

Community Financing of Renewable Energy Projects in the Age of Low and Negative Interest Rates in Austria and Switzerland

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This contribution describes the current attitudes of potential investors towards community financing of renewable energy projects. Based on a representative survey of more than 2,000 respondents, conducted in Austria and in French- and German-speaking parts of Switzerland in 2015, the study identified four types of potential investors depending on their location (urban vs. rural) and social acceptance of wind energy.

1. Introduction and Literature Review

Globally, an estimated \$16.5 trillion of private investment in renewable energy (RE) and energy efficiency projects is needed over the coming 15 years, in order to meet national emission and clean energy installation targets (Buchner et al., 2015). As of 2015, \$243 billion of private investment has been achieved, but is still at a low level compared to what is required. Community financing of RE projects is a private investment instrument, which provides a viable alternative to both public and large-scale private, often utility-lead, development of RE.

Compared to traditional RE business models, community finance has a number of important advantages. Community finance projects require much smaller commitment of funds compared to the upfront costs of RE installations at home. The individuals investing into community energy projects don't necessarily even have to be property owners. Community finance allows the renters to invest into RE projects and the willing property owners to increase their RE exposure without necessarily installing another solar photovoltaic system on a rooftop. The shares in the community projects can be acquired gradually and each project can be carefully selected and pre-screened by the investor. Unlike buying shares in a RE company or investing into a fund, engagement in the community project does not require the same extent of specialized financial knowledge.

As an alternative to the savings or time deposit accounts, which currently offer close to zero or even negative returns, community finance has a conservative but a positive earning potential. To put the matter into context, in 2016, the major Swiss banks (UBS, Credit Suisse) are offering between 0-1% returns on different types of accounts. However, a 5-year deposit of a minimum 5,000 CHF would yield exactly zero return. Since some accounts are charged

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maintenance fees, their yields might be even negative. In contrast, community finance projects are usually getting the funding only in case they satisfy a given hurdle rate, which lies between 2-3% in Switzerland (own research). Similar interest rates can be observed in Austria.

In addition to providing positive financial returns, community energy projects have the potential to alleviate the tension between the RE development and the willingness to protect natural landscapes (especially pristine Alpine scenery), which is often of concern in case of large wind power projects. It has been shown that projects with a significant involvement of local population enjoy higher social acceptance levels (Tabi and Wüstenhagen, 2015). Community projects are thus less likely to encounter strong local opposition, which often results in longer permitting procedures. Also, community projects foster local values such as solidarity, self-sufficiency, self-determination and empowerment (Walker, 2008). In addition, the investors might value a positive environmental impact, creation of green jobs, and support of local economic base and rural or regional development that usually accompany the development of RE projects.

Finally, communal RE projects allow for production of green electricity within the country's borders, as opposed to electricity import. For example, the Swiss population has shown a clear preference for electricity to be produced within the country (a preference of 86% of respondents), while a third would like the electricity to originate from their region, compared to only 1% who would welcome green electricity imports (Ebers and Wüstenhagen, 2016). Gamel et al. (2016) showed that individuals with pro-environmental attitude are also more interested to invest in wind energy projects in their neighborhood.

Given these attractive qualities of community finance, the number of community energy projects has been on the rise recently, most notably in Denmark, Germany and the Netherlands (Boon and Dieperink, 2014; von Bock et al., 2015; Yildiz, 2014). In Austria (AT) and Switzerland (CH), community RE projects got increasingly popular in the recent years, even though the number of such projects is relatively low compared to the countries mentioned above.

There are several participatory mechanisms in community projects: as a direct investment in RE projects or a membership in associations or energy cooperatives, which typically invest in more than one project. Cooperatives have a long tradition in Europe, where individuals organize themselves to create value for all members, be it the distribution of food (e.g. COOP or Migros food chains), banking services (e.g. the Raiffeisen banking cooperatives), or energy production (Purtschert, 2005). In Switzerland, 292 energy cooperatives were active in 2015 (Schmid and Seidl, 2016), which were involved not only in energy production, but also managed distribution networks. Currently, the information on the number of energy cooperatives has not been readily available for Austria.

