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Adaption of the general policy assessment methodology for managing the energy saving process

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The member states of the European Union (EU) do their best to accelerate resistance to the crisis, attaching an important role to increased energy saving (ES). There are investigations conducted in each EU member state on the planning and management methods to accelerate ES. In Latvia, which imports almost 70% of the total energy consumed there, each "toe" economy is of great importance. Adaptation of the general policy assessment methodology is being studied for the planning and management of the ES process. Twelve ES management methods have been analysed and recommendations worked out for the introduction of several most topical methods.

Key words: energy saving, policy assessment, adaptation methodology

1. INTRODUCTION

In accordance with the tendencies of the world energy policy, many energy saving (ES) methods and technical means are being developed. However, their introduction is going on slowly, particularly under the conditions of crisis when the financial resources are shrinking. The European Union (EU) requires to present the strategy of energy efficiency policy intended to improve energy economy and as a result to reduce hazardous waste and global warming. The EU Directive 2006/32/EC "On energy end-use efficiency and energy services" provides for all the EU member states to save 9% of annual energy consumption in the year 2016. The North European countries consume much energy to produce heat for heating houses. In Latvia, more than 60% of the total consumption of energy resources is used to produce heat. Considering the fact that the existing buildings have great losses of heat, it is planned to economise heat mainly for heating houses. The annual specific heat consumption for heating living districts is more than twice as high as in the Scandinavian countries with similar weather conditions. There conditions are similar in all Baltic States and in the other new EU member states of Central and East Europe. To reduce heat consumption in buildings by half after the oil crisis of the year 1973, the Scandinavian countries needed 20–25 years. This shows the importance of the coherence of the national policy and EU strategy of energy efficiency, so that energy economy could be reached still faster as required by the Directive.

To develop the national energy efficiency policy strategy in Latvia, energy efficiency (EE) processes have been analysed. The coherence of the vertical and the horizontal dimensions of the General Policy Assessment Methodology (GPAM) are being activated, and tasks are formulated to gain faster a greater energy economy. The GPAM is used as the main research method in which the coherence of the vertical and the horizontal dimensions is developed. They are aimed at the EE policy to gain faster and greater energy economy. The coherence of the vertical dimension is developed starting from the global (EU) policy, the national governmental EE policy, the EE policy of the local authorities and of the regional energy supply companies, etc. The coherence of the horizontal dimension is developed to coordinate the EE policy with the other spheres, cross-cooperation and coordination of the branch institution with the EE policy, stimuli, sections, taxes, etc.

The goals set by Directive 2006/32/EC of the European Parliament and the Council on energy end-use efficiency and energy services require that all the EU member states should reduce energy consumption by 9% until 2016.

In conformity with the Directive, the energy efficiency action plan is being worked out in Latvia for the years 2008–2010. This Action Plan is important for accelerating resistance to the crisis. According to this document, for the EE development there is calculated the average annual amount of energy in Latvia in a 5-year period with the planned 9% target economy. In all sectors, the planned economy is based on a rather detailed calculation, taking into consideration the known EE measures to be taken. In Latvia, such a detailed calculation was made for the housing sector where the highest economy is planned. It is logical because in Latvia, like in other East European countries, much energy is consumed

for heating buildings, and for dwelling houses it often reaches 250 kWh/m^2 a year, while in the Scandinavian countries it is less by half. The plan provides for the improvement of rules and normative acts in order to raise also the heat endurance of the envelopes of buildings.

In order to achieve the planned energy economy, it is necessary to elaborate innovative EE management methods. Twelve EE management methods and their dependence on the most important instruments of the EE policy are analysed. These are the applied methods which have the advantage that they can be evaluated in an appropriate manner and the best of them can be sooner put into practice.

2. GENERAL POLICY ASSESSMENT METHODOLOGY

The coherence of the vertical and the horizontal dimensions of the General Policy Assessment Methodology (GPAM) is being activated, and tasks are formulated to gain a faster and greater energy economy. The GPAM is used as the main research method in which the coherence of the vertical and the horizontal dimensions are developed. The coherence of the vertical dimension is developed starting from the global international (EU) policy, the national governmental EE policy, the EE policy of the local authorities, the EE policy of the regional energy supply companies, etc. The coherence of the horizontal dimension is developed to coordinate the EE policy with the other spheres, cross-cooperation and coordination of the branch institution with the EE policy, stimuli, sections, taxes, etc. Table 1 presents the coherence dimensions of the EE managing policy.

