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MANAGMENT METHODS FOR ACHIEVING FASTER AND HIGHER ENERGY EFFICIENCY FOR END USERS

VADĪBAS METODES ĀTRĀKAI UN AUGSTĀKAI ENERĢIJAS IZMANTOŠANAS EFEKTIVITĀTES SASNIEGŠANAI

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Introduction

The tasks of the management of energy complexes are solved on the basis of information data about the condition and functioning of the energy complexes.
Up to now more attention was paid to the energy production and transmission sector, less – to raising energy efficiency in the management systems. One of the main obstacles to wider introduction of the measures how to raise energy efficiency are the limited financial resources. Therefore it is essential to apply innovative management and financial mechanisms and schemes in this field.
The aims of the conducted investigations were to study the methods how to raise the efficiency of the use of energy and to work out recommendations for their implementation under Latvian conditions because not only technical measures, for instance, the improvement and updating of the machinery, can be a cause for raising energy efficiency. Very often it can be achieved by introducing a correct energy efficiency management system. Consequently, not only huge sums must be invested to achieve such an effect. It is important to recognise that there are savings possible without great investments. In order to arrive at such a result, the main thing is to form a strategic approach to the management of energy consumption by joining various separate technical solutions of energy management.

The main targets and tasks of the research can be divided into the following parts:

- to review the main tasks and targets of the energy efficiency management;
- to analyse the achievements in the efficient use of energy;
- to evaluate the measures to be taken in order to raise the efficiency of the use of energy;
- to study the methods for purposeful management how to raise the efficiency of the use of energy;
- to choose management methods for the most important categories or energy users (the living sector and industry);
- the performance of the selected methods and the expected results.

The discussed methods for efficient management of the use of energy are in conformity with the basic regulations of the European Union in this field, and they are different in the aforementioned branches on national economy (the living sector and industry).
Raising the efficiency of the use of energy is a continuous process which is to be identified by means of the proposed management methods.
The research in the problems how to raise the efficiency of the use of energy is very important for sustainable development of the Latvian energy sector. At the same time, reduced energy consumption and possible raising energy efficiency is necessary in order to cut the production and service costs, as well as to tackle local and global ecological problems too. By skilful application of the energy economy potential, attracting investments and taking purposeful organisational steps, it is possible to gain considerable economy of financial resources.

The basic concepts of management

The global ecological problems can be solved by reducing the consumption of energy. In Latvia, a great deal of heat is consumed for heating houses. What is more, the

existing dwelling and public houses lag far behind the developed countries in terms of the low specific heat consumption. A similar picture is also in the heating of industrial buildings, and this constitutes a considerable part of the heat consumed in industry.
Reduction of energy consumption, especially the reduction of thermal energy, in conformity with the regulations of the energy management system is a complicated technical and economic process, and specific methods must be developed for its management.
Modern, highly efficient individual boiler houses are being introduced increasingly widely in heat production. Centralised heat supply, the main advantage of which is application of co generating sources of heat (producing thermal and electric energy simultaneously in an optimum mode), must be able to compete with the individual boiler houses. Cogeneration is recommended in the European Charta, the Kyoto documents, etc. as one of the most important instrument for the reduction of energy consumption in the production of heat. That is why the development of cogeneration is one of the tasks of energy management.
The EU Directive 2004/81/EC, on the basis of previous directives on cogeneration, accentuates the need to create support schemes for cogeneration which would enhance the development of the energy efficiency management methods.
Energy management is similar to the environmental management system (EMS) because the reduction of the energy consumption is directly linked with the restriction of production emissions and the protection of environment.
The standards from the ISO 14000 series have been worked out with an aim to help the enterprises develop efficient elements of the environmental management system which would be integrated with the other management requirements and would be helpful in achieving the intended economic aims and targets of environment protection. The ISO 14001 standard demands a management structure with a clearly defined task, roles and responsibilities, efficient internal and external links of the organisation, paying particular attention to the motivation of the staff.
The ISO 14001 standard renders methodological assistance to organisations and government institutions:

