

Mapping the energy community cooperation chains

Carine Sebi
Grenoble Ecole de Management (GEM)
Univ Grenoble Alpes ComUE
12, rue Pierre Semard
38000 Grenoble
France
carine.sebi@grenoble-em.com

Anne-Lorène Vernay
Grenoble Ecole de Management (GEM)
Univ Grenoble Alpes ComUE
12, rue Pierre Semard
38000 Grenoble
France
anne-lorene.vernay@grenoble-em.com

Julien Dautre
Grenoble Ecole de Management (GEM)
Univ Grenoble Alpes ComUE
12, rue Pierre Semard
38000 Grenoble
France
julien.dautre@grenoble-em.com

Keywords

energy communities, sharing economy

Abstract

In response to growing concerns about climate change and the will to take individual actions, citizens increasingly want to be involved in renewable or sustainable energy development projects. This involvement can take different forms, from, for example, financing only via crowd funding platforms to co-governing when a local energy cooperative is created. Many argue that involving local communities is crucial to help accelerate the energy transition. It is often key to overcome NIMBY opposition (Not In My BackYard) and can provide additional sources of financing. Besides setting up an energy community can be a way to strengthen the local economy and the local social fabric.

In this paper, we argue that besides looking at individual initiatives, it is important to study the cooperation chain (Becker, 2008) that supports their creation and growth, and more generally, to position these communities in a “world” of citizen led energy production. The paper intends to benchmark the structure of citizen led energy production “world” in two countries, namely France and The Netherlands, to better understand what is key for such cooperation chains to function.

These two countries present different level of maturity. Indeed, The Netherlands has a high density (in relation to its population) of communities engaged in energy management solutions. And France which is maybe less mature compared to The Netherlands but where a momentum is starting. Ultimately, our objective is to map the chains of cooperation in order to understand why certain work better than others and to derive

preliminary recommendations to facilitate the development of energy communities.

Introduction

The power sector was historically designed as a strongly centralized and hierarchical system that was to be managed by central governments and public utilities. Citizens have been largely excluded from its governance. Various developments indicate that this situation is going to change and that citizen will play a more important role in the sector in the years to come. First, technological innovations allow individual to start producing their own energy. By 2050, it is estimated that almost half of all EU households could be involved in producing renewable energy, about 37 % of which could come through involvement in an energy community (Rescoop, 2018). Second, the increasingly pressing need to fight global warming demands to deeply transforms how the sector functions and will require changes not only of the technologies involved but also of the institutions, of the dominant logic of firms and of the behaviour of users (Foxon, 2011). This will require very large investments, which may be quite difficult to finance because they come with high transaction costs and have uncertain benefit return (Yildiz, 2014). It is expected that citizens may be important contributors to co-finance the energy transition (Johnson and Hall, 2014).

One way through which citizen can participate to the energy transition is by taking part in an energy community. Energy communities involve groups of citizens, social entrepreneurs, public authorities and community organisations participating directly in the energy transition by jointly investing in, produc-

ing, selling and distributing renewable energy (InterregEurope, 2018), or by implementing information campaigns or actions helping citizens to better manage their energy production and consumption. Today, there are around 3,000 energy communities across Europe, according to REScoop, the federation of European energy communities, which links over 1,250 cooperatives and one million citizens. It is expected that energy communities can substantially contribute to the energy transition (Carpène, 2018) and the European Commission estimates that by 2030, more than 50 GW of wind and more than 50 GW of solar could be owned by energy communities, representing 17 % and 21 % of installed capacity, respectively (European Commission, 2016).

It is expected that these citizen initiatives will develop thanks to digital technologies and will become firmly established in the institutional landscape and take up more and more space in local public action (Lancement and Cadre, 2018). Yet, their current diffusion is still limited explaining why some initiatives, such as Rescoop, are trying to converge and merge these actions to make them more visible, in particular in front of decision policy makers. Energy communities suffer from a lack of institutional framework limiting their development. In that sense, the recast of the Renewable Energy Directive (RES II) stipulates that EU Member States will be obliged to provide enabling frameworks that acknowledge, enable and provide rights to citizens that want to be active customers or participate in energy communities.

