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Jacques-Aristide Perrin, Christine Bouisset. Emerging local public action in renewable energy production. Discussion of the territorial dimension of the energy transition based on the cases of four intermunicipal cooperation entities in France. *Energy Policy*, 2022, 168, pp.113143. 10.1016/j.enpol.2022.113143 . hal-03723310

HAL Id: hal-03723310

<https://univ-pau.hal.science/hal-03723310>

Submitted on 14 Jul 2022

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Citation: Jacques-Aristide Perrin, Christine Bouisset, Emerging local public action in renewable energy production. Discussion of the territorial dimension of the energy transition based on the cases of four intermunicipal cooperation entities in France, *Energy Policy*, Volume 168, 2022, 113143, ISSN 0301-4215, <https://doi.org/10.1016/j.enpol.2022.113143>.

Abstract

Local authorities in France have recently been granted administrative and operational responsibilities to pursue action in the domain of renewable energy. In this article we discuss the strategies and projects implemented by a diverse set of local authority groupings in France and highlight the different ways in which they have appropriated the issues and challenges of renewable energy. These intermunicipal entities have different sociocultural and geographic configurations, and our study shows that their local public action is driven by different motivations. Renewable energy is a vector for development that can be utilized in various ways, sometimes to legitimate public energy policy in the territory, and in other instances to bring in revenue. The politics of territorial energy strategy are often narrowly bounded by the scope of the intermunicipal structure (*Etablissement public de coopération intercommunale*, EPCI). This restricted focus makes it difficult to develop strategies spanning several territories, and in the long term could lead neighbouring territories to compete to attract investment.

Keywords: energy, France, local authority, transition

Introduction

This article looks at the ways in which local authorities participate in the energy transition. It focuses on actors in renewable energy and their practices, with emphasis on the articulation between decentralization of energy systems and the emergence of new forms of governance in France (Faller, 2016)¹. The local scale is increasingly important in the energy transition (Mattes and al. 2015²). Local authorities play a major role in the deployment of renewable energy (Kerr and al., 2017)³ by exemplary management of public properties, and through planning, incentives and awareness campaigns. Local authorities also initiate and/or accompany energy projects in their territory (Comodi and al., 2012)⁴. While in some European countries such as Germany (Libbe, 2013)⁵ local authorities have the leading role in renewable energy, in France and other countries action at this level is a recent phenomenon and is now the focus of much research (Lepessant, 2017)⁶.

French renewable energy objectives were drawn up under the European Union framework set forth in a 1997 white paper⁷ urging EU member countries to attain the proportion of 12% renewable energy in total energy consumption by 2010. The regulatory framework has since evolved (Monti and Martinez Romera, 2020)⁸. In the case of France, the objective is to attain 32% renewable energy by 2030⁹. Currently at 18% renewable energy in total consumption, France has not yet reached the objective of 23% set for 2020¹⁰. France is lagging behind in renewable energy development and must now tackle head-on the coordinated timing and

articulation of action at the local, national and European levels (Durand and al., 2018)¹¹. Energy policy in the country is based on action at multiple levels of government (Marks and al., 1996)¹², in keeping with the EU framework that sets objectives and establishes the economic rules of the energy market (Faure-Schuyer and al., 2017)¹³. Nationally the central government institutes incentive mechanisms, including regulation of commercial prices for renewable energy, tax reductions, etc. The government subsidizes projects via calls for proposals. Territorial authorities are legal public persons distinct from the national (State) government and are invested with administrative powers. Recently, the central State gave them more responsibilities to increase the chance of achieving the objective in terms of renewable energy (Poupeau, 2022)¹⁴.

The aim of this article is to provide a contribution to the analysis of the deployment of the energy transition at the local level and its link with the decentralization process. It focuses in particular on the intermunicipal entities (*Etablissement Public de Coopération Intercommunale - EPCI*) which represent the second smallest unit of administration and government, just above the local municipal echelon, the *commune* (figure 1). Their scope and legal responsibilities¹ were substantially expanded in the 2010s. They were created as an additional administrative level to compensate for the small size of the municipalities which do not always have the necessary resources to assume certain responsibilities (more than 85% have less than 2,000 inhabitants). Their scope and responsibilities have been considerably expanded in the 2010s. Among other things, they were given the leadership on the energy transition at the local level to elaborate a Territorial Air, Climate and Energy Plan² and develop renewable energy strategies. Four neighbouring EPCIs were studied. They were chosen because they belong to the same higher level administrative entities (Pyrénées-Atlantiques *département*, New Aquitaine region) and are consequently subject to the same regional energy planning directives. But they offer very different sociocultural and geographic configurations, different resources, economies, and political orientations, which makes it possible to analyse local geographic variations in the way the energy transition is addressed.

¹ What is referred to in France as 'compétences', notably in the field of law and administrative jargon, is characterized by the recognition of legitimate actors who are legally responsible to act in a certain field/area.

² These plans were made mandatory by a 2010 law for EPCIs with more than 50,000 inhabitants, a threshold lowered to 20,000 inhabitants in 2015.

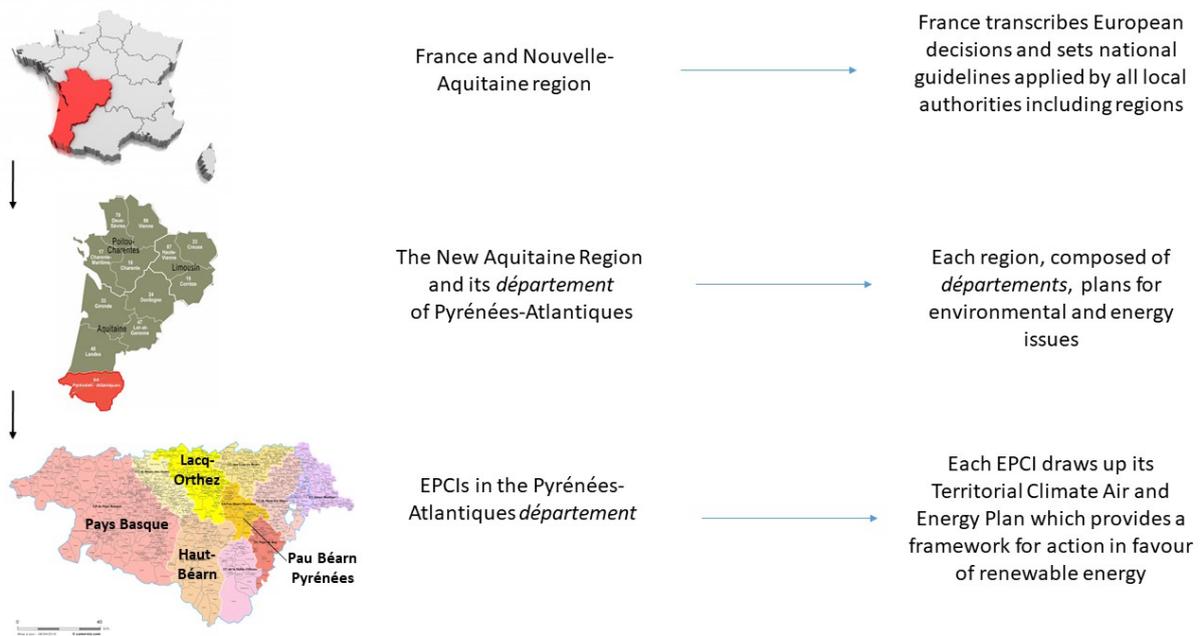


Figure 1: Levels of public administration in France and the entities discussed

The objective is to understand how these local authorities are handling their new responsibilities, how they build their own strategies and implement renewable energy projects within the framework of policy set at the European, national and regional levels. We propose a comparative approach to grasp the motivations driving their action, how these initiatives are conducted and the spatial effects in the energy sector. Our hypothesis is that the action of these local public bodies is driven not only by the mandatory regulatory framework, but first and foremost by specific concerns related to their geographic configuration. In our exploration we look at the territorial dimension of the energy transition, the actors that drive it and the induced spatial effects.

