Explaining the diversity of motivations behind community renewable energy

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Abstract

Community-based renewable energy initiatives may be important actors in the transition toward low-carbon energy systems. In turn, stimulating investments in renewable energy production at the community level requires a better understanding of investors' motives. This paper aims to study the heterogeneity of motivations that drive individuals to participate in community renewable energy projects and the underlying explanatory factors behind this, as well as the implications for their level of engagement in initiatives. Based on quantitative data from an original survey conducted with two renewable energy cooperatives in Flanders, the statistical analysis shows that cooperative members should not be considered as one homogeneous group. Several categories of members with different motives and levels of engagement can be distinguished. This heterogeneity is explained by contrasts in terms of institutional settings, spatial patterns and attitudes to the diffusion of institutional innovations. Regarding policy implications, the findings suggest that this heterogeneity should be taken into account in designing more effective supporting policies to stimulate investments at the community level. The activation of social norms is also shown to be a promising mechanism for triggering investment decisions, although the implications of its interplay with economic incentives should be further explored.

Keywords

Renewable energy, investments, community, institutions, social norms, innovation diffusion, Flanders.

1. Introduction

The limits faced by energy systems with respect to the depletion of fossil fuels and climate change are today widely recognised and make a transition from fossil resources to a low-carbon society necessary. Aside from other measures such as efficiency improvements, this transition will most likely require the displacement of fossil fuels by various renewable energy (RE) sources (Smil, 2010), all the more since several countries have announced decisions to abandon nuclear power following the 2011 Fukushima Daiichi disaster in Japan (Schneider et al., 2011).

The challenges ahead are enormous. The Intergovernmental Panel on Climate Change estimates that the global cumulative RE investments needed to achieve atmospheric greenhouse gas concentration stabilisation will range from 2,850 to 12,280 billion USD (valued in 2005 prices) for the period 2011-2030[1] (IPCC, 2011). Governments alone are unable to achieve investments of this magnitude (Wüstenhagen and Menichetti, 2012). The support of other RE investors and producers is necessary, including business organisations, households and civil society actors, and therefore a better understanding of these are needed. In this perspective, community renewable energy (CRE) initiatives seem promising. The concept of 'community energy' describes formal or informal citizen-led initiatives which propose collaborative solutions on a local basis to facilitate the development of sustainable energy technologies and practices (Bauwens et al., 2016; Seyfang et al., 2013; Walker and Devine-Wright, 2008). Gaining a better insight on the motivations of RE investors at the community level can help decision makers design more effective supporting policies to address these communities.

Recent research has explored the factors that influence participation in CRE projects (Bamberg et al., 2015; Dóci and Vasileiadou, 2015; Kalkbrenner and Roosen, 2016), but without significant or systematic investigation of the reasons why different types of members may have distinct

[1] The lower values refer to the International Energy Agency World Energy Outlook 2009 Reference Scenario and the higher values to a scenario that seeks to stabilise atmospheric CO_2 concentrations at 450 ppm.

motivations to join these initiatives. The analysis of actual members' level of engagement has also been neglected in previous studies.

In response to these research gaps, the objective of this paper is to empirically investigate the potential heterogeneity among members of CRE initiatives in terms of their motivations, and the underlying explanatory factors behind this. Further, it analyses the influence of this heterogeneity on members' level of engagement in projects. Following recent research on the heterogeneity of RE investors (Bergek et al., 2013; Mignon and Bergek, 2016), this paper specifically looks at institutional and innovation diffusion dimensions to explain why investors may have heterogeneous motives at the community level. It also examines the roles of spatial patterns as an additional explanatory factor. The influences of these factors have never been studied jointly.

Drawing upon the comparative analysis of two RE cooperatives, BeauVent and Ecopower, located in Flanders, the paper uses data from an original survey conducted among the members of these two organisations. Correlation analyses and statistical tests are performed to study cooperative members' motivations and level of engagement. Despite common features, the two cooperatives studied differ in a crucial way: in addition to producing RE, Ecopower also supplies electricity, while BeauVent is a production cooperative only and does not undertake any supply activities. Due to these different positions in the energy value chain, the two organisations present distinct institutional characteristics which, in turn, shape different incentive structures for potential and existing cooperative members. As a result, the analysis reveals clear differences among cooperative members in terms of motivations, both within and across organisations. This heterogeneity is also reflected in their level of engagement. In addition to institutional aspects, the spatial localisation of the groups of members and their attitudes to the diffusion of social innovations (Rogers, 1995) are shown to reinforce the differences among them.

By providing a fine-grained analysis of the factors that influence the heterogeneity of participants in CRE initiatives, the results can inform policy-makers and CRE managers for the development

of effective strategies to encourage active participation and financial investments at the community level.

The article is structured as follows. Section 2 provides the theoretical framework on which the empirical work is grounded. Section 3 presents the methodology used and Section 4 analyses the collected data. Then, Section 5 discusses the findings, while Section 6 concludes and suggests some implications for policy-makers and for future research.

2. Theoretical framework

2.1. The roles of community-based initiatives in speeding up the diffusion of RE technologies

CRE initiatives are typically characterised by a high degree of community involvement in the ownership, management and benefits of projects (Walker and Devine-Wright, 2008). RE cooperatives, as a specific form of CRE schemes, enable citizens to collectively own and manage RE projects at the local level. Through this model, citizens produce, invest in and, in some cases, consume RE. The following cooperative principles, adopted by the International Co-operative Alliance (ICA, 1995), are common to all types of cooperatives around the world: a voluntary and open membership, democratic member control (e.g. a 'one person-one vote' rule), economic participation by members, autonomy and independence, education, training and information, cooperation among cooperatives, and concern for the community. In addition, only a limited remuneration of the capital subscribed is permitted in cooperatives, which suggests that profit maximisation is not the main objective.

CRE initiatives in general and RE cooperatives in particular are increasingly perceived as potential key actors in the transition toward low-carbon energy systems (e.g. Boon and Dieperink, 2014; Yalçın-Riollet et al., 2014). Indeed, it has been argued that the participation of citizens in benefits and decision-making processes of RE projects may increase levels of societal

acceptability of renewables, especially in the case of onshore (Bauwens, 2015; Maruyama et al., 2007) and offshore wind farms (Walker et al., 2014). Comparative research has shown that a high degree of citizen involvement in wind energy projects is positively correlated with high deployment rates (Bauwens et al., 2016; Toke et al., 2008). In the same perspective, while Mumford and Gray (2010) show evidence of a lack of trust from the public in conventional energy actors as far as the deployment of alternative energy in the UK is concerned, the implementation of decentralised RE installations need to be steered by trustworthy individuals and organisations rooted in local communities (Eyre, 2013; Walker et al., 2010).

Community participation in RE deployment is also an important condition for success in financing the transformation of energy systems. CRE initiatives have substantially contributed to RE deployment in several countries. In Denmark, over 150,000 households contributed to wind power financing as members of wind power cooperatives in 2002, and more than 80% of the installed wind turbines were owned by wind power cooperatives and single owners (Bauwens et al., 2016). Similarly, 46% of the total installed RE capacity in Germany in 2012 was owned by individuals, farmers or CRE initiatives (trend:research Gmb and Leuphana Universität; Yildiz et al., 2015).

2.2. Motivations to join and engage with CRE initiatives

Two types of decisions are considered in this section: on the one hand, members' decisions to join CRE initiatives in the first place, and, on the other hand, their level of engagement. Engagement is defined in terms of the volume of financial investment made and the degree of participation in the governance of organisations. It is argued hereafter that both types of decision are influenced by two broad categories of motivation: 'self-regarding' motives and social or moral norms.

Research into households' investments in RE production from a standard economic perspective commonly shares the assumption that individuals are purely 'self-regarding', i.e. they only care

about their own material payoff. It follows that households will invest in RE microgeneration systems if the expected return of the investment, in the form of avoided electricity imports and therefore reduced electricity bills, balances or exceeds its upfront capital cost (Bergman and Eyre, 2011; Sauter and Watson, 2007).

Socio-psychological research and behavioural approaches in economics have contested this simplistic vision of individuals. In general, people are not purely self-regarding, but also follow social or moral norms[2] of behaviour backed up by emotions such as pride, guilt, shame and anger (Bowles and Gintis, 2009). Norms are 'customary rules of behaviour that coordinate our interactions with others. Once a particular way of doing things becomes established as a rule, it continues in force because we prefer to conform to the rule given the expectation that others are going to conform' (Young, 2008: 647). The roles of norms have gained increasing attention in the literature on RE investments. For instance, Mignon and Bergek (2016) report that some people invest in renewable electricity production to conform to the behaviour of peers and to gain acceptance and recognition. Other studies analyse the roles of social interactions and peer effect processes in the decisions and intentions to adopt photovoltaic systems (Bollinger and Gillingham, 2012; McEachern and Hanson, 2008; Noll et al., 2014).