Powered by collective intelligence, knowledge and know-how sharing, energy communities are shaped by the willingness and inventiveness of citizens, by mobilizing collaborative techniques and a new, more horizontal and collegial organizational mode. If energy communities are all keen to implement and offer new type of actions to promote energy transition, they can take various forms (information platform, crowdfunding, etc.) within a large scope of actions (renewable energy generation, education/training/information, energy efficiency, etc.). However, the very existence of cooperative is at first sight counter intuitive. First, energy projects require high capital needs that usually cooperatives or communities have difficulties to collect (Yildiz, 2014). Second, energy has been traditionally supplied as quasi-public good, but its management is increasingly entrusted to private actors including energy cooperatives. Third, the energy sector is heavily regulated and homogenized at both European and national levels and was not considering the diffusion of energy communities (Artis et al., 2017).

Despite these market failures, energy communities are spreading and becoming supported by new regulations, like abovementioned RES II. The energy community's "world" (Becker, 2008) appears to be rich. While a single community is rather fragile, they can be robust collectively if they cooperate with the right actors (Lancement and Cadre, 2018). Little attention has been given to analysing citizen led energy production's cooperation chain (Becker, 2008), understanding what kind of organization composes it and how actors coordinate their actions (Geels and Deuten, 2006; Hargreaves et al., 2013).

Inspired by Howard Becker's work on Art Worlds (Becker, 2008), the aim of this paper is to present the energy communities and their stakeholders in the form of a world, governed by conventions and articulated by chains of cooperation. Accord-

ing to Becker, the notion of world is "a network of cooperation in which the same people cooperate on a regular basis and which therefore links the participants according to an established order" (Becker, 2008). The world of citizen led energy production is made up of the very activity of all these people who cooperate. Although Becker uses this concept for describing and analysing artists' environment, numerous researchers appropriated these concepts on many other topics (De saint pol, 2003).

The following sections present the methodology, the field-work that has been investigated and identify the different type of energy communities. Once the different cooperation chains are identified, a comparative analysis will allow drawing some recommendations to overcome barriers that energy communities may encounter.

Methodology

The following section presents the context specific to both countries in which energy communities and their chains of cooperation have been studied, as well as the data collection process.

INTERNATIONAL COMPARISON CONTEXT

This study focuses on two national contexts, France and The Netherlands, which present different degrees of maturity concerning the development of energy communities. There are numerous advantages to comparing the energy communities and its cooperation chain from different countries. First, it can highlight the differences of maturity as the Dutch projects tend to grow faster and are usually more developed than French ones (more details in next section). It also permits to better understand the different citizen motivations and level of involvement. Finally, it is especially useful when one wishes to connect the global context of each country with communities and their necessarily locally focused concerns.

In France, the latest census carried out by the association Énergie Partagée, that supports and finances renewable energy community projects and which gathers most energy communities at national level, counts nearly 300 energy projects (~0.5 communities for 100,000 inhabitants), of which 56 %, are PV panel on rooftops. These energy projects gather 10,800 citizen shareholders and produce 65 GWh/year (i.e. 0.2 % of France's annual renewable electricity production in 2016). Since 2014, the number of these initiatives was multiplied by four (Energie Partagée, 2019). This increase has been led by a change in the French legislation, more precisely by the definition of new article in the French energy code (L. 314-28, article 111) adopted in 2015 in the Energy Transition for Green Growth Act (LTECV). This latter offers the possibility for joint stock companies and cooperative companies willing to develop renewable energy production projects to propose to inhabitants or communities to take a share of their capital, or to participate in the financing of the project (Energie Partagée, 2017).

According to the Local Energy Monitor HierOpgewekt, 484 communities are active in The Netherlands (~2.8 communities for 100,000 inhabitants). Nearly 70 % of all cooperatives is working on energy saving, 75 % on solar and 20 % on wind projects. The energy cooperatives gather 70,000 Dutch citizens (or 1 % of all Dutch households). The solar power capacity of

cooperatives reached 74.5 MWp in 2018 (i.e. 2 % of all installed solar power in The Netherlands), and the wind capacity was close to 16 MW in 2018. Energy cooperative are growing quite rapidly in the Netherlands. In 2018 for instance the number of cooperative increased by 20 %.