The first part of the article will describe our approach, the fields of our study and our qualitative method. Secondly, we will highlight the reasons advanced for renewable energy production by local actors and show that these may be factors internal to the territory, or external considerations.

1. Territorial approach to energy transition applied to the fields selected for study

In highly centralized countries such as France the energy transition is a movement that encourages decentralization of government (Lepesant, 2017). As a particular socio-technical transition pathway (Judson et al, 2020¹⁵), this process introduces governance challenge because of the necessity to determine the most effective way of allocating roles and responsibilities (Brisbois, 2020¹⁶). As underscored by LaBranche and Bosboeuf¹⁷, the recent decentralization of action to address energy issues in France must be analysed in terms of appropriation of new responsibilities, internal expertise and relevant know-how in technical, financial and administrative domains. Measures designed to spur the energy transition often come from above, and grass-roots initiatives are slow to take off due to the lack of autonomy exercised by local authorities. The structure of the energy sector makes it hard for new players to break into

national energy markets that are dominated by major corporations. The local deployment of renewable energy has been widely studied. Acceptability to the public has been analysed through the prism of conflicts and opposition to implantation of certain kinds of energy infrastructure (Sovacool and al., 2022¹⁸). Emerging citizen energy communities (Sebi and Vernay, 2020¹⁹) have been studied in terms of social innovation. Above all, technological innovation has been the subject of research along the classic lines of multi-level perspective (Geels, 2004²⁰ ; Kanger, 2021²¹). Nevertheless, several researchers have pointed out that these analyses pay little attention to the spatial dimension of the energy transition (Coenen and al., 2012²²; Bridge and al. 2013²³; Murphy, 2015²⁴, Hansen and Coenen, 2015²⁵; Labussière and al. 2018²⁶; Selvakkumaran and Ahlgren, 2017²⁷).

1.1 Energy issues at the territorial level

We place our work in the body of research on territorialization and multi-level governance (Dobracev and al., 2021²⁸ ; Melica and al. 2018²⁹) of energy policy, a field that has been growing since the mid 2010s. Unlike research work that focuses on a given type of renewable energy, we propose to focus on local authorities and their territories, in a comparative perspective. Likewise, we explore institutional motivations and the ways in which institutions implement renewable energy projects. We look less at territories that are pioneers or outstanding examples in the areas of renewable energy deployment and/or energy self-sufficiency, which have often been studied (Engelken and al., 2016³⁰; Young and Brans, 2017³¹). We seek to understand what happens when local authorities are given new responsibilities and embrace the energy transition even when they were neither willing nor particularly committed to the topic before. Therefore, we are primarily interested in the ways in which diverse territories handle the requirements of the energy transition, through different energy mixes and forms of governance (Fusch and Hinderer, 2014)³². It seems to us that there is reason to explore less advanced situations insofar as this could allow to identify some unanticipated outcomes and explain certain difficulties and even resistance encountered in the generalization of the energy transition.

We propose to study the energy transition and the development of renewable energies through an analytical framework that ties together the notions of level and scale. A level is a "reification of the concept of scale³³" that refers to a spatial grid applied to the political and administrative sphere. A scale is a methodological framework of analysis used to observe and think about action. Scales can be inter-related, superimposed, nesting or articulated. These two notions have different final purposes, but both can be used to study the strategy of intermunicipal entities as presented in their Territorial Air, Climate and Energy Plans, in accordance with their given responsibilities and national objectives. A territorial analysis of renewable energy involves a study of how renewable energy issues become politicized in the context of the energy transition, a process which constitutes a "collective mechanism to define a problem, in order to produce solutions³⁴". We hope to determine if renewable energy projects are the product of an ambition to appropriate energy issues at the territorial level, whether it be the result of a top-down dynamic to apply policy elaborated at another administrative level, or a bottom-up movement based on the desiderata of actors "in relation to local values and behaviours³⁵". This tension between the procedural dynamics of national and sectoral public policy deployed locally and

the substantive impetus for territorial action must be studied closely to grasp the driving forces in local energy transition.

The action by EPCIs entities can be understood through the articulation of local dynamics and policy orchestrated by the national government, "which does not want to – or cannot – control all aspects, but which nonetheless claims a central role in the political elaboration of the transition narrative"³⁶. Nevertheless, the development of decentralized energy supply and energy communities represents a break with the historically centralized energy sector in France. This could potentially jeopardize the national tariff structure designed to equalize costs and which has up to now worked to eliminate regional and local disparities in energy costs for consumers (Poupeau, 2013)³⁷. Consequently, the discourse proffered by local authorities to promote their capacity for action through the interaction of scales and levels can be analysed to reveal the options chosen in terms of space, scale and energy (Raven and al., 2012)³⁸, which in turn directly determine the type of energy transition set in motion. In this regard energy is a key to understanding and describing territorial action and the ways in which actors in the territory appropriate renewable energy production from spatially distributed resources and points of consumption. By reassessing the geographic, sociopolitical and cultural characteristics of the spaces under their jurisdiction, EPCIs can change their energy trajectory and augment their capacity for action. This does not mean that there is only one way to implement local energy transition. Some disparities in the capacity of local authorities have come to light (Kata and al, 2022³⁹; Kuzemko and Britton, 2020⁴⁰) but there is still a gap to be filled to characterize the different strategies and levers that local authorities use to implement local energy transition, and how they include it within their pre-existing missions and how it changes (or not) both their internal organization, their relations with other actors and the organization of their territory. A comparative and methodologically reproducible approach which is a method frequently used in geography to emphasize spatial similarities and disparities (Phillips and al., 2018⁴¹) and distinguish geographically situated *versus* more generic processes, would make it possible to work on the role of local configurations in the shaping, formulation, and management of energy issues.

Consequently, we looked at four administrative entities in south-western France, in the Pyrénées mountains and close to the Spanish border: Lacq-Orthez Communauté de Communes, Haut-Béarn Communauté de Communes, Pau Béarn Pyrénées Communauté d'Agglomération, and Pays Basque Communauté d'Agglomération. The territories were selected in relation to two criteria: proximity but diverse geographic and institutional settings, and the existence of energy projects.