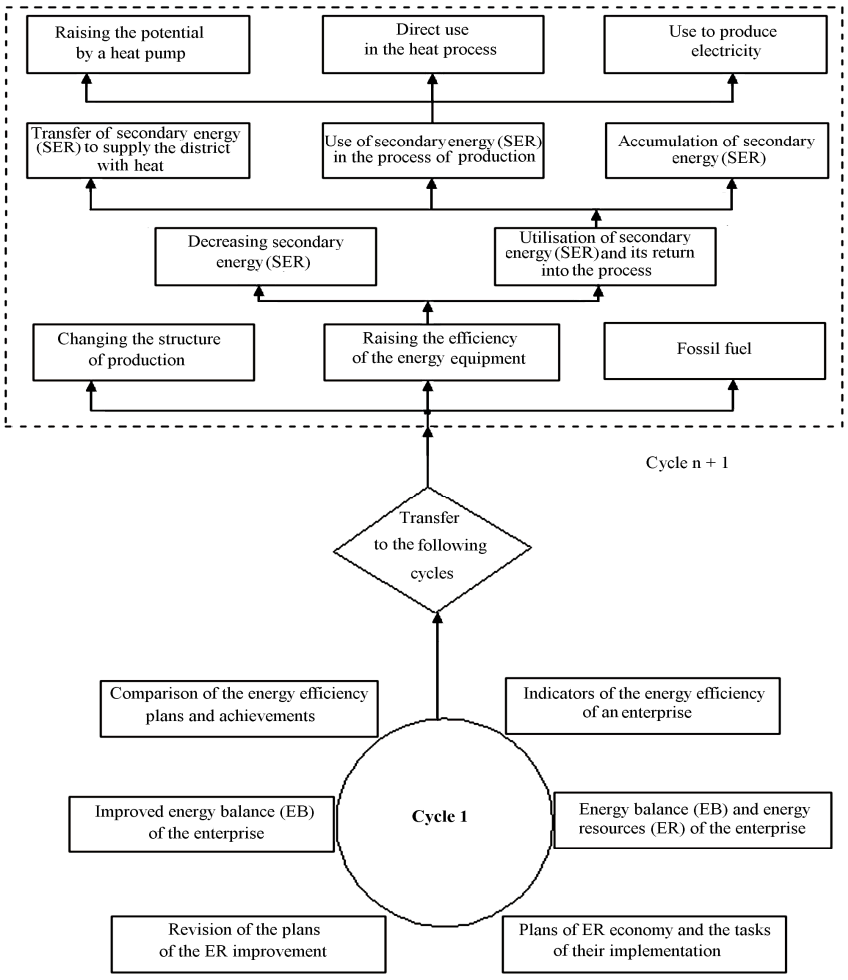
- in carrying out an analysis of the environmental impact;
- in setting aims and tasks;
- in carrying out the monitoring of the environmental condition and the attained results;
- in ensuring continual improvement of the environmental condition.

The motives to introduce the environmental management system are:

- direct economic benefits (decreased harmful emissions, rational utilisation of natural resources, the economy of energy resources, reduced industrial risk);
- better environmental compatibility of technologies – reduced harmful emissions per unit of production, decreased negative impact of emissions upon the environment, higher utilisation efficiency of natural resources and increased utilisation efficiency of energyresources. It should be remarked that worldwide use of natural resources is increasing in the recent decades, which is connected with rapid development of production, the progress of science and technology, as well as with the increase in the population, as a result of which the burden on nature increases and aggravates the interaction problems of nature and economy;
- benefits in the social sphere;
- improved positions in the market.

All these motives are basically very similar to the motivation for the introduction of a management system for energy. The EMS comprises the economy of raw materials and energy, i.e. optimisation of the ways how energy is obtained, the improvement of the energy transmission efficiency and higher utilisation efficiency of energy.

Fig.1. Schematic diagram of the energy efficiency management at an enterprise



The environmental management system is already included into the Latvian standard: LVS EN ISO 14001:1996. In the present work the Environmental Management System is developed for the management of the process in which the efficiency of thermal energy is raised because thermal energy is an important part of energy. Figure 1 presents a model of the energy efficiency management system based on the management standart ISO 14001.

The basic concept of the energy efficiency management system, as well as of the environmental management system is the principle of continual improvement.

