

A Blockchain-based platform for peer-to-peer energy transactions between Distributed Energy Resource

Publieke samenvatting / Public summary

Aanleiding

The energy production landscape is being reshaped by distributed energy resources (DER), such as Photovoltaic (PV) panels, electric vehicles (EV) and charging stations. The rapid deployment of these DER calls for management schemes of these resources to guarantee grid reliability in the future. Proposed control schemes, such as demand response, assume that the operation of DER will be centrally managed by an aggregator or a cooperative utility. However, these centralized control schemes suffer from scalability issues when the number of DER significantly increases. In addition, it is unclear how these centralized systems would work in the face of incentive issues or regulatory shortcomings.

Doelstelling

This project will develop a platform to enable peer-to-peer energy transactions between DER, allowing households, with energy generation capabilities, to trade energy with each other or with other DER in the neighborhood, such as EV charging stations, in a distributed, optimal, verifiable and secure fashion. To achieve this mission, we will develop an optimization algorithm that allows households to minimize their electricity cost and maximize benefit from their PV system while at the same time ensuring a profitable charging price for EV charging stations owners. To enable secure and verifiable energy transactions between entities, we will

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Publicaties en materialen / Publications and attachments

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Eindrapport B-DER

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implement the optimization algorithm in a private blockchain-smart contracts architecture. We will assess the technical and economic potential of the developed stations demand in a residential neighborhood in Amsterdam. The assessment will be analyzed for different penetration levels of DER currently and in the future and under different electricity pricing and support schemes.

Korte omschrijving

Utrecht University (UU) and Resourcefully will closely collaborate on designing and implementing the proposed platform. To this end, UU will design the blockchain platform and develop an algorithm for optimizing peer-to-peer energy transactions between multiple DER. UU and Resourcefully will be responsible on implementing the optimization algorithm on a private cloud-based blockchain-smart contracts architecture provided by EnergyCoin Foundation. UU and Resourcefully have already collaborated successfully in the 3-years EU JPI Urban Energy project, PARTicipatory platform for sustainable ENergy management (PARENT) . In this project, they run a pilot installation in Amsterdam and installed 30 energy monitors in households to collect their electricity consumption and PV production data. An innovative dashboard is developed within PARENT, this will be incorporated and further developed in B-DER. The data collected and energy monitors installed in PARENT will be exploited in this project. This data is already stored in a server owned by Resourcefully and UU.

Resultaat

This project will develop, assess and deliver a novel decentralized management platform of DER that is extensible, reusable and marketable. The technical and economic potentials of the proposed platform will be assessed for different stakeholders in the energy system. The optimal management of DER is expected to result in a smooth load profile on the grid, by optimizing the use of locally generated energy, and at the same time create monetary benefits for households and EV charging stations owners. In addition, this project will test the

versatility of blockchains for smart energy applications.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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