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Preface

The project of NAMEA-energy was financially founded by Eurostat for the time between January-September 2008. Due to administrative problems the final date has been postponed until 28th of November. The partner has also been changed; Energy Centre had been engaged in the cooperation in the project.

The main objective of the project NAMEA-energy was to compile energy accounts in compliance with the EU NAMEA-approach.

This report summarises the work done in the field of environmental accounts. In the scope of this project it was the first possibility emerged in Hungary to elaborate the methodology and compile data for the energy part of the NAMEA-system. All data and methodological remarks necessary to mention are presented in this report.
1. Introduction

Within the framework of the Grant Agreement Hungarian Central Statistical Office contracted the Energy Centre Public Benefit Company (Energy Centre Pbc.) to carry out supplementary developments on national energy database and information system and query data on energy use for the purpose of compiling the Hungarian NAMEA-tables on energy use.

The main objective of the project was to compile the first version of standard NAMEA-tables on energy use for the year 2006 on the base of the former classification system: TEÁOR’03 (NACE rev1).

The most important aim we tried to achieve was to meet EU-requirements, and to perform essential methodological improvements in energy statistics.

Nevertheless the long term objective of our work is equal to the main objective of compilation of NAMEA-tables: serving a comprehensive analysing tool for policy making processes.
2. Documentation of data collection system on energy use in Hungary

2.1. Main objectives, content

Energy Centre Pbc. maintains a comprehensive range of data on energy industry in Hungary, and is obliged in developing a comprehensive, up-to-date statistical system. In doing this energy statistics should adhere to certain obligations peculiar to them.

One of the main commitments of Energy Centre Pbc. is to compile official statistics and as part of it, it is essential to provide producers and consumers with indispensable information in order to increase their effectiveness and environmentally sound consumption. Energy Centre undertakes researches and analysis also on the changing state of Hungarian energy industry.

The development and management of official statistical system is with the object of assuring legal framework and fulfilling the Hungarian Republic’s national and international commitments to supply data on energy production and consumption at national and international level as well.

The present statistical system developed by Energy Centre Pbc. is based on three subsystems, as follows.

- energy supply,
- energy consumption,
- other areas of energy management.

The subsystem of energy supply includes the data collection processing and analyses of input data (inland production and import), from the main suppliers (i.e.: coal mining, production of carbonhydrogens, oil processing, electricity and heat production, external trade of energy resources), data on stocks of main producers and users and also data on products of oil processing.

The subsystem of energy consumption covers the compilation of energy balance on monthly, quarterly and annual base divided by energy sources or by final destination and also the compilation of data on energy use serves the development of prognosis to determine presumable energy demand at country-level. The analysis of this data set by branches and
by user-groups allows the determination of energy efficiency and energy saving potential for the whole country as well.

2.2. Data collection system

In Hungary the statistical data collection on energy use is included in the National Statistical Data Collection Programme, and has been executed by the governing ministry as a part of industrial statistics. State institutions participating National Data Collection Programme (OSAP) regularly examine their statistical data collection system, and present all proposals necessary to improve the statistical system on energy in order to follow any changes or movements in energy sector. These proposals are forwarded to the National Statistical Council, which is responsible for developing the structure of data collection system of the forthcoming year. The execution of OSAP is legally binding and is regulated by governmental decree year by year.

There are monthly, quarterly and annual data collections with the aim of providing an overall picture on energy suppliers’ activities as follows.

- Monthly data collection on production, export, import and on the volume of stocks by sources,
- Quarterly data collection on energy consumption and on the stock of users by energy resources and by groups of users,
- Annual data collection on energy balance.

