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Local energy communities, citizen cooperatives, and collective self-consumption: Forms and trajectories in France

Gilles Debizet, Marta Pappalardo

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Energy communities: a multifaceted subject in a recent field of research

Recent research, both in France and internationally, demonstrates the interest in the question of energy communities, and more broadly, in the organizational modes of actors around the production and consumption of renewable energies at the local level.

This thematic issue of Flux, dedicated to local energy communities, aims to account for the diversity of recent research on this polysemic and polymorphic subject, through a perspective on international literature regarding energy communities and four contributions from researchers working on these issues across different disciplines. The four articles stem from a selection process of proposals made by authors following their participation in the webinar series "Energy Communities for collective Self-Production: Framework, Practices, and Tools" organized by CDP Eco-SESA of the Université Grenoble Alpes and the PUCA, from June to October 2020¹. As detailed in the report at the end of this issue, the colloquium sessions addressed interdisciplinary themes involving researchers as well as institutional actors and energy professionals.

Since the beginning of the 2010s, the model of energy communities has sparked enthusiasm among stakeholders, notably due to the possibility of citizen participation in collective deliberation processes. In this regard, this societal and political objective intertwines with environmental values, which aim for a reduction in energy consumption and a lesser impact on the planet, but more importantly, fit into a trend of moving away from traditional market logics. Many actors particularly associate energy communities with the idea of spatial proximity and, implicitly, interpersonal relationships among its members. Since July 2021, the French regulatory framework has been evolving, notably through the implementation of ordinances (published in March 2021) transposing the European directives RED II and IEMD [1] which define the rules applicable to various models of energy communities, guarantees of origin, as well as the regulation of electricity storage [2].

Beyond the regulatory framework, our definition of an energy community accounts for this diversity of approaches and analyses: we define an energy community as a grouping of

individuals or legal entities actively involved in a project of renewable energy production and/or consumption. Thus, the community is a flexible concept, where the representations of actors carry as much weight as the objective characteristics of the devices: the sense of belonging to a community, the establishment of horizontal governance forms, the interweaving between technical installations and spaces, or local anchoring, all contribute to shaping communities.

This broad and polysemic definition fits within an international scientific landscape that acknowledges this diversity and the aspirations highlighted by various disciplines towards forms of transversality and collaboration.

Scientific Debates, in France and Internationally

The literature on energy communities reveals major differences: the term "energy community" can define collectives ranging from a few participants to several thousand members. Regarding spatial dimension, an energy community can be contained within a single building or extend over vast territories, being driven by very informal collectives to public authorities or even digital social networks.

In the diversity of configurations, the international literature on energy communities primarily focuses on the organizational dimension and the political scope of experiments. Depending on the cases studied, research cultures, countries where scientific work is conducted, the characterization of local energy projects varies. As presented in the article by Aubert and Souami in this thematic issue, while in Germany the focus is more on *citizen energy* (Radtke, 2013), or *local energy initiatives* (Blanchet, 2015; Hoppe et al., 2015), Anglo-Saxon literature specifically examines the community and its functioning, especially when the latter is established by civil society actors. Thus, the literature on *energy communities* primarily concerns so-called *citizen* or *grassroots* energy communities (Seyfang et al., 2013; van der Waal et al., 2018), and their forms of internal organization. Attention to organizational dynamics, and even institutionalization of energy communities (Seyfang, Haxeltine, 2012; Wirth, 2014), is confirmed in several studies on energy communities in the UK, with a significant portion focusing on the processes and effects of citizen involvement in projects (Walker, Devine-Wright, 2008).

The ambiguous and flexible nature of the notion of *community* is acknowledged by Anglophone authors (Hicks, Ison, 2018). This stems from a collectively accepted positive understanding of the very concept of *community* in the English language, which evokes strong connotations of citizen empowerment, solidarity, and local collaboration. This positive vision of community becomes more complex in the context of French-speaking research, where the notion of community may evoke negative connotations of communitarianism. In this regard, Yalçin-Riollet, Garabuau-Moussaoui, and Szuba (2014) emphasize how the French linguistic culture leads to the perception of communities as spaces of withdrawal and insularity, contrasting with the values of the Republic.

