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Positive energies? An empirical study of community energy participation and attitudes to renewable energy

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ABSTRACT

It has been suggested that participation in community energy initiatives may play an important role in enabling a transition towards renewable energy (RE) deployment by fostering positive attitudes toward renewables. Yet, little is known about how members of community energy initiatives differ from non-members in terms of energy attitudes and whether different profiles of community energy members exist. This article empirically analyses the relations between community energy membership and attitudes toward RE and onshore wind energy. Based on statistical analyses of a large-scale quantitative dataset from an original survey ($N = 3963$) conducted with two energy cooperatives in Belgium, it contrasts different groups of cooperative members with each other and a comparison group of non-members. Results show that members have significantly more positive attitudes towards RE than non-members. Results also suggest that non-members tend to be more indifferent or more uncertain, not more objecting, than members to wind power. Finally, significant differences among cooperative members are highlighted, illustrating the contrast between communities of place and communities of interest. The findings suggest a novel perspective on the benefits of community energy membership – to overcome indifference or uncertainty – that is relevant to foster a rapid and socially acceptable low carbon transition.

1. Introduction

The dominance of fossil fuels poses major ecological and social threats to the sustainability of energy systems. These threats call for a displacement of fossil resources by low carbon and, in particular, renewable energy (RE) sources. Any technological transition away from fossil fuels will involve important issues of social acceptance of technologies, and public participation is likely to play a crucial role in these.

Onshore wind power is an emblematic example of such issues. This technology has a major role to play in the deployment of RE sources, as it is characterized by high technical potential and promising commercial prospects, and has become more economically affordable than other RE sources (Ackermann and Söder, 2002; Harborne and Hendry, 2009). However, wind power development has provoked considerable opposition in many places all over the world, despite broad positive public views of renewable energy (Devine-Wright, 2008). The motivations often invoked by opponents include the perceived impacts on natural landscapes (Meyerhoff et al., 2010) and their subsequent perceived effects on tourism, the generation of noise pollution or flicker shadow and the perceived consequences for property prices (Gibbons, 2015) and local fauna and flora (Tabassum et al., 2014). Such resistance sometimes takes the form of formalized citizen networks (Ogilvie and Rootes, 2015) such as Vent de Colère (France), Vent de Raison (Belgium), Opzione 0 (Italy), Iaeden (Spain), Stilhed (Denmark), etc.

Most recent community acceptance research has taken the form of case studies of opposition responses to particular wind energy projects, with a focus upon the opinions of nearby residents and stakeholders (Devine-Wright and Howes, 2010; Gross, 2007; Hall et al., 2013; Swofford and Slattery, 2010; Zoellner et al., 2008). The present article distinguishes itself from these contributions by using questionnaire survey methods to quantitatively analyze community energy members' attitudes toward energy sources (RE and onshore wind energy), both at the general and local levels. Accordingly, this study crosses scales between societal acceptance (captured through general attitudes toward RE) and community acceptance (captured through attitudes toward locally installed technologies) (Wüstenhagen et al., 2007). Studying general attitudes is important for two reasons: on the one hand, policy makers often draw on opinion surveys of general attitudes to inform energy policy-making (Batel and Devine-Wright, 2015) and, on the other, several studies have found that general attitudes are related with attitudes toward specific wind energy developments (van der Horst, 2007; Walter, 2014; Wolsink, 2000). For instance, in a study of public

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attitudes towards potential wind energy development sites in the United Kingdom, Jones and Eiser (2009) found that general attitudes towards renewables were a strong predictor of attitudes towards specific projects. Accordingly, recent studies (Bidwell, 2016; van der Horst, 2007) suggest that 'the gap in public support for renewables could be reduced by strengthening general support for wind energy and other renewables' (Bidwell, 2016: 749). Indeed, for a wider low carbon transition and more widespread systemic change to take place and have greater legitimacy, it is important to develop positive general attitudes towards RE amongst society as a whole as well as positive attitudes towards specific RE proposals amongst local residents.

This paper focuses on one specific factor that may have an important role in strengthening general public support for renewables: community energy participation. 'Community energy' projects are formal or informal citizen-led initiatives which propose collaborative solutions on a local basis to facilitate the development of sustainable energy technologies and practices, producing local benefits (Bauwens et al., 2016; Walker and Devine-Wright, 2008). Community-developed and community-owned initiatives, i.e. schemes in which local communities take the leading role in the development of projects, fully own the production assets, and capture most of the benefits, can be distinguished from other, more hybrid models of community participation, such as community benefit funds, in which communities typically benefit from a utility-led energy project through a community fund (Aitken, 2010; Cowell et al., 2011) or shared ownership, which occurs when a local community and a commercial develop enter into a legal relationship (Goedkoop and Devine-Wright, 2016). Community energy initiatives have been regarded by UK policy makers as a means to remedy a perceived backlash against large scale onshore wind farms, fostering positive general attitudes towards RE technologies generally and wind energy specifically (Walker et al., 2007). However, whether this overly simplistic policy assumption holds is uncertain and merits further research. For example, it is theoretically possible that participation in a community wind energy initiative fosters positive general attitudes towards renewable energy. Whether it also leads to more positive general attitudes to other specific renewable energy sources (e.g. solar, hydro) or to more positive attitudes towards a specific wind farm project will depend on many other factors. Specific project attitudes are likely to also be influenced by the environmental and visual impacts of the project, the ownership model (e.g. community-owned or private developer owned), the perceived fairness of how costs and benefits are distributed and the degree of actual involvement of ordinary citizens in projects. Overall, little is known yet about how members of community energy initiatives differ from non-members in terms of attitudes toward RE generally, and wind energy specifically, and whether different profiles of community energy members can be distinguished. These are the research gaps that the quantitative analysis performed in this article seeks to address.

Our approach is novel in four ways. First, since most studies on community energy look at the participants or instigators of such projects (Seyfang et al., 2013; Walker et al., 2007), very few studies to our knowledge have sought to ask community energy participants about their attitudes to RE sources, both generally and locally. Second, our study is further distinguished by including in our analysis communities of different kinds, more precisely communities of interest and communities of place. Third, the large scale, quantitative nature of our methodology allows us to explore differences between members and non-members in energy attitudes. Finally, our study examines differences in attitudes amongst community energy participants, investigating potential differences between individuals who have joined energy cooperatives at different times and for different purposes.

The following sections of this article present the theoretical framework (Section 2), the methodology used (Section 3), the empirical analysis (Section 4), the discussion of the results and recommendations for future research (Section 5), and some concluding remarks and policy implications (Section 6).

2. Theoretical framework

Seeking to go beyond the NIMBY phenomenon,[1] which has been largely criticized on the grounds that it is too simplistic and unable to apprehend the real motives of the majority of opponents (Burningham et al., 2006; Devine-Wright, 2005, 2009, 2011; Wolsink, 2006), scholars have advanced various factors to explain community acceptance of RE technologies and wind turbines in particular (e.g. Huijts et al., 2012). These include factors such as perceived risks and benefits (Visschers and Siegrist, 2014), emotions and personal values (Truelove, 2012), perceived trust in the owners and operators of the technologies or fairness of the decision-making process and of the distribution of associated costs and benefits (Gross, 2007; Wolsink, 2007). The importance of more deliberative and inclusive citizen participation in the ownership and planning procedures of projects has also been emphasized (Haggett, 2011). Community-based energy projects are likely to play an important role in this respect. For instance, in a study of public attitudes to onshore windfarm development in Scotland, Warren and McFadyen (2010) show that community ownership can create a strong sense of pride and connection with the windfarms project and is associated with more positive local attitudes than in the case of windfarms owned by commercial companies.

Community is a term which can encompass a wide variety of meanings. Looking across a range of environmental and climate-related uses of community, Walker (2011) identifies six different but interconnected meanings.[2] Among these, the community as *place* and the community as *network* are two categories of particular interest for this study. On the one hand, a community as place implies a set of social relationships embedded in a particular geographical context. On the other hand, a community as network, also referred to as a community of interest, is formed by networks and social relationships, but these can extend beyond specifically place-based networks. Having said that, different categories of communities can coexist within one community-based energy project. For instance, looking at the geographical distribution of the membership of the RE cooperative Ecopower in Flanders, Bauwens (2016) shows that early generations of cooperative members form communities of place, while later members form a community of interest. The present study extends this analysis to investigate whether distinctions are likely to be observed between members of communities of place and communities of interest as far as attitudes toward RE and wind energy in particular are concerned.

