ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 1 , January 2020

Renewable Energy. Technical and Economic Calculations of the Renovated Building In Accordance With Passivhaus Standard Requirements

Kholiqova Irodakhon Karimovna , Abduganiev Numonjon Nabijonovich , Milladjanova Zulxumor Raxmatovna, Otajonov Olmosbek Asqaralievich

Department of Production of Construction Materials, Products and Constructions, Assistant of Fergana Polytechnic Institute, Ferghana, Uzbekistan
Department of Production of Construction Materials, Products and Constructions, Assistant of Fergana Polytechnic Institute, Ferghana, Uzbekistan
Department of Production of Construction Materials, Products and Constructions, Assistant of Fergana Polytechnic Institute, Ferghana, Uzbekistan
Department of Production of Construction Materials, Products and Constructions, magistor of Fergana Polytechnic Institute, Ferghana, Uzbekistan

ABSTRACT: The article presents the main results of calculating the functional properties of the Italian central real estate engineering system, taking into account the technical and economic features of the reconstruction that the building's energy standard must meet with the passivha.

KEY WORDS: energy saving, energy, engineering support for residential real estate

I.INTRODUCTION

Thirty years have passed since the first oil attack of the 1970s. However, the effectiveness of measures taken by governments of different countries to conserve energy resources is not limited to the existing problems in the field of energy, environmental protection, ecology and politics. The fight against renewable energy sources, primarily oil and other fossil fuels, as well as greenhouse effect, has long been a topic that cannot be ignored or eliminated.

It is necessary to take quick and serious action around the world to reduce energy consumption and reduce the negative impact on the atmosphere in the carbon dioxide atmosphere.

From 1880 to the present, the amount of greenhouse gases in the atmosphere has grown by more than 20 percent, the planet's temperature has increased so that everyone can see it with their own eyes.

According to the International Energy Agency (IEA), the temperature of the planet will continue to rise by 1-3 degrees in the next century, according to the current trend (www.iea.org). What is more, the appearance of misfortune, its contribution to improving the excessive impact of the construction industry is very clear. Almost half of the energy consumed in industrialized countries is spent on air conditioning and lighting of buildings, as well as in the production of construction materials such as steel, aluminum, glass, cement, brick, and plastics, with high levels of CO2 and other contaminants. gives the substance.

In 1997, the EU justified itself under the Kyoto Protocol, which came into force on 16 February 2005, to reduce greenhouse gas emissions by 8 percent compared to 2008, compared to 1990 levels in cities and buildings. In addition, the energy certification of buildings has been mandatory since 2006, their effectiveness should be transparent and should encourage the design of energy efficient facilities.Building energy-efficient means means not only reducing energy dependence on energy imports and reducing harmful emissions, but also saving material resources for the state and each consumer. According to the Enea Committee (www.enea.it), Italians have an average of 160 kWh / m2 of housing per year, including 106 for heating, 20 for cooking hot water, and 9 for kitchens.

In addition, residential and service businesses are generally the largest energy consumers, accounting for more than 30% of the total energy consumed in Italy.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 1 , January 2020

Today, in the European Union, the standard energy use for heating is 70 kWh / m2 per year for buildings built before the introduction of energy-saving standards (1950-1975) to 70 kW / m2 per year from 1980 to the present) and below Passivhaus for category CasaClima Class A buildings at 30 kW / m2 / year, even 15kW / m2 / year.

About 86% of energy consumed in Italy comes from renewable sources such as oil, natural gas and coal. In 2002, domestic demand for oil increased by 94% with imports. The demand for solid fuel is almost entirely covered by imports.

Today, the increasing energy dependence on natural gas supplies is over 80%. With such a structure of energy consumption, non-renewable resources are used, which cause severe environmental pollution, but primarily to reduce construction costs for low-pollution buildings, primarily reducing energy consumption and remaining demand over renewable sources. The app is required for use.

Current regulatory documents and energy-saving goals

Reduction of energy consumption and relevant regulations are of great importance in political, economic, technical and technological terms. The first national energy conservation legislation in Italy, enacted in 1976, and its application in the construction industry have significantly reduced energy consumption by imposing restrictions on energy consumption and implementing appropriate heat insulation at high heat dispersion facilities. .