In works of Anglo-Saxon origin, there appears to be a form of *overemphasis on the community* (Aubert and Souami, in this issue). However, these socio-political analyses deserve to be nuanced by paying attention to factors other than organizational dimensions. The comparative work of Brummer (2018) highlights that many authors define energy communities based on the focus of their research. Thus, while several authors concentrate on social aspects such as civil

society participation or actor organization, others define energy communities based on technological aspects such as renewable energy production or decentralized installations (Acosta et al., 2018).

In France, research on energy communities is relatively recent, but there is a well-established literature on the territorialization of energy and the organization of actors in the energy sector, contributing to the emergence of three major scientific debates: the democratic forms of communities, territorial dimensions starting from infrastructures, and the mutations of economic models and the organization of the energy sector.

Research on the internal deliberation systems within communities (Pappalardo, 2022 ; Maître, in this issue) highlights numerous experiments in the governance of collectives, departing from the model of representative democracy to embrace more horizontal forms such as sociocracy or holacracy. According to these approaches, the distinctive character of the energy community lies not so much in the type of renewable energy implemented but in the experimentation of governance models. Thus, while energy communities in the form of production or supply cooperatives were the first to undergo significant deployment in territories (Fontaine, 2019), production and consumption communities on-site are currently asserting themselves as spaces of political experimentation through collective reorganization (Rumpala, 2013). This organization proves to be deeply intertwined with the spaces where energy consumption practices unfold (Pappalardo, Debizet, 2020).

The relationship between the energy network and its alternative organizational models has also brought forth several notions in the field of geography and urban planning, starting with that of the *post-network* (Coutard, Rutherford, 2009, 2011), indicating an ongoing transition from the traditional model of the large centralized network towards logics built around the local dimension and the concept of *energy territories* implemented at the scale of the city, neighborhood, or building (Souami, 2009), where energy systems are comprised of a set of *socio-energy nodes* (Debizet et al, 2016). The notion of *socio-energy assemblage* has thus been mobilized to analyze energy and urban governance seeking renewable or waste energies (ibid ; Hampikian, 2017; Aubert, 2020), highlighting the role of energy intermediaries (Tabourdeau, Debizet, 2017; Debizet, Tabourdeau, 2017) following the *French proximity concept* (Bahers, Durand, 2017). The notion of *energy autonomy* points to spaces for constructing new relationships with resources and new forms of organization (Lopez et al., 2019).

Finally, French sociological research has focused on analyzing the economic forms of energy communities, often through the analysis of energy-producing communities or local cooperative projects. Through organizational forms such as cooperatives, mixed public-private companies, or associations, the local - considered as a space for deploying renewable energies - requires adaptation of the energy project (Nadaï et al., 2015; Fontaine, 2021). These studies highlight cross-scale processes, characterized by trial and error and risk-taking, which give these initiatives a political dimension in opposition to national energy policy (Cointe, 2016). These studies question the transformative power of energy communities, even the establishment of an energy democracy. Through control of energy infrastructure, citizen participation, and local distribution of benefits, energy communities assert themselves as alternative spaces to socio-economic and market models (Wokuri, 2021): however, these experiences are heavily conditioned by the political and economic systems of the country of emergence (Wokuri, 2019).

From this overview, we can note the limited attention to urban and territorial dynamics as a structuring variable of energy community action. Some research identifies space as an indicator for classifying energy communities within taxonomic exercises. For example, Heiskanen et al. (2010) distinguish between geographically local communities, sectoral communities, interest communities, and virtual communities. Stefano Moroni et al. (2019) propose a taxonomy of energy communities that introduces the territorial variable in their characterization. Thus, they construct a matrix with four cells: the first distinction is made between *place-based* communities, constructed from a displayed and operating local dimension, and *non-place-based* ones. The second distinction concerns the community's ambitions, which can be *single-purpose* (especially around the energy function) or *multi-purpose*. These taxonomic works allow for the realization of typologies of energy communities where spatial dimension is not understood merely as a receptacle of national political opportunities or interests at the local level, but as an operating element in the structuring of groups and their capacities for action on the energy system.

