Zero-Emission communities: The role of local governments and citizens

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ABSTRACT: Climate protection activities at the local level play an important role towards responding effectively to global climate change. The research at hand deals with the subjectively nominated success factors and barriers relevant to the implementation of climate protection measures in local municipalities. Determinants for the transition towards energy sustainable communities (Schweizer-Ries, 2008) are the subject-matter of a longer research tradition (Schweizer-Ries, 2009). In order to work out recommendations for a German federal policy instrument designed to support municipalities towards climate protection, we chose to concentrate on municipalities having applied for the above mentioned funding. Some of these municipalities also plan to realise a process towards "zero-emission" as a long-term project. With qualitative interviews, we assessed in a first research step, how local stakeholders perceive the climate protection measures inside their municipalities, how they were successfully implemented, where social barriers appeared and how they could be minimised. Thus, we were able to collect subjective determinants of success or failure for zero-emission processes. We also examine the role of the citizens, and make the case for increased public participation. The main insights of these first results are that within the administration of local municipalities, cross-sectional interaction and communication are crucial, along with the need to engage a socially skilled permanent employee to manage the implementation of measures and activate external stakeholders. Involving citizens is pivotal in shaping a zero-emission community identity and reality. The research is designed to shed some light on the role the above mentioned financial support programme and therefore serves as policy counselling. The policy instrument seems to be able to promote most factors of success within local authorities, only minor adaptations are necessary.

Keywords: zero emission, municipality administration, local stakeholders, public participation

1. Introduction

Climate protection on a municipal level demands efforts from local governments. Already many municipalities in Germany have committed themselves towards the reduction of CO_2 emissions and are dedicating their own financial resources to this goal. In addition, in 2008 a support programme has been developed, which aids German municipalities realise more CO_2 reductions by providing means to develop an integrative climate change mitigation concept (as well as for different single measures). Furthermore, for municipalities having completed this process, there is available funding for engaging a so called "climate protection manager" helping to implement the different measures.

The support programme obliges the local authority to develop its own climate change mitigation concept with the help of a consulting engineer. An effect of the funding being, that policy makers will not be hard to convince. The amount of intense debates over whether climate protection measures are financially viable will be reduced, and decision makers will lack arguments against committing to climate protection vis-a-vis other targets.

The aim of our research is to investigate how social aspects are incorporated in this programme and how it could be improved in this regard. We are focussing on so called "integrative measures" whereby municipalities are supported to develop and realise climate change mitigation concepts by technical as well as social means. [1]

2. Zero-Emission communities as Energy Sustainable communities

Climate protection comprises the utilisation of renewable energy technologies (RET) as well as the rational use of energy (RUE) e.g. by energy efficiency technologies; this should be accompanied by reduced demands within energy saving lifestyles (often addressed as sufficiency, see e.g. Linz, 2004). Towns and villages getting involved in these activities have apprehended the benefits: cutting energy costs, enhance added value within the region, independency of fossil fuels and the image of a healthy place of residence that fosters in-migration of families and demonstrates cutting-edge and future-oriented policy making.

Most municipalities commit themselves to exploiting smaller or bigger parts of their energy saving potential. Some however, embrace the opportunity not to emit any CO_2 whatsoever and become energy self-sustaining (see also 100% renewable energy communities, e.g. Bonow et al., 2009).

[1] The activities described in this article are part of a socio-environmental research project (2009-2012) that is commissioned by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (FKZ 03KSW003).

A Zero-Emission community, according to definitions of specialists, aims at reducing its greenhouse gas emissions within an intermediate to long term period (e.g. the year 2050) by a percentage close to 100, compared to a given year of reference. These efforts will be valid within some clearly defined topographical area, or another defined part of the municipality. They include exploiting all possible reduction potentials concerning the use of regional renewable energies, efficient energy use, closing material and energy flows, energy saving as well as the transition towards sustainability lifestyles (Paar et al., 2010; see also Diefenbach et al., 2002).

In any case, zero emission or energy sustainability does not include technical measures only. It requires the clear commitment and engagement of different stakeholders inside the community and finally an energy awareness or even energy culture, including behaviour related to energy sustainability (Schweizer-Ries, 2008; Schweizer-Ries, Zoellner & Rau, in press).