Usually the plan of measures for raising energy efficiency is limited by the amount of investments; therefore priorities should be chosen which give greater effect. In accordance with the basic concepts of the energy efficiency management system

about continual improvement, the process of raising energy efficiency of an enterprise (a public or dwelling house) is transferred further to the following cycles (within the limits of new investments). The upper part of Figure 1 shows a detailed expansion on cycle n+1 with the elements of the energy efficiency raising process, including a change in the production structure, the structure of the utilised energy resources, etc. Great attention is paid to decreasing secondary energy (SER) and its return into the production process or useful utilisation in other processes. In essence, SER is an energy residue arising in the production process, and its reduction may produce an energetic, economic and ecological effect.

Integration of the management systems

`As mentioned above, the structure of the energy management system is very similar to the structure of the environmental management system regulated by the standard ISO 14001. The present EU approach is directed at the integration of the management systems.
All the existing management systems are eventually aimed at stable development of the world. The schematic diagram of the interaction of the management systems is illustrated in Figure 2.

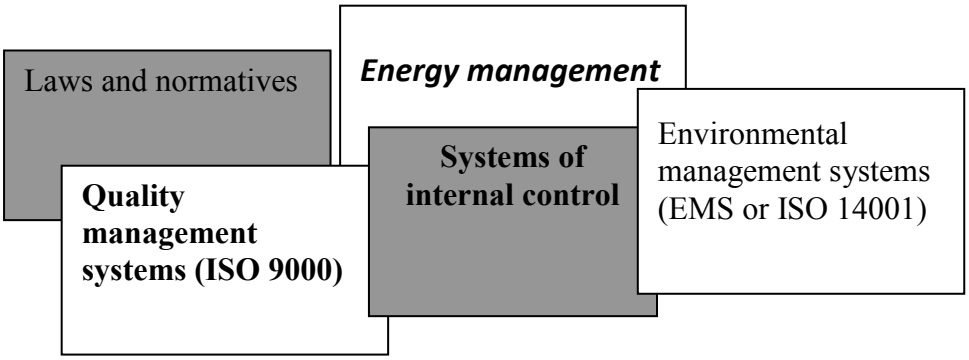


Fig. 2. Integration of the management systems

Energy management is an instrument that ensures continual improvement of energy efficiency. Like the other management systems, energy management is a set of procedure, or a routine that brings results. The results, in their turn, are concrete activities.
The aim of the energy consumption management system is the reduction of energy consumption due to better management. The energy consumption efficiency management is an approach including organisational and technical measures, and its task is to reduce the costs of fuel/energy and the harmful impact upon the environment.
The energy consumption management (see Fig.1, cycle 1) can be presented by highly simple repetitive activities arranged in a cycle:

- starting the energy consumption management (efficiency indicators);
- the energy balance;
- cognizance (plan) of the energy saving measures;
- improvement of the energy utilisation;
- measuring and accounting of the energy consumption (improved energy balance);

- an analysis of the variations in the energy consumption.

As a result of the analysis, in agreement with the ISO 14001 model on continual improvement, possibilities (financial, etc.) are sought for the repetition of the cycle, or to pass over to another, newer cycle of technological development (see Fig. 1m cycle n+1): paying greater attention to the interaction of the environment, quality etc. management systems. Since the interaction of the quality management and the energy efficiency management systems can be characterised by increased ratio of quality products (a high market price), which lowers the energy consumption per unit of quality products sold by the organisation.
If the energy consumption per unit of products is:

$$q_0 = \frac{Q_0}{G_0}, (kWh/t) \quad (1)$$

where: Q_0 – the total consumption of energy, (kWh);
G_0 – the amount of production (t),

then, due to the improvement of the technology, the consumption of energy will decrease also owing to the increased amount of quality products because the amount of the products which do not comply with the standards (cannot be distributed in the sales network) decreases:

$$q_e = \frac{Q_e}{G_e} = \frac{Q_0 - (\Delta Q_{teh} + \Delta Q_p)}{(G_0 + \Delta G_{teh} + \Delta G_p) K_{kv}}, (kWh/t) \quad (2)$$

