



## Step 1

# Municipal Energy Information System

## Administrative commitments

The process of municipal energy planning starts with a decision for the development of an energy information system of the municipality. In its essence this is a decision of the municipal administration and can be taken by it or by the mayor.

### Management decision

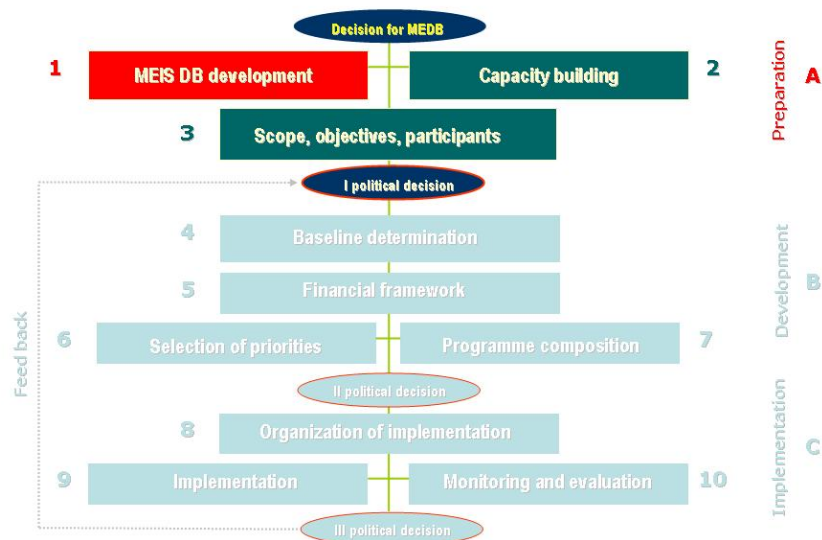
This decision of the management consists of the following major elements:

- Decision for the development of an energy information system of the municipality
- Commitment of the municipal administration to the information collection process (internal organization of the data collection process)
- Nomination of the leading municipal energy information officer
- Partnership agreements with local businesses and other players to contribute to the information collection process (external organization of data collection process)

## General structure of MEIS

Municipal energy planning is realised on the basis of rich and diverse information about the current state and the prospects for development of the energy sector in the municipalities and the individual sites related to it. This

information should contain data about the political and socio-psychological climate, the conditions under which the programme will be compiled and implemented, the general economic state of the municipalities and the individual sites which the programme should influence, about energy production, transportation and consumption, about the efficiency of use of fuels and energy, the technical state of and operating conditions in the sites of impact, the accessible financial resources for implementation of the programme, the capacity of the municipality to work out and manage the implementation of an energy efficiency programme, etc. This voluminous information may serve the needs of planning only if it is full, reliable, well arranged and organised.



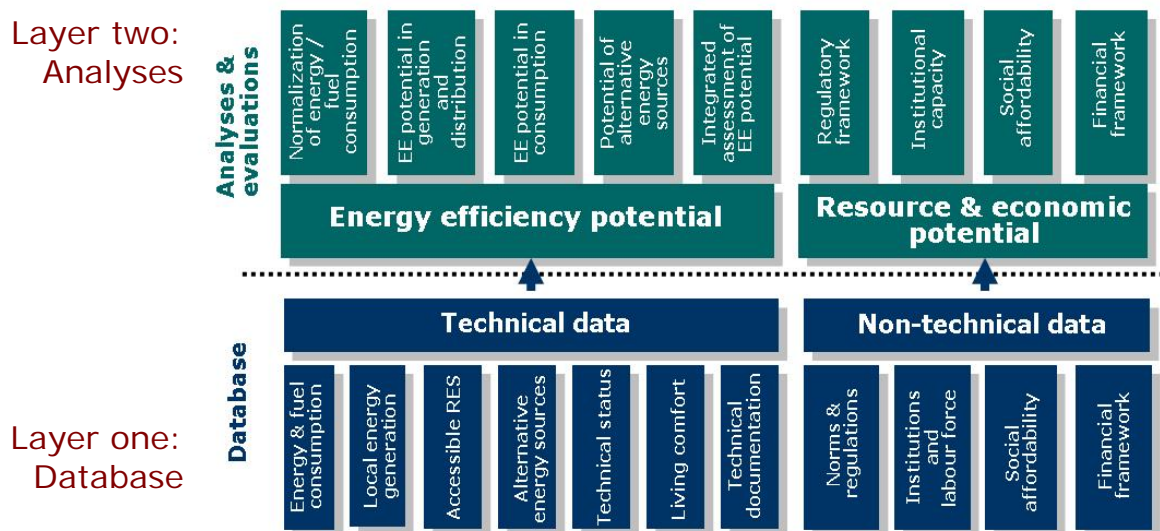
The municipal energy information system (MEIS) consists of two layers: (a) database (DB) and (b) analyses and evaluations (AE). Once created, the ISEE requires permanent maintenance and further development. Therefore, the activities related to its design, maintenance and updating are of permanent nature.

