



## HEAT LOSSES INFLUENCE ON SOLAR THERMAL SYSTEMS

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### ABSTRACT

Heat losses are more than 30% from the collector field yield gain in typical solar thermal systems in Baltic countries region. Heat losses increase arises mainly from reduced outdoor air temperature. Outdoor air temperature is lower in Baltic countries region in comparison with other European countries where solar collectors are more widespread. This creates the need for solar thermal system optimization in Baltic region.

A dynamic modelling program with real meteorological data was used, consider of many factors dynamic changes for heat losses determination in single components of a solar system.

Meteorological data was collected at the “Solar energy testing polygon” at the Institute of Physical Energetics in Latvia. Meteorological data of several years were collected and entered into the modelling program. The results of modelling program have been compared with the results of solar collectors testing in the real conditions in solar energy polygon. A lot of the results were compared and several regularities were obtained.

Solar collectors productivity dependence from the system heat losses was determined. Efficiency of some systems elements increases with reduction of heat carrier temperature as a result of heat losses. Therefore, the overall efficiency of solar thermal system decreases nonlinearly at heat losses increase.

Dependence of heat losses quantity from conductivity coefficient of the single components of the solar thermal system was included in the studies for deeper and wider research. This dependence was determined for conductivity coefficient of solar collector, pipeline and tank insulation.

Obtained regularities allow to figure out yields and energy saving more precisely and get more accurate cost analysis in solar thermal systems. It will help further this system optimization.

Keywords: Renewable Energy; Solar thermal systems; efficiency increasing.