In order to tap into the full potential of community financing for RE projects, it is important to learn more about potential investors. The retail investors often evaluate the RE projects based on their intuition as well as employing financial instruments like the calculation of a payback period (Ebers and Wüstenhagen, 2015). This means that a lot of decision-making happens when the retail investors compare the perceived risks and perceived returns of possible projects, and this risk perception varies widely among the respondents. In Switzerland, only 19% of respondents view community RE projects as secure as the savings accounts or 1-year deposits (Ebers and Wüstenhagen, 2015). At the same time, the same share of respondents believes that investment into community finance project is as risky as investing into a

start-up company, which are known for very high failure rates. 13% of Swiss respondents viewed the risk profile of energy cooperatives as comparable to a well-diversified market portfolio and 16% as investing in real estate. Even though community finance projects usually are much less risky than the start-ups, the perceived risk looms large. This suggests that the potential investors would require higher returns from the RE projects, to counterweigh the high perceived investment risks.

Literature on the underlying motivations and behavior of private individuals (often called 'retail investors') in community RE projects is still scarce. Gamel et al. (2016) shows that investors' preferences for wind energy investments are impacted by such characteristics as age, environmental attitudes and available financial means. At the same time, general financial knowledge does not have an influence on investment preferences (Gamel et al., 2016). In addition to pro-social attitudes and altruistic motives, purely financial considerations of higher return on investment play a role in retail investment decisions (Nilsson, 2008).

Even though previous research has provided insights on drivers and barriers of community engagement in RE projects, there is a lack of understanding of the socio- demographic profiles of the potential investors in Switzerland and Austria. Based on a unique pooled dataset on community financing in these countries, this paper provides cross-country comparison of retail investors' preferences for community RE projects. Our results show that indeed this form of financial investment has an untapped potential in both countries. The findings are also relevant for community project developers who wish to target their communication strategies towards most receptive segments in the population.

2. Data and Methods

The analysis is based on a pooled dataset (N=2,260) from two surveys, which provide one of the most in-depth information on household and individual preferences with respect to RE in Austria and Switzerland. Both samples are representative of the respective population in the two countries. The survey in Austria has been completed in October 2015 with 1,014 respondents. The Swiss survey was conducted in February-March 2015 and included 1,246 respondents. Even though the surveys were conducted separately, it was possible to pool the data because the surveys included the same set of questions on (1) socio-demographic and psychographic characteristics, (2) attitudes towards community finance and (3) willingness-to-invest (WTI) (including a specific amount) in community RE projects in the respective country.

For the analysis, the surveys recorded socio-demographic characteristics of the potential investors, such as age, education level, income, type of living (urban vs rural), and home ownership (renter vs homeowner) (see Table 1). The surveys also solicited information on the respondents' knowledge about solar technology, their attitudes towards economic competitiveness of RE (grid parity), the potential of substituting away from fossil fuels in the long run, and acceptance of large-scale wind projects near their communities. Further questions on potential investment barriers and other attitudes towards RE rounded up the potential investors' profiles (see Ebers and Wüstenhagen, 2015; Ebers and Wüstenhagen, 2016; Hampl et al., 2016).

In the next step, we described and characterized respondents who were willing to invest in community projects and examined cross-country differences. There were 1,254 potential

Variables	Variable code	Sample Mean	Average investor	Average non-investor	Average investor CH	Average investor AT
Willingness-to-invest (WTI)	1=potential investor, 0=potential non-investor	0.55	1	0	1	1
<i>Socio-demographic variables</i>						
Gender	1=male, 0=female	0.51	0.54	0.46	0.49	0.62
Age	years	44.83	43.76	46.16	43.56	44.07
Education	0=compulsory school, 1=vocational training, 2=high school, 3=college, 4=other degree	1.83	1.92	1.71	1.97	1.85
Residence	1=urban, 0=rural	0.68	0.69	0.67	0.71	0.65
Income	0=low, 1=average, 2=high income	1.04	1.09	0.99	1.01	1.17
Home Ownership	1=owner, 0=renter	0.53	0.54	0.53	0.49	0.61
<i>Psychographic variables</i>						
Knowledge About Solar	„I believe that solar cells use more energy during their manufacturing than they later produce.“ 1=agree, 2=rather agree, 3=rather disagree, 4=disagree	2.68	2.76	2.58	2.8	2.7
Grid Parity	„I believe that solar electricity will reach grid parity in 20 years.“ 1=agree, 2=rather agree, 3=rather disagree, 4=disagree	2.11	2	2.26	2.04	1.94
Future Fossil	„I do not believe we will one day be able to do without fossil fuels.“ 1=agree, 2=rather agree, 3=rather disagree, 4=disagree	2.45	2.59	2.27	2.61	2.56
RE Acceptance	„I would approve of building a wind turbine slightly outside of my community.“ 1=agree, 2=rather agree, 3=rather disagree, 4=disagree	2.11	1.94	2.31	1.92	1.98

Table 1: Description of variables and average values for different investor groups

investors in the total sample. We also investigated whether socio-demographic and psychographic characteristics can be connected to the respondent's willingness to invest into community RE projects. These differences were tested by the logistic regression method, which included a binary WTI as the dependent variable and the socio-demographic and psychographic dummy and categorical variables as covariates (Hayes and Matthes, 2009).

