

## DEFINITION OF DRIVING FACTORS FOR DESIGNING SOCIAL INNOVATIONS IN THE ENERGY SECTOR

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### ABSTRACT

Current development of renewable energy systems (RES) is characterised by an increasing participation of citizens in the upstream decision-making process. These citizens can be future users of the RES but also members of a Renewable Energy Community that develop RES. They can be at the same time Renewable Energy producer, investor and consumer. Moreover, several type of businesses and terms are used to cope with social innovations within the energy sector: local renewable projects, sustainable energy communities or community of renewable energy production. So, actors' engagement opens new solutions for designers who are induced to share alternatives before making decisions. They usually impose constraints since the early phases of the design process. This approach implies for designers to consider new criteria related to citizens motivations and barriers. This paper presents a study to define the main factors that drive people to contribute in social innovation schemes for clean-energy transition. After a state of the art, a survey about 6 main factors and 18 criteria is presented. The analysis based on the responses from 34 participants (i.e. experts) reveals 2 most important factors of motivation and 2 principal barrier sources.

**Keywords:** Sustainability, Social responsibility, Innovation, Renewable Energy System

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# 1 INTRODUCTION

Designing and developing renewable energy systems (RES) is a complex process. Beyond the necessity to select the best technical solutions, the designer faces continuous socioeconomic trade-offs during the design process. Current development of RES is characterised by an increasing participation of citizens in the upstream decision-making process. These citizens can be future users of the RES or members of a Renewable Energy Community (REC) that develop the RES. These citizens have access to several mechanisms for funding the RES (RES cooperatives, Crowdfunding platforms, etc) and are therefore concerned by the economic returns of the project. Nevertheless, unlike classical funders, economic aspects are not the only motivation of these citizens. They usually impose a large array of constraints since the early phases of the design process. Environmental and social constraints can for example be reinforced by these actors participating in the development of the RES.

Besides, RESs are currently embed within larger energy systems that include Demand Side Management (DSM) means. The aim is to link more closely the supply and demand aspects and provide energy, which is more secure, affordable, sustainable and competitive. The result is that a citizen can be at the same Renewable Energy (RE) producer, investor and consumer. As a consumer, the energy behavioural aspects will influence the consumption characteristics and therefore will affect the production models that will be developed. This is especially true when RE are intermittent like wind or solar energy systems. The engagement of these actors in the energy consumption patterns and at the same time in the RES development process, modifies the Design Space of RES. This engagement opens new solutions for designers who are induced to share different alternatives with these stakeholders before making decisions. In order to analyse how the Design Space, evolve in the energy domain, it is necessary to investigate the motivations and incentives of these stakeholders: citizens that are producers and investors, consumers and investors, or the three at the same time. The energy domain is restrained to the RES domain in this paper. Indeed, most of the initiatives that include a large variety of stakeholders and emerge as social innovations are directly related to RES. Several type of businesses and terms are used to cope with social innovations within the energy sector: local renewable projects (Dóci and Vasileiadou, 2015), sustainable energy communities (Romero-Rubio and de Andrés Díaz, 2015), community-owned means of renewable energy production (Walker, 2008). Within this scope, the authors intend to **identify and weight the main factors that drive citizens, investors and other stakeholders to contribute in social innovation schemes for clean-energy transition.**

To do so, section 2 presents a state of the art of the factors identified in the scientific literature, mainly focusing on the motivations of the stakeholders to participate in the development of RES projects. This section also presents an internal classification defined for driving factors of social innovations in the energy sector. Section 3 describes the research methodology followed in this project and illustrates the experimental protocol employed in this research. This experimental protocol is presented by enumerating the questionnaires and measurements utilised, as well the nine case studies analysed in this research work.

Section 4 presents the results of the questionnaire and analyses the answers from a motivation and barriers point of view. Since citizens can be producers, investors and consumers, the initial hypothesis is that the participation of these actors will modify the Design Space of RES by including new constraints. By analysing the answers from a motivation and barriers point of view, factors that drive citizens within three type of organisations (cooperatives, aggregators and crowdfunding platforms) are categorised. Lastly, section 5 ends our paper with some conclusions.

## 2 DRIVING FACTORS FOR SOCIAL INNOVATIONS IN THE ENERGY SECTOR

In this section driving factors are classified into success factors, barriers and mainly the motivations of citizens and consumers to participate in development of RES projects.

