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Future acceptance of wind energy production: Exploring future local acceptance of wind energy production in a Swiss alpine region

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ABSTRACT

Future sustainable energy systems strongly rely on new renewable energies. Wind energy production has become an interesting option for alpine regions. In addition to grid reliability, public acceptance is an important factor that currently limits wind energy's market penetration.
An interdisciplinary research team explored, through socio-economic and technical approaches, the current and future acceptance of wind energy production in the Swiss energy region of Goms, an alpine valley at 1300 m above sea level. The focus of this paper is on research questions comprising future societal challenges for the local population. For this purpose, the focus-group discussion has proven to be a valuable participatory method. Concerning future development of wind energy in the Alps, regional value creation (including workplaces) and the placement of systems where man-made infrastructure is already present were the main visions mentioned by workshop participants.
So far, wind energy as implemented in the valley of Goms has not been perceived as a topic of conflict by the local community. Crucial components towards local acceptance of wind turbines are questions of aesthetics, technical performance and economic feasibility.

1. Introduction

The Swiss 'Energy Strategy 2050' emphasises – among other priorities – the promotion of increased renewable energies to contribute to a more sustainable energy system. Wind energy will contribute to electricity production from renewable sources in Switzerland. Compared to 2010, the installed power capacity will be more than a hundred times higher in 2050. In Switzerland, a very special situation exists concerning wind energy: rather low wind velocities, mostly very dense settled areas and a culture of direct democracy. There is therefore an even stronger requirement for social-acceptance investigations in these settings, as democracy processes, economic potential, site optimisation, distance to and visibility from settlements and noise perception are crucial aspects of the social-acceptance discussion. This paper explores local-acceptance factors of wind energy production in a Swiss alpine region. These factors enable the development of policy recommendations to strengthen future acceptance (the recommendations are published in Spiess et al., 2014).

Today, major expectations have been placed on future energy generation with renewable energy systems such as wind energy. These energy sources will contribute to climate-change mitigation without reducing the standard of living through the replacement of fossil fuels and therefore avoiding greenhouse-gas emissions. Wind energy production has become an option for alpine regions, since the costs of wind turbines have declined and their technical reliability has improved. The growth of wind energy production is not only limited by meteorological conditions (wind force and variability) or by grid reliability, but increasingly by public acceptance (IEA, 2007).

To explore future stakeholder engagement, it is essential to work with adequate participative-foresight research methods (cf. IFA, 2013; Nikolova, 2013; Faucheux and Hue, 2001). This paper addresses the potentials and limits of the focus-group method in the context of foresight research. The future of energy generation relies greatly on societal challenges and democratic decision-making.

The presented results are part of an interdisciplinary research project entitled 'Wind Energy Goms', coordinated by the Institute of Sustainable Development (INE) at ZHAW Zurich University of Applied Sciences. The future-orientated research questions are as follows:

1. What are – as seen by local stakeholders – the *opportunities*, *future chances and risks* for the region in connection with wind energy projects?
2. What are – as seen by local stakeholders and adolescents – the *factors for acceptance* of wind energy in the region?
3. What are – as seen by local stakeholders and adolescents – adequate *measures to strengthen future acceptance*?

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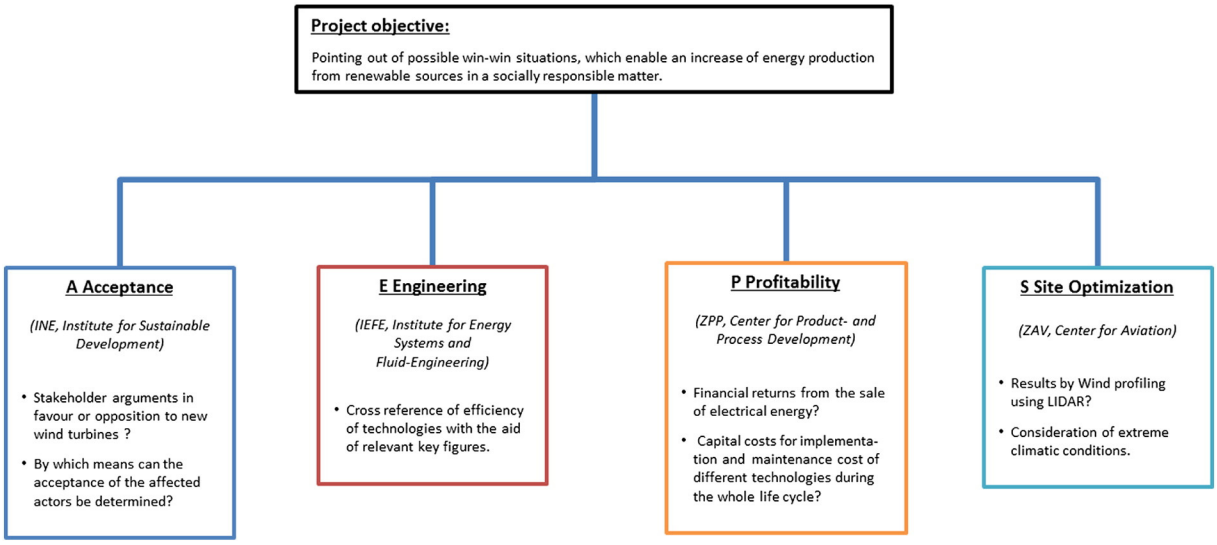