Finally, we conducted a hierarchical cluster analysis, an explorative technique that finds groups in the data (Kaufman and Rousseeuw, 2005). Four profiles were selected to group potential investors with similar investment preferences, based on one socio-demographic variable (residency) and one psychographic variable (RE acceptance). These profiles were subsequently described and compared to the non-investor group.

3. Results and Discussion

3.1 Willingness to invest in community renewable energy projects

The results suggest positive prospects for community projects in renewable energy in both countries. In Austria, 50% of the respondents would invest in a community renewable energy project (see Figure 1, sum of "yes" and "rather yes"). This is a high rate for this relatively new investment vehicle, given that only 7% of respondents in Austria have previously participated in a community RE finance project (HAMPL et al., 2016). In Switzerland, the share of the potential investors is even higher: 60% of the sample.

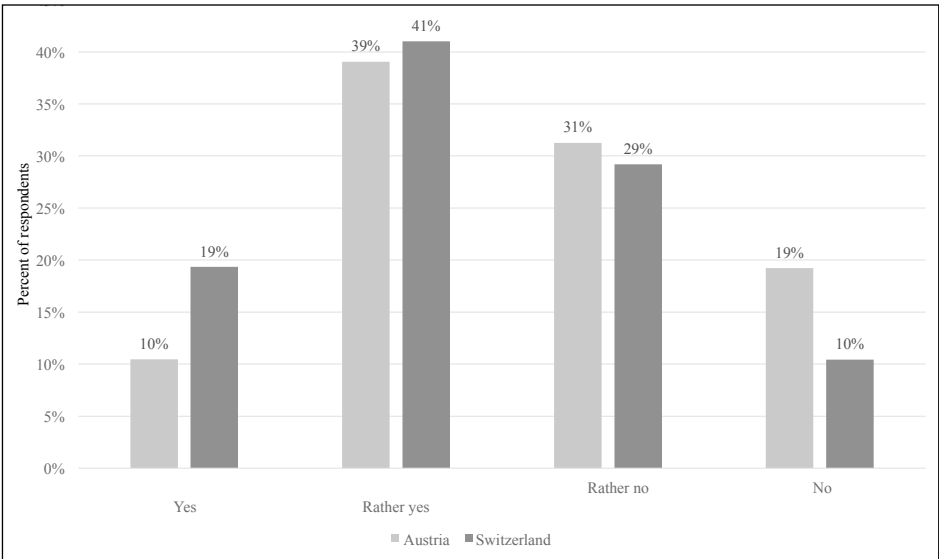


Figure 1: Intention to invest in a community renewable energy project

Concerning the willingness to invest (WTI) in monetary units, the respondents in the two countries have slightly different appetites for investment (see Table 2). Swiss potential investors are generally willing to invest higher amounts than their Austrian counterparts. More

than a third of potential Swiss investors would be willing to dedicate up to 10,000 CHF to a community finance project. At the same time, three quarters of the Austrian potential investors would choose to invest up to 1,000 EUR. There is also a small percentage of community finance enthusiasts who would be willing to invest more than 10,000 EUR/CHF into RE projects. It must be noted that in both countries the top barrier to the investment was the lack of financial funds. Positive environmental effects of the RE projects were cited as the most important driver for participation.

Willingness-to-Invest	Share of potential investors in AT	Share of potential investors in CH
Up to 100 EUR/CHF	20%	16%
Up to 1,000 EUR/CHF	56%	44%
Up to 10,000 EUR/CHF	10%	35%
More than 10,000 EUR/CHF	2%	3%
Missing values	12%	1%
Sample size	502	752

Table 2: Willingness to invest in community renewable energy projects in monetary units

Respondents also had clear preferences with respect to the technology that is developed in the project. Solar photovoltaic was the most preferred technology and was mentioned 75% of time in Austria and 79% in Switzerland by the potential investors. Other popular technologies included wind power, hydropower, and biomass (see Figure 2). This result particularly suggests a high potential for community projects in solar photovoltaic in both countries. It must also be noted that the technology preferences were very similar in both countries.