	Communauté d'Agglomération Pau Béarn Pyrénées	Communauté de Communes de Lacq-Orthez	Communauté d'Agglomération du Pays Basque	Communauté de Communes du Haut-Béarn
Year of creation or expansion	2017	2014	2017	2017
Land area	343 km ²	730 km ²	2 968 km ²	1 066 km ²
Population	162 000	55 000	305 000	32 500

Geographic characteristics	Primarily urban and semi-urban	Mixed urban, industrial and rural areas	Mixed urban coastal areas, rural and mountainous areas	Primarily semi-urban and mountainous
Political and economic characteristics	Corporate headquarters of energy technology companies <u>Leading business sectors:</u> geosciences, energy, aerospace and agri-food	Industrial conversion <u>Leading sectors:</u> energy, chemicals, pharmaceuticals	Active civil society, energy and food independence highlighted in discourse <u>Leading sectors:</u> aerospace, agri-food, sports, tourism	Included within the bounds of the Pyrénées National Park <u>Leading sectors:</u> livestock grazing, tourism, thermal cure establishments, hydropower
Types of renewable energy present or under discussion to develop the potential of resources	Biogas (waste recovery) Geothermal (heating) Methanization Solar (roof panels, shade structures) Hydropower Fuelwood Methanation "Green" hydrogen	Biogas (agricultural effluent) Methanization Solar power (brownfields) Hydropower Fuelwood "Green" hydrogen	Biogas (waste recovery) Methanization (farm) Solar (roof panels, shade structures) Hydropower Fuelwood Wind power (offshore turbines in the medium term) Hydro turbines – wave power	Methanization Solar power (agrivoltaic) Hydropower Fuelwood Turbine power on thermal establishment heat networks
Proportion of % renewable energy in total energy consumption in each territory	7%	23% 103% (with biofuels)	12%	64%

Table 1: Characteristics of the four territories studied (data gathered through the review of official documents related to their Territorial Air, Climate and Energy Plans)

These EPCI entities have different configurations in terms of geography, land area, population and energy production (Table 1). The Pau Béarn Pyrénées and Lacq-Orthez entities have a sound industrial base in an urban context for the former and in a rural context for the latter. The Haut-Béarn is a rural and mountainous territory affected by demographic decline, whereas the Pays Basque is a vast territory which seeks to promote its political and energy autonomy, but is marked by a strong contrast between a very dynamic urban coastline and a mountainous interior in decline. If each EPCI has its own resources and potential for developing renewable energies, most are betting on the same technologies – solar power, methanization, hydropower and fuelwood – even if some are investing in specific energy chains, e.g., hydrogen for Pau Béarn Pyrénées and Lacq-Orthez.

1.2 Energy strategy analysis methodology

To understand why and how these EPCIs hope to embrace the energy transition and produce renewable energy we studied their public discourse and action over the course of the year 2020.

Using a qualitative approach, we gathered data via existing documents collection (climate plan, reports, communication materials, etc.) and semi-directive interviews with actors in these territories. In all, 55 interviews were conducted to reconstitute the history of the local energy strategy and to collect the interviewees' personal opinion on it and to cross-check their different point of views. They include: territorial public employees in charge of energy issues and political representatives (24 people), national administrations (10 people), energy companies (14 people), and not-for-profit organizations (7 people). The interviewees were all involved in preparing, planning and adopting local energy policy or assessing, counselling and directly implementing renewable energy projects. This allowed us to interview most of the people implicated in the decision-making processes related to renewable energy in the four territories studied. The interviews covered several topics: the respondents' job description and functions, the strategies of their entities, the types of projects developed and the collaboration between actors to implement them. Therefore, we coded manually the interviews and gathered data through this analytical framework to characterize and compare the energy strategy deployed in each case study. The content of the discourse was analysed to identify key elements in the way the EPCIs consider the energy transition and the main arguments put forth to justify their choices (type of energy, business model, political endorsement...).

When represented by a quantitative goal, the ambitions of their energy strategies can be correlated to human, organizational, financial and infrastructure resources, to energy technologies, and to energy uses, assuming that the structure has ranked energy issues internally and has defined the role or roles that the EPCI wants to play. Considering the entity's strategy, three emblematic renewable energy projects were identified for each territory to avoid discussing only on general objectives and to understand more concretely their modalities of action. Across this array of projects, we established comparisons with respect to type of energy and the configurations of public and private-sector actors. The three projects were selected to represent for each EPCI a project carried out with private partners, a project implemented by the EPCI alone, and thirdly identical projects pursued by each of the four EPCI.

Criteria Territories	1 project with private partners	1 project implemented alone	1 similar project conducted singly by each EPCI
Pau Béarn Pyrénées Communauté d'Agglomération (CA)	Lead partner for installation of an urban heat network supplied by incineration of waste and wood (with a subsidiary of the ENGIE group)	Installation of a photovoltaic panels over a parking area, to build an energy community among public actors	Coordination of a solar resources map (the Pays Basque CA has its own solar resources map; the three other entities have chosen the same contractor for their mapping projects)
Pays Basque Communauté d'Agglomération (CA)	Financial and political support for a social and citizen entrepreneurial solar energy project	Hydropower development study considering the constraints of regulations to preserve biodiversity in aquatic habitats	
Lacq-Orthez Communauté de Communes (CC)	Project to network industrial companies and make public infrastructure available for installation of a final waste incineration facility to produce steam and electricity	Purchase of polluted former industrial sites (50 hectares) for installation of photovoltaic panels to be rented to a private operator	

Haut-Béarn Communauté de Communes (CC)	Political and financial support for a citizen-led project to produce rooftop solar energy on public buildings	Political support for hydropower, in compliance with regulations to preserve biodiversity in aquatic habitats	
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Table 2: Three categories of projects studied

The range of renewable energy options and the diverse roles of the EPCI structures can be seen in a brief description of the projects. The Pau Béarn Pyrénées and Lacq-Orthez entities have initiated construction and start-up of energy facilities (district heating network, final waste incinerator, photovoltaic panels) while the Pays Basque and Haut-Béarn entities have opted to conduct studies to support actors from the private sector (citizen energy, hydropower). The solar resources maps are freely available on the internet. For the intermunicipal entities the aim is to inform citizens about the tool and demonstrate the energy potential of rooftops within the jurisdiction of each EPCI. Based on the information gathered, we retraced the strategy of the actors involved and the progression of projects currently underway or recently completed.

The strategies underlying the Territorial Air, Climate and Energy Plans and their implementation in the projects studied are identifiable through four main elements: 1) the stated and pursued energy objectives and the concerns driving the involvement of the EPCIs; 2) the means of action leveraged; 3) the role the EPCIs grant themselves; 4) and the relationships they maintain with other energy players and stakeholders in their territory. Therefore, we coded manually the interviews and gathered data through this analytical framework to characterize and compare the energy strategy deployed in each case study:

-- objectives and desired outcomes: quantitative targets expressed in % of production in relation to national and European objectives, and in relation to local uses and consumption; greater energy independence, incremental policy, territorial autonomy, benchmarking according to standards and targets of national policy, etc.

-- implementation choices: energy technology, favouring either centralized or inversely decentralized energy production and consumption, and preferred scale of action (industrial park or dense urban area, for example),

-- role of the EPCI structure in the process: regulator and arbitrator among proposed projects from the private sector, promoter of action suggested by private entities in the territory, or planning authority,

-- partnership and mode of interaction with forces in the territory – citizen initiatives, small businesses or large enterprises, public partners who provide guarantees for collaboration – and the influence of interest groups regarding specific energy resources, i.e., hydropower⁴², nuclear energy⁴³, fossil fuels⁴⁴, and the intervention of citizen activist groups⁴⁵. This last aspect has been abundantly covered in the literature.

