# Consultancy for the implementation of a high quality and international compatible database on energy efficiency indicators

## Final report

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Para:
**Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH**

Grenoble, France – September 2012

*Fontes
Renováveis e
Eficiencia
Energética*

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# Context and objectives

Energy efficiency has become increasingly important in energy planning in Brazil. It was incorporated within the legal competences of EPE (*Empresa de Pesquisa Energética*), the state owned company bound to the Ministry of Mines and Energy (MME) and responsible for long term energy planning studies.

In the context of the technical cooperation program between Brazil and Germany, the EPE and GIZ (*Deutsche Gesellschaft für Internationale Zusammenarbeit mbH*) cooperate in order to refine energy efficiency related methodologies and instruments for energy planning.

The National Energy Plan 2030 assumes significant energy savings due to energy efficiency programs. Policies and measures on energy efficiency have to be accompanied by a sound monitoring and evaluation instruments. Therefore EPE is presently designing and implementing a national database on energy efficiency indicators.

As a step towards the successful implementation, completion and utilization of this Brazilian database on energy efficiency indicators, ENERDATA has been asked by GIZ in a first phase in September 2011 to train EPE staff on energy efficiency indicators (EE indicators), using the experience of the ODYSSEE project in Europe. After the four days training, EPEs specialists have become more familiar with ODYSSEE indicators, with the difference between their own work on indicators and ODYSSEE, as well as with the design and implementation of a national database for EE indicators.

In a second phase, that spread from June to September 2012, two main activities were carried out to further bring forward the implementation of a high quality and international compatible database for EE indicators in Brazil:

- Implementation of a well structured template, that organizes the input data, executes data consistency controls, calculates the indicators and produces graphics.
- Assistance to the definition of a strategy to improve the data gathering, including experience in how to improve the cooperation with strategic partners who can supply necessary data and how to elaborate survey questionnaires in case surveys would be needed.

# Development of a template for energy efficiency indicators for the Brazilian context

The first task has been to customize the ODYSSEE template on EE indicators to the Brazilian context. For that purpose, Enerdata has proposed a first customization of the ODYSSEE template to EPE and GIZ, taking into account its knowledge of the Brazilian situation. This first version of the template was sent end of June.

The template is an Excel file and is similar in its design to the ODYSSEE template that all EU member countries fill in to update the ODYSSEE data base. The data template covers all end-use sectors: industry, households, services and transport sectors. Compared to the ODYSSEE

template used in EU countries, some adaptations have been made to the EPE ODYSSEE template, mainly to account for the specificity of Brazil compared to EU countries.

The main adaptations made are the following:

- Addition of the energy sector
- Greater focus on air conditioning and removal of space heating.
- Greater focus on biofuels (separation of ethanol and biodiesel) and biomass (separation wood and other biomass).

Enerdata also prepared a manual including a detailed scope and definitions of EE indicators based on the ODYSSEE database. This manual was sent at the same time as the customized template end of June.

EPE and GIZ have then analyzed the relevance of the template indicators and proposed some adaptations that were sent to Enerdata end of July. These adaptations were then discussed during a phone conference end of August.

Finally, Enerdata made final revisions to the template that was sent early September to EPE and made a final revision to the manual (see Annex 1). A document was also prepared summarizing the adaptations made in the template (Annex 2).

The new adaptations made are the following:

- Adaptation to the BEN (Energy Balance for Brazil), in particular in terms of subdivision in sectors in industry and services.
- Separation of the service sector in two main sub-sectors: public and commercial
- Addition of a detailed agriculture sector
- Addition of data and indicators on Distributed Generation (DG), especially solar PV and solar water heaters.
- Additions of data and indicators on $CO_2$ Emissions.
- Additions of data and indicators on Water and Sewage

## Assistance to the definition of a strategy to improve the data gathering

This second activity was mainly carried out during a 3 days seminar at EPE's office to share EU member countries experience on data gathering for ODYSSEE: showing the data flow constellation between institutions and ODYSSEE, showing strategic partnerships, giving organizational advice, exemplifying with survey questionnaires. This seminar aimed at further contribute to the capacity building of EPE specialist and to enable them to plan and organize the data gathering for the database in Brazil.

The seminar took place at EPE from September 17 to 19. The agenda was the following:

September 17

- Morning: summarized presentation of the new template version and clarification of some issues (climatic corrections, decentralized generation).
- Afternoon: experience about the data gathering in Europe in the industry sector.

September 18

- Morning: experience about the data gathering in Europe in household sector.
- Afternoon: experience about the data gathering in Europe in commercial and public sector.

September 19

- Morning: experience about the data gathering in Europe in transport sector.
- Afternoon: scope of use of the ODYSSEE indicators and ODEX; link of ODYSSEE to MURE; evaluation of policies with indicators.

The 4 sessions devoted to the experience about the data gathering in Europe in the different end-use sectors were all organized in the same way:

- Review of the data needed for the indicators, i.e. reminder of the data included in the template;
- For each main type of data (e.g. activity data, specific consumption, allocation of consumption by end use or sub sector), review of the different sources usually considered, reviewing all possible alternatives encountered in Europe;
- Then case studies of good practice were presented in mode details, with presentation of questionnaires used in the case of survey.