### 2.1 Literature revue of driving factors in the energy sector

Driving factors for social innovations in the energy sector are heterogenous. A first categorisation of these factors in the literature include norm-driven motivations and material incentives. Other factors can include subjective norms, which are psychological factors often influenced by social pressure, or

spatial patterns, which can be a criterion to classify the motivations to join an energy community: While a “community of place” is based on social relationships in a specific geographical setting; other communities cover a larger geographical scope and are based on specific goals (Bauwens, 2016). (Serlavos, 2018) analysed different motivations to join energy communities in Switzerland. These motivations include ecological, personal, infrastructural, political, social and economic motivations. This ongoing project emphasises that the main motivations are ecological. Personal motivations are related to value changes (Pellicer-Sifres et al., 2018). Infrastructural motivations are associated to territorial autonomy and political motivations are associated to the willingness to contribute to the energy policy (Schreuer, 2016). Social motivations are associated to interpersonal relationships and the society consistency. Lastly, economical motivations include return on investment or access to cheaper energy.

### **2.1.1 Economical motivations**

Some authors analyse the economical motivations based on specific renewable energy investments and conclude that their results contradict a widespread narrative which perceives social innovations in the energy sector as a form of exclusively driven by environmental motivations.

Economical motivations are present in most of the literature that analyses the driven factors in social innovations within the energy sector. It is often claimed that investors are heterogenous individuals and that economic motivations can have different weight in their decisions. (Ebers Broughel and Hampl, 2018) analysed different motivations and their socio-demographic and socio-psychological profiles.

(Hoppe, Coenen and Bekendam, 2019) analysed the influence on energy conservation among households based on members of two energy cooperatives. This analyse included the motivations cited hereabove and include other motivations like a willingness to act against nuclear energy or the distrust large-scale traditional energy companies. (Bauwens, 2016) investigated the heterogeneity among members of Community Renewable Energy projects in term of motivations based on the motivation already identified and including other factors like the transparency of pricing and the influence of others’ advice.

### **2.1.2 Normative motivations**

The motivation to integrate a local renewable project can be arranged in different ways. (Dóci and Vasileiadou, 2015) for example organised into three main domains: Gain, normative and hedonic. While the first motivation group gather gains mainly related to decreasing energy cost, the normative motivations addresses societal issues like the global climate change. The normative motivations include also a political motivation related to dealing directly and independently on energetic issues: “Let’s do it ourselves. We can do it better on our own”(Becker and Kunze, 2014; Dóci and Vasileiadou, 2015). Within the hedonic motivations, several type of motivations can be found integrating in a community or having fun. People interested in technology and innovation that are fascinated by “DIY” (Do it yourself) approaches and love sharing with others this creativity applied to the energy domain, are also classified within the hedonic motivations. Beyond the technical innovations, the development of social innovations can also be a motivation to engage a community energy project (Mulugetta, Jackson and van der Horst, 2010) (Jalas et al., 2017).

### **2.1.3 The community factor**

Some members of community energy projects expect a modification in attitudes towards technology, consumption, or equity (Rommel et al., 2018). This is the case of the degrowth movement which is a heterogenous movement where different motivations can be identified when integrating an energy community: common development of low-tech systems in the energy field, a radical reduction of energy consumption or to avoid the power concentration into big energy utilities (Lizarralde and Tyl, 2018).

A more recent study about the motivations to participate in German community energy companies and cooperatives, concludes that environmental concerns as well as social and political goals are the most relevant motivations (Holstenkamp and Kahla, 2016). Not all the members of the energy cooperatives have the same motivations and these differences are perceptible when analysing early members of the cooperatives and late coming members. While the former has mainly environmental motivations; the later focus more on material incentives attached to the energy supply (Bauwens, 2016). The fair distribution of economic benefits of renewable projects is an important motivation in many cases and is often associated to a distributive justice (Mundaca, Busch and Schwer, 2018).

Being member of an energy cooperative can also influence the behaviour of households. Ecological and/or economical motivations can induce engagements in energy saving actions. Cooperative members engage more in energy savings members than non-members (Hoppe, Coenen and Bekendam, 2019).

Other researches have focused on the motivations linked to the degree of investment and the scale of the community they citizen-investor participates. For members of large communities, return on investment is the most important determinant interest, while members of smaller communities have other motivations like environmental or social (Bauwens, 2019).