In this context, energy communities are emerging today as models of renewed spatiality of energy (Dubois, Kébir, 2021), which take on different meanings and are part of a tradition of challenging the dominant French centralized model. From the desire for autonomy, which gives rise to citizen projects claiming local as a mean towards sustainability (Brusadelli, 2016), to the role of energy community in urban developments (Ramirez-Cobo et al., 2022, the pooling of actors around energy consumption and production not only invokes space as a *place* to locate energy devices but also prompts reflections on *locality* as a set of values (Hérault et al., 2012; Martin, Upham, 2016; Perlaviciute et al., 2018), such as energy traceability, the geographical proximity between producers and consumers or the move away from large distribution infrastructures. In this sense, energy communities are deeply embedded in a local space, in other words, in a reflection on space that invites us to move away from traditional conceptions of energy and its management.

The contributions of this thematic issue

In the context of recent debates on local energy communities, particularly in the French context and in electrified countries (Europe, North America, Asia), the articles selected for this thematic issue address various dynamics related to three significant aspects of the emergence and implementation of local energy communities, namely their integration into space, governance organization, and relationship with national or supranational regulations.

The urban dimension is the subject of analysis proposed by the contribution of **Flora Aubert** and **Taoufik Souami**. Through research primarily questioning the definition and mobilization of the concept of energy community in international literature, the authors emphasize the need to move away from a vision of this object focused on socio-political relations among actors. Their article mobilizes analytical frameworks of sociotechnical systems to integrate the materiality of technical devices and urban spaces in order to understand dynamics leading to the implementation of local energy communities. Through case studies of three collective electricity self-consumption communities - located in France, Germany, and the United Kingdom - the authors propose an analysis of the action of these collectives through the lens of urban fabrication, namely the set of tools, mechanisms, and logics involving human and non-human actors in the implementation of communities as urban socio-energy systems.

Regardless of the actors involved, the concept of an energy community thus requires a shift from an individual to a collective dimension: the organization of actors around a resource - renewable electricity - and their reflection on an alternative, even innovative, development of energy consumption and production are at the heart of the contributors' research in this issue. More specifically, in his article, **Arnaud Assié** analyzes the dynamics of *doing things differently*, namely the search for new ways of organizing to produce and consume resources and new regulations that are adapted to these unprecedented configurations. Through his analysis of the challenges faced by citizen renewable energy projects, the author shows how the idealized visions of project leaders collide with cross-scale operation and the need to implement governance tools. The study of the functioning of the French *Energie Partagée* association at the national level, but also of local projects claiming to belong to this movement of local citizen cooperatives, shows complex interconnections between actors and devices that force them to create networks of knowledge exchange and to rely on cognitive support skills. These inquiries invite us to question the relationship with networks: what alternative is possible in a context dominated by economic, political, and spatial centralization of large distribution networks? In this sense, the various contributions to this issue reflect the willingness of actors, whether private, public, or citizens, to experiment with ways to move away from centralized energy production, infrastructures and their management

In this regard, the analysis of deliberation modes, namely the modalities through which people gather, negotiate, and even reach a common decision on the technical, spatial, and organizational aspects of the community, is the subject of several research studies on energy communities, including the contribution by **Rémi Maître**. Through his case study on Enercoop, a cooperative supplier of renewable energy nationwide and its regional branches - particularly *Enercoop Midi-Pyrénées* (EMIP) - the author examines the functioning of these collectives, which simultaneously carry the paradoxical ambitions of reducing consumption and providing energy. Organized according to three principles: operation through a Scic (Cooperative Society of Collective Interest), decentralization from the national level to the regional level, and an organizational configuration based on holacracy, Enercoop builds an alternative offer to the traditional energy market, not only from an economic standpoint but even more so in terms of *active participation* by its members. After presenting the organization of EMIP, the article utilizes praxeological sociology to analyze the governance, decision-making processes and modes of information circulation among cooperative members.