## Database

The database contains adequately selected and systemised objective information, which is used to evaluate the energy sector in the municipality as a whole and its individual sectors or sites. Usually, the

building of the database requires involvement of different experts. Some of them are officials from the local administration, others are employed in the energy end-use sites, and yet others are connected with the fuel and energy suppliers. Part of the information in the database may be collected through the national and regional statistical centres, another part requires conducting of specific studies, surveys and interviews.

### Principle scheme of the Municipal Energy Information System



Building of the database passes two major actions:

- (a) Data collection, which consists of:
  - identification of necessary information to be collected
  - identification of information sources
  - provision / development of appropriate software for data collection, processing and analyses.
- (b) Determination of missing information, which consists of:
  - identification of the information to be generated
  - targeted studies to generate missing information.

## **Technical data**

The first steps in the construction of the database begin with collection of technical information about the baseline in the energy sector in the municipality prior to the start of programme implementation. The absence of this basic technical information will render impossible any efforts to either identify the bottlenecks of the energy system or to select appropriate actions for resolution of the existing problems. This part of the future energy database is the most voluminous and the most dynamic one as compared to the other parts. For this reason it needs permanent maintenance and updating. A considerable portion of the technical information is easily accessible and may be collected by the experts from the local administration. There is, however, information, which does not exist in a readily available format. Such is, for instance, the detailed information about the individual sites in the municipality.

The basic elements of the technical information are:

- energy and fuel consumption by end-users
- local energy generation by generators
- accessible renewable energy sources (RES)
- accessible alternative energy sources
- technical status of end-user sites
- living comfort in end-user sites
- technical documentation of local end-users and energy generators.

The technical data is needed for the determination of the technical status, the living comfort and the potential for energy efficiency improvements. Sample forms for the collection of technical information are given in annexes 1-5.

## **Non-technical data**

The second component of the database is the information about the regulatory, institutional, human and financial capacity of the municipality to implement energy efficiency programmes. The majority of this non-technical information is of descriptive, non-quantified nature. It consists of data about:

- norms and regulations (incl. local when available)
- institutions and labour force
- social capacity / affordability

- financial framework

The non technical data serve for the determination of the legal and financial framework and the institutional and human capacity of the municipality to develop and implement municipal energy programme.

**Analyses and assessments**

The information in the database is necessary, however not sufficient for the compilation of the energy efficiency programme, since it does not contain data about the energy efficiency potential and does not offer ranking of the demand for energy conservation projects. To this end it is necessary to conduct periodically specific analyses and assessments of the available information.

The analyses and assessments of the information in the database are based mainly on objective technical and economic criteria. They are performed above all with the aim to determine the real potential for energy efficiency improvement in individual sites, in selected target groups or entire sectors of the municipality. On the basis of the thus established potential it is possible to select priority spheres of impact through energy conservation projects or measures.

The analyses and assessments are the connecting link between the objective information (the database) and the political objectives and tasks related to the compilation of the municipal energy efficiency programme. Although the analyses and assessments are performed mainly on the basis of the objective technical and economic information, a certain subjectivism might get manifested in the formulation of the evaluations. This subjectivism ensues from the different professional background, life experience and access to information of the experts performing the analyses and formulating the evaluations. The higher the qualification of the experts, the more reliable and objective the analyses and evaluations will be. Different methods, some of which are reviewed in this manual, are applied for minimizing subjectivism in the evaluation of the objective information.

Subject to analysis are both the technical (quantitative) and the non-technical (non-quantifiable) data in the database.

## **Analysis of technical data**

The analyses of the technical data aim at determining the potential for energy efficiency improvements in the municipality and at creating prerequisites for the optimum energy balance achievement.

The analyses and evaluations of the technical data are based mainly on technical and economic criteria and are conducted mainly with the aim to identify the real potential for energy efficiency improvement in individual sites, target groups or entire sectors on the area of the municipality. On the basis of the thus determined potential it is possible to select priority spheres of impact through energy conservation projects or measures.

The analyses and evaluations of the technical information should be performed and updated on a periodical basis, where at the results from these should be stored in the database. In this way they may serve for identification and forecasting of the trends in the development of the energy sector in the municipality.

