

Was also calculated the discounted payback period - the period of time when the investment amount will be equal to the discounted cash income. On the basis of the data in Table 1 and 2 were calculated payback period of the investment project according to the following formula:

$$DPP = \text{Last year with a negative index} + \frac{\text{Last year with a negative index}}{\text{Last year with a negative index and the following year}}$$

Calculations have shown that if the company will carry your project to a standard in their calculations will use the method of calculation in terms of the refinancing rate and the inflation of the risk, the project will pay for itself in 4 years 9 months, if the weighted average cost of capital - 5 years 10 months if the method is cumulative construction - about 6 years. Classification of the investment project to non-standard (with an uncertain implementation schedule) shows smaller payback period of 5 years. All the project's payback period is less than the period of its implementation, which allows reasonably decide on its adoption.

Thus, investments play an important role in the functioning and development of the economy. Investment growth has an impact on the amount of social production and employment, structural changes in the economy, the development of its specific industries. Through investments to create new high-tech production, modernizing existing, implemented promising for the national economy and business investment projects. One crucial to making an investment project has the right and informed choice of discount rate. It should take into account all the risks that may be subject to an investment project, including not only common, but also specific risks. How well will the discount rate, so the investor can correctly predict the further development of events associated with the investment project. After entering the investment project, the company will have at every stage of design techniques and methods of influence on the level of risk in order to reduce it to the maximum.

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ECONOMIC PERFORMANCE OF THE CONSTRUCTION OF A SMART HOME

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The questions of technological progress, which help to improve a person's life, are considered in the article. The question of how scientific advances are helping people to care about the ecology of the environment, as well as financial savings in the operation of the building.

Expenditures for maintenance and operation of any building typically include utility bills for heating, ventilation, gas, hot and cold water, lighting and power appliances. Rates listed on the utilities are constantly growing. Obviously, the reduction of this expenditure is possible by reducing the amount of energy consumed, which in turn requires the implementation of principles and energy-saving technologies in the design and construction of buildings.

Smart home is a house of modern type, organized for people living with the help of automation and high-tech devices. Under the "smart" home should be understood a system that provides comfort (including security), and resource for all users. In the simplest case, it should be able to recognize specific situations that occur in the home, and properly respond to them. In addition, the automation of several subsystems provides a synergistic effect for the entire complex [1].

The main advantage of "smart home" is considered to be comfortable. But more important is the possibility of significant reductions in energy consumption.

Economics

Energy-efficient building is called, which uses design and technical solutions to exploit its low power consumption, while maintaining a comfortable sanitary conditions.

Construction of energy-efficient homes based on the following criteria:

- Low power consumption ensures low operating costs at home;
- Increased comfort - warm and healthy indoor climate;
- Higher market value of the building.

Energy economy of the building, in turn, is useful for society and the economy, as the effect on reducing pollution, saving natural resources and reduce dependence on import of energy carriers.

Search and energy supply, and their conversion into energy, leading to the pollution and destruction of the environment (carbon dioxide and other gases, dust and liquid emissions, water contamination), thus, less energy consumption, the lower the soiling. However, for the needs of environmental protection is not enough only to energy conservation. Hence the desire to energy-efficient building was also the environmental, which uses materials which are safe for human health and has no adverse impact on the environment.

Rate the energy properties of the building can be based on the average value of the annual energy consumption in a particular building, per 1 m² of usable area. For projected building this value can be calculated based on the data of the project and for the construction of the building - actually measured.

That the building could be called energy saving, the following important building solutions:

- location of the building, taking into account the profile of the terrain, sunlight, wind direction, "green shield" etc.;
- shape of the building of maximum compression, without projections and discharges, the room with large windows on the south side, small windows, or lack thereof on the north side, thermal buffer zone (greenhouses, waiting room sun window);
- outdoor enclosures, such as walls, roof, with good thermal insulation, sealed, with a minimum of thermal leaks;
- exterior windows and doors with high thermal isolation and increased tightness;
- night insulation of windows;
- balconies special design shall minimize thermal leakage
- automatic ventilation with heat recovery;
- heating and hot water with high efficiency;
- the possible use of solar collectors for heating domestic hot water [2].

Smart home – it is also a good project, which specifies all the details of the implementation of elements on which the limit heat loss. Implementation of the construction is in accordance with the project, metering and leak of thermal insulation of external protections.