These goals are thus to be realized by applying adequate technical, infrastructural and process innovations. This has to be, however, accepted and supported by the members of the local government as well as citizens, the latter being the main producers of emissions and thus the main targets for reducing them (Schweizer-Ries, 2010a). Research, events and a supporting framework must be designed and permanently improved in order to reach the target of Zero-Emission. Only actions within Germany are considered here. It goes without saying that such actions have to take place at the European and global level in order to counteract global climate change.

Overall, it is suggested that this can only take place via good interaction and communication among the above mentioned groups, involving them from the outset. Understanding the change process as a socio-technical system, can help run the successful introduction of new technologies and smoothly change energy consumption patterns (Schweizer-Ries, Zoellner & Rau, in press).

In the following chapters, we will shed some light on this special type of low carbon society or Zero-Emission community, whose ambitious goals make it an ideal starting point in the quest for climate change mitigation at the local level. It requires therefore the best possible integration of human dimensions into this often purely technical approach.

3. Theoretical basis

The underlying model used to describe the CO_2 reducing community is based on the open systems theory (cybernetic, second order) and, more specifically, on the socio-technical systems design (van Eijnatten, 1990; van Eijnatten et al., 1992; Emery, 1993; Pasmore, 2002), in which technologies and humans influence each other and evolve in cooperation over time.

Our investigation methods are following the principles of action research (Peters and Robinson, 1984; Aguinis, 1993; Dickens and Watkins, 1999; Reason and Bradbury, 2002). They include the idea of social and participative design derived from architecture (Sommer, 1983). The aim of these research studies is to support societal change as described in sustainability science (Kates et al. 2002).

In order to emphasize the different starting points of change both inside and outside the community, Kaufmann-Hayoz and Gutscher (2001) and Kaufmann-Hayoz (2006) developed a system model, which is used as a basis for describing sustainable energy communities and of how they should look like (Schweizer-Ries, 2010b). This also includes approaches describing the transition from one status to another. Figure 1 shows the model that is permanently adapted to new research findings and in which central concepts are investigated and developed in fieldwork with local actors (Schweizer-Ries, 2004, 2008), according to Kaufmann-Hayoz and Gutscher (2001).

With this model it is important to be aware that the investigation process artificially separates the investigated system (e.g. a person, family, organization or municipality) from its environment. This is called the 'change system', stating that an investigation of a system is also a kind of intervention (Willke, 1996). From the perspective of sustainability science, the change should result in a better (more sustainable) state of the system (idea of how it could look like). This kind of intervention can change both the perception and appraisal of reality, and the manner of action. The socio-technical system changes over time. Especially when a new energy technology is introduced, there is a change that may be utilized to produce new and more energy-sustainable habits regarding behaviour and thoughts.