Table 1 presents the denomination of each questionnaire on the Hungarian energy statistical system operated by Energy Centre Pbc., and figure 1 shows the structure of the system for guidance.
<table>
<thead>
<tr>
<th>Registration number (OSAP)</th>
<th>Denomination of data collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1321</td>
<td>Energy balance</td>
</tr>
<tr>
<td></td>
<td>Industry</td>
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<tr>
<td></td>
<td>Energy production</td>
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<tr>
<td>1322</td>
<td>Balance on the consumption of energy resources</td>
</tr>
<tr>
<td>1323</td>
<td>Balance on the sale of energy resources</td>
</tr>
<tr>
<td>1324</td>
<td>Report on the producers and providers of district heating</td>
</tr>
<tr>
<td>1329</td>
<td>ENERGINFO Operative Energy Statistics</td>
</tr>
<tr>
<td></td>
<td>• Monthly oil statistics (MOS)</td>
</tr>
<tr>
<td></td>
<td>• External trade of energy resources</td>
</tr>
<tr>
<td></td>
<td>• Operative report on energy management</td>
</tr>
<tr>
<td></td>
<td>• Production of coal, briquettes, coke</td>
</tr>
<tr>
<td></td>
<td>• Data on the production and external trade of electricity</td>
</tr>
<tr>
<td></td>
<td>• Data on the production of natural gas</td>
</tr>
<tr>
<td>1335</td>
<td>Questionnaire on energy consumption</td>
</tr>
<tr>
<td></td>
<td>1335/a Wholesale and retail trade health care, education, services and other suppliers</td>
</tr>
<tr>
<td></td>
<td>1335/b Agriculture, hunting and forestry</td>
</tr>
<tr>
<td></td>
<td>1335/c Transport and storage</td>
</tr>
<tr>
<td>1660</td>
<td>Data on public lighting</td>
</tr>
<tr>
<td>2067</td>
<td>Data on investments in production in the sector of oil processing</td>
</tr>
<tr>
<td>2068</td>
<td>Data on the external trade price of hard coal</td>
</tr>
</tbody>
</table>
Figure 1. The data processing method of Energy statistics

Frequency

Weekly, monthly
Monthly
Quarterly
Bi-annual
Annual supplying of data

Supplying of data, the registry and regulation number of National Programme for Statistical Data Collection (NPSDC)

NPSDC 1329 ENERGY INFO Operative collection of data in energetic
NPSDC 1322 Consumption balance of Energy sources
NPSDC 1323 Sales balance of Energy sources
NPSDC 2068 Data submission about import price of hard coal
NPSDC 1321 Energy balance Energy sector Industrial sector
NPSDC 1335 Energy-use report
NPSDC 1324 District heating statistics
NPSDC 1660 Public lighting statistics

The place of data utilization

Fuel price information
Simplified national energy balance
Balances of Energy sources (production, export, import, stock changes)

National energy balance, balances by sectors (production, import, export, stock changes, transformation, losses)

User

European Union
KHEM Ministry of Transport Telecommunication and Energy
KvVM Ministry of Environment and Water Energy Office
International data submission IEA, EUROSTAT, UN EEC
Hungarian Central Statistical Office
Other employers, international projects, forecast creating
2.3. **Dissemination of data**

The dissemination of data should be based on the following guiding principles:

- objectiveness, impartiality and competency
- wide-ranging publicity and transparency of data (ensuring simultaneously the protection of individual data)
- synchronous information dissemination.

Regular publications of Energy Centre Pbc. are the followings.

- Statistical Yearbook of Energy Management
- First Releases, published monthly
- First Releases, published quarterly
- Statistical Yearbook on District Heating,

Besides the Energy Centre regularly publish data tables on energy statistics in different HCSO publications.

2.4. **History**

In the last decades the data collection system on energy supply and use has been reorganised strictly according to the provisions of the national Act XLVI of 1993 on statistics of Hungary.

In the ’70s two statistical systems in parallel was in operation:

- one of them was operated by Hungarian Central Statistical Office, as a part of material statistical system.
- the other developed by the predecessor of Ministry of Transport, Telecommunication and Energy, governing at present.

The Hungarian Central Statistical Office has been continuously ceased any statistical activities in the field of energy statistics from 1986 onwards, and delegated the authority to the predecessor Ministry of Transport Telecommunication and Energy, governing at present.
2.5 Methodology and quality

The data collection on energy statistics in Hungary is based on the following national legal provisions.

