Energetic Efficiency in the Environmental Politics, Element of the Sustainable Development

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Abstract: *Taking into consideration the aderation to the EU, Romania has to make a big effort to create a harmonized link between the present legislation and the one in force in the country-members of the EU.*

The EU Action for the Environment Program (the 6th Program) establishes the environment objectives for 2001-2010, including also a series of measures, specific for the climate changes, taking for example the intensification of the energetic efficiency measures application.

In this context, the paper presents different aspects concerning the legislative and normative field elaborated end a case study with the idea of promoting efficient use of energy and the energetic efficiency; the purpose is the integration of energetic efficiency in the environmental politics, criteria that, in Romania, is in the initial state.

1. Principles of sustainable development

The sustainable development has become lately a concept with priority in Romania, the Government assuming the obligation to harmonies the Romanian legislation with the European water and environment protection legislation.

Thus, it is foreseen an active participation of all local and regional communities in Europe in the integration and democratization process, creating a flexible environment and an orientated one towards the future, which addresses to political and social body.

The sustainable development within the framework of the European continent must be integrated at a regional, national and international level. On long term, it is imposed the realization of a balance between the four dimensions of the sustainable development: economical, social, cultural and environmental.

On a long term vision in the European politics, the correlation between the environment with economic dynamic and social cohesion has gradually made room for itself, the most important moment being represented by the Amsterdam Treaty. However, the application of the principle of sustainable development has not been consistent until the adoption of the EU Strategy for sustainable development in 2001 by the European Council in Göteborg.

This strategy emphasises the necessity of correlation between economical, social and environmental objectives and, as well, the necessity of more efficient integration actions of the environment in specific politics. A major place, in what concerns a sure and clean future, is represented by the efficient usage of energy.

The energetic efficiency politic was launched by the impact created by the oil crisis and is continuously under the influence of climatic changes. By the law no. 3/2001 Romania ratified the Protocol from Kyoto at the Framework Convention of United Nations concerning the climatic changes, by which they oblige to reduce by 8% the gas with greenhouse effect in the period 2008-2012 confronted by the reference year 1989.

These aspects grant general features as well as specific ones to the three major economical zones: Europe, USA and Asia.

The VI Action Program for the Environment of EU establishes the environment objectives for the period 2001-2010 including also a series of measures specifics to the climatic changes, as the example of the intensification of the application of energetic efficiency measures.

2. Promotion of the efficient usage of energy

By the increase of energy efficiency, the energy economy represents the energy resource the easiest to be obtained, unpolluting in comparison with the fossil combustible resources or energy regenerating resources.

Taking into consideration that the energetic intensity of the Romanian economy is a few times higher than that of the EU countries, the efficient utilization of energy represents a priority.

Romania has signed the Protocol regarding Energy Efficiency which stipulates:

-creating an energetic efficiency Program

-creating some framework conditions for the development of the energetic efficiency activity

-co-operation in the energy efficiency

The implementation of the Directive 2003/54/CE regarding the common rules established for the internal energy market, as well as the Directive 93/76/CEE Save dedicated to some minimal programs of energy economy represents one of the major trends.

In Romania, the electric energy Law no. 318/2003 creates the general juridical frame for the regulation of carrying on activities from the thermic and electric energy field that has to take place in conditions of safety and quality in order to permit the proper utilization of primary resources of energy simultaneously with respecting the environment protecting laws. Directive 93/76/CEE Save is taken over in the Romanian legislation by:

-Law no. 199/2000 – energetic efficiency;

-HG. No. 393/2002 – methodological norms for the implementation of Law no. 199/2000;

-Order MEC no. 312/2003 – technical prescription regarding design, execution, assembling, repairing, installation, exploitation and inspection of hot water boilers;

-Order MIR no. 245/2002 – energetic balance sheet;

The major target established through the national strategy of energetic development on middle term is represented by the creation of some efficient energy markets whose sustainable development should be done in high quality and safety conditions of energy supplying, by the efficient usage of energy and by the protection of the environment.

In 2003, Romania has drawn up the Road Map in the energetic field which covers the period until 2015 stating the major directions of action in the energetic field for integration in the internal energy market of the EU.

Therefore, in order to achieve the goal of reducing energetic intensity until 2015, special programs oriented towards the following directions are necessary:

- imposing some high energetic efficiency standards for all the activities which consume energy from the economy and social activity: industry, transports, construction, agriculture, services;
- the increase of energetic efficiency in the existent energy consumer capacities;

In this context, a case study is presented regarding the increase of energetic efficiency by reducing the costs with energy in some water supply systems.

3. Case study

Water pump stations from water supply systems are big consumers of electricity, with different electricity consumption values in working days and holydays, as well as differences during the same day, produced by the variable demand of water in the system.

In this context, the most recent works in the field of forecasting models show a significant shifting of the interest of the scientific community towards forecasting models based on computational intelligence. Therefore, the forecasting model used in our studies used a neural network approach based on the multilayer perceptron (MLP). These studies aims to produce short-term load forecasts for a water pump station from a local water supply system.