The analyses are realized in the following major directions:

- Normalization of energy and fuel consumption;
- Determination of the energy efficiency potential in energy generation and distribution;
- Determination of the energy efficiency potential in energy end-use;
- Determination of the potential of alternative energy sources / fuels;
- Assessment of the integrated energy efficiency potential of the municipality.

## **Analysis of non-technical data**

The analyses and evaluations of the non-technical information usually cover the political, regulatory, socio-psychological and other factors. They are performed for the purposes of determining the municipality's capacity to implement an energy programme. This capacity is generally quite dynamic, although not directly related to the energy sector, and is often subject to significant influence by political and socio-psychological factors. For this reason, the analysis and evaluation of the non-technical information in the database is usually performed in the process of development of the

programme and are not obligatory part of the energy database.

The analyses of the non-technical data are realized in the following main directions:

- Analyses of the regulatory framework;
- Assessment of the institutional capacity of the municipality;
- Assessment of the social capacity / affordability;
- Assessment of the financial capacity / framework.

The main outcome of the analyses is the determination of the technical and the economic/financial energy efficiency potential of the municipality. The energy efficiency potential is equal to the energy resource that could be secured by energy conservation (energy efficiency measures).

The energy efficiency potential could be determined in different ways:

- through energy audits;
- through comparisons with pre-defined key numbers;
- through comparisons with other municipal programmes and projects.

### **Methods of analysis and evaluation of the available information**

#### (a) Scientific methods

There are different scientific methods of analysis and evaluation of the information, some of which require the application of complex computerised software. The application of these complex evaluation methods usually requires specific training and long practice. For this reason, this part of the analysis should be assigned to specialised institutions or complex teams of experts of proven capacities.

#### (b) Expert assessment

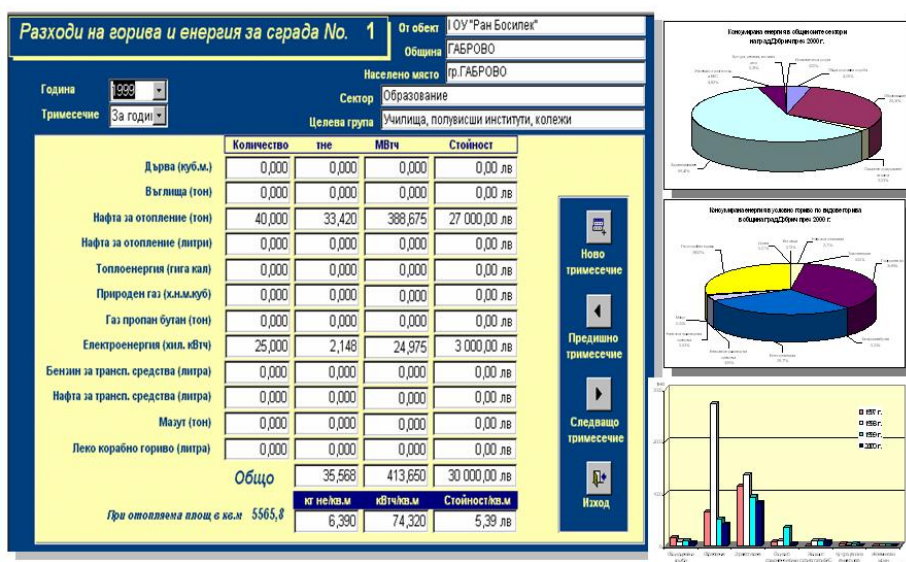
The method of expert assessment is based on the evaluation by selected experts, whom the municipal administration may ask for help. The expert assessments are made on the basis of collected data about the sites to be assessed or observations and previous experience. This method may be applied with

success in the cases when the subject of the evaluation is a smaller individual site or target group in a small municipality. Experts from the administration itself, who have their own impressions of the state in the target groups and individual sites from personal observations, should mandatory be included in the experts team.

There are different ways of collection of expert opinions. One very reliable method is to conduct interviews with a specific circle of specialists on the basis of preliminary drawn up survey forms (questionnaires). The elaboration of the questionnaires is a matter of key importance for the reliability of the evaluations. It is desirable to structure in a way close to the structure of the database. The replies of the experts (the assessment) usually compensate for the absence of reliable objective data or time for conducting specific surveys, studies or measurements.

