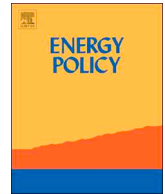




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Community financing of renewable energy projects in Austria and Switzerland: Profiles of potential investors

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ABSTRACT

Small-scale investors are gaining recognition as a valuable source of private funding necessary for a successful energy transition. Still, there is limited knowledge about the characteristics of potential investors, especially in community renewable energy projects. This study intends to address this gap and investigates the impact of socio-demographic and socio-psychological characteristics on individuals' willingness to invest in community renewable energy projects. Our investigation is based on two large-scale representative surveys of 2260 respondents in Austria and Switzerland. The majority of respondents would be willing to invest 1000 to 10,000 CHF/EUR in such a project, with higher amounts in the Swiss sample. Potential investors in Austria tend to be male homeowners with higher incomes, while Swiss investors are more educated. Generally, positive attitudes and beliefs related to renewable energy have a significant impact on investment intention. The largest group of potential investors in both countries can be described as 'urban wind energy enthusiasts', who show high acceptance of wind energy installations near their communities. Surprisingly, a significant segment of potential investors is skeptical of a nearby wind installation. Study results can be used by decision-makers to tailor appropriate policy measures and by project developers for communication of the project aims and benefits.

1. Introduction

In order to meet national emission and clean energy installation targets, an estimated \$16.5 trillion of private investment in renewable energy (RE) and energy efficiency projects is needed over the coming 15 years and a large investment gap still exists (Buchner et al., 2015). Given this huge unmet need for private investment, public attention has recently turned towards community renewable energy (CRE) projects, which involve small-scale private (aka 'retail' or 'individual') investors and provide an important alternative to large public and private investors, such as funds and electric utilities (e.g. Bauwens, 2016; Bergek et al., 2013). While regional utilities and banks are often favored for CRE development (Gamel et al., 2016), the communities remain closely involved in different aspects of the projects, ranging from planning, installation, financing, and operations (Walker and Devine-Wright,

2008). Thus, CRE increases investor diversity in the sector. There are multiple other benefits of CRE: in addition to financial returns (Salm et al., 2016) and the development of the local economic base, CRE projects have been linked to fostering communal values (solidarity, self-sufficiency, self-determination, and empowerment through local engagement), job creation, and a positive environmental impact (Walker, 2008). Other studies have found a correlation between communal energy projects and positive attitudes toward wind turbines (Musall and Kuik, 2011) and highlighted the importance of trust between the community and project developers (Walker et al., 2010).

There are considerable knowledge gaps about this relatively new investment vehicle: limited data are available on the potential for capital inflows in this sector, but also on profiles of potential investors and their investment. These aspects are of crucial importance for a sound CRE policy that would target the most interested segments in the

Abbreviations: ANOVA, Analysis of variance; AT, Austria; BIC, Bayesian information criterion; CH, Switzerland; CHF, Swiss franc; CRE, Community renewable energy; ElWOG, Elektrizitätswirtschafts- und -organisationsgesetz, Electricity Act in Austria; EnG, Energiegesetz, Energy Law in Switzerland; EnV, Energieverordnung, Federal Energy Directive in Switzerland; EUR, Euro; FIT, Feed-in-tariff; NGO, Non-governmental organizations; OeMAG, Abwicklungsstelle für Ökostrom AG, processing and administration center for eco-electricity subsidies in Austria; ÖSG, Ökostromgesetz, Green Electricity Act in Austria; PV, Photovoltaic; RE, Renewable energy; SFOE, Swiss Federal Office of Energy; SFSO, Swiss Federal Statistical Office; WTI, Willingness to invest

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population. Perhaps the most-studied aspect of CRE finance is the motivation to invest, which includes environmental, social, financial, ethical, altruistic or emotional considerations, with multiple motivations often present simultaneously (Bauwens, 2016). It has been established that environmental concerns, peer effects, and social norms (e.g. interpersonal trust and social identification) have a positive effect on the willingness to participate in a CRE project (Bamberg et al., 2015; Dóci and Vasileiadou, 2015; Kalkbrenner and Roosen, 2016; Mignon and Bergek, 2016). Moreover, place of residence plays a role: countryside dwellers in Germany were more likely to participate in CRE projects than urban dwellers (Kalkbrenner and Roosen, 2016). Rural dwellers seem to be motivated by the increase in self-reliance and independence, while urban inhabitants appreciated their interdependence and being connected to other people in the city (Dóci and Vasileiadou, 2015). Investors into CRE projects tended to be older males with higher incomes, higher education and higher electricity usage (Bauwens and Eyre, 2017; Dóci and Vasileiadou, 2015; Yildiz et al., 2015). It remains to be shown whether these investor characteristics hold for two other German-speaking countries of Austria and Switzerland.

The paper seeks to accomplish a number of research objectives, including a cross-country comparison of the results. We seek to address the following research questions:

- What are socio-demographic and socio-psychological characteristics of potential investors (and non-investors) in CRE in Austria and Switzerland?
- What are the preferences of different types of potential investors with respect to CRE (e.g. investment amount, preferred technology) and what are perceived drivers and barriers to investments into CRE?