As a specific form of community energy scheme, RE cooperatives generally share strong community features and their model of ownership contrasts with that of classical economic firms (Hansmann, 1996). They are controlled by their members/users and are not investor-owned, unlike capitalist corporations, at least when they are energy suppliers. Furthermore, the net surplus is typically allocated pro rata among the members. In addition, the cooperative governance structure is democratic, involving democratic member control (e.g. the 'one person-one vote' rule, regardless of the number of shares owned) and voluntary and open membership. These characteristics may have important implications in terms of attitudes toward RE technologies. If local residents are the beneficiaries of the organization's surplus and decision-making procedures, they are likely to feel more fairly treated and to be more supportive of the outcomes. In addition, while different studies suggest that trust in actors involved in the conventional energy industry is limited as far as the development of alternative energy is concerned (Mumford and Gray, 2010), it has been argued that cooperatives benefit from a high level of trust, given their constraint on the profits distribution and their democratic governance (Hansmann,

[1] The concept of NIMBY describes the position of people that view wind energy as positive for society in general, but who are motivated by their personal cost-benefits analysis to resist the construction of a wind farm in their direct neighborhood.

[2] These meanings are: community as actor, community as scale, community as place, community as network, community as process and community as identity.

1996). Citizen ownership further contributes to the trust capital of cooperatives, as it ensures non-controlling stakeholders that the firm is managed by people who share their interest (Spear, 2000). These characteristics of the cooperative model are consistent with the finding that horizontal networks, where people have equivalent status and power, engender trust because they facilitate exchanges of information, whereas hierarchies tend to inhibit information flows due to asymmetric power relationships (Kasperson et al., 1999).

In addition, we postulate that identities play an essential role in determining attitudes toward RE. As stated by Walker (2011: 778), the notion of 'identity' is often associated with that of community and suggests in this context 'a way of thinking and being that people might adopt, or be expected to adopt in their everyday encounters and ways of living'. From a theoretical point of view, identity theory (Stryker, 1968) and social identity theory (Tajfel, 1978) are two perspectives about the social basis of the self-concept and on the nature of normative behavior (Hogg et al., 1995). Self-identity 'reflects the extent to which an actor sees him- or herself as fulfilling the criteria for any societal role' (Conner and Armitage, 1998: 1444). For instance, an individual with a high pro-environmental self-identity refers to 'someone who is concerned with green issues' (Sparks and Shepherd, 1992: 392). Social identity can be defined as 'that part of an individual's self-concept which derives from his knowledge of his membership of a social group (or groups) together with the value and emotional significance attached to that membership' (Tajfel, 1978: 63). A growing body of research shows that self-identity is an important predictor of behavioral intentions, especially in relation to pro-environmental actions (e.g. Castro et al., 2009; Whitmarsh and O'Neill, 2010). Similarly, the socio-psychological literature on collective action has shown that a strong sense of social identity fosters cooperative behaviors toward the group (Simpson, 2006; Tyler and Blader, 2001) and, in particular, community volunteerism and local participation (Stürmer and Kampmeier, 2003). However, identity – both self and social – has rarely been studied in relation to attitudes toward RE sources.

In conclusion, the characteristics of community-based ownership and, in particular, cooperative ownership, seem to meet the aspirations of justice and trust which have proven to be crucial for community acceptance of onshore wind farms. However, very little is known about community energy members' attitudes towards RE and wind energy technologies as compared to non-members and about how these perceptions may differ across distinct categories of communities. Hence, the present article addresses the following two questions: 1) *to what extent do community energy members' attitudes toward RE and wind energy technologies differ when compared to non-members*? and 2) *are there any differences among, on the one hand, members of communities of place and, on the other, members of communities of interest in terms of such attitudes and, if so, why*? To answer the latter question, we conducted a multivariate analysis which also controls for a range of variables (e.g. rural location, spatial proximity to a wind turbine, etc.) that might explain attitudes to RE. In particular, we analyzed the roles that pro-environmental self-identity and social identification to the cooperative may play in shaping the attitudes studied. We expected that members would hold more positive attitudes towards RE than non-members. In addition, 'early' Ecopower members (see 'Field setting' section below for details of Ecopower members), who form a community of place, were expected to be more likely to have positive attitudes and 'later' members, who form a community of interest, were expected to also be positive, but less strongly than the early members.

3. Methods

3.1. Field setting

The research questions of this article are addressed through case study research on two RE cooperatives based in Flanders, Ecopower and BeauVent. The Flemish government aims to increase the share of onshore wind power to 1063 MW by 2020, as compared to 809 MW in 2015. Despite a widespread public support for wind power in Belgium (IPSOS-Belgium, 2010), the presence of organized groups and local residents opposed to wind farm projects also reveal the limits of such a social adhesion (Bauwens, 2015; Pepermans and Loots, 2013; Rossignol et al., 2014).

There are currently 6 RE cooperatives in Flanders. Yet, many of them have been created recently and do not have many members. In contrast, Ecopower and BeauVent are relatively well-established, as they are the two oldest initiatives. In 2011, Ecopower and BeauVent represented 87% of members of RE cooperatives in Flanders. This figure ensures that the cases of BeauVent and Ecopower represent a large majority of members of such organizations in this region. In 2013, they represented 3.8% of total wind power capacity installed on the Flemish territory.

Comparability of the cases is facilitated by a number of common features: they are based in Flanders, they generate energy from renewable sources, including wind energy, they are controlled according to the 'one person-one vote' rule and the distributed dividends are limited, in line with the principles of the International Cooperative Alliance; finally, they are both affiliated to the Flemish federation of RE cooperatives 'REScoop Vlaanderen'. However, the cases also present several sharp differences. First of all, Ecopower supplies electricity directly to end users, while BeauVent does not.[3] When Ecopower became an electricity supplier in 2003, it started attracting many new members, as cooperative membership was a condition for being supplied with green electricity. Hence, a second major contrast is the size: as a result of its activity in electricity supply, Ecopower has grown appreciably in terms of number of members and full-time equivalent workers, and of cooperative capital (Table 1). In addition, Bauwens (2016) showed that several profiles of members with different motives and levels of engagement can be distinguished within Ecopower. Indeed, individuals who joined Ecopower before it started supplying its electricity directly to its members have higher environmental concerns and identify more strongly with their organization than Ecopower members who joined later on. The former are also more actively committed to the organization than the latter, as they attend general assemblies more frequently and make larger financial investments. In contrast, members who joined Ecopower after it became a supplier are more driven by material incentives attached to electricity supply (i.e. to access lower prices, Bauwens, 2016). In addition, it was shown that the two first generations of Ecopower members as well as BeauVent members were more spatially concentrated than later Ecopower members, due to the broadening of the geographical scope of economic operations resulting from the start of electricity supply. This higher spatial concentration was associated with a higher frequency of social interactions between members. Hence, these results suggested that the first and second cohorts of Ecopower members and BeauVent members formed communities of place, while the third generation of members formed a community of interest.

Ecopower members can thus be divided into three categories of cooperative members, following Bauwens (2016): those who joined the cooperative during its early development phase (1991–1999; n = 47), those who joined it after the installation of the first wind turbines (2000–2002; n = 656) and those who joined it after it became an electricity supplier (2003–today; n = 47,716).[4]

3.2. Data collection

Data on cooperative members and a comparison group were gathered through an online questionnaire-based survey carried out between May and June 2014. Members' email addresses were provided by the cooperatives. 36,642 emails were sent to Ecopower members and 849

[3] BeauVent supplies most of its electricity produced to Ecopower and the remaining to the public grid and a few large final customers.

[4] For more details about these distinctions, see Bauwens (2016).

Table 1
General characteristics of cooperatives.
Source: Created by author based on 2013 data provided by the cooperatives.

	Ecopower	BeauVent
Year of creation	1991	2000
Number of full-time equivalent workers	22	5.37
Number of members	47,419	2391
Price of one cooperative (in euro)	250	250
Total cooperative capital (in euro)	48,328,750	4,781,500

emails were sent to BeauVent members. In addition, in order to reach a profile of people who would not have been by the online questionnaire, printed copies of the questionnaire were handed out during both organizations' General Assembly. Indeed, General Assembly participants are typically older and may presumably use the Internet less extensively. 195 printed copies of the questionnaire were handed out in Ecopower's General Assembly and 43 in BeauVent's. Overall, 4061 respondents participated in the survey out of the 37,729 copies distributed in total. This 10.8% response rate averages that obtained in similar surveys (e.g. Litvine and Wüstenhagen, 2011), although drawing firm conclusions about the generality of members calls for caution.

In addition, data were collected by a professional survey institute (IPSOS) for individuals who are not part of a cooperative (n = 501), in order to contrast the results for the two samples. We imposed quotas so that the comparison group and the reference group of cooperative members had the same characteristics in terms of gender, age, geographical location and education level.[5] Hence, the comparison group did not have to be representative of the general Flemish population, but instead, to be as similar as possible to the reference group in characteristics other than membership of a RE cooperative after deletion of missing observations, a final total sample of 3963 observations was used.