Fig. 1. Project organisation of the overall interdisciplinary research project 'Wind Energy Goms', Spiess et al. (2013).

4. What are – as seen by local stakeholders – *further important stakeholders* for the topic of wind energy in the region of Goms?
5. What are the potentials and limitations of the focus-group *method* in the context of foresight research?

These questions are answered by a literature review and by the implementation of two focus groups with local stakeholders, realised in 2013.

The Goms Valley is unique because it is a tourist area, and in 2011, the first wind power plant was installed there. An online survey with potential tourists, concerning their acceptance of wind energy production in mountain areas, is also part of the whole research project.

The interdisciplinary research project 'Wind Energy Goms' is based on an overall research design with the following four modules: acceptance (A), engineering (E), economic profitability (P) and site optimisation (S), as shown in Fig. 1. This paper is focused on the results of the acceptance (A) module.

All modules are covered by experts from the School of Engineering (SoE) at ZHAW Zurich University of Applied Sciences in Winterthur. Modules E, P and S are predominantly handled by engineers, economists and physicists, while module A (the focus of this paper) is handled by environmental and social scientists.

There are synergies in this interdisciplinary research approach, for instance, the synergies between modules A and E: appropriate and comprehensible visualised energy characteristics from module E, especially indications of technical efficiency and effective energy production, create transparency in communication and therefore play an important role in the acceptance of wind power projects.

Further synergies could be found between modules A and P: for example, local stakeholders (e.g., the community) want a share in the wind power plants, as economic profitability might become an essential acceptance criterion.

An overview of all synergies of the interdisciplinary approach was presented at the 3rd International Exergy, Life Cycle Assessment, and Sustainability Workshop & Symposium (ELCAS 3), 7 July 2013, in Nisyros, Greece (Spiess et al., 2013).

The design of module 'A—acceptance' is shown in Fig. 2. The focus of the presented paper is the evaluation of future local-stakeholder acceptance, based on two focus groups realised in 2013 in the research area and on a literature review.

The paper is structured as follows: the next section provides a short description of the research area. Section 3 includes the results of the literature review. Section 4 explains the chosen research method. The results are presented in Section 5 and discussed in Section 6. They are based on an extension of the framework by Wüstenhagen et al. (2007). The discussion section also contains the lessons learned through applying the focus-group method. The conclusions are given in Section 7, along with the outlook on future research needs.

2. Background of Energy region Goms

The research area of the presented project is the Swiss Goms region, an alpine valley located 1300 m above sea level, with particular importance in terms of tourism: hiking in the summer and fall, and Nordic skiing (Fig. 3) and alpine skiing (in Bellwald) in the winter.

For several reasons, the Goms Valley provides a good point of departure for studying the technical and social aspects of the potential for wind energy:

- The local population and tourists had their first visual impression of a wind energy installation from a small-scale wind turbine contest that ran from July 2012 to July 2013 (Fig. 4) and from a large wind turbine on top of Griespass (2462 m above sea level), installed in 2011 (Fig. 5).
- Along with the implementation of wind energy production, the scientific evaluation of the projects is strongly supported by the local initiative 'energieregionGOMS' (2013).[1]
- A parallel research project from ETH–WSL[2] explores public acceptance of photovoltaic panels on an avalanche-protection construction in Bellwald, Goms, which shows parallels and deeper insights for the exploration of the future acceptance of renewable energy production sites (Graf and Buchecker, 2013).

In addition, the whole setting is sutiable for reflections and discussions with local stakeholders and for applying participatory-foresight

[1] Project goals: 'On the way to the first energy region in the Swiss Alps.' Sustainable, decentralised and local energy production shall be promoted in the region of Goms, in a way that production and demand of the region meet under a minimisation of transport ('energieregionGOMS', 2013). Project-Manager: Mr Dionys Hallenbarter, Münster-Geschinen.

[2] A survey of 352 residents and tourists from the communities of Bellwald, Münster and Ernen has been carried out (Graf and Buchecker, 2013).

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