Policy coherence is understood as a systematic promotion of mutually reinforcing policy aspects across the governmental and regional departments and agencies ensuring synergies towards achieving the agreed objectives; the term has two dimensions and can be differentiat into vertical policy coherence (coherence and coordination among different administrative levels) and horizontal policy coherence (cross-departmental coherence and coordination of adjacent policy areas).

In Fig. 1, we present the hierarchic steps of EE managing vertical dimension.

Table 1. **Dimensions of policy coherence**

1. The coherence dimension of the vertical EE policy
1.1. The EU policy of central management
1.2. The management of national policy for common aims
1.3. Policy coordination and raising integration
2. The coherence dimension of the horizontal EE policy
2.1. Coordination of the EE policy with other spheres (regional development, nature protection, development of business, etc.)
2.2. The level of cross-cooperation and coordination of the branch institutions with the EE policy
2.3. Intensification of cross-cooperation and coordination of institutions
2.4. Stimuli, sanctions, taxes, etc.

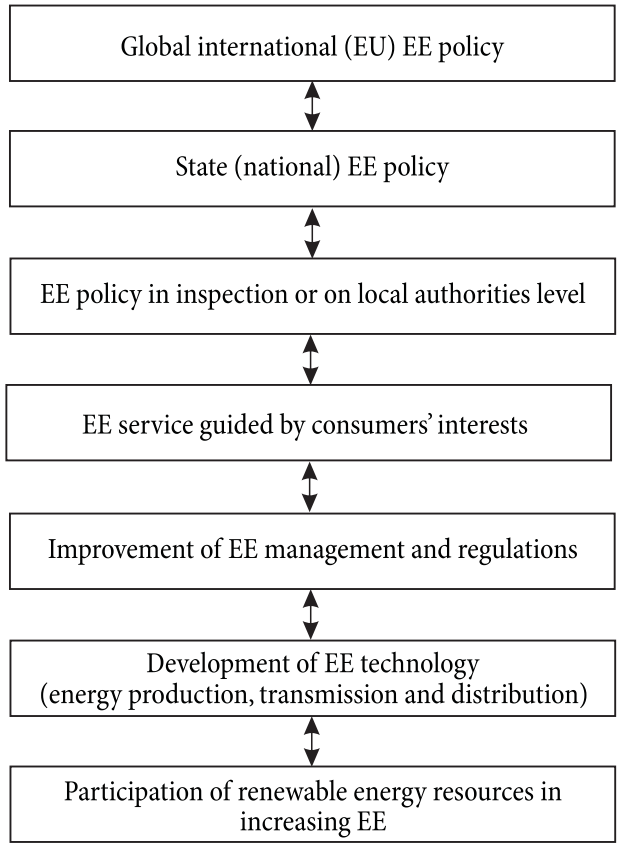

Fig. 1. Hierarchic steps of EE managing vertical dimensions

The key instruments (planning, instructional, financial and communicative) and factors of success for developing EE management are presented in Table 2.

3. THE EE DEVELOPMENT DEPENDING ON MAIN POLICY INSTRUMENTS

The main problems and challenges concerning the prospects of developing EE managing systems in Latvia are discussed as well as the results are presented of the post analysis of the EE planning and managing practice. The key instruments are planning, institutional, financial and communicative, and factors of success for developing EE managing.

The goals set by the Directive 2006/32/EC of the European Parliament and the Council on energy end-use efficiency and energy services require that all the EU member states should reduce the consumption of energy by 9% until year 2016.

In conformity with the Directive, the EE Action Plan is being worked out in Latvia for the years 2008–2010. According to this planning document, for the EE development there is calculated the average annual amount of energy in Latvia for the 5-year period with the planned 9% target economy.

In all sectors, the planned economy is based on rather detailed calculations, taking into consideration the known EE measures to be taken. Table 3 presents such a detailed calculation in the housing sector where the highest economy

Table 2. **Identified policy instruments to support EE developing management**

Instruments of planning	Institutional organisations	Financial instruments	Communicative instruments
1. The EE strategy (national, regional and municipality levels). 2. The Programme of actions (on the national level). 3. Energy audit for the living sector and industry. 4. Assessment of the accessibility and logistics of the renewable energy resources.	1. The EE implementation management organizations. 2. The energy service organization. 3. Cooperation of administrative and municipal management bodies. 4. Cooperation of consultancy firms, municipal, supplying organizations of energy and technical means.	1. The main sources: • The owner's resources; • State (municipal) credit guarantees; • Public investment Programme (state budget). 2. Additional sources: • The EE funds; • Ecological funds.	1. Meetings of the population. 2. Days of information (institutional organizations). 3. Inquiries of the population about EE implementation and energy service.

