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Do stakeholders' perspectives on renewable energy infrastructure pose a risk to energy policy implementation? A case of a hydropower plant in Switzerland

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ABSTRACT

As governments propose policies for increasing use of renewable energy, a key risk to policy implementation concerns potential conflicts amongst stakeholders, and public opposition to such policies. Adequately accounting for stakeholders' values and interests is key to understanding whether stakeholders' perspectives pose a risk to energy policy implementation. We present results from a case study on the implementation of a renewable energy project in Switzerland, where we applied Q methodology. Three perspectives were identified, namely: 1) promotion for local development and production of energy ('Local pro-producers'); 2) promotion for a national level 'greener' environmental agenda ('National greens'); and 3) regional government empowerment for implementing energy policies ('Cantonal leverage'). These three perspectives reflect different sets of values and priorities for local, cantonal and national interests, revealing disagreements with the energy policy at different levels of government. The key basis for disagreement rests on which objectives of the policy to prioritize, *i.e.* energy efficiency, sustainable development, electricity reduction or production. Despite this disagreement, stakeholders largely agree on the importance of an inclusive and democratic decision process. These findings support calls for the explicit and systematic consideration for deep-seated values and perspectives amongst stakeholders on an evidentiary basis.

1. Introduction

Governments in many countries have started to review their energy policies to accommodate a transition to renewable energy sources, as a response to international commitments to reduce greenhouse gas emissions through climate change mitigation, or in response to phasing out of other sources of energy such as nuclear. Some examples of such policies are: the new energy market design in the European Union (Anon, 2015); the last revision of the German Renewable Energy Act (Anon, 2017); or the Swiss energy law (Anon, 2016). One key factor for successfully implementing these policies is the degree of public acceptance of the infrastructure that comes along with renewable energy (Späth and Scolobig, 2017; Spiess et al., 2015; Stirling, 2008; Wolsink, 2012; Wüstenhagen et al., 2007).

Transforming the energy system, and the electric power system in particular, to one that is dominated by renewables instead of fossil fuels, will likely change the relationship of the average citizen to that system. Actors who are now consumers could then be also small producers in a more decentralized system with household photovoltaic installations, and current big producers could increase investment abroad, where resources for renewables are more abundant (Hanger et al., 2016; Lilliestam and Hanger, 2016). Consequently, the electricity will need to be either transmitted from remote areas with high voltage power lines, or to be smartly distributed by the grid (Blarke and Jenkins, 2013).

In the eighties, developers of renewable energy failed to anticipate acceptance issues associated with the implementation of those technologies. According to Pahl-Wostl (2002), engineers have considered the human dimension as an exogenous variable of their planning, and policy-makers have focused generally on the environmental and technological dimensions. Later, some scholars appealed for policies to institutionalize frameworks that promote acceptance within markets and communities (Wüstenhagen et al., 2007). The need for research on a broader range of determinants of public acceptance of energy technologies besides demographic variables was also identified (Visschers and Siegrist, 2014). A considerable number of studies have focussed on public acceptance, public risk perception, and stakeholder involvement. Fig. 1 shows a compendium of the determinants found in

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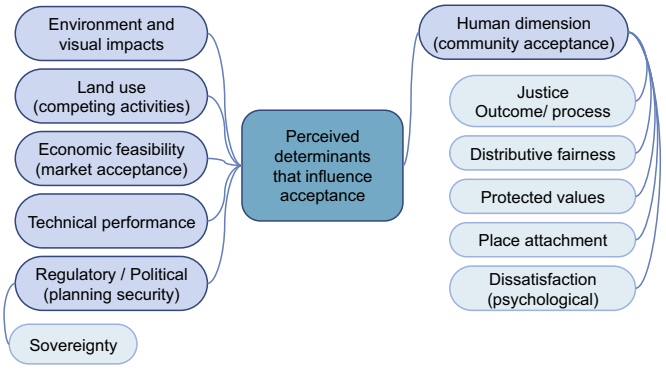

Fig. 1. Determinants of public acceptance during decision processes.

literature that may hinder public acceptance of renewables infrastructure.

The human dimension of public acceptance involves perceptions, namely justice in the outcome and the process of engagement, distributive fairness, protected values and place attachment (Devine-Wright, 2005; Ellis, 2004; Howard et al., 2016; van der Horst, 2007; Walter, 2014). Public acceptance may also be hampered by negative environmental impacts and dissatisfaction with end-of-pipe solutions which tend to prioritize the economic cost-benefit dimension (Geissmann, 2011; Pahl-Wostl, 2002; Zoellner et al., 2008). Spiess et al. (2015) observed that aesthetics, along with techno-economic performance, is a crucial determinant of public acceptance. Furthermore, trust and regulatory context are a relevant determinant of public acceptance (Hanger et al., 2016; Scolobig et al., 2015; Slovic, 1993; Stauffacher et al., 2008; Wolsink, 2007). In many cases, expansion of renewables leads to a conflict of interest or space between stakeholders' activities due to contested land uses (Heller et al., 2010; Neu et al., 2012). All these technical, environmental and socio-economic changes must be taken into consideration for successful implementation of renewable energy projects (Bryson, 2004; Wildavsky, 1979).