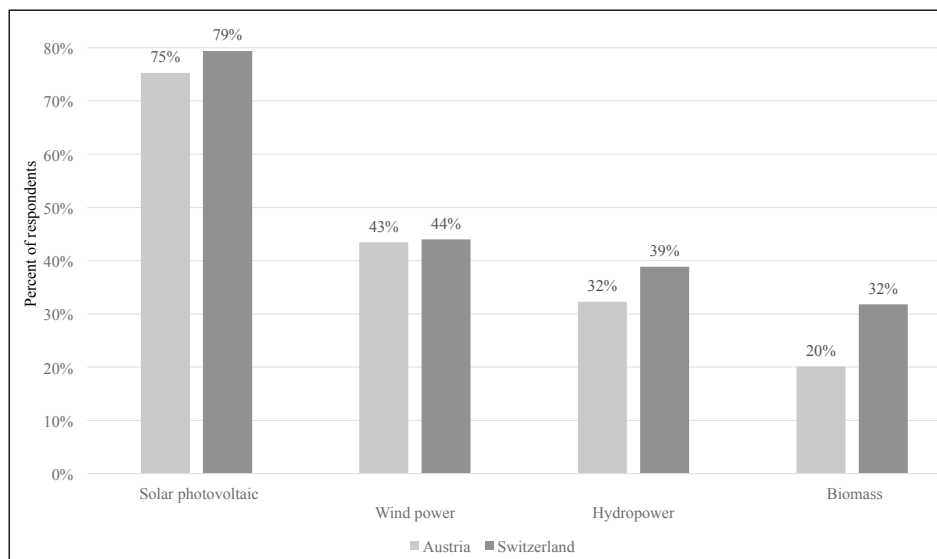


Figure 2: Preferred technologies for community renewable energy projects

3.2 Comparison of potential investors and non-investors in Austria and Switzerland

Based on the logistic estimations (see Table 3), our analysis shows that investors were more likely to be male. This effect was especially pronounced in Austria, while Switzerland seemed to have a better gender balance among potential investors (also compare average values given in Table 1). With respect to age, there can be identified a statistically significant but a rather small difference between the investors and the non-investors. The age had a significant impact on the odds to invest in Austria, but not in Switzerland. An average potential investor was slightly under 44 years old, while the non-investors were on average 2 years older.

We could not find evidence in our pooled sample that potential investors necessarily have higher incomes. Yet, in Austria, higher income increased the odds of being a potential investor, as did home ownership. In contrast, the education variable is highly significant for Switzerland, suggesting that more years of schooling increase the odds for the investment.

Psychographic variables also revealed information about investors' WTI. Potential investors tended to be more knowledgeable about solar photovoltaic and tended to disagree with the myth that solar cells use more energy during their manufacturing than they later produce. Potential investors demonstrated significantly higher acceptance of wind power than non-investors, which is related to social acceptance of large-scale renewable energy installations. In addition, the potential investors in both countries tend to be more optimistic about the economic competitiveness (grid parity) of solar photovoltaic and in the possibility of substitution of fossil fuels with RE in the future.

Dependent variable= WTI	Exp(B) total sample	Exp(B) Austria	Exp(B) Switzerland
<i>Socio-demographic variables</i>			
Gender	1.476**	2.269**	0.899
Age	0.986**	0.982**	0.992
Education	1.197**	1.099	1.297**
Residence	0.932	0.827	0.974
Income	1.048	1.237*	0.786
Home Ownership	1.251*	1.75**	0.906
<i>Psychographic variables</i>			
Knowledge about solar	1.139*	1.133	1.126
Grid parity	0.724**	0.679**	0.753**
Future fossil	1.373**	1.242**	1.517**
Wind Acceptance	0.762**	0.765**	0.741**
Constant	1.137	1.285	2.337
Nagelkerke R Square	0.13	0.171	0.148

** Statistically significant at the 0.01 level * Statistically significant at the 0.05 level

Table 3: Impact of socio-demographic and psychographic variables on willingness-to-invest

These findings were generally in line with the results of previous research in Germany, where it was shown that wind investments are less attractive for older people, while investors tend to have higher available financial means as well as pro-environmental attitudes (Gamel et al., 2016). At the same time, the results provide new insights into country-specific investor differences and highlight the importance of psychological attitudes in investment decision-making.