Lastly, behavioural aspects under social pressure influence also the participation on community energy projects. Therefore, social norms seem to be an important factor that determines the citizen motivation to participate in a local community energy project (Greenberg, 2014; Kalkbrenner and Roosen, 2016).

## 2.2 Success factors and barriers influencing citizen toward social innovation

In this subsection, we propose an analysis of the success factors and the barriers influencing citizen to overtake social innovation. We base our analysis on the factors that have been identified in the research literature. (Warbroek et al., 2019) have defined a categorisation of potential success factors within social innovations in the energy sector:

- Factors related to the organisation itself: Project champions, Human capital, Size, Availability of time, Access to funds and Board diversity.
- Interactions with the local community: Alignment with local values and frames of reference; Alignment with the institutional characteristics of the local community; Visibility; Community involvement; Bonding capital and Bridging capital.
- Governance settings and linkage to the government: Linkage to government; Linkage to intermediaries and Supportive government arrangement.

Other authors have proposed a different taxonomy of the factors that influence the emergence and development of social innovations in the energy sector. These factors are classified into four categories: The emergence of an occasion to establish social innovations in the energy sector, the local perception of the energy community, the local support and acceptance of the energy community and the assessment of the applied renewable energy technology (Boon and Dieperink, 2014).

Based on the former literature revue, an internal classification has been defined for driving factors in social innovations in the energy sector. This classification includes three main factors and six motivation criteria (see Table 1) and 8 key barriers (see Table 2).

Table 1. Main factors of motivations

| Main factors                                   | Motivations   |
|--|---|
| Individual Goal oriented (Self-interested)     | Personal development Motivation<br>Economical Motivation (material payoffs) |
| Communal Goal oriented (based on Social norms) | Political Motivation<br>Territorial Motivation<br>Ecological Motivation     |
| Form/practise oriented                         | Social relationships Motivation   |

Concerning the barriers, 8 “key barriers” have been identified based on the work of (Unceta et al., 2016).

Table 2. Main factors of barriers

| Main factors                                   | Barriers  |
|--|---|
| Individual Goal oriented (Self-interested)     | Lack of funding<br>Administrative and bureaucratic barriers<br>Lack of access to information needed   |
| Communal Goal oriented (based on Social norms) | Passivity in society<br>Passivity and low level of stakeholder support<br>Deficiency of society to open up the experience of other groups<br>Absence of legal framework |
| Form/practise oriented                         | Lack of experience in carrying out social innovation projects   |

In order to **identify and weight the main factors that drive citizens, investors and other stakeholders to contribute in social innovation schemes for clean-energy transition**, we have chosen to measure the importance of these criteria whether they are success factors or barriers to the adoption of social innovations. We are convinced that both barriers and successes are useful vectors for decision-making in the preliminary stages of innovation development.

Based on our internal classification, a questionnaire has been defined to analyse case studies in the energy sector and to weight the factors according to the type of innovation proposed. In the next subsection, this questionnaire is presented as well as a detailed description of the case studies. The 18 criteria defined to assess the 6 main driving factors of the internal classification are detailed in the appendix.

### **3 EXPERIMENT PROTOCOL**

#### **3.1 Case studies**

In the following subsections describe the nine case studies participating in our study. These case studies include Cooperatives, Aggregators and Crowdfunding platforms:

- Lake Constance Foundation (LCF) (Germany): A cluster of citizen energy cooperatives in Baden-Württemberg. Two uses case based on energy cooperatives are the Bioenergy Villages and Bürgerenergie Bodensee (Civil energy cooperatives at Lake Constance).
- I-ENER (France): A citizen society focusing on the development of renewable energy projects, mainly the production of electricity and heat (e.g. photovoltaic, biomass, etc.), in a specific scope (the Bask country).
- Energetica S. Coop. (Spain): A consumer cooperative whose aim is to provide electricity coming from renewable resources to its members.
- Power Parity (Portugal): Two case studies include the Power Purchase Agreement (PPA) signed between the RES cooperative Cooperative Agrícola de Mangualde (CAM) and Coopernico, and the RES crowdfunding case study Peer to Peer (P2P).
- Abundance (UK): A crowdfunding platform that works with Swindon Borough Council (SBC) in the frame of the studied case.
- REGEA (Croatia): A crowdfunding platform that works with Križevci Solar Roof project in the frame on this study.
- Tractebel (Romania): An aggregation company for which main objective is to develop a virtual platform.

