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**RES-TMO – WP4 – Action 4.2 – November 2020**

# *Working Paper* – Challenges and Solutions for an Integrated Renewable Energy Market in the Upper Rhine Region: Socio-Cultural Issues and Actors' Interactions

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The Interreg RES-TMO (*Renewable Energy Sources in the Trinational Metropolitan Region Oberrhein*[1], February 2019-January 2022) European project aims to examine the conditions for the development of a renewable energy market in the trinational metropolitan region of the Upper Rhine[2]. Seven work packages (WP) have been defined to analyse the technical, economic, regulatory, political and socio-cultural issues involved in developing a regional energy system based on renewable energies. The team working on WP4, composed of researchers from the SAGE research unit[3], studies the socio-cultural conditions for the development of a renewable energy system in the Upper Rhine region. The goal is both to examine 1) the conditions required for key players (energy suppliers, network operators, associations, decision-makers...) to be able to work together across national borders; 2) the acceptability of social innovations involving citizens in local production of renewable energies.

This working paper[4] presents first an overview of the current development of renewable energies in the Upper Rhine. In a second and third part, we present our main research questions and hypotheses, then describe our methodological approach, based on field surveys. The fourth and fifth sections describe our first results, derived from the analysis of the interactions of key players involved in the development of a trinational energy market, and, more specifically, of the issues raised by citizen energy. In a final part, we then formulate recommendations for an increased cross-border integration of renewable energies in the Upper Rhine.

## 1) An overview of the energy system in the Upper Rhine: different energy transitions for different local territories

European policies all consider that increasing the share of renewable energies in the energy mix is a prerequisite to the decarbonisation of energy systems in order to achieve climate policy objectives[5]. EU member states have in particular committed to reducing carbon dioxide emissions by 80% by 2050. Yet the energy transition (or *Energiewende* in Germany) required needs to be examined as a plural phenomenon, dependent on the different conceptions and instruments supporting its development and on the specific socio-cultural contexts of countries and energy areas[6]. Within the Trinational Metropolitan Region of the Upper Rhine (TMR), Switzerland,

[1] See the dedicated website: https://www.res-tmo.com/en/

[2] The trinational Upper Rhine area, which is situated around the border between France, Germany and Switzerland, was made into the Trinational Metropolitan Region of the Upper Rhine as a result of exchanges between political, economic and civil society actors at the 10th Tripartite Congress in Freiburg im Brisgau in 2006. It was officially recognized by Paris, Berlin and Bern on Dec 9, 2010, at the occasion of the 35th anniversary of the French-German-Swiss Intergovernmental Commission in Offenburg, and is now at the center of many cross-border cooperation projects. Source: http://www.rmtmo.eu/fr/la-region-metropolitaine.html

[3] "Societies, Actors, Government in Europe" research unit, UMR 7363, CNRS/University of Strasbourg.

[4] We would like to thank the trainee students from the Strasbourg Institute of Urbanism "City, environment and societies" master's programme who worked on WP4: Flandrine Lusson and Mathilda Wingert (2019); Aude Dziebowski and Sophie Henck (2020).

[5] On RES policies in Europe, see: Evrard Aurélien, 2013, *Contre vents et marées. Politiques des énergies renouvelables en Europe*, Paris, Presses de Sciences Po.

[6] See Baggioni Vincent, Burger Céline, Cacciari Joseph, Mangold Marie (eds.), 2019, *Repenser la transition énergétique. Un défi pour les sciences humaines et sociales*, Rennes, Presses Universitaires de Rennes; Christen Guillaume, Hamman Philippe, 2015, *Transition énergétique et inégalités environnementales. Énergies renouvelables*

Germany and France have all set national targets for a significant increase of renewable energies and a reduction of fossil fuels and nuclear energy[7]. Yet the energy policies or energy mix are not exactly similar in the three countries, which can have an impact on the possibility of **cross-border cooperation** in the Upper Rhine region. In this paper, we'll go more in-depth into electricity, as the main focus of the RES-TMO project. However, to have a holistic picture of the energy sector, we need to keep in mind that electricity accounts for about 23% of final energy consumption in the EU (Eurostat, 2017) with other sectors (i.e. burning fossil fuels in industry and households, incl. for heating and cooling) being responsible for a large share of GHG emissions[8].

In Germany, the Climate Action Programme 2020 (*Aktionsprogramm Klimaschutz* 2020), adopted in December 2014, set the target of cutting greenhouse gas emissions by 40% by 2020 compared to 1990. It was expanded by the Climate Protection Plan 2050 (*Klimaschutzplan* 2050) whose goal is to achieve "climate neutrality" by 2050: the plan has thus defined quantified emission reduction targets for each sector and aims for a global decrease of greenhouse gas emissions by 55% by 2030 compared to 1990. At the same time, the 2017 RES Act (*Erneuerbare-Energien-Gesetz* 2017 – EEG-2017) aims to increase the share of electricity produced from renewable sources in gross electricity consumption, that is reach 80% of RES in the electricity mix by 2050[9]. Currently, the share of RES in the German electricity mix is already relatively high (see diagram below), and accounts for 41% of the overall electricity mix. It is largely dependent on the energy produced by wind turbines and photovoltaic panels. Although nuclear production in Germany is limited (13%), fossil fuels, particularly coal and lignite power plants, still represent a significant share of electricity production (46%), which should be gradually reduced with the objective of closing these plants by 2038[10]. The state of Baden-Württemberg, for example, launched a campaign to promote photovoltaic installations and published in May 2020 an *ad hoc* practical guide addressing municipalities in the following terms: "In order to make the transition to a secure, affordable and climate-friendly energy supply, solar energy must be massively developed in the coming years. [...] With photovoltaic systems, you reduce your electricity bill and protect the municipal budget. Start today, because it's worth it"[11].

