEB + Annual Energy survey + estimate
Other transformation	-	-	-	-	-	-	-	-	-	-	-	-	CEB units used on work
Own use	-	-	-	-	-	-	-	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-	-	-	-	-	CEB units sent out sales
Total Final Consumption	**Estimated mainly from production of bagasse, sales of electricity, coal and petroleum products**												
Manufacturing sector	Sales Petroleum Companies	-	Sales Petroleum Companies	-	-	Sales Petroleum Companies	estimate		-	-	-	estimate	sales CEB
Transport sector	-	sales Petroleum Companies		Airports of Mauritius	-	-	sales Petroleum Companies	-	-	-	-	-	-
Commercial and distributive trade sector	-	-	-	-	-	-	-	-	-	-	-	-	-
Household	-	-	-	-	sales Petroleum Companies	-	estimate	estimate	estimate	-	-	-	Sales CEB
Agriculture	-	-	estimate	-	-	-	-	-	-	-	-	-	-
Other													

Statistics Mauritius

ANNUAL SUGAR INDUSTRY ENERGY & WATER SURVEY - 2011

1. GENERAL

1.1 Name of establishment: ……..……

1.2 Address of establishment:: ……..……
……..……
……..……

1.3 Crushing period From: …… To: ……...…..

1.4	No. of crushing days	……	
1.5	Total cane crushed	……	tonnes
1.6	Total crushing hours	……	hrs
1.7	Total hours of factory operation, including "liquidation" *(processing for the last batch of sugar)* and burning of remaining bagasse	……	hrs

2. STEAM

2.1 High pressure steam

(a)	Steam produced per hour	……..	kg
(b)	Operating pressure	……..	Bar
(c)	Operating superheated temperature	……..	° C
(d)	Specific steam consumption per tonne of cane	……..	kg/hr
(e)	Maximum steam generated/hour from coal		tonne/hr
(f)	Maximum steam generated/hour from bagasse		tonne/hr

2.2 Low pressure steam to sugar mill

(a)	Operating pressure	……..	Bar
(b)	Low pressure steam temperature	……..	° C
(c)	Steam exported to sugar mill	……	tonnes
(d)	Condensate return from sugar mill	……	tonnes

3. BOILER CHARACTERISTICS [1]

3.1 Basic Technology

……

……

3.2 Configuration/Technology

……..

……

3.3 Estimate of Emission Factors (Kg/TJ energy input)

	CO_2	CO	CH_4	NOx	N_2O	NMVOCs	
(a) Emission Factor when using coal							Kg/TJ
(b) Emission Factor when using bagasse							Kg/TJ
(c) Other fuel, specify: …….							Kg/TJ

[1] *Please refer to Tables 1 & 2 of annex for identifying basic technology and configuration/technology and for estimating plant or technology specific emission factors. Additional notes can be given below.*

Notes *(*if any*):* ……..……

……..……

……..……

……..……

……..……

ANNUAL SUGAR INDUSTRY ENERGY & WATER SURVEY - 2011 (cont'd)

4 ELECTRICITY

4.1 Plant capacity

4.11 Hydro

(a) Installed ..... MW

(b) Effective ..... MW

4.12 Thermal

(a) Total installed ..... MW

(1) Back pressure TA set ..... *MW*

(2) Condensing / pass-out TA set ..... *MW*

(3) Fully condensing TA set ..... *MW*

(b) Total effective ..... MW

(1) Back pressure TA set ..... *MW*

(2) Condensing / pass-out TA set ..... *MW*

(3) Fully condensing TA set ..... *MW*

(c) Type of steam turbine used

(1) Back pressure TA set

(i) Steam consumption per kWh generated ..... kg

(ii) Operating pressure ..... bar

(iii) Operating temperature ..... ° C

(2) Condensing / pass-out turbine

(i) Steam consumption per kWh generated ..... kg

(ii) Volume of steam extracted under normal condition of operation / hr. ..... tonnes