#### **3.2 Questionnaire and measurements**

In order to identify driving factors for social innovations in the energy sector, we have designed an online questionnaire elaborated as semi-structured interviews. The questionnaire was divided into 3 main parts and followed an “hourglass structure” (see this type of interview structure in the work of [Abi Akle et al., 2013](#)). Hourglass structure allows to start with very open questions at first, semi-open question afterwards for narrowing the answers, and reopen the issues in the end. Reopening the questionnaire is mainly useful to increase the feeling of freedom of the interviewed persons. Thereby, as presented in the Figure 1, the first part of the questionnaire is about Respondents’ profile and general point of view about citizens in social innovation in energy sector. The centre of the questionnaire is the core of our study and deals with barriers and motivations to join a social innovation project. For this purpose and in order to be able to integrate these assessments in a Design Space, the type of responses is semi-open. Indeed, respondents had neither to select the driving factors from Multi Choices Questions (MCQ) or to give assessment on ordinal scale (4-point scales from “disagree” to “strongly agree. This is a primary motivation” and another option “not applicable”). Finally, the third part of our questionnaire examine the differences between participants in case studies and let open section to free comments.

The core of the questionnaire, and so our study, is about “motivations” of citizens. Then based on the internal classification presented in section 2.3, 18 criteria were defined to assess the 6 main driving factors of motivations: 5 criteria for “Personal development Motivation”, 2 criteria for “Economical Motivation (material payoffs)”, 3 criteria for “Political Motivation”, 3 criteria for “Ecological Motivation” and 5 criteria for “Social relationships Motivation”. The entire 18 criteria are presented in Appendix.



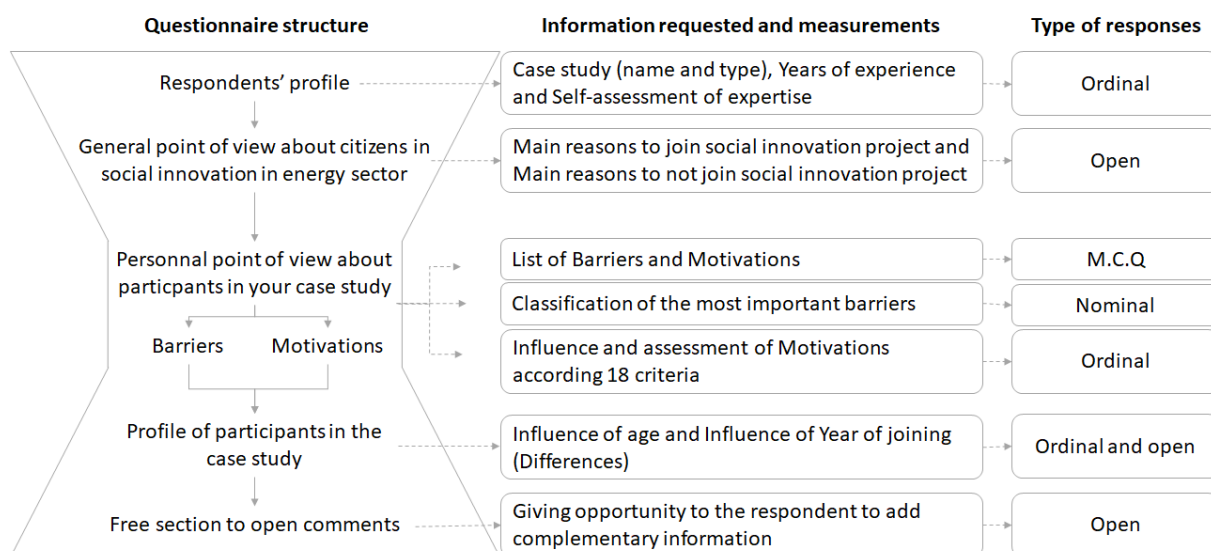


Figure 1. Questionnaire structure, information requested and type of responses

## 4 ANALYSIS OR RESPONSES AND RESULTS

### 4.1 Participants profiles

The total amount of answers was 34, most of them coming from founders or managers of cooperatives. Most participants in the survey come from “RES cooperative”. Indeed, we observe that more than 70% of responses come from managers / actors of energy cooperatives (with 24 respondents against 4 for RES aggregator and 6 for RES Crowdfunding platform).