Table 3. **EE measures in the housing sector**

Measures	Action	Period	Expected economy in the year 2016 (GWh)
1. Energy audit	Audit and informing consumers	2005–2016	135
2. Raising EE in a block of flats	EE improvement in buildings	2007–2016	1900
3. Raising EE in government and municipal houses	EE improvement in buildings	2007–2016	570
4. Informing consumers	Informing end-consumers	2006–2016	7
5. Legislation on raising EE of buildings	Development of rules and normative acts	2008–2016	90
		Total	2702

is planned. It is logical because in Latvia, like in other East European countries, there is a great specific consumption of energy for heating buildings, and for dwelling houses it often reaches 250 kWh/m^2 a year, while in the Scandinavian countries it is less by half. The plan provides for the improvement of rules and normative acts in order to raise also the heat endurance of building envelopes.

Table 4 presents a motivation of the energy economy plan in the industrial sector.

4. IMPLEMENTATION OF MANAGING METHODS

In order to achieve the planned energy economy, it is necessary to employ innovative EE management methods. Table 5 presents an analysis of 12 EE management methods in Latvia and their dependence on the most important factors of EE policy: institutional organisation and financial instruments (see Table 2).

It is evident from Table 5 how wide are the possibilities in Latvia to improve the EE management methods because only 5 of the 12 methods mentioned in Table 5 are used (in part). Practically, there are several elements of these five systems of management methods in the country, mainly on the level of pilot projects. These are applied methods which have the advantage that they can be properly evaluated and the best of them can be sooner put in practice. Therefore, evaluation of methods is an important direction of research in the field of EE management.

The main priorities of implementation can be the managing methods of thirt-side financing, developing the EE networks (EEN) and certification of the thermal quality of buildings.

4.1. The third-party financing

The third-party financing is called an innovative practice in the EU Directive 2006/32 EK, and it should be promoted. The third-party financing is a technical and financial instrument which provides a project of raising EE with the most appropriate technical solution and the necessary financial means. The third-party financer is the Energy Service Company (ESCO). Its responsibilities commonly include the customer's energy consumption audit, selection of technical solutions how to decrease energy consumption, an economic assessment of the project, and the implementation of the project. Upon implementing the measures aimed to improve EE, the operation of the object may proceed by one of the two variants.

Table 4. **EE measures in the industrial sector**

Measures	Action	Period	Expected economy in the year 2016 (GWh)
1. Information about EE	Analysis and introduction	1995–2016	32
2. EE for lighting	Analysis and introduction	1995–2016	56
3. Energy audit on the EE of technologies; restructuring of enterprises	Audit, improvement of technologies, restructuring of enterprises	1995–2016	72
		Total	159

Table 5. **Dependence of EE management methods on the most important instruments of the EE policy**

EE management processes	Development of institutional support	Development of financial support
Efficient integrated management methods	++	++
The market of the efficiency service	+	+
Formation of the energy supply service enterprises (ESCO)	+	+
The ESCO competition in the market of EE services	+	+
Optimization of the market of EE services	+	+
Management methods of third-side financing	+	+
Optimization of third-side financing agreements	+	+
Development and computerization of the method of energy audit	++	++
Improvement of standards and norms	++	++
Development of enterprises of quality EE services	++	++
Establishing the post of "energy manager"	++	++
Improvement of EE networks in order to raise EE in industry	+	+

++ – there are several elements of the management system in the country; + – exists only on the level of a proposal.

In variant one, the operation of the object is ensured by the ESCO which is also responsible for all expenditures during this period (cost of the fuel, maintenance and service). The user of the object pays for the energy a little less or, in the worst occasion, just as much as in the case if the project had not been implemented. Such an order of operation is followed for the number of years as envisaged by the agreement, and is calculated so that the ESCO could regain the invested sum after the end of this period with a definite profit rate.

In variant two, the operation of the object after implementing the measures with all respective costs is ensured by the user. The user periodically pays the ESCO part of the economy gained from the implementation of the project, in contrast to the costs he would have to cover if the project has not been implemented. The installed equipment remains the property of the ESCO until the moment when the user has fully paid for them.

