Research question (max. 400 words)

There is a societal trend towards a more sustainable electricity system with the integration of sustainable energy sources and an increase in electricity demand (Ruester et al., 2013). Smart distribution grids are seen as enabler of this transformation as these grids can help saving energy and are needed to integrate distributed generation successfully (Veldman, 2009). Verbong et al. (2013) consider distributed generation, measurement and control equipment, innovative consumer appliances and communication tools as the technological artefacts of smart grids. Since technologies are embedded components of socio-technical systems (Bijker et al., 1987), the success of these technological innovations not only lies within the engineered artefacts themselves but also dependent on their social organization. New stakeholders and opportunities arise as the electricity system is transforming towards a more horizontal and bi-directional system dynamic (Verbong & Geels, 2010).

Local energy initiatives, operating micro-generation, are recently seen as a new tool to help achieve the transition towards a low-carbon energy system (Seyfang et al., 2013). Three deployment models for micro-generation have been suggested by Sauter & Watson (2007) (e.g. 'Plug & Play', 'Company Control' and 'Community Microgrid'), The role of the energy communities and companies are explained in these models, however; the role and responsibilities of the distribution system operator, to which network these generation-units are connected, are not yet defined. In addition, these models are set up according to research in the UK and therefore might not apply in the Netherlands. For a successful transition of the electricity system it is relevant to study the social organization of the future distribution system. The roles and responsibilities within smart grid technologies are not clearly defined yet (EG3 (2011); Giordano & Fulli (2012)). As expectations provide direction to experimental pilot projects (Geels & Raven, 2006) and niche developments, this research will focus on visions of stakeholders in the future system. There is a focus on local energy initiatives and their visions on the (future) role of Distribution System Operators (DSOs), as DSOs are currently searching for and experimenting with their role and responsibilities in the future grid. The following research questions are defined:

What are the opportunities and barriers for Dutch DSOs to develop (smart grid) services for local energy initiatives?

1. What are the ambitions, visions and expectations of differently organized and experienced local energy initiatives regarding the future distribution system?
2. How do they see the future role of the DSO and how could existing products and services of DSOs help them in their development?
3. What are the visions of Dutch DSOs regarding their role towards local energy initiatives in the future distribution system?
4. What are the institutional barriers for Dutch DSOs to fulfill the envisioned role(s) in the (future) electricity market organization?

Scientific and TIW relevance (max. 150 words)

This research gives more insight in the expectations, visions and ambitions of local energy initiatives in the Netherlands regarding the future market organization of the distribution system. Their expectations of the future role and responsibilities of the DSO will give insight in the actor dynamics between these two stakeholders as well as in the social organization of the future electricity system. Within Innovation Sciences theory, actor dynamics are important in determining the success of innovations as they help construct further search trajectories for innovation.

The social dimension of a technological system (the future electricity system) will be studied in this research, giving insight in the synthesis between these two layers of a system. In addition, theoretical contributions can be made to the deployment models for micro-generation and social organization of the electricity system by defining visions on the future role of the distribution system operator.

Method (max. 200 words)

Case studies on existing local energy initiatives in the Netherlands will be carried out and compared. These case studies will be selected with the help of relevant documents about the organization of these energy communities (mainly their websites). Data on the expectations, ambitions and visions of these

communities will be gathered via relevant documents and semi-structured interviews with board members of these communities.

To test if the visions and expectations regarding the social organization of the future electricity system and the role of the DSO match with the visions of the DSO, a focus group with experts from several departments within the DSO will be held. To investigate if the envisioned future role(s) of the DSO matches current institutions regulatory and policy documents will be deliberated.

The theory of Walker & Cass (2007) concerning the social organization of energy systems will be used as theoretical lens to help structuring the data and target interview questions. In addition, insights from Strategic Niche Management theory on local experiments and global niches (Geels & Raven, 2006) will be used to extrapolate the innovation processes within the electricity system. The research outcomes will be validated by conducting three expert interviews with experts in future electricity market design.

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