





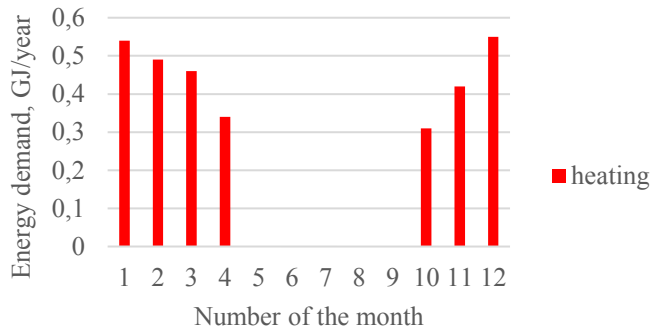








the mortar with heat transfer coefficient of 1.25 W/m<sup>2</sup>K. This multifamily building consist of 4 floors. The plan area of the building is 144 m<sup>2</sup>. The vegetation was assumed to be on all buildings external walls. The calculations shows that the annual energy saving for heating, determined only on the basis of a reduction in the heat transfer coefficient, will amount to less than 200 PLN (Fig. 5).



**Fig. 5.** Annual energy savings after adding of greenery at the façade and taking into account only static losses through the building envelope.

The statistical economic indicator SPBT (Simply Pay Back Time) was used to determine the simple payback period of implementation greenery. SPBT is based on the assumption a constant value of money throughout the payback period and is described by the equation (1) as follows:

$$SPBT = \frac{Nu}{\sum_n \Delta Q_{rU}} \tag{1}$$

$Nu$  – planned costs of works related to the reduction of heat transfer losses for the total area of the selected wall/with the replacement of window and door joinery [PLN]

$\Delta Q_{rU}$  – annual energy savings resulting from the use of the improvement [PLN/year].

The investment cost for analyzed building with direct green façade was determined following the data published in the literature [6]. Its value amounts to 6,000 PLN. Taking into account the annual energy savings and the aforementioned local law, the payback time (SPBT) for this investment was calculated to be 13 years.

## 5 Summary

Nowadays big cities struggle with urban heat islands, bad quality of outdoor air and high energy costs in buildings located in dense urban tissue. The perspective to use the vegetation on the external walls seem to have enough advantages, described in the paper, to be applied into everyday city and citizens life. Apart those connected with the air quality green facades have a positive effect on the level of buildings energy consumption and thus it is also desirable as the additional element of existing buildings. The purpose of this paper was to point out pros of using plants as the external wall covering, and to check the level of savings in heat energy consumption on the example of uninsulated building. The reduction of the heat transfer losses for analyze premise is not significant. The simple pay back time (SPBT) reaches quite high value that is lowered by the land tax exemption (guaranteed by the local city regulations). However it is important to underline, that there was no shading effect taken into account nor additional cooling effect during the summer was calculated. Apart this

