

SDWS2011.0326 Solar, Pellet Combisystem for Apartment BuildingsA. Žandeckis¹, C. Rochas¹, M. Rošā¹, D. Blumberga¹, K. Siliņš¹, L. Timma¹¹Riga Technical University, Institute of Energy Systems and Environment, Latvia;
(kaspars.silins@rtu.lv)**Abstract**

As the fossil fuels are constantly depleting and their prices are rising, the need for new energy systems emerges. Especially this is noticeable in the field of domestic heating field for apartment buildings, where the heating bill is increasing each month. There is an urgent need to switch to renewable energy resources because of their lower price and environmental impact. Combined wood pellet and solar power system is seen as one of the best solutions to solve the issue as the pellet prices stable and not so high and solar power is free.

Main objective of this research is to develop and optimize compact combined solar, pellet combisystem for apartment building, for the highest possible solar fraction.

System of one 100kW pellet boiler and 42 m² solar collectors was developed for 36 apartment building. System is enclosed in one standard size shipping container to allow easy installation of the combisystem.

Simulation model of the solar, pellet combisystem was developed using TRSYS. For the model continuous monitoring of the buildings thermodynamic parameters, solar collector and pellet boiler energy outputs and site-specific weather conditions was carried out.

Using the simulation model, combined pellet, solar system performance analysis was done. Considering all the monitored data, series of simulations (e.g. to find out the optional size of the pellet tank and hot water accumulation tank) were carried out to reach the highest efficiency of the solar, pellet combisystem.

To validate the simulated data, optimized system was installed in the existing apartment building and continuous monitoring was carried out.

Major results indicated that in the new developed and optimized system 5% from the total yearly energy demand are covered by solar energy and 95% by wood pellets. During summer, solar fraction for the hot water can be close to 100%.

Main conclusions of this research are:

- Due the simulations optimum parameters of the combisystem were found and implemented
- Developed and optimized system can guarantee domestic hot water supply at required temperature all year round.
- Space heating demand is guaranteed by the system at the required level during all heating season.