

Social Acceptance of Renewable Energy Communities: A Quantitative Study on Motivations, Barriers, and Drivers Among Prosumers

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This study examines predictors of individuals' intention to join Renewable Energy Communities (RECs), focusing on current and potential prosumers. Data were collected via a Computer-Assisted Web Interview using a quota-based online panel. The final sample included 974 respondents who owned or planned to install photovoltaic systems. A multiple linear regression model analyzed several groups of predictors such as household characteristics, perceived participation costs, technological engagement, environmental attitudes, values, and personality traits.

Results indicate that male gender ($\beta = 0.15$) and digital services use ($\beta = 0.10$) were positive predictors of REC participation, while perceived membership cost ($\beta = -0.19$) was a significant barrier. Environmental attitudes ($\beta = 0.12$), self-enhancement ($\beta = 0.16$), and self-transcendence ($\beta = 0.21$) also played key roles. These findings underscore the importance of psychological and behavioral factors in shaping REC policies, highlighting the need to complement economic incentives with value-based engagement strategies.

***Index Terms*-- Renewable energy communities, Energy transition, Social acceptance, Energy citizenship, Prosumers**

I. INTRODUCTION

The transition to sustainable energy systems has facilitated the development of renewable energy communities (RECs), which are collaborative initiatives where citizens, local authorities, and various stakeholders collectively manage and consume renewable energy [1]. By utilizing resources such as solar, wind, and biomass, RECs are designed to meet the energy demands of their members through a model based on shared ownership and democratic decision-making. Participation in these communities enables members to engage actively in REC operations, fostering a stronger connection to and investment in local energy resources.

Empirical research has identified several key determinants influencing individuals' intentions to join energy communities [1-6]. Environmental concern is a significant motivator, as individuals with heightened awareness of and commitment to environmental sustainability are more likely to engage in local renewable energy initiatives. Social trust within the community also plays a crucial role, as higher levels of trust facilitate cooperation and collective action. Moreover, a strong sense of community identity enhances individuals' willingness to participate in shared energy projects.

Despite these factors, RECs remain predominantly concentrated in Western European countries [4]. In Poland - one of Europe's largest nations - such communities are largely absent, with only a limited presence of energy clusters and cooperatives. However, the combination of a gradually evolving regulatory framework, planned infrastructure improvements, and increasingly favorable public attitudes toward renewable energy suggests that RECs are likely to emerge as a more significant component of Poland's energy sector in the coming years.

This study aims to identify the predictors of declared intention to join RECs, with particular emphasis on the perspectives of current and potential prosumers. Given the findings of previous qualitative research [5, 6], prosumers are expected to demonstrate a heightened interest in participating in future REC initiatives.

II. METHODOLOGY

A. Sample and Data Collection

The study was conducted using a Computer-Assisted Web Interview (CAWI) methodology, utilizing an online panel (Ariadna). A quota sampling approach was applied, ensuring

representation based on key sociodemographic variables reflecting the structure of Polish society. From this preselected pool, only respondents who owned or co-owned a house and either already had a photovoltaic installation or declared an intention to purchase one within the next year were invited to participate. The obtained dataset included 1,037 responses. The study was conducted in November 2024. A description of REC presented to the respondents is available on OSF at the following link: <https://osf.io/96z2k>.

B. Analytical Approach

Prior to analysis 63 cases were removed due to inattentive response patterns. For the remaining 974 cases a multiple linear regression model was estimated. The dependent variable was the declared intention to join a REC measured using the 3-item subscale (Cronbach's $\alpha = 0.96$) adapted from Shakeel and Rahman [7].

The model encompassed several groups of predictors:

- *PV ownership*: current owners vs future buyers.
- *Household characteristics*: photovoltaic ownership, place of residence, household size, electricity expenditure.
- *Perceptions of REC participation costs*: measured using three survey items (Cronbach's $\alpha = 0.86$) [7].
- *Technological engagement*: perceived digital proficiency, digital service usage.
- *Personality traits*: assessed using the Polish adaptation of the 20-item IPIP-BFM questionnaire [8].
- *Environmental orientation*: measured by the New Ecological Paradigm (NEP) scale [9].
- *Values*: assessed using the Higher-Order Value Scale (HOVS17) [10].
- *Political attitudes and religiosity*: self-placement on the left-right political spectrum, frequency of religious practices.

The sample characteristics are presented in Table I.

TABLE I. SAMPLE CHARACTERISTICS

Respondent characteristics	M (SD)
Age (in years)	45.81 (13.78)
Intention to join REC (1-7 Likert scale)	5.17 (1.12)
	n (%)
Sex: Female	460 (47.2)
Male	509 (52.3)
Other / Do not want to respond	5 (0.5)
Education: Primary/Vocational.	60 (6.2)
Secondary	271 (27.8)
Post-secondary	99 (10.2)
Household characteristics	
PV ownership : Current users	579 (59.4)
Planning to buy	395 (40.6)
Location : Rural	398 (40.9)

Town <20k	126 (12.9)
City 20-99k	217 (22.3)
City 100-450k	149 (15.3)
City >450k	84 (8.6)
Housing Type : Detached	735 (75.5)
Semi-detached	92 (9.4)
Terraced house	68 (7.0)
Family-owned with many apartments	79 (8.1)

III. RESULTS

Due to the large number of predictors included in the regression, detailed results are presented only for significant groups of predictors in Table II. Other variables listed above were included in the model but are not reported in detail for the sake of brevity.