In either case, the ESCO takes part for a period of time provided by the agreement, after which the equipment becomes the user's property. The third-party financing provides the user with a series of technical and economical advantages.

The technical solution of the project is well considered, and it ensures the highest efficiency because highly qualified experts who have great experience in the implementation of energy-efficient projects work for the ESCO. The ESCO organizes the implementation of a project with the best technical and economic solution. The user is not responsible for the technical solution; if the prognosticated economy is not achieved, the user will not suffer losses. Due to the fact that the ESCO usually has great amounts of the ordered equipment and materials, their purchase is ensured at lower prices, and a better quality of the project is attained at lower costs.

An essential factor for a successful implementation of the EE management is the agreement of the third-party financing. When analyzing such agreements, one can see that there are many and various kinds of agreements used depending on the specificity of a project, agreements on energy management, "paid-from-the-saved" agreements, a guaranteed energy economy leasing, joint venture agreements, etc.

The ESCO can finance projects from its own resources, as the largest ESCOs do, but it can also be only a reliable mediator between the consumer and the banks financing ecological projects, or special "green" financing societies, or the other development banks with low interest rates.

The most reliable third-party financers in Latvia could be energy supplying enterprises which may be interested in retaining their customers (see Table 6 and Fig. 2).

In cases when investments in energy saving measures bring sufficient income, they may be financed by means of bank credits, and no special measures have to be taken on behalf of the state.

4.2. Energy efficiency network

Another EE management method in which the EE scale is important is the energy efficiency network (EEN). The EU Directive 2006/32/EK provides for voluntary agreement between the parties concerned in raising energy efficiency. To a

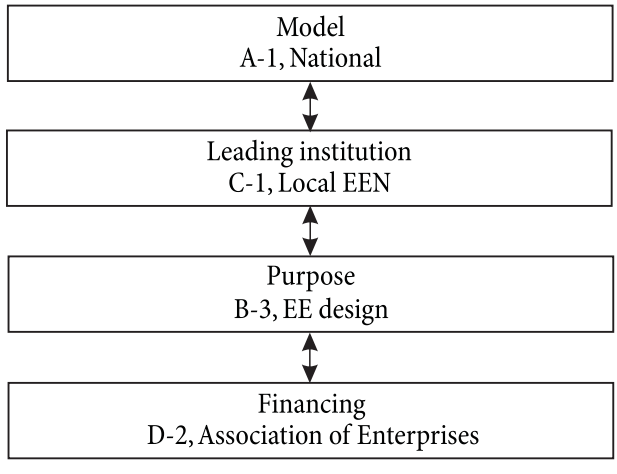

Fig. 2. Structural version of ESCO project
For the numbers of versions, see Table 6.

Table 6. **Versions of structural models of ESCO**

Functions	Version	Institutional and financial support, activities
A. Model	A-1	International
	A-2	National
	A-3	Local (cities, regions)
	A-4	Sectional (industry)
	A-5	Intersectional (industrial enterprises, public and residential buildings)
B. Purpose	B-1	Increment and education of the EE owners
	B-2	The EE interim design
	B-3	The EE design
C. Leading institution	C-1	The EEN organization
	C-2	The leading enterprise
	C-3	The energy supplying organization
D. Financing	D-1	The state budget (at the initial stage)
	D-2	Associations of enterprises

certain extent, it agrees with the project of the EEN as one of the links in the solution of the problems how to raise energy efficiency. One of the principal tasks of the Network would be to reduce the power intensity of the products produced by the industrial enterprises, i. e. to reduce the percentage of energy carriers in the prime costs of the product. Within the scope of its possibilities, the Network should use the developed methodology, conduct an analysis of the power intensity of a product and compare it with the European and world levels. The Network could unite industrial enterprises according to the branch principle and render support in various issues. Its main activities would be the already discussed audit, energy management, and the provision of information, seminars and consultations, recommendations for projects, the study of technologies and branches, as well as introduction of benchmarking. When building such a network, the Norwegian experience (the Norwegian Energotechnological Institute) should be taken into consideration, where such a network has been operating for more than ten years (Fig. 3).