The expertise of the respondents and their experience in the organisations is relevant for a qualitative survey. In Figure 2 (left) is presented the number of respondents in the survey according to their expertise. It appears that more than 70% are either “expert” (9 people) or “advanced” (13 people) in the field that concerns us. In addition to expertise, we have a panel of participants with broad experience in their field. In Figure (right), we observe that more than a third of the panel has “7 or more years” of experience in their organisation.

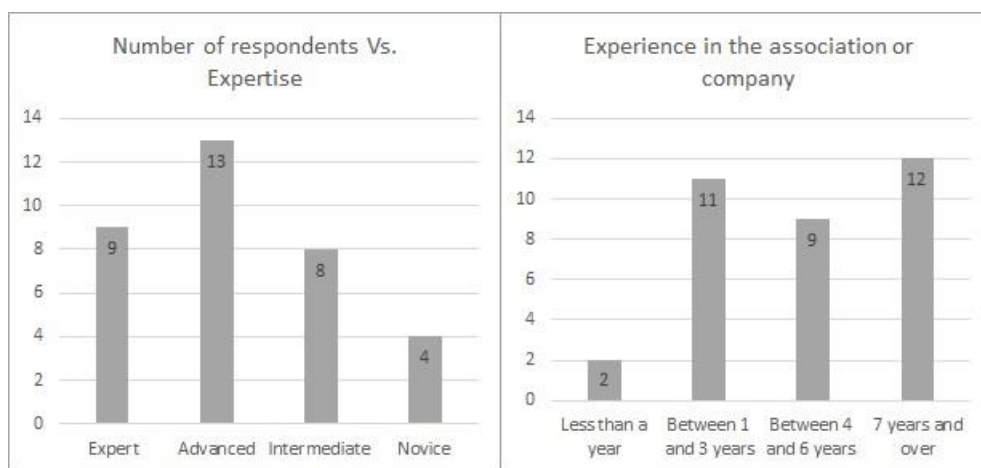


Figure 2. Expertise of respondents (left) and Experience (right)

Finally, a panel of diverse social innovations in the energy sector based in different European countries has been determined. We also notice a greater participation coming from Germany and Spain (9+8 respondents) but also from Croatia (2 people), France (3 people), Italy (1 person), Portugal (4 people), Romania (4 people) and UK (3people).

Based on this panel of respondents, a direct question concerning the main motivation has been asked as well as specific question following the motivations classification presented here above.

## 4.2 Main motivations to RES social innovation

Based on the classification presented in the section 2.3, six motivations have been identified. Based on our survey, the main criteria for citizens to join social innovation project in the energy sector is the ecological criteria (cited 27 times/34) as well as the economic motivation (cited 26 times/34).

So, for the following analysis, we detail specific criteria assessments of these 2 motivation factors: 3 criteria for Ecological motivation and 2 criteria for Economical motivation. Moreover, the responses were giving on ordinal scale (4-point scales from “disagree” to “strongly agree and a fifth option “not applicable”) so for the analysis we choose to calculate Median and to present results in box-plot graphs (see Figure 3 and 4). In this type of graph, one box corresponds to the percentiles of responses for each one criterion. In our case, there are as many boxes as there are criteria evaluated by the participants.

Within the ecological motivations, the main criterion is related to the climate change mitigation (see Figure 3). Indeed, the respondents think that people remark the more and more the connection between fossil fuel-based energy plants and climate change. Therefore, this global goal is getting more importance than local pollution related motivations. Concerning nuclear power reduction, answers are more heterogenous with a high motivation for responders from largely nuclearized countries like France. Indeed, France is the second country in the world to be a producer of nuclear power (the first one in Europe).