DATA COLLECTION

The data collected are based on first-hand fieldwork: 10 interviews were conducted with energy stakeholders in the Netherlands and 12 in France. Further interviews are planned, and the final sample should include minimum 20 interviews in each country. The sample includes both founders of energy communities and public or private associations that cooperate with these communities and belong to their chains of cooperation. These semi-directive interviews lasted between one and two hours and allow actors a great deal of latitude to express themselves. Three thematic protocols have been set up according to the type of actors interviewed: experts (consultants, researchers, or institutional decision makers involved on communities); public or private associations that cooperate with these communities; and member of energy communities. The objectives of the interviews were to understand how community manage to set up energy production, with which actors they are in touch and what are their different business models. Actors belonging to the chain of cooperation of energy communities were asked what they can do to help communities and what are their criteria to choose what community they want to sponsor. The focus was also put on respective actors' specialities. The relationship between those sponsoring actors were also explored.

Defining Energy communities

To begin with, it is necessary to define what energy communities are and why they exist. Searching through the literature in the academic or practitioner sphere shows that there is not a unique and broadly accepted definition of what an energy community is. Energy communities are plural and how they are defined depends on the perspective of the actors that coordinate the community be them association, public authorities, citizens or firms. In this paper we rely on the definition of energy communities provided by the newly adopted Renewable Energy Directive recast (RED II) by the European Union (EU) (in Article 22). It defines a 'renewable energy community' as: "A legal entity: i) which, according to applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects owned and developed by that community; ii) whose shareholders or members are natural persons, local authorities, including municipalities, or SMEs; iii) whose primary purpose is to provide environmental, economic or social community benefits for its members or the local areas where it operates rather than financial profits." (Interreg, 2018).

Energy communities have in common their understanding that "solving energy issues requires integrated solutions at all societal and institutional levels." (Klein et al, 2016). Indeed, energy communities propose responses to several issues that are not taken, or insufficiently taken, into account by the existing institutional and policy framework, with first of all the ecology and environmental impacts (Foxon, 2011). Many energy com-

munities are developing renewable energy projects that are by definition carbon free, or other type of actions including the changing of behaviours toward more efficient and sustainable consumption. Second, there is a strong willingness of citizens to produce energy independently to the centralized distribution and generation grid in a collective action, via a cooperative for instance. And this vow of independence implies the emergence of a new disruptive business model where social welfare is distributed and managed by citizens. Even if the profitability of the projects is not a prerequisite, the benefits are directly valorised by local actors. Indeed, beyond the reduction of greenhouse gas emissions, there are many benefits for the communities involved, including economic development, the creation of new local jobs, cheaper energy, self-sufficiency, community cohesion and energy security. Finally, citizens participating in communities look for empowerment through local and financial governances offering them an opportunity to take action to the energy transition – "the energy transition to energy democracy" as defined by Rescoop.

However, field work shows that energy communities can be quite different depending on the type of interaction they create between their members and whether these members are co-located or not. To explain these differences we propose using the Weber's distinction between communalization and sociation. Communalisation corresponds to "a social relation when, and as long as, the disposition of the social activity is based [...] on the subjective feeling (traditional or emotional) of the participants belonging to the same community [Zusammengehörigkeit]" (Weber, 2015). In this case, people do not have to personally know each other to feel part of the same community. Sociation on the contrary is "a social relation when, and as long as, the disposition of social activity is based on a rationally motivated (Ausgleich) compromise of interests (in value or purpose) or on a coordination [Verbindung] of interests motivated in the same way" (Weber, 2015). In other terms the sociation would fit to people that are really involved in the creation of the energy community. As soon as they decide to create a structure, here for producing energy, they decide to follow rules. Not only do they have to believe in the project, but they also have to be very rational if they want success. Such level of involvement requires coordination with the other people involved to create a viable structure. The communalization would instead encompasses people who want to feel like they are part of a community, who are emotionally linked with its mission, but who are not necessarily active in the community.

