METHODOLOGY

Model A
1. Only hot domestic water (HDW) covered by a solar thermic system with support of a heat pump and heat recovering (1/3 of used energy can be recovered).
A photovoltaic system provides the electricity demand of the heat pump.
2. Heating with a heat pump supported with- and without a geothermal energy source.

Model B
Heating and HDW combined in one storage tank with the support of a water-to-water heat pump and a solar and geothermal energy source. This simulation should show differences between model A to improve the best performing system.

The target of this simulation was to find the best relation between hot water storage tank size, collector area and a maximum of solar cover ratio with a minimum of electrical energy-consumption caused by the heat pumps.

RESULTS
The simulations showed the most efficient system is directed south with a 278,4 m² collector-area installed in the facade and the values listed below.

CONCLUSIONS
• Building structures according to the Passive House standard (D) or the Minergie label (CH) are a useful basis for designing ZEB’s. To fulfill the criteria of these labels is still ambitious. There must be a special focus on renewable building materials with little “grey-energy”.
• The climate in Korea causes peaks for energy not only in wintertime but also during summertime because of air conditioning.
• Heating systems with modulating heat pumps connected in series are the most efficient solution for heat pump systems. Source temperatures are geothermal source and a solar collector field.