Finally, in **Thibaut Fonteneau's** contribution, the energy community is considered as an alternative politico-economic organization, uncovering controversies related to the national regulation of the energy market. Specifically, through the case study of three collective electricity self-consumption initiatives in France, the author analyzes controversies arising from requests for adjustments to grid access tariffs. His analysis reveals the cross-scale contradiction between the principles of national solidarity, embodied in the centralized energy grid, and the local dimension, which is the space of emergence for dynamics and actors of a decentralized energy transition.

The issue is complemented by an interview with Didier Laffaille, Secretary General of the Committee for Prospective Analysis at the French Energy Regulatory Authority (CRE), conducted by Gilles Debizet. Primarily dedicated to legal frameworks for individual self-consumption and collective self-consumption of electricity, this interview highlights the focus on

the economy of the electrical grid and the equity embodied by the principle of uniformity of electricity access tariffs regardless of the location of production or consumption, as discussed in T. Fonteneau's article. Finally, the report on the international webinar series "Energy Communities for collective Self-Production: Framework, Practices, and Tools" written by Marta Pappalardo, broadens the questions raised in the aforementioned contributions and feeds into transdisciplinary lines of inquiry.

Emergence and Deployment of Local Energy Communities in France

The four contributions address a particular period that has been the subject of numerous communication proposals: the transition from the emergence to the deployment of energy communities. The articles published in this issue and the report of the webinar series highlight the "challenges" faced by energy community projects as well as deployment strategies implemented by various actors. Between citizen initiatives, local public action, and governmental measures, several processes of institutionalization of local energy communities are emerging. The cross-cutting analysis of the texts in this special issue of *Flux* journal highlights significant differences and equally salient questions: the local alternative to the dominant electricity model, the relationship to the local, and institutional and deployment trajectories.

The local community as a counter-model to the dominant regime?

Establishing a counter-model to dominant energy systems constitutes a strong and common motivation for individuals involved in community operations for renewable energy production. The vision of a centralized and technocratic model - with French nuclear power often presented as the archetype - unites opposition.

Beyond this opposition to the centralized model, there are different shades depending on the focus of the community. In his investigation of the Enercoop network, Rémi Maître highlights the reaction to the predominant weight of large "capitalistic" or "speculative" companies - both national and international - in renewable energy production. Abuses of origin guarantee certificates organized within the framework of a European market are also denounced to justify the activities of Enercoop, the French consumers' cooperative supplying renewable electricity.

In the scientific literature, Arnaud Assié specifically points out the logic - which we call - extractivist of these companies, meaning that they exploit a resource outside of its extraction territory without the latter being able to influence this exploitation. Practices on the ground are thus sometimes described as predatory, unfair, and even colonial [3]. In contrast to these practices, the *Energie Partagée* movement presents the local impact as an intrinsic objective of each operation carried out by local citizen cooperatives. Cooperative investors usually residing in the local area derive a financial income, which is generally reinvested in other local projects. Furthermore, cooperators support social and environmental activities in the area (Assié). The *Energie Partagée* charter explicitly states these two values: local anchoring and a non-speculative approach.

This charter outlines two other values: an ecological requirement and an open democratic governance (Assié). The latter is reflected in the choice, made by *Energie Partagée* as well as by Enercoop, of the Scic status which allows individuals or entities of different statuses to participate openly and democratically (1 person = 1 vote) in the cooperative's decisions. The common objective is to democratize energy, in contrast to the dominant electricity producers - fossil, fissile, or renewable - considered technocratic or capitalistic.

The other two articles in this issue take a considerably less affirmative view on the objective of establishing a counter-model. Thibaut Fonteneau presents collective self-consumption operations as opportunities seized by local actors such as municipalities and social housing companies to provide their residents, respectively their tenants, with inexpensive, green, and local energy. It is true that these two types of actors operate primarily at the local level and have a well-established legitimacy at this scale. In other words, they already occupy a specific place within the French institutional system: there is no need to position themselves as a counter-model, although this does not exclude a struggle for the expansion of their means and prerogatives (Poupeau, Boutaud, 2021).