where: q_e – the consumption of energy per unit of products;
Q_e – the total consumption of energy by an improved technology;
ΔQ_{teh} – energy economy considering the system of the new machinery;
ΔQ_p – energy economy due to qualitative, biological and chemical admixtures to enhance the technological process;
ΔG_{teh}, ΔG_p – the growth in the amount of products due to the new technology and admixtures;
K_{kv} – the ratio of quality products, besides:

$$K_{kv} = \frac{G_e - G_{br}}{G_e} \quad (3)$$

where: G_{br} – the amount of products (and, as an optimum, it would be K_{kv} = 1,0), not complying with standards, which are not distributed in the sales network.

Energy audit and certification of buildings

The new EU Directive 2006/32/EC on energy end-use efficiency and energy services (ESD) provides for all the member states to decrease the energy consumption in the period 2008 – 2016 by 9%. Latvia, too, is planning the respective activities, and the conducted analysis shows that the greatest potential for energy economy is connected with the supply of dwelling houses and public buildings with heat. Starting a motivated management of raising energy efficiency (see Fig.1.) is connected with the cognizance of the potential and measures of energy economy. First of all, it entails

energy audit which allows the cognizance of thermal characteristics of the building and the potential of energy economy. This is of great importance for the formation of public opinion and training the supervisors of houses in order to motivate society to support urgent measures of saving. In several countries the energy audit is obligatory, and it is paid by the state.

Calculations of the energy audit are connected with a great amount of work, and computerisation of these calculations is conducted.

As a participant in the solution of this problem, the Energy Efficiency Centre of the Institute of Physical Energetics (EEC IPE) elaborated the ENERGY AUDIT programme.

On the basis of the calculation of the heat consumption balance of the building this programme determines: thermal losses through various components of the envelope of the building (walls, windows, the roof, etc.) before and after its thermal insulation; the economy of thermal energy and monetary resources needed for heating the house that arise as a result of its thermal insulation; the payback periods of thermal insulation of various elements of the building.

The ENERGY AUDIT programme was drawn up on the basis of the *Microsoft Excel* programme, and it consists of several blocks.

The block which contains the measurements of the materials used for thermal insulation, the thermo physical properties and costs.

The block of calculations ensures determination of the consumption and losses of thermal energy, and the saved thermal energy, as well as the expediency of renovation measures of the envelope components of the building.

The block of the processed information prints data about the investments that are necessary for the renovation measures of the building, as well as the values of the annually saved energy as a result of these measures (in the units kWh and in lats (LVL) or USD), and their payback periods. Thus, by using the obtained calculus, it is possible to plan in a more qualitative manner further renovation steps of the building.

The ENERGY AUDIT programme was used to calculate the losses of heat in more than 1000 houses and the amount of investments required for heat economy. The results of this calculus were employed for planning thermal insulation measures of these buildings.

In order to gain faster and greater economy of energy, a management system is being developed to ensure that the assessments of the energy audit were put into practice (to inform and rouse interest of the owners of houses, their supervisors, investors, and so on). Therefore a classification scale of buildings is being developed according to their heat consumption.

For the electric devices, a worldwide “labelling” system is used when the energetic efficiency of the electric device is indicated in the comparative power scale. This system has proved very good. Therefore certification of buildings would also be efficient as a method of the heat consumption management system based on the classification of buildings by their heat consumption. It is used to stimulate the introduction of energy saving measures. In order to reach better results, verification of the heat consumption in buildings should be linked with tax and credit relief, and other ways of moral and material stimulation.

With the development of the real estate market, the buildings with a lesser heat consumption will count higher. Likewise, with the development of a free housing market, it will be more profitable to sell and buy flats having a lesser heat consumption. Consequently, certification of buildings by the quality of their heat

endurance can be recommended as one of the management methods how to minimise their heat consumption.

On the basis of the data obtained from the research on the actual heat consumption in buildings carried out at Riga Technical University (RTU) the consumption of level 0 (the common, generally accepted consumption) was calculated for the mean statistical heat consumption and the consumption of level 3 (the best existing level) was converted to the normative specific heat consumption of the building (specific losses) which constitute 145 kWh/m^2 a year.

