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Construction and Realization of a Measurement and Control System for a Trigeneration System.

ABSTRACT - Masterthesis

The Trigeneration is a simultaneous production of power, heating and cooling from the same renewable energy source. These systems provide hot water, chilled water and power, from a single energy system. In addition to the economic benefits and advantages, a Trigeneration system also reduces the dependence on foreign energy supplies.

The "Bavarian Research Cooperation for Energy-Efficient Technologies and Applications" (FORETA), is currently analyzing the potential of energy efficiency in different Bavarian branches. The research project "Renewable Driven, Innovative Trigeneration" (InnoKKK) is a part of this research cooperation in collaboration with Hochschule Kempten. The aim of this research project is to combine a renewable driven combined heat and power unit (CHP), a solar thermal plant and an adsorption chiller to get an efficient energy system at low performance category. A solar assisted combined cooling heating and power Trigeneration system (CCHP). For this Master thesis, the necessary equipments are selected, constructed and measurement, control concepts are developed for the above Trigeneration system using LabVIEW FPGA technology. The work aims at developing an advance control strategy for efficient utilization of energy in the above system.

The major challenges faced while designing this LabVIEW FPGA development flow were

• Setting the flow rate in the system: Since the flow sensor gave digital pulses only for every 10 liter of water, accuracy of the flow rate was lowered, hence Hydro meter software was used to improve this.

• Data storage of the entire system: This is achieved by using the File I/O function pallet. The File I/O function pallet has brought limitations to the data storage, when the Host.vi is placed under the FPGA target. Empty data files were always created while using this function pallet. To avoid this and store data from the Host.vi for the entire system, this Host.vi was then placed outside the FPGA Target in the FPGA Project explorer. To our knowledge, it is the first time that this technique of placing the Host.vi outside of the FPGA Target has been implemented. Reading and storing data from the Host.vi using this function pallet was successfully achieved.