*et implications citoyennes en Alsace*, Strasbourg, Presses Universitaires de Strasbourg; Christen Guillaume, Hamman Philippe, Jehling Mathias, Wintz Maurice (eds.), 2014, *Systèmes énergétiques renouvelables en France et en Allemagne. Synergies et divergences*, Paris, Éditions Orizons; Hamman Philippe, Vuilleumier Stéphane (eds.), 2019, *Sustainability Research in the Upper Rhine Region. Concepts and Case Studies*, Strasbourg, Presses Universitaires de Strasbourg; Schumacher Kira, Krones F., McKenna Russell, Schultmann Frank, 2019, "Public Acceptance of Renewable Energies and Energy Autonomy: A Comparative Study in the French, German and Swiss Upper Rhine Region", *Energy Policy*, vol. 126, p. 315-332.

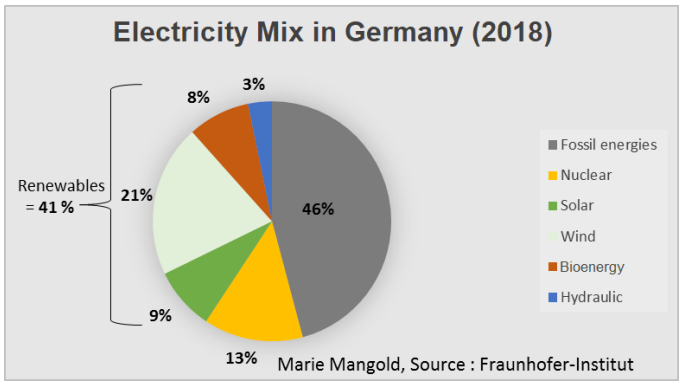
[7] For instance, Germany has committed to definitely phasing out civil nuclear energy by 2022. In France, the 2015 Act for energy transition planned to reduce by half the share of nuclear energy in total energy production by 2025, an objective which has since then been postponed to 2035. In Switzerland, the "energy strategy 2050", which was adopted in 2014, forbids the construction of new nuclear power plants and sets targets for their progressive dismantlement.

[8] See for instance: https://res-tmo.com/en/resources/default-title-1/default-title-4

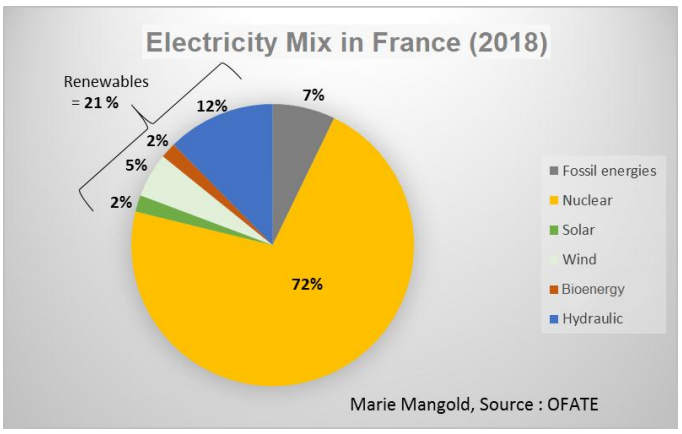
[9] Trion Climate, 2019, Trinational Climate-Energy report.

[10] *Les Échos*, 16/01/2020: https://www.lesechos.fr/monde/europe/la-fermeture-des-centrales-a-charbon-allemandes-peut-commencer-1163623

[11] *Photovoltaik in Kommunen. Solarenergie sinnvoll einsetzen*, Solar Cluster Bade-Wurtemberg, Mai 2020 (translated into English).

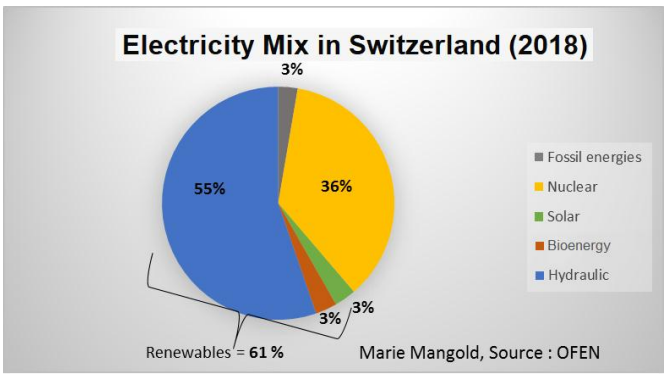



In France, a country which has long been attached to its "centralised tradition and technostructure"[12], civil nuclear power has guaranteed a certain degree of energy independence. The French energy mix has also relied on a massive and growing use of fossil fuels since the end of the Second World War, a "hard energy path"[13] which has translated until recently into only limited use of renewable energy sources since they were considered as less competitive than nuclear power[14]. The 2015 Energy Transition for Green Growth Act has nevertheless planned to reduce greenhouse gas emissions by 40% by 2030. The share of RES in electricity production should then be raised to 40% by 2030. Today, RES account for 21% of the French electricity mix mainly due to hydropower facilities: many dams and hydroelectric power plants on the Rhine make the exploitation of this renewable energy source visible in the TMR. Yet, hydropower has been exploited for many years and has now reached maximum capacity on the Rhine (except for micro-hydroelectric power plants), which has prompted reflection about new sources of renewable energy. Electricity production in France is mainly based on nuclear power (72%) and, to a smaller degree, on fossil fuels (7%). However, the closure of the Fessenheim nuclear power plant in Alsace in 2020 provides the opportunity for the region and border areas to rethink energy production and develop new projects based on renewable energy[15].