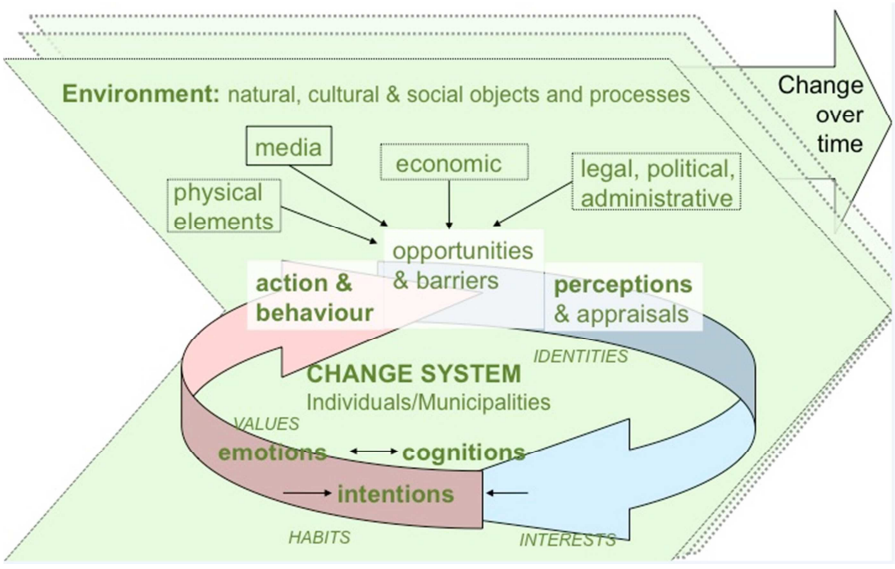

Fig. 1: System model

In this approach, the socio-technical system is defined according to the introduction of the new technology. In the research at hand we focus on municipalities, which can be seen as subdivisions of states and regions, and which include sublevels of urban quarters, households or buildings, or individuals. Social structures cannot be seen independently from the political realisation and the existing and permanently developing cultures of energy use, production and distribution. There are mutual relationships between the environments and the embedded system that can be examined (Willke, 2000). We conduct open interviews in order to reconstruct the way the socio-technical system and its change is perceived and what could help further the development towards Zero-Emission and Energy Sustainability.

4. Investigation method

A semi-structured manual with questions for open interviews was developed on the basis of the aforementioned theoretical background, allowing new questions to be brought up during the interview and to be further adapted during the process. Also, document- and internet-analysis and discussions between those responsible for the project and social scientists served to establish the questions. Thirty municipalities and towns were randomly selected; this included a well distributed number of villages, villages assembled in a rural district with superordinate administration, as well as small towns and cities (Number of inhabitants from ca. 5000 to 670,000). It was provided that they varied sufficiently in their geographical location within Germany. The above mentioned national financial support program for climate change mitigation activities in municipalities, holds different eligibility conditions according to the adeptness of municipalities; i.e. inexperienced ones get funding for developing climate protection concepts, more advanced ones for engaging a “climate protection manager”. The number of communities in those different phases were equalised as well, thus it was provided that the sample of municipalities represented the levels of development in climate protection competence. The interviews were conducted with the person in the administration, that was mostly involved in coordinating and implementing the measures (in villages, this could be the mayor). They were carried out over the telephone and varied in duration between 35 and 110 minutes. In addition, six experts for local level integrative climate protection where interviewed on the basis of the above mentioned, slightly adapted, manual. All material was transcribed, and then analysed and the contents categorised according to the method of qualitative content analysis (Lamnek, 2005; Mayring, 2007).

5. Results

In the following paragraph, we integrate all the findings from the qualitative interviews with experts and representatives of local municipalities. The categories established according to deductive theoretical reasoning could widely be affirmed. In addition, new categories could inductively be extracted. The consequent results are shown to act as main factors of success or as barriers hindering local climate protection efforts.

- **Financial flexibility**

The availability of financial resources is a strict precondition in order to attempt integrative climate change actions or towards being a Zero-Emission community. Many German municipalities face economic problems and thus are very hesitant to invest in sustainable energy technologies, especially the high-cost ones, much more so since they are not obliged to. Interested and very active municipalities pursue already more or less single climate protection measures. Yet, these kinds of efforts were consistently the first ones that fell victim to budget cuts. There are still some municipalities that are not aware of its necessity and don't recognize the possible human and financial benefits, as the interviewed experts pointed out. Especially lack of finance prevents the setting up of staff capacities, so that climate protection cannot be promoted by skilled professionals, which is an important prerequisite (see below).

- **Personal involvement and motivation**

A success factor often mentioned in almost all interviews is that a key actor must exist in a village or town, who is personally and fully committed to the idea of practicing climate change mitigation and supporting the guiding visions of integrative climate protection actions or a Zero-Emission concept. If this is not the case, then members of staff, political parties or other interest groups will have to try to win over the main decision makers, which however often proves to be unsuccessful when there is not much convincing power. In the ideal case, there is a dedicated mayor, or in larger cities the head of the office for the environment. Only when these heads of municipal administration are convinced to fulfil the task is success ensured. It is crucial that there is a strong, often charismatic personality who takes initiative in leadership (pioneers according to Rogers, 1995), that can support the members of staff and policy makers, and encourage them to be part of the activities.