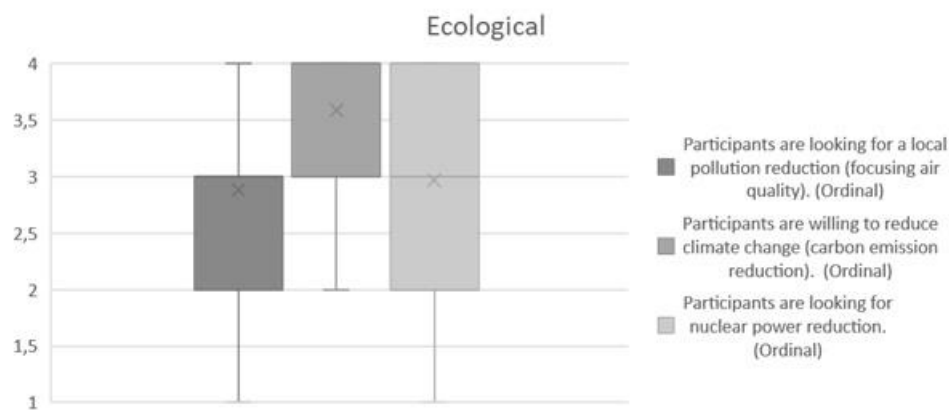


Figure 3. Criteria assessments for Ecological motivation

Within the economic motivations, respondents think that participants are mostly looking for a return of investment (see Figure 4). This criterion is more scattered concerning the answers within the cooperatives; indeed, the only answers that consider that return on investment is not important are answers from cooperatives. This factor is coherent to the fact that members of the cooperatives respond that they are looking for an equitable distribution of economic benefits. In some cooperatives, internal discussions are organised to find a good balance between return of investment for the members and the salary of the cooperative’s workers.

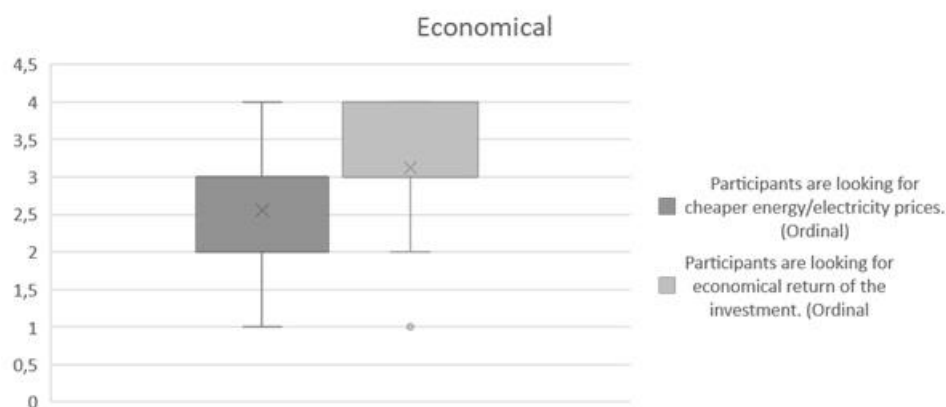


Figure 4. Criteria assessments for Economical motivation

### 4.3 Main barriers to RES social innovation

Lastly, a detailed analysis has been done considering the barriers to launch a social innovation in the energy sector. To better understand the driving factors, we have asked to respondents of the survey: “Check only those that concern your structure. Rank those you checked in the order of the “most important” to “less important””. For the analysis of response, we counted each time a criterion was selected for the 1st barrier, then for 2nd barrier and finally for the 3rd barrier.

All the involved actors answered that the main barrier to launch social innovations in the energy sector is the “passivity in the society”. This result is visible in the Table 3 in the column “1st Barrier” with 44,12% and in the column giving the percentages of the 3 most important barriers. Table 3 could be read as a heatmap table: we use ordinal color form blank to red in order to indicate the most important barrier (in red). Considering the detail responses, it is difficult to define classification for the second and the third barriers. We have then analysed the responses given according the typology of actors.

The same analyse was performed grouping the answers by typology of social innovation project in the energy sector.

Concerning energy aggregators, an important barrier is the “absence of legal framework”, clearly positioned as the main barrier for them. For this profile of respondents, “the administrative and bureaucratic barriers” are also an important barrier for citizen to join social innovations.

For cooperatives the “lack of access to information needed” is an important barrier as well as the “administrative and bureaucratic barriers”. These barriers might show that citizens cooperatives have not as many as direct or indirect links with the administration, as other type of companies might have. Another barrier that is considered as important by cooperatives is the “passivity and low level of stakeholder support”.

For the RES Crowdfunding platform, the results are more “scattered”. “Passivity in society” is clearly the first barrier but then we find three other barriers with the same importance for them: “Lack of access to information needed”, “Lack of experience in carrying out social innovation projects” and “Lack of funding”.

