Status of the TransiEnt Library: Transient simulation of coupled energy networks with high share of renewable energy

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Growing shares of fluctuating renewable energy generation technologies in power systems lead to temporal and regional imbalances between electricity supply and demand. Technologies that increase the operation flexibility of the grid (such as demand side management, power-to-heat, power-to-gas or flexible combined heat and power plants) are therefore gaining on importance. Simulation platforms enabling the coupled simulation of electricity, district heating and gas grids are needed to evaluate renewable energy integration strategies in urban energy systems. This is the goal of the TransiEnt model library which is being developed within the *TransiEnt.EE*[1] research project. This paper presents the current status of model library and outlines its structure and modeling concept. After completion, the library will be freely available and will provide a framework to model coupled energy grids, i.e. electricity, district heating and gas grids, including their corresponding producers, consumers and storage (see Figure 1). The usage of the library is illustrated in this paper by modeling and simulating an urban energy system based on the city of Hamburg. The impact of a high share of fluctuating renewable energy generation in the electric grid and the integration of excess electricity in the district heating network is presented.
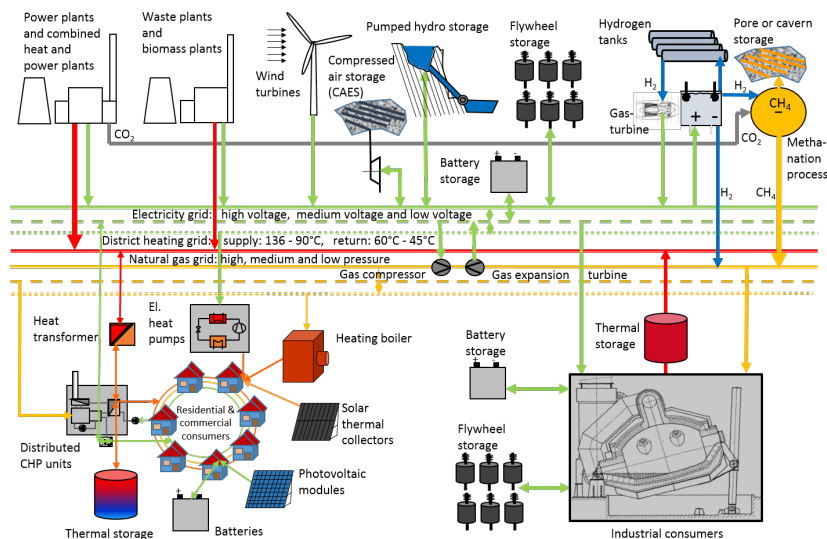
Figure 1. Scheme of coupled electricity, district heating and gas energy supply systems including their corresponding small- and large-scale producers, consumers, and storage systems.

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[1]http://www.tuhh.de/transient-ee/