The objective here is not to challenge the idea that members of CRE initiatives may partially act based on self-regarding calculations. Some incentives, such as the return on the investment in share(s) or cheap electricity prices, rely on self-regarding motives. Nonetheless, material incentives may not be the only type of motivations for members of CRE initiatives. Recent research shows that different social or moral norms play a role as well. Following Kalkbrenner and Roosen (2016), the norms considered are environmental concern, interpersonal trust and social identification.

[2] It is difficult to draw the line between socially- and morally-driven behaviours, both empirically and conceptually, because norms are never completely independent of the social context (Dubreuil and Grégoire, 2013). Therefore, for sake of simplicity, no distinction is made between social and moral norms in subsequent analysis and the term 'norms' refers to both types.

First, individuals may join these initiatives because they care for the environment and want to encourage RE production. In this perspective, different studies show that environmental concern has a positive effect on pro-environmental behaviour in general (e.g. Fraj and Martinez, 2006) and on the willingness to participate in CRE projects in particular (Dóci and Vasileiadou, 2015; Kalkbrenner and Roosen, 2016). A second factor of interest is interpersonal trust, understood as mirroring an expectation of trustworthiness. Much of the literature on community-based management of natural resources argues that trust is an essential ingredient for building highly cohesive and cooperative communities (e.g. Ostrom, 2003). Similarly, the literature on CRE shows that these initiatives are typically characterised by a high degree of interpersonal trust (Walker et al., 2010). Third, social identification, i.e. the perception of belonging to some human aggregate, is also likely to play a role. The socio-psychological literature on collective action shows that a strong social identification to a group fosters cooperative behaviours (Tyler and Blader, 2001). This result is supported by extensive evidence from experimental settings and the field (Brown-Kruse and Hummels, 1993; Dawes et al., 1988; Goette et al., 2006). For instance, Stürmer and Kampmeier (2003) highlight the importance of group identification as a determinant of community volunteerism and local participation, relying on experimental and field data. In the same perspective, social influences such as advice from trusted individuals in people's direct social network (colleagues, neighbours, friends, relatives, etc.) may matter as well. For instance, a survey conducted among the members of the cooperative Ecopower shows that almost 30% of members came to know of the organisation by word of mouth (Ecopower, 2013).

That being said, the relative importance of self-regarding motives and norm-driven behaviours depends on several factors. First, the institutional context within which members of CRE projects interact is likely to play a role. Indeed, recent studies emphasise the role of institutions as important factors for understanding the heterogeneity of RE investors (Bergek et al. 2013; Mignon and Bergek, 2016). Generally defined, institutions refer to the formal and informal rules that shape and structure the interactions between people within collective settings (families, local

communities, markets, business organisations, etc.) (Ostrom, 2005). They constrain the actions and strategies adopted by individuals, the information they obtain, the outcomes they receive or are excluded from and how they reason about the situation. Regarding CRE initiatives, two essential aspects define their institutional nature: on the one hand, they are economic organisations that operate on a market and generate part of their revenues through trading of energy. On the other hand, they share strong community features. From an institutional perspective, communities are social institutions characterised by high entry and exit costs and non-anonymous interactions among members (Bowles and Gintis, 2002). In addition, interactions between community members are more frequent and extensive than interactions with 'outsiders'. These structural characteristics of interactions contrast with those of other institutions, such as markets, at least in their idealised forms. Market interactions are characterised by ephemerality of contact, anonymity among interacting actors and ease of entry and exit (Bowles and Gintis, 2002). In contrast to markets, by facilitating direct personal interactions, communities effectively encourage the formation of norms, such as interpersonal trust, social identification, solidarity, reciprocity, reputation, personal pride, vengeance, etc. Thus, depending on how these market and community institutional logics are prioritised within CRE initiatives, it is likely that they will structure social interactions among members differently and will foster the creation of norms to a lesser or greater extent.

Second, spatial factors may also influence members' motivations. Indeed, by facilitating direct social interactions and face-to-face communication, spatial closeness further facilitates the activation of social norms in the group. Not all communities are identical in this respect (Heisnaken et al. 2010). In particular, a relevant distinction can be made between 'communities of place' and 'communities of interest'. A community of place, or place-based community, is a community defined by geography: people are bound together because of where they reside, work, visit or otherwise spend a continuous portion of their time. A community of interest is not defined by space, but by some common bond (e.g. a feeling of attachment) or entity (e.g. a

church group) (Gilchreist, 2000). It can be expected that social norms are stronger in communities of place as compared to communities of interest, as interactions are generally more personal and frequent.

Third, individual motivations to invest and participate in CRE projects can also be explained from the innovation adoption perspective (Bergek et al, 2013). In the innovation adoption literature, investment decisions are neither inevitable nor uniform across a population of potential adopters. Instead, following Rogers (1995), different consumer segments can be distinguished according to their attitude to the diffusion of new innovations: 'innovators' are the first group to purchase a new product in its 'introduction' phase. They have a high risk tolerance and are therefore willing to try out new technologies with low performance. This group is followed by 'early adopters' in the 'early growth' phase, who agree to try out relatively crude technologies as long as they see a clear potential benefit. Finally, the '(early) majority', during the market 'take-off' phase, gathers people who prefer to 'wait and see' in order to learn from earlier adopters or even until a standard has been set and the technology is really proven. Although this theory has mainly be applied to technological innovations, there may well be different groups of adopters of 'institutional' innovations, just as technological innovations spread within societies at different rates. For instance, in his analysis of emergence and development of two car-sharing cooperatives in Switzerland, Truffer (2003) shows how the membership evolved from a handful of environmentally concerned early users highly involved in the provision of services, to individuals mainly driven by financial motives, as pressure for more differentiation and professionalisation accompanied organisational growth. In the same perspective, the distinction between project frontrunners and average members has been shown to be relevant for sustainability transition (Dóci and Vasileiadou, 2015; Kern and Smith, 2008), and previous literature has argued that citizens prefer different degrees of participation (Rogers et al., 2012), although this has not been systematically explored.

In conclusion, while RE investors' motivations at the community level and their degree of engagement may be expected to be heterogeneous, very little is known in the current literature about how and why such diversity occurs. The present paper thus specifically deals with the following two questions: (1) *what explains the heterogeneity, if any, of motivations among members of community renewable energy projects*? (2) *What are the implications of such a potential heterogeneity in terms of members' level of engagement in projects?* Based on previous literature, the explanatory factors to be considered for potential heterogeneity are threefold: institutional characteristics of CRE and, specifically, the relative weights given to market and community logics within initiatives, spatial characteristics of membership, and attitudes to innovation diffusion (innovators, early adopters etc.).

3. Methodology

3.1. Field setting

This paper reports on two case studies of RE cooperatives, Ecopower and BeauVent, located in Flanders (the northern part of Belgium). In 2011, Ecopower and BeauVent represented 87% of all members of RE cooperatives in Flanders. This figure ensures that the cases of BeauVent and Ecopower represent a large majority of members of such organisations in this region.

The two cooperatives studied here share a number of common features, which aid in comparability of the cases: they deal exclusively with RE (mostly from wind power, but also solar and, in the case of Ecopower, biomass and wood pellets), they are owned by individual members who each have equal voting rights and receive limited dividends following the principles of the cooperative movement, and they are part of the Belgian federation of RE cooperatives 'Rescoop.be'.

However, the cases also differ across several important dimensions. First of all, Ecopower is an electricity supplier, while BeauVent is not. When Ecopower started supplying electricity, i.e. when

the Belgian electricity market was liberalised in 2003, its membership rose dramatically because individuals had to become cooperative members in order to be supplied with green electricity. Hence, a second important difference is the size: as a result of its electricity supply activities, Ecopower has increased substantially and is much larger than BeauVent. In 2013, the former was almost twenty times larger than the latter in terms of number of members and ten times larger in terms of total capital (Table 1). BeauVent itself does not supply electricity, but through an agreement between the cooperatives, BeauVent members can be supplied with electricity by Ecopower even if they are not formally members of the latter.

Table 1. General characteristics of cooperatives.

	Ecopower	**BeauVent**
Year of creation	1991	2000
Number of full-time equivalent workers	22	5.37
Number of members	47,419	2,391
Price of one cooperative share (in euro)	250	250
Total capital (in euro)	48,328,750	4,781,500

Source: created by author based on 2013 data provided by the cooperatives.