2. Results

Breaking down the EPCIs' energy strategy through the prism of these four components, both in documents and in interviews, makes it possible to study the "why" and "how", i.e. to compare and classify their choices and then to highlight the levers of action that they choose to activate in order to achieve these objectives and implement their projects.

2.1 Stated goals and energy choices: a combination of driving forces

The inventory of the fundamental policy and goals stated by the EPCIs, the energy projects implemented or envisaged and the way in which the actors interviewed described them, allowed us to create a typology categorising each project according to the objectives and the goals pursued.

EPCI	Pays Basque CA and Haut-Béarn CC	Pays Basque CA and Haut-Béarn CC	Lacq-Orthez CC	Lacq-Orthez CC	Pau Béarn Pyrénées CA	Pau Béarn Pyrénées CA	All four EPCI
Goals							
Projects	Support for citizen solar energy	Support for continued hydropower	Waste incineration to produce steam and electricity	Solar array on polluted industrial brownfields	Solar array over a stadium parking area	District heating networks in urban areas	Coordination of solar resource mapping
Local energy supply to ensure autonomy and security	X	X			X	X	X
Stimulate economic activity in the territory		X	X				X
Meet rising demand for renewable energy	X	X	X	X	X	X	X
Foster decarbonization of the economy	X	X				X	
Financial advantages for the EPCI (tax revenues, rental income, etc)		X	X	X	X	X	
Local energy resources for local consumption	X	X	X	X Final waste disposal	X	X	X
Enhance the image of energy transition	X		X Green industry	X	X	X	
Greater comfort and better quality of life for residents	X (if solar thermal energy)					X	X (if solar thermal energy)

Table 3: Policy goals targeted by EPCI renewable energy projects (X = stated objective ; X = underlying objective)

Table 3 offers a synthesis of this typology. It shows that each project is driven and justified by a different goal or set of goals, as a single project may be the result of a combination of driving forces. The table adopts also two coloured-codes categories of difference in the discourses of the actors: a red cross means a stated objective by EPCI entities whereas a black cross represents an underlying argument. A critical-discourse lens is used to differentiate clearly the official and

informal discourses. In this way, this highlighted the role of discourse by contextualizing the public statement which has its own logic and explanation, and the real unstated goals.

This observation confirms earlier work on the motivations of municipalities, in particular studies carried out in Germany (Busch et McCormick, 2014⁴⁶). We distinguish eight major reasons that lead local authorities to pursue energy projects, depending on their goals. The goals may be directly related to energy and climate, e.g., reducing greenhouse gas emissions, or meeting demand for renewable energy. Others have different or complementary motivations, such as economic development, acquisition of additional financial resources, improved image and branding, or better provision of services to residents of the territory. In this regard, the economic opportunity is never publicly acknowledged. It is rather paradoxical that, in the same time, the energy efficiency is promoted as energy strategy and cost savings.

Renewable energy production in an EPCI territory can provide a range of benefits: measurable and foreseeable financial gains; a way to exploit local resources such as wood or waste; a tool for economic development via new activities and job creation; social advances in the form of high-quality facilities and management to hold down final energy costs; image enhancement for marketing purposes, with greater attention to citizens and civil society; new ties linking economic forces and citizens in the territory as they appropriate energy issues at the local level. In their discourse local public actors involved in the projects confirm that several aims and ambitions accompany renewable energy production: urban planning and development, industrial and economic renewal, new financial resources, and image enhancement for the territory. Local public action shaped around renewable energy also enables territories to draw value from resources, by exploiting "energy from space"⁴⁷.

All four EPCI structures are aware of the need to meet growing societal concerns. Typological analysis reveals their different positions and approaches to these demands. The Pays Basque and Haut-Béarn structures have focused their action on mobilizing citizens' personal savings to promote installation of small arrays of solar panels. This confidence in civil society is characteristic of their vision of the energy transition that relies on popular support and residents' involvement as a way to correlate energy production with lower energy consumption. There is thus a difference between the official discourses of the EPCI and the way to apprehend the energy transition of the civil society. The discourse of Pau Béarn Pyrénées also accords a prominent place to residents, via a district heating network that guarantees a "stable" energy price for users, but the structure has not deployed the practices of participative democracy. Inversely, the projects conducted by the by Lacq-Orthez are not aimed at the residents of the territory but target industrial companies that could make use of steam and electricity to produce "green hydrogen". This is consistent with a productivist vision of the energy transition to support conversion of the industrial fabric to new activities. Accordingly, there is no link between production of renewable energy and action to hold down energy consumption.

The position taken by each EPCI regarding organization of energy networks is also a central issue. Pau Béarn Pyrénées stands out for its criticism of the French model of centralized energy production; this entity approaches renewable energy as an opportunity to take control of the

energy chain, from production to consumption. This EPCI wants to revamp the existing centralized energy system by creating a closed distribution network serving only public buildings. Other actors in the energy sector do not support this decentralized energy project because it could jeopardize the national tariff system that equalizes the cost of electricity supply across urban and rural areas. Those who hesitate to decentralize electricity at the intermunicipal scale see it as a threat to solidarity between territories, and as a withdrawal from the central supply network and tariff structure that could undermine this system which has maintained low electricity costs for remote rural areas. Inversely, Lacq-Orthez used the instruments of centralized procedure to issue its call for projects to develop solar power on polluted brownfields. The electricity generated is fed directly into the centralized grid and is not correlated to the activity of local industrial companies or the needs of the local population. In implementing a renewable energy project, the intermunicipal structures are led to take a position on the scale and sizing of the supply grid, and consequently on the viability of the centralized system established on the national scale. This calls into question the fate of cost sharing and solidarity between territories, via cross-subsidized tariffs, and raises the perspective that future renewable energy development will not be the same for all⁴⁸.

2.2 Levers to pursue a local energy strategy

In examining the concrete means that the four EPCIs studied pursue their energy strategy through the framework described above, we found that they mobilize at least five levers to promote the local energy transition.