[12] Christen and Hamman, *op. cit.*, p. 79.
[13] Lovins Amory B., 1977, *Soft Energy Paths: Toward a Durable Peace*, Cambridge, Harper and Row.
[14] Collard Fabienne, 2015, « Les énergies renouvelables », *Courrier hebdomadaire du CRISP*, n° 2252-2253, p. 5-72.
[15] See the project for a biofuel plant expected to generate hundreds of jobs. Source: *France Bleu Haut-Rhin*, 20.06.2020: https://www.francebleu.fr/infos/economie-social/un-projet-d-usine-de-biocombustibles-a-fessenheim-des-centaines-d-emploi-a-la-cle-1592649870

Finally, in Switzerland, a significant proportion of energy is imported. In 2014, only one quarter of the country's energy needs was produced there, from hydroelectric power generation, incineration of household and industrial waste, and wood[16]. The new version of the law on energy, which came into force in January 2018, aims for an increase in energy efficiency (through reduction of energy consumption, i.e. a 13% decrease of electricity consumption by 2035), a development of RES and a gradual phase-out of nuclear power. The Federal act on CO2 emissions reduction, which was adopted in 2011 and is currently being revised, set the target of reducing greenhouse gas emissions by 20% by 2020 compared to 1990[17]. Switzerland's electricity production mainly depends on its hydroelectric facilities (55%), and on nuclear energy power, which accounts for quite a significant share of the global electricity mix (36%). Yet the energy produced by hydroelectric dams can vary depending on the season. In winter, they thus produce 50% less energy whereas consumption increases. Therefore, while in summer overproduction due to the melting of the snow enables Switzerland to export its surplus, in winter it has to import resources to make up for the deficit. The problem of adapting RES production to real-time demand is one that concerns all renewables, which are most often intermittent sources of energy. If renewable energy sources are to compete with, or even replace nuclear power, which seems to be more adaptable, it is then necessary to consider the question of **storage,** in order to make sure they are available when energy consumption is high.




The contribution of RES to the electricity mix greatly varies, then, in the three national areas of the TMR, both overall and in terms of the different energy sources used, with hydroelectric power predominating in France and Switzerland. In Germany, solar and wind energy have been more developed, and the German areas of the Upper Rhine often stand as models for cross-border French and Swiss territories. The most frequently mentioned variable is the **price of electricity**, which is higher in Germany than in France, and might be the reason for the promotion of the more profitable solar energy:

> *"When you cross the border, you see photovoltaic panels, actually it's because people, since they have to pay 20 cents per kilowatt for electricity, if they put a panel on their roof, it only costs 10 cents, so you can quickly figure out why they do. In France, before tax you pay 10-11 cents for it, and when you produce it, you pay 10-11 cents: so you don't really rush to put panels on your roof. Because it's an investment, you have to have money. But if you make double the money, well then of course you are willing to go for it. There is this thing to consider, the price of energy is a decisive factor"* (Environment officer in the Haut-Rhin department, April, 2020).

[16] Vuille François, Favrat Daniel, Erkman Suren, 2015, *Les enjeux de la transition énergétique suisse: Comprendre pour choisir: 100 questions-réponses*, Lausanne, Presses polytechniques et universitaires romandes, p. 58.
[17] Trion Climate, 2019, Trinational Climate-Energy report.

That is why the French interviewees advocate an increase in the price of electricity, which they consider is the "real" price to pay (taking into account the cost of maintaining and dismantling nuclear power plants for example) in order to make RES more competitive. Today, EDF, which has historically been France's national electricity supplier, is facing competition from private operators such as Cdiscount énergie[18] or Total, a French company that is among the six leading oil and gas companies in the world. Total is now offering private individuals subscriptions to "Green electricity contracts", 100% based on wind and/or solar energy, with the slogan: "green and cheaper energy"[19]. It is also worth pointing out that solar energy owes much of its development in Germany to **citizen initiatives**, which can broadly be defined as "citizen projects deprived of any speculative goal, with a democratic and participatory mode of governance, and firmly rooted in a local territory through the local and decentralised production of renewable energy in order to achieve the energy and ecological transition of society"[20].

The favourable regulatory context, due to the decentralisation and liberalisation of the energy market in the 1990s in Germany, led to the multiplication of such initiatives. Citizen protest movements against nuclear power, which have been active from the start in Germany (especially in the Upper Rhine[21]) and have gained momentum in the aftermath of the 2011 Fukushima nuclear disaster, have prompted a search for alternative energy sources and the creation of numerous citizen energy cooperatives at the municipal and intermunicipal level. In Endingen, for example, a group of citizens (*ArbeitsKreisEnergie*) who had met during anti-nuclear demonstrations in 2011 founded a *BürgerEnergieGenossenschaft* in 2012. Yet, this important development of citizen energy cooperatives on the German side of the Upper Rhine seems to have slowed down over the past few years, after new regulatory measures were introduced making renewable energy production less profitable for these structures:

> *"So, until 2014, we had strong market incentives, for people individually as well as for community energy projects to invest in solar energy or in renewable energy. In 2014 our government did the breaks and started to do a disincentive... So basically they want to put off people from the renewable energy market, because the big power companies, they were really afraid... From then on to 2014 you can see the number of energy cooperatives foundation really going down"* (An Official in charge of climate issues in the Landkreis Emmendingen and a founding member of Fesa Freiburg, July, 2019).

In France, as in Switzerland, citizen energy cooperatives are now developing and organising into regional networks, with the creation of the *Grand Est Citoyen et Local d'Énergies Renouvelables* (GECLER) network in 2019 on the French side, and the development of a Swiss Association for citizen energy (ASEC) in French-speaking Switzerland since 2018. The role of citizen energy for the future of an integrated renewable energy market in the Upper Rhine therefore deserves attention.