TABLE II. REGRESSION MODEL EXPLAINING PARTICIPANTS' INTENTION TO JOIN REC. NON-SIGNIFICANT PREDICTORS ARE OMITTED.

Effect	std. Beta ^a	p
Sex: Male	0.15	0.012
Other / Do not want to respond	-0.21	0.587
Digital Services Usage	0.10	0.003
Perceived Cost of Joining REC	-0.19	<0.001
Personality : Neuroticism	-0.04	0.206
Extraversion	-0.00	0.950
Agreeableness	0.09	0.018
Conscientiousness	-0.04	0.157
Intellect	-0.01	0.870
Pro-ecological attitudes (NEP scale)	0.12	<0.001
Values : Conservation	0.05	0.227
Openness to Change	0.02	0.581
Self-Enhancement	0.16	<0.001
Self-Transcendence	0.21	<0.001
Model statistics:		
R ² / R ² adjusted	0.290 / 0.265	

a. For continuous predictors, coefficients are fully standardized. For categorical predictors (dummy variables), these are semi-standardized coefficients (change in outcome in SD units for category change).

The analysis revealed that being male ($\beta = 0.15$) and intensity of digital services use ($\beta = 0.10$) were significant predictors of the intention to join a REC. In contrast, perceived cost of membership ($\beta = -0.19$) emerged as a significant barrier.

Among personality traits, only agreeableness ($\beta = 0.09$) showed a significant association. Environmental attitudes ($\beta = 0.12$) and two value dimensions, self-enhancement ($\beta = 0.16$) and self-transcendence ($\beta = 0.21$), were also significant predictors.

Importantly, no other variables including PV ownership, economic status, other household and individual characteristics proved to be significant.

IV. DISCUSSION AND CONCLUSIONS

The findings of this study highlight the key role of psychological and subjective factors in shaping the intention to join RECs. Despite the inherent challenges in measuring psychological constructs with high precision, such variables emerged as significant predictors, whereas many socio-

economic and household characteristics did not. This suggests that the decision to engage in RECs is less strongly related to structural and financial conditions and more to individual attitudes, values, and personality traits.

Notably, gender was the only significant socio-demographic predictor, while education level, economic status, age, household size, and housing characteristics had no explanatory power. Surprisingly, even current ownership of a photovoltaic installation was unrelated to REC participation intentions. Our analysis indicates that REC membership intention extends beyond rational economic calculations, reflecting deeper psychological and social influences.

The findings regarding agreeableness, pro-environmental attitudes, and familiarity with digital services align well with theoretical expectations. Agreeableness likely plays a role due to the inherently pro-social and community-based nature of RECs, while the positive link between environmental attitudes and REC participation is intuitive, as these communities are framed around sustainability. Additionally, the association between digital engagement and REC interest suggests that potential members are more likely to be comfortable using online platforms and applications, which are essential tools for REC operations. The gender disparity in participation intentions might reflect the cultural framing of energy and technological domains as traditionally masculine spheres of expertise.

A particularly interesting aspect of the results is the role of values. Both self-enhancement (the pursuit of personal interests, success, and dominance over others) and self-transcendence (concern for welfare of others and transcending self-centered concerns) were significant positive predictors of REC participation, despite being (theoretically) negatively correlated. This suggests that participation may be driven by two distinct motivational pathways: one emphasizing individual benefits (financial or reputational), and the other focusing on pro-social and environmental engagement. Understanding these dual motivations might be crucial for designing more effective communication strategies for RECs.

Despite its contributions, this study has several limitations. First, it is based entirely on self-reported data, which is inherently susceptible to social desirability bias and cognitive distortions, particularly when predicting future behavior. However, given the lack of operational RECs in Poland, self-reported measures were the only feasible approach. Second, public awareness is still low, meaning that respondents were introduced to the concept of RECs during the study. Although the methodology ensured that participants carefully reviewed the provided information, their understanding may still differ from that of individuals actively engaging with RECs in real-world settings.

Despite these limitations, this study makes an important contribution to our understanding of the psychological and motivational barriers to REC adoption. The results strongly suggest that subjective, psychological factors might co-determine the willingness to join REC. This has practical implications, particularly for the design of targeted

communication strategies. Policymakers and stakeholders could consider tailoring persuasive messages to align with both self-enhancement and self-transcendence motivations, as well as improving digital accessibility to lower technological barriers to entry. Additionally, public education campaigns may be necessary to increase awareness and knowledge of RECs, addressing potential misconceptions about costs and benefits.

Overall, these findings emphasize the potential contribution of psychological and behavioral approach in shaping REC policy and communication, moving beyond economic incentives to consider the individual motivations and values that drive participation.

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