



Assignment 1: Smart energy control for a sustainable urban district

Project:	Smart Grid Meppelenergy
Soort opdracht:	practical internship or final master/bachelor degree project
Betrokken bedrijven:	Rendo, i-NRG, University of Twente, TU-Delft, Saxion sustainable energy research group, council of Meppel.

In Meppel, a new urban district “Nieuwveenslanden” is developed in which for the first time, a smart grid is applied for controlling electric and thermal energy generation and consumption. A PhD of the University of Twente investigates the renewable energy system and develops the smart Grid control algorithms together with i-NRG.

The Smart Grid control requires prediction of heating and cooling demand from a few hours up to a day ahead. This is used to plan energy consumption within the area. Based on the planning, equipment like heat pumps, the CHP and district heating system are scheduled and controlled. This type of control is called MPC (Model Predictive Control). MPC contains a predictive model of the controlled system, usually based on equations or transfer functions. For houses and district heating these models quickly become complex due to the many influences on energy consumption, for instance heat pump characteristics, manifolds, concrete floor heating, heat loss of houses, resident circumstances and comfort settings.

An important research question is:

To what extent can we simplify the MPC models to reach sufficient accuracy of energy planning and schedules?

For the assignment we think about the following tasks:

- Development of one or more simplified thermal models
- Building a validation model within the TRNSYS modelling environment
- Running simulations and comparing results of the modelling approaches
- Preparation of measurements in one or more houses
- Development of a measuring system based on a smart meter interface and wireless temperature sensors within the house
- Comparison of measured and simulation results

Depending on the progress of your study (internship or degree project), interest (mathematical or practical/experimental) or level (bachelor or master’s thesis) different research opportunities are offered. Students are paid according to regular internship agreements.

For more information please contact:

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Assignment 2: Energy concepts for reaching sustainable urban districts

Project:	Smart Grid Meppelenergy
Soort opdracht:	practical internship or final master/bachelor degree project
Betrokken bedrijven:	Rendo, i-NRG, University of Twente, TU-Delft, Saxion sustainable energy research group, council of Meppel.

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The renewable energy concept involves a biogas CHP, underground thermal storage, heat pumps and distributed heating/cooling. Due to the financial risks involved, individual renewable energy generation concepts are becoming more attractive than distributed concepts.

An important research question is:

To what extent are all-electric houses which generate their own renewable electricity an attractive alternative for a more complex, collective energy infrastructure?

For the assignment we think about the following tasks:

- Investigation of all-electric house concepts
- Determination of system dimensions
- Comparing investments of individual and collective concepts
- Comparing energy and operational costs and benefits

Depending on the progress of your study (internship or degree project), interest (mathematical or practical/experimental) or level (bachelor or master’s thesis) different research opportunities are offered. Students are paid according to regular internship agreements.

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