**Regulatory context,** price, taxes and feed-in tariffs are especially important incentives for the development of renewable energy citizen projects. The administrative hurdles encountered by energy cooperatives in France are placing them at a disadvantage compared to monopoly of the power grid companies, as shows the following example regarding connection of a solar installation to the electricity grid:

[18] https://www.cdiscount.com/cdiscountenergie

[19] https://total.direct-energie.com/particuliers/electricite-et-gaz/offres-d-electricite-et-gaz/offre-verte-electricite-et-gaz

[20] Bally Frédéric, 2015, « Vers une transition énergétique citoyenne. La réappropriation des questions environnementales par les acteurs ordinaires », *Rives méditerranéennes*, vol. 51, n° 2, p. 70.

[21] Pohl Natalie, 2016, « Une histoire du temps présent nucléaire: le mouvement anti-nucléaire franco-allemand dans la région du Rhin supérieur », in Droit Emmanuel, Miard-Delacroix Hélène, Reichherzer Frank (eds.), *Penser et pratiquer l'histoire du temps présent. Essais franco-allemands*, Villeneuve d'Ascq, Presses Universitaires du Septentrion, p. 27-36.

*"We have huge problems with Enedis [the French electricity grid operator] about connection to the electricity grid, it's very expensive, they've tripled the cost. And you never know when you're going to start, now we're working on two 36 kWp projects, and roughly speaking we can say they have a [global] cost 50,000 euros. But connection to the grid can cost 12,000 euros, that's a quarter of the installation just for connection to the grid, Enedis asking for so much is crazy! And it makes us insecure not to know how much we are going to pay in the end, or is it just a project that won't get made because connection is too expensive"* (a member of the management committee of the Alsatian cooperative *Énergies Partagées*, March 2020).

According to the interviewees, it seems easier to build a solar installation in Germany than in France, for regulatory as well as financial reasons, which may be a hindrance to the development of cross-border cooperation.

## 2) Research questions and hypotheses. Socio-cultural conditions for the development of a renewable energy integrated market in the Upper Rhine

In the RES-TMO programme, we are trying to identify the brakes and levers for the development of a network of actors involved, on the one hand, in the development of RES and, on the other hand, in cross-border cooperation in the Upper Rhine. This general aim is pursued through different hypotheses and questions, which can be summed up in the five following points:

- **The roles and profiles of the key players working in the field of renewable energy:** what type of renewable projects are carried out in the professional structures (local authority, company, etc.) to which they belong and what type of challenges are they facing? What is the role of the different people involved in these projects and what professional background has led them to become involved in them? What is their vision of the future of energy systems in the Upper Rhine?

- **Interactions between key players:** our goal is to provide an overview of the interactions between different types of key players, both in the space of each region and in the trinational space of the Upper Rhine (regional and cross-border cooperation). With what other actors did the respondents cooperate (the State, local authorities, the private sector, cooperatives, NGOs, citizens' associations, etc.)? How did the cooperation between them work out? What help do the respondents rely on to carry out their renewable energy projects (public or private funding, technical help, etc.)?

- **The role of citizen energy for a renewable energy market in the Upper Rhine:** in principle, citizen energy projects offer a more "democratic" alternative to centralised energy production which is dominated by private industrial companies. In the facts, how have citizen energy cooperatives developed in the Upper Rhine region? What are the socio-professional profiles of the members? What are their different modes of participation (participation in operations *vs* financial participation)?

- **Technical solutions for the development of RES:** the development of an integrated renewable energy market in the Upper Rhine not only requires human cooperation between the different actors and organisations leading the projects but also technical solutions, for instance storage of the energy produced. Our surveys raise the issue of the way actors appropriate the technological innovations related to RES development. What are the most privileged technical solutions? What challenges are raised by the development of infrastructures linked to the massive growth of renewable energy (for instance, storage

technologies and capacities, smart grids, etc.)? Is there opposition to these technological innovations, and if there is, what type of opposition and what motivates it?

- **Constraints and opportunities provided by the national and European regulatory context:** a favourable regulatory context is a prerequisite for the development of renewable energy projects. Are the actors involved aware of the regulatory context and what aspects of it are they confronted to when carrying out the projects? What possible improvements could be suggested on the basis of field observations?

In order to answer these questions, we elaborated a methodology based on several lines of enquiry.

## 3) Methodology

We favoured qualitative surveys based on interviews and observation in order to understand more precisely the discourse held by key players and citizens involved in renewable energy projects. In-depth interviews provided an opportunity for them to describe the concrete projects, their progress and interactions with other actors, groups or institutions, revealing the stakeholder games which will be played in a future renewable energy market in the Upper Rhine. The surveys were organised in two main parts: 1) interviews with the key players involved in renewable energy projects in the Upper Rhine, and 2) interviews and observation of two specific citizen projects: a regional initiative in Alsace (*les Centrales Villageoises de Saverne Plaine et Plateau*) and a cross-border French and German collaboration to produce solar energy (between *Énergies Partagées* in Alsace and *Fesa Energie Geno* in Baden Württemberg). We defined interview questions adapted to each of the fields (institutional players and key players, members of the managing committees of citizen energy cooperatives, other individuals cooperating in the projects). From spring 2019 to summer 2020, we conducted 42 interviews (8 in Germany, 23 in France and 11 in Switzerland[22]) with key players from various professional structures: regional authorities, public bodies funding projects related to the environment, associations, engineering offices, energy suppliers, etc. The map below shows the location of the main key players interviewed during that period[23]. "Operators" stand for energy companies, while "private companies" refer to engineering offices or craftsmen interested in renewable energy. Public institutions such as ADEME, *Banque des Territoires*, etc., are distinguished from local authorities (municipalities, departments, regions or equivalents).

[22] We wish to thank our German colleagues, members of Pr Bernhard Neumärker's team (Bianca Blum, Dominik Schröder and interns Franziska Leopold and Peter Scherer) and the coordinators of the programme, Barbara Koch and Ines Gavrilut, for their support in conducting 8 interviews in Germany and Switzerland.