The analysis of the existing database, the self-correlation between load data, as well as the suggestions from the literature [5], led to a forecast model that would contain the following components of the learning data set:

- Output data:
  - forecasted electricity consumption for hour *t*;
- Input data:
  - electricity consumptions for moments with 1, 2, 3, 4, 5, 24, 25, 26, 168, 169, 170 hours before the forecasting hour;
  - type of the day (working day or holyday);
  - the forecasting hour.

Using this input structure, the learning data set for the training of the neural networks was built, using a series of MATLAB functions. The neural network was then trained using the SNNS (Stuttgart Neural Network Simulator) environment, and the Resilient Propagation function as training procedure [6]. This learning function is one of the most efficient one used with feed-forward neural networks, and supervised learning.

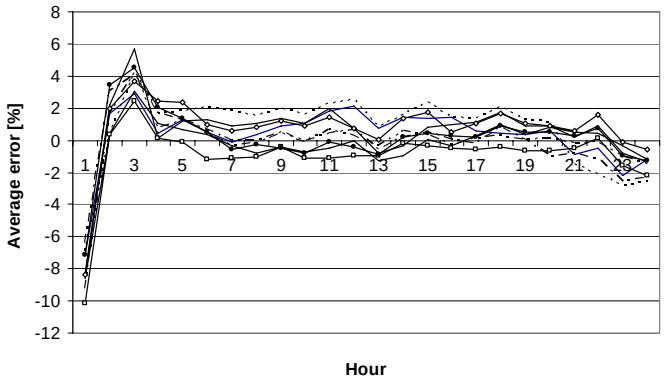

Fig. 1 Average errors for the 9 variants of forecasting models

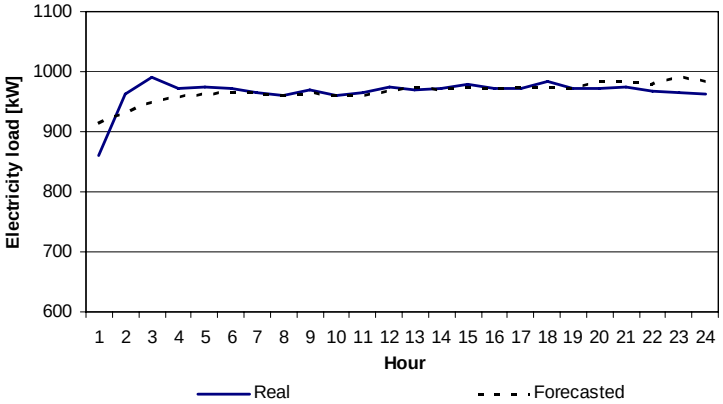

Fig. 2 The real and the forecasted profiles for July 26-th 2006

The analysis was driven for an electricity consumer from a water supply system, using database containing electricity load data for 2 months. The training and validation of the mathematical model have used data between June 1-st and July 25-th 2006, while the forecast was generated for July 26-th 2006.

There were 9 variants with different input data structures that were analyzed, each variant using different combinations of the hourly delays in energy consumption. In Fig. 1 shows the mean errors over 24 hours of the forecasted electricity load for the 9 variants.

The real and the forecasted profiles for July 26-th 2006 are shown in Fig. 2, while Fig. 3 contains the corresponding percentage errors.

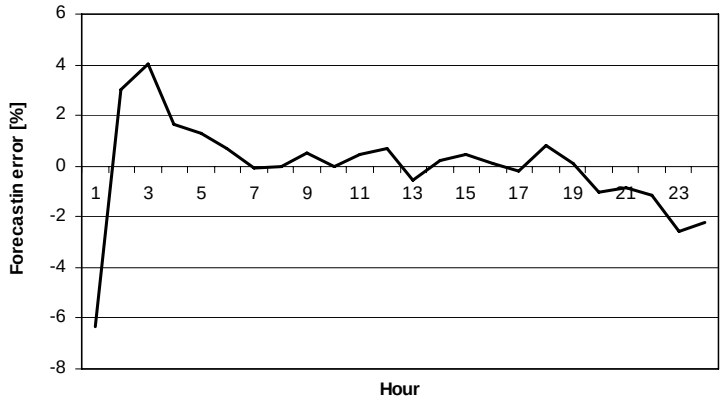

Fig. 3 Percentage errors for the forecasted profiles for July 26-th 2006.

4. Conclusions

Taking into consideration the aderation to the EU, Romania has to make a big effort to create a harmonized link between the present legislation and the one in force in the country- members of the EU.

The EU Action for the Environment Program (the 6th Program) establishes the environment objectives for 2001-2010, including also a series of measures, specific for the climate changes, taking for example the intensification of the energetic efficiency measures application.

To comply with the European standards, one of the objectives aimed for a sustainable development of water supply systems is to promote energy efficiency. In this view, electricity load forecasts for water supply systems play an important role in obtaining a qualitative management, especially in the new conditions created by the electricity market.

The case study presented in this paper shows that the real and the forecasted profiles are very close, a fact that in most cases confers a very good accuracy to the forecasts (±3%).

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