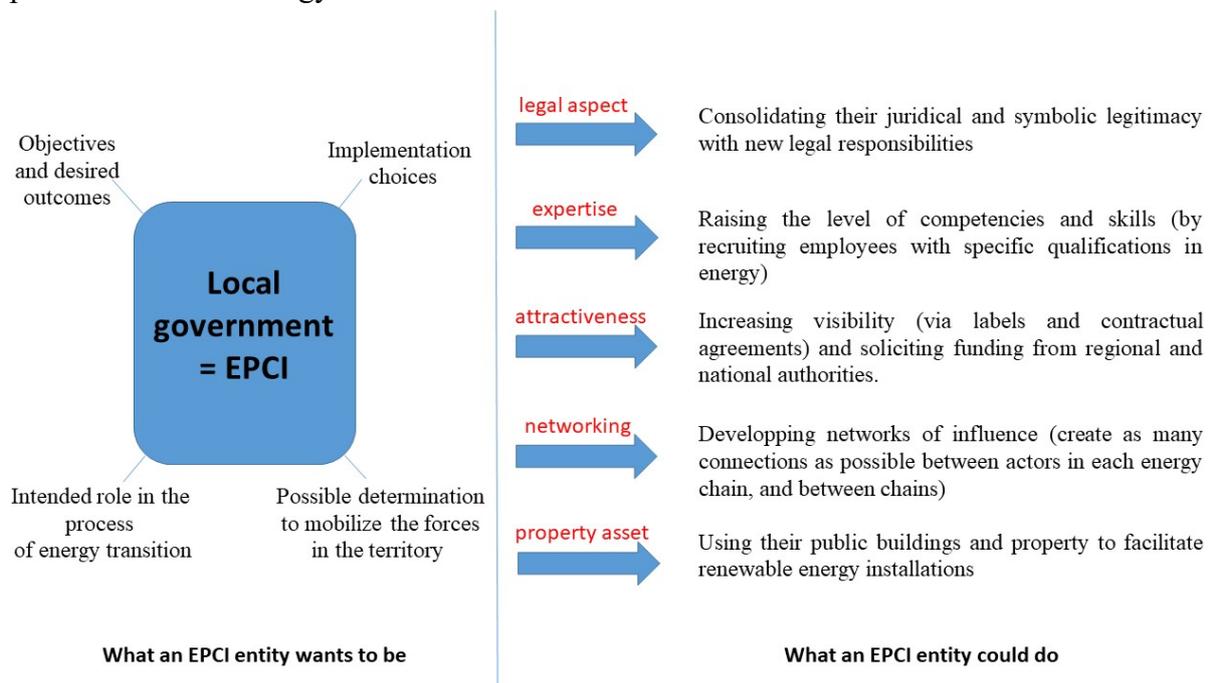


Figure 2: levers to promote the local energy transition on our field studies

The first lever stems from the desire to consolidate their juridical and symbolic legitimacy in an area which historically was outside the scope of their legal responsibilities. Some EPCIs have sought to justify and legitimate their action to reinforce their impact, via a vote by territorial elected officials to approve measures to assume optional responsibilities and acquire legal authorization to manage activities beyond those that are mandatory for EPCI structures.

Pau Béarn Pyrénées took this course to install an urban heat network. Likewise, Haut-Béarn was not required to draw up a Territorial Air, Climate and Energy Plan, but chose to do so in order to qualify for the national quality label of *Territoire à Énergie Positive*. This label awarded by a national association recognizes territories that produce as much energy as they consume.

The second lever used by EPCIs is to gain internal skills by recruiting employees with specific qualifications in energy. With specialized knowledge and staff, the structures are better equipped to analyse tools and services in detail and to present their requirements to partners and vendors in the private sector. This knowledge was a decisive factor for assessment of the potential benefits of the solar resources map proposed for each of the four territories. The solar resources mapping project was launched to inform citizens and enterprises of the solar energy that could be produced on their rooftops, and to encourage them to exploit this resource. The maps can also serve to establish and implement energy policy: aerial thermographic data can be plotted with social data to determine which social groups follow through on solar installations, or to target areas for action to reduce energy vulnerability.

A third lever is action to increase visibility and to solicit funding for renewable energy from regional and national authorities. Visibility is obtained via labels, contractual agreements, and participation in national programmes and calls for project proposals. Haut-Béarn has been awarded the *Zero net energy territory* label. Pau Béarn Pyrénées has concluded an Ecological Transition Contract agreement with the State and has benefited from the support of the national *funds renewable heat* for its heat network. Lacq-Orthez participated in a call for projects to secure advantageous energy purchase agreements for solar power from an array installed on polluted land. Haut-Béarn obtained matching funds from regional authorities to encourage local participative financing.

Promotion and consultation with partners are other instruments. The Pays Basque CA stands out for its efforts to create as many connections as possible between actors in each energy chain, and between chains. To build this network the EPCI conducted a survey of hydroelectric production sites and listed ways to upgrade them to comply with environmental regulations, to enable operators to maintain their activity in the short and medium term.

Yet another form of action is to be an example. All four of the entities in our study set the example by using their public buildings and property to facilitate renewable energy installations. Haut-Béarn and Pays Basque exploit rooftops and public lands, Lacq-Orthez its gas lines and public land.

The ways these levers are used depends on the role chosen by the EPCI structure. In our interviews the respondents of all the local public entities emphasized their role as "assembler", bringing together and coordinating all the protagonists in the territory – other public bodies, businesses and companies, civil society, citizens – to avoid competition between energy projects. Correlated to this role, a second role as planner can be seen in the documents elaborated under the mandatory Territorial Air, Climate and Energy Plans. Pays Basque also

elaborated an optional multi-year renewable energy development plan. The EPCI entities also want to act as project facilitators, insofar as the backers of private projects comply with their criteria in terms of environmental impact, social acceptability and fiscal revenue.

In addition to consultation and persuasion, the EPCI structures provide assistance to other actors. Haut-Béarn and Pays Basque have worked to maintain and even extend hydroelectric installations in their respective territories, while contending with national and European policies that are more favourable to biodiversity than to deployment of hydropower⁴⁹. Pau Béarn Pyrénées is backing a solar array project designed to produce energy for local consumption and solely in public buildings under a legally binding contract. Pays Basque has provided logistic and financial assistance to create a wave power facility on its Atlantic coast. This role is rounded out with measures to attract private-sector activity to the territory. This form of action is clearly seen in Lacq-Orthez where subsidiaries of Total and Suez companies have come in to ensure successful conversion of the industrial fabric initially created to extract natural gas and now devoted to green chemicals and advanced technology (methanation and green hydrogen) under the slogan *Green Lacq Valley*.

3. Discussion, conclusion and policy implications

We analysed how the intermunicipal structures make use of new responsibilities delegated by the central government, integrate them into their territorial management practices and communicate their vision and objectives.

3.1 Capacity for public action

These visions and objectives vary with the projects, and from one EPCI to another. The different motivations expressed go beyond a general discourse in support of action to address the energy transition, and reveal how renewable energy is appropriated in economic, financial, spatial, social and symbolic terms. Eventually, our study shows how the intermunicipal structures have seized upon renewable energy as a force for development. Each has appropriated renewable energy differently, depending on its overall vision for the territory and choice of governance, and on its conception of the energy transition.

The first model is an inclusive one, adopted by Haut-Béarn and Pays Basque who have invested time and money in civil society via citizen-led solar projects and support for small hydroelectricity producers. In these cases, local public bodies have consulted broadly and worked to build as many connections as possible across different electricity generation chains (methanization, solar power, hydropower, marine energy, municipal wastewater and waste incineration plants). The notion of a convergence between production and consumption by and for the local community emerges in their official and semi-official renewable energy discourse. A second model, represented by Lacq-Orthez, emphasizes methanation and hydrogen production in the medium term, and the industrial dimension clearly underlies the research work of companies specialized in energy and climate transition technology. This model disconnects energy production and consumption, and the other forces of the territory and its inhabitants disappear from the picture. The strategy of Pau Pyrénées is situated between these two poles. Its project is based on innovation to serve local residents and users, via a district heating network that was initially meant to draw heat from deep geothermal resources, but in the end will

produce energy by household waste incineration and fuelwood combustion. This configuration corresponds to the legal framework of an energy community to supply public buildings.