- **Networking, cooperation and communication**

Reducing greenhouse gas emissions at the municipal level is a task that no single administrative office within a local authority can decide about and implement on its own. Several offices, like urban

development, building authorities, tourist and traffic offices, the treasurer and public relations have to be involved. Like Stender (2001) points out, it demands a holistic, integrative approach, and collaboration between many different administrative offices and levels. This is especially the case when attempting to reach Zero-Emission status, which is an undertaking that affects the whole town as a system. However, a characteristic of an administration is its sectoral organisation, and often a lack of communication and cooperation leads to conflicts when such integrative tasks have to be faced. Only a real interest towards long term collaborating and networking will lead to positive results. Thus, agreements to an early and perfect exchange of information, as well as to binding structures for cooperation processes (Stender, 2001), and making use of process and quality management elements, are some of the prerequisites towards achieving the goal of a Zero-Emission community.

- **Institutionalising and long-term commitment**

In order to coordinate the above mentioned processes of communication and cooperation, it is crucial that a municipality creates at least one position (depending on its size); a contact point for all the climate change mitigation activities. It is crucial that the person in charge possesses well developed social skills, including communication, cooperation, moderation and mediation abilities. Her tasks are to take care of the whole process of becoming a Zero-Emission community and to interconnect the different administrative players as well as external stakeholders. Moreover, she has to be the direct link to the mayor or decision maker in charge of the whole endeavour. In more detail, this person will be everyone´s contact point, she will establish new partnerships, activate resources and also pass over her skills to colleagues, so that someone else will be able to replace her when positions are changed (bearing in mind the that process could last up to 40 years). Stender (2001, S. 128) in general, argues that such persons should be „programme-authentic“. It is not always easy to find those players, but it is worthwhile when municipality leaders make efforts to find and engage them, providing support and back up.

Furthermore, it is crucial to legally establish commitment among the administration and political leaders of the municipality. During the planning of the integrated CO_2-reduction strategy, but especially during its implementation, it is of the outmost importance to have the strategy agreed upon by the town or district or municipal council. A regular re-submission thereby strengthens the political commitment.

- **Participation of municipality stakeholders**

The implementation of greenhouse gas mitigation activities requires, besides the above mentioned administrative offices, the involvement of all energy relevant stakeholders within the town. For

example municipal energy suppliers, industry, SME, citizens´ initiatives, environmental associations, trade associations, parishes, housing societies etc. An early participation is crucial (Zoellner et al., 2009). These interest groups have to discuss and agree upon the measures that are feasible and financially viable. Each stakeholder should eventually agree to be responsible for the implementation, the running and maintenance of one or a few measures. It has proven to be a major barrier if they are not involved in the decision making from an early point. When these stakeholders are able to develop and identify with their "own" designed actions, their commitment and collaboration in the long run is ensured. Thus, participation and an open dialogue, but ideally moderated with some specific target-setting, will lead to a common agreement as well as to acceptance and motivation to contribute and cooperate among the different stakeholders.

- **Participation of local citizens**

One major success factor towards becoming a low or zero-Emission municipality is to make local citizens an active part of the endeavour. A CO_2-reduction target without active support by the local citizens is not possible, bearing in mind that the share of private households in final energy consumption is about 30% (BMWi, 2010). Hence we must take into consideration that the immense reduction potential can effectively be addressed, when we mobilise citizens to invest in energetic refurbishments and to adapt their usage related behaviour (Gigli, 2008). Most of the interviewed persons have recognised the need to develop concepts for public relations according to the Zero-Emission guiding visions. However, many are not sufficiently familiar with the adequate methods of participation, or don't have the right expertise (Rau et al., 2009). This constitutes one of the major barriers why technically and financially viable concepts in many cases only have a limited impact or even fail entirely.

Years of socio-scientific research has shown that there is no doubt that local citizens are one of the most crucial contributors to the success of sustainable energy technologies (Villalobos Montoya & Schweizer-Ries, 2005; see also Strategiegruppe Partizipation, 2004). Thus, one could argue that a change in cognitive and behavioural habits has to happen if we are to realise the guiding vision of zero-emission or energy sustainable community (see above). A transition process towards a new energy culture is needed (Schweizer-Ries, Zoeller & Rau, in press).