[23] We also conducted interviews with other representatives of structures whose headquarters were located outside the Upper Rhine area.


During the same period, we conducted 19 interviews with the shareholders of *Centrales Villageoises de Saverne Plaine et Plateau* and 13 interviews with cooperators involved with *Énergies Partagées* in Alsace and with the president of *Fesa Energie Geno Freiburg.* This paper is thus based on 74 interviews, to which can be added 9 sequences of *in-situ* observations (general assemblies, energy trade shows, etc., in Saverne, Sélestat, Basel or Emmendingen)[24].

The surveys were completed with the organisation on Sept 23, 2019 of a workshop dealing with the issues raised by citizen energy and cross-border cooperation (*cf.* fig.1). This event, held in Strasbourg, brought together about thirty participants from the three national areas of the Upper Rhine working on renewable energy at different levels: representatives of citizen cooperatives, local authority representatives and members of associations. The comments they made during the workshop were used as complementary empirical material for the analysis of our data. In the same way, a second workshop was held online on October 7, 2020, in collaboration with the legal

[24] Because of the Covid-19 epidemic and the restrictions designed to curb its spread, the possibilities for *in-situ* observation were unfortunately limited in 2020.

scholars involved in the RES-TMO programme (WP5), about regulatory issues and the new role of citizens as prosumers.

**Fig. 1: Workshop organised as part of the RES-TMO programme with citizen energy actors**

Source: Marie Mangold – Strasbourg, September 23, 2019

## 4) The interplay of actors and the energy market in the Upper Rhine

### *a) A renewable energy market needs to take different scales into account: European policies, national frameworks and local projects*

While the development of RES largely depends on the commitment of local political, economic and social actors to projects developed by municipalities or groups of municipalities at the level of a specific territory, the national context – regulations and financial aids – very often conditions the launch of new projects. Key-players in the field indeed often mention the decisive role played by the national States, by the German *Länder* and the Swiss cantons, as the main incentives derive from them in the form of new regulations or financial tools such as feed-in tariffs. Local actors are generally well aware of the new regulatory context and of the evolution of taxes and feed-in tariffs, since they need to take them into account and use them to their advantage in carrying out their projects. Conversely, they are little familiar with European policies and with the norms produced at that level from which they are far removed. To the European, national and territorial levels can be added intermediate levels, represented in urban planning documents or local, especially regional, financial aids from the *départements* in France, the *Länder* in Germany and the *cantons* in Switzerland. Local administrations are indeed more and more invested in energy issues, with dedicated services and agents (*Klimaschutz manager* in Germany or *chargé de mission transition énergétique*, "energy transition officer", in France, etc.).

To take an example, in France, the *Région* is responsible for the "regional plan for spatial planning, sustainable development and territorial equality" (*Schéma régional d'aménagement, de développement durable et d'équilibre des territoires*, SRADDET), a strategic document which outlines the main objectives for the Grand Est region by 2050. Numerous groups of stakeholders are involved in drawing up this document, including private players such as energy producers and

distributors. Its objectives are reflected at the territorial level in the Local Urban Development Plans (*Plans locaux d'urbanisme*-PLU) elaborated at the municipal or intermunicipal levels. Some documents are now specifically dedicated to the development of RES, such as the Territorial Climate-Air-Energy Plan (*Plan Climat Air Énergie Territorial*-PCAET) and the Energy Master Plan (*Schéma directeur des énergies*-SDE). Our surveys clearly showed that the PETR (*Pôle d'Équilibre Territorial et Rural*)[25] Sélestat Alsace Centrale and Saverne Plaine et Plateau were responsible for producing these documents. They provide an overview of the local situation, in order to identify the main levers and implement actions. They are elaborated in consultation with the local economic actors, institutions and associations (*cf*. fig. 2).

**Fig. 2: Consultation for the Climate Plan elaborated by the PETR Sélestat Alsace Centrale, final meeting with all the key-players in the area**

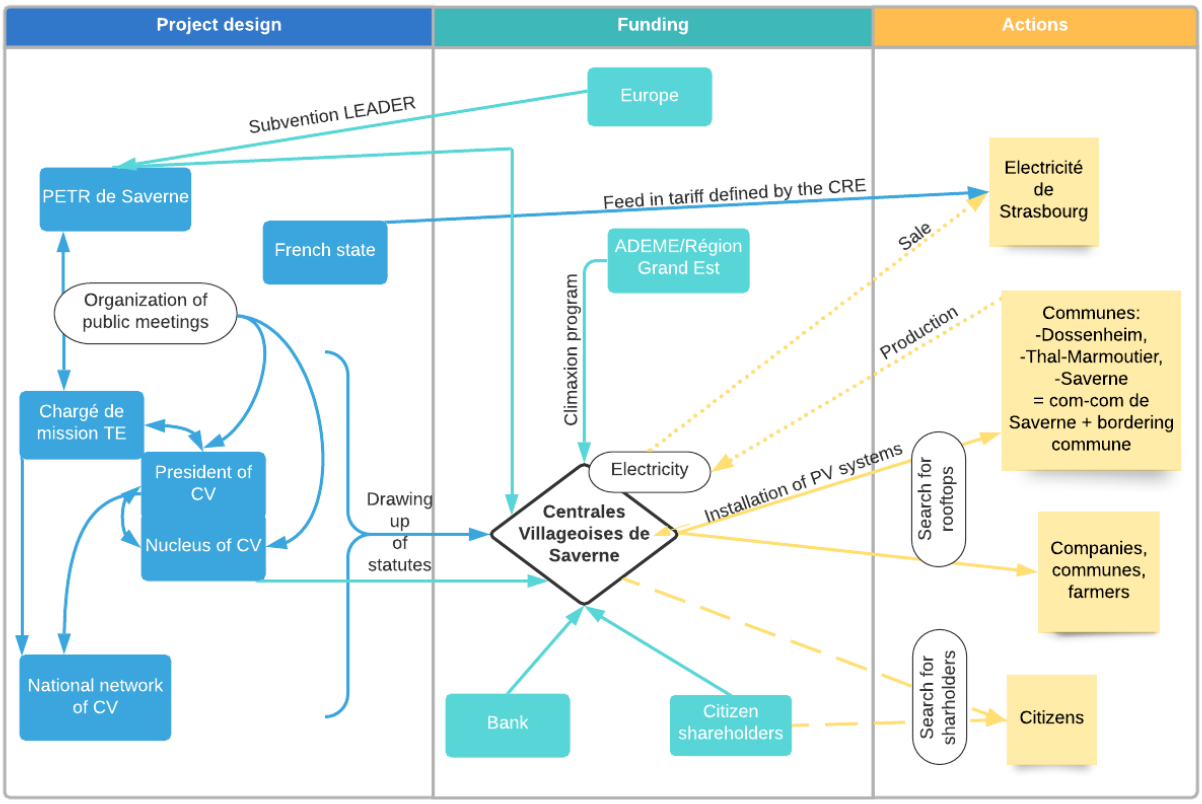
Source: Observation Marie Mangold – Châtenois, July 4, 2019