3.3. Variables

Data were collected for the key dependent variables in the analyses – different attitudes toward RE and wind energy. First, for accessing the attitude toward RE in general, one item was used: 'More renewable energy projects should be developed'. It was answered through a 5-point Likert scale, from 1 = 'completely disagree' to 5 = 'completely agree'. Second, the general attitude toward onshore wind turbines was accessed through three items: (1) 'More wind turbines must be developed on the land'; (2) 'Wind turbines cause landscape pollution'; (3) 'Wind turbines offer an answer to the climate issue'. They were answered through 5-point Likert scales, from 1 = 'completely disagree' to 5 = 'completely agree'. Third, the respondent's reaction to the installation of a wind turbine in her local neighborhood was measured by one single item: 'If a wind turbine were erected in your direct neighborhood (less than 5 km from your house), then your reaction would be…', answered on 5-point scale: 1 = 'strong resistance', 2 = 'moderate resistance', 3 = 'neither resistance nor support', 4 = 'moderate support', 5 = 'strong support'.[6] Following Batel et al. (2013), this item was included to capture reactions other than mere acceptance (social support and resistance in particular) and to distinguish general attitudes to wind power from intentions regarding local developments (Krohn and Damborg, 1999). Questions were purposefully formulated in a general and neutral way regarding the ownership and the development of technologies in order to avoid any bias when asking cooperative members. Indeed, cooperative members would be presumed to be more favorable to a community-based form of ownership and development rather than an external owner or developer.

Moreover, data were gathered for a range of explanatory indicators that might explain attitudes to renewable energy in addition to cooperative membership. For example, questions probed motivations to join the cooperatives, with members asked to rate on a five-point scale (from 1 = 'not at all' to 5 = 'completely') the extent to which they valued the influence of other members' advice and the democratic control of organizations in their decision to join. Regarding monetary incentives, questions were included to assess the importance of return on investment (ROI) and low electricity price. In addition, we measured respondents' so-called 'pro-environmental self-identity' (*PROENVORIENT*) by selecting and adapting six items from existing questionnaires (Castro et al., 2009; Fielding et al., 2008; Whitmarsh and O'Neill, 2010). They capture the degree to which the respondent describes himself as a person who cares for the environment. Furthermore, social identification (*SOCIDENT*) to the cooperative was measured by five items adapted from existing studies (Stürmer and Kampmeier, 2003; Tyler and Blader, 2001). Social identification entails a cognitive component (a cognitive sense of belonging to a group), an affective component (a sense of emotional involvement with the group) and an evaluative component (a positive or negative value attached to membership) (Ellemers et al., 1999). Accordingly, we sought to collect indicators of these different aspects. The cognitive component was measured by three items: 'I have a lot in common with the other members of the cooperative', 'Being a member of the cooperative is an important part of whom I am', and 'I feel attached to the other cooperative members'. One item was used to measure affective commitment to the group: 'I am proud to be part of the cooperative', and another one to measure the evaluative component: 'I like talking about the cooperative in the presence of others'. They were answered through a 5-point Likert scale, from 1 = 'completely disagree' to 5 = 'completely agree'. Together, the five items formed an internally consistent scale (Cronbach's alpha = 0.86).

The items for all socio-psychological characteristics were aggregated into single summative scales. Table A1 (Appendix A) reports the specific statements, along with statistics to test for internal consistency (item-total correlations, item-rest correlations and Cronbach's alpha).

Finally, data were collected for respondents' gender, level of education and spatial characteristics. Regarding the latter, respondents were asked to indicate their locality and whether there lived close to a wind turbine (in a radius of 2 km from their home). People also were asked whether they lived in a rural, semi-urban or urban environment. Table 2 reports the description and summary statistics of all the explanatory variables used in the analysis.[7]

3.4. Data analysis

To analyze our data, we developed a progressive approach. First, we conducted a descriptive analysis to identify significant differences between cooperative members and the comparison group on our dependent variables. We also explored differences among the categories of cooperative members. For this purpose, the sample of Ecopower members was divided into three categories of cooperative members, according to the distinction mentioned in 'Field setting' section: those who joined the cooperative during its early development phase (1991–1999; n = 43), those who joined it after the installation of the first wind turbines (2000–2002; n = 94) and those who joined it after it

[5] See Bauwens and Eyre (2017) for more details about the socio-demographic characteristics of the group of members and non-members.

[6] Note that the implementation of a single wind turbine is not the same as implementing a large scale company led wind farm. Therefore, the distinction between general attitudes toward wind farm and the response to a local wind turbine calls for caution, as they reflect different scales of RE implementation (farm vs single turbine).

[7] Although we also collected data about income, age, home ownership, type of home and presence of a garden, these variables were left out of the analysis, as their effects were negligible and/or insignificant and their inclusion did not affect the other coefficients.

Table 2
Descriptive overview of explanatory variables.
Source: Survey (2014).

Variable	Description	N	Mean	SD
PROENVORIENT	Ordinal variable taking values from 1 to 5	3428	4.06	0.69
SOCIDENT	Ordinal variable taking values from 1 to 5	3451	3.24	0.89
ADVICE	Ordinal variable taking values from 1 to 5	3461	2.32	1.28
ROI	Ordinal variable taking values from 1 to 5	3461	2.61	1.34
PRICE	Ordinal variable taking values from 1 to 5	3220	3.63	1.19
DEMOCRATIC	Ordinal variable taking values from 1 to 5	3461	3.26	1.35
AGM	Ordinal variable taking values from 1 to 4	3440	1.16	0.51
EDUCATION	Ordinal variable taking the value 1 if secondary education, 2 if superior non-university education and 3 if university education	3395	3.05	0.76
GENDER	= 1 if individual is a man	3445	0.83	0.38
TURBINE	= 1 if household sited close to a wind turbine (< 2 km)	3428	0.13	0.34
RURAL	= 1 if household located in a rural area	3442	0.47	0.50
SEMIRURAL	= 1 if household located in a semi-rural area	3442	0.29	0.46
URBAN	= 1 if household located in a urban area	3442	0.24	0.43
ANTWERP	= 1 if hous. lives in prov. of Antwerp	3415	0.21	0.41
EAST	= 1 if hous. lives in prov. of Eastern Flanders	3415	0.24	0.43
BRABANT	= 1 if hous. lives in prov. of Flemish Brabant	3415	0.17	0.38
WEST	= 1 if individual lives in Western Flanders	3415	0.23	0.42
OTHERPLACE	= 1 if individual lives elsewhere	3415	0.00	0.02
PROFESSION	= 1 if individual is a professional	3368	0.03	0.17
SELFEMPLOYED	= 1 if individual is self-employed	3368	0.04	0.20
WORKER	= 1 if individual is a worker	3368	0.07	0.25
EMPLOYEE	= 1 if individual is an employee	3368	0.39	0.49
EXECUTIVE	= 1 if individual is an executive	3368	0.17	0.38
OTHERSTATUS	= 1 if individual has another employment status	3368	0.05	0.22
INACTIVE	= 1 if individual is inactive (student, retired, etc.)	3368	0.25	0.43

became an electricity supplier (2003–today; n = 3141). In the remainder of this article, the different groups are referred to in the following ways: the three successive cohorts of Ecopower members are respectively called 'Ecopower 1', 'Ecopower 2' and 'Ecopower 3', BeauVent members are called 'BeauVent' and individuals belonging to both cooperatives are called 'Both coops'. Non-parametric tests (Kruskal-Wallis H and Dunn) were performed to determine whether there were statistically significant differences across the different groups of members.[8]

Second, to reveal better the potential differences in RE attitudes between the different categories, we conducted a multivariate regression analysis to control for potentially confounding factors, restricting the sample to cooperative members only. An ordered probit model was used to predict positions toward RE and onshore wind projects, since these variables are ordinal. Parameters were estimated by maximum likelihood. The latent utility function of an individual is modelled as follows:

$$Attitude_i = \beta_1 E1_i + \beta_2 E2_i + \beta_3 B_i + \beta_4 EB_i + \sum_{j=1}^{n} \beta_j X_{i,j} + u_i. \quad (1)$$

where i denotes the individual. In this equation, the individual's attitude is measured by the items described previously and is specified as a linear function of the belonging to one of the categories of cooperative members and a set of controls, $X_{i,j}$. $E1_i$, $E2_i$, B_i, and EB_i are dummies that indicate the belonging to Ecopower 1, Ecopower 2, BeauVent and Both coops respectively. Control variables are potential determinants of attitudes as often used in the literature, and include socio-psychological, spatial and socio-demographic characteristics. u_i is the error term.