Correspondingly, the values of the other levels are:

5 – a level which is by 25% better than level 3 - 109 kWh /m^2 a year;

4 – a level which is by 10% better than level 3 – 130 kWh /m^2 a year;

3 – the existing level which could be the presently accepted normative level - 145 kWh /m^2 a year;

2 – the best level plus 1/3 of the difference between the generally accepted and the best levels - 177 kWh /m^2 a year;

1 – the best level plus 2/3 of the difference between the generally accepted and the best levels - 208 kWh /m^2 a year;

0 – the generally accepted level – the common level of the actual consumption - 240 kWh /m^2 a year;

-1 – a level which is by 15% worse than level 0 - 276 kWh /m^2 a year;

-2 – a level which is by 30% worse than level 0 -312 kWh /m^2 a year.

When the heat endurance quality certification of buildings is introduced according to the quality scale mentioned above, it is necessary to determine the heat consumption of a particular house (using the ENERGY AUDIT model of calculation or some other model) and to compare it with the values given on the scale. The significance of such certificates growing, it will be in the interests of the owners of houses and flats to take measures of heat economy. Under such circumstances this desire should be supported by means of moral and material stimulation.

The choice of the management method

Certification of the thermal quality of buildings or the evaluation of the economic potential of the energy of an industrial enterprise is the basis for achieving real energy economy. Yet implementation of appropriate steps requires finances and institutional support.

In principle, the energy efficiency management in the dwelling and public sectors, as well as in industry is a part of energy management which, as indicated above, is in agreement with the basic concepts of the environmental management system. However, any branch of national economy has its own specificity and corresponding methods of the management system. The choice of the management method is connected with the solution of the problems of institutional and financial support of this system.

In this particular situation of the development of national economy the choice of a management system may be most influenced by the financial support and its possibilities, although the government and private institutions, too, may affect the implementation of the management system and the choice of the entire system.

The EU Directive 2006/32/EC qualifies third side financing as an innovative practice which has to be stimulated.

Third side financing is a technical and financial instrument (means) which ensures the energy efficiency improvement project with the most appropriate technical solution and the necessary financial means.
The provider of third side financing is the Energy Services Provision Enterprise (ESPE). Its usual responsibilities are:

- ✓ the audit of the customer's energy consumption;
- ✓ selection of technical solutions how to reduce the consumption of energy;
- ✓ economic assessment of the project;
- ✓ implementation of the project.

After the measures aimed at the improvement of energy efficiency are implemented, the operation of the object may occur according to one of two variants.
According to the first variant, the operation of the object is ensured by the ESPE which is also responsible for all the expenditure of this period: the costs of fuel, maintenance and operating costs. The user of the object pays for energy a little less or, in the worst case, just as much as he would have paid if the implementation of the project had not taken place. Such an order of operation is provided by an agreement for a definite number of years calculated so that, after the end of this period, the ESPE could regain the invested sum with a definite interest rate.
According to the second variant, the operation of the object after the implementation of the measure with all the respective costs is ensured by the user. The user regularly pays to the ESPE a part of the economy he gains from the operation of the project in contrast to those expenses which he would have to cover if the implementation of the project had not taken place. The installed equipment remains the property of the ESPE till the moment when the user has completely settled accounts for them.
In either case the ESPE takes part for the period of time envisaged by the agreement of the project, afterwards the equipment becomes the user's property.
During the operation of the agreement the equipment is insured. The insurance costs are included into the operating expenses covered by that side which is responsible for operation. Therefore neither side suffers losses because of the possible damage.
The payback agreement fixes the maximum payback time. Any unpaid sums should be annulled after the fixed period expires and taken over by the third-side investing organisation. If the user wants, sooner payback of the investments is allowed.
Third party financing offers the user a series of technical and economic advantages.

Technical advantages:

- The technical solution of the project is well thought out, and it ensures the best efficiency because the ESPE has highly qualified specialists with huge experience in the implementation of energy-efficient projects.
- The ESPE organises the implementation of a project with the best technical and economic solution.
- The user is not responsible for the technical solution. If the planned economy is not achieved, the user will not suffer losses.
- Since the ESPE usually has great amounts of the ordered equipment and materials, this guarantees their purchase at lower prices, and better quality of the project is achieved at lower costs.