(iii) Operating pressure ..... bar

(iv) Operating temperature ..... ° C

(3) Fully condensing steam turbine

(i) Steam consumption per kWh generated ..... kg

(ii) Operating pressure ..... bar

(iii) Operating temperature ..... ° C

4.2 Electricity production : ..... kWh

(a) Thermal ..... kWh

(1) Bagasse ..... *kWh*

of which: export to CEB ..... *kWh*

export to sugar mill ..... *kWh*

own consumption ..... *kWh*

(2) Diesel ..... *kWh*

(3) Coal ..... *kWh*

of which: export to CEB ..... *kWh*

export to sugar mill ..... *kWh*

own consumption ..... *kWh*

(b) Hydro ..... kWh

4.3 Imports of electricity from CEB: ..... kWh

(a) Tariff 311 ..... kWh

(b) Tariff 313 ..... kWh

(c) Tariff 411 ..... kWh

(d) Tariff 421 ..... kWh

(e) Tariff 412 ..... kWh

(f) Tariff 422 ..... kWh

(g) Other tariff (*specify*)..... ..... kWh

4.4 Total consumption (imports + own production) ..... kWh

(a) Total units for factory use ..... kWh

(b) for offices ..... kWh

(c) for workshop ..... kWh

(d) for other purpose (*please specify*) ..... kWh

(e) *(1)* .... kWh

(2) .... kWh

ANNUAL SUGAR INDUSTRY ENERGY & WATER SURVEY - 2011 (cont'd)

5 BAGASSE

5.1	Opening stock	…… tonne
5.2	Bagasse production	…… tonne
5.3	Bagasse imported for warming up of boiler	…… tonne
5.5	Bagasse imported to generate energy	…… tonne
5.5	Export	…… tonne
	(a) to Sugar factories	…….. tonne
	(b) to Tea industry	…….. tonne
	(c) for feeding animals	…….. tonne
	(d) to Flower industry	…….. tonne
	(e) Other purpose (*please specify*)	…….. tonne
	(1) ..…… ……..	*tonne*
	(2) ..…… ……..	*tonne*
	(3) ..…… ……..	*tonne*
5.6	Bagasse consumption for steam / electricity production	…… tonne/hr
5.7	Average net calorific value (NCV)	…… terajoule/tonne
5.8	Bagasse used for electricity production	…… tonne
	(a) for export to CEB	…….. tonne
	(b) for factory production	…….. tonne
5.9	Closing stock	…… tonne
5.10	Average bagasse moisture content	…… %

6 DIESEL

6.1	Diesel consumption for steam / electricity production	…… tonne/hr
6.2	Diesel used for electricity production	…… tonne
6.3	Average net calorific value (NCV)	…… terajoule/tonne

7 COAL

7.1	(a) Bagasse capacity / coal firing	…… tonne/hr
	(b) Operating pressure	…… bar
	(c) Operating temperature	…… ° C
	(d) Average net calorific value (NCV)	…… terajoule/tonne
7.2	Coal consumption for steam / electricity production	…… tonne/hr
7.3	Coal used for electricity production	…… tonne
7.4	Energy exported per tonne of coal	…… kWh

8 WATER

8.1	Water consumption (m^3)	
	(a) for factory use	…… m^3
	(b) for irrigation	…… m^3
	(c) for other purpose (please specify) ……..	…… m^3

Name of contact person :…… Tel. No. :…….

Name of officer filling form :…… Tel. No. :…….

E-mail: ……..

Date : ……. Signature : ……

Statistics Mauritius

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Annex for Question 3 - Boiler Characteristics

Please refer to Table 1 & 2 to estimate plant specific emission factors.

Table 1 - Utility Boiler Source Performance

Basic Technology	Configuration	Emission Factors (Kg/TJ energy input)					
		CO_2	CO	CH_4	NOx	N_2O	NMVOCs
Coal							
Pulverised Bituminous Combusion	Dry Bottom, wall fired	NAV*	9	0.7	3.8	1.6	NAV*
	Dry Bottom, tangentially fired	NAV*	9	0.7	2.5	0.5	NAV*
	Wet Bottom	NAV*	9	0.9	5.9	1.6	NAV*
Bituminous Spreader Stokers	With and without re-injection	NAV*	87	1	2.4	1.6	NAV*
Bituminous Fluidished Bed Combussor	Circulating Bed	NAV*	310	1	68	96	NAV*
	Bubbling Bed	NAV*	310	1	270	96	NAV*
Bituminous Cyclone Furnace		NAV*	9	0.2	590	1.6	NAV*
Anthracite Stokers		NAV*	10	NAV*	160	NAV*	NAV*
Anthracite Fluidised Bed Combustors		NAV*	5.2	NAV*	31	NAV*	NAV*
Anthracite Pulverised Coal Boilers		NAV*	310	NAV*	NAV*	NAV*	NAV*
Pulverised Lignite Combusion	Dry Bottom, tangentially fired	NAV*	NAV*	NAV*	130	NAV*	NAV*
	Dry Bottom , wall fired	NAV*	45	NAV*	200	NAV*	NAV*
Lignite Cyclone Furnace		NAV*	NAV*	NAV*	220	NAV*	NAV*
Lignite Spreader Stokers		NAV*	NAV*	NAV*	100	NAV*	NAV*
Lignite Atmospheric Fluidised Bed		NAV*	2.8	NAV*	63	42	NAV*
Oil							
Residual FuelOil/Shale Oil	Normal Firing	NAV*	15	0.9	200	0.3	NAV*
	Tangential Firing	NAV*	15	0.9	130	0.3	NAV*
Distillate Fuel Oil	Normal Firing	NAV*	16	0.9	220	0.4	NAV*
	Tangential Firing	NAV*	16	0.9	140	0.4	NAV*
Distillate Fuel Gaseo		NAV*	21	NAV*	300	NAV*	NAV*
Large Diesel Fuel Engines >600hp (447kW)		NAV*	350	4	1300	NAV*	NAV*

