

THE METHODS OF ANALYSIS FOR RAISING THE ENERGY EFFICIENCY AND THE REDUCTION OF GREENHOUSE GASES

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Overview

The formation of affordable energy supply is essential for raising energy efficiency thus decreasing the emission of the greenhouse gas (GG) and global warming. Investigations witness that there are sharply different conditions in various regions for energy saving depending on both the climate zone and the state of its infrastructure, as well as the prospects for its development. In the Baltic region, including Latvia, like the other new EU member states, the thermal parameters of buildings are bad, and that is why there is a huge potential for energy economy.

In order to estimate the possibilities to reduce the harmful emissions by raising the efficiency of the use of energy in the energy supply of buildings, the consumption rates of fuel are analysed for the production of heat and electricity depending on the kind of the fuel used and the energy production technology. The methods of analysing are discussed for the consumers of heat supplied from the district heating system, as well as from individual boiler houses using various heat production technologies. The ratio of thermal power plants in the production of electric energy is of great importance, which may change with time, and their prognoses are analyzed.

Since more than a half of all the energy resources in Latvia are consumed for heating and the supply of hot water, it is essential to analyze the consumption of energy and the fluctuations connected with the reduction of the harmful emissions which accompany the production of energy. By analyzing the duration curves of the outdoor temperature, typical of the Latvian climatic conditions for many years', a conclusion can be made that the consumption of energy for heating under the particular weather conditions may differ from the average by about +/-20%.

The peculiarities of heating industrial buildings are connected with internal heat emissions from the technologies operating in these buildings. That is why the consumption of energy and its potential amount of economy for heating, depending on the weather conditions, vary from year to year within a much wider range; and the "balance temperature" methods are used for its assessment. Analysing show that in the industrial buildings with a great amount of internal heat emissions the fluctuations of the additionally supplied energy for heating considerably increase in a warm and a cold year. Therefore the difference in the amount of emissions grows remarkably from year to year depending on the weather conditions.

The new EU directive 2006/32/EC on energy end-use efficiency and energy services provides for remarkable decrease in the energy consumption during the next 10 years. The action plan of Latvia provides for its implementation by considerable improvement of the thermal parameters of buildings. Practice (in Scandinavia) shows that the warming process of buildings is lasting therefore innovative management methods of the process for raising the energy efficiency are envisaged.

Methods

The methods of system analysis are suitable for the solution of the varied problems how to raise energy efficiency.

Results

The importance of infrastructure and the possibilities of its development is studied for raising energy efficiency, as well as the methods of analysis and evaluation are motivated.

Decrease in the emission of the GG is analysed when energy efficiency is raised depending on the production technology of heat and electricity, and the kind of the primary source of energy; evaluation methods are developed under the conditions of uncertainty of prognoses.

Methods are developed for the analysis of the impact of the fluctuations in the energy consumption upon raising energy efficiency depending on the variable weather conditions. An assessment method is recommended for industrial buildings which is based on “the balance temperature”.

Evaluation methods are worked out for the acceleration of the development process of raising energy efficiency, the development of which is based on the model ISO 14001.

Conclusions

Raising the energy efficiency, decreasing energy consumption, the GG emission and limitation of the global system are of great importance for the improvement of the energetic parameters of the infrastructure. This applies not only to the energetic sector but also to the infrastructure of other branches. In the new EU member states from Central and Eastern Europe, a great potential for raising energy efficiency is the improvement of the poor technical parameters of buildings. To evaluate this potential, to lower correspondingly the consumption of energy and limit the GG emission, methods are worked out which are based on the development of system analysis by adjusting this method to the solution of the varied tasks of raising energy efficiency.

A significant factor in the evaluation of the energy efficiency potential is also the analysis of the weather conditions and their fluctuations.

Considering the lasting character of the thermal insulation (warming) process of buildings (reduction in the energy consumption for the heat supply by half of buildings in Scandinavia required 20 – 25 years) innovative methods for the management of the energy efficiency raising process are worked out.

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