For studying the evolution of the institutional characteristics of organisations, it is meaningful to identify the main stages of their organisational development. Ecopower has gone through three main phases. The first, from the year of its creation in 1991-1999, can be labelled the 'idealistic' phase. The original goal of the cooperative was to gather small amounts of money from motivated individuals to finance the refurbishment of small hydropower installations. As such, during this period, the cooperative itself was not involved in any energy production activities. The second, the 'energy production' phase, corresponds to the period 2000-2002. It started with the installation of three wind turbines in the city of Eeklo, which were financed by a recruitment campaign launched in 2000. The third phase is the 'supply' phase, which is identified with the

start of electricity supply in 2003 and extends to the present. Parallel to its supply activities, Ecopower continues to invest in RE projects. BeauVent, on the other hand, has gone through two main phases: an idealistic phase from 2000 to 2004 and an energy production phase from 2005 onwards.

There are four types of material incentives attached to participation in the co-ownership of the cooperatives studied. A first incentive is the possibility to be supplied with electricity at a low price. A second incentive is that Ecopower does not charge any fixed fee for electricity connection and only charges for what is actually consumed. This means that a member who does not consume anything does not pay anything. This is likely to be a strong motivation for people who produce their own electricity. A third incentive is the return on investment in the form of dividends distributed by each cooperative. These dividends are limited to 6% in both cases because these cooperatives are recognised by the Belgian National Council of Cooperation. The fourth type of incentive is the transparency of pricing, since Ecopower offers a single tariff, which includes all costs (transport and distribution costs, taxes, VAT, costs for public service obligations). In addition, there is no differentiation between day and night or according to the consumption level.

3.2. Data collection

Household data was collected through an online questionnaire-based survey of cooperative members conducted between May and June 2014. The cooperatives provided the members' email addresses. 36,642 emails were sent to Ecopower members and 849 emails were sent to BeauVent members. In addition, a paper version of the questionnaire was handed out during the General Assembly of both organisations, with the objective of reaching a profile of people who otherwise would not have been reached by the online questionnaire. Indeed, the participants of the General Assemblies are typically an older public who, presumably, may have a lower usage of the Internet. 195 paper versions of the questionnaire were handed out during the general assembly of

Ecopower and 43 during the assembly of BeauVent. Thus, 37,729 versions of the questionnaire were distributed in total. 4,061 respondents participated in the survey. This represents a response rate of 10.8%, which is comparable to response rates obtained in similar surveys (e.g. Litvine and Wüstenhagen, 2011), although it should make us cautious in drawing firm conclusions about the generality of members. In order to better isolate the differences between organisations, individuals who were members of both cooperatives were excluded from the analysis.

Information about the location of members and their period of membership (i.e. how many years they were part of their cooperative) was available for the whole underlying population of cooperative members. In order to improve the representativeness of the collected sample regarding these variables, their distribution was computed for the whole population and compared to their distribution in the sample. Weights were then assigned to the observations with a view to reproducing the distributions of the aforementioned variables in the collected sample, using post-stratification adjustments (Table 2). Post-stratification classifies the sample by group or *stratum* based on the characteristics of the population and then weights individuals in each group up to the population total in that group, with values above 1.00 boosting the weight given to data collected from participants in the relevant group.

Table 2. Weighting factors used in the data analysis.

	Period of membership (in years)				
	$0 \leq x < 5$	$5 \leq x < 10$	$10 \leq x < 15$	$15 \leq x < 20$	$20 < x$
Antwerp	1.056	0.845	0.724	0.015	0.120
Brussels	1.170	0.936	0.802	0.016	0.132
Limburg	1.240	0.993	0.850	0.017	0.140
East-Flanders	1.199	0.960	0.822	0.016	0.136
Flemish Brabant	1.069	0.856	0.733	0.015	0.121
West-Flanders	1.325	1.061	0.909	0.018	0.150
Other	1.170	0.936	0.802	0.016	0.132

Source: created by author based on survey (2014).

3.3. Variables

The questionnaire was designed to collect data on indicators of the variables of interest, namely members' motivations, some of their socio-psychological characteristics and some information about their interactions with cooperatives, including their level of engagement. Indicators of motivations consist of a series of ordinal variables which have been constructed by asking respondents to indicate on a five-point scale (from 1 = 'not at all' to 5 = 'completely') the extent to which a specific motivation had played a role in their decision to join the cooperative. More specifically, questions were included to assess the importance of material incentives, which correspond to self-regarding motivations, including return on investment, low electricity price, the absence of charges for connection and the transparency of pricing.

Furthermore, in order to assess the importance of norm-driven motivations, members were asked to what extent they valued the production of renewable energy and the influence of other people's advice in their decision to join the cooperative. The former is related to the norm of environmental concern, while the latter is linked to norms of interpersonal trust and social identification to the group, consistent with the theoretical framework. In addition, different socio-psychological characteristics were measured: pro-environmental orientation, interpersonal trust and social identification to the cooperative. These different characteristics are based on a series of items that asked respondents to indicate on a five-point scale (seven points in the case of interpersonal trust) the extent to which they agree or disagree with different statements. The items were then aggregated into single indices. Individuals' pro-environmental orientation was captured through two dimensions: pro-environmental self-identity and daily behaviours. In order to measure the degree of pro-environmental self-identity, six items from existing questionnaires were selected and adapted (Castro et al., 2009; Fielding et al., 2008; Whitmarsh and O'Neill, 2010). These items measure to what extent the respondent perceives herself as a person concerned with environmental issues. To measure respondents' pro-environmental engagement in terms of daily behaviours, pro-environmental behaviours were selected from existing studies

(Delacolette et al., 2011), such as 'travel short distances on foot or by bike', 'avoid plastic bags in shops' or 'turn off the tap while brushing my teeth'. Respondents were asked to indicate the frequency at which they had adopted each behaviour during the last 15 days. Interpersonal trust was measured using three items selected from the World Value Survey. Finally, social identification was measured by five items adapted from existing studies (Tyler and Blader, 2001; Stürmer and Kampmeier, 2003). Table A1 (Appendix) reports the specific statements for all socio-psychological characteristics, along with statistics to test for internal consistency (item-total correlations and Cronbach's alpha). The results indicate good internal consistency and support combining the items into summated scales.

In addition, some data were collected about the history of members' interactions with their organisations. First, members were asked the year when they joined their cooperative, so that their period of membership (in years) could be computed. Second, in order to assess members' level of interactions with other cooperative members, they were asked whether or not they had other members within their direct social network (relatives, friends, neighbours). Third, as indicators of members' level of engagement, data about the frequency of attendance to general assemblies and about the number of cooperative shares purchased was collected. Respondents had to indicate on a four-point scale the frequency at which they attended general assemblies (1='never', 2='sometimes', 3='often', 4='always'). As to the number of shares purchased, two sources of information were available. On the one hand, respondents were asked to indicate on a six-point scale how many shares they had purchased (1 = '1 to 9 ', 2 = '10 to 19', 3 = '20 to 29', 4= '30 to 39', 5 = '40 to 49', 6 = 'more than 50'). On the other hand, the cooperatives provided data about the exact number of shares purchased for the entire population of members. Finally, members' postal codes were used to analyse the spatial characteristics of the different categories of members, based on information provided by the cooperatives for the entire population.

3.4. Data analysis

The goals of this paper are to analyse the potential heterogeneity of members' motivations to join RE cooperatives in relation to institutional factors, spatial factors and attitudes to innovation diffusion, as well as the potential implications of such heterogeneity in terms of level of engagement. To do so, the sample of Ecopower members was divided into three categories of cooperative members, which correspond to the three phases described in section 3.1 which Ecopower went through: members who joined the cooperative during the idealistic phase (1991-1999), members who joined during the energy production phase (2000-2002) and members who joined during the supply phase (2003-today). As explained later, this division is meaningful because these three phases also correspond to different institutional settings. The variables of interest could then be compared across these three groups and with BeauVent members.[3] In the rest of the article, the different groups are referred to in the following way: the three successive cohorts of Ecopower members are respectively called 'Ecopower 1', 'Ecopower 2' and 'Ecopower 3', and BeauVent members are called 'BeauVent'. Table 3 presents the number of members in each category, based on data for the entire population. As shown in the table, Ecopower 3 is much larger than the three other categories.

Table 3. Number of members by category.

Category	Number of members (%)
Ecopower 1	47 (0.09%)
Ecopower 2	656 (1.32%)
Ecopower 3	46,716 (93.79%)
BeauVent members	2,391 (4.80%)
Total	49,810 (100%)

Source: created by author based on 2013 data provided by the cooperatives.