Economic advantages:

- Immediate economy of the payment for energy without any monetary investments (the ESPE does it).
- The user keeps intact his capital and credit lines. The investment is not reflected as a debt, and it does not influence in any way the assessment of the user's financial status.
- If the investment was made in an industrial enterprise, it raises the competitive capacity of the products because better equipment is used.
- After the term of the agreement expires, the user becomes the owner of the equipment without a preliminary monetary investment.
- Immediate improvement in the account of profit and losses because the charge for the consumed energy decreases after the implementation of the project.

An essential factor for successful implementation of the energy efficiency management is an agreement on third-side financing.

When analysing the agreements on third-side financing, it is possible to find that there are many and various kinds of agreements used in accordance with the specificity of each project: an agreement on divided economy, an agreement on energy management, an agreement "paid from the savings", a guaranteed energy economy leasing, joint venture agreements.

The ESPE can finance projects from their resources, as the biggest ESPE do, but it can be also a reliable intermediary between the consumer and the banks which finance ecological projects, or special "green" financial companies, or other developed banks with low interest rates.

In Latvia, the most reliable third-side financers could be the energy supplying organisations that might be interested in retaining their customers.

In case the investments in the implementation of the energy saving measures bring sufficient profit, they can be financed with help of a bank, and no special steps from the side of the government are needed. Due to the low solvency of the population of Latvia such a situation there will not be possible for some time. Therefore the state should stimulate additionally investments in the energy saving measures.

In industry, the process of raising energy efficiency is a complex of organisational and technical measures involving efficient use of energy in order to obtain an equivalent end product or service at the required quality and reduce the consumption of energy at the same time.

Raising energy efficiency improves also the economic indices of the country (by reducing the import of the fossil fuel and updating production and the energy supply).

Attention paid to the energy efficiency problem at large enterprises, including the industrial ones, is not sufficient because the costs of energy often constitute a small part of the total costs. Today the prices of energy are comparatively low, sometimes not exceeding the prices of the raw materials.

An impetus for the development of the production processes is the market competition. By the way, an effective stimulation method of energy economy is "labelling" of electric appliances (motors, bulbs, etc.) which is coming into wide use all around the world. The problems which concern the management of increased heat supply efficiency are the same in industry and in the dwelling sector. In Latvia, where

the heavy industry has little specific weight, a great ratio in the energy consumption in factories falls on the heat supply to the production premises.
The heat and energy economy can often be achieved at small or comparatively small costs by introducing an efficient maintenance programme of buildings. Such steps allow an economy of resources which can be applied in order to introduce new technologies and take steps that require greater investments.
All the industrial enterprises, independent of their sizes, the number of buildings or work places, and the total energy consumption, can gain benefit by means of a good management system of raising the efficiency of heat consumption.
The EU Directive 2006/32/EC provides for voluntary agreement between the interested sides on increasing energy efficiency. This corresponds, in a sense, to the project of the Energy Efficiency Network as a link in the series of problems connected with raising the energy efficiency. One of main tasks of the Network would be to reduce the energy capacity of industrial products, i.e. to reduce the percentage of the energy carriers in the prime cost of products. The Network, within the scope of its possibilities, should apply the developed methodology, carry out the analysis the of energy capacity of products and compare it with the European and world level. The Network would join industrial enterprises by the branch principle and render assistance on various items. Its principal activities would be audit, which is already discussed in the present work, energy management, providing information, arranging seminars and consultations, project recommendations, the study of technologies and branches, as well as comparative tables, or the so-called benchmarking or reference tasks. When creating such a Network, one should take into consideration the Norwegian experience (the Norwegian Energotechnological Institute) where such a network has been operating more than ten years.
The energy efficiency network offers to sum up information about energetic efficiency at any individual enterprise forming the so-called benchmarking tables in which the data of every enterprise are reflected, and the representatives of enterprises can compare the situation of their organisation with that at the other enterprises of the same branch. In contrast to the data reflected by the Statistics Board, the benchmarking results show the economic condition of any particular enterprise in the field of energy utilisation and, following these data, concrete proposals are worked out for the enterprise. As mentioned above, energy efficiency networks are being created. Now there is a project for such a network in Latvia, too. These networks operate successfully for quite a long time in Canada, Norway and other countries. Enterprises can join these networks voluntarily, and anonymous (confidential) comparison of the heat efficiency indicators of these enterprises is carried out there by branches. The enterprise which, because of its insufficiently high indicator in comparison with another enterprise of the same branch, reveals potential possibilities to raise it, conducts the energy audit already described in the present work, selecting prior measures of raising the heat efficiency and raising the value of the indicator of this enterprise. After a repeated audit the first cycle of the indicator improvement may be followed by the next cycle of the indicator improvement aimed at further development of raising efficiency.
In order to make such comparison tables, first of all, it is necessary to summarise the required information about the operation of the enterprise, make calculations, and only after that it is possible to show in a visual way the situation at every enterprise in comparison with the other enterprises of the same branch, revealing by means of a diagramme and a table the “weak” points.