- Act LXV of 1995 on State and Official Secrets
- Act LXIII of 1992 on Protection of personal data and disclosure of data of public interest
- Act LXIII of 1992 on Statistics
- Decree No. 20//2004. (II. 27.) GKM on International data supply on oil and oil products
- Government Decree No.229/2006 (XI. 20.) on Modified and new data collection under the 2007 National Statistical Data Collection Programme
- Government Decree No.300/2007 (XI. 9.) on Modified and new data collection under the 2008 National Statistical Data Collection Programme

In Hungary several institutions, organisations and enterprises are involved in the system of energy statistics, some of them are data supplier, others are users.

Target population for data collections are
- energy producers, suppliers
- energy users
- energy transformers,
- organisations dealing with internal and external trade,
- organisations dealing with transporting energy,
- organisations dealing with tankers
- energy suppliers.

As for the survey framework, an earlier version is used from the Business Register, operated by HCSO.

Observation units for data collections are economic enterprises. Data are supplied on a full-scope basis using self-administered questionnaires (questionnaire surveys, by mail or online).

Data input is performed through simultaneous controlling and correction during recording. In the course of data processing, further checks are also carried out, e.g. comparing national and regional data with the same data from earlier periods, checking outliers through calculating specific indices, cross checking with other statistical domains.
Energy statistics are widely read by state institutions, researchers, universities and non-profit organizations as well.

Observations of national energy supply require evaluation and analysis of source data alike:

- data on supply areas (coal mining, production of hydrocarbons, oil processing, electricity and heat production, international trade of energy resources),
- data on the volume of stocks of the main producers and users and
- data on oil products.

Data dissemination and retrieval involves

- compilation of energy balance (on monthly, quarterly, annual base) by users and by type of end use
- compilation and analysis of data on energy consumption, in order to predict probable energy needs,
- compilation and analyses of data on energy consumption and management by economic sectors and users in order to determine the potential of energy efficiency and energy savings

Quality requirements have to meet four essential aspects:

- completeness: examination has to cover all available data sources;
- consistency: calculation has to be made according to equal aspects ensuring comparability;
- transparency: calculation process has to be understandable for everyone;
- accuracy: results have to converge to real values as much as possible.

Data base management system in operation at present allows different data queries by certain point of views.
2.6. Data collection

2.6.1 Energy production

Data are supplied on a full-scope basis using self-administered questionnaires (questionnaire surveys, by mail or online) in the framework of National Data Collection Programme (No. 1321)

It involves all firms if they

- produce and/or
- transform and/or
- import and/or
- transport and/or
- purchase energy.

Relating NACE codes are: 10,11,12,23,40,505,51. In order to comply with international standards the national inventory and classification of energy products is based on Eurostat/IEA inventories.

2.6.2 Industry

Data are supplied on a full-scope basis using self-administered questionnaires (questionnaire surveys, by mail or online) with a mandatory character in the framework of National Data Collection Programme (OSAP Reg. No. 1321, see table 1.)

Data collection on energy consumption in the industry sector covers any plants that produce industrial goods. Relating NICE-codes are: 15-22, 24-37, 45. Observation units for data collections are plants of industrial companies with more than 300 employees and every firm of the energy intensive sub sectors (metallurgy, manufacture of non-metallic mineral products) irrespective of the number of employees.

End use of industry involves all kind of energy resources that are used by Mining, Manufacturing and Construction. Energy used for the transformation of energy resources (oil refineries, electricity power stations, CHPs, heat power stations) is excluded. Energy consumptions of transport purpose are also excluded, because they are allocated to the Section „H“: Transport and storage. Energy products used as raw materials are separated as non-energy use.
Data collection covers 32 classes (NACE 4-digit-level) and 16 energy products.

2.6.3. Services sectors

Relating to energy consumption patterns services sector is the most uncovered areas relating to energy statistics in Hungary, mainly because it is fairly heterogeneous. Classes involved in this sector are the following.

- wholesale and retail trade
- restaurants and hotels,
- transportation, storage and telecommunications,
- financial bodies, banks, insurance companies, real estate offices
- educational institutes (primary, secondary schools, colleges, universities)
- public health institutions (hospitals, surgeries),
- governmental offices
- local government institutes
- other suppliers.