Correlation analysis and statistical tests were performed to analyse members' motivations and characteristics, and compare the different categories. Since most of the variables used in the

[3] BeauVent members could not be distinguished according to different periods as was done for Ecopower members, due to a too small sample.

analysis were ordinal, statistical tools which only use the ordinal information in the data were needed. To conduct our correlation analysis, the Spearman's correlation coefficient was used. It ranges from -1 (perfect negative correlation) to +1 (perfect positive correlation). In addition, Kruskal-Wallis H tests were performed to determine whether there were statistically significant differences across the different groups of members. The Kruskal-Wallis H test is a rank-based nonparametric method that can be used to determine whether three or more independent samples, which may be of unequal sizes, originate from the same distribution. The scores reported on the rating scales by the different groups of members were transformed into ranks to conduct the Kruskal-Wallis tests. The mean ranks were computed for each group and for each variable by dividing its rank sum by its sample size. If the four sampled populations were actually identical, the mean ranks would be expected to be about equal. The Kruskal-Wallis test enables to determine whether at least one group of members differs significantly from at least one other group. Kruskal-Wallis tests were combined with Dunn's multiple comparison tests. The Dunn's test is a post-hoc test which can be performed to analyse the specific sample pairs that are dissimilar from each other.

Two variables used in the analysis were not ordinal and required other methods than a Kruskall-Wallis test: the presence of other members in the direct social network, which was binary, and the number of shares purchased based on the data provided by cooperatives, which was continuous. For the first, binary, variable, tests of pairwise comparison of proportions were performed for each pair of groups using Bonferroni corrections to correct for multiple comparisons (Section 4.4.). For the second, continuous, variable, a one-way analysis of variance (ANOVA) with Bonferroni correction and subsequent pairwise comparisons were conducted (Section 4.5.).

4. Results

4.1. Correlation analysis

Table 4 presents the results of the correlation analysis. Unsurprisingly, there is a high positive association between pro-environmental orientation and the production of renewable energy. These two variables are also relatively strongly positively correlated with social identification. This indicates that members who identify strongly with the organisation also have high environmental concerns. Interpersonal trust is also positively correlated with pro-environmental orientation and social identification, although to a lesser extent.

By contrast, material incentives are weakly correlated with social identification and pro-environmental orientation, but are relatively highly positively associated with each other. This suggests that self-regarding motivations and norm-driven motivations are mutually exclusive to a certain extent: people who joined the cooperative for self-regarding reasons do not identify with it very strongly and have a relatively low pro-environmental orientation. Interestingly, the people for whom others' advice and, therefore, social norms, played a relatively important role in their decisions to join the organisations also have a relatively strong social identification. Participation in general assemblies is positively associated with social identification, the period of membership and the number of shares purchased. The number of shares purchased is also strongly positively correlated with the return on investment, but poorly associated with social identification, pro-environmental orientation and interpersonal trust.

Table 4. Correlation matrix.

Spearman's rho	1	2	3	4	5	6	7	8	9	10	11	12
1. Production of renewable energy												
2. Return on investment	-0.03*											
3. Electricity price	-0.14***	0.22***										
4. Absence of connection charges	-0.18***	0.24***	0.28***									
5. Transparency of pricing	-0.09***	0.17***	0.40***	0.62***								
6. Others' advice	0.08***	0.17***	0.10***	0.14***	0.12***							
7. Social identification	0.35***	0.07***	-0.02	-0.01	0.06***	0.26***						
8. Pro-environmental orientation	0.40***	-0.07***	-0.12***	-0.12***	-0.05***	0.08***	0.44***					
9. Interpersonal trust	0.13***	-0.11***	-0.09***	-0.13***	-0.06***	-0.01	0.12***	0.17***				
10. Participation in general assemblies	0.06***	0.07***	-0.05***	0.03	0.03*	0.04**	0.18***	0.05***	0.00			
11. Number of shares purchased	0.00	0.28***	-0.06***	0.01	-0.01	-0.04**	0.06***	0.02	-0.02	0.18***		
12. Presence of other members in social network	0.04**	0.05***	-0.03	0.02	0.02	0.17***	0.13***	0.10***	0.07***	0.08***	0.07***	
13. Membership period	0.13***	0.04*	-0.04**	-0.12***	-0.06***	-0.05***	0.16***	0.13***	0.07***	0.15***	0.16***	0.07***

Source: created by author based on survey (2014).

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

4.2. Motivations to join cooperatives

Let us now turn to the comparison of motivations to join cooperatives across categories of members.[4] The Kruskal-Wallis H tests showed that, for each motivation except the influence of others' advice, at least one category differed significantly from at least one of the other categories. Table 5 provides the results of the Dunn's tests, along with the mean ranks for each group of members. The pairs of groups that are significantly different from each other are in the far right column.

Table 5. Comparison of motivations to join the cooperative.

Variable	Ecopower 1	Ecopower 2	Ecopower 3	BeauVent	Statistically significant comparisons
Production of renewable energy	2219.62 (43)	1803.12 (94)	1655.52 (3141)	1827.06 (59)	Ecopower 1 vs. Ecopower 2 *** Ecopower 1 vs. Ecopower 3 *** Ecopower 2 vs. Ecopower 3 * Ecopower 1 vs. BeauVent **
Return on investments	1689.13 (43)	1575.21 (94)	1665.07 (3141)	2067.19 (59)	Ecopower 1 vs. BeauVent*** Ecopower 2 vs. BeauVent*** Ecopower 3 vs. BeauVent**
Electricity price	1146.58 (40)	1364.01 (90)	1572.20 (2964)	1832.80 (22[a])	Ecopower 1 vs. Ecopower 2* Ecopower 1 vs. Ecopower 3*** Ecopower 2 vs. Ecopower 3** Ecopower 3 vs. BeauVent[a] *
Absence of connection charges	1294.94 (39)	1219.51 (90)	1571.14 (2966)	1747.41 (22[a])	Ecopower 1 vs. Ecopower 3** Ecopower 2 vs. Ecopower 3*** Ecopower 1 vs. BeauVent[a] ** Ecopower 2 vs. BeauVent[a] ***
Transparency of pricing	1344.71 (39)	1252.51 (91)	1668.26 (2972)	1747.41 (22[a])	Ecopower 1 vs. Ecopower 3** Ecopower 2 vs. Ecopower 3*** Ecopower 1 vs. BeauVent[a] ** Ecopower 2 vs. BeauVent[a] ***
Influence of others' advice	1724.37 (43)	1572.89 (94)	1651 (3141)	1790.73 (59)	None

Source: created by author based on survey (2014).

Note: numbers are mean ranks and, in parentheses, sample sizes.

[a]: only BeauVent members who were supplied by Ecopower were considered.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

[4] Figure B1 (Appendix) presents the relative frequencies by categories of cooperative members for each motivation.

Regarding the production of renewable energy, Ecopower 1 is the group for which the production of renewable energy significantly matters the most, compared to Ecopower 2, Ecopower 3, and BeauVent. Similarly, this factor is significantly more important for Ecopower 2 when compared to Ecopower 3. By contrast, there is no significant difference between BeauVent and Ecopower 2, or between BeauVent and Ecopower 3.

The Dunn's test for the return on investments clearly indicates that BeauVent significantly values the return on investments more compared to Ecopower members, regardless of the category. On the other hand, there is no significant difference between the three groups of Ecopower members.

Regarding the electricity price, the absence of charges for connection and the transparency of pricing, an examination of the results reveal that these three factors all play a more important role for members in Ecopower 3 than for those in Ecopower 1 and 2. This may be explained by the fact that Ecopower 3 is constituted by members who joined the cooperative after it started its supply activities and are thus more likely to be attracted by incentives related with electricity supply[5].

4.3. Socio-psychological characteristics

Let us now turn to the analysis of socio-psychological characteristics, i.e. social identification, pro-environmental orientation and interpersonal trust (Table 6). Ecopower 1, Ecopower 2 and BeauVent seem to be very similar groups in terms of social identification and pro-environmental orientation. There is no statistically significant difference across these three groups, except that members in Ecopower 1 identify significantly more to the cooperative than BeauVent members, on average. On the other hand, Ecopower 3 appears to stand out clearly. Members belonging to this group identify significantly less to the cooperative and are less pro-environmentally oriented, on average, than the other three groups.

[5] BeauVent also significantly differs in several ways from other categories of members, but these differences are not very informative because the sample of BeauVent members has been restricted to members who are supplied by Ecopower only.

Table 6. Comparison of socio-psychological characteristics.

Variable	Ecopower 1	Ecopower 2	Ecopower 3	BeauVent	Statistically significant comparisons
Social identification	2222.28 (43)	1883.06 (93)	1497.45 (3132)	1603.26 (59)	Ecopower 1 vs. Ecopower 3*** Ecopower 2 vs. Ecopower 3*** Ecopower 1 vs. BeauVent* Ecopower 3 vs. BeauVent**
Pro-environmental orientation	2059.72 (43)	1930.43 (92)	1636.13 (3111)	1879.22 (59)	Ecopower 1 vs. Ecopower 3*** Ecopower 2 vs. Ecopower 3*** Ecopower 3 vs. BeauVent*
Interpersonal trust	1730.81 (43)	1901.87 (92)	1642.51 (3105)	1612.25 (59)	Ecopower 2 vs. Ecopower 3*** Ecopower 2 vs. BeauVent**

Source: created by author based on survey (2014).

