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GEOTeCH

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Collaborative Project

D4.6 Global system model of plug & play installations

Executive Summary

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1. PUBLISHABLE EXECUTIVE SUMMARY

One of the key aims of the project is to develop a 'plug and play' (P&P) small scale heat pump system solution that is adaptable to a wide range of small buildings in a range of climatic and ground conditions. This is possible because of the hybrid nature of the heat pump that is being developed and also because of the control system being developed.
Development of a robust control system depends on firstly modelling whole system operation in a wide range of conditions. This report describes the development of the models used for this task.
The P&P controller will work in conjunction with the internal heat pump controller. The heat pump controller will control the refrigerant cycle of the heat pump and the auxiliary equipment (such as circulation pumps) when the heat pump is in operation, whereas the controller will provide a supervisory function and optimize the overall operating strategy in the actual installed system using an adaptive self-learning control algorithm. It will control some elements of the building system and circulating pump operation. This means that the P&P controller system needs to evaluate the response and performance and adjust its operational control governing parameters accordingly. A review of applicable control approaches has been completed and it has been decided to base the system of the P&P controller on Artificial Neural Network technology.
Based on the overall systems design for the Plug and Play dual source heat pump system, developed in co-operation with WP6, a strategy for the P&P supervisor controller has been developed and implemented in three simulation models. The simulation models consist of one simple model (developed by Groenholland) that is used to implement the actual control system software on the controller hardware. UPV and KUL have developed more detailed models to test and validate different control strategies. The analysis and optimization with regard to control strategies will be investigated with these models and reported in D4.7 – Optimal operation of the systems.