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Azarova, Valeriya; Cohen, Jed; Kollmann, Andrea; Reichl, Johannes

Research Report

All for one and one for green energy: Community renewable investments in Europe

EconPol Policy Brief, No. 37

Provided in Cooperation with:
Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Azarova, Valeriya; Cohen, Jed; Kollmann, Andrea; Reichl, Johannes (2021) : All for one and one for green energy: Community renewable investments in Europe, EconPol Policy Brief, No. 37, ifo Institute - Leibniz Institute for Economic Research at the University of Munich, Munich

This Version is available at:
https://hdl.handle.net/10419/245907

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EconPol
POLICY BRIEF

37
2021

September
Vol.5

All for One and One for Green Energy: Community Renewable Investments in Europe

Valeriya Azarova (ifo Institute), Jed Cohen (Salt River Project Integrated System Planning and Support), Andrea Kollmann (Johannes Kepler University) and Johannes Reichl (Johannes Kepler University)

Key Messages

- Community renewable energy projects are gaining momentum and can play a significant role in reaching the ambitious decarbonization goals of the EU.
- We find a high interest in CRE opportunities from citizens across Europe, especially in the markets where the CRE model is not yet common.
- The configuration of an energy community project plays a vital role in its acceptance, i.e., does it require additional power lines, support; thus tailoring the project to local interests is important.
- People generally prefer CRE investments that are administered by local cooperatives. Supporting the establishment of local cooperatives could be a strong policy tool to unlock CRE investment, especially in nations where this model is not yet widely applied.

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CERGE EI

CPB Netherlands Bureau for Economic Policy Analysis

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INSTITUTE FOR ADVANCED STUDIES
Vienna

KOF
KOF Konjunkturforschungsstelle
KOF Swiss Economic Institute

REM
RESEARCH IN ECONOMICS AND MATHEMATICS

Toulouse School of Economics

uc3m
Economics

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UNIVERSITY OF OXFORD

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EconPol POLICY BRIEF
A publication of EconPol Europe
European Network of Economic and Fiscal Policy Research

Publisher and distributor: ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 89 9224-0, Telefax +49 89 9224-1462, Email Dolls@ifo.de
Editors: Mathias Dolls, Clemens Fuest
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All for one and one for green energy: community renewable investments in Europe.

Valeriya Azarova[1*], Jed Cohen[2], Andrea Kollmann[3] and Johannes Reichl[3]

[1]ifo Institute for Economic Research at the University of Munich
Poschingerstraße 5, 81679 Munich, Germany
[2]Salt River Project Integrated System Planning and Support
1500 N. Mills Ave., 85281, Tempe, Arizona, USA
[3]The Energy Institute at Johannes Kepler University
Altenberger Strasse 69, 4040 Linz, Austria

[*] E-mail: azarova@ifo.de

Abstract

A crucial part of the recently adopted "Fit for 55" package of the European Commission is devoted to the transition to a greener energy system. More specifically, the amendment to the Renewable Energy Directive sets up an increased target to produce 40% of energy from renewable sources by 2030. Hence, encouraging private investments in renewable generation capacity is becoming even more imperative to reach the ambitious climate-neutrality goals of the EU and to make the European Green Deal a reality. In this context, a pertinent design and endorsement of community renewable energy (CRE) projects may play a crucial role. A recent study based on a survey administered across 31 European nations, shows that there is high interest across Europe in CRE investment models, with 79% of respondents choosing to invest in at least one of the eight investment scenarios shown to them. Yet, operational details matter: e.g. administration through a local community organization is preferred to being administrated by an utility company. On top of that, highlighting local economic benefits, such as job creation from CRE projects, improves participation more so than highlighting general environmental benefits.

1 Background

Recently, the European Commission adopted a package of proposals to make the EU's climate, energy, land use, transport and taxation policies fit for reducing greenhouse

gas emissions by at least 55% by 2030, compared to 1990 levels. A crucial part of this "Fit for 55" package is devoted to the transition to a greener energy system. More specifically, the amendment to the Renewable Energy Directive sets up an increased target to produce 40% of energy from renewable sources by 2030. Hence, additionally to institutional and public investments, encouraging private investments in renewable generation capacity is becoming even more imperative to reach the ambitious climate neutrality goals of the EU and to make the European Green Deal a reality. In this context, a pertinent design and endorsement of community renewable energy (CRE) projects may play a crucial role.