In Hungary services sector covers approximately 250 000 statistical units, the data collection is based on sampling. In the lack of well-established statistical methodology sampling is not representative and involves only one or two classes of major economic importance.

2.6.4 Agriculture

Data collection in this field relates to 15 energy commodities and to areas of heating, crop production, animal husbandry, agricultural services, non agricultural activities and other areas in the field.

2.6.5 Transport

Selected data suppliers in this sectors are enterprises involved in the Section „H”: Transport and Storage. Data suppliers are questioned about their energy consumption of the reference year, and year before, divided by energy resources, and by type of end use (heating, technology, transport and other). Energy consumption of transport purpose is further divided by mode of transport, and by fuel. In this context specific measurers on the volume of passenger and freight transport are also asked to calculate (kJ/passenger km, kJ/tonnes km, kWh/passenger km, kWh/tonnes km).
2.6.6 Households

Energy consumption of households is encountered as a residual value in the energy balance.

In order to comply entirely with Eurostat methodology household survey should be performed regularly. On Eurostat initiative Hungarian Central Statistical Office conducted a survey in 1996 in the framework of an international project involving all East-European countries. Unfortunately this survey has not been repeated since then, therefore results and experiences gained by this project can not be applied and built in the energy balance of 1996.

In order to elaborate household energy balance based on Eurostat methodology the following items should be surveyed at least once in 3-5 years.

- volume energy consumption for cooking
- volume of energy consumption for heating water
- volume of electricity consumption
- volume of energy consumption for heating

Results gained by periodic household surveys would be excellent for calculating special measurers indices e.g. on share of energy consumption for cooking in total energy consumption of households.

3. NAMEA-tables on energy use

NAMEA-table on energy use elaborated in the course of the project stands for a first version; it is mainly because breaking down the energy consumption of the services sectors presented different difficulties.

With the purpose for elaborating the first set of NAMEA-tables on energy use in Hungary, the Eurostat methodology was used with reference: (2002: Energy use table for NAMEA standard tables, Eurostat Unit B1, 1-3 October 2002).

The main purpose of the NAMEA-tables on energy use is to report data on energy use in a way that is correspondent to air emissions. Therefore the focus of the table is on fuels combusted to produce heat and power (and consequently air emission). This means that the inputs of fuels that are transformed from one form of fuels into another are not recorded (e.g. crude oil for refining
into petroleum products, coal conversion into coke and coke gas, etc.). For industries where such transformation takes place, only the combustion of fuels for the transformation processes are recorded. Combustible fuels that are not used for energy purposes but as raw materials, such as petroleum products in the chemical and plastics industries or wood for construction are also not recorded.

In addition to the combustion of fuels, primary electricity, i.e. electricity from sources other than combustion of fuels (hydro, nuclear, wind, etc.) as well as sold and purchased electricity, heat and hot water are included in order to get for each industry and for households the total energy consumed. For details see the Notes to NAMEA table, in Appendix 2.

According to the Eurostat methodology the structure of the Hungarian NAMEA-table, in Appendix 1 enables adding up all energy uses industry by industry or by category of final consumption (households) to show total energy consumption per category and also for the total economy. No double counting appears across the different items of fuels used for combustion and the additional categories for electricity and heat and hot water, because:

- Fuels (e.g. coal and crude oil) used to produce another form of energy product (such as coke or petroleum products) are not recorded. Only the consumption of the corresponding energy products (e.g. coke and petroleum products) is taken into account by user category. An exception is electricity and heat: fuels used to produce electricity and heat are included in the table, while the resulting electricity and heat are not.
- The set-up of the table makes sure that electricity and heat produced on own account (i.e., for own consumption) from the combustion of fuels is excluded as the fuels combusted to generate this electricity or heat are already taken into account in the table.
- Only the net uses of electricity are taken into account by user category. This is done by adding primary electricity (i.e., hydro, nuclear) produced and the electricity purchased, and deducting electricity sold for each category of user. The same principle is applied to heat (heat sold is deducted and heat purchased is added to the energy use of each user category).