Despite the attention and recognition that public acceptance receives in accounting for policy-relevant knowledge, the interconnection of determinants of public acceptance has remained relatively unexplored. In particular, it is important to understand which determinants of public acceptance arise during the transition to renewables, how these interrelate with one another, and whether any negative perceptions pose an actual risk to the implementation of plans to effect a transition to renewable energy. To do so, we use Q methodology to analyse stakeholders' perspectives with respect to a typical renewable energy project in Europe, a proposed small hydropower project being developed in a Swiss community. Our aim is to account for values and perceptions at stake in a renewable energy transition process, thereby enhancing our understanding of potential conflicts and contributing policy-relevant knowledge regarding how key determinants for public acceptance interrelate.

In this paper, we present the results of this study, which we have structured as follows: First, we present a contextual overview of the case study (Section 2), followed by a description and rationale for the methodology employed (Section 3). We then present key results of the analysis (Section 4), followed by a discussion on the significance and relevance of these results – not only for the case study in question, but also for similar cases (Section 5), and conclude with key insights and recommendations (Section 6).

2. Case study: Swiss small hydropower plant

We chose a case study in the country of Switzerland, which like most wealthy countries has a policy target of switching from fossil fuels to renewable sources of energy, and which is having to grapple with acceptance issues (Guggenbühl, 2016). As a consequence of the nuclear accident of Fukushima, the Swiss Federal Council has been working since 2011 to develop a completely new energy strategy for the period 2020–2050 (ES2050). The energy strategy has four main pillars: (i) to reduce energy consumption by 54% based on 2000 consumption; (ii) to increase, 15 fold, the share of new renewable energy production in 2010; (iii) to reduce CO_2 emissions by 40–70% without jeopardizing supply, security, and costs; (iv) to phase out the five existing nuclear power reactors at the end of their safety-related service life and not replace them with new plants (BFE, 2013). The energy strategy is presently the most prominent element of the Swiss energy policy and will have to be voted in several stages by the parliament. Moreover, the public will have to vote on the strategy in the referendum initiated by the Swiss People's Party and a number of associations.

The Federal Office of Energy reported in 2013 economic and procedural determinants leading to public opposition to the energy strategy from specific group of stakeholders (UVEK, 2013). However, in the same document, the Federal Office of Energy declared: "The assessment of the energy strategy as a whole is positive on the part of energy policy, technical, landscape and environmental protection organizations".

Hydropower is the main electricity source in Switzerland, accounting for 59.9% of electricity production in 2015 (BFE, 2015). The energy strategy specifies plans to increase hydropower by 10% with respect to 2010, which is the maximum increase potential for Switzerland (BFE, 2012). Of the total expansion, small hydropower would account for 35%. Currently, the electricity contribution by all small hydropower plants is about 8.6% of total hydropower produced (BFE, 2012). To check how plausible this increase would be, the Federal Office of Energy assessed the hydropower potential in Switzerland among 34 stakeholders. The survey identified a generic list of barriers to expansion of hydropower, including ecological, economic, social and spatial planning factors (BFE, 2012). Some experts expressed "the existing fronts between conservation and use interests have so far prevented an objective discussion. From different sides a transparent, fact-based debate is required instead of lobbying and emotional discussions" (BFE, 2012). As reported in other studies, the location of the small hydropower plants, and the feed-in tariffs raised concerns from environmentalists and other stakeholders (Guggenbühl, 2016; Wehrli and Cadonau, 2014). Although the Swiss Federal Office of Energy attempted to address the hydropower debate in the country, this situation highlights the need for a deep analysis of stakeholder perspectives on the matter.

The complexities involved in the development of small hydropower plants provide a context in which to study and reveal potential conflict areas among stakeholders in the implementation of the Swiss energy strategy. After comparison amongst various options and consultation with the Swiss Federal Office of Energy, we selected the small hydropower plant of Berschnerbach located in the canton of St. Gallen in the east of Switzerland, for this case study (Fig. 2). The planned installed capacity for this hydropower project is 3.1 megawatts (MW), enough electricity for 2500 households or 30% of the consumption of Berschnerbach municipality. According to the energy policy (Anon, 2016), the project was eligible for feed-in tariff for the electricity produced.

The planning of the hydropower project in Berschnerbach was a complex process. It started in 2009 as a proposal from two electricity companies, one operating in that community and one national, along with the municipality of Berschnerbach and one environmental consultancy company. After the water license concession in 2011, the local electricity company organised meetings among the 40 or so participating stakeholders and several compensation measures were added to the plan, according to information obtained through interviews with the stakeholders of this study. The decision-making process lasted until the beginning of 2015, when one NGO submitted several complaints to the cantonal court. In its submissions, the NGO demanded a withdrawal of