Previous research showed that energy communities – be them based on communalization or on sociation – are rather fragile alone but can be robust collectively, if supported by the right ecosystem (Lancement and Cadre, 2018). This paper focuses on analysing the chains of cooperation (Becker, 2008) that the communities rely on to be initiated and further developed.

Energy community cooperation chain

The cooperation chain characterizes the different type of stakeholders involved in citizen led energy production. These actors can be grouped into three interacting pillars, represented by the concentric circles in Figure 1 for France and in Figure 2 for The Netherlands. The community itself is not represented and is supposed to be in the middle, crossing the three circles.

IN FRANCE

The governance and structure of the French energy communities is roughly identical from one to another and based on the principle of “one person = one vote”. It is collegial governance with the following types of stakeholders: i) citizens (shareholders, associations, and salaries); ii) public authority (local collectivity and agency); and iii) private stakeholders/investors. Three main pillars, described as in Figure 1, compose their cooperation chain. First, associations or NGOs in charge of networking, lobbying and communication, like Rescoop at EU level aiming at converging and connecting energy community initiatives to make them more visible, and like Énergie Partagée Association – in English, “Shared Energy” at national level that supports project administrators and creates networks between energy activists. A second pillar includes actors involved in the technical or commercial support, like the production site installers or the owners of community energy production site (e.g. roof tops for installation of PV, fields owners for installation of wind turbines). Indeed, most of the time the energy communities do not have the internal capacity to install themselves the energy production materials and thus involve professional installers. Finally, energy communities require financial supports and – in addition to citizen shareholdings – investments and funds can come from banks, and more recently from energy suppliers like *élecocité* that offers to its clients the choice to invest in a specific energy community project. In the same sphere, the national French electricity supplier EDF is playing a central role in the sense it is mandatory that EDF purchases photovoltaic or wind electricity produced by communities at regulated feed in tariffs (above the market price). However, since 2016 a second potential buyer, Enercoop, has been authorized by decree to purchase at these regulated rates.

Some other actors are playing hybrid roles like community volunteers or local energy agencies, at the frontier of technical/commercial support and networking, helping to engage new citizen shareholders in the community or to set-up project and identifying the future energy production sites’ owners. On another frontier, Enercoop is the sole French energy supplier that creates a direct link between energy community producers (via its own energy community network) and final consumers. On the one hand, Enercoop helps communities in their legal and financial development as well as in their financial structuration. On the other hand, some energy communities are selling their production to Enercoop instead of the national and “obliged” incumbent electricity supplier EDF, allowing Enercoop to warranty to its clients that 20 % of its supply come from renewable energy produced by private homeowners, SME and energy communities. What is invoiced to consumers is thus paid back to the cooperative’s producers. At the frontier of financing and communicating in the cooperation chain, Énergie Partagée Investissement is a financing association, which has been authorized to collect and manage contributions from citizens for investment purposes since 2011 and whose funder is Enercoop. Énergie Partagée Investissement had raised 16 million Euros for energy communities, including more than 10 million Euros invested in 102 projects in 2018. Énergie Partagée also includes the abovementioned association mandated by the French Energy Agency (ADEME) to map and gather existing or on-going collaborative energy project

experiences in France. Both Énergie Partagée association and investment fund occupy an important place in the chain of cooperation for many energy communities, even if some communities develop their own way of funding (e.g. Centrales Villageoises) without going through Énergie Partagée Investissement. This latter type of “independent” cooperatives of energy communities is located at the intersection of the three pillars: it brings citizens together, support technically and financially speaking the projects, and shares all needs and risks. For instance, Cowatt is in charge of installing solar PV on sites previously chosen by a citizen community as well as its exploitation through the whole duration of the project (including the sale of electricity to the grid).

In The Netherlands

The Dutch cooperation chain is presented in the same way as the French one. The description will focus on actors that are specific to the Dutch model. First, we find more associations in charge of lobbying or for communicating about energy communities such as the lobbying organisation ODE decentral which lobbies for decentralised and sustainable energy producers and consumers or the knowledge network HierOpgewekt (produced here) that organises, among other, yearly event where energy communities can meet and exchange knowledge and good practices with one another. The second pillar with regards to technical processes and commercial also includes NGOs such as Nudge that provide the digital infrastructure that energy communities can use to recruit members and communicate with them and provide them with the administrative support they need to start an energy community. In the pillar that concerns financing, there is crowd funding platform such as Greencrowd that help energy cooperative to raise local funds when they want to develop a renewable energy production facility.

