Buildings account for a large part of total energy consumption and generate more greenhouse gas emission than any other sector. The purpose of this work is to demonstrate the energy savings in small scale low energy buildings designed and constructed in hot region (Karbala city lat. 32.26°).

The experiments are carried out for clear sky days from (July 2013 to February 2014), to report the space, inner and outer surfaces temperatures, thermal conductivity, and the impact shading by BIPV on roof and windows, and electrical energy generated by photovoltaic panels.

A Computer programs have been developed to calculate the cooling and heating loads, solar gain ratio of shading plans on windows area and electrical power generated by PV panels that adaption of energy efficient walls and windows technologies. In this study three single story building were selected (conventional house, low energy house and low energy house with BIPV) to represent the construction types and using ambient conditions for Karbala city, the monthly energy saving for thermal loads calculation procedure were set utilizing the cooling load temperature difference (CLTD) method. Changes in thermal load demand between the conventional building case and the new proposed design are analyzed.

The results show that the space needs of room tested electrical energy of heating load is 110.38 kW.hr, while the electrical energy generated by PV is 1000.54 KW.hr for hot season and 1852.31 KW.hr for cold season, the seasonal electrical energy for cooling load is 1286.37 KW.hr.

The seasonal heating load for low energy houses were 33838kW.hr, 23489kW.hr and 24245 kW.hr for conventional, low energy without BIPV, and low energy house with BIPV respectively. The electrical energy generated by PV panels is 14438 kW.hr. The seasonal cooling demand is 28481kW.hr, 21551 kW.hr, and 18129 kW.hr for conventional house, low energy house, and low energy house with PV panels respectively, while the electrical generated by PV panels is 28159kW.hr.