Comparing discourses and motivations, we observe that the core of EPCIs' action aims to legitimate their legal status and to enhance the public image of the territory and its energy policy, and thereby make the territory more attractive in economic terms, to bring in financial revenue that can be redistributed in the form of other services to inhabitants. In their action to engage in the energy transition via spatial and political strategies, the intermunicipal entities place these considerations above ethical injunctions (Jenkins and al., 2018)⁵⁰ or quantitative targets set by the central government. While these renewable energy projects were undertaken when new responsibilities were granted to EPCI structures, they are driven by their internal capacity for public action (Guillen and al., 2016)⁵¹. These entities have the administrative and organizational skills to identify problems and implement solutions on their own (Degrémont, 2018)⁵².

Our findings converge with the notion that endowed with this capacity, reflecting the profiles of the employees recruited and assigned to the projects, and the resources allotted to pursue strategic objectives, the intermunicipal entities are not limited to simple application of national and EU directives, but are able to integrate objectives at other levels that are determined by their own political and strategic conception of the territory. This confirms the need to address "the question of territory not merely via simply defined forms (location of resources, area of consumption, local scale, day-to-day administration) but in new ways, to grasp the social and territorial changes elicited by the deployment of new potential⁵³". Renewable energy projects have a spatial scope and produce effects on practices such as consumption of locally produced energy, on urban development (heating networks) and on land values (solar projects). The ways in which intermunicipal entities shape their spaces via renewable energy projects raises the issue of their broader contribution to the future of each territory.

We sought to understand how local public actors promote a given form of energy (Fudge and Peters, 2009⁵⁴), and for what reasons. The public actors we interviewed rarely referred explicitly to the political dimension of the relationship between the local EPCI entity and the territory as such (and they mention it even less in their institutional communication to the citizens). This dimension was merely suggested by vague formulas such as "shared energy", "affordable energy", "energy that links people". These formulas are often drawn from EU or national directives and framework documents established at other levels of decision, or by protagonists other than the State who relay vastly different visions of the future and transitional projects.

The effects of each type of renewable energy and the consequences in terms of distribution network for the energy produced have social and technical repercussions that are not readily perceptible to the general public. These consequences reveal the beneficiaries of locally produced energy. In public discussion to communicate the scope and effects of local management of energy production and distribution, intermunicipal bodies are obliged to take political positions regarding other scales and levels of decision, and the discussion may be transformed into a conflictual debate. A key issue in France is the fate of the national tariff

structure⁵⁵ which equalizes the cost of electricity supply across the whole country. This model is challenged by the concept of closed public distribution systems that is close to the model of energy communities. In order to reconcile territorialization and a multi-scale analysis of renewable energy development, it is necessary to assess the impacts of decisions according to the level of decision and scale (the effects of decisions).

3.2 Change of scale of energy action

The nature of the projects seen in EPCIs shows that the delegation of legal responsibilities to these intermunicipal structures starting in 2010 has produced a change of scale. Under the first climate and energy plans established by EPCI structures in the early 2000s, measures were devised primarily at the scale of public buildings and property, e.g., rooftop solar panels and heat networks for each building). Now energy action is thought out more in terms of neighbourhoods (for instance heating network in Pau Béarn Pyrénées district) and industrial sites (final waste incineration facilities to produce steam to be used other industrial companies). This action is even framed with reference to the territory as a whole, to build cooperation between protagonists and stakeholders, to ensure coherence and compatibility between projects and limit competition for land and financial resources. This change of scale of energy action is part of a general shift to local authorities endowed with broader legal responsibilities driven by decentralization.

Three types of processes are at work: "the projection of a new institution consistent with a space deemed to be relevant, new definitions of the scope and substance of public action, realignment of the relations between levels of responsibility (bottom-up or top-down)⁵⁶". The administrative departments of EPCI entities are restructured to better match their strategies: redrawn geographic areas, revised framework for action, new agenda. The change of scale implies a broader scope of conception, elaboration, and implementation of local public action. This change results in strategies that vary between different intermunicipal entities.

The delegation of powers has not, for the moment, resulted in political rescaling (Jouve, 2011)⁵⁷ – the affirmation of the EPCI level as the reference for energy action – as has been observed in other domains in Europe. This can be explained by the fact that the political dimensions of local energy strategy are bounded by the geographic limits of each EPCI, given their limited financial autonomy and their incremental and experimental policies that advance step by step. As has been seen in other European countries such as Denmark with a need to continuously improve coordination at local scale, there appears to be very little coordination between the strategies of local authorities in France (Sperling et al. 2011⁵⁸). The current decision-making chain, with the various levels of government, favours "the coexistence of local autonomy and institutional regulation⁵⁹" with "nesting hierarchical arrangements⁶⁰" that are particularly visible in the structuring of financing and EU/State/regional and local programmes. If local EPCIs continue to make gains in their capacity for action and successfully modify their energy mix without severe setbacks or blockage due to resistance and opposition, calls for decentralized energy, a claim already in the minds of some, could emerge as a dominant voice and constitute a turning point in the territorial framework for renewable energy projects.

Eventually, our territorial approach to the geography of energy aimed to better understand the territorial dimension of the energy transition. Our objective was to apprehend how one type of local authority in France, called EPCI, is able to seize the opportunities offered by renewable energy and to devise strategies to implement local projects. If the case of France is particular because of the specificity of the EPCIs, new supra-municipal entities intended to compensate for the too small size of the French municipalities, we proposed a replicable methodology to study the modalities, the underlying logic, and the geographical disparities of the deployment of the energy transition at the local level. From an empirical point of view, one of the contributions of this work is to show the coexistence, within the same territory, of different, even competing, and contradictory local energy transition models. We emphasize the extent to which the local implementation of the energy transition can come under powerful intertwined territorial logics.

The local authorities we studied are driven not only by the mandatory regulatory framework or a concern for global environment, but first and foremost by specific local concerns. Analysing the projects now underway provides a view of the conflict between the general interest and local institution that inevitably arises in the elaboration and implementation of public action to develop renewable energy. This emerging conflict could be rendered even more visible - and potentially addressed - via a grid to explicitly map out local, general and shared public interests in spatial terms.

¹ Faller F., A practice approach to study the spatial dimensions of the energy transition, *Environmental Innovation and Societal Transitions*, 2016, 19, p.85-95. doi:<http://dx.doi.org/10.1016/j.eist.2015.09.004>. <http://www.sciencedirect.com/science/article/pii/S2210422415300198>.

² Mattes J., Huber A., Koehrsen J., Energy transitions in small-scale regions — What we can learn from a regional innovation systems perspective, *Energy Policy*, 2015, 78, p.255–64, doi:10.1016/j.enpol.2014.12.011

³ Kerr S., Johnson K., Weir S., Understanding community benefit payments from renewable energy development. *Energy Policy*, 2017, 105, p.202-211, <https://doi.org/10.1016/j.enpol.2017.02.034>

⁴ Comodi G., Cioccolanti L., Polonara F. and Brandoni C., Local Authorities in the Context of Energy and Climate Policy, *Energy Policy*, 2012, 51, p.737-748. doi:[10.1016/j.enpol.2012.09.019](https://doi.org/10.1016/j.enpol.2012.09.019). <https://linkinghub.elsevier.com/retrieve/pii/S030142151200777X>.