Similar to the French situation, we also find multiple organizations that play hybrid roles between these three pillars. First, we find energy suppliers that provide both technical/legal and financial support to the energy communities. The main difference here is that more firms are involved including Greenchoice and the historical incumbent Eneco. And, contrary to France, where the energy produced by the cooperatives is most of the time sold directly to national energy suppliers (via feed in tariffs), the Dutch local cooperatives established their own local energy supplier, named OM – in 2018 it regrouped 34 cooperatives – with a permit to trade on the energy markets. That gives cooperative a direct access to the consumer. These cooperative plays very diverse roles: organising the back-office required to edit electricity bills for the cooperative, helps them recruit members and to communicate with potential customers thereby gaining in visibility. Since 2014, additional cooperatively owned energy suppliers such as Energie Van Ons (energy owned by us) have been active on the market. And the revenues are returned to the local members.

Comparative analysis

Comparing the chains of cooperation of French and Dutch energy communities reveals important differences. To understand these differences, it is first important to highlight that even though their objectives are similar – they all aim to em-

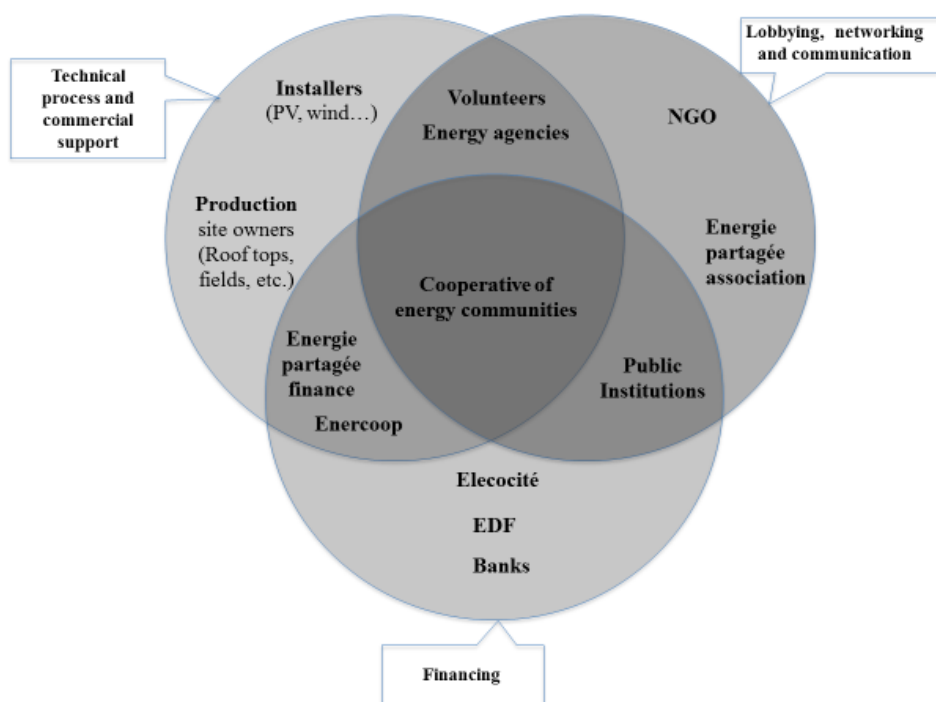


Figure 1. French energy community cooperation chain. Source: Grenoble Ecole de Management.