Note: numbers are mean ranks and, in parentheses, sample sizes.

* Significant at the 10% level.

** Significant at the 5% level.

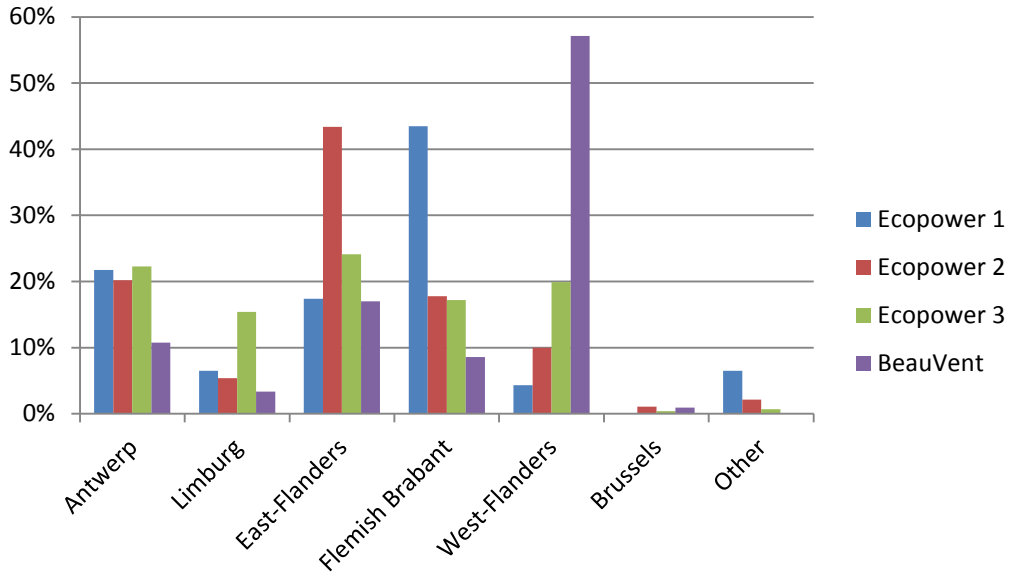
*** Significant at the 1% level.

Regarding interpersonal trust, differences are less clear-cut. The only significant differences observed are between Ecopower 2 and Ecopower 3 and between Ecopower 2 and BeauVent. In both cases, members in Ecopower 2 have a higher level of interpersonal trust, on average, than members of the other group.

4.4. Spatial and relational antecedents

In Section 2.2., it was argued that the spatial characteristics of the membership may partly explain the heterogeneity among members' motivations. In particular, it has been suggested that spatial proximity of members is likely to encourage social interactions, which, in turn, facilitate exchanges of information and enhance trust and other social norms among members. It is thus interesting to examine the spatial localisation of the different categories of members.

Figure 1. Spatial location of Ecopower and BeauVent members by provinces.



Source: created by author based on 2013 data provided by the cooperatives covering the entire population of members.

Figure 1 shows the spatial distribution of members by province and by categories. As shown in the figure, over 43% of members in Ecopower 1 are spatially concentrated in the province of Flemish Brabant. This results from the fact that the very first project of the cooperative was to gather small amounts of money to finance the refurbishment of small hydropower installations located close to Leuven, in Flemish Brabant. On the other hand, 43% of members in Ecopower 2 are spatially concentrated in the province of East Flanders. This shift of the 'centre of gravity' of membership corresponds to the installation of the first wind turbines in Eeklo, a small municipality located in East Flanders, and the parallel recruitment campaign that took place to attract new members. By contrast, Ecopower 3 is not concentrated in any specific province, but is rather distributed relatively equally across all provinces of Flanders. This reflects the fact that when Ecopower became electricity supplier, it extended its activities across all of Flanders. The evolution of the spatial distribution of membership is thus closely related to the location of the different projects developed by the cooperative. Finally, it is interesting to note that Ecopower members are nearly absent from Brussels or territories outside Flanders. This is not surprising, as

Ecopower supplies electricity in Flanders exclusively. Regarding BeauVent, Figure 1 shows that more than 57% of BeauVent membership is concentrated in the province of West-Flanders, where the cooperative was founded and where it develops most of its projects.

Table 7. Comparison of social interactions between members.

Variable	Ecopower 1	Ecopower 2	Ecopower 3	BeauVent	Statistically significant comparisons
Presence of members in social networks (friends, relatives, neighbours) (in %)	77.13 (43)	67.20 (92)	57.52 (3103)	69.11 (56)	Ecopower 1 vs. Ecopower 3* Ecopower 2 vs. Ecopower 3** Ecopower 3 vs. BeauVent**

Source: created by author based on survey (2014).
Note: numbers are proportions and, in parentheses, sample sizes.
* Significant at the 10% level.
** Significant at the 5% level.

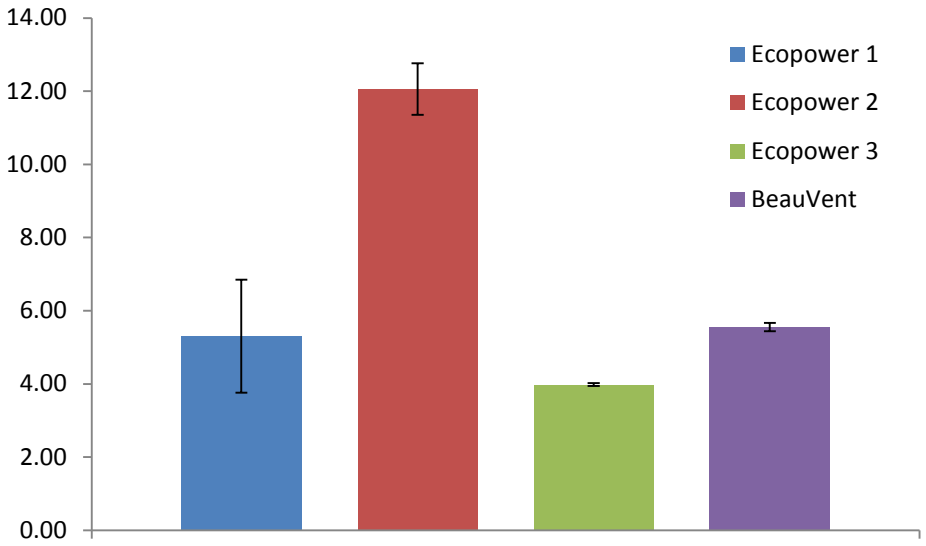
How are these differences in spatial location reflected in terms of social interactions with other cooperative members? Table 7 presents the proportion, in each group, of members with other members in their direct social network (relatives, friends, neighbours). The difference between Ecopower 3 and other groups of cooperative members is striking: Ecopower 1, Ecopower 2 and BeauVent contain a significantly higher proportion of individuals with other cooperative members in their social network as compared to Ecopower 3. In contrast, there is no significant difference between Ecopower 1, Ecopower 2 and BeauVent. These findings confirm that the more concentrated spatial locations of Ecopower 1, Ecopower 2 and BeauVent are associated with a higher frequency of social interactions as compared to Ecopower 3.

4.5. Implications in terms of level of engagement

Finally, the different categories of cooperative members are compared in terms of their level of engagement, measured by the number of cooperative shares purchased and by the frequency of attendance of general assemblies. Regarding the number of shares purchased, data on the distribution of the number of shares covering the entire population of members was used.

Interestingly, Figure 2 clearly shows that members belonging to Ecopower 2 invest, on average, considerably larger amounts than members in any other category.

Figure 2. Average number of shares purchased by categories of members.



Source: created by author based on 2013 data provided by the cooperatives covering the entire population of members.

The results of the Bonferroni multiple-comparison test in Table 8 confirm that these differences are statistically significant. They also show that BeauVent members make significantly larger investments than members in Ecopower 3. By contrast, there is no significant difference between Ecopower 1 and Ecopower 3 and between Ecopower 1 and BeauVent. To interpret these findings, it is worth recalling that members belonging to Ecopower 2 joined when the cooperative installed its first wind turbines. The results thus suggest that the concrete realisation of the first wind energy project and the expectation of tangible economic benefits coming with it attracted many members willing to invest larger amounts of money in the cooperative.

Table 8. Comparison of members' level of engagement.