All in all, the new involvement of local authorities in renewable energies would represent a sectoral expansion of urban transformation for local actors, according to Flora Aubert and Taoufik Souami, who study territories where projects for collective self-consumption or cooperative production are being implemented. They argue that this involvement results from a local dynamic: it is not limited to their ability to overcome constraints on resource valorization.

Two points are worth noting at this stage. Unlike the energy cooperative movement, the use of the collective self-consumption scheme does not seem to require adherence to a counter-model - non-speculative, democratic, and ecological - compared to the dominant model. While energy cooperatives are in opposition to the predominant energy regime, urban and territorial existing actors consider collective self-consumption as a thematic expansion. How do the articles reveal the contribution of local energy communities to this energy territorializing process?

Community energy: the "local" as compulsory step or as breeding ground of initiatives?

" Citizen-led projects are distinguished by taking into account territorial issues," asserts Arnaud Assié. The regionalization of Enercoop aims to achieve proximity with members, subscribers, and renewable energy producers (Maître). Citizen production cooperatives aim for a form of re-territorialization of energy. The two authors precisely describe the consequences of this position on the structuring of the Enercoop and *Energie Partagée* networks but less on the operability of re-territorialization.

Through fine sociotechnical analyses, Flora Aubert, Taoufik Souami, and Thibaut Fonteneau reveal the modalities of implementing collective self-consumption. They thus underline the dependency on the materiality of the electrical grid, the road network, and the land network. Subject to specific legal statuses, these three objects are at the heart of urban transformation. The authors also show the importance of spatial metrics (maximum distance between members of the collective) defining the maximum perimeter of collective self-consumption operations. This metric proves to be "actant" in targeting collective self-consumers (Aubert and Souami). It has

been the subject of debates and adjustments in several scenes involving representatives of local authorities, national legislators, and state administration responsible of national energy policy (Fonteneau).

Spatial proximity replication is another dimension of territorialization. The principle of reinvesting profits in new projects located within the operational perimeter of local citizen cooperatives (Assié), as well as support for production projects from EMIP (regional cooperative of Enercoop operating in Midi-Pyrénées), territorializes the financial resources necessary for the deployment of renewable projects. In addition to financing, another territorial resource - as defined by Gumuchian and Pecqueur (2007) - is expertises in project development and community energy animation; initially provided by volunteer founders, these expertises are now by staff of regional Enercoop cooperatives (Maître) and regional networks bringing together local citizen cooperatives (Assié). Finally, the success of operations demonstrates the feasibility and benefits of local energy projects and communities, which stimulates and reinforces initiatives gradually, following the manner of Hagerstrand (1967) and according to Rogers' theory of innovation diffusion (2003).

All in all, as much as local authorities themselves and other actors rooted in the territory (for example, the University of Nottingham or the local energy distribution company in Saerbeck according to Aubert and Souami), the cooperative movements *Enercoop* and *Energie Partagée* contribute doubly to the territorialization of energy. Indeed, they bring intangible resources to their areas of action and, moreover, constitute a cross-scale network significantly less top-down than that of the dominant electrical regime. The shift in perspective—from the national electrical system to a more territorial one—relates to the notion of a territorial operator proposed by Durand and Landel (2015): renewable energy production organizations would be operators that territorial actors solicit to valorize anchored energy resources. Thus, territorialized energy systems could be considered as energy autonomy places connected by grids (ADEME, 2019; Debizet, 2019).

Two niches and institutional trajectories: cooperatives versus collective self-consumption

As stated earlier, collective self-consumption operations are often led by actors already established locally, who are expanding their activities into the field of electrical energy, whereas renewable energy production and consumption cooperatives are new organizations. The trajectories of self-consumption collective and energy cooperatives are significantly different. To understand these trajectories, let's employ the multi-level approach (Geels, 2004), which is central to the research stream of *sustainability transition studies*.