Software used by municipalities of the Municipal energy efficiency network EcoEnergy (Bulgaria).  
Data collection and processing and reporting of outcome of the analyses

Example



Frequently made mistakes

Sometimes the data input is performed mechanically by the accounting or other department of the municipality. For instance, often the unit for electricity is “thousand kilo-Watt-hours” (‘000 kWh), but the electricity consumption is erroneously recorded in “kilo-Watt-hours” (kWh) and hence 1000 times higher consumption

is obtained. Sometimes, for some of the sectors the input data are in kWh and for others – in '000 kWh. The same applies to natural gas, which is usually measured in thousand normal cubic meters ('000 Nm<sup>3</sup>). In some cases, however, the information about natural gas is entered in the column of propane-butane gas.

Sometimes, no difference is made when the naphtha for space heating is measured in tons or in liters – the two units are recalculated in tons oil equivalent (toe) under different formulas.

The heat for district heating is accounted in kilo-Watt-hours / Mega-Watt-hours (kWh / MWh) depending on the setting of the heat meter. In the reports the value is often quoted in Giga-calories (Gcal) and in the majority of cases it is not re-calculated.

## Determination of information sources

### Information for municipalities

The basic source of information is the accounting department where invoices for energy and fuels bills are kept with data about dates of payment and prices of the purchased energy / fuels.

The technical departments (territorial development, construction, infrastructure) normally keep data about the municipal building stock. Similar information is also kept by the management of different buildings (hospitals, schools, kindergartens). With some help from the municipal administration this information could easily be afforded.

The most reliable data about energy consumption of the street lighting systems is kept by the electric distribution companies. Due to possible conflicts of interest the municipality could keep its own records that could be compared with the data of the electric distribution companies.

The most reliable is the information received from energy audits. When this information is available for separate sites only it can be extrapolated with sufficient accuracy to the rest of the sites. Such data can be obtained from pilot, demonstration and other types of projects.

**Summary  
information  
for the  
residential  
sector**

Data about residential building stock is normally kept by the municipality in the architectural, construction and public works departments and taxation authorities. Summary information about the residential sector is available in the official statistical reviews. Such information is often kept by the energy companies often (central heating and electric distribution companies, etc.).

**Information  
about  
companies  
and  
enterprises**

This is the most difficult type of information to be collected. This process can be facilitated to a great extent if the municipal management initiates a constructive dialogue with local businesses and patiently explains the meaning of the development of a municipal energy information system. The best approach is to explain how the business could benefit from the provision of energy security and sustainable development of the municipality.

Certain information about the business can be supplied by the official statistics as well as by the central heating and electric distribution companies on the territory of the municipality.

**Information  
about the  
available RES**

The determination of the potential of RES requires normally the involvement of a specialist that is well acquainted with the technologies for utilization of the different types of RES.

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This information should be collected and evaluated with great attention, since it has a strong influence on the management decisions. The best aggregate information is one, which is compiled on the basis of detailed data about the individual end-use sites. In all other cases the sources of aggregate information should be carefully checked and evaluated by experts.

## **Annexes**

The attached practical tools aim at facilitating the collection of technical and non-technical information. The tables are samples, which could be adjusted to the specific conditions in municipalities.

The following sets of data can be collected and organized with the attached tools (tables and forms):

### **Annex 1 Technical data for buildings**

- Building type by function – school, hospital, kindergarten, administrative building, etc.
- Building type by construction – brick-built, pre-fabricated panels, sliding shuttering, etc.
- Total floor area
- Operational rate
- Heat energy consumption in the last three years
- Electricity consumption in the last three years
- Liquid fuels consumption in the last three years
- Fossil fuels consumption in the last three years
- Available boilers, including co-generation units
- Implementation of energy saving measures

### **Annex 2 Technical data for street lighting systems**

- Electricity consumption for the last three years
- Percentage of illumination
- Information about the lighting fixtures type, capacity, year of installation
- Number of lighting fixtures by type and
- Number of poles
- Energy efficiency measures implemented

### **Annex 3    Technical data about residential sectors**

- Total floor area
- Conditions of exploitation
- Heat energy consumption in the last three years
- Electricity consumption in the last three years
- Liquid fuels consumption in the last three years
- Fossil fuels consumption in the last three years
- Implementation of energy saving measures

### **Annex 4    Technical data about companies / enterprises**

- Conditions of exploitation of production and administrative buildings
- Heat energy consumption in the last three years
- Electricity consumption in the last three years
- Liquid fuels consumption in the last three years
- Fossil fuels consumption in the last three years
- Implementation of energy saving measures

### **Annex 5    Technical data about RES**

- Quantity of accessible waste wood biomass
- Quantity of accessible agricultural waste biomass
- Data about solar radiation
- Information about water sources suitable for micro water electric stations – capacity, speed
- Data about thermal sources – capacity, temperature

### **Annex 5    Regulatory framework of the municipal energy planning**