Variable	Ecopower 1	Ecopower 2	Ecopower 3	BeauVent	Statistically significant comparisons
Number of shares purchased	5.30 (47) [a]	12.06 (656) [a]	3.98 (46,716) [a]	5.55 (2,391) [a]	Ecopower 1 vs. Ecopower 2*** Ecopower 2 vs. Ecopower 3*** Ecopower 2 vs. BeauVent*** Ecopower 3 vs. BeauVent***
Participation in general assemblies	2066.91 (43) [b]	1721.95 (94) [b]	1639.97 (3122) [b]	2277.26 (57) [b]	Ecopower 1 vs. Ecopower 2*** Ecopower 1 vs. Ecopower 3*** Ecopower 2 vs. Ecopower 3** Ecopower 1 vs. BeauVent*** Ecopower 2 vs. BeauVent*** Ecopower 3 vs. BeauVent***

Source: as to the number of shares purchased, data provided by cooperatives and covering the entire population of members was used. The data for the participation in general assemblies is based on the author's survey (2014).
Note: a Bonferroni multiple-comparison test and a Dunn's test have been performed to compare the average number of shares purchased and the participation in general assemblies respectively.
[a]: Numbers are the mean scores of the number of shares purchased and, in parentheses, sample sizes.
[b]: Numbers are mean ranks and, in parentheses, sample sizes.
** Significant at the 5% level.
*** Significant at the 1% level.

Regarding the participation in general assemblies, Table 8 shows that members belonging to Ecopower 1 attend assemblies more frequently, on average, than the other two categories of Ecopower members. Similarly, members in Ecopower 2 have significantly more frequent participation than members belonging to Ecopower 3. Finally, BeauVent members attend general assemblies significantly more frequently than any cohort of Ecopower members.

5. Discussion

An important finding is that cooperative members cannot be regarded as one homogeneous group in terms of motivations. Their apparent uniformity hides significant differences in preferences and interests across categories of members. The two first cohorts of Ecopower members as well as BeauVent members are more pro-environmentally oriented and identify more strongly to their cooperative than the third generation of Ecopower members. Moreover, the two first generations of Ecopower members attach more value to RE production than the third generation. Material incentives attached to electricity supply are also less important to the former than to the latter. In addition, the second generation of Ecopower members also has a higher

degree of interpersonal trust when compared to Ecopower 3. Overall, the results show that 'early' Ecopower members, i.e. members of the first and second cohorts, and BeauVent members tend to be norm-driven individuals who are ready to join the cooperative even in the absence of clear material benefits, based on solid environmental convictions or strong feelings of belonging in the group (although the results also indicate some significant differences across these three categories).[6] In contrast, 'late-coming' Ecopower members, i.e. those who joined the cooperative during its 'supply' phase, are less motivated by environmental values or social identification and more driven by material incentives attached to electricity supply.

These differences can be explained by different factors. First, they should be related with institutional dimensions. Indeed, the results show how shaping incentives affect the structure of social interactions and the population of types of individuals who are most likely to come to prominence in a particular setting. By attaching tangible material benefits in the form of electricity supply to cooperative membership, Ecopower modified the incentive structure faced by existing and potential members. It introduced relatively more 'market' logic and undermined the 'community' logic in its organisational model. This modified the composition of the membership, which evolved toward less norm-driven and more self-regarding members, and diluted its social capital. In contrast, BeauVent, which did not establish direct market transactions with its members, contains more norm-driven members. Overall, early Ecopower members and BeauVent members also tend to have a higher level of engagement in the cooperative. On the one hand, they participate more frequently in general assemblies than late-coming Ecopower members. On the other hand, BeauVent members and the second generation of Ecopower members purchase more cooperative shares.

Second, this heterogeneity can be explained by members' spatial localisation. Indeed, the two first generations of Ecopower members and BeauVent members are more spatially concentrated as compared to the third generation of Ecopower members. Relying on the distinction between

[6] It is worth noting, for instance, the important exception of BeauVent members, for whom the return on investments is seen as more important than for any generation of Ecopower members.

community of place and community of interest introduced in Section 2.2., it can be said that the first and second cohorts of Ecopower members and BeauVent members form communities of place, while the third generation of members forms a community of interest. This spatial distribution explains why a higher proportion of early Ecopower members and BeauVent members have fellow members in their direct social network. Spatial patterns thus reinforce the influence of the changes in institutional settings just presented. Indeed, as explained in Section 2.2., by facilitating direct social interactions and face-to-face communication, spatial closeness between members enhances the level of social norms in a group. In contrast, the broadening of the geographical scope of economic operations resulting from the start of electricity supply weakened the bonds among cooperative members, as well as between them and their organisation.

Third, these findings should also be related with the innovation adoption perspective. Indeed, the case of Ecopower indicates that cooperative organisations and their membership are dynamic entities that evolve over time.[7] In this respect, a parallelism can be made between the different cohorts of Ecopower members and the segments of adopters of innovations defined by Rogers (1995), the cooperative management of RE projects being the institutional innovation in this case. The first members can be considered as 'institutional innovators'. They were highly motivated individuals who agreed to provide time and lend 'patient' capital, i.e. capital with no expectation of turning a quick profit. This would not have been possible with a for-profit developer and traditional venture capital. It can thus be argued that the idealistic phase took place in a 'niche' environment, i.e. a space relatively isolated from selective pressures of the market where the technologies could develop and their social embedding could take place (Kemp et al., 1998). In addition, at that time few traditional developers in Belgium were interested in RE. The cooperative therefore took advantage of its embeddedness in this social network of highly motivated people to develop technologies (wind turbines, solar panels) for which there were still

[7] It is more difficult to draw similar conclusions in the case of BeauVent, as its membership was not compared over different periods of time.

no economies of scale. The second important step for Ecopower was the realisation of its first wind energy projects in 2000. It then attracted a second wave of members, who were still more norm-driven than the third generation, but were also motivated by the actual installation of the first production assets which secured tangible economic benefits. From the innovation diffusion perspective, these members correspond to the early adopters. A third important turning point was the liberalisation of the energy market in 2003. Then, Ecopower and BeauVent took divergent development paths. Ecopower chose to start supplying electricity, while BeauVent did not. By doing so, Ecopower 'mainstreamed' the innovation represented by cooperative management of RE projects, as it introduced more market logic in its organisational model. It can also be shown that electricity supply was accompanied by further standardisation of management practices (Bauwens and Huybrechts, 2015). Ecopower then started attracting members who were quite distinct from early members and who developed more of a customers' attitude in wanting to benefit from the advantages of electricity supply without being strongly involved. In Rogers (1995)'s terms, they correspond to the early majority of adopters. On the other hand, this was an essential step for increasing market share and organisational development because it enabled additional members to be attracted and to mobilise more resources. This highlights the trade-off that is likely to arise for CRE initiatives between the creation and maintenance of a high level of social capital and the scaling up of activities (Smith et al., 2015).

6. Conclusion and policy implications

The paper has empirically investigated the heterogeneity among members of CRE projects in terms of motivations and level of engagement. Regarding the first research question, the analysis shows that members' motives are indeed heterogeneous. This diversity can be explained, first of all, by institutional factors and, more precisely, by the respective weights of market and community logics within CRE initiatives. When the community logic prevails members are more norm-driven, whereas when a market relationship is established between the organisation and its

members these are more motivated by material incentives. Second, this heterogeneity of motivations is linked to spatial patterns, as evidence suggests that communities of place are more likely to foster norm-driven behaviours than communities of interest. Third, this heterogeneity corresponds to different attitudes to the diffusion of institutional innovations. Indeed, the segments of members can clearly be differentiated according to their stance toward cooperative management of RE projects. As to the second research question, the paper shows that these differences are reflected in the level of engagement of members: norm-driven individuals tend in general to invest more and to be more involved in the governance of organisations.

These findings contribute to the emerging literature on community-based energy projects and on the diffusion of grassroots innovations in the field of energy through highlighting the heterogeneity of participants' motivations and relating them to their level of engagement. To scholarship interested in energy policy and environmental management, the paper brings a more fine-grained analysis of how institutional factors and, in particular, social norms may interplay with spatial patterns and attitudes to innovation diffusion in order to shape RE investments at the community level.

Regarding policy and managerial implications, the heterogeneity of investors should be taken into account across several dimensions. At the organisational level, in addition to the obvious specificities of community-based energy projects as compared to more traditional companies, the findings emphasise substantial differences among these initiatives, which in turn require adapted policy responsiveness. The results also highlight that even the same community-based organisation may contain appreciably different profiles of individual investors in terms of motivations and level of engagement. As shown in the analysis, these contrasts tend to correspond to different phases of the development of organisations. This confirms the need for designing a portfolio of several different policies (a 'policy mix') which adapts to the development stages of organisations in order to stimulate investments in RE production (Mignon and Bergek, 2016). Taking this heterogeneity into account increases the complexity of policy-

making decisions, but may also considerably enhance their effectiveness. The other side of this complexity is that policy-makers and CRE managers can rely on new ways to stimulate RE investments. Indeed, in addition to traditional economic incentives, the results suggest that relying on norms may be an effective way to influence investment decisions, especially when technological or institutional innovations are still in an experimental phase. However, market incentives and the activation of social/moral norms should be combined with care, as they are likely to interact with each other. Indeed, the introduction of material incentives, such as financial rewards or sanctions, may sometimes 'crowd out' behaviours that are based on social preferences. For instance, Frey and Oberholzer-Gee (1997) found that proposing financial compensation reduced Swiss citizens' willingness to host a nuclear waste facility.