4. Results

4.1. Testing for statistical differences between members and non-members, and between subgroups of members

Table 3 provides information about the statistical significance of the differences between the groups of respondents. As expected, cooperative members have significantly more favorable attitudes toward renewable and wind energy than non-members. However, when looking at Figs. 1–5 which report the distributions of the relative frequencies for the responses to the different attitudinal statements across groups of respondents, it is also apparent that there is a difference between non-members and members for the percentage of responses at the mid-point of the rating scales, which is always greater for non-members. As this mid-point corresponds to neither agreement nor disagreement, an interpretation of this finding is that non-members are not more opposed to RE than members, or even less supportive, but are actually more indifferent. As there was no option 'I don't know' provided, it is also possible that they were less certain of their attitude. In addition, Table 3 shows differences amongst cooperative members. Recent members of the Ecopower cooperative (the Ecopower 3 subgroup) have less favorable attitudes towards a locally implemented wind turbine than the four other groups of members. If we recall that Ecopower 3 forms a community of interest while Ecopower 1, Ecopower 2 and BeauVent members form communities of place, this finding suggests that members of communities of interest have less positive attitudes toward RE sources than members of communities of place.

If we look more closely at the mid-point responses, we can see that they vary in quantity depending upon the particular item, as well as cooperative membership (Table 4). The percentage of respondents who gave a mid-point response is the lowest for the attitude toward RE in general, while it is the highest for the item on wind energy and

[8] 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 analyze the specific sample pairs that are dissimilar from each other.

Table 3
Comparison of attitudes.
Source: Created by author based on Bauwens, 2014.

Variable	Ecopower 1	Ecopower 2	Ecopower 3	BeauVent	Both coops	Non-members	Statistically significant comparisons
More renewable energy projects should be developed	5 (43)	5 (85)	5 (2811)	5 (47)	5 (109)	4 (501)	Ecopower 1 vs non-members* Ecopower 2 vs non-members* Ecopower 3 vs non-members* Ecopower 3 vs both coops* BeauVent vs non-members* Both coops vs non-members*
More wind turbines must be developed on the land	5 (43)	5 (85)	5 (2806)	5 (47)	5 (110)	4 (501)	Ecopower 1 vs non-members* Ecopower 2 vs non-members* Ecopower 3 vs non-members* Ecopower 3 vs both coops* BeauVent vs non-members* Both coops vs non-members*
Wind turbines cause landscape pollution	4.5 (42)	4 (85)	4 (2805)	4 (47)	4 (110)	3 (501)	Ecopower 1 vs non-members* Ecopower 2 vs non-members* Ecopower 3 vs non-members* Ecopower 3 vs both coops* BeauVent vs non-members* Both coops vs non-members*
Wind turbines offer one answer to the climate issue	4 (43)	4 (85)	4 (2810)	4 (47)	4.5 (110)	4 (501)	Ecopower 1 vs non-members* Ecopower 2 vs non-members* Ecopower 2 vs Ecopower 3* Ecopower 3 vs non-members* Ecopower 3 vs both coops* Ecopower 3 vs BeauVent* BeauVent vs non-members* Both coops vs non-members*
'If a wind turbine were erected in your direct neighborhood (less than 5 km from your house), then your reaction would be…	5 (43)	5 (85)	5 (2812)	5 (47)	5 (110)	4 (501)	Ecopower 1 vs non-members* Ecopower 1 vs Ecopower 3* Ecopower 2 vs non-members* Ecopower 2 vs Ecopower 3* Ecopower 3 vs non-members* Ecopower 3 vs both coops* Ecopower 3 vs BeauVent* BeauVent vs non-members* Both coops vs non-members*

Note: Numbers are median values and, in parentheses, sample sizes. P-value:.
* $p < 0.01$.

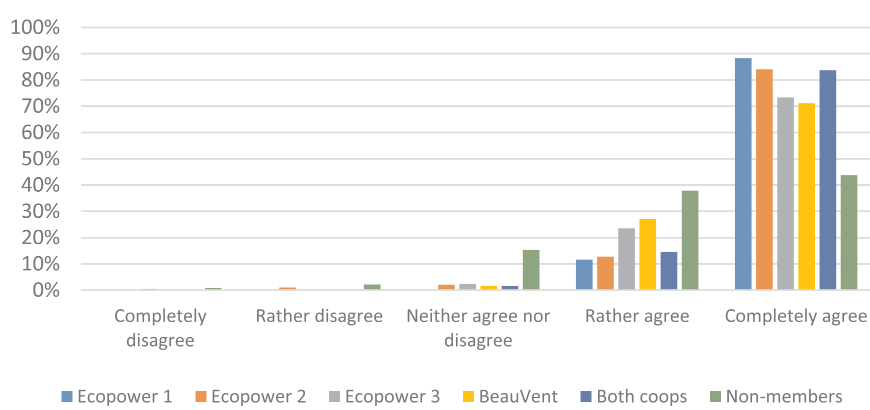

Fig. 1. Responses to the statement 'More renewable energy projects should be developed' across the six categories of respondents.
Source: Bauwens, 2014.

landscape pollution and the attitude toward the implementation of a local wind turbine. This is particularly striking for non-members. While 14% of them gave a mid-point response for the attitude to RE in general, this percentage rises to 31% for the item on wind energy and landscape pollution and to 34% for the attitude toward the local wind turbine. The more positive responses for RE in general in comparison to wind energy reflect that attitudes toward RE in general and toward wind energy do not perfectly overlap with each other, given the diversity of forms of RE. These findings also suggest that general attitudes are more favorable than local ones, in line with previous studies which propose that general attitudes reflect conditional or qualified support for renewable energy (Aas et al., 2015; Batel et al., 2013; Walter, 2014). In addition, it could mean that participants are avoiding both strongly positive and strongly negative opinions, instead preferring to 'sit on the fence' to avoid the possibility of taking a position that leaves them open to being criticized by either the objectors or the supporters. Tests of pairwise comparison of proportions were performed for each pair of groups using Bonferroni corrections to correct for multiple

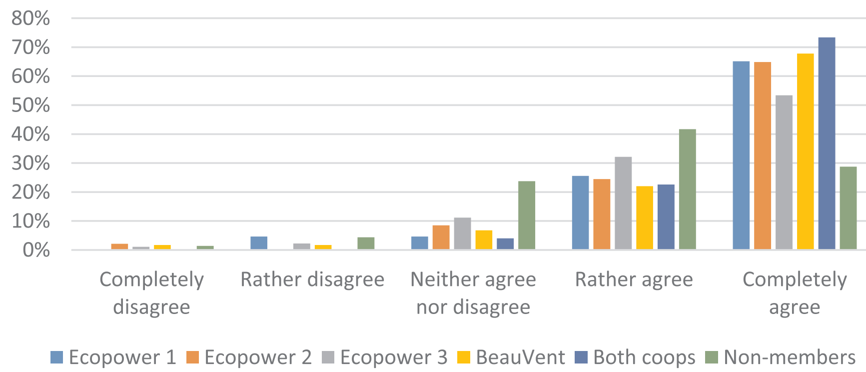

Fig. 2. Responses to the statement 'More wind turbines must be developed on the land' across the six categories of respondents.
Source: Bauwens, 2014.

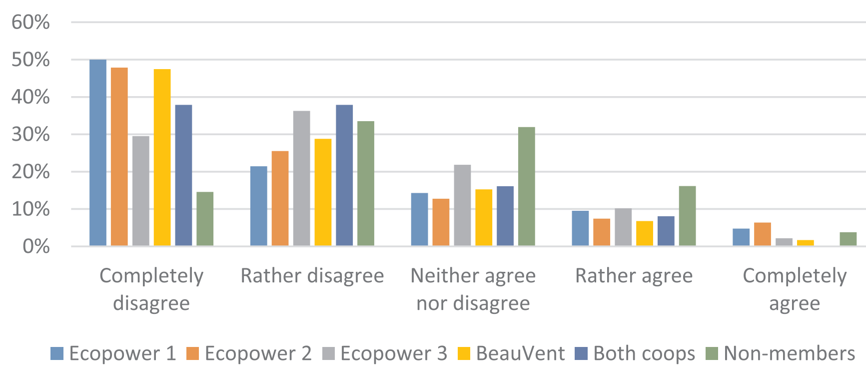

Fig. 3. Responses to the statement 'Wind turbines cause landscape pollution' across the six categories of respondents.
Source: Bauwens, 2014.

comparisons. We can see in the last column of Table 4 that for each item, the main significant differences are between the group of non-members and the different categories of members, with non-members showing higher levels of mid-point response for each variable.