Control of heating the house is organized as follows. The house is equipped with different heat sources (fireplace, solar collectors, heat pumps, boilers), after kindling fire automatically redistribution of energy (depending on the season) in the central heating or hot water system. It provides exactly home control system. On hot days, kindling the fire is not possible, because it is blocked by the system, and the function of the ground source heat operate solar collectors. After nightfall the situation changes, because changes external conditions. If tenants do not want to heat the fireplace, the system includes a heat pump, or (if it is down for maintenance) – gas boiler. This sequence is not accidental - it is defined economies. The cheaper energy, the higher the priority equipment that it produces. For economic reasons, the heat pump provides two modes of operation: it is a source of heat and cold in the winter - summer. This possibility has a positive effect on the efficiency of its use. Similarly, the situation with the electricity used by tenants of the house for domestic purposes. Whenever possible, the system switches the device to the power of cheap electricity generated by solar panels installed. Such interaction scenarios, there are many. That is why the management of heating systems, hot water system or home lighting is the task of computers rather than people. Today, the system creates a dream house, do not need to resign ourselves to the role of technical workers [3].

Making a decision about the construction of energy efficient buildings in the first place ask ourselves whether the amount of change to pay for our energy and how much we improve interior comfort. Providing energy and thrift buildings require additional costs for the construction, since the calculation of additional costs for such a building should take into account the difference between the cost of standard and energy-saving products. For example, the cost of increasing the thickness of the insulation, the difference in the cost of the windows and doors of standard and energy saving, the difference in the cost of heating and ventilation systems, etc.

Increasing the size of the investment, depending on the choices made, is combined from several to 12% of the standard object. But, as a result of investment in single-family home can achieve a reduction of energy consumption up to 16,000 kWh per year.

If you use credit to build a house, then this value can be used to save on payment of an additional portion of the loan, the amount of which increased costs to improve the energy standard.

Perhaps additional construction costs of energy-efficient homes and increase the amount of the loan, however, the monthly loan payment is not increased by an amount greater than the same value of the monthly savings on operating costs. Total costs as energy and credit for energy-saving and standard buildings are approximately the same, while after payment of the loan total cost of ownership of energy-efficient buildings will be lower.

Thus, the construction of energy-efficient building is a profitable investment.

There are many different insulating materials that can be used to insulate the external building fences, however, for each specific case it is necessary to select an appropriate material of desired thickness. And in addition to the cost, the choice of insulating material to take into account the following properties:

1. The thermal conductivity.
2. Diffusion (permeability) of water vapor.
3. Strength (load bearing capacity).

Insulation is provided the use of reliable full of products of one manufacturer, as compared with a combination of different systems and solutions.

The main reason is the lack of heat leakage, poorly executed or no insulation at a particular location. Also, among the reasons for this phenomenon can be distinguished geometric profile of the building, for example, the presence of a plurality of angles or kinks.

Energy-efficient building should not only have good insulation, but also sealed outdoor enclosure. The tightness of the building is a necessary element to limit the losses of valuable heat as well as to create conditions in which the exchange of ventilation air is adjusted.

Fresh air to be discharged into the room through the instruments, while the uncontrolled flow of air should be kept to a minimum. Performing airtight building requires the use of appropriate design solutions in all areas with the risk of loose connections designs.

The energy demand for heating and ventilation of the building is largely dependent on its location in the area, shape, and internal planning. Thanks to the excellent location and profile can reduce energy consumption by even a few tens of percent.

Location of the building should be taken into account as far as possible the natural barriers (uneven ground, adjacent buildings, high trees) that protect against the wind blowing in the dominant direction and make maximum use of the sun's energy.

The form of the building should be open, without breaks, large protrusions and recesses. Large windows on the south side - is the foundation, which should be subject to the interior layout of the building. On the south side shall be located room with large windows, and on the north side - utility room (bathroom, storage room, entrance to the building), in which the windows are small or non-existent.

This placement of windows allows maximum use of heat in the form of solar radiation, which reduces energy requirements for heating the building, and makes better use of natural light in the room. And for the installation of solar collector would be the best place with the orientation of the roof slope to the south.

Glazed waiting room, winter greenhouse, or other premises built to the building, it is desirable to use as a communicating zone, further insulating and reduces the need for heat for heating.