Regulations and financial tools can support RE development initiatives or conversely limit them: for example, the decrease of electricity feed-in tariffs does not facilitate the development of small photovoltaic installations whereas they are favoured by citizen energy cooperatives or rural communes desirous of "spinning off" small-scale renewable projects across their territory. This testifies to the importance of the national and regional legislative and institutional context, which can lead local players to draw different conclusions depending on their country. The co-president of Coopergy, a citizen energy cooperative located in French-speaking Switzerland, for example, calls for the State "to intervene on the feed-in tariff in order to have a national policy as in France, rather than a local one different from one area to the other"; he also adds, from an economic standpoint: "in Switzerland, it is not recommended to do solar energy on a private house, because it is not profitable" (RES-TMO Workshop, Strasbourg, Sept 23, 2019).

The diagram below describes the interactions between the different actors involved in the operations of a citizen energy cooperative, *Centrales Villageoises de Saverne Plaine et Plateau.* There are interactions between the European, national and local scales at the stage of project design and funding. There are also exchanges between diverse groups of players (energy suppliers, banks, local authorities, etc.) when it comes to building the solar installations of the cooperative. The diagram reveals the complex interactions between the actors involved, at different levels and scales, in the development of a single renewable energy project in a specific territory.

[25] PETR, which were created in 2014, are rural communities cooperation councils: they consist in groupings of intermunicipalities and aim at facilitating territorial cooperation between rural territories and small and medium-sized towns.

**Diagram 1: Interactions between actors involved in the operations of Centrales Villageoises de Saverne Plaine et Plateau**




Source: Sophie Henck, RES-TMO, UMR SAGE, November 2020

*b) When projects are organized around local communities, what place is left for cross-border cooperation?*

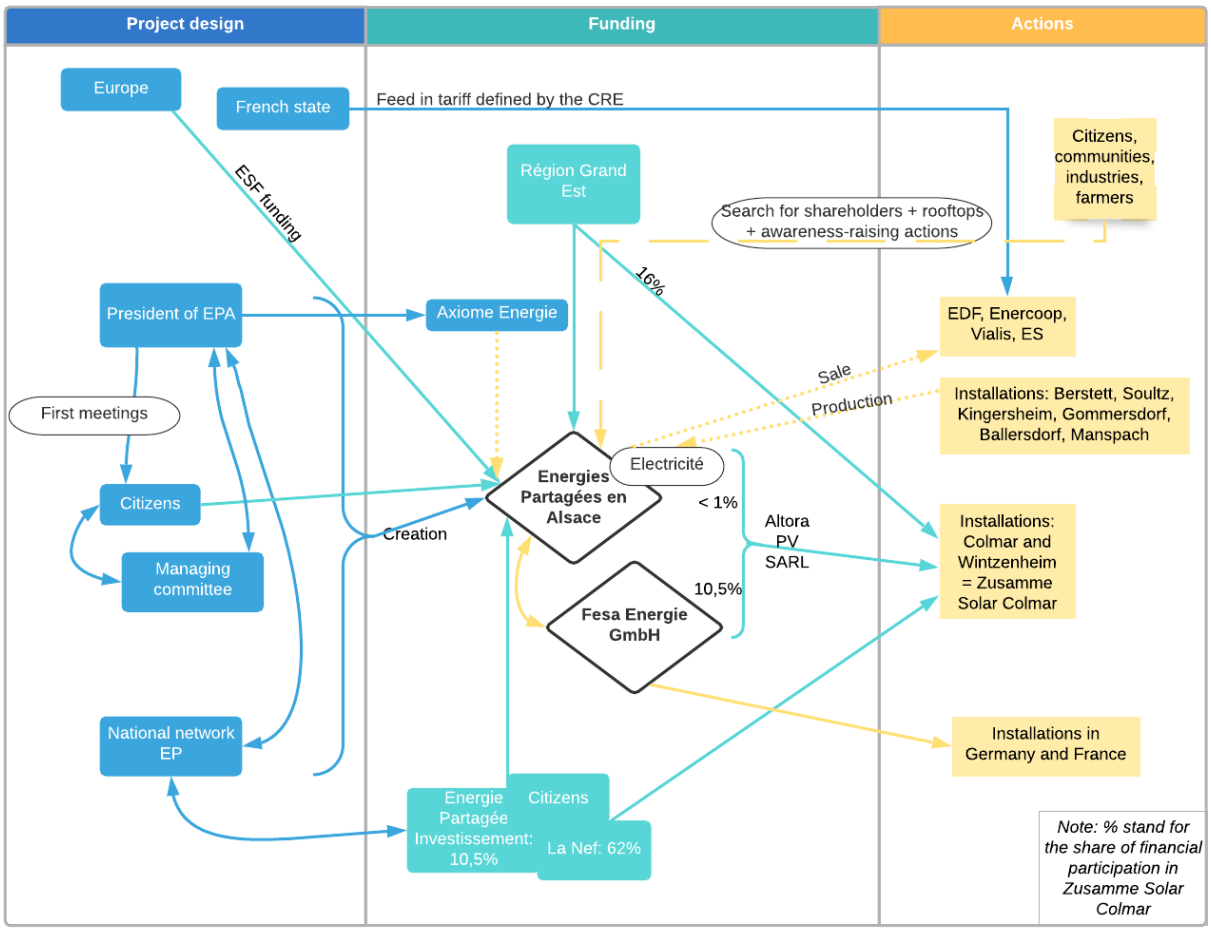
Our surveys show that there have been only a small number of cross-border cooperation renewable energy projects. While exchanges and cooperations have been initiated, especially between Germany and France (*cf.* fig. 3) and while both French and German key-players find there especially valuable opportunities for sharing and learning from each other's experiences, these exchanges do not result in concrete common projects. This is confirmed by an official in charge of climate issues in the German conurbation of Emmendingen, who took part in a week-long cross-border cooperation programme with the PETR Sélestat Alsace Centrale : "That's kind of a shared dream or shared vision, but you have to amalgate different laws, different regulations and that's a tough one" (July 2019). What is first needed is to assess the constraints and opportunities offered by the local context and to "build at home" before building anything with border neighbours: "It's very inspiring but we've always been told that the regulatory context is also very different, so it's not necessarily possible to reproduce things" (official in charge of the environment, agriculture, economy and energy for the Community of communes of the Valley of Kaysersberg, July 2019).