4.2. Analysis of differences amongst members

To reveal better the varying impacts of cooperative membership, we continue with a multivariate analysis that controls for the variables described in Section 3.3. We restrict the sample to cooperative members only. For the sake of this analysis, the three items related to wind energy in general have been aggregated into a single summative scale (Cronbach's alpha = 0.68). The attitudes toward RE in general, toward wind in general and toward the implementation of a local wind turbine are respectively called *RENEWABLE*, *GENERAL_WIND* and *LOCAL_WIND*.

Table 5 presents the Spearman's rank correlations between the attitudes considered, the different categories of members and selected control variables. Overall, cooperative membership is generally associated with positive RE attitudes, as indicated by positive correlations between the three dependent variables and the different categories of members. However, recent members of the Ecopower cooperative (*ECOPOWER3*), differ from this trend, with consistent negative correlations indicating that late Ecopower members have relatively less positive attitudes to renewable energy.

Table 6 presents the results of the multivariate regression analysis for two of the dependent variables – general RE attitudes and general wind attitudes.[9] The coefficients indicating cooperative memberships have to be interpreted with reference to the third cohort of Ecopower members, i.e. those who have joined the cooperative after it became a supplier. Columns (1)–(5) correspond to our first dependent variable, attitude toward RE in general, while columns (8) corresponds to our second dependent variable, attitude toward wind energy in general. Different specifications are estimated and control variables are added gradually. Model 1 exclusively contains the dummy variables indicating belonging to a specific category of cooperative members and pro-environmental and social identification variables (i.e. *PROENVIRONMENT* and *SOCIDENT)*. Model 2 introduces gender and education. Next, models 3 adds the motivations to join the cooperatives and model 4 adds the frequency of attendance to General Assemblies. Finally, model 5 is the richest specification, as it also contains spatial variables and dummies for employment status.

Column (1) shows that belonging to Ecopower 1, Ecopower 2 and both cooperatives has a significantly positive effect on attitudes toward RE in general as compared to Ecopower 3. This suggests that late Ecopower members are, on average, less supportive of renewable energy in general as compared to these categories. By contrast, belonging to BeauVent has a significantly negative effect on attitude towards RE. Column (1) also shows that both pro-environmental self-identity and social identification to the cooperative have strong positive marginal effects on the dependent variable. This indicates, on the one hand, that

[9] To make sure that our estimation results are valid, we tested the hypotheses of normality and homoscedasticity of the distribution of the residuals by conducting Lagrange Multiplier tests. Both tests are based on the first order conditions from a more general model that specifies the alternative hypothesis, and check whether these are violated. We cannot reject the null hypotheses of homoscedasticity and normality of the distribution at either the 5% or the 10% significance levels in any of the cases. These results suggest that the likelihood function is correctly specified. In addition, we performed Tukey-Pregibon link specification tests after each regression (Hilbe, 2009). These tests revealed no problem with our specifications. A further adjustment is made on the covariance matrix of the estimates: since we can assume correlation is present between the residuals of members within the same cohort, we use cluster robust standard errors.

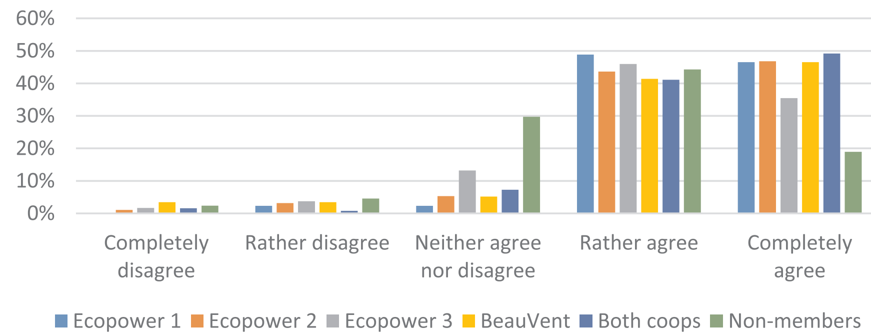

Fig. 4. Responses to the statement 'Wind turbines offer one answer to the climate issue' across the six categories of respondents.
Source: Bauwens, 2014.

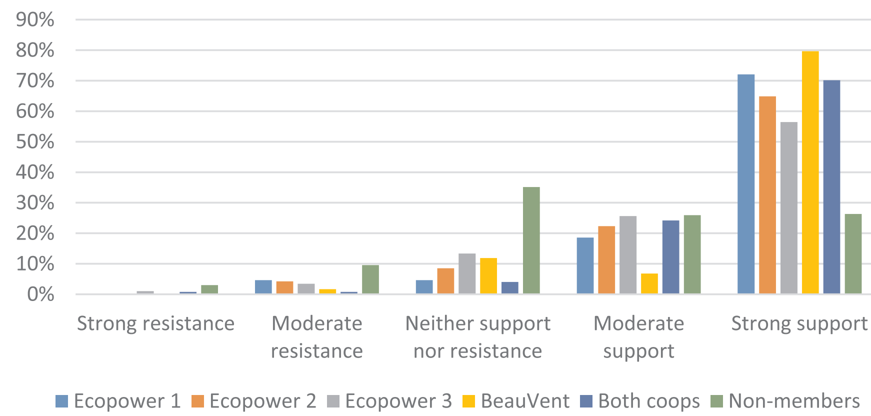

Fig. 5. Responses to the statement 'If a wind turbine were erected in your direct neighborhood (less than 5 km from your house), then your reaction would be…' across the six categories of respondents.
Source: Bauwens, 2014.

the more cooperative members perceive themselves as environmentally-friendly individuals, the more positive their attitudes toward RE in general. On the other hand, the more members identify themselves with their organization, the more positive their attitudes. These are important findings, as they provide insight into the social-psychological processes underlying the impact of community energy membership and suggests that identity construction, both self and social, plays an important role in the relationships between community membership and attitudes toward RE sources.

Column (2) introduces gender and education. This hardly affects the coefficients of the different categories of members. Somewhat surprisingly, education level has a significantly negative effect. This contrasts with the empirical research on pro-environmental behavior showing that people concerned with the environment tend to be better-educated (Ostman and Parker, 1987; Scott and Willits, 1994). However, the coefficient for education level remains small across all specifications.

Column (3) includes the motivations to join the cooperative as additional explanatory variables. We see that controlling for these variables does not substantially modify the coefficients of the different categories of members, except for *BOTHCOOP*, whose coefficient increases from 0.06 to 0.12. This is mainly due to the inclusion of the variable *ROI (return on investment)*, which is positively correlated with *BOTHCOOP*, but negatively correlated with the dependent variable (see Table 5). Consequently, the effect of *BOTHCOOP* was underestimated. *ROI* and *PRICE* have a significantly negative effect on the dependent variable, showing that members strongly motivated by monetary incentives (the return on investment or a low electricity price) to join the cooperative have less positive attitudes toward RE in general. By contrast, *DEMOCRATIC* has a significantly positive effect: those for whom the democratic governance of the cooperatives was a strong motivation to join have significantly more positive attitudes. It is consistent with previous studies which show that the perceived procedural and distributive fairness of wind energy projects are important antecedents of public reactions toward energy projects[10] (Gross, 2007; Schweizer-Ries, 2008).

In column (4), *AGM* is added to the analysis. We can see that the coefficients of *BEAUVENT* and *BOTHCOOP* decrease slightly, as these categories are most strongly correlated with *AGM*. The effect of *AGM* is positive but insignificant, suggesting that frequent participation in General Assemblies is unrelated with attitudes toward RE in general.

Column (5) shows that the effect of living close to a wind turbine is significantly negative, but is relatively small. Living in a rural or semi-rural area also has a significantly negative effect, suggesting that members living in urban areas have more positive attitudes about RE in general.

As regards the attitude toward wind energy in general, belonging to Ecopower 1, Ecopower 2, BeauVent or both cooperatives has a significantly positive effect in comparison to membership of Ecopower 3, as column (6) shows. *PROENVORIENT*, *SOCIDENT* and *DEMOCRATIC* behave as with RE in general. *ADVICE* has a significantly positive effect, whereas the effect of this variable was negative in the case of RE in general. This indicates that members for whom other members' advice was an important motivation to join the cooperative have a more

[10] Distributive justice involves the subjective individual estimation of the way benefits and costs–which may not be merely material–are distributed within a group. As far as wind energy projects are concerned, benefits can be monetary, like the earnings from the electricity produced or the creation of new jobs, as well as non-monetary, e.g. landscape-balancing actions in the region. Similarly, costs can be associated to change of the local landscape and noise pollution, real estate depreciation, etc. Procedural justice concerns the subjectively perceived fairness of the process through which wind turbines are implemented and relate to aspects such as zoning and licensing processes, the possibilities for participation, time and amount of information, etc.