The main lessons by sector are summarized below:

- In industry, most EU countries have annual surveys devoted to the collection of energy consumption by branch, that are combined as much as possible with administrative request to gas and electric utilities; in some countries, they rely on expenditures surveys carried routinely by National Statistical Offices (NSO) and derive the quantities consumed from the expenditures on energy; in some countries, large consumers have the obligation to report their consumption to the administration, which is another possible source of data that can complement the existing surveys by more detailed data or can be used as an alternative source of information. Interesting examples for surveys are that of France and UK.

- In the household sector, there is a combination of household surveys to get the equipment ownership, with panels to monitor behavior at a more detailed level or to interpolate between years of surveys and modeling to estimate the consumption by end-use and type of equipment. Interesting practice are that of France, Germany, Denmark or Sweden. France is probably the country with the most detailed system of access to information, but it is more costly.  Household surveys are routinely carried out by NSO: a good practice is to

add energy related question in these surveys (e.g. Norway or France). Specific household energy surveys can be carried out on a yearly basis or every 2/3 years to reduce the cost (e.g. Germany).

- In the service sector, energy consumption data by branch come either from administrative requests or from dedicated surveys (or most often from a combination of both, such as in Denmark). Energy consumption by end-use implies modeling and detailed data from dedicated surveys (e.g. France or Germany) or from comprehensive audits (e.g. Sweden). This sector is generally the least well covered although its consumption is growing fast.
- In the transport sector, the main issue is to get detailed data on road vehicles and on the split of the energy consumption by type of vehicle. Again all countries combine different sources in a kind of modeling. The French approach can be considered as a good reference. Generally speaking, in that sector, it is important to rely on the expertise and cooperation of multiple sources and actors beyond the energy sector (e.g. Ministry of Transport, transport associations, transport research institutes and NSO). In particular, NSO routinely carry out transport surveys for households or include transport related question in their household surveys. Ministries of Transport also usually carry out survey on transportation companies for passengers and freight activities in which questions can be easily added on energy issues.

All the presentations, including case studies and examples of survey questionnaires were handed over to EPE staff and GIZ. The presentations were the following:

- Session 1: one presentation on the new template version and on the clarification of some issues.
- Session 2 (industry): one presentation on the experience about the data gathering in Europe in the industry sector; 2 surveys questionnaires (France and UK) and one presentation on the experience of Ireland.
- Session 3: (households) one presentation on the experience about the data gathering in Europe in the household sector; 2 surveys questionnaires (France and UK), 3 case studies (Germany, Norway and Austria) and a set of documents on the Remodece study aiming at a better knowledge of the consumption of electrical appliances in 12 EU countries.
- Session 4: (services ): one presentation on the experience about the data gathering in Europe in the commercial and public sector; 2 surveys questionnaires (Germany and USA) and a presentation on the EL-Tertiary study aiming at a better knowledge of the electricity consumption in the service sector buildings in 12 EU countries.
- Session 5 (transport) : one presentation on the experience about the data gathering in Europe in the transport sector, including several case studies and a questionnaire of a survey on light duty vehicles (France).
- Session 6: one presentation of use of the ODYSSEE indicators for the evaluation of policies

# Conclusions and recommendations

EPE has already started to prepare the data necessary for the template and the discussions during the seminar will also help extending the data coverage. One main outcome of the seminar is that there is usually not only one source to consider but a combination of sources and part of the data, especially with respect to the energy consumption by end-use or by road vehicle, has to be modeled. The modeling has to be adapted to the data available and to their relative reliability.

For each main source of data a comprehensive data mapping should be done to check who may have the information, especially outside the energy sector, and to understand the quality and reliability of the data. Indeed getting data from existing sources (i.e. the so called "administrative sources") is the cheapest way to complete the data template. Therefore strategic agreements and cooperation should be established to enlarge the data access.

Following this review, EPE will have a better understanding of the remaining data gaps and should set up a strategy to fill in the data gaps, by considering surveys and/or panels, depending on what type of information is missing. A survey is more comprehensive in terms of coverage and more costly. A panel will have a more limited sample and is complementary to surveys to interpolate in between years of surveys or to collect additional information (especially on consumer behavior with the use of their appliances or equipment). One cost effective way is to include relevant questions on energy issues to existing surveys. Therefore it is also important to map out the surveys already being done by IBGE or other organizations, including private surveys, in which EPE could co finance additional questions; this practice is very common in EU countries as illustrated with various examples during the seminar.

Future assistance to EPE could be devoted on the following issues:

- Assistance to filling up the template with some kind of regular hot line service, to provide immediate answer to any questions encountered ;
- Assistance to the modeling of some indicators; the best solution can only be identified once we have a good idea of the data available and we know which data are the most reliable;
- Assistance to the indicator analysis and interpretation of the trends observed for the indicators.
- Assistance to the evaluation of the impact of policy measures through indicators, starting with some case studies (e.g. solar water heaters).