**Fig. 3: Meeting between actors from the PETR Sélestat Alsace Centrale and from the Landkreis Emmendingen: conversation on the renewable energy citizen projects developing in the two areas**


Source: Observation Marie Mangold – Endingen, January 26, 2019

The "Zusamme Solar Colmar" project, resulting from cooperation between *Énergies Partagées* in Alsace and *Fesa Energie Geno Freiburg*, differs from other cross-border cooperation initiatives since it has translated into the actual installation of photovoltaic panels. It has led to the creation of a new structure, *Altora PV*, which has actualised the cooperation between the two citizen energy cooperatives and has since then conducted other solar installation projects (with the financial help of the French national structure *Énergie Partagée*). Diagram 2 describes the interplay of actors involved with the structure. In an interview, the president of *Fesa Energie Geno Freiburg* underlined that the cross-border project had encountered several regulatory hurdles. The procedures being different in the two countries, a great deal of work was needed, especially with the banks, as the local agencies could not decide on their own to further the process without reporting to their decision-making centre. The project promoters had difficulty aligning their project report with administrative norms and getting a bank guarantee. It finally came to fruition and the president of *Fesa Energie Geno Freiburg* is still looking for French partners to develop new initiatives of the same kind.

**Diagram 2: The interplay of actors involved in the creation of the cross-border cooperative Altora PV**




Source: Sophie Henck, RES-TMO, UMR SAGE, November 2020

## 5) Issues raised by citizen energy: reconfigured interactions?

### *a) An alternative model of RE production based on the knowledge of "citizen experts"*

Citizen energy cooperatives not only aim at relocating RE production within specific areas but also embody values such as more inclusivity in the handling of energy issues. Thus in opposition to a top down centralised system, a growing number of bottom up initiatives have been developed by local authorities and citizens. Germany's and Switzerland's cultural traditions seem to be more favourable to citizen participation (as shows the example of popular initiatives in Switzerland) whereas in France communes have only recently started really taking inhabitants into account, beyond somewhat formal concertations. Yet, citizen energy has been developing in recent years in France, as show the creation of new energy cooperatives and of a network for citizen energy in the Grand Est region (GECLER, *cf.* fig. 4). Conversely, whereas on the German side such initiatives had been well under way since the 1980s, today their development seems to have been checked by new less favourable regulations, as indicated above[26].

Political and administrative history is also an important factor in each country. The German municipal government, and its municipal public services or *Stadtwerke*, is playing a significant role

[26] Hamman Philippe, Mangold Marie, 2020, « Les coopératives énergétiques, levier de transition écologique ? Quelques réflexions comparées France-Allemagne-Suisse-Belgique », *Etopia – Revue d'écologie politique*, n° 14, p. 136-173: https://etopia.be/revues/.

in energy transition and in mobilising various actors, including citizens. Karlsruhe and other municipalities in Baden Württemberg[27], in particular, are using this tool to address their inhabitants and position themselves on the RES market. The interplay between actors cannot thus be summed up in a mere binary opposition between private companies and citizen cooperatives, even considering possible cross-border extensions (for example, couldn't these *Stadtwerke* in the future supply Alsatian consumers directly with energy *via* French legal contracts?).