This approach distinguishes three temporalities: firstly, the landscape, which corresponds to cultural dimensions and values that mainly evolve slowly unless there is a conjunctural shock; secondly, the sociotechnical regime, consisting of a coherent set of infrastructures, organizations, and rules that link them, whose stability allows some of them to occupy a dominant position; thirdly, niches within which innovations will emerge and deploy in a limited manner before their eventual propagation disrupts the sociotechnical regime. In some cases, the generalization of a bundle of innovations can sufficiently destabilize the sociotechnical regime to deeply transform it or give rise to a new sociotechnical regime.

The liberalization of the gas and electricity market - a corollary of European integration - and the general awareness of the need to limit climate change have recently (given the more than century-old history of electrical grids) emerged at the landscape level. The sociotechnical regime of electricity in France resulted from the nationalization, following the Second World War, of private local and regional electricity companies. The creation of the national public company “Électricité de France” allowed for the construction of powerful hydroelectric and then nuclear power plants. This highly centralized electrical regime at the national level was amended at the turn of the 2000s by the liberalization of production and supply and, more recently, by the establishment of niches in which projects for renewable energy emerge, carried by, among others, energy communities. It is the nature of the niche that distinguishes collective self-consumption operations from those carried by cooperatives: exemption from the rule prohibiting the sale or transfer of electricity outside of authorized suppliers for the former, protected market spaces for renewable energy production for the latter.

In the first case, the State - through its various institutions - has since 2019 defined a derogatory scheme by precisely regulating the modalities of electricity exchange (Fonteneau). The scheme establishes the principle of an intermediary entity contracting separately with the producer(s) and the voluntary consumers, defines its responsibilities towards the (public) distribution system operator, and ultimately sets a maximum distance between production and consumption locations. This spatial condition effectively removes collective self-consumption from the yoke of market mechanisms based on the principle of a multitude of suppliers and the independence of demanders from each other. Thus, the scheme calls for deliberations involving - or even bringing together - the producer(s) and all participating consumers.

In the second case, cooperatives take advantage of incentives (guaranteed purchase price by the State and additional bonus on the average market price) and provisions (such as guarantees of renewable origin) that the State has established since the early 2000s to create a protected market space allowing for the development of renewable energy installations in France. In other words, cooperatives fully engage with market mechanisms: Enercoop purchases renewable energy and resells it to consumers/members; local cooperatives federated under *Energy Partagée* produce renewable energy and usually injects it entirely into the grid by selling it to suppliers, especially Enercoop. They position themselves *de facto* - the first as a supplier, the second as a producer - in the national competitive market while claiming a local (Assié regarding *Energie Partagée* or now regional (Maître regarding Enercoop) focus.

The interplay between scale economies, professionalization, and organization

While profitability may not be the central objective of energy communities, it often proves necessary for the realization of renewable energy production installations, at least with subsidies considered. Although each operation is specific due to its geographical and political context, there are common factors and dynamics among them. Thus, the pursuit of economies of scale and cost reduction takes specific forms depending on the type of energy communities.

The Enercoop cooperative, having chosen rapid growth, has regionalized itself to attract more subscribers, but it retains at the national level the legal responsibility as a supplier - and therefore the customer relationship - the relationship with the producers from whom it buys renewable

energy, and the advocacy and representation activities with national and European institutions. In a reverse movement, the more recent federation *Energie Partagée* has gradually federated and sustain local associations and cooperatives. In doing so, the national federation has access to a pool of technical, economic, and legal expertise that develops guides and training for local cooperatives and engages in advocacy actions with national authorities. Large-scale "local" projects can also benefit from financing from the national cooperative, controlled by founding organizations of the federation. Even though their trajectories are opposite in scale (from national to regional for Enercoop, from local to national for *Energie Partagée*), both cooperative networks organize economies of scale through their national components.

Compared to these cross-scale cooperative movements, the operators of collective self-consumption operations carried out in France appear isolated. Legal entities are - at this stage of deployment - specific to each operation. The small scale (anyway limited by the framework of the metric distance) does not offer hope for economies of scale in the short or medium term. Therefore, it is through the congruence of objectives that these operations - generally unprofitable - succeed. Each operation fulfills multiple objectives and mobilizes resources specific to its operator: social landlords and municipalities leverage their knowledge of the field and their legitimacy to recruit self-consumers. In contrast to cooperative movements, these organizations only carry out a collective self-consumption operation occasionally; lacking the means to develop technical and legal expertise internally, they resort to external entities: often consulting firms or energy service companies. (Fonteneau ; Aubert and Souami).