⁵ Libbe J., « La transition énergétique en Allemagne et le rôle des communes » in *Droit et gestion des collectivités territoriales*, 2013, Tome 33, p.267-275

⁶ Lepasant G., « Implementing EU Renewable Energy Policy at the Subnational Level », in Arent D. J. (dir.) *The Political Economy of Clean Energy Transitions*, 2017, Oxford, United Kingdom: Oxford University Press. doi:10.1093/oso/9780198802242.003.0028

⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3A127023>

⁸ Monti A. and Martinez Romera B., Fifty shades of binding: Appraising the enforcement toolkit for the EU's 2030 renewable energy targets, *RECIEL*, 2020, Vol.29, n°2, p.221-231, doi: <https://doi.org/10.1111/reel.12330>

⁹ <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000039355955/>

¹⁰ Phan C., Plouhinec C., Ministère de la Transition Énergétique, Data Lab : chiffres clés des énergies renouvelables, 2020, 92p

¹¹ Durand L, Oiry A. and Palle A., La mise en politique de la transition énergétique : la durabilité à l'épreuve des conflits de temporalités, *Temporalités*, 2018, 28, DOI : <https://doi.org/10.4000/temporalites.5091>

¹² Marks G., Hooghe L. and Blank K., European Integration from the 1980s: State-centric vs Multi-level Governance, *Journal of common market studies*, 1996, Vol.34, n°3, <https://doi.org/10.1111/j.1468-5965.1996.tb00577.x>

-
- ¹³ Faure-Schuyser A., Welsch M., Pye S., “Chapter 7 - A Market-Based European Energy Policy” in Europe's Energy Transition, Editor(s): Welsch M., Pye S., Keles D., Faure-Schuyser A., Dobbins A., Shivakumar A., Deane P., Howells M., 2017, Academic Press, p.41-48, <https://doi.org/10.1016/B978-0-12-809806-6.00007-9>
- ¹⁴ Poupeau F-M, Local authorities and energy in France. Increasing duties, limited means of action” in Dreyfus M., Suwa A.. Local Energy Governance. Opportunities and Challenges for Renewable and Decentralised Energy in France and Japan, 2022, Routledge,
- ¹⁵ Judson E., Fitch R. O., Pownall T., Bray R., Poulter H., Soutar I., Lowes R., Connor P. M., Britton J., Woodman B., Mitchell C., The centre cannot (always) hold: examining pathways towards energy system de-centralisation, *Renewable and Sustainable Energy Review*, 2020, Vol. 118, [10.1016/j.rser.2019.109499](https://doi.org/10.1016/j.rser.2019.109499)
- ¹⁶ Brisbois M-C., Decentralised energy, decentralised accountability? Lessons on how to govern decentralised electricity transitions from multi-level natural resource governance, *Global Transitions*, 2020, 2, p.16-25
- ¹⁷ LaBranche S. et Bosboeuf P., La prise en main de l'énergie par les collectivités territoriales : freins et moteurs, *Environnement Urbain*, 2017, Vol.11, URL: <http://journals.openedition.org/eue/1897>
- ¹⁸ Sovacool B. K., Hess D. J., Cantoni R., Dasom L., Brisbois M-C., Walnum H. J., Dale R. F., Johnsen Rygg B., Korsnes M., Goswami A., Kedia S., Goel S., Conflicted transitions: Exploring the actors, tactics, and outcomes of social opposition against energy infrastructure, *Global environmental change*, 2022, Vol.73, <https://doi.org/10.1016/j.gloenvcha.2022.102473>
- ¹⁹ Sebi C. and Vernay A-L., Community renewable energy in France: The state of development and the way forward, *Energy Policy*, Vol.147, doi: <https://doi.org/10.1016/j.enpol.2020.111874>
- ²⁰ Geels F. W., From sectoral systems of innovation to socio-ecological systems: insights about dynamics and change from sociology and institutional theory, *Research Policy*, 2004, Vol. 33, n°6-7, p.897-920, <https://doi.org/10.1016/j.respol.2004.01.015>
- ²¹ Kanger L., Rethinking the Multi-level Perspective for energy transitions: from regime life-cycle to explanatory typology of transition pathways, 2021, *Energy Research & Social Science*, Vol.71, <https://doi.org/10.1016/j.erss.2020.101829>
- ²² Coenen L., Bennenworth P., Truffer B., Toward a Spatial Perspective on Sustainability Transitions, *Research Policy*, 2012, 41, p.968-979, <https://doi.org/10.1016/j.respol.2012.02.014>
- ²³ Bridge G., Bouzarovski S., Bradshaw M. and Eyre N., Geographies of energy transition: Space, place and the low-carbon economy, *Energy Policy*, 2013, 53, p.331-340. <http://www.sciencedirect.com/science/article/pii/S0301421512009512>.
- ²⁴ Murphy J. T., Human Geography and Socio-Technical Transition Studies: Promising Intersections. *Environmental Innovation and Societal Transitions*, 2015, 17, p.73-91, doi: [10.1016/j.eist.2015.03.002](https://doi.org/10.1016/j.eist.2015.03.002)
- ²⁵ Hansen T., Coenen L., The geography of sustainability transitions: Review, synthesis and reflections on an emergent research field, *Environmental Innovation and Social Transition*, 2015. Vol.17, p.92-109. doi: [10.1016/j.eist.2014.11.001](https://doi.org/10.1016/j.eist.2014.11.001)
- ²⁶ Labussière O., Banos V., Fontaine A., Verdeil E. and Nadaï A., « The Spatialities of Energy Transition Processes. » in *Energy Transitions: A Socio-Technical Inquiry*, in Labussière O. and Nadaï A. (dir), 2018, p.239-275
- ²⁷ Selvakkumaran S. and Ahlgren E. O., Understanding the Local Energy Transitions Process: A Systematic Review, *International Journal of Sustainable Energy Planning and Management*, 2017, 14: p.57-78. doi:[10.5278/ijsepm.2017.14.5](https://doi.org/10.5278/ijsepm.2017.14.5). <https://somaesthetics.aau.dk/index.php/sepm/article/view/1989>.
- ²⁸ Dobravec V., Matak N., Sakulin C., Krajacic G., Multilevel governance energy planning and policy: a view on local energy initiatives, *Energy, Sustainability and Society*, 2021, 11:2, <https://doi.org/10.1186/s13705-020-00277-y>
- ²⁹ Melica G., Bertoldi P., Kona A., Iancu A., Rivas S., Zancanella P., Multilevel governance of sustainable energy policies: The role of regions and provinces to support the participation of small local authorities in the Covenant of Mayors, *Sustainable cities and Society*, 2018, Vol.39, p.729-739, <https://doi.org/10.1016/j.scs.2018.01.013>
- ³⁰ Engelken M., Römer B., Drescher M. and Welpel I., Transforming the energy system: Why municipalities strive for energy self-sufficiency, *Energy Policy*, 2016, 98, p.365-377, DOI: [10.1016/j.enpol.2016.07.049](https://doi.org/10.1016/j.enpol.2016.07.049)
- ³¹ Young J. and Brans M., Analysis of factors affecting a shift in a local energy system towards 100% renewable energy community, *Journal of cleaner production*, 2017, 169, p.117-124, DOI: [10.1016/j.jclepro.2017.08.023](https://doi.org/10.1016/j.jclepro.2017.08.023)
- ³² Fuchs G., Hinderer N., Situative Governance and Energy Transitions in a Spatial Context: Case Studies from Germany, *Energy, Sustainability and Society*, 2014, 4 (1), p.1-11. doi:[10.1186/s13705-014-0016-6](https://doi.org/10.1186/s13705-014-0016-6).
- ³³ Orain O., « La géographie française face à la notion d'échelle: Une approche par les significations et les contenus épistémologiques », in Robic Marie-Claire (dir.), *Echelles et temporalités en géographie*, 2004, CNED, p.2-24
- ³⁴ Lagroye J., « Les processus de politisation », in Lagroye Jacques (dir.), *La Politisation*, 2003, Belin, p.359-385