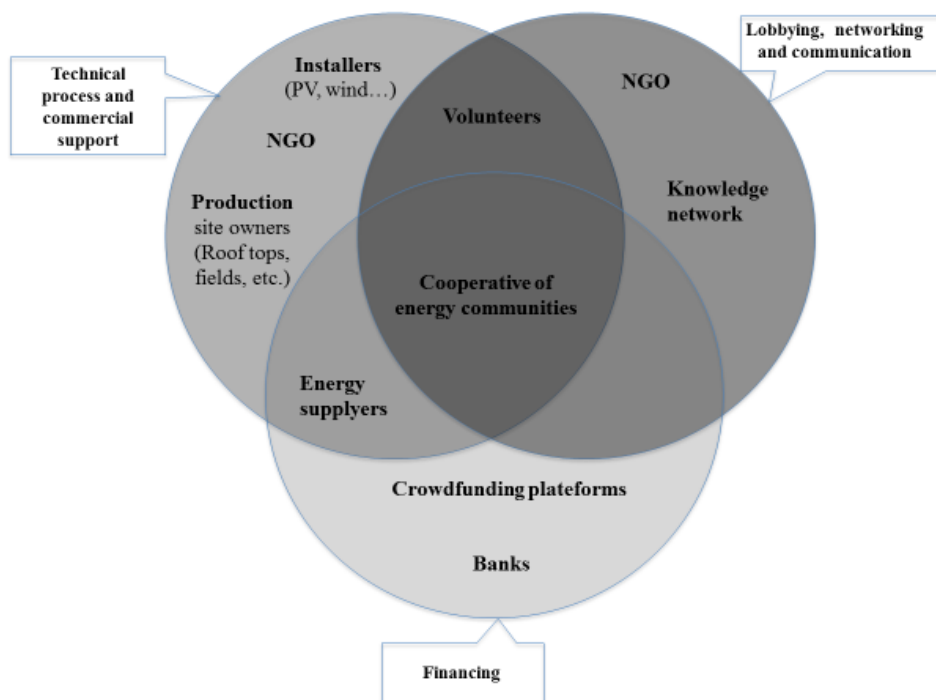


Figure 2. The Netherlands's energy community cooperation chain. Source: Grenoble Ecole de Management.

power citizen to take part in the energy transition and participate in local renewable energy production – French and Dutch energy communities are rather different when it comes to how they try to achieve their goal. In France, energy communities focus on collecting investments of citizens in order to buy and install local renewable energy capacity. Even though they promise some return on investments to their shareholders, most communities are not mature enough to be able to distrib-

ute dividend. In fact, most energy communities are not looking for profit and aim at developing in priority the community with a balanced budget. Only few communities focus on project with attractive profitability for their shareholders. ERCISOL for example is a structure designed to remunerate shareholders around 4 % a year. This energy community focuses on a specific niche market: they buy old small hydraulic power plants that they rehabilitate. Their capacity in term of energy generation is

way higher than most of photovoltaic structures seen in energy communities. This way they have more room to offer a better remuneration to their shareholders. In the Netherlands however, energy communities focus on being able to supply locally produced renewable electricity under their own name such as Texel Energie (Texel being the name of an island in the Wadden sea) or 070Energiek in the Hague. Their aim is to allow people to consume electricity that is produced ‘van eigen bodem’ (from our own ground). They brand themselves as local energy supplier and show how the price of their electricity compares to that of large incumbents.

These differences in how French and Dutch energy communities want to contribute to the energy transition also influence how their chains of cooperation are organised. In the Netherlands, the chains of cooperation mainly differ depending on whether or not the cooperative wants to be autonomous from energy incumbents. The ones that do not look for a strong degree of autonomy will insert themselves in the more traditional chain of cooperation. These energy communities partly rely on the help of NGO and on the support of green energy suppliers (like greenchoice or eneco) to be able to develop and maintain themselves. The ones that prefer a strong degree of autonomy will mobilize a completely different chain of cooperation. They will also rely on NGOs but more strongly on the cooperative of cooperative that allows them to supply renewable electricity and that becomes an important orchestrator in this chain of cooperation. This chain of cooperation presents itself as an alternative to the chain of cooperation that is orchestrated by incumbent actors.

In France, the chains of cooperation are more diverse and we identified four generic types of chains of cooperation. Similar to the Dutch context, these types depend on the degree of autonomy that the energy community wants to achieve from incumbent. However, it also depends on two other characteristics. On the one hand, the size of the project and the level of investment it requires is an important differentiator. Some projects present higher fix costs and thus require higher investments like the development of local district heating or wind turbines compared to the installation of some PV panels to be installed on rooftops that can be financed entirely or principally by citizen shareholders. On the other hand, the geographic scope of the project is also of importance.