As a basis to further explore how members' motivations are affected by a modification of institutional settings, two hypotheses can be formulated. First, it may be the case that motivations evolve toward a homogenisation of preferences. That is, members with strong normative drivers become less norm-driven over time, due to the introduction of market incentives, the arrival of more self-regarding individuals and the resulting increase in size of the organisation. In other words, according to the first hypothesis, norm-driven behaviours are crowded out by the introduction of material incentives. According to a second hypothesis, there is no such tendency toward homogenisation and different profiles of members remain over time. Longitudinal data about members' motivations and preferences would be necessary to test these hypotheses. In addition, further research could include the analysis of cooperative organisations in other geographical contexts and of other types of community-based energy projects. Finally, additional qualitative analysis such as in-depth interviews with cooperative members would also provide a more fine-grained analysis of member's motives and level of engagement.

References

Bamberg, S., Rees, J., Seebauer, S., 2015. Collective climate action: Determinants of participation intention in community-based pro-environmental initiatives. Journal of Environmental Psychology 43 155-165.

Bauwens, T., 2015. Propriété coopérative et acceptabilité sociale de l'éolien terrestre. Reflets et Perspectives de la Vie Economique LIV (1), 59-70.

Bauwens, T., Gotchev, B., Holstenkamp, L., 2016. What drives the development of community energy in Europe? The case of wind power cooperatives. Energy Research & Social Science 13 136-147.

Bauwens, T., Huybrechts, B., 2015. The Frog and the Ox, or How Hybrid Organizations Deal with Growth: The Case of Renewable Energy Cooperatives, EMES Conferences Selected Papers Series ECSP-5EMES-06. EMES.

Bergek, A., Mignon, I., Sundberg, G., 2013. Who invests in renewable electricity production? Empirical evidence and suggestions for further research. Energy Policy 56 (0), 568-581.

Bergman, N., Eyre, N., 2011. What role for microgeneration in a shift to a low carbon domestic energy sector in the UK? Energy Efficiency 4 (3), 335-353.

Bollinger, B., Gillingham, K., 2012. Peer Effects in the Diffusion of Solar Photovoltaic Panels. Marketing Science 31 (6), 900-912.

Boon, F.P., Dieperink, C., 2014. Local civil society based renewable energy organisations in the Netherlands: Exploring the factors that stimulate their emergence and development. Energy Policy 69 297-307.

Bowles, S., Gintis, H., 2002. Social Capital And Community Governance. The Economic Journal 112 (483), F419-F436.

Bowles, S., Gintis, H., 2009. Beyond Enlightened Self-Interest: Social Norms, Other-Regarding Preferences, and Cooperative Behavior, in: Levin, S.A. (Ed.), Games, Groups, and the Global Good. Springer Berlin Heidelberg, pp. 57-78.

Brown-Kruse, J., Hummels, D., 1993. Gender effects in laboratory public goods contribution. Journal of Economic Behavior & Organization 22 (3), 255-267.

Castro, P., Garrido, M., Reis, E., Menezes, J., 2009. Ambivalence and conservation behaviour: An exploratory study on the recycling of metal cans. Journal of Environmental Psychology 29 (1), 24-33.

Dawes, R.M., Van De Kragt, A.J.C., Orbell, J.M., 1988. Not me or thee but we: The importance of group identity in eliciting cooperation in dilemma situations: Experimental manipulations. Acta Psychologica 68 (1–3), 83-97.

Delacolette, N., Claus, B., Verbeek, B., Sohet, X., Warlop, L., Dardenne, B., 2011. Fostering Sustainable Behaviors: Community-Based Social Marketing. Belgian Science Policy, Brussels.

Dóci, G., Vasileiadou, E., 2015. "Let's do it ourselves" Individual motivations for investing in renewables at community level. Renewable and Sustainable Energy Reviews 49 41-50.

Dubreuil, B., Grégoire, J.-F., 2013. Are moral norms distinct from social norms? A critical assessment of Jon Elster and Cristina Bicchieri. Theory Decis 75 (1), 137-152.

Ecopower, 2013. Power Post-Nieuwsbrief van Ecopower cvba. Ecopower cvba, Berchem.

Eyre, N., 2013. Decentralization of governance in the low-carbon transition, in: Fouquet, R. (Ed.), Handbook on Energy and Climate Change. Edward Elgar Publishing, Cheltenham, UK, pp. 581–597.

Fielding, K.S., McDonald, R., Louis, W.R., 2008. Theory of planned behaviour, identity and intentions to engage in environmental activism. Journal of Environmental Psychology 28 (4), 318-326.

Fraj, E., Martinez, E., 2006. Environmental values and lifestyles as determining factors of ecological consumer behaviour: an empirical analysis. Journal of Consumer Marketing 23 (3), 133-144.

Frey, B.S., Oberholzer-Gee, F., 1997. The Cost of Price Incentives: An Empirical Analysis of Motivation Crowding-Out. The American Economic Review 87 (4), 746-755.

Gilchreist, A., 2000. Design for living: the challenge of sustainable communities, in: Barton, H. (Ed.), Sustainable Communities: the Potential for Eco-Neighbourhoods. Earthscan, London, pp. 147-159.

Goette, L., Huffman, D., Meier, S., 2006. The Impact of Group Membership on Cooperation and Norm Enforcement: Evidence Using Random Assignment to Real Social Groups. The American Economic Review 96 (2), 212-216.

Heiskanen, E., Johnson, M., Robinson, S., Vadovics, E., Saastamoinen, M., 2010. Low-carbon communities as a context for individual behavioural change. Energy Policy 38 (12), 7586-7595.

I.C.A., 1995. Statement on the cooperative identity. Review of International Cooperation 88 (3), 3-4.

IPCC, 2011. Special Report on Renewable Energy Sources and Climate Change Mitigation. Cambridge University Press, United Kingdom and New York, NY, USA.

Kalkbrenner, B.J., Roosen, J., 2016. Citizens' willingness to participate in local renewable energy projects: The role of community and trust in Germany. Energy Research & Social Science 13 60-70.

Kemp, R., Schot, J., Hoogma, R., 1998. Regime shifts to sustainability through processes of niche formation: The approach of strategic niche management. Technology Analysis & Strategic Management 10 (2), 175-198.