-
- ³⁵ Dubresson A., Jaglin S., Gouvernance, régulation et territorialisation des espaces urbanisés, dans Antheaume B., Giraut F. (dir.), *Le territoire est mort, vive les territoires ! Une (re)fabrication au nom du développement*, 2005, Éditions de l'IRD, p.337-352
- ³⁶ Aykut S. C., Evrard A., Une transition pour que rien ne change ? Changement institutionnel et dépendance au sentier dans les « transitions énergétiques » en Allemagne et en France, *Revue internationale de politique comparée*, 2017, Vol. 4 (n°1), p.17-49, DOI : [10.3917/ripc.241.0017](https://doi.org/10.3917/ripc.241.0017)
- ³⁷ Poupeau F.-M., La péréquation tarifaire de l'électricité en France : une difficile "recherche en paternité". *CLER Infos*, Montreuil: CLER, 2013, p.13
- ³⁸ Raven R., Schot J. W., Berkhout F., Space and scale in socio-technical transitions, *Technology, Innovation & Society*, 2012, Vol.4, n°16, p.63-78, <https://doi.org/10.1016/j.eist.2012.08.001>
- ³⁹ Kata, R., Cyran, K., Dybka, S., Lechwar M., Pitera R., The Role of Local Government in Implementing Renewable Energy Sources in Households (Podkarpacie Case Study), *Energies*, 2022, 15, p.31-63, <https://doi.org/10.3390/en15093163>
- ⁴⁰ Kuzemko C. and Britton J., Policy, politics and materiality across scales: A framework for understanding local government sustainable energy capacity applied in England), *Energy research & Social Science*, 2020, Vol.62, <https://doi.org/10.1016/j.erss.2019.101367>
- ⁴¹ Phillips M. and Smith D., « Comparative approaches to gentrification: Lessons from the rural », *Human Geography*, 2018, 8: 3-25. doi:[10.1177/2043820617752009](https://doi.org/10.1177/2043820617752009)
- ⁴² Byrne J, Toly N, "Energy as a social project: Recovering a discourse", in Byrne John, Toly Noah and Glover Leigh (dir.), *Transforming power: Energy, environment and society in conflict*, 2006, Routledge, p.1-32
- ⁴³ Jasanoff S. and Sang-Hyun K., Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea. *Minerva*, 2009, 47 (n°2), p.119-146, [10.1007/s11024-009-9124-4](https://doi.org/10.1007/s11024-009-9124-4)
- ⁴⁴ Bouzarovski Stefan and Bassin Mark, Energy and identity : Imagining Russia as a hydrocarbon superpower, 2011, *Annals of the Association of American Geographers*, Vol.101, p.783-794.
- ⁴⁵ Corroyer P., Faunes sauvages en politique. Tisser et mettre en scène un territoire contestataire : de la ZAD de Notre-Dame-des-Landes à Bure, *L'Espace Politique* [En ligne], 2019, Vol.37, n°1, <https://doi.org/10.4000/espacepolitique.6344>
- ⁴⁶ Busch H., McCormick K., Local power: exploring the motivations of mayors and key success factors for local municipalities to go 100% renewable energy, *Energy, Sustainability and Society*, 2014, Vol. 4, 5, p.1-15, doi:10.1186/2192-0567-4-5
- ⁴⁷ Brücher W., Energy, Geography of, in Smelser Neil J. and Baltes Paul B. (dir.), *International Encyclopedia of the Social and Behavioral Sciences*, 2001, p.4520-4523.
- ⁴⁸ Dégremont M., Transitions énergétiques et politiques à l'orée du XXIe siècle. L'émergence en France d'un modèle territorial de transition énergétique, thèse de science politique, Institut d'Etudes Politiques de Paris, 2018.
- ⁴⁹ Habel M., Mechkin K., Podgorska K., Dam and reservoir removal projects: a mix of social-ecological trends and cost-cutting attitudes. *Scientific Report*, 2020, 10, 19210, <https://doi.org/10.1038/s41598-020-76158-3>
- ⁵⁰ Jenkins K., Sovacool B. K., McCauley D., Humanizing sociotechnical transitions through energy justice: An ethical framework for global transformative change, *Energy Policy*, 2018, Vol.117, p.66-74, <https://doi.org/10.1016/j.enpol.2018.02.036>
- ⁵¹ Guillen M. F., Capron L., State Capacity, Minority Shareholder Protections, and Stock Market Development. *Administrative Science Quarterly*, 2016, 61(1), p.125-160.
- ⁵² Dégremont M., Transitions énergétiques et politiques à l'orée du XXIe siècle. L'émergence en France d'un modèle territorial de transition énergétique, thèse de science politique, Institut d'Etudes Politiques de Paris, 2018.
- ⁵³ Labussière O. et Nadaï A., Introduction, *L'énergie des sciences sociales*, 2015, Athéna. <https://books.openedition.org/allianceathena/203?lang=fr>
- ⁵⁴ Fudge S. and Peters M., Motivating carbon reduction in the UK: the role of local government as an agent of social change, *Journal of Integrative Environmental Sciences*, 2009, 6:2, p.103-120, DOI: [10.1080/19438150902732101](https://doi.org/10.1080/19438150902732101)
- ⁵⁵ CRE, *Eléments de réflexion : les enjeux associés au développement de l'auto-consommation*, 2017, 19 p.
- ⁵⁶ Négrier E., *La question métropolitaine : les politiques à l'épreuve du changement d'échelle territoriale*, 2005, PUG
- ⁵⁷ Jouve B., « Le political rescaling pour théoriser l'Etat et la compétition territoriale en Europe », in Faure Alain, Leresche Jean-Philippe, Muller Pierre et Nahrath Stéphane (dir.), *Action publique et changements d'échelles : les nouvelles focales du politique*, 2011, L'Harmattan
- ⁵⁸ Sperling, K., Hvelplund, F., Vad Mathiesen, B., Centralisation and decentralisation in strategic municipal energy planning in Denmark, *Energy Policy*, 2011, 39, p.1338-1351, DOI:[10.1016/j.enpol.2010.12.006](https://doi.org/10.1016/j.enpol.2010.12.006)
- ⁵⁹ Maïté J., Les communs urbains à Barcelone : vers une réinvention de la gouvernance territoriale ?, *Espaces et sociétés*, 2018, Vol.4, n°175, p.35-49
- ⁶⁰ Harvey D. *Villes rebelles. Du droit à la ville à la révolution urbaine*, 2015, Buchet-Chastel.