Table 3. Most important barriers according to the respondents

| Representative of the number of people expressed                |             |             |             |                             |
|---|-------------|-------------|-------------|-----------------------------|
| The most important barrier                                      | 1st Barrier | 2nd Barrier | 3rd Barrier | Total of total (1st to 3rd) |
| Absence of legal framework                                      | 8,82%       | 8,82%       | 0,00%       | 5,88%                       |
| Administrative and bureaucratic barriers                        | 8,82%       | 8,82%       | 5,88%       | 7,84%                       |
| Deficiency of society to open up the experience of other groups | 2,94%       | 14,71%      | 14,71%      | 10,78%                      |
| Lack of access to information needed                            | 11,76%      | 11,76%      | 11,76%      | 11,76%                      |
| Lack of experience in carrying out social innovation projects   | 5,88%       | 17,65%      | 11,76%      | 11,76%                      |
| Lack of funding   | 5,88%       | 8,82%       | 23,53%      | 12,75%                      |
| Passivity and low level of stakeholder support                  | 11,76%      | 5,88%       | 14,71%      | 10,78%                      |
| Passivity in society  | 44,12%      | 23,53%      | 17,65%      | 28,43%                      |
| Total   | 100,00%     | 100,00%     | 100,00%     | 100,00%                     |

## 5 CONCLUSION

In this paper we have presented the main motivations that drive citizens, investors and other stakeholders to contribute in social innovation schemes for clean-energy transition: Individual goal oriented, including personal development motivations and economical motivation; communal goal oriented, including political motivation and territorial motivation and ecological motivation; and lastly



the form oriented based on social relationships motivations. In addition, our study shows main barriers to launch a social innovation in the energy sector: lack of funding, passivity in society, administrative and bureaucratic barriers, absence of legal framework, lack of access to information needed, deficiency of society to open up the experience of other groups, lack of experience in carrying out social innovation projects and passivity and low level of stakeholder support.

Based on this survey, the main criteria for citizens to join social innovation project in the energy sector is the ecological criteria as well as the economic motivation. Moreover, most of the involved actors answered that the main barrier to launch social innovations in the energy sector is the passivity in the society. Finally, we are convinced of the usefulness of these results in the Design Space as decision vectors for the development of social innovation project in the energy sector. The further steps of our research will be to define an efficient way to integrate these factors in Design Space in order to explore feasible social innovations according their actors, types and countries among other more standard design parameters.

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## APPENDIX

18 criteria defined to assess the 6 main driving factors of motivations:

- 5 criteria for "Personal development Motivation":
  - Participants of my case study are wanting to change personal values (for example to modify the relationship human/nature or to simplify their life).
  - Participants are looking to develop new skills within my case study.
  - Participants of my case study are looking for a reduction of their energy consumption (moral motivation).
  - Participants are willing to modifying energy consumption patterns (Not only to reduce energy consumption, it could be for example to consume mainly when renewable electricity is injected to the grid or other active behavioural practice).
  - Participants are willing to test new technologies (for energy efficiency, renewable energies etc.).
- 2 criteria for "Economical Motivation (material payoffs)":
  - Participants are looking for cheaper energy/electricity prices.
  - Participants are looking for economical return of the investment
- 3 criteria for "Political Motivation":
  - Participants are willing to be actor of the energy/environmental policies.
  - Participants are willing to reduce fuel poverty.
  - Participants are looking for more fairness in energy tariff (price, tax, etc).
- 3 criteria for "Territorial Motivation":
  - Participants are looking for a more resilient territory (increase the energy autonomy of the territory)
  - Participants are willing to improve competitiveness of the territory.
  - Participants are looking for job creation in the territory
- 3 criteria for "Ecological Motivation":
  - Participants are looking for a local pollution reduction (focusing air quality).
  - Participants are willing to reduce climate change (carbon emission reduction).
  - Participants are looking for nuclear power reduction.
- 5 criteria for "Social relationships Motivation":
  - Participants are willing to participate in the governance of the structure.
  - Participants are willing to equalize the gender participation within the energy sector.
  - Participants are looking for an equitable distribution of economic benefits.
  - Participants are willing to create new social practices in the community.
  - Participants joined the organisation because a peer suggest him/her.