Balancing energy communities deployment and financing?

National federations bringing together these companies and members of parliament solicited by local officials conduct advocacy actions for the expansion of the spatial scope and for the reduction of the tax financing the grid (Fonteneau). While collective self-consumption operations currently represent a negligible quantity in grid financing due to their size and current number, the national energy regulator shows caution, as evidenced by the interview with Didier Laffaille, secretary of the Prospective Committee of the CRE, in this thematic issue. The investment and operating costs of the public electricity grid stem from its ability to handle instantaneous flows (corresponding to peak withdrawal times by subscribers) rather than the volume of transit (which corresponds to the cumulative withdrawals over a long period). However, the financing of the public electricity grid is primarily based on the volumes transited; consequently, a decrease in the tax rate for collectively self-consumed flows would require an increase in the rate for external flows (those not covered by the collective self-consumption scheme). This would challenge the principle known as the "postage stamp" principle, in force since 1973, which ensures uniformity across the national territory in the price of electricity transmission. In this context, collective self-consumption appears to be in an economic deadlock: the same tax regime but very limited potential for economies of scale compared to massive external productions. This explains why these operations are generally carried out by existing entities which, on the one hand, mainly produce for their individual self-consumption (which is de facto exempt from taxes) and, on the other hand, derive non-market benefits from collective self-consumption: satisfaction of citizens and tenants, strengthening of the local economy, or implementation of ecological values. Combined with the complexity of implementation, the economic deadlock

also explains the low number of collective self-consumption operations: around fifty in 2021, when electricity market prices were still lowⁱⁱ.

Operations carried out by citizen cooperatives have seen significant growth in France in recent years (Assié). Following European directives introducing the concept of energy communities, Enercoop and *Energie Partagée* advocate - along with the French Renewable Energy Liaison Committee - for the introduction of a criterion of citizen involvement in calls for projects supporting renewable energy installations. The goal is to provide citizen projects with a larger bonus than that awarded to projects led by traditional private companies, meaning those whose capital remuneration is the central purpose. The interventions of François Ménard, Cyril Martin de la Garde, and Thomas Rüdinger during the closing roundtable of the webinar series " Energy Communities for collective Self-Production: Framework, Practices, and Tools" outline the modalities retained by the March 2021 ordinance: financing by localized individuals, proximity of the production installation, and a cooperative status.

Conclusion: Debates and political perspectives in France

Firstly, it is important to draw the reader's attention to the fact that the four articles and the interview with Didier Laffaille concern almost exclusively the electrical carrier, while the concept of energy community does not exclude exchanges of gas, heat, or wood, each of these carriers potentially deriving from renewable energies. However, there are tens of thousands of residential buildings that utilize renewable energies captured on-site to power their collective heating systems; there are also several hundred public heat grids in France. These "de facto" energy communities provoke local controversies (analyzed in doctoral theses by Tardieu, 2015; Blanchard, 2018; Hampikian, cited; Balaye, 2019; Aubert, cited) but do not seem to be addressed in national debates on energy transition. It is true that no national approval is necessary to sell heat or wood and that their extraction and transformation locations are spreaded compared to electricity production units. Perhaps because the socio-technical regimes of wood energy and heat are less centralized, they do not stimulate national controversies, nor do they present a counter-model to energy communities.