Confidentiality of the information provided by every enterprise is ensured in the network where every enterprise is assigned a unique, appropriate number, known only to it. Consequently, this benchmarking is like an information data base enabling the enterprise to compare his data on energy efficiency with the data from the enterprise of the same branch.
It summarises simultaneously both the economic technical and statistical information about particular industrial enterprises of Latvia which have voluntarily joined the Network with an aim to reduce energy consumption at these enterprises, as well as to reveal their reserves for the use of various nature-friendly energy carriers.
Managers can obtain information about their enterprises in the section of the entire branch. However, at those enterprises where the situation is unstable or critical the weak points are evaluated. The main work proceeds in cooperation with the specialists of the enterprise that is responsible for the energetic situation at the enterprise. Those may be not only the power engineers but also, as the experience of the particular Network shows, the other specialists. It should be noted that there are no such specialists just at the small enterprises, therefore special consultations and explanatory work are needed with the staff of the small enterprises.
At present such networks which carry out benchmarking are created in many countries of the world. In Norway, for instance, the operation of this network is financed from the state budget and a state programme is implemented by means of the network in the field of raising energy efficiency. Presumably, when the economic situation improves in the country, the Latvian government, too, will finance the operation of such a network. But now it could be organised and exist as an experiment and a sort of pilot research in order to prove that the creation of such a network is very topical and necessary for Latvian industry and entire economy in the future.

The development trends of the energy efficiency management

The aims and tasks of raising energy efficiency are defined in the EU documents. The EU Directive 2006/32/EC sets in a rather detailed way the tasks for the EU member states for the next 10 years. This document contains also guidelines on the improvement of the management of raising energy efficiency. It is envisaged to perfect the institutional, financial and legal support of energy efficiency management, its mechanisms and stimuli. It is intended to develop the market of the energy efficiency services. Stimuli are necessary so that the market participants could offer and buy energy efficiency services (funds, subsidies, tax relief, credits). An important role is assigned to the formation of the ESPE which offers energy efficiency services and takes certain financial risk. Various kinds of agreements are envisaged between the receiver of services and their provider, as well as an agreement on third-side financing in which, besides the receiver and the provider of a service, the third side is involved. The third side ensures capital for the events and, in accordance with agreement, takes charge from the receiver. Not always the third side is the ESPE. In order to achieve the quality of increasing the energy efficiency measures, accreditation and certification of the service providers are intended. It is envisaged to improve and computerise energy audit, as well as the mechanism of financing. Energy audit is of great importance for the provision of information to initiate and enhance the energy efficiency measures in order to achieve higher and faster energy efficiency. Standards and norms improve the quality of the energy efficiency services – eventually, the energy efficiency of buildings, too. Important component parts of the

process of energy efficiency management are campaigns of concentrated information, studies and education which promote the improvement of energy efficiency.

