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RESOURCE AND ENERGY SAVING TECHNOLOGIES IN THE ACTIVITY OF SMALL ENTERPRISES

ТЕХНОЛОГИИ РЕСУРСО- И ЭНЕРГОСБЕРЕЖЕНИЯ В ДЕЯТЕЛЬНОСТИ МАЛЫХ ПРЕДПРИЯТИЙ

Les A. V. / Лесь А. В.

с.е.с. / к.э.н.

ORCID: 0000-0002-1746-3744

Rashchenko A. V. / Рашченко А. В.

с.е.с. / к.э.н.

ORCID: 0000-0002-7603-072X

Zhytomyr National Agroecological University Zhytomyr, Stary Boulevard, 7, 10008

Житомирский национальный агроэкологический университет,

Abstract.г. Житомир, Старый бульвар 7, 10008

Abstract. The article estimates energy and resource-efficient measures that foresee new levels of technological ways of transforming and consuming the resources used by the enterprise. It is suggested to consider the resource saving at the enterprise in various aspects (economic, financial security, technical, technological and social information). Directions and constituent estimates of resource consumption are given. It is substantiated that the organizational mechanism of implementation of measures for conservation of resources in small enterprises should be possible from the point of view of technological decisions and economic justification of the efficiency of modernization. Thus, the organization of the introduction of energy and resource-saving technologies in the activities of enterprises should be part of the process of improving the efficiency of energy and resource consumption.

Key words: environmental protection technologies, energy efficiency, resource conservation.

Rapid development of technologies and relatively open access to them for businesses provides new opportunities for development. However, they cause an uncontrolled growth of energy and resource use. That is why it is important to control the environmental aspects of energy and resource consumption. This topic is especially relevant in the context of the transformation of the problem of saving resources and their rational consumption to one of the factors of the development of enterprises.

We consider energy and resource saving as an activity that involves taking measures and applying technological solutions that provide savings for the main types of resources (including energy). Energy and resource efficient measures are most relevant as they include new levels of technological ways of transforming and consuming the resources used by enterprises. They also comprise the efficient allocation and use of resources, thereby reducing the environmental impact.

We believe that resource saving at the enterprise should include four main directions:

- economic as achievement of efficiency of use of production resources;
- financial security and efficiency of implementation of resource-saving measures;
- technical and technological as providing the enterprise with efficient and environmentally safe fixed and working capital;
- social and informational as a continuous education and maximum involvement



of employees of the enterprise in the implementation of energy and resource saving measures.

Projects of implementation of energy and resource conservation measures at enterprises aim to reduce the consumption of all types of resources. They are needed because of the constant increase of the cost of resources, which affects the profitability of the business as a whole. However, in addition to the obvious argument for such projects (reducing utility bills), the following aspects should be noted:

- increasing of term of effective operation of office (industrial) building;
- increasing the comfort of being in the building of clients and employees of the enterprise;
- improving of the condition of the ventilation systems of buildings, basic production and sanitary equipment;
- improving the quality of production of goods (providing of services), etc.

In general, resource savings by types of resources can be divided into measures to improve the efficiency of energy (electrical and thermal), water, materials, funds and personnel (labor resources) of the enterprise. This study focuses on the first two types of resources that are of the greatest environmental importance.

In the area of the improving the energy efficiency of buildings, measures include improving of the heat retention of fencing structures and improving their heating systems. In addition, it is important to apply technologies that can improve the state of cold and hot water systems. Efficient use of energy also implies the rational placement and economical use of electricity for the operation of the equipment of the enterprise and for lighting its premises. For certain types of business, the issue of the proper organization of the ventilation system, which must fulfill its functions of updating and purifying the air and be as efficient as possible in terms of the cost of electricity for its operation, is fundamentally important.

The methodology of estimating the use of resources and energy at the enterprise involves the following works: 1) technical inspection of the enterprise and measurement of indicators of consumption of resources (water, electricity); 2) analysis of indicators of use of resources at the enterprise (water, electric and thermal energy).