**Fig. 4: Foundation of the GECLER network on the occasion of a regional Citizen Energy Day**

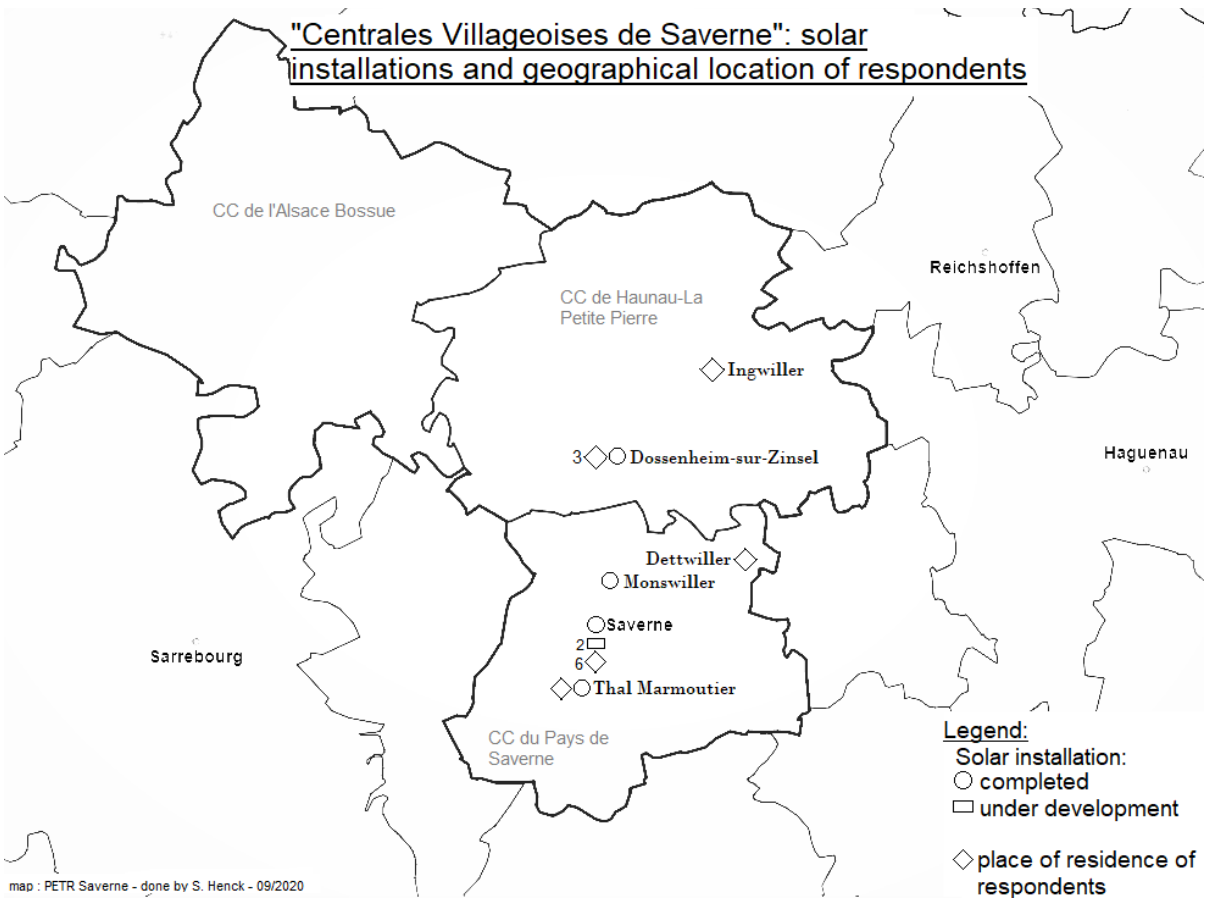
Source: https://gecler.fr/, Saâles, June 30, 2019

While citizen energy cooperatives support the relocation of energy production and a reappropriation of citizen issues by citizens, thus calling for an "alternative" energy model, the respondents on the management committees of these cooperatives frequently point to the possible complementarity between two models, a citizen-based one and an industrial one. Most of them believe that production of renewable energy on an industrial scale is necessary to compete with the energy system based on fossil fuels and nuclear power, while at the same time supporting the multiplication of local citizen projects. The two models belong to different scales, and the possibility of a renewable energy market based on the interactions of multiple actors located at different scales of energy production seems worth considering.

Beyond this display of democratic ambition, who are the actors really involved in the cooperatives? Analysis of the surveys shows that citizen energy cooperatives are a meeting point for a plurality of actors, with relatively diverse socio-demographic profiles, commitment history and environmental awareness. The most active members are often recruited on the basis of their "expert" status and knowledge in accountability, legal matters, communication, etc. They thus call on their professional skills in the context of community projects, and most of the time can draw on one or several similar and concomitant experiences with other associations. Cooperatives must indeed convince local authorities or private partners that they are competitive, i.e. can be considered as competent partners compared to PV companies, through the promotion of their in-house knowledge and skills. This certainly limits their democratic appeal, i.e. the possibility for any ordinary citizen to become involved in their management. The new members of their management committees are generally recruited "by word of mouth", and cooperators are also partly approached through personal and professional networking. Although citizen energy cooperatives are proclaiming their determination to pull energy issues out of the technical and scientific "black box", by engaging in

[27] https://energiewende.baden-wuerttemberg.de/projekte/kommunen/solarstrom-fuer-selbstversorger

large-scale information, teaching and awareness-raising work, "practical tensions" remain, leading to a gap between democratic principles, inclusivity and volunteer commitment, on the one hand, and the need for practical skills or even professionalism. Care should be taken to avoid a "community elite"[28] forming at the head of citizen energy cooperatives, organised as a "community of specialists", thus limiting citizen participation to shareholding (i.e. to financial participation, which can sometimes boil down to holding just a token share of the cooperative's stock) while excluding them from governance[29]. Moreover, proximity appears to be a decisive factor for many of the cooperators. Citizens feel useful when they can contribute to projects rooted in their municipality or nearby, as shows the map below about *Centrales Villageoises de Saverne.* It is a solar installation's implantation in a local area which raises the awareness of inhabitants and encourages them to get more information or even join in. The arguments of project leaders also, at least partly, emphasize local roots, since the money invested in the community will be used to meet its needs and stay in the community.




*b) Self-consumption and activity diversification: future challenges for citizen energy cooperatives*

Self-consumption, a question at the centre of the regulatory