

Track 2 - The smart energy system transition in cities and regions

Title of the proposed paper

The dynamic interaction between self-consumption and the grid

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3 keywords

self-consumption, peer-to-peer, smart-grid

Text abstract (max. 300 words)

This paper explores the implications of self-consumption and peer-to-peer supply of electricity for the centralised grid based electricity production. In the Netherlands we see a large growth of private PV systems with PV power directly used by consumers (self-consumption). We designed an agent based model to simulate the grid effects when, within a neighbourhood, households install PV systems. The paper discusses the model and its application. As a first application we studied the influence of the introduction of local exchange and/or private storage. This exercise answers the question of how, in these scenario's, neighbourhood's demand on the central grid is reduced and the demand pattern changes.

The initial results show a clear decrease in average daily grid demand of the neighbourhood when more households install PV systems. This decrease is larger when private storage and/or local exchange is introduced. The peak in the demand slightly reduces (maximally about 10%) , independent of the introduction of private storage and/or local exchange. The time of peak demand does not change. The paper concludes by exploring the potential of the model. For instance, for more significant reduction of peak demand, more advanced algorithms of (re)charging storage and/or local exchange should be included in the model. Other aspects that will be added in future versions include, among others, taking into account financial, psychological or social motives of households to install PV or storage or to join the smart grid community and considering electricity transport (amount and distance) in the local grid.