Law No. 10, which entered into force in 1991, was passed to replace and integrate the old and finally outdated law. One of the most important news is that the bill introduces the concept of a system of engineering and technical support for construction only, for air conditioning, the winter must first of all mean art. Article 30 of the Energy Certification of Buildings

The Presidential Decree No. 412/93, which is regarded as the mechanism for the application of this law, regulates the use, design, execution and responsibility of the operation and operation of the heating networks of buildings for various purposes. However, it is important to note that compliance with this law is still not the norm and is poorly controlled at the government, as well as at regional and local levels, especially in the implementation of intermittent monitoring.

As for the European Regulatory Document, the main rule in this regard is the European Energy Regulatory Authority, which was introduced by Italy under Act 192 of 2002/91 / CE. The task of European regulation is to improve the overall energy efficiency of facilities and environmental protection in EU member states.

However, there are other tools in the European Union designed to encourage designers to create low-energy facilities. As an example, note the Swiss Standard Standard Svizzero Minergie, the Vauban Quarter Project in Friborg and the city's technical regulations used for the current energy certification of CasaClima facilities in Bolzano, Italy.

Founded in 1999, the Swiss quality brand Minergie focuses on products and services that provide the rational use of energy resources while reducing harmful emissions.For a quality mark, a product or service must meet a variety of requirements, including reducing the consumption of fossil fuels by at least 50%, a high level of user comfort, and the overall value of a construction project not to exceed 10%.

In order to apply for the delivery of Minergy quality signs to buildings or parts, such as roofing and brick wall intervals, the sound can be at least 45 dB, and the maximum allowable heat transfer is transparent. elements ≤ 0.20 W / m2 • ° C and Uw ≤ 1.30 W / m2 • ° C for elements with window glass.

In 1992, in the city of Friborg, the municipality decided to encourage energy efficiency and the extension of experience in the construction of energy-efficient facilities.

Such a policy, especially in the Vauban Quarter, which occupies 38 hectares and is very attractive in terms of real estate, found the program as it is only three kilometers from downtown. Today, the quarter covers buildings from 65 kWh / m2 to the passivhaus category and even to the surplus. It includes buildings facing the south facing the roof strongly and is completely covered with solar panels, which is a positive energy balance for homes.

In the third quarter, the land is divided into individual and cooperative property. This gave the designer the freedom of expression - energy efficiency, building diversity, landscape gardening, natural drainage and rainwater use, and the importance of public transport, resulting in pedestrian and bicycle routes. development.

With the CasaClima certification, Bolzano province has decided to encourage the development of new building technologies aimed at energy conservation and environmental protection, as well as providing the user with complete information about the building's energy parameters.

The purpose of this certification is to align with future energy certification goals, which will help cover the costs of fully heating the building and thus selling or renting it. All buildings here are classified according to the energy index (heating), which is expressed in kWh / m2 per year and has a G (less than 160 kW / m2) consumption less than 30 kW / m2 / year. years).The building can also be assigned to the CasaClimapiu category, using environmentally

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 1 , January 2020

friendly materials and using renewable energy sources for heating (if the building in this category requires less than 50 kWh / year of heat).

Design and construction technologies and materials, on the one hand, have led to the construction of buildings with less and less energy demand, which can be achieved by improving the thermal performance of materials using renewable energy sources.

Today, all modern energy-saving technologies, the passivhaus standard introduced by the Passive Haus Institute in Darmstadt, Phi, are very interesting. The building is classified as a "passive object" if its heating needs are below 15 kWh / m2 / year.

At such low rates, the Passivhaus home can operate without any conventional air conditioning systems, since microclimatic conditions and air quality regulation can only be provided by a single system of mechanical ventilation with heat recovery.

In the European countries, where this type of building has been extensively tested, energy classification is characterized by clear and precise functional parameters for all components of the technical and technical support system.

Before optimizing the building's direct solar energy generation and recycling in front of the Passivhaus class object, the dispersion reduction is reduced, resulting in a complete thermal insulation of window blocks and wall ceilings. carried out with careful inspection of the facility for availability.

Although ventilation is provided with mechanical ventilation in the volume provided by applicable regulations, windows can be opened to ventilate rooms during ventilation. Such systems are usually supplemented by various devices such as microclimate control systems, such as underlying heat exchangers, a flexible air heat regenerator equipped with an after-heating system (heat pump, chip briquette boilers, central heating, etc.). .