** NAV: Standard Not Available*

Table 2 - Utility Emission Controls Performance

Technology	Efficiency Loss[(a)]	CO Reduction	CH_4 Reduction	NO_X Reduction	N_2O Reduction [(c)]	$NMVOC_S$ Reduction [(d)]	Date Available[(b)]
	%	%	%	%	%	%	
Low Excess Air	-0.5	+	+	15	NAV*	NAV*	1970
Overfire (OFA)-Coal	0.5	+	+	25	NAV*	NAV*	1970
OFA-Gas	1.25	+	+	40	NAV*	NAV*	1970
OFA-Oil	0.5	+	+	30	NAV*	NAV*	1970
Low No_x Burner(LNB)-Coal	0.25	+	+	35	NAV*	NAV*	1980
LNB- Tangentially Fired	0.25	+	+	35	NAV*	NAV*	1980
LNB-Oil	0.25	+	+	35	NAV*	NAV*	1980
LNB-Gas	0.25	+	+	50	NAV*	NAV*	1980
Cyclone Combustion Modification	0.5	NAV*	NAV*	40	NAV*	NAV*	1990
Ammonia Injection	0.5	+	+	60	NAV*	NAV*	1985
Selective Catalytic Reduction (SCR)-Coal	1	8	+	80	NAV*	NAV*	1985
SCR-Oil,AFBC	1	8	+	80	NAV*	NAV*	1985
SCR-Gas	1	8	+	80	NAV*	NAV*	1985
Water Injection- Gas Turbine simple cycle	1	+	+	70	NAV*	NAV*	1975
SCR- Gas Turbine	1	8	+	80	60	NAV	1985
Retrofit LEA	-0.5	+	+	15	NAV*	NAV*	1970
Retrofit OFA-Coal	0.5	+	+	25	NAV*	NAV*	1970
Retrofit OFA-Gas	1.25	+	+	40	NAV*	NAV*	1970
Retrofit OFA- Oil	0.5	+	+	30	NAV*	NAV*	1970
Retrofit LNB-Coal	0.25	+	+	35	NAV*	NAV*	1980
Retrofit LNB-Oil	0.25	+	+	35	NAV*	NAV*	1980
Retrofit LNB-Gas	0.25	+	+	50	NAV*	NAV*	1980
Burners Out of Service	0.5	+	+	30	NAV*	NAV*	1975

(a) Efficiency loss as a percentage of end - user energy (ratio of energy output to energy input for each technology) due to the addition of an emission control technology.Negative loss indicates an efficiency improvement.
(b) Date technology is assumed to be Commercially available
(c) and (d) NAV : Insert the available reduction efficiency if available
Units for emission factors are usually estimated on a unit of gas per unit of fuel or energy value of fuel, e.g Terajoule (TJ) basis, e.g - gramme/ kg of gas per ton fuel input (g/t)
NCV of fuel is the Net Calorific Value

CO_2:Carbon Dioxide — CO: Carbon Monoxide — ** NAV: Standard Not Available*

CH_4: Methane — NOx: Oxide of Nitrogen

N_2O: Nitrous Oxide — NMVOCs: Non-Methane Volatile Organic Compounds

Note : Technology generally affects emissions, therefore, the presence of any of the controls in the technologies mentioned above may alter the emissions and should be taken into account while estimating emission factors. A"+" indicates negligible reduction

Source : Radian, 1990

Additional information/suggestion may be written beneath:

……

……

……

Note: Table 1 is to be used as reference and as a starting point for estimating plant specific emission factors. Once estimates have been worked out, please insert them into Question 3 of the survey form.