Demonstration projects in transition processes to sustainable energy and transport

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Demonstration projects in transition processes to sustainable energy and transport

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In the transition towards sustainable energy and transport systems the development and up-scaling of niche experiments plays a decisive role. The problems of the incumbent fossil-based socio-technical regime increase possibilities for niche development, but this is not sufficient to succeed. Following processes have been highlighted in the transition literature as decisive for successful niche development: facilitating learning processes, the formation of broad and aligned networks and institutional embedding, voicing and shaping of expectations and visions, and the development of complementary technologies and infrastructures (Hoogma, et al., 2002:30; Raven, 2005). We concentrate here especially on the formation of broad and aligned networks and involvement of users, both industrial users and customers and analyse public funded demonstration and trial projects as one type of niche experiments for facilitating niche development.

This paper gives first results of an analysis of effects of demonstration projects in transition processes to sustainable energy and transport in the Scandinavian countries on knowledge networks and interaction with users. The paper is based on a research project which includes following steps: (1) a state of the art study on the role of demonstration projects in innovation and transition processes (Klitkou et al., 2013); (2) the compilation of a database over Scandinavian demonstration and trial projects (Dannemand Andersen, Cramer-Petersen, Harnes, & Nikoleris, 2014); (3) a social network analysis of collaboration patterns; (4) a survey about the results and learning effects of those projects (Olsen, 2014); and (5) a number of focus groups and interviews on the outcomes, effects and impact of demonstration and trial projects. Here we present results mainly from the three first steps and will add some insights also from the latter steps.

The main purpose of this paper will be twofold: (1) analysing the role of public funded demonstration projects for the changes of the knowledge networks of project participants over time and (2) analysing the role of involvement of users in these demonstration projects.

Demonstration projects target core processes and key instruments needed to facilitate the alignment of promising new technologies with societal conditions. Such alignment is necessary for the successful adoption of radical new technology and if the development and diffusion of emergent technologies, in a transition to more sustainable energy and transport systems, is to be sustained and accelerated. Demonstration projects have proven to be an important instrument both for policy-makers, researchers and firms in helping to reduce uncertainty and learn about the acceptance, desirability and adaptation of new technology in society. Interaction with societal actors, monitoring experiences with governance of such projects and policy learning are all important issues.

We have selected technologies that are promising platforms for a transition to a more sustainable energy system and transport system, such as renewable electricity, hydrogen, and sustainable

biofuels. The future development pathways of these technologies are challenged by a high degree of technological, social and economic uncertainty as well as durability of the incumbent fossil-fuel based energy and transport system.

The measurement of the tangible and intangible outcomes, intended and unintended effects and long-term impacts of trial and demonstration projects can provide important insights for policy makers. Countries have invested heavily in trial and demonstration projects for sustainable energy solutions over recent years. This makes it crucial to understand why certain projects do or do not succeed and how the funding programmes can be improved. Success can be measured by comparing the aims of the projects and the achieved outcomes of the project. Intangible learning outcomes are important (Kamp, Smits, & Andriesse, 2004) and strengthened networking between firms, technology providers, authorities, user groups and other stakeholders (Hoogma, Kemp, Schot, & Truffer, 2002).

We created a database over demonstration and trial projects funded by public agencies or programmes in Scandinavia over the last decade. The database gives an account over the targeted energy and transport technologies, project aims, project partners, funding programmes, duration and funding. We identified 445 demonstration projects starting in the period 2002–12, in Denmark 223 projects, in Norway 113 projects and in Sweden 109 projects (Dannemand Andersen, et al., 2014). Less than one fourth of the projects targeted road transport solutions, mainly electrical mobility and biofuel/biogas.

The group around Harborne, Hendry and Brown developed a taxonomy for demonstration and trial projects and programmes according to their aims (Harborne & Hendry, 2009:3588; Hendry, Harborne, & Brown, 2010), distinguishing between (1) prove technical feasibility, (2) reduce building, materials, components, operating and maintenance costs, (3) prove feasibility in commercial applications, and hybrid projects with a combination of aims. We developed in our state of the art study this taxonomy further and distinguish between following aims, acknowledging that projects can have several aims and categorised the identified projects accordingly:

1. prove technical feasibility
2. reduce building, operating and maintenance costs
3. prove feasibility in commercial applications
4. prove environmental feasibility
5. contribute to the formation of knowledge networks
6. improve public acceptance
7. introduce institutional embedding
8. expose system weaknesses
9. facilitate learning

From the analysis of the database we conclude that to prove technical feasibility is the aim in more than half of all projects, while for one third of the projects following aims were listed: to reduce building, operating and maintenance costs, to prove feasibility in commercial applications, and to facilitate learning. In less than one fourth of the projects to contribute to the formation of knowledge networks was the project aim. The other aims are less prominent.

In our paper we concentrate on the analysis of effects of such projects for networking of the involved actors. This will be shown by social network analysis (SNA) of the involved project partners at different points of time to show if there are changes over time. We distinguish between different types of partners, such as private companies, universities, research institutes, non-governmental organisation, municipalities, regional and national administration, public finding agencies and other public agencies. And we distinguish between national and international collaboration patterns based on the localisation of the partners. We identified about 360 nodes in the Danish projects, 340 nodes in the Norwegian projects and 190 nodes in the Swedish projects. SNA techniques to measure different types of centrality in the networks will be applied.

The state of the art study pointed out that project design should not be too rigid to allow user input and modifications to improve effectiveness, and that careful planning is needed to take account user involvement. Therefore we assume that beside project collaboration the involvement of users as crucial. Here we will look at the interaction with individual users and customers, stakeholder organisations and politicians. These issues cannot be targeted by the social network analysis and will therefore be addressed by interviews and focus groups and will have some impact on our conclusions for the governance of demonstration projects and programmes.

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