A distinctive feature of the Passivhaus classroom building is the durability of the construction site, the parameters of which are thoroughly tested during the acceptance test phase (www.passiv.de).In Scandinavian countries, the following permissible parameters are defined for these types of construction components:

- heat transfer coefficient of opaque components - ≤ 0.15 W / m2 • ° C;
- heat transfer coefficient of the window blocks - 0.80 W / m2 • ° C;
- Heat bridge linear coefficient - y ≤ 0.01 W / m • ° C;
- Mechanical ventilation system with heat regenerator - h ≥ 80%.

Thanks to extensive experiments over the past decade, the construction of a passivhaus home in northern Europe is very competitive today, with additional costs not exceeding 10% of the cost of building the facility according to current energy conservation standards.

In Mediterranean climates, such as in central and southern Italy, such homes have only appeared in recent years. On the one hand, the climate here is more favorable in winter than in Central Europe; On the other hand, to revise some of the Phi parameters for summer operations, to prevent the building from overheating, including a new design for optimizing heat capacity, protection and ventilation inherent in the design tradition. approaches are required.

The experience of the Cepheus project (passive housing as a European standard), which has tested various energy-saving technologies over the four years (1998-2002), was then presented in a very interesting way, followed by the oversight of 250 buildings in five countries. was the European Union.

Expected results of the experiment are the feasibility study of the new energy model, with the added value of not more than 10-15%, which is covered by the cost savings in the optimum period. In addition, the task was to determine how the new model was perceived by builders, designers and end users.

The experience of a number of completed projects shows that while the typology of construction is very close to the design practices of northern European countries, it can only give general advice on the types of materials used and the construction of passivhaus classroom buildings in Italy.

There are already such things in Italy. It is built on a variety of technologies: wood or reinforced concrete structures, light fillers or ceramic fillings, even metal structures with light fillers.

Methodology

In order to determine the feasibility of using such models in the construction industry in Central Asia, it was the first time to re-calculate the parameters of a construction facility with a power class of 15 kW as part of an ongoing project to reduce energy costs and introduce passivhaus. m2 per year.For this purpose, residential buildings in central Italy were selected, materials used in the construction were simple and meeting the requirements of the current regulations on consumption parameters. Following the buildings, specific measures were taken to improve energy efficiency in winter operating mode.

The technique used has two main points: the first test allowed the determination of the functional parameters of the whole passivhaus class, and the second was performed on energy efficiency indicators for heating with less rigid ratios.

The article presents the results of a second study proving that it is not necessary to use such solid thermal conductivity rates provided by the Rhi Institute in less climatic conditions than in northern Italy. And of course - results from the first study gave an energy index of less than 15 kW / m2 per year, which is the maximum allowed passivehaus class. The second work was performed using the method of analytical analysis, taking into account metric calculations of economic indicators and environmental factors associated with the indicators.

The following results show how precise the implementation of the passivhaus class facilities with an estimated 10-15 years of investment coverage is relative to the service life of the new building, especially with the city administration surveyed. It is very reasonable considering the

In particular, the energy performance was considered as a seasonal energy demand for continuous heating QH (MJ) for the entire heating period and in accordance with the requirements of European Regulation 832:

$$Q_h = Q_l - h_u (Q_i + Q_s),$$

where Ql is heat transfer and energy ventilated from the building box;

hu - index of use with dynamics taking into account construction actions;

Qi is the ratio of energy produced by internal sources;

Qs is the ratio of energy received from solar radiation through transparent and transparent structures.

In order to determine the heat demand for heat at qH (kWh / m2 per annum) in the applied heat zone, the seasonal useful energy needs in the QH constant must be separated from the heat-treated area A:

$$q_h = Q_h / A.$$

From the economic point of view, the proposed energy efficiency measures can be implemented, and therefore additional costs to determine the level of economic benefit should be met within a reasonable time. Therefore, some economic indicators are calculated using the financial mathematics formulas: the proportion and the repayment rate (CO) and the savings (HT) calculated using the new energy-saving technologies.

The recovery period is the most widespread economic indicator and is often sufficient to determine the return on investment: this figure represents the number of years (cash flow (KP) investments generated by the investment each year). energy costs) equal the cost or value of such an investment (K). Reducing CO costs makes capital investments more efficient.