Table 4
Percentage of mid-point responses for the five items by category.
Source: Created by author based on Bauwens, 2014.

	Ecopower 1	Ecopower 2	Ecopower 3	BeauVent	Both coops	No coop	Statistically significant comparisons
More renewable energy projects should be developed	0.00	2.13	2.43	1.69	1.63	15.37	Ecopower 2 vs non-members* Ecopower 3 vs non-members* Both coops vs non-members*
More wind turbines must be developed on the land	4.65	8.51	11.14	6.78	4.03	23.75	Ecopower 1 vs non-members* Ecopower 2 vs non-members* Ecopower 3 vs non-members* Both coops vs non-members*
Wind turbines cause landscape pollution	14.29	12.77	21.85	15.25	16.13	31.94	Ecopower 2 vs non-members* Ecopower 3 vs non-members* Both coops vs non-members*
Wind turbines offer one answer to the climate issue	2.33	5.32	13.20	5.17	7.26	29.74	Ecopower 1 vs non-members* Ecopower 2 vs non-members* Ecopower 3 vs non-members* BeauVent vs non-members* Both coops vs non-members*
'If a wind turbine were erected in your direct neighborhood (less than 5 km from your house), then your reaction would be…	4.65	8.51	13.37	11.86	4.03	35.13	Ecopower 1 vs non-members* Ecopower 2 vs non-members* Ecopower 3 vs non-members* BeauVent vs non-members* Both coops vs non-members* Ecopower 3 vs Both coops* BeauVent vs both coops*

P-value:.
* $p < 0.01$.

positive attitude to onshore wind energy in general, but a less positive attitude toward RE in general. Similarly, the coefficient of *AGM* is now significantly positive, showing that members who frequently participate in General Assemblies are more likely to have positive attitudes toward wind energy.

Table 7 presents the multivariate regression analysis for the attitude toward a locally implemented turbine. Column (1) shows that, when no other control variable is included, *ECOPOWER1*, *ECOPOWER2*, *BEAUVENT* and *BOTHCOOP* all have a significantly positive effect on local wind energy attitudes as compared to Ecopower 3, *BEAUVENT* exhibiting the largest effect. Their coefficients barely change when socio-demographic variables are added in column (2). However, when the motivations to join the cooperatives are added in column (3), the coefficient of *ECOPOWER1* becomes insignificant. This is because *DEMOCRATIC* and *PRICE* correlate in the same direction with *ECOPOWER1* and with the dependent variable (positively for *DEMOCRATIC* and negatively for *PRICE*), as shown in Table 5. Hence, omitting these variables would result in an overestimation of the effect of *ECOPOWER1*. When *AGM* is included in column (4), the coefficient becomes negative, but remains small.

Regarding spatial variables, *TURBINE* has a significantly positive effect, in contrast with the cases of RE in general and wind energy in general. This positive sign of the effect suggests that spatial proximity to an existing wind turbine increases support for the local implementation of a new wind turbine. This result may reflect the fact that the actual local experience of living close to an existing turbine reduces risk perceptions toward the new and the unfamiliar (van der Horst, 2007). However, it is important to note that this result may be different for people living close to *proposed* projects rather than *existing* projects.[11] Living in a rural or semi-rural area significantly decreases support of a locally implemented wind turbine. Hence, the results from Tables 6, 7 show that city-dwellers have more favorable attitudes to renewables, both in general and locally. However, when adding an interaction term between *RURAL* and *TURBINE* in column (6), the effect of *RURAL* for people far away from a wind turbine is negative, while it is insignificant for people living close to a wind turbine. A possible interpretation of this is that rural dwellers living far away from a wind turbine may potentially be affected by the future installation of wind turbines in their neighborhood while being not yet familiar with the technology – hence their less favorable attitude. By contrast, rural dwellers living close to a wind turbine are already familiar with the technology, hence they have more favorable attitudes. This finding deserves further research.[12]

5. Discussion

Onshore wind projects have frequently faced local opposition, despite broad public support for renewable energy. Although recent research has focused on opposition responses to specific wind farm development processes, strengthening general attitudes toward wind energy and other renewables may also contribute to close this 'social gap' (Bell et al., 2005; Bidwell, 2016; van der Horst, 2007). This paper sought to address the assumption by some policy makers that participation in community energy initiatives may foster positive attitudes towards renewable energy generally (Walker et al., 2007), illustrated by differences in terms of such general attitudes between different profiles of cooperative members and in comparison to a carefully selected group of non-members. Several important findings can be highlighted.

In response to the first research question, the analysis revealed that

[11] Indeed, in their study of public perceptions at different distances to wind farm locations for proposed and existing wind farms, Warren et al. (2005) found that, in the case of proposed wind farms, people living further away from the proposed site were less opposed to the wind farm than people living closer to the proposed site. Regarding existing wind farms, the reverse was observed: support for the wind farm was higher in areas closer to the wind farm than in areas further out.

[12] Additional robustness checks of these results are presented in Table A2 (Appendix A). Three models transform the ordinal dependent variables into binary variables and are estimated with a probit model instead of an ordered probit regression in columns (1)–(3). The findings in these models largely confirm the robustness of our results. Moreover, regressions are run to test the attitude toward wind power in general, but using the individual items instead of the constructed summative scale as dependent variables in columns (4)–(6). In most cases, the coefficients of the different categories of members are significantly positive, regardless of the dependent variable considered.

Table 5
Correlation matrix.
Source: Bauwens, 2014.

Spearman's rho	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. RENEWABLE														
2. GENERAL_WIND	0.39*													
3. LOCAL_WIND	0.34*	0.59*												
4. ECOPOWER1	0.04	0.05*	0.03											
5. ECOPOWER2	0.04	0.05*	0.02	− 0.02										
6. ECOPOWER3	− 0.06*	− 0.10*	− 0.07*	− 0.39*	− 0.57*									
7. BEAUVENT	− 0.01	0.02	0.03	− 0.01	− 0.01	− 0.29*								
8. BOTHCOOP	0.04	0.06*	0.05*	− 0.02	− 0.03	− 0.62*	− 0.02							
9. PROENVORIENT	0.37*	0.26*	0.28*	0.05*	0.05*	− 0.10*	0.03	0.06*						
10. SOCIDENT	0.30*	0.25*	0.30*	0.07*	0.06*	− 0.15*	0.03	0.11*	0.43*					
11. ADVICE	0.03	0.08*	0.08*	0.01	− 0.02	− 0.01	0.02	0.02	0.09*	0.25*				
12. ROI	− 0.08*	− 0.01	− 0.02	0.00	− 0.02	− 0.08*	0.02	0.14*	− 0.07*	0.08*	0.16*			
13. PRICE	− 0.07*	− 0.04	− 0.07*	− 0.05*	− 0.03	0.06*	− 0.03	− 0.01	− 0.13*	− 0.02	0.09*	0.22*		
14. DEMOCRATIC	0.18*	0.18*	0.20*	0.07*	0.02	− 0.10*	0.03	0.08*	0.23*	0.45*	0.38*	0.12*	0.02	
15. AGM	0.07*	0.07*	0.11*	0.10*	0.01	− 0.24*	0.10*	0.24*	0.07*	0.21*	0.04	0.09*	− 0.06*	0.17*

P-value:.
* $p < 0.01$.

Table 6
Attitudes toward renewable energy projects in general and wind energy in general (ordered probit).
Source: Bauwens, 2014.

