

Self-consumption of local renewable energy sources in coupled heat and power networks

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Objectives

- 1) Minimise power imports from higher level electricity grid
- 2) Minimise heat generation of base supply unit in the district heating network

Scope

There is significant interest in taking advantage of the hitherto unused synergies by coupling different energy-carrier networks, such as district heating and electrical distribution networks. This could increase the hosting capability of electrical distribution networks for distributed energy resources (DERs). It could also support the integration of local low-temperature heat sources into the district heating network. To fully exploit the possible synergies, an energy management system must supervise the efficient use of local renewable energy resources for both electrical and thermal demands.

This multi-energy management system (M-EMS) therefore manages the energy flows between the heat and power distribution networks.

Description

The electrical distribution system is connected with the district heating network at one or multiple points where electricity can be converted to thermal energy via power-to-heat appliances. The operational goal is to efficiently use energy generation from DERs connected to the electrical energy distribution system. To this end, the M-EMS operates the available power-to-heat and storage appliances with the goal to directly convert or store surplus energy from DERs with respect to future/predicted energy demands.