In modern residential buildings glazed spaces are used of different functionality (e.g. winter greenhouses). These spaces are used to reduce energy consumption and provide tenants access to natural light, the sun, and also serve as an excellent holiday destination.

Space bounded by fences glazed requires appropriate in summer cooling system, and in winter - an effective system of use and containment of heat flow. Moreover, these require adequate ventilation space and protection against too strong sunlight radiation.

In energy-saving facilities glazed space serves as a buffer which delays or heat and transfers it into the building at night, or cool rooms in summer. Glass composition should be characterized by the corresponding stiffness ensure safe entry and be resistant to atmospheric agents. Most often used for these purposes or tempered safety glass.

Exterior walls protect the interior of the building from heat loss. However, some of the heat still penetrates through the wall. Therefore, they must have good thermal insulation properties, with minimal heat indicator.

Applies two types of wall construction: single-layer and multi-layer.

In a single-layer wall construction material used is one that performs a structural function while maintaining thermal isolation wall at the desired level.

In present multilayer wall layers made from two or three different materials, each of which performs a different function. The carrier layer - the inner affected by high load, made of a material with high strength (concrete, ceramic or silicate brick). The next layer - insulating material (foam, mineral wool). And the front or outer layer protects the wall from external influence.

For thermal protection of buildings used by the glass with a special coating that lets solar radiation inside the building, but the thermal radiation from the walls. Thus, a significant portion of the heat retained inside.

Economics

An important property of the window also has its tightness. Especially in energy-efficient buildings where the air intake is regulated by the aerator or air intakes.

The lowest temperature observed from the outside of the building at night, when the window as the light source are not required. Nevertheless, it is possible to limit heat loss by using additional insulation on the windows at night only in the form of blinds, blinds and shutters.

After the closing of the shutters should create a tight barrier that even when a strong gust of wind did not let the cold air. Exterior shutters reduce heat loss at night to 40 %, furthermore, to protect against noise.

The balcony slab is conventionally continuation slabs that leads to rupture of the outer wall of the insulating layer. There is, therefore, the heat leak. But such solutions are not acceptable for energy-efficient home.

The best solution would be a balcony, set on its own design (columns or struts), coupled with the design of the building only single reinforcement bars placed at several points. Also, the best solution is to use special items consisting of outer fastening steel parts and connecting balcony slabs with slab floors [4].

In the smart houses the whole system works for Heat, and each person can regulate the temperature in the apartment, and the comfort of home, include standby heating. According to experts, it gives only 15 % energy savings. In addition, the house has an increased heat protection, installed windows are of a new design, the effect of which is twice the traditional windows. Savings are of up to 30 kilowatt-hours of electricity per square meter of housing. And it's important to say that such houses are the houses of future.

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**COMPARATIVE ANALYSIS OF INNOVATIVE ACTIVITY
IN THE REPUBLIC OF BELARUS AND GERMANY**

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Today innovation is an important factor in ensuring economic competitiveness and sustainable growth. It is necessary to study the experience of the leading countries in this field, in order to increase the innovative development of the Republic of Belarus.

Innovation activity needs a new understanding of innovation. Not only new products but also business models, services are the focus of research and development organizations. Therefore, innovation should not focus only on technological innovation.

The Austrian economist Joseph Schumpeter defined innovation as the basis of scientific and technical progress [3, p. 15].

Among such Russian scientists as: Dorofeev V.D., Dresvyannikov V.A., Zharikov V.V., Sergeev V.A., Kipcharkskaya E.V. and German: Schomberg, Rene, Kirner, Eva; Som, Oliver; Dreher, Carsten; Wiesenmaier, Victoria has not developed a unified approach to the definition of "innovative activities". However, in the broad sense, innovation is the use of scientific and technical knowledge to convert various aspects of social life. In a narrow sense the activity that is aimed at obtaining new scientific and technical knowledge and their implementation in the manufacturing sector in order to create a competitive product (service) [4, p. 8].

Today, innovation should be considered as an important factor in ensuring the competitiveness of the economy and its sustainable growth. Innovations have a significant impact on the volume of production and sales, on its quality indicators and operational characteristics, production costs, the profitability of enterprises.

International indicators of innovation are becoming an important tool for evaluating the effectiveness of innovation policy.