	RE in general					Wind energy in general
	(1)	(2)	(3)	(4)	(5)	(6)
ECOPOWER1	0.67* (0.00)	0.68* (0.00)	0.66* (0.01)	0.66* (0.00)	0.70* (0.01)	0.18* (0.02)
ECOPOWER2	0.16* (0.00)	0.16* (0.00)	0.13* (0.01)	0.13* (0.00)	0.15* (0.01)	0.26* (0.01)
BEAUVENT	− 0.37* (0.00)	− 0.37* (0.00)	− 0.36* (0.01)	− 0.39* (0.01)	− 0.33* (0.02)	0.12* (0.04)
BOTHCOOP	0.06* (0.01)	0.06* (0.01)	0.12* (0.02)	0.10* (0.01)	0.17* (0.01)	0.16* (0.03)
PROENVORIENT	0.60* (0.01)	0.59* (0.01)	0.57* (0.01)	0.58* (0.01)	0.58* (0.01)	0.27* (0.01)
SOCIDENT	0.32* (0.01)	0.32* (0.01)	0.32* (0.02)	0.32* (0.02)	0.31* (0.02)	0.19* (0.01)
GENDER		− 0.15* (0.02)	− 0.16* (0.02)	− 0.15* (0.02)	− 0.12* (0.02)	− 0.06* (0.02)
EDUCATION		− 0.03* (0.01)	− 0.04* (0.01)	− 0.04* (0.01)	− 0.02* (0.00)	− 0.07* (0.01)
ADVICE			− 0.06* (0.01)	− 0.06* (0.01)	− 0.06* (0.01)	0.02 (0.01)
ROI			− 0.08* (0.01)	− 0.08* (0.01)	− 0.07* (0.01)	− 0.01 (0.01)
PRICE			− 0.02* (0.00)	− 0.02* (0.00)	− 0.02* (0.00)	− 0.01* (0.00)
DEMOCRATIC			0.07* (0.01)	0.07* (0.01)	0.06* (0.01)	0.03* (0.00)
AGM				0.05 (0.03)	0.03 (0.04)	0.06 (0.05)
TURBINE					− 0.05 (0.02)	0.02 (0.03)
RURAL					− 0.14* (0.02)	0.01 (0.02)
SEMIRURAL					− 0.19* (0.03)	− 0.07* (0.00)
PROVINCES					YES	YES
STATUS					YES	YES
N	3008	3008	3008	3008	3008	3009
Pseudo R^2	0.135	0.137	0.144	0.144	0.151	0.028

Note: cluster robust standard errors are in parentheses. P-value:.
* $p < 0.01$.

cooperative members have more positive attitudes toward RE and onshore energy in general and are more supportive of the implementation of a local wind turbine when contrasted with the comparison group of non-members. These differences persist across all of the variables even between non-members and the more recent Ecopower members, which are shown to have less supportive attitudes towards renewable energy than other cooperative members. However, our results also indicate that a key difference between members and non-members is not a higher percentage of negative responses, but actually a higher percentage of 'neither agree nor disagree' survey responses, which we interpret as suggesting either indifference to or uncertainty about renewable energy in contrast to strong support or strong objection. In addition, we have seen that responses vary across the five items. The percentage of respondents who gave mid-point responses is highest for the attitude toward RE in general, and lower for wind-specific attitudes. This suggests that RE support and wind support do not perfectly overlap with each other, as might be expected given the diversity of forms of RE, encompassing not only wind but solar, biofuels and large-scale hydro-electricity projects. In addition, among the wind-specific items, those which are related to the local negative implications of wind energy projects – the item related to landscape pollution and the reaction to the erection of a local wind turbine – receive the highest percentage of mid-point responses. This is a novel perspective on the benefits of community energy membership – to overcome indifference or uncertainty – that is relevant to foster a rapid and socially acceptable low carbon transition, and is discussed further below.

In response to the second research question, the findings show that there are appreciable differences in terms of attitudes within the sample of cooperative members. The first two cohorts of Ecopower members and the members belonging to both cooperatives are more favorable toward RE in general and wind energy in general. By contrast, the third cohort of Ecopower members, i.e. members who joined after the cooperative became an electricity supplier, is the least favorable. These findings are robust to the inclusion of key controlling factors such as socio-psychological, socio-demographic and spatial variables. Regarding the attitude toward a locally implemented wind turbine, the

Table 7
Attitudes toward a locally implemented wind turbine (ordered probit).
Source: Bauwens, 2014.

	(1)	(2)	(3)	(4)	(5)	(6)
ECOPOWER1	0.06* (0.01)	0.04* (0.01)	0.00 (0.01)	− 0.05* (0.01)	− 0.03* (0.01)	− 0.03* (0.01)
ECOPOWER2	0.06* (0.00)	0.07* (0.00)	0.06* (0.00)	0.05* (0.01)	0.06* (0.01)	0.06* (0.01)
BEAUVENT	0.30* (0.00)	0.29* (0.00)	0.26* (0.01)	0.16* (0.01)	0.20* (0.03)	0.20* (0.03)
BOTHCOOP	0.08* (0.01)	0.07* (0.01)	0.08* (0.02)	− 0.01 (0.01)	0.03* (0.01)	0.03* (0.01)
PROENVORIENT	0.28* (0.01)	0.30* (0.02)	0.11* (0.01)	0.11* (0.01)	0.29* (0.01)	0.29* (0.01)
SOCIDENT	0.33* (0.01)	0.32* (0.01)	0.28* (0.02)	0.29* (0.01)	0.28* (0.01)	0.28* (0.01)
GENDER		0.10* (0.01)	0.29* (0.01)	0.28* (0.01)	0.14* (0.02)	0.14* (0.02)
EDUCATION		− 0.08* (0.01)	− 0.08* (0.01)	− 0.08* (0.01)	− 0.07* (0.01)	− 0.07* (0.01)
ADVICE			0.01* (0.01)	0.02* (0.01)	0.02* (0.01)	0.02* (0.01)
ROI			− 0.02 (0.01)	− 0.02* (0.01)	− 0.02 (0.01)	− 0.02 (0.01)
PRICE			− 0.04* (0.00)	− 0.04* (0.01)	− 0.03* (0.01)	− 0.03* (0.01)
DEMOCRATIC			0.05* (0.00)	0.04* (0.00)	0.04* (0.00)	0.04* (0.00)
AGM				0.15* (0.03)	0.14* (0.04)	0.14* (0.04)
TURBINE					0.12* (0.02)	0.11 (0.06)
RURAL					− 0.17* (0.02)	− 0.17* (0.02)
SEMIRURAL					− 0.13* (0.02)	− 0.13* (0.02)
RURAL X TURBINE						0.02 (0.09)
PROVINCES						YES
STATUS						YES
N	3008	3008	3008	3008	3008	3008
Pseudo R^2	0.055	0.057	0.059	0.061	0.065	0.065

Note: cluster robust standard errors are in parentheses. P-value:.
* $p < 0.01$.

findings are less clear-cut. Ecopower 1 have a slightly less favorable attitude, while Ecopower 2, BeauVent members, and members of both cooperatives have a more favorable attitude. BeauVent members are less favorable to RE in general, but more favorable to wind specific attitudes than the other categories of members, suggesting that BeauVent members may be wind energy supporters, but may be relatively less favorable toward other RE sources, such as solar or biomass energy. The less positive attitudes of BeauVent members to RE generally may reflect differences in organizational strategies. Indeed, Ecopower has a larger and a more diverse RE technology portfolio, having invested in large-scale wind and solar energy installations, small hydropower stations, one biomass installation and a wood pellet factory. The investments made by BeauVent are more limited with respect to the capacity and diversity of installations. In addition, BeauVent is not a renewable electricity supplier, unlike Ecopower, and is further engaged in energy efficiency projects. These differences in the business model of the two organizations may explain why BeauVent members are relatively less enthusiastic to RE in general in comparison with Ecopower members.

It is informative to relate these differences between subgroups of cooperative members with the differences in the spatial distributions of membership and the motivations to join cooperatives detailed in Bauwens (2016) and already mentioned in Section 2: members who joined Ecopower after it became a supplier are more driven by material incentives attached to electricity supply, have lower environmental concerns and identify less strongly with their organization than early Ecopower members and BeauVent members. Furthermore, these differences can be related with the kind of communities they represent: early Ecopower members and BeauVent members form communities of place, while later Ecopower members represent a community of interest. This suggests that favorable attitudes to RE sources arise in communities of place because of the higher level of social interactions triggered by spatial closeness. The present research also highlights the important roles played by self- and social identity in the formation of attitudes toward RE sources and suggest that these may be key variables in the social-psychological processes underlying the impact of community energy membership that deserve more attention in future research.

As in any research project, the choices made in this study reveal some limitations in our findings, which suggest various avenues for future research. First, the findings are limited by the nature of the questions asked (e.g. only a single turbine for a local wind development). Further research could investigate the reaction to different types of projects (e.g. large-scale, company-led wind farm, community-led and shared ownership or joint venture models) and to different renewable energy technologies (e.g. biomass plant, photovoltaic installations, etc.). In particular, the question about the erection of a local wind turbines focuses on one specific characteristic of the project, namely its spatial proximity. Other relevant characteristics could be investigated, such as the environmental and visual impacts of the project (the size of the technology, the quality of the landscape, etc.). Second, our data presents a static picture of members' attitudes and it would be interesting to collect longitudinal data to assess the evolution of attitudes over time. While few studies to date have examined changes in general RE attitudes over time, it has been shown that social acceptance of local RE projects may evolve (Wolsink, 2007; van der Horst, 2007). It would be particularly insightful to collect data before and after the creation of community-based ownership. Third, since individuals could not be randomized into the cooperative, going beyond identifying the relationship between cooperative membership and attitudes toward RE sources, i.e. investigating whether cooperative membership causes a change in attitudes is difficult. An avenue for further research would consist in designing an empirical strategy that would make it possible to isolate the causal effects of cooperative membership on attitudes. This would require collecting experimental or quasi-experimental data by randomizing individuals into a CBE project or by mimicking randomization. The choices made in terms of geographical scope and in our sample frame also imply some caution when generalizing our results. Further research could include the analysis of cooperative members' attitudes in other geographical contexts and of other types of community-based energy projects. Finally, research could look at the processes in community energy membership that might lead individuals to move from 'neither agree nor disagree' positions to positive or negative responses for these kinds of attitudes. Does change in attitudes arise from the direct experience of the technologies (e.g. visiting CE sites to see the technologies in operation)? Does it come from emotional aspects of social identification – of feeling proud of being a member and feeling attached to other members (or not)? Or does it come from the amount of financial return? We suggest that future research, employing a qualitative method, is undertaken to verify whether midpoint responses are based upon indifference to the topic, uncertainty or some other position.