It should be noted that projects for the implementation of energy and resource-saving measures at enterprises should be based on a detailed survey of structures, systems of supply of resources, technological processes and equipment. Only under such conditions is it possible to develop the high quality project and to implement it with minimal risks and financial costs.

Carrying out an assessment of the use of resources by an enterprise and developing clear recommendations based on it can ensure the reduction of the use of electricity, heat, water, gas, etc. (Table 1). At the same time, the receipt of information about the object should be as complete as possible and economically justified.

These assessment steps are a simplified version of the methodologies adopted by the current regulations of Ukraine [1, 2]. We believe that this type of resource and energy consumption assessment is acceptable for small businesses that do not use energy-consuming equipment and have already carried out basic energy-saving and



warming measures. After all, unlike the approaches typical of large companies and organizations, the managers of such enterprises are usually not ready to spend additional funds for the diagnostics of the enterprise and organization activities.

At the same time, the methodology should include the measurement of the amount of thermal energy required to maintain the normative temperature indicators in the premises and the volume of water supply, which will ensure the normal functioning of the enterprise.

Table 1

Directions and components of resource consumption estimates

Areas of assessment	Complements	Resources
Heating systems		
Enterprise	- system of individual heating of the enterprise; - state and distribution system at the enterprise; - condition and isolation of basements or attics; - presence of weather regulation in the thermal point; - condition and thermo-regulation of heating appliances.	Electricity, thermal energy, water
Building	district heating system; - state and distribution system in the house; - condition and isolation of basements and attics; - presence of weather regulation in the thermal point; - condition and thermo-regulation of heating appliances.	
Building options	- type and structural features of the building; - state of translucent structures (windows, balcony doors).	Thermal energy
Equipment		
Specialized	- condition and class of energy efficiency of equipment; - equipment usage mode.	Electricity, water
Sanitary-engineering	- condition and characteristics of the whater heaters (heating element capacity, tank volume); - condition of water-locking and regulating fittings, sanitary engineering and all equipment of water supply.	
Public use	- condition and class of energy efficiency of equipment; - equipment usage mode.	
Airing	- the condition and capacity of specialized airing equipment (motor power, capacity, pressure, receiver volume, number of cylinders); - general airing systems condition and capacity (air velocity, relative humidity, temperature).	Electricity
Lighting		
Specialized	- light levels; - Reflection of light from ceiling, walls and floor; - color illumination temperature; - color matching index.	Electricity
Public use	- the level of illumination of the premises providing the lamps of general illumination.	

Thus, a full assessment of the efficiency of consumption of resources at the enterprise includes separate directions and components: systems of heating, lighting, ventilation, etc. Its conducting requires financial resources, staff time, and involvement of external experts. However, developing an energy and resource efficiency action plan is not possible without analytical preparation. Even if the employees carry it out, it is possible to achieve a reduction in the consumption of resources through organizational measures and work on the principles of "green



office".

An organizational mechanism for implementing measures to conserve resources in small businesses should be possible from technological solutions and economic justification for the effectiveness of modernization. Conventionally, this process can be represented as a block diagram (Fig. 1).