Let's analyze the insights from the cross-sectional analysis of the articles. All in all, the widespread deployment of renewable electricity production operations, driven by a community energy approach, requires institutionalization that is both bottom-up and top-down. The six texts gathered in this issue testify to two distinct trajectories of institutionalization:

- The establishment of a cross-scale cooperative movement followed by the consideration of its specificities in energy market regulation: local citizen cooperatives gradually organized into a national network and a national electricity supply cooperative now partially decentralized regionally have seized upon the liberalization of energy and the creation of a protected market niche favoring the deployment of renewable energies. Twenty years after the liberalization of electricity and the creation of the first cooperatives, European and national regulations recognize their citizen and local specificity.
- The establishment - following a parliamentary debate - of a derogatory mechanism to the exclusive electricity sales granted to market suppliers (approved by the State), which has

been seized upon by a variety of local actors and service and equipment companies: introduced by the French Energy Transition and Green Growth Act of 2015, the idea of expanding collective self-consumption beyond individual self-consumption materialized into regulatory measures in 2018; since then, this mechanism has been subject to adjustments based on the experiences of the few organizations capable of representing them on national stages.

Complementary to each other, the economic and organizational models developed by the two cooperative networks prove to be antagonistic with the model of collective self-consumption that other actors implement on the ground and advocate at the regional and national levels. The moment of "locking" - in the sense of Flichy (1995) - of a status of "citizen energy community" within energy regulations is approaching; the decree that will follow the March 2021 ordinance could be the prelude to a wide deployment of production/injection cooperatives if the government opens the floodgates of financing. On the other hand, the future of collective self-consumption appears very uncertain since its scaling up requires a shift - and therefore a challenge - to the principle of "postage stamp" pricing.

From this recent history, three models of energy community based on the electrical carrier emerge. 1) The *citizen cooperative* model participates in the functioning of the market (national and European) while organizing a network of interdependencies between supply cooperatives and production/injection cooperatives at different spatial scales; 2) *Collective self-consumption* extracts from the electricity market the portion that collectively connects one or more producers with consumers spatially close while contributing to the financing of the grid; 3) A less visible but present model, *downstream meter self-consumption*, can be *de facto* community-based for certain uses (Pappalardo, Debizet, cited). It is also a model of *public downstream meter self-consumption* that is generally in effect for collective renewable heat production. In these latter two cases, conventional real estate organizations often themselves fulfill the functions of deliberation and supervision of flows.

The relationship between the grid and the territory is reexamined by the notion - and the associated realities - of the local energy community. Observing this relationship from the territory - and not just from the grid - highlights the weight and heterogeneity of existing collective organizations. At a time when it becomes apparent that the transition will be both ecological and solidarity-driven, it is also necessary to reconsider the relationship between the grid and the territory from the perspectives of justice and democracy. To cite just two examples, if procedural justice (which inspires the decision by consent reported by R. Maître) leads to the development of deliberation scenes regarding the sharing of energies produced at different scales, the premise of equal access to electricity - regardless of the location and the "collective" to which a consumption unit is attached - effectively reduces (given the predominance of national market mechanisms) the effects of deliberations at intermediate territorial scales. The new frontiers of research in energy justice (van Bommel, Höffken, 2021) and energy democracy (Szulecki, Overland, 2020) will have to take into account the planning and regulatory levels and investigate the management of energies within communities, whether self-declared or designated, using - more or less apart from market mechanisms - common resources.

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Notes

- [1] "The Renewable Energy Directive (Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources) and the Internal Electricity Market Directive (Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 concerning common rules for the internal market in electricity and amending Directive 2012/27/EU) of the Clean Energy Package, implementing this objective, have notably led to the introduction of the concepts of renewable energy communities and citizen energy communities."

Source : <https://www.smartgrids-cre.fr/encyclopedie/les-communautes-energetiques-locales/au-dela-de-lautoconsommation-concept-de-communautes-energetiques> [accessed on 04/11/2021].

- [2] Source : <https://www.bureauveritas.fr/magazine/marche-de-lelectricite-et-promotion-des-energies-renouvelables-transposition-de-directives> [access on 06/26/2021].
- [3] The expression, reported by Yalçın-Riollet and Garabuau-Moussaoui, comes from a local government official playing a key role in the energy autonomy initiative of the Breton canton of Mené.
- [4] See the summary of the webinar series at the end of this thematic issue.

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ⁱⁱ By the end of 2023, the number of operations had increased 6-fold