The first type is orchestrated by Energy Partagée Investissement. This chain of cooperation only supports communities from a certain threshold and does not include smaller PV projects producing less than 10 kWp for instance. Incumbent actors such as EDF or Enercoop play an important role as buyer of the electricity that is generated. Énergie Partagée also plays an important role in allowing inter-community action in the scope of a large civic project where private actors such as associations, citizens, and businesses join forces with public and national authorities. Given that Energy Partagée was founded by Enercoop and the French energy agency (ADEME), we can argue that it is quite well institutionalised.

The second type is orchestrated by “centrales villageoises”. This chain of cooperation promotes in priority smaller projects and supports projects if and only if the whole cooperation chain of actors is set at the local level (social and solidarity economy). This chain of cooperation is also set-up to empower citizens and seek to increase the competence of the community

by itself. Their main goal is to make autonomous and independent communities from incumbent utilities or other existing national associations.

The third type includes projects that try to minimize the financial burden and avoid having to deal with the EDF. These communities set-up specific chains or cooperation so that they can produce and self-consume their own electricity without having to sell it to EDF. Here the support of local government is really key for the viability of the project.

Finally, we also find many small projects that do not really belong to any organised chains of collaboration and depend on their own capabilities and resources to develop and grow. Here we find a lot of bricolage, and could observe that what these communities manage to achieve heavily depends on the personal network which their founders are able to mobilize and on the willingness of other energy communities to share their good practices.

Unlike the Netherlands, where the economic model is completely liberalized, the French energy community system has a legislative rigidity that enforces an obligatory resale of its electricity produced to EDF (until 2016), or more recently to Enercoop. While in France there are only two potential buyers of its the electricity through regulated feed-in tariffs, there are dozens in the Netherlands. Moreover, some French communities find that the legislative rules applied to Enercoop are too strong and not in favour of some communities that would like to avoid selling their electricity to EDF.

The previous section highlighted the importance of lobby and network that mutualize the knowledge and valorise the community initiatives. Compared to France, there are more lobbies in The Netherlands that are promoting communities at national level and offering activities and services that are more institutionalized. As a result, there are more technical and digital supports that facilitate the recruitment of new members in The Netherlands. Besides, there is a greater diversity and easier access to national crowd funding platforms like GreenCrowd.

Conclusion

France and The Netherlands are both engaged at national levels to reduce their greenhouse gas emissions to hold at minimum the global warming. While the main energy and climate change orientations are taken at international (e.g. Kyoto protocol or COP21), regional (e.g. EU Renewable Energy Directive), or national levels (e.g. Loi Transition Énergie pour la Croissance Verte LTECV in France, Energieakkoord voor duurzame groei in The Netherlands, or Energiewende in Germany), the citizenship empowerment, through energy communities for instance, is expected to substantially contribute to the energy transition (Carpène, 2018). In fact, since a decade, citizens’ participative energy communities are multiplying. However, both countries present different levels of progress and particularities that could explain some of the discrepancies.

The Netherlands has a richer and more diversified cooperation chain compared to France. It is better structured thanks to its greater experience and maturity, while France, which is at an earlier stage of development, is facing legislative rigidities that prevent the entry of new players, such as the energy purchasers, into the market. The development of communities is also

promoted in the Netherlands by the need and the willingness to evolve towards professionalized structures, by the greater diversity of actors and by the involvement of the private sector. In France, the action remains to date mainly militant with a rejection of private (or para-public) actors involvement from the communities.

France is at its early stage of energy community development and thus exploring different models. Even if *Energie Partagée* plays a central role in the cooperation chain, some other communities exist and operate in parallel, sometimes in an exclusive and closed way. Despite this complexity of actions and the fact that communities are lacking of professionalism, communities are under development, highlighting a strong willingness of citizens to take part of energy transition.

For the near future, the French energy communities can take two different paths. One option is to let energy communities to develop (independently or not) their model of governance, financing, etc. with their own charter. This model will allow energy communities to emerge in accordance with their territory and in line with the vision of the citizens, but will not gain the experience from national association (orchestrator) and may not be sustainable in the medium or long-term. The second option is to promote energy communities, like in The Netherlands, via existing national platforms integrating and helping the different kind of energy communities (smaller or bigger installations, etc.). This option would imply for instance *Energie Partagée Investissement* to change its charter in order to welcome smaller projects. In both cases the challenge in France will be to enlarge the profiles of citizen engages in the communities, and target a broader social class population like in The Netherlands.