Motivating the people prevents conflicts and thus establishes a shared identity to be part of a Zero-Emission town. From earlier studies, we know that communication skills can help to integrate relevant stakeholders as well as citizens (Matthies et al., 2004). There are a variety of interaction and communication strategies (e.g. moderation techniques, group processes design, conflict resolution techniques and event mediation). Only these can lead to successful cooperation between the

community administration, policy makers, stakeholders and the citizens. There is no master strategy that fits every project, but it is possible to establish patterns of participation and to elaborate rules adapted to individual municipalities. Such activities are supposed to stimulate and encourage all involved partners to make the zero-emission a joint vision and action. Inexperienced local authorities learn fast when supported and accompanied by communication experts (they can be seen as “change agents”). This person or team will however have to enable the community administration to manage the social transition process on their own after a certain period, and thus work towards capacity building.

- **Inter-municipal-learning and diffusion of best practice**

It is important that a municipality shares positive and negative experiences with its peers. Municipalities agree that they have profited a lot by learning from others – ideally ones within the same region, showing similar structures like size, financial power etc. It is crucial that within a network, the municipalities have the opportunity to exchange best practices, which can finally be diffused for instance in databases, so that all interested local authorities are able to profit.

5.1. First recommendations to the German financial support programme

In the study at hand it became evident, that most municipalities truly rely on funding in order to create climate protection concepts, so that the possibility of “windfall gains” can overall be excluded. This is especially the case in smaller towns and villages as well as rural districts, which happen to be more often affected by financial difficulties than bigger towns and cities. Given that the funding in these cases acts as a significant driver for climate protection activities, funding rates approximately adjusted to municipality structure (including its financial situation) can be recommended.

The “climate protection manager” is indeed one possibility to support and institutionalise climate protection endeavours in general. Again especially smaller municipalities often lack the financial means to create a full time post. Thus, it is very important that she is professionally skilled especially in communication and organisation processes. When carefully selected she can serve as a link between different offices, support the cross-sectional climate protection process and a functioning communication and cooperation within the administration. She can also be a contact person for external stakeholders and in charge of the public relations work. A personality evoking acceptance and appreciation is highly desirable. This position is paid by the programme for three years. Given that many municipalities already express doubts as to whether they will be able to maintain the post after that period, alternative financing strategies should be sought out to assure continuity.

A prerequisite of the support programme states that an adoption of the project by the municipal council is necessary. This is central to the democratic process and helps strengthen its acceptance inside the community. Nevertheless it was learned that highly motivated single players are needed as well; even more so in towns that don't receive monetary funding.

Another positive element of the financial programme are the mandatory participatory processes among the macro stakeholders within town, which help define measures. The details on how this is accomplished are however only roughly determined. This could be improved by research and the collection of relevant information to be noted down in the funding guidelines, e.g. in concretising which methods best to apply (e.g. future conferences, workshops or other well known social support measures), when, how often and with whom.

Public relations, informing and motivating the local citizens is desired and requested in the funding guidelines in a general way. The quantity however has to be more precisely defined, and the quality should be continually assessed. It is important to maintain a steady process of public participation and information over the years (more so in Zero-Emission communities), just as it is necessary to maintain the technical measures installed. Presently, effective and also emotionally touching information and communication strategies are in many cases not applied and knowledge about their application is rare.

6. Outlook

The social processes, like interaction among administration staff, dedication of key players, participation of municipal stakeholders and activating citizens, are elements that municipalities with the intention to realise climate change mitigation or even Zero-Emission concepts are in most cases aware of. However many of them fail to recognize the full extent of their importance or how to successfully exercise it. Even with support by a financial programme these endeavours remain difficult, because they require a fundamental transition of entire municipalities into energy sustainable technological support and lifestyles. In order to reach the challenging and ambitious goal of becoming an energy sustainable or even a Zero-Emission municipality, we argue that it is crucial that the collective identity as a Zero-Emission community is shaped. Commitment and internalising those guiding visions is needed among the citizens and all relevant local stakeholders like policy makers, administration staff, business entities and others. Only a long-term support of the sustainability process will serve to reach this goal, by help of socially skilled experts. The aim of a financial support programme is to initiate the process of capacity building and empowerment within

a municipality, in order to reach the ambitious goal of becoming an energy sustainable town in the long run.

Further case studies of the successful implementation of sustainable energy systems and successful transition to climate protection – or even Zero-Emission - communities are needed. So far only a few can be found that meet the requirements of good practice, showing how to implement the crucial social support of a sustainability process, including technical as well as social innovations.

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