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V. Zebergs, N. Zeltins, I. Puikevica - Puikevska, I. Silantjeva un L. Grackova, Management Methods for Achieving Faster and Higher Energy Efficiency for End Users. *The paper reflects investigations into the management methods for raising the efficiency of the processes of the use of energy under the conditions of Latvia. It justifies the fact that the model ISO 14001 of the ecological management system can be used for the management of the processes of raising energy efficiency. The impact of the energy efficiency management system is shown on raising the energy efficiency of an industrial enterprise. Certification of the energy efficiency of buildings is treated as an important management method of raising energy efficiency by means of improved methods of the energy audit. The studies of the choice of the energy efficiency management methods indicate the priority role of the institutional and financial support of the management methods. In the next decade the development of the energy efficiency management methods will be essentially influenced by the EU Directive 2006/32/EC. The directive not only provides for the reduction of energy supply in all the EU countries till the year 2016 by 9.4% (in contrast to the averahe consumption during the last 5 years); but also points to the development of the management methods of raising energy efficiency in order to achieve the targets set by the directive. The work contains evaluation of the management methods of energy efficiency under the conditions of Latvia, which is a new EU member state with her own specificity in the infrastructure development and its management.*

V. Zēbergs, N. Zeltiņš, I. Puikevica - Puikevska, I. Silantjeva un L. Gračkova, Vadības metodes ātrākai un augstākai enerģijas izmantošanas efektivitātes sasniegšanai. *Darbā atspoguļoti pētījumi par enerģijas izmantošanas paaugstināšanas procesu vadības metodēm Latvijas apstākļos. Pamatots tas, ka energoefektivitātes paaugstināšanas procesu vadībai var tikt izmantots ekoloģiskās pārvaldes sistēmas modelis ISO 14001 modelis. Parādīts energoefektivitātes vadības sistēmas iespaids uz rūpniecības uzņēmuma energoefektivitātes paaugstināšanu. Apskatīta ēku energoefektivitātes sertifikācija, kā svarīga energoefektivitātes paaugstināšanas vadības metode. Izmantojot pilnveidotas energo audita metodes. Energoefektivitātes vadības metožu izvēles pētījumi parāda vadības metožu institucionālā un finansiālā nodrošinājuma izšķirošo nozīmi prioritāro metožu izvēlē. Energoefektivitātes vadības metožu attīstību nākošo 10 gadu laikā būtiski iespaidos ES direktīva 2006/32/EK. Direktīva ne tikai paredz visās ES dalībvalstīs samazināt enerģijas patēriņu līdz 2016. gadam par 9,4% (salīdzinot ar vidējo patēriņu pēdējos 5 gados); bet arī dod norādes par enerģijas efektivitātes paaugstināšanas vadības metožu attīstību direktīvas nospraustо mērķu sasniegšanai. Darbā tiek veikta enerģijas efektivitātes vadības metožu vērtēšana Latvijas apstākļos, kas ir jauna ES dalībvalsts ar savām īpatnībām infrastruktūras attīstībā un tās apsaimniekošanā.*

В. Зебергс, Н. Зелтиньш, И. Пуйкевица-Пуйкевска, И. Силантьева и Л. Грачкова, Методы управления для достижения наискорейшей и наивысшей эффективности использования энергии. *В работе отражены исследования о повышении методами управления процессов использования энергии в условиях Латвии. Обосновано, что для управления процессом повышения энергоэффективности может быть использована модель экологической системы управления ISO 14001. Показано влияние системы управления энергоэффективностью на повышение энергоэффективности промышленного предприятия. Рассмотрен метод управления повышением энергоэффективности: сертификация энергоэффективности зданий с применением усовершенствованных методов энергоаудита. Исследования выбранных методов управления энергоэффективностью показали, что при выборе приоритетного метода решающее значение имеет институциональное и финансовое обеспечение. На развитие методов управления энергоэффективностью существенное влияние в последующие 10 лет будет оказывать директива ЕС 20006/ЕС. Дирректива предусматрываает во всех странах участниках Европейского Союза не только снижение энергопотребления на 9,4% (по сравнению со средним потреблением в последние пять лет) до 2016 года, но и даёт указания по развитию руководящих методов о повышении эффективности энергии для достижения определённых директивой целей. В работе произведена оценка руководящих методов эффективности энергии в условиях Латвии, которая является новой страной участницей Европейского Союза со своими особенностями в развитии инфраструктуры и её охозяйствования.*