If CO exceeds what is defined as the useful life of energy saving, capital investment is useless.

The cost of CO is determined by the following formula:

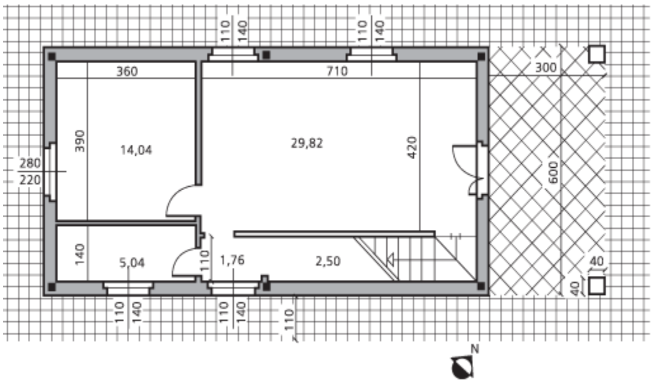
$$SO = (K / KP).$$

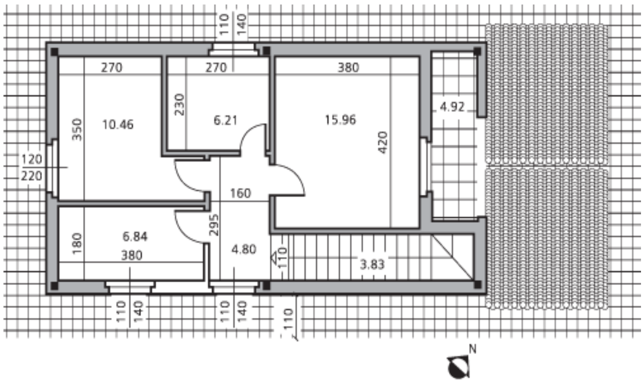
In addition to energy and economic expediency, it is necessary to assess the environmental benefits expected from passivhaus classrooms. In fact, any final energy consumption gives a certain amount of CO2 emissions. In Italy, methane for gas is 230 g / kWh and 580 g / kWh for gas. Evaluation of these parameters is required to assess the reduction of greenhouse gas emissions in such buildings.

An example of this

The building selected as a control sample (Fig. 1) is a separate housing located in a residential area in central Italy. The total area of the house is 104 m2 and is divided into two levels: living room on the ground floor, dining room and a total area of 53 sq.m. There is a balcony. The building box is a rectangular reinforced concrete, ceramic ceiling, wooden roof, recessed sensors, black roof on top, plate and tile.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 1 , January 2020





The building is designed to meet all applicable energy efficiency guidelines. In particular, all energy indicators set by Act 10/91 are monitored. In a label. 1 The main calculated indicators are shown.

Table 1

Energy indices of a building that has been selected as an office model

Ql - energy is dissipated by heat transfer and ventilation from the building box	56 711 MDJ
Qi is the percentage of energy produced by internal sources	7,584 MDJ
Qs is the ratio of energy derived from solar radiation through transparent and transparent designs	6,831 MDJ
Qh - Seasonal beneficial energy requirements	42,440 MDJ 11,798 kWh
qh - energy requirement for heating in calculating the useful heating area	114 kW • ch / m в god

II. Reconstruction of the energy-saving standard passivhaus

It has been proposed to reduce this rate to 15 kW / m2 per year to reduce the annual energy demand for heating the building rated at 114 kWh / sq. Thermal resistance of transparent and transparent construction components is simultaneously improved, optimized for free energy sources, retaining existing building box using highly efficient ventilation systems, and existing national regulations (minimum permissible height, ground level). from the plot, the area, which allowed construction).

To do this, the proposed custom functional parameters for components and air conditioning networks of the Passivhaus Institute building of the Darmstadt Institute were first reviewed. In the first version of the calculation, the energy requirement for heating was much lower than the passivhaus standard.

Although more precise computational parameters were not taken into account and the latter was calculated, only the task of bringing the energy demand indicator to the recommended standard was considered, which corresponds to the specific climatic conditions of cold weather Italy. This requires the identification of the exact functional parameters that come in, as in northern and central Europe.