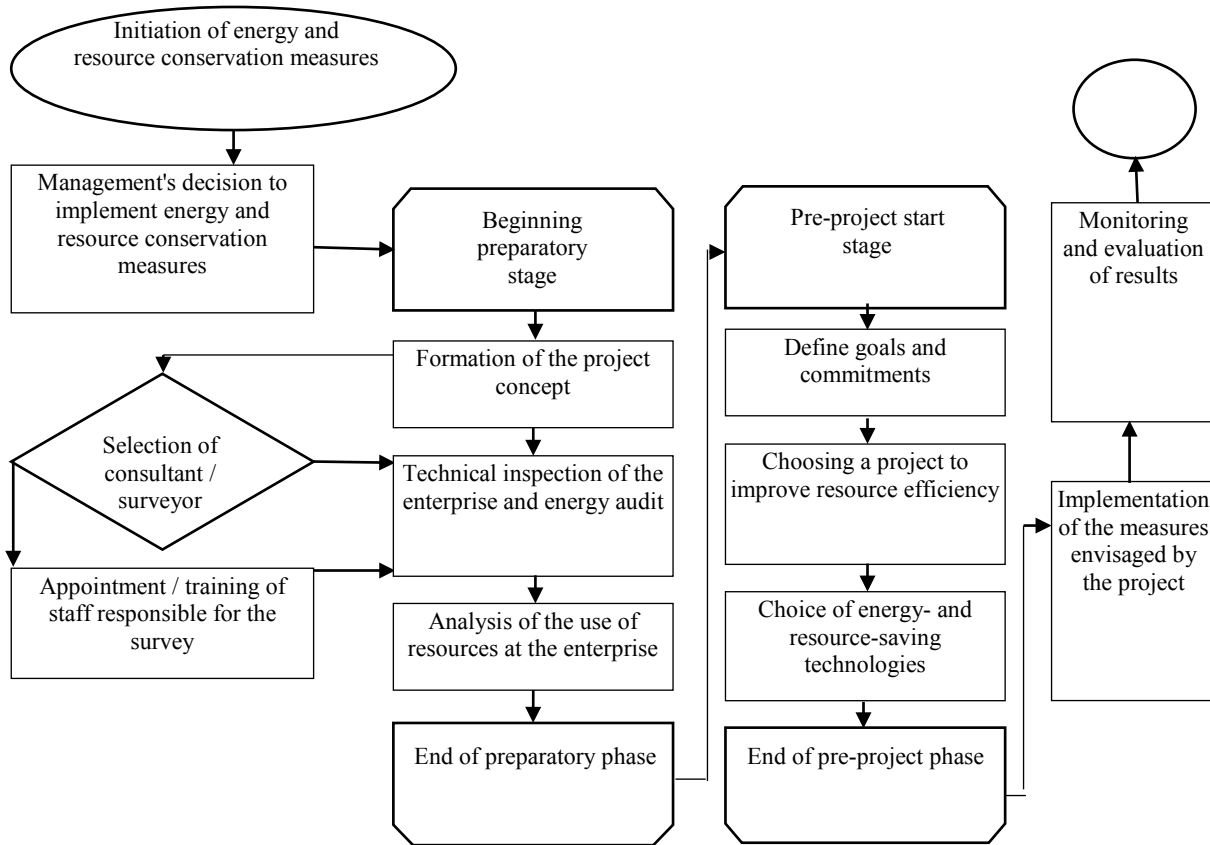


Fig. 1. Block diagram of organization of introduction of energy and resource-saving technologies in the activity of enterprises

In general, specialists and employees, who are sufficiently motivated to obtain positive results of the planned activities, should carry out each stage of the project implementation. Traditionally, experts have identified two main groups of resource conservation measures: short-term activities that are capable of delivering relatively fast results and basic activities that can provide a high level of resource savings [2, p. 14]. The first group of events includes, first and foremost, information companies held among employees of small businesses; rules of procurement of working capital, which save resources and others. The second group of measures include the selection and implementation of energy and resource-saving measures and technologies that will provide the opportunity to eliminate the causes of low efficiency of resource consumption by the enterprise [2, p. 17].

It is particularly appropriate to emphasize the financial aspect of implementing energy and resource conservation measures. Obviously, it is the core group of activities that will require some investment and additional funding to realize them. In the process of selecting the best project to improve the use of resources and energy



and resource-saving technologies, the financial component itself can potentially have the greatest weight.

Conclusions. Thus, the organization of the introduction of energy and resource-saving technologies in the activities of enterprises should be part of the process of improving the efficiency of energy and resource consumption. This process involves six steps, the ultimate goal of which is to increase the level of resource savings and reduce the enterprise's dependence on resource suppliers. Further research needs to assess the state of fixed assets of enterprises from the point of view of their resource conservation, as well as the peculiarities of management decisions on their updating.

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