References

- Artis, A., Panenko, A., Pezzini, E. (décembre 2017) *Les coopératives énergétiques dans un système énergétique national: regards croisés entre la France et l'Italie*. Journée d'étude Coopération, gouvernance et territoire : leviers vers la transition énergétique? Grenoble. https://transcoop2017.sciencesconf.org/data/artis_penzini_panenکو_VF.pdf
- Balandier, G. *Le detour. Paris: Fayard.* –1985.
- Becker, H. S. (2008). *Art worlds*. University of California Press.
- Carpenè, L. (2018). Projets citoyens dans les renouvelables, où en est la France? <https://theconversation.c/projets-citoyens-dans-les-renouvelables-ou-en-est-la-france-103728>
- de Saint Pol, T. (2003). Le sociologue et l'apprenti sorcier : de l'usage raisonné des chiffres (note critique). *Terrains & travaux*, 4 (1), 215–228. <https://www.cairn.info/revue-terrains-et-travaux-2003-1-page-215.htm>
- Energie Partagée (2019). Carte collaborative des porteurs de projets citoyens. <http://www.wiki.energie-partagee.org/wakka.php?wiki=ProjetS2>
- Energie Partagée (2017). Les collectivités territoriales, parties prenantes des projets participatifs et citoyens d'énergie renouvelable. <https://www.actu-environnement.com/media/pdf/news-30545-guide-energie-participatif.pdf>
- European Commission (2016). Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (recast). <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1490879548464&uri=CELEX:52016SC0418>
- Foxon, T. J. (2011). A coevolutionary framework for analysing a transition to a sustainable low carbon economy. *Ecological Economics*, 70 (12), 2258–2267.
- Geels, F., & Deuten, J. J. (2006). Local and global dynamics in technological development: a socio-cognitive perspective on knowledge flows and lessons from reinforced concrete. *Science and Public Policy*, 33 (4), 265–275.
- Hargreaves, T., Hielscher, S., Seyfang, G., & Smith, A. (2013). Grassroots innovations in community energy: The role of intermediaries in niche development. *Global environmental change*, 23 (5), 868–880.
- InterregEurope (2018). Renewable Energy Communities – A Policy Brief from the Policy Learning Platform on Low-carbon economy. https://www.interregeurope.eu/fileadmin/user_upload/plp_uploads/policy_briefs/2018-08-30_Policy_brief_Renewable_Energy_Communities_PB_TO4_final.pdf
- Johnson, V. C., & Hall, S. (2014). Community energy and equity: The distributional implications of a transition to a decentralised electricity system. *People, Place & Policy Online*, 8 (3).
- Lancement K., Cadre R. (2018). L'action citoyenne, accélérateur de transition vers des modes de vie plus durables. *Commissariat général au développement durable –THE-MA*. https://www.ecologique-solidaire.gouv.fr/sites/default/files/Th%C3%A9matique%20-%20L%27action%20citoyenne_0.pdf
- Klein, S. J., & Coffey, S. (2016). Building a sustainable energy future, one community at a time. *Renewable and Sustainable Energy Reviews*, 60, 867–880.
- Rescoop (2018). How can the EU support energy communities and citizens to participate in the energy transition? <https://www.rescoop.eu/blog/how-can-the-eu-support-energy-communities-and-citizens-to-participate-in-the?categoryId=39507>
- Wainstein, M. E., & Bumpus, A. G. (2016). Business models as drivers of the low carbon power system transition: a multi-level perspective. *Journal of Cleaner Production*, 126, 572–585.
- Weber, M. (1995). *Économie et société*, vol. 1. Paris: Pocket, p 78.
- Yildiz, Ö. (2014). Financing renewable energy infrastructures via financial citizen participation – The case of Germany. *Renewable Energy*, 68, 677–685.

Acknowledgement

This research has been funded by the Tuck Foundation.