Thermal insulation increased and work was done to reduce the heat bridge (Table 2). In particular, the chosen coating insulation system significantly reduces thermal bridges and prevents condensation, improves the thermal inertia of the building, increases the surface temperature of the various layers forming the building box, and as a result improves internal comfort. Therefore, in addition to the costs of minimizing the cost of selecting construction materials, the designers provided guidance on the physical, technical and environmental parameters.

Table 2

Thermophysical parameters of passivhaus in the building class

Building box	Heat transfer (W / m • ° C)
Exterior wall coverings: inner slab (1.5 cm), perforated brick blocks (20 cm), foam plastic (polystyrene) panels (20 cm), plasticizer (2 cm)	*U = 0,16*
Roof coating: lime and plaster (1.5 cm), ceramic ceramics (20 cm), foam panel (polystyrene) panel (20 cm)	*U = 0,17*
(20 cm), ceramic ceramics (20 cm), ventilated crushed stone layer (20 cm), polished plastic	*U = 0,16*

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 1 , January 2020

(20 cm), ceramic tiles (1 cm), lime-)	
Glass windows: wood heat insulated frames (U = 1.10 W / m • ° C), triple-glass windows with cryptone (U = 1.10 W / m • ° C, g = 49%)	window -UW = 0.72 window boxes - UW = 0.76
Entrance: Wooden with solid fiberglass panels	*U = 0,90*

Regarding air conditioning technology, a thermal pump and a small boiler (total dimensions 67 x 60 x 215 cm, 1,200 capacity) and a complex thermal regenerator (h = 85%) have been proposed for the preparation of hot water for solar panels. C).

The system is integrated with a pre-heating and pre-cooling air (located about 2m deep), with a base heat exchanger with a length of about 50m and up to 2% for drainage condensate. Air is taken out of the office (kitchen, shower) and delivered to the main rooms (dormitories, living room, study room, dining room). Outflow is carried out through several filters 2 m above the ground, far from sources of possible contamination of the air and through the exhaust roof. The choice of equipment is based on an analysis of the environmental and economic characteristics of technologies with the lowest energy consumption.

Table 3

Energy indicators of a building that has been reconstructed in accordance with the energy-saving standard passive

Ql - energy is dissipated by heat transfer and ventilation from the building box	18 983 MDJ
Qi is the percentage of energy produced by internal sources	7 584 MDJ
Qs is the ratio of energy derived from solar radiation through transparent and transparent designs	6 842 MDJ
Qh - Seasonal beneficial energy requirements	5 709 MDJ = 1 587 kWh
qh - energy requirement for heating in calculating the useful heating area	15 kW • ch / m^2 в god

III. ANALYSIS OF PROFIT, ECONOMIC, ECONOMIC AND ENVIRONMENTAL FACTORS

A detailed analysis of the economic parameters of buildings designed and built in accordance with the law of 10/91 (qh = 114 kWh / m2 per year) to determine and evaluate the effectiveness of energy efficient works is recommended with Passivhaus standard buildings (kh = per year). 15 kW / m2).

Assessment of the economic parameters was based on regional price lists, which were not available in the Italian market, according to the estimates of specialized organizations installing and maintaining special systems and equipment. was done.

Fig. Figures 2 and 3 show the percentage of energy consumption for some of the building components selected as a control sample and recommended by the passivhaus standard.

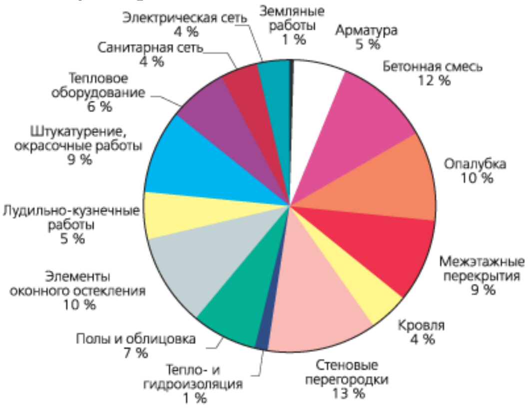


Figure 2. Different types of work during the conventional building construction Cost of primary and secondary improvements, technical consultancy fees and land cost for a facility built according to traditional technology, is approximately 89,000 euros or 860 euros per square meter, according to the passivhaus standard. The cost of this

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 1 , January 2020

building is € 100,200 per square meter, or € 920. It is estimated that construction costs (about 12%) should be paid in about 14 years

Figure 3.