## REFERENCES

- Abi Akle, A., Bertoluci, G., & Minel, S. (2013). From environmental assessment to usage centered eco-design: taking into account the real impact of container-content system for the liquid laundry detergent. In DS 75-5: Proceedings of the 19th International Conference on Engineering Design (ICED13) Design For Harmonies, Vol. 5: Design for X, Design to X, Seoul, Korea 19-22.08. 2013 (pp. 241-250).
- Bauwens, T. (2016) 'Explaining the diversity of motivations behind community renewable energy', *Energy Policy*, 93, pp. 278–290. <https://dx.doi.org/10.1016/j.enpol.2016.03.017>.
- Bauwens, T. (2019) 'Analyzing the determinants of the size of investments by community renewable energy members: Findings and policy implications from Flanders', *Energy Policy*, 129, pp. 841–852. <https://dx.doi.org/10.1016/j.enpol.2019.02.067>.
- Becker, S. and Kunze, C. (2014) 'Transcending community energy: collective and politically motivated projects in renewable energy (CPE) across Europe', *People, Place and Policy Online*, 8(3), pp. 180–191. <https://dx.doi.org/10.3351/ppp.0008.0003.0004>.
- Boon, F. P. and 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, pp. 297–307.
- Dóci, G. and Vasileiadou, E. (2015) "'Let's do it ourselves" Individual motivations for investing in renewables at community level', *Renewable and Sustainable Energy Reviews*, 49, pp. 41–50. <https://dx.doi.org/10.1016/j.rser.2015.04.051>.
- Ebers Broughel, A. and Hampl, N. (2018) 'Community financing of renewable energy projects in Austria and Switzerland: Profiles of potential investors', *Energy Policy*, 123, pp. 722–736. <https://dx.doi.org/10.1016/j.enpol.2018.08.054>.
- Greenberg, M. R. (2014) 'Energy policy and research: the underappreciation of trust', *Energy Research & Social Science*, 1, pp. 152–160.
- Holstenkamp, L. and Kahla, F. (2016) 'What are community energy companies trying to accomplish? An empirical investigation of investment motives in the German case', *Energy Policy*, 97, pp. 112–122. <https://dx.doi.org/10.1016/j.enpol.2016.07.010>.
- Hoppe, T., Coenen, F. H. J. M. and Bekendam, M. T. (2019) 'Renewable Energy Cooperatives as a Stimulating Factor in Household Energy Savings', *Energies*, 12(7), p. 1188. <https://dx.doi.org/10.3390/en12071188>.
- Jalas, M. et al. (2017) 'Everyday experimentation in energy transition: A practice-theoretical view', *Journal of Cleaner Production*, 169, pp. 77–84. <https://dx.doi.org/10.1016/j.jclepro.2017.03.034>.
- Kalkbrenner, B. J. and 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, pp. 60–70. <https://dx.doi.org/10.1016/j.erss.2015.12.006>.
- Lizarralde, I. and Tyl, B. (2018) 'A framework for the integration of the conviviality concept in the design process', *Journal of Cleaner Production*, 197, pp. 1766–1777. <https://dx.doi.org/10.1016/j.jclepro.2017.03.108>.
- Mulugetta, Y., Jackson, T. and van der Horst, D. (2010) 'Carbon reduction at community scale', *Energy Policy*, 38(12), pp. 7541–7545.
- Mundaca, L., Busch, H. and Schwer, S. (2018) "'Successful" low-carbon energy transitions at the community level? An energy justice perspective', *Applied Energy*, 218, pp. 292–303. <https://dx.doi.org/10.1016/j.apenergy.2018.02.146>.
- Rommel, J. et al. (2018) 'Community renewable energy at a crossroads: A think piece on degrowth, technology, and the democratization of the German energy system', *Journal of Cleaner Production*, 197, pp. 1746–1753. <https://dx.doi.org/10.1016/j.jclepro.2016.11.114>.
- Schreuer, A. (2016) 'The establishment of citizen power plants in Austria: A process of empowerment?', *Energy Research & Social Science*, 13, pp. 126–135. <https://dx.doi.org/10.1016/j.erss.2015.12.003>.
- Serlavos, M. (2018) 'Les citoyens deviennent acteurs de la transition énergétique. L'exemple de l'énergie citoyenne en Suisse romande.', in *Volteface - La transition énergétique, Un projet de société*. Editions Charles Léopold Mayer. Available at: [https://serval.unil.ch/notice/serval:BIB\\_87A8C207ACE7](https://serval.unil.ch/notice/serval:BIB_87A8C207ACE7) (Accessed: 17 February 2020).
- Warbroek, B. et al. (2019) 'Testing the social, organizational, and governance factors for success in local low carbon energy initiatives', *Energy Research & Social Science*, 58, p. 101269. <https://dx.doi.org/10.1016/j.erss.2019.101269>.