As mentioned above, EENs, are being set up, and now there is a project of establishing such a network in Latvia, which has been operating successfully in some countries for a comparatively long time. Enterprises can join such networks voluntarily, and an anonymous (confidential) comparison of the heat efficiency indicators of the enterprises is made by branches. An enterprise with an insufficiently high indicator in comparison with another enterprise of the same branch, but which shows a potential capacity to raise it, makes the above described energy audit to set the priorities of the measures for raising the heat efficiency and the value of the indicator of the enterprise. The first improvement cycle of the indicator may follow the next improvement cycle after a repeated audit aimed at the further rise of efficiency.

In order to draw up benchmarking tables, first of all it is necessary to collect the necessary and required information about the operation of the enterprise, to make calculations, and only then it is possible to visualize the condition of each enterprise in comparison with the other enterprises of the same branch, to reveal the "weak" points by using a scheme and a benchmarking table.

The network ensures the confidentiality of the information provided by each enterprise; each enterprise is assigned a unique number known only to it. So this benchmarking serves as an information data base allowing the enterprise to compare its EE data with the data of another enterprise from the same branch (see Fig. 4).

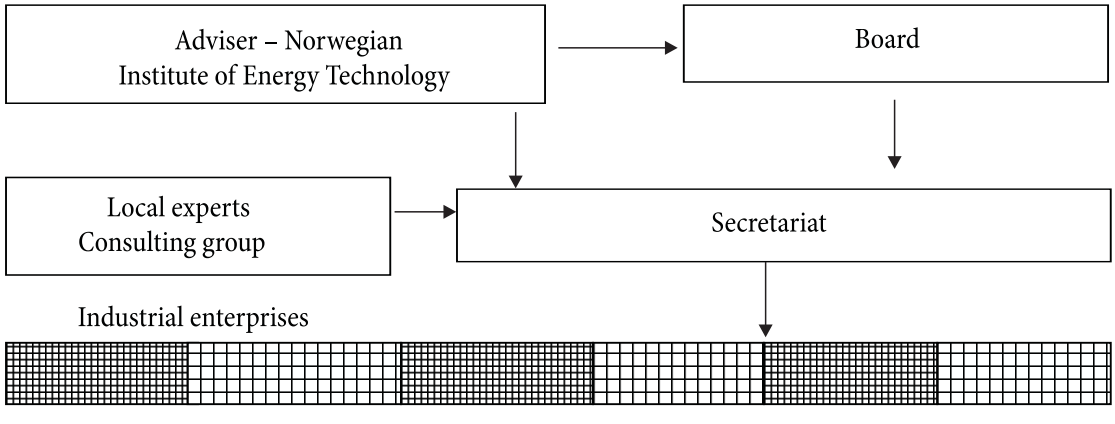

Fig. 3. Structure of the Latvian EEN project

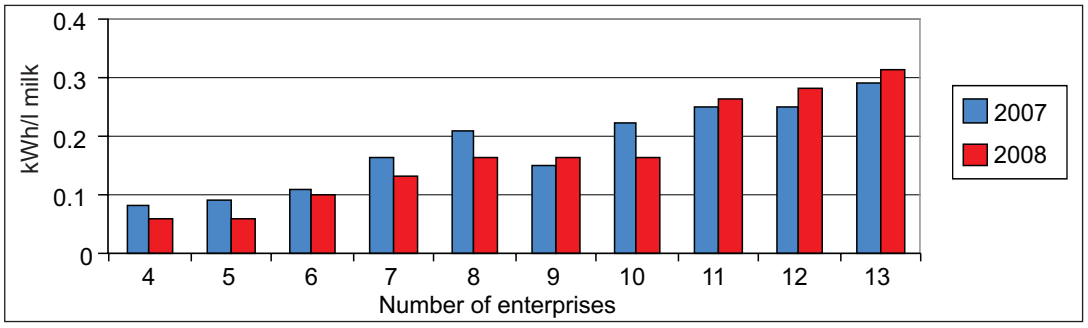

Fig. 4. Energy intensity benchmarking of milk processing industry

At present, such networks which perform benchmarking are operating in many countries of the world. For instance, in Norway the operation of this network is financed from the state budget, and with the help of the network the state program is implemented in the field of raising energy efficiency. Presumably, the Latvian government will also finance the operation of such a network when the economic situation of the country improves, but now it could be organized and exist as an experiment and a kind of preparatory research to prove that the creation of such a network is highly urgent and in the future will be necessary for the Latvian industry and economy as a whole.