Giga-joules are used in NAMEA-table in Appendix 1. Notes to the description of data can be found in Appendix 2.
4. Improvements and conclusions

4.1. Improvements in the framework of an additional project

One of the main features of the Hungarian economy is that there are a lot of small economic enterprises in different branches, their economic influences are not remarkable separately, but can not be negligible as a whole. In this context data collection on the energy consumption of services sector should involve numerous but in most cases small statistical units.

At the end of last year the Energy Centre Pbc. under the supervision of National Development Agency has invited applications for the Elaboration of representative sampling plan for data collection of energy consumption in the services sector, relating to the reference year of 2008. In the course of the project a comprehensive and reliable statistical methodology had to be developed for the determination of a representative sample based on the revised national classification system, TEÁOR’08 (NACE rev2). The description of the project also involved the development of methodology for estimation and calculation of sampling error. Two departments of HCSO: Agriculture and Environmental statistics and the department of Statistical Research and Methodology, in close cooperation have applied for that project. Due to the successful application the HCSO was charged with the work and managed to contract with the Energy Centre Pbc.

In the framework of the project the Dep. of Methodology determined the framework (Business Register operated by HCSO), and the maximum size of the sufficient sample (3000 statistical units) needed for conducting representative sampling. By means of stratified sampling methodology the data suppliers were managed to be selected. Data have been collected and processed by Energy Centre for years; therefore this was not an expected result of the project. On the other hand the Dep. of Methodology has successfully elaborated and documented the suitable statistical and mathematical methodology for estimation and calculation of sampling error needed for the development of grossing up.

The project has been expanded, taking advantage of the good relations developed by the two departments of HCSO.. For the sake of further improvement energy statistics and of elaborating NAMEA-tables on energy, an attempt was made for break down of total energy consumption of the services sector into classes for the year 2006 (based on TEÁOR’03 in compliance with NACE rev1).

Taking into consideration the characteristics and structure of the sector, the statistical break-down can be performed on the basis of the number of employees or return from sales. It needs the determination of coefficients such as energy consumption/number of employees, and energy
consumption/return from sales for each class in the services sector. Data stocks of the year 2006 (forwarded by Energy Centre Pbc.) were matched to the Business Register in order to calculate coefficients between total energy consumption and number of employees or return form sales. The calculation showed only slight correlations, it was significant only for less than 20 classes. Therefore technical literacy researches were needed for determining reliable and consistent coefficients. The most relevant material on that topic that we found is “Jørn Kristian Undelstvedt et al, Statistics Norway, Environment Statistics: Improvement of methodologies for Water Statistics 2008 Action 1: Establishment of an unified methodological system for producing statistics on water abstraction and use”. Further researches are needed to coefficients for the allocations of energy use (see also References)

In the course of this project further investigations were carried out in the respect of energy resources, because it is also very important to break down the consumption of energy resources by classes. The examination of data stock showed that these energy resources are natural gas, purchased heat energy and electricity.

4.2 Conclusions, future work

One of the objective of this project is to establish a sustainable system that are able to serve assistance in compiling NAMEA-tables on energy use in Hungary on annual base in the long run.

The Hungarian NAMEA-table on energy use can be reliably compiled from the available energy statistics according to the Eurostat methodology. In the framework of the project on NAMEA-energy a good relation has been built between the Energy Centre Pbc and HCSO, and based on that this co-operation will hopefully continue.

Future works in the field include

- Break-down of the energy consumption of services sector by classes (NACE 4-digit level) and by energy sources
- Analyses and publication of data included in the NAMEA-table on energy use.
- Methodological description in order to document all statistical methodology used in the compilation of NAMEA tables.
Publications, relevant web-pages

2002: Energy use table for NAMEA standard tables, Eurostat Unit B1, 1-3 October 2002

M. de Haan, S.J. Keuning: The NAMEA as Validation Instrument for Environmental Macroeconomics Springer Netherlands, November 02, 2004


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