

## Socio-technological innovations by energy cooperatives, a challenge

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### Introduction

Initiatives in the field of local renewable energy appear to be very successful in several countries. Because of their activities, the share of renewable energy and the involvement of citizens and civil society organizations in energy transition have increased. Examples from Denmark are well known, but also in other countries such as UK, Germany, Austria, Japan and USA these types of initiatives exist. They also lay the foundation for innovation: changes in the organization of supply, social cohesion and new technologies.

So, social and technological innovations are linked to each other somehow. It is unclear, however, if these local energy initiatives can play a significant role in the energy transition in the Netherlands. Many initiatives lack money, support, knowledge and other resources.

Using theories of community of practice and innovation, we try to understand what factors and actors could or should play a key role in the innovative power of these initiatives. First we compare these factors and actors with relatively long existing initiatives outside the Netherlands. Then we will have a closer look at the Dutch initiatives. We focus on learning aspect within the cooperatives, the way they handle knowledge and the way they have impact on the surrounding world, especially on agenda's for technology and science developments, and on physical and societal structures.

The question is how we can understand and probably facilitate learning processes of these initiatives. And how can we scale up these initiatives of civil society organizations to the mesolevel and macrolevel of society? In other words, how to challenge existing regimes, routines and habits, i.e. regulations, policies, organization, finances, culture and technology? In this paper we focus on learning and knowledge.

### Theory

From Wenger's theory of community of practice, we learn that crucial for learning are at least four aspects:

- a certain structure that ensures continuity and interaction between the members of the community,
- a common identity, visions, ideas, aims and ideals
- common activities such as producing artifacts or services, which reproduce social structures and process, creativity and motivation

- explicit space for learning and reflection

From theories of innovations we learn that for successful innovation is needed:

- fruitful interaction between three levels,
  - the microlevel of innovation,
  - the macrolevel of societal trends and structures and the
  - intermediate level of the so-called regime of routines, incentives, rules etc. which consolidates existing systems and procedures.
- activities and interaction through several lines:
  - governance
  - knowledge
  - market
  - civil society

### Practices abroad

Examples of energy cooperatives in Denmark, Scotland, and Germany show how personal, legal, financial-economic, organizational and technological factors sometimes slow and sometimes encourage the innovative power of these initiatives.

Apart from legal, political and economic factors as well as the availability of natural resources such as water and natural gas, an important issue is the growth and potential of CSOs, the embedding in local systems, and the support by knowledge institutions such as a university and a energy academy.

### Dutch situation

In the Netherlands, we find almost 300 initiatives, most of them being established during the last two years. Although energy initiatives may differ considerably in size and scope, main hurdles are: existing power of energy companies, lack of vision and support of governments, lack of urgency, lack of knowledge, lack of motivation .

With respect to knowledge, at least three types of knowledge had to be distinguished:

\* practical knowledge: were to buy PV, how to get financial support, how to organize a group?

\* applied knowledge: were to build a windmill, how to organize a biogas installation

\* more fundamental knowledge: how to improve grid systems, how to get more efficient load capacity, how to increase efficiency, how to change legal, social and economic institutions.

Some initiatives have been successful in founding new energy cooperatives and even energy firms. In addition, new technologies have been invented or improved, such as wind mill parks, biogas installations, new sharing systems, new ownership systems etc.

Energy initiatives are seen as boundary organisations, in which participants learn from each other and articulate their demands for technical, scientific and social support. To do so they are embedded in all kinds of supportive institutions, initiated by NGOs, governments and research institutions. However, because crucial actors are missing, such as market parties and central government, it is unlikely that they will be successful enough to challenge the existing regime.

#### Conclusions

- initiatives as regime changers
- national and local aspects
- local initiatives and science and technology drivers
- next steps