4.3. Certification of the thermal quality of buildings

On the basis of the research data obtained in Latvia concerning the actual heat consumption of buildings, the consumption of level 0 (the commonly accepted consumption) was calculated as an average statistic heat consumption, and the consumption of level 3 (the best existing level) was recalculated for the normative specific heat consumption of the building (specific heat losses), and it constitutes 145 kWh/m^2 a year. The corresponding values of the other levels are:

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

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

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

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

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

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

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

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

Certification of the thermal quality of buildings, or else, the evaluation of the energy economy potential at an industrial enterprise is the basis for a real energy economy. However, the implementation of respective measures requires finances and institutional insurance. In principle, the management of energy efficiency, both in the residential and public sectors, and in industry, is a component part of the energy management which, as stated above, complies with the basic provisions of the Environmental Management System. Yet each branch of national economy has its own specificity and corresponding methods of the management system. The choice of the management method is associated with the solution of the problems of the institutional and financial insurance of this system.

5. CONCLUSIONS

1. As a result of the research, policy instruments have been identified to support the EE development planning and management for mitigating the consequences of crisis. Twelve EE management methods have been investigated depending on the basic policy instruments (instruments of institutional and financial support) under the existing EE management development conditions in Latvia. The possible structural models of the Energy Service Company (ESCO) have been worked out for the conditions of Latvia. Recommendations have been developed for the structural model of the EEN and certification of the thermal quality of buildings.

2. The General Policy Assessment Methodology (GPAM) is used as the main research method in which the coherence of the vertical and the horizontal dimensions is developed. They are aimed at the EE policy to gain a faster and greater energy economy. The coherence of the vertical dimension is developed starting from the global (EU) policy, the national governmental policy for EE, the policy of the local authorities for EE, the policy of the regional energy supply companies for EE, etc. The coherence of the horizontal dimension is developed to coordinate the EE policy with the other spheres, cross-cooperation and coordination of the branch institution with the EE policy, stimuli, sections, taxes, etc.

3. The EU Directive 2006/32/EC presents the aims of the EE development till the year 2016, but it utters an appeal to do still more. Ways are given how to reach these aims, including the EE Action Plan 2008–2010 as an important step to

withstand the crisis. However, investigations are important also into the management of the EE development process. The GPAM analysis shows that this model of the EE policy can be used for reaching faster the EE aims and exceeding the tasks set by the EU Directive, especially in the area of thermal energy management for heat supply in Northern Europe and other regions with a similar climate.

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BENDROSIOS POLITIKOS ĮVERTINIMO METODOLOGIJOS PRITAIKYMAS VALDANT ENERGIJOS TAUPYMO PROCESĄ

S a n t r a u k a

Europos Sąjungos (ES) valstybės narės daro viską, ką gali, siekdamos paspartinti pasipriešinimą krizei, daugiausia dėmesio skirdamos energijos taupymo (ET) didinimui. Kiekvienoje ES valstybėje narėje atliekami planavimo ir valdymo metodų tyrimai, siekiant sutaupyti daugiau energijos. Latvijoje, kuri importuoja beveik 70 % visų vartojamų energijos išteklių, kiekvienos „tne" sutaupymas yra ypač svarbus, siekiant paspartinti pasipriešinimą krizei. Bendrosios politikos įvertinimo metodologija taikoma nagrinėjant ET proceso planavimą ir valdymą. Buvo išanalizuoti 12 ET valdymo metodų ir parengtos rekomendacijos keliems aktualiausiems metodams nustatyti.

Raktažodžiai: energijos taupymas, politikos įvertinimas, pritaikymo metodologija

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ПРИМЕНЕНИЕ МЕТОДОЛОГИИ ОЦЕНКИ ОБЩЕЙ ПОЛИТИКИ ДЛЯ ПРОЦЕССА УПРАВЛЕНИЯ ЭКОНОМИЕЙ ЭНЕРГИИ

Р е з ю м е

Государства – члены Европейского Союза (ЕС) делают все возможное по ускорению сопротивления кризису, уделяя особое внимание увеличению экономии энергии (ЭЭ). В каждом государстве – члене ЕС проводятся исследования методов планирования и управления в целях достижения более высоких показателей ЭЭ.

В Латвии, которая импортирует почти 70 % используемых энергоресурсов, каждое сэкономленное „tne" особенно важно в процессе повышения темпа сопротивления кризису. Методология оценки общей политики применяется при исследовании процесса планирования ЭЭ. В работе проанализированы 12 методов ЭЭ, разработаны рекомендации, позволившие выделить самые актуальные методы.

Ключевые слова: экономия энергии, оценка политики, методология применения