

ЕМіністерство освіти і науки України
Сумський державний університет
Навчально-науковий інститут фінансів, економіки та менеджменту
імені Олега Балацького
Кафедра економічної теорії

**INTERNATIONAL ECONOMIC RELATIONS
AND SUSTAINABLE DEVELOPMENT**

**МІЖНАРОДНІ ЕКОНОМІЧНІ ВІДНОСИНИ
ТА СТАЛИЙ РОЗВИТОК**

**MIEDZYNARODOWE STOSUNKI GOSPODARCZE
I ZRÓWNOWAŻONY ROZWÓJ**

**МЕЖДУНАРОДНЫЕ ЭКОНОМИЧЕСКИЕ ОТНОШЕНИЯ
И УСТОЙЧИВОЕ РАЗВИТИЕ**

Матеріали

Міжнародної науково-практичної конференції
(Суми, Україна, 5–6 травня 2017 року)



Суми
Сумський державний університет
2017

**РОЗДІЛ 3
ІННОВАЦІЙНИЙ МЕНЕДЖМЕНТ В ЦІЛЯХ
СТАЛОГО РОЗВИТКУ**

**РАЗДЕЛ 3
ИННОВАЦИОННЫЙ МЕНЕДЖМЕНТ В ЦЕЛЯХ
УСТОЙЧИВОГО РАЗВИТИЯ**

**SECTION 3
INNOVATIVE MANAGEMENT FOR THE PURPOSES
OF SUSTAINABLE DEVELOPMENT**

SYSTEM OF SHADING AS INSTRUMENT OF GREEN TECHNOLOGY*

Prokopenko Olha, Dr. of Sci. in Economics, Professor^{1,2},

Chayen Samuel, Ph.D.^{1,3},

Romanyuk Yaroslavna¹

¹*Sumy State University (Ukraine)*

²*University of Bielsko-Biala (Poland)*

³*Knesset, Jerusalem (Israel)*

For many years all over the world the mankind has been using such a famous and important invention as an air conditioner. When first this device appeared in sale, it was considered as a luxury, but today this invention is an essential, giving us the opportunity to cool homes, business centers, schools, hospitals, different public places, and other buildings vital to our economy and daily lives.

Air conditioning system prevents people from exhausting heat. But at the same time, as any technological invention, it has some disadvantages: 1) causing of health problems because of the abusively low temperatures and faulty maintenance. Health problems include disturbance of functioning the respiratory system (due to the difference of temperature and humidity between inside and outside rooms), negative impact on skin (air conditioning system has a drying effect on skin and the mucous membranes), suffering from infectious diseases, allergic reactions, chronic

*The paper was written according to budget money from the Ministry of Education and Science of Ukraine, given to develop scientific-research topic № 53.15.01-01.15/17.3Ф “Methodology of forming mechanism of national economics innovative development based on alternative energy”.

rhinitis and pharyngitis, throat irritation and hoarseness. Air conditioning also worsens eye conditions, people become lazy because of comfortable temperature inside, thus, they lack of natural sunlight, which they can receive outside; 2) bad environmental impact. In burning fossil fuels such as coal to supply electricity to homes and workplaces, power plants discharge clouds of soot and other pollutants into the atmosphere. Air conditioners use results of millions tons of CO₂ emissions from power plants every year. However, today there exists a new “green” construction based on the system of shading, that is an excellent alternative to air conditioners. With the help of this innovative device the necessity of using the air conditioners can significantly reduce. This new development allows to stay healthier and not to have such a bad impact on the environment.

The system of shading (or an overhang) is used for solar passive houses or buildings. Passive solar buildings typically have windows (glazing) on the southern facing side of the building in order to absorb the sun’s heat energy to warm a building during the winter. In order to stay cool in the summer, passive solar houses rely on a system of shading (or an overhang) to keep the building cool. Simply by building in this way, a house can reduce its heating and cooling costs by 85%. In the northern hemisphere, in order to face the sun and obtain maximum solar gain, the windows would face the south. In the southern hemisphere, however, it is opposite, with the windows facing the north in order to maximize solar gain.

Winter. The diagram to the left shows how the sun is lower in the winter and can enter the building (fig. 1a), and the diagram to the right shows how it is much higher in the summer and can not enter the building (fig. 1b). During the day, the low winter sun can shine through windows are to allow heat energy to be absorbed into the building’s thermal mass. While windows allow heat into a building to be absorbed, their thin and transparent nature also allows heat to escape a building. In order to keep this from happening in cold climates, it is recommended that the glass panes are doubled (double glazing) or even tripled. An insulated window covering or thick shade can also be used to help insulate the windows and help keep the heat in the building after the sun goes down.

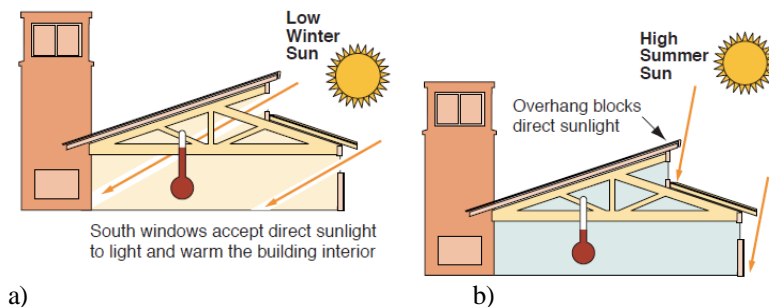


Figure 1 – Seasonal Window Considerations

Summer. In the summer, as temperatures rise, a passive solar building uses its thermal mass to help keep the building cool. In order for this to happen, the summer sun is kept from reaching the thermal mass of the building. The summer sun's path aides in this process by traveling high in the summer sky, thus a proper overhang or other type of system is needed to shade or cover the widow, in the summer so that the sun's heat energy is blocked or avoided when it is desired to have the building cooler than the outside temperature. A properly designed overhang keeps the heat and energy from being absorbed into the house in the summer.

As for the *building orientation*, it should be noted that because of the fact that the sun rises in the east and sets in the west, the side of the building that is utilized for solar gain needs to be facing the south to take maximum advantage of the sun's potential energy (fig. 2).

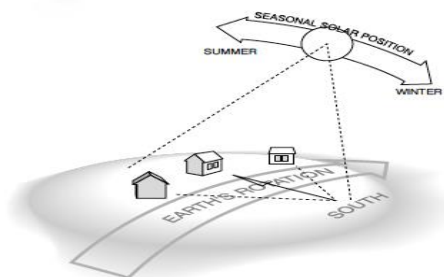


Figure 2 – Building Orientation

Moreover, it is ideal to have the windows (solar glazing) within 5 degrees of true south. However, windows that are within 15 degrees of true south are said to function almost as well. As the degree difference from true south expands, the overall potential solar efficiency of the structure decreases. Put another way, *the* greater the degree variation from true south, will decrease the amount of the building's solar gain.

Both *vertical and angled glass* (glazing) is used, but angled glass, however, is more frequently used in passive solar design because it increases the amount of solar energy that can be absorbed (but at the same time this can cause overheating in the summertime).

As a conclusion, it should be said that this construction is very useful from the point of view of protection the environment. Applying the system of shading will significantly increase the amount of "green" buildings that will have positive impact on the ecological situation. Moreover, this kind of technology is widespread all over the world: very many countries, for example Israel, actively use it. But, unfortunately, it is not still used in some countries, like in Poland and Ukraine, carrying in itself big potential of energy saving.