6. Conclusion and policy implications

Our results indicate that, in terms of attitudes toward RE and wind energy, cooperative members are more positive than non-members and that important differences among cooperative members can be identified. In terms of policy implications, the findings provide evidence for the positive benefits of public participation in renewable energy – even recent Ecopower members, characterized by lower levels of environmentalism and more financially driven motivation for cooperative membership, have more positive attitudes to RE and wind energy in comparison to non-members. This is important because of recent shifts in the policy strategy of several European countries, with potentially negative consequences for the future of the participatory dimension of RE deployment (Bauwens et al., 2016; Wolsink, 2017). In Flanders, the development of RE cooperatives has been hindered by existing planning policies which have contributed to create a highly competitive environment (Pepermans and Loots, 2013). In Germany, where citizen participation has historically played a crucial role in the development of RE, the trend is toward an increasing reliance on market mechanisms, with the reductions of feed-in tariffs for photovoltaics (PV) in 2012, the introduction of a mandatory market-premium system in 2014 and the eventual shift from feed-in tariffs to a tender-based system in 2017. This is expected to favor large energy companies to the expense of smaller developers (Ćetković and Buzogány, 2016; Holstenkamp and Kahla, 2016). In Denmark, another pioneer of community RE in Europe, community energy initiatives have also experienced a retreat as a result of an increasing exposure to market risks, more stringent planning policies, higher requirements for capital investments and fiercer competition with professional developers (Mey and Diesendorf, 2017). Hence, a major policy recommendation derived from the present study would be to reverse this trend by designing policy instruments that accommodate the specificities of community energy projects.

A second policy implication is that community energy members do not differ from non-members because the latter have negative attitudes to RE and wind energy. Actually, the findings show that non-members are more indifferent or uncertain. It can be argued that public indifference to or uncertainty around RE is just as significant for policy makers as public objections, given the scale of transition required. Indeed, the transformation of energy infrastructures and practices implied by a large-scale integration of renewables is so substantial that the absence of opposition and the mere tolerance or acceptance of new energy technologies will likely not be sufficient and that greater public active support will be necessary to advance the transition to low-carbon energy systems (Batel and Devine-Wright, 2015).

Finally, our findings reinforce the principle that community energy participation is heterogeneous, supporting and extending the results of previous qualitative studies with small samples of participants (e.g. Rogers et al., 2008). Participation in community energy is complex, with varying degrees of commitment and future research needs to make this more apparent, distinguishing between communities of place and interest and gauging the impact of membership over time.

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Appendix A

See Appendix Tables A1 and A2.

Table A1
Item-total correlation and Cronbach's alpha for the different scales.[a]
Source: Created by author.

	Item-total correlation and Cronbach's alpha	Item-rest correlation
Social identification		
1. I am proud to be part of the cooperative.	0.77	0.64
2. I have a lot in common with the other members of the cooperative.	0.79	0.67
3. Being a member of the cooperative is an important part of who I am.	0.84	0.72
4. I feel attached to the other cooperative members.	0.82	0.70
5. I like talking about the cooperative in the presence of others.	0.79	0.66
Cronbach's alpha	0.86	
Pro-environmental orientation		
1. I feel concerned about climate change.	0.81	0.71
2. I think that human activities are one of the main causes of climate change.	0.68	0.53
3. I am the type of person who cares about ecology.	0.80	0.72
4. I think of myself as an eco-responsible consumer.	0.77	0.67
5. I want to feel that I personally contribute to the protection of the environment.	0.83	0.74
6. I like that my family or my friends see me as someone concerned by the environment	0.76	0.61
Cronbach's alpha	0.86	

[a] Cronbach's alpha is a statistic that provides a measure of the internal consistency of a test or scale, i.e. the extent to which all the items in a test measure the same concept or construct; it is expressed as a number between 0 and 1. A low alpha may be due to poor interrelatedness between items. Conversely, if alpha is too high, it may suggest that some items are redundant. Values ranging from 0.70 to 0.95 are considered acceptable in most social science research situations (Nunnally and Bernstein, 1994; DeVellis, 2003).

Table A2
Additional robustness checks.
Source: Bauwens, 2014.

	Renewable energy in general *Probit* (1)	Wind energy in general *Probit* (2)	Reaction to a local wind turbine *Probit* (3)	Onshore wind power *Ordered probit* (4)	Onshore wind and landscape pollution *Ordered probit* (5)	Onshore wind and climate change *Ordered probit* (6)
ECOPOWER1	0.15* (0.00)	0.08* (0.01)	0.00 (0.00)	0.00 (0.01)	0.29* (0.02)	0.15* (0.02)
ECOPOWER2	0.05* (0.00)	0.10* (0.00)	0.03* (0.00)	0.10* (0.01)	0.14* (0.00)	0.34* (0.00)
BEAUVENT	− 0.11* (0.01)	0.08* (0.01)	0.14* (0.01)	− 0.17* (0.03)	− 0.02 (0.03)	0.20* (0.04)
BOTHCOOP	0.05* (0.00)	0.05* (0.01)	0.01 (0.01)	0.36* (0.02)	0.03 (0.02)	0.15* (0.03)
PROENVORIENT	0.17* (0.00)	0.12* (0.01)	0.13* (0.01)	0.33* (0.01)	0.35* (0.01)	0.07* (0.01)
SOCIDENT	0.09* (0.01)	0.07* (0.00)	0.11* (0.00)	0.23* (0.01)	0.20* (0.01)	0.08* (0.02)
GENDER	− 0.04* (0.00)	− 0.01 (0.01)	0.07* (0.01)	0.11* (0.02)	− 0.11* (0.02)	− 0.10* (0.01)
EDUCATION	− 0.01* (0.00)	− 0.02 (0.01)	− 0.04* (0.00)	− 0.06* (0.02)	− 0.04* (0.01)	− 0.07* (0.01)
ADVICE	− 0.02* (0.00)	0.00 (0.00)	0.01* (0.00)	− 0.02* (0.01)	0.00 (0.01)	0.05* (0.01)
ROI	− 0.02* (0.00)	− 0.01* (0.00)	− 0.02* (0.00)	0.01 (0.01)	0.01 (0.01)	− 0.02* (0.00)
PRICE	− 0.01* (0.00)	− 0.01* (0.00)	− 0.01* (0.00)	− 0.02 (0.01)	0.02 (0.01)	− 0.02* (0.01)
DEMOCRATIC	0.02* (0.00)	0.03* (0.00)	0.02* (0.00)	0.03* (0.01)	0.03* (0.01)	0.01 (0.00)
AGM	0.00 (0.01)	0.03 (0.02)	0.06* (0.01)	0.05 (0.05)	0.04 (0.05)	0.07 (0.05)
TURBINE	− 0.02 (0.01)	0.02* (0.01)	0.06* (0.01)	0.04 (0.04)	0.05 (0.06)	− 0.04 (0.02)
RURAL	− 0.05* (0.01)	0.01 (0.01)	− 0.05* (0.01)	0.00 (0.01)	0.03 (0.02)	− 0.02 (0.03)
SEMIRURAL	− 0.05* (0.01)	− 0.04* (0.00)	− 0.04* (0.01)	− 0.12* (0.01)	− 0.07* (0.01)	− 0.03 (0.01)
PROVINCES	YES	YES	YES	YES	YES	YES
STATUS	YES	YES	YES	YES	YES	YES
N	3015	3015	3015	3002	3007	3002
Pseudo R^2	0.171	0.064	0.098	0.058	0.051	0.012

Note: columns (1)–(3) correspond to model 5 in Table 6, but use probit instead of ordered probit and the dependent variables are dummy transformations instead of the original ordinal variables. Columns (4)–(6) correspond to model 5 in Table 6 and test the attitude toward wind power in general, but use, as dependent variables, the individual items instead of the constructed summative scale. P-value:.
* $p < 0.01$.

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