Kern, F., Smith, A., 2008. Restructuring energy systems for sustainability? Energy transition policy in the Netherlands. Energy Policy 36 (11), 4093-4103.
Litvine, D., Wüstenhagen, R., 2011. Helping "light green" consumers walk the talk: Results of a behavioural intervention survey in the Swiss electricity market. Ecological Economics 70 (3), 462-474.
Maruyama, Y., Nishikido, M., Iida, T., 2007. The rise of community wind power in Japan: Enhanced acceptance through social innovation. Energy Policy 35 (5), 2761-2769.
McEachern, M., Hanson, S., 2008. Socio-geographic perception in the diffusion of innovation: Solar energy technology in Sri Lanka. Energy Policy 36 (7), 2578-2590.
Mignon, I., Bergek, A., 2016. Investments in renewable electricity production: The importance of policy revisited. Renewable Energy 88 307-316.
Mumford, J., Gray, D., 2010. Consumer engagement in alternative energy—Can the regulators and suppliers be trusted? Energy Policy 38 (6), 2664-2671.
Noll, D., Dawes, C., Rai, V., 2014. Solar Community Organizations and active peer effects in the adoption of residential PV. Energy Policy 67 330-343.
Ostrom, E., 2003. Toward a Behavioral Theory Linking Trust, Reciprocity, and Reputation, in: Ostrom, E., Walker, J. (Eds.), Trust & Reciprocity. Interdisciplinary Lessons from Experimental Research. Russell Sage Foundation, New York.
Ostrom, E., 2005. Understanding Institutional Diversity. Princeton University Press, Princeton.
Rogers, E.M., 1995. Diffusion of Innovations. Free Press, New York.
Rogers, J.C., Simmons, E.A., Convery, I., Weatherall, A., 2012. Social impacts of community renewable energy projects: findings from a woodfuel case study. Energy Policy 42 239-247.
Sauter, R., Watson, J., 2007. Strategies for the deployment of micro-generation: Implications for social acceptance. Energy Policy 35 (5), 2770-2779.
Schneider, M., Frogatt, A., Thomas, S., 2011. Nuclear Power in a Post-Fukushima World, The world nuclear industry status report 2010–2011. Worldwatch Institute.
Seyfang, G., Park, J.J., Smith, A., 2013. A thousand flowers blooming? An examination of community energy in the UK. Energy Policy 61 (0), 977-989.
Smil, V., 2010. Energy Transitions: History, Requirements, Prospects. ABC-CLIO, Santa Barbara.
Smith, A., Hargreaves, T., Hielscher, S., Martiskainen, M., Seyfang, G., 2015. Making the most of community energies: Three perspectives on grassroots innovation. Environment and Planning A.
Stürmer, S., Kampmeier, C., 2003. Active citizenship: The role of community identification in community volunteerism and local participation. Psychologica Belgica 43 (1-2), 103-122.
Toke, D., Breukers, S., Wolsink, M., 2008. Wind power deployment outcomes: How can we account for the differences? Renewable and Sustainable Energy Reviews 12 (4), 1129-1147.
trend:research Gmb, H., Leuphana Universität, L., Definition und Marktanalyse von Bürgerenergie in Deutschland, Bremen; Lüneburg.
Truffer, B., 2003. User-led Innovation Processes: The Development of Professional Car Sharing by Environmentally Concerned Citizens. Innovation: The European Journal of Social Science Research 16 (2), 139-154.
Tyler, T.R., Blader, S.L., 2001. Identity and Cooperative Behavior in Groups. Group Processes & Intergroup Relations 4 (3), 207-226.
Walker, B.J.A., Wiersma, B., Bailey, E., 2014. Community benefits, framing and the social acceptance of offshore wind farms: An experimental study in England. Energy Research & Social Science 3 46-54.
Walker, G., Devine-Wright, P., 2008. Community renewable energy: What should it mean? Energy Policy 36 (2), 497-500.
Walker, G., Devine-Wright, P., Hunter, S., High, H., Evans, B., 2010. Trust and community: Exploring the meanings, contexts and dynamics of community renewable energy. Energy Policy 38 (6), 2655-2663.
Whitmarsh, L., O'Neill, S., 2010. Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. Journal of Environmental Psychology 30 (3), 305-314.
Wüstenhagen, R., Menichetti, E., 2012. Strategic choices for renewable energy investment: Conceptual framework and opportunities for further research. Energy Policy 40 1-10.
Yalçın-Riollet, M., Garabuau-Moussaoui, I., Szuba, M., 2014. Energy autonomy in Le Mené: A French case of grassroots innovation. Energy Policy 69 347-355.
Yildiz, Ö., Rommel, J., Debor, S., Holstenkamp, L., Mey, F., Müller, J.R., Radtke, J., Rognli, J., 2015. Renewable energy cooperatives as gatekeepers or facilitators? Recent developments in Germany and a multidisciplinary research agenda. Energy Research & Social Science 6 (0), 59-73.
Young, H.P., 2008. social norms, in: Durlauf, S.N., Blume, L.E. (Eds.), The New Palgrave Dictionary of Economics. Palgrave Macmillan, Basingstoke.

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Appendix A

Table A1. Item-total correlation and Cronbach's alpha for the different scales.

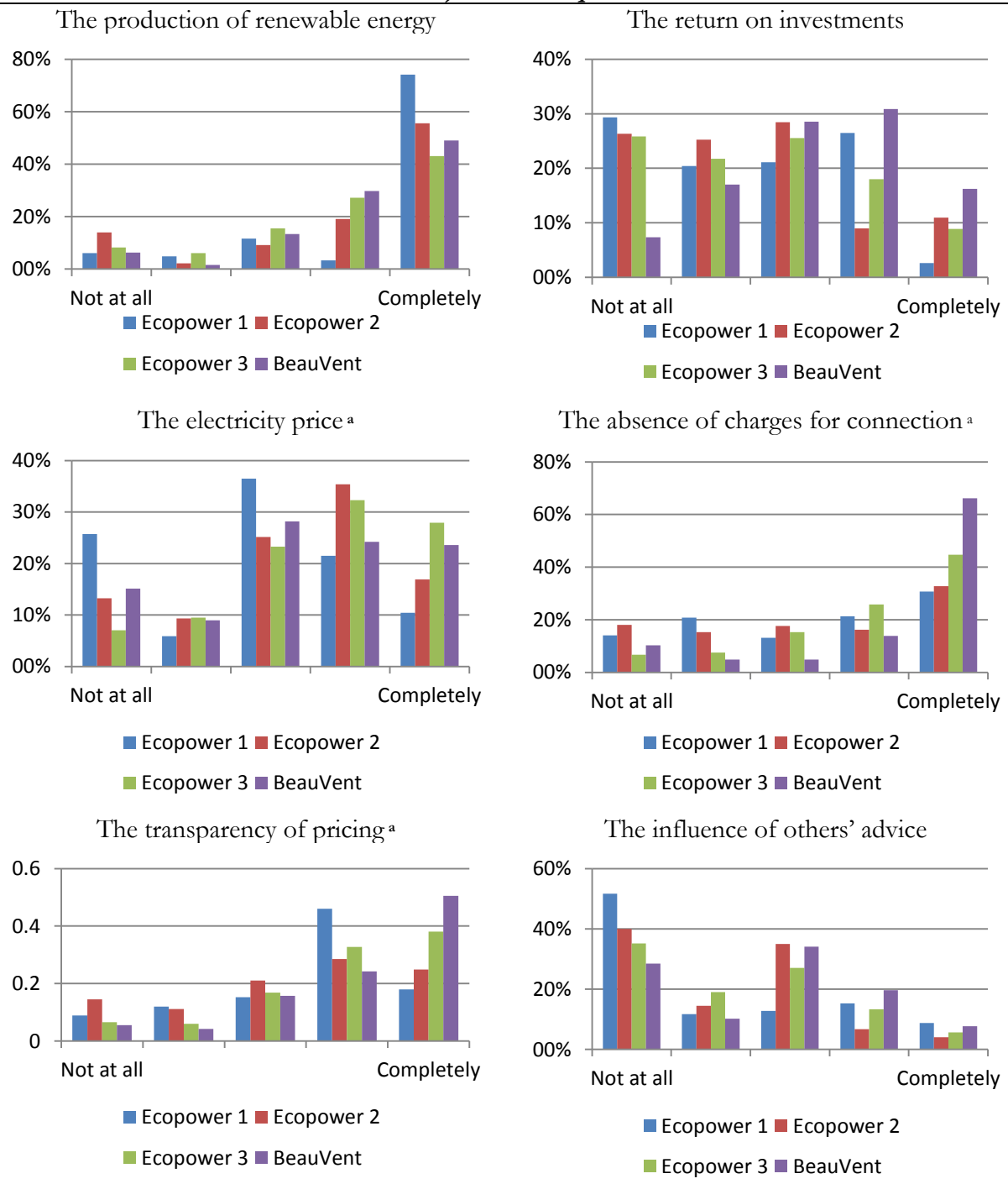
	Item-total correlation and Cronbach's alpha
Social identification	
1. I am proud to be part of the cooperative.	0.64
2. I have a lot in common with the other members of the cooperative.	0.67
3. Being a member of the cooperative is an important part of who I am.	0.72
4. I feel attached to the other cooperative members.	0.70
5. I like talking about the cooperative in the presence of others.	0.66
Cronbach's alpha	0.86
Pro-environmental orientation	
1. I feel concerned about climate change.	0.63
2. I think that human activities are one of the main causes of climate change.	0.45
3. I am the type of person who cares about ecology.	0.65
4. I think of myself as an eco-responsible consumer.	0.68
5. I want to feel that I personally contribute to the protection of the environment.	0.68
6. I like that my family or my friends see me as someone concerned by the environment	0.57
7. Make short distances on foot or by bike	0.44
8. Avoid plastic bags in shops	0.45
9. Reuse old plastic bags	0.48
10. Buy fruit and vegetables grown locally rather than imported	0.40
11. Turn off the tap while brushing my teeth	0.40
Cronbach's alpha	0.84
Interpersonal trust	
1. Would you say that most people can be trusted, or that you can't be too careful in dealing with people?	0.70
2. Do you think that most people would try to take advantage of you if they got the chance, or would they try to be fair?	0.66
3. Would you say that most of the time people try to be helpful or that they are mostly looking out for themselves?	0.65
Cronbach's alpha	0.82

Source: created by author.

Appendix B

Figure B1. Relative frequencies of cooperative members' motivations.

Question: "To which extent each of the following elements has played a role in your decision to join the cooperative?"



Source: created by author based on survey (2014).

[a]: as regards the sample of BeauVent members, only members who were supplied by Ecopower were considered.