The study's focus on Austria and Switzerland is not accidental. Austrian and Swiss CRE projects have not been subject to much academic attention, unlike those in Germany (cf. Yildiz et al., 2015), the Netherlands (cf. Dóci and Gotchev, 2016), the United Kingdom (cf. Walker et al., 2010), and to a lesser extent in France and Sweden (cf. Mignon and Rüdinger, 2016) or Belgium (cf. Bauwens et al., 2016). In both Austria and Switzerland, there are traditional concerns about the pristine Alpine scenery and tourism, which impact socio-political acceptance of large-scale renewable energy installations. Direct citizen involvement might alleviate the tension between RE development and the willingness to protect unique natural environments. Still, there are reasons to believe that CRE projects might have a large potential in Austria and Switzerland, as both countries have a long tradition of citizen participation in different types of community-based initiatives (ranging from banking services to dairy farms). In Switzerland, 292 energy cooperatives were involved in both energy production and distribution in 2015 (Schmid and Seidl, 2016). Austria hosted a total of about 400 community RE projects in 2014 (Bauwens et al., 2016). Purtschert (2005) and Madlener (2007) provide further examples of community energy projects in Switzerland and Austria respectively.

Complementing previous research efforts that looked at potential investors and their characteristics (Kalkbrenner and Roosen, 2016; Salm et al., 2016), this study describes and compares potential CRE investors in Austria and Switzerland by the means of two large-scale representative surveys. Note that actual investors provide current investment flows into CRE projects, while the presence of potential investors is indicative of future capital flows and growth opportunities for the sector.

One of the contributions of this study is connecting personal beliefs to the willingness to invest (WTI) in CRE projects. While various scholars have shown the impact of beliefs on pro-environmental behavior, such as energy savings (cf. Gadenne et al., 2011), willingness to engage in climate change mitigation (cf. Ferguson and Branscombe, 2010), and willingness to pay for green electricity (cf. Liu et al., 2013),

surprisingly little is known to date on how personal beliefs are connected to actual or potential engagement in CRE projects. A study by Bamberg et al. (2015) investigated the influence of participative efficacy beliefs on the intention to engage in collective climate protection actions, while Fleiß et al. (2017) looked at the impact of beliefs on investment into communal solar energy projects. Our research further addresses the connection between individual beliefs and investment intentions, establishing that potential investors in both countries are on average more optimistic about solar power achieving grid parity and the possibility of a future without fossil fuels. Yet, there is a significant investor heterogeneity with respect to welcoming wind power in the back yard.

The study has several other important contributions, such as the estimation of the potential market size for CRE projects. The market size can be inferred by knowing that nearly half of the Austrian respondents and 60% of the Swiss respondents would be interested in investing into a CRE project and that the majority of the investment would lie in the range of 1000–10,000 EUR/CHF.¹ The study also identified the most promising technologies for CRE projects: solar photovoltaic and wind power. Moreover, our analysis provides new insights into the profiles of potential investors and non-investors, illustrating socio-demographic differences between them. Based on explorative cluster analysis, this study identifies the largest group of potential investors in both countries as 'wind energy enthusiasts'. In contrast to Germany (Kalkbrenner and Roosen, 2016), where living in a rural community increased the likelihood of investment, location of residence did not significantly impact the odds of investment in Austria and Switzerland.

Another important insight is that there is a significant sector of potential investors (about a quarter of the sample) who report lower levels of acceptance of wind energy installations near their domicile. This is a somewhat surprising result, given that prior research established a correlation between community energy and positive attitudes to wind turbines, which can be interpreted as increased social acceptance (e.g. Musall and Kuik, 2011). In spite of the wind energy skeptics' resistance to wind power near their communities, roughly every fifth of them in Austria and sixth in Switzerland would invest into wind power. The segmentation findings are especially relevant to policy makers, who intend to create a tailored mix of policy measures, as well as community project developers, who wish to target their communication strategies towards the most receptive groups of potential investors. Additional policy implications can be derived with the knowledge of drivers and barriers for CRE investment investigated by this paper. Tellingly, the most significant barrier in Austria were lacking financing means (hence, the need to communicate about incremental investment opportunities in CRE), while the Swiss respondents were struggling with the perceived riskiness of investment and indicated the lack of knowledge about CRE (hence, a recommendation for consumer education with respect to risk and return profiles of CRE investments).

This paper proceeds as follows: we describe the data collection and methodological approach, followed by the results. The paper ends with a discussion of policy implications, as well as the study's limitations and suggestions for further research.

2. Policy background

It is necessary to put the discussion of CRE into its country-specific policy context. One of the defining features of energy laws and regulations in both countries is that neither gives explicit support for community finance, but both have provisions that encourage CRE. For example, both countries set ambitious targets for the expansion of the

¹ For simplicity, we assumed a 1:1 exchange rate between the currencies. When the surveys were fielded, the Euro and the Swiss franc fluctuated around 1.12–1.13 and 0.93–0.98 per US dollar respectively (IMF, 2017).

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