3.3 Respondent profiles with a positive willingness to invest into community RE projects

Cluster analysis allowed us to identify four clusters, achieving nearly perfect division of the respondents into four profiles. As evident from Table 3, living in the city or in the rural area was not increasing the odds of investment. However, knowing the residence (urban vs. rural) was very useful in creating profiles for potential investors. Table 4 summarizes these profiles, depending on the potential investor's residence and their acceptance of wind energy and per extension RE. The investors in the profile 1 are the largest group (53.4%) and can be described as urban renters with an average income. These investors are informed about solar technologies, are rather optimistic about the achievement of grid parity and the possibility to live without fossil fuels in the future. This group can be labeled as 'urban RE enthusiasts'. RE enthusiasts can also be found in the rural areas. The profile 2 accounts for 23.4% of the investor sample and describes a rural home-owner with a higher income, who is rather optimistic about the achievement of grid parity and shows high RE acceptance. The surprising result of this analysis is that nearly a quarter of potential investors into a RE community project would not welcome a wind turbine slightly outside their community. Despite their low acceptance of RE technologies, the urban dwellers described by the profile 3 would still have a positive WTI. The profile 4 describes a predominantly male rural home-owner who has the means and willingness to participate in a community finance project, even though they would not be happy to accept an installation in their back yard.

	Urban	Rural
High RE Acceptance	<u>Profile 1:</u> an urban renter with an average income, informed about solar, a grid parity optimist and a believer in the future without fossil fuels 53.4%	<u>Profile 2:</u> higher income, rural home owner, a grid parity optimist with high RE acceptance 23.4%
Low RE Acceptance	<u>Profile 3:</u> urban dweller (mostly renter) with an average income, who would not welcome a wind turbine in the community 15.4%	<u>Profile 4:</u> mostly male rural home owner with a higher income, who doesn't necessarily want a wind installation in the back yard 7.8%

Table 4: Four profiles of potential investors identified by cluster analysis

4. Conclusions and Policy Implications

Current study presents new evidence for an upward market potential for RE community projects in Austria and Switzerland. A surprisingly high share of respondents in both countries was open to the idea of investing into a community RE project, with the majority willing to dedicate between 1,000 – 10,000 CHF/EUR. Community finance allows investing incremental amounts with a positive return, and thus is a viable alternative to savings accounts and other low-risk investment instruments. At the same time, the respondents appreciated the environmental benefits and other positive spillovers that are connected to community RE projects. Given that locally produced electricity is welcomed by the consumers, a certificate of origin for the electricity can be offered to community finance investors. Labeling local produce is a common practice in supermarkets, but is yet to spill over into the energy sector. Community finance also offers interesting collaboration options for local banks, as well as utilities, which could attract their customers by selling them both green electricity or shares in a RE project. This recommendation is supported by previous research, which indicated that respondents favor regional utilities and banks in community finance development (Gamel et al. 2016). Another implication from this study is the need to cater to different potential investor segments. The study identified most important determinants for WTI in Austria and Switzerland. In Austria, WTI was connected to the respondents' gender, age, income, and home ownership. By contrast, in Switzerland, the most important socio-demographic variable was education. In both countries, psychographic variables showed high significance: general knowledge and attitudes towards RE, as well as expectations of the future energy systems were shown to impact WTI.

The largest group interested in community finance consisted of well-off urban dwellers, who have a positive expectations of RE development in the future. The study also identified a significant share of rural RE enthusiasts, who together with the first group account for more than three quarters of the potential investors. In the efforts to promote community finance, the policy makers might find it most efficient to focus on these groups first. Knowing the profiles of their potential customers is also important for energy cooperatives. Yet, one does not need to be a staunch RE enthusiast to invest into RE projects. Nearly a quarter of potential investors did not show high levels of RE acceptance. Unlike the previous two groups, these investors are probably more likely to respond to messages that emphasize non-environmental benefits of RE projects, such as economic development, energy security, and production of green electricity domestically rather than reliance on imports. Furthermore, local acceptance of RE is likely to increase if the local population has a financial stake in the project. An open question remains on why community finance investments were viewed as highly risky by some respondents (Ebers and Wüstenhagen, 2015). Such a large disparity in risk perceptions among the respondents suggests uncertainty about the risk-return profile of this relatively new investment vehicle. Providing more information to the public about usual returns and risks of energy cooperatives could make this investment a more attractive option. This could be done by setting up a local one-stop-shop, which would bring together potential community finance customers with the project developers, as well as provide project developers with information on permitting and relevant regulations. Local authorities could also be useful in helping small RE project developers obtain economically attractive power purchasing contracts.

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