Different levels of work in building a building using Passivhaus technology

The environmental benefits of the project are significant. The environmental impact of two objects - a traditional building and a passivhaus class object - were used to calculate CO2 emissions.

For conventional gaseous methane, this value is 3,389 kg CO2 per year and 1,211 kg CO2 per year, which is 4,600 kg / year. In a "passive" environment, methane consumption is excluded, and electricity is 2554 kWh per year, which corresponds to only 1,481 kg of CO2 emissions per year. Thus, building a building using passivhaus technology will, despite being economically attractive, contribute significantly to improving the environment and reducing emissions, thus contributing to the goals of the Kyoto Protocol and energy certification of buildings.

IV. CONCLUSION

An analysis of the general situation of energy consumption both in Europe and Italy shows that immediate implementation of energy efficiency measures in the construction sector is a priority. Especially based on the energy certification requirements of buildings that came into effect in Italy in January 2006.

In Europe and Italy, energy conservation policies should focus primarily on parameters that can reduce energy consumption, while maintaining the living conditions of the population, including through the economic benefits of local governments.

According to the economic analysis of the Energy Reconstruction Project, the project has very good prospects, considering the new types of building materials and technologies that will appear on the market in the coming years: the best prices for products within the new balance between supply and demand.

Finally, how the pilot projects can be implemented and, in particular, the energy parameters of low-energy buildings (eg CasaClima Class A or B) and passivhaus class depending on local climatic conditions and the specific features of the local construction market. and may even be subsidizing such construction, as in the Bolzano region.

REFERENCES

1. Design Engineer and Recipient of Pod Editorial Professor Poo enko N.E. pg no: 05-09.
2. Drozdov V.F. Sanitary engineering of buildings M Stroizdat 1997 pg no: 15-20.
3. Theological V.N. etc. Auto and ventilation M Stroizdat 1990 pg no: 13-15.
4. Drozdov V.F. Outlet and ventilation, frequency 1 and frequency 2 pg no: 126-129.
5. G.G. Ignazarov, Regional Aircraft, Heating and Ventilation, M Stroyizdat 1998 pg no:129-136.
6. Theological V.N. Output and ventilation of frequency 1 and frequency 2 pg no: 98-108
7. V.I. Bogoslovsky and A.N. Scanavi Heating Moscow 1991 pg no: 66-83
8. K.V. Tikhomirov General heating engineering, diesel gas production and ventilation 1991 pg no: 156-178.
9. V.M. Gusev et al. Heating, ventilation, ventilation and air conditioning Leningrad 1991 pg no: 56-98.
10. Shekin R.V. and others. Kiev "Budivalnik" 1998 pg no: 33-42.
11. I.V. Prozorov G.I. Nikolodze, A.V. Minaeva "Hydraulics, water supply and sewerage" M. "Vkshaya school" 1990 pg no: 52-58.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 1 , January 2020

12. V.I. Kalisun, V.S. Kedrov, Yu.M. Laskov, P.V. Safonov "Hydraulics, Water Treatment and Sewerage" M. "Stroyizdat" 1990 pg no: 78-92.
13. V.S. Kedrova, E.N. Levevnova "Plumbing equipment", M. "Stroyizdat" 1999 pg no: 25-26.
14. The methodology of water supply for the course "Waterproofing and wastewater treatment and monitoring", Ferghana 1994 / Abduganiev NK, Khusanov N.Kh. / pg no: 96-101.
15. SNIP 2.04.01 - 85 “Intravenous plumbing and sewage system”.
16. SNIP 2.04.02 - 84 "Water supply and water supply".
17. SNIP 2.04.03 - 85 "Sewerage, sewerage and solar services"
18. Engineer for repair and maintenance. Under the red. NOT. Pashenko 1991 pg no: 39-41.
19. Water supply and sewerage. T.T. Tursunov, N.K. Abduganiev. Ferghana 2001 pg no: 168-173.
20. Mamatov Vaxidjon Shuhratovich, “Solar Power” International Journal Of Advanced Research In Science, Engineering And Technology Volume 6, Issue 12, December 2019 Pp 12006-12010