In general, CRE projects can be defined as "a group of private citizens investing in an electricity generation facility and earning a rate-of-return from selling the produced power back into the grid or using it to offset their own electricity consumption" (Cohen et al., 2021). The key characteristic of CRE projects, which are sometimes also referred to as energy cooperatives, is collective ownership of renewable electricity generation resources (Nolden, 2013).

The concept of CRE has several potential benefits compared to single-entity investments:

1. The reduced investment amount due to the collective nature and shared ownership by multiple individuals offers a way to deal with the typical barrier of high upfront costs required for renewable generation capacity installations (Rao and Kishore, 2010).

2. CREs have a potential to negate some distributional impacts by allowing individuals who otherwise could not participate in the renewable energy market alone to be included in the energy transition. For instance, income constraints, property rights constraints or lack of appropriate location are the type of obstacles that can be addressed through CREs, thereby allowing to improve the social equity of the energy transition.

3. Community-based investments can decrease local opposition to energy infrastructure projects, which has become a substantial hurdle for the energy transition in Europe (Langer et al., 2017).

Although CRE projects are still a rather recent development, which is only gaining momentum: there are already over 1,500 energy cooperatives in the EU involving over 1 million private citizens (Cohen et al., 2021). Yet, a strong dominance of Germany, Denmark and the UK is currently observed in this field, which suggests that the CRE investment model still has potential to be taken up by other European nations. However, the success of this transfer requires a better understanding of how to carefully configure CREs across Europe while accounting for the heterogeneity of European countries energy markets.

Some efforts to investigate the key determinants of a successful realization of CRE projects have already been made within the framework of research projects such as, for

instance, the eCREW project, where practicability and citizens' willingness to participate are currently tested in real-life in Spain, Turkey and Germany (see https://ecrew-project.eu/ for details). Yet, the completed studies and research projects are limited to representation of only a few (or even more so single) country perspectives, thus, leaving out important insights allowing to increase the uptake of the CRE model to other countries.

A recent study providing extensive insights on the preferences of European citizens with regards to such projects is published by Cohen et al. (2021) and serves as a main basis for this brief. The paper analyses choice experiment (CE) survey responses from citizens across 31 European countries. The CE analysed in the paper is designed to assess respondents' interest for participating in a CRE investment in a wind or solar energy installation, and to investigate what attributes of such investments are most favourable.

The goal of the study is to contribute to a better understanding of the preferences of potential investors for attributes of renewable energy schemes and to evaluate heterogeneity across nations with regards to these preferences. In the following sections, we summarize survey data collection, methodology and key results of the paper.

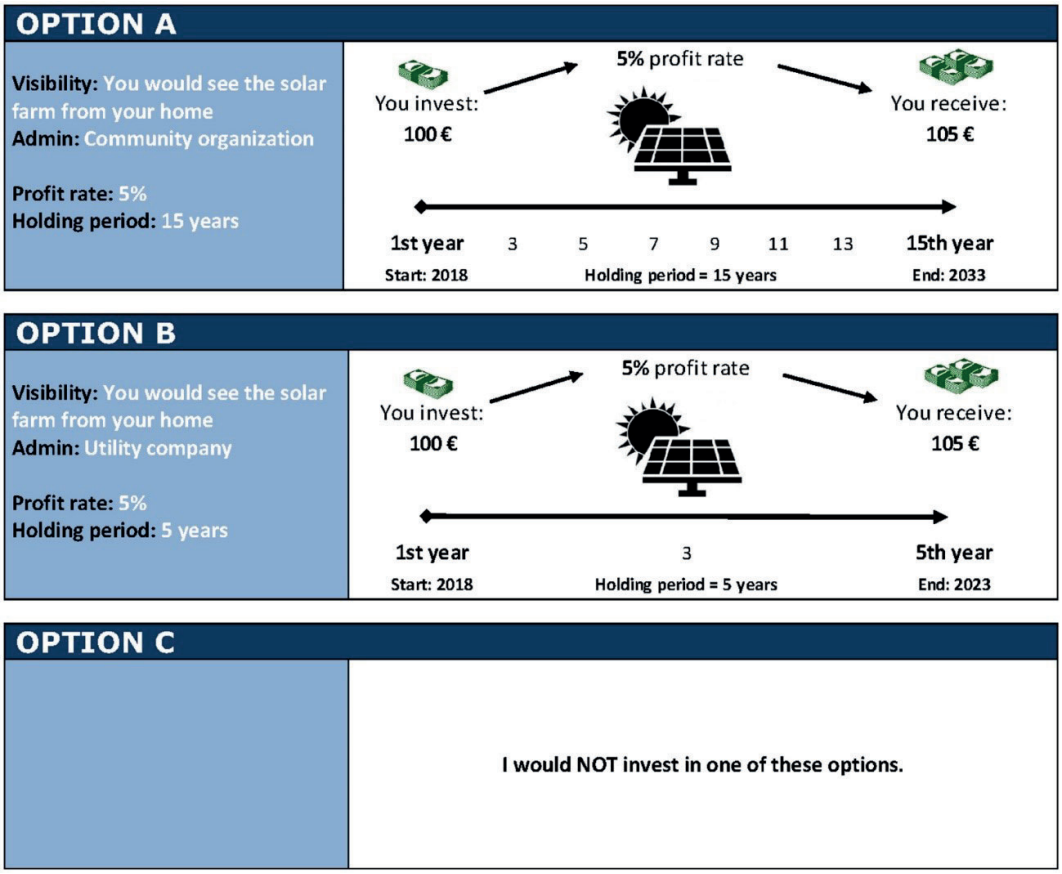
2 Data

The survey was administered over 31 European countries and was presented to respondents over the internet in their native language with all monetary values translated from Euros into the equivalent value of the respective national currency, where applicable. About 600 respondents were recruited in each nation resulting in a total sample of 18,037 completed questionnaires. A representative sample from each nation's population was ensured via quota sampling methods in the dimensions of income, age, and gender. The quotas were filled based on screening questionnaires, which are maintained and administered by the survey panel companies. Respondents were compensated with €5 upon completion of the survey. The full survey took 20 min to complete, on average. The survey also obtained information of the respondent's socio-demographics and environmental/energy-related values and behaviours.

3 Methodology

The CE offered respondents two hypothetical investment opportunities in eight choice scenarios. In each scenario either a wind park or solar farm was the object of investment with four attributes that varied between choice options. A third 'opt-out' option was provided in each scenario where the respondent could refuse to invest. This ensures a feasible choice set, as at least one option does not require a minimum amount of funds to be available to the respondent. The order the choice scenarios were shown was randomized, and 3 blocks of eight scenarios were created with 24 total choice scenarios used in the survey (see Fig.1 for an example).

Figure 1: Example choice scenario from English version of the survey.



Source: Cohen, J. J., Azarova, V., Kollmann, A., Reichl, J. (2021). Preferences for community renewable energy investments in Europe. Energy Economics, 105386.

The attributes included within each choice set are described in Table 1. The experimental design used the D-efficiency criteria with Bayesian priors for creating choice sets.

Table 1: Attribute levels and descriptions

Attribute	**Description**	**Levels**
Profit Rate	The percent of money you get on top of your initial investment. For example if the profit rate is 10% then you receive the equivalent of **100 EUR profit + your 1,000* EUR = 1,100 EUR** at the end of the holding period. Consider this a risk-free investment, where the profit rate is a real rate that already accounts for inflation..	0, 2, 5, 10, 20, 50%
Holding Period	The number of years until get your money back, including any profits.	5, 10, 15 years
Visibility	If the proposed wind or solar park is visible from your home.	visible or not visible
Administrator	The group that handles your investment and is in charge of building and running the power plant. This can be either a community organization, which is a group of private citizens, a utility company, which is a company that provides energy, or a government entity.	community organization, utility company or government entity

Source: Cohen, J. J., Azarova, V., Kollmann, A., Reichl, J. (2021). Preferences for community renewable energy investments in Europe. Energy Economics, 105386.

4 Key results

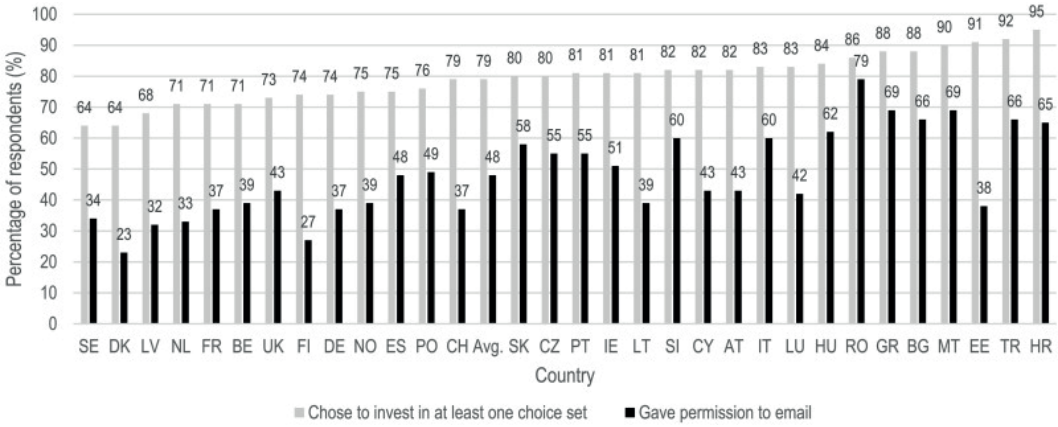
4.1 Descriptive analysis of the choice experiment responses

The paper first provides a descriptive analysis of the choice experiment data, which is given in Fig. 2. The bars represent the observed proportion of respondents that chose to invest in at least one investment option across the eight choice scenarios, and the pro-portion who gave permission for their email to be used for follow-up offers in each nation. Over the full sample, 79% of respondents preferred an investment option in at least one choice scenario. An investment option was chosen over the opt-out option in 57% of all choice scenarios. In total, 48% of respondents chose to provide their email. This email follow-up question seems to be a good indicator for interest in CRE investments, as the country-level percentages of email provision are highly correlated with the proportions of positive responses in the full sample, as is evident in Fig. 2.

4.2 Key determinants of preferences of European citizens to invest in CRE

The multinomial probit model was estimated using the full sample of choice scenario responses from 18,037 respondents across 31 European nations. The model included country fixed effects, thus identifying coefficients through intra-country variation in response patterns, which account for macro factors such as national culture and purchasing power parity. The key drivers of citizens preference to participate in a CRE

Figure 2: Percentages of respondents choosing to invest in at least one hypothetical investment and giving permission for email follow-up offers.



Source: Cohen, J. J., Azarova, V., Kollmann, A., Reichl, J. (2021). Preferences for community renewable energy investments in Europe. Energy Economics, 105386.

investment are identified as investment requirements, holding period and profit rates, ancillary economic benefits of CRE, and administration type.

The estimated average marginal effects of the investment showed that smaller investment requirements drive higher acceptance on average across the sample. However, no statistical distinction in the probability of acceptance between asking respondents for a €1,000 or a €5,000 investment was determined. Hence, to reach higher participation rates when setting up CREs these could allow for minimum investments of €500 or below. Yet, the practicability of allowing for small investments needs to be assessed for each project specifically. Other investment parameters include a strong positive relationship between offered profit rates and the acceptance of the investment option. More specifically, the marginal effect of a one percentage point increase in profit rate is estimated to increase the probability of choosing options A or B over option C by 0.8 percentage points. The opposite effect if found for the holding period – increasing the holding period by one year decreases the probability of joining the CRE by 2 percentage points. Looking at the preferred administrative setup, there is a positive and statistically significant effect of locally-based community administration. Hence, when configuring a CRE these parameters should be accounted for and additional support or promotion should be provided to local community organizations in order to facilitate and speed up the uptake of CREs.

Following the key investment parameters, respondent-specific socio-demographic characteristics and beliefs have been found to be major determinants of the investment decision. For instance, older respondents are shown to be significantly less accepting of investment options than respondents in the 18–34 years range, possibly suggesting that younger groups are more open to the social innovation model of co-financing. Males, employed persons, university graduates and respondents from larger households revealed higher probabilities of accepting investment options, perhaps due to a greater interest in personal finance and willingness to make long term investments on the part

of these groups.

Beliefs that renewable energy improves the environment and adds jobs, and self-identification as an environmentalist are positively associated with accepting the investment options. The belief in renewable energy as a job creator is a much stronger predictor of investment acceptance than the belief that renewables improve the environment. This shows the importance of highlighting ancillary economic benefits of the CRE project that appeal to the societal concerns of potential investors beyond environmental issues.

Looking at the results of the multinomial probit model estimated separately for 31 countries, the study finds evidence for a high degree of heterogeneity. For instance, in terms of the preferred technology, the country-specific results show that the slight general preference for a wind investment over a solar investment, which is observed in the full sample estimation is primarily driven by respondents in a few nations: Austria, Greece, Spain, the Netherlands, and the UK. All of these nations have relatively high proportions of electricity generation from solar sources, suggesting a familiarity effect whereby respondents are less interested in investing in commonly available technologies. Yet, Germany does not reveal a significant preference of one technology over the other. This can possibly be explained by the fact that solar and wind technologies have nearly equal capacity installed in Germany (Salm et al., 2016).

Interestingly, the positive effect of belief that renewable energy creates jobs on the decision to join a CRE is the most consistent result across nations, with a statistically significant marginal effect in all but five nations. This highlights the importance of ancillary benefits in gaining acceptance for aspects of the energy transition, as has been shown in previous large-scale international surveys in the EU (Cohen et al., 2016). Hence, one major takeaway from this study is to stress the regional employment and economic stimulus benefits of CRE options to potential citizen-investors.

5 Conclusions

Overall, the study analysing data collected in 31 European countries confirms high interest of European citizens in community renewable investment options with 79% of the respondents choosing an investment option in at least one scenario and overall, choosing to invest in 57% of the scenarios presented to them.

The results of the choice experiment show that the younger, male, employed and university-educated are more likely to invest in CRE. Self-identification as an environmentalist and beliefs that renewable energy creates jobs and improves the environment are also strongly associated with willingness to invest. Interestingly, the belief that renewable energy creates jobs has a much stronger positive effect than the belief that renewable energy improves the environment, suggesting that highlighting local economic benefits from CRE projects will improve participation more so than highlighting general environmental benefits, on average.

In configuring the CRE scheme, higher profits and shorter holding periods on in-

vested capital are, as expected, strongly preferred. On average across the full sample of 31 nations, the preferred administrative entity for the CRE project is a community non-governmental organization, while a utility company administrator is revealed to be considered a disadvantage. This result suggests a clear policy recommendation to increase the uptake of CRE schemes: support local organizations with navigating the procedural and legal burdens of administering CRE.

References

Cohen, J., K. Moeltner, M. Schmidthaler, and J. Reichl (2016). An empirical analysis of local opposition to new transmission lines across the EU-27. *The Energy Journal 37*(3), 59–82.

Cohen, J. J., V. Azarova, A. Kollmann, and J. Reichl (2021). Preferences for community renewable energy investments in Europe. *Energy Economics*, 105386.

Langer, K., T. Decker, and K. Menrad (2017). Public participation in wind energy projects located in germany: Which form of participation is the key to acceptance? *Renewable Energy 112*, 63 – 73.

Nolden, C. (2013). Governing community energy feed-in tariffs and the development of community wind energy schemes in the United Kingdom and Germany. *Energy Policy 63*, 543 – 552.

Rao, K. U. and V. Kishore (2010). A review of technology diffusion models with special reference to renewable energy technologies. *Renewable and sustainable energy reviews 14*(3), 1070–1078.

Salm, S., S. L. Hille, and R. Wustenhagen (2016). What are retail investors' risk-return preferences towards renewable energy projects? A choice experiment in Germany. *Energy Policy 97*(Supplement C), 310 – 320.

EconPol Europe

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The mission of EconPol Europe is to contribute its research findings to help solve the pressing economic and fiscal policy issues facing the European Union, and thus to anchor more deeply the European idea in the member states. Its tasks consist of joint interdisciplinary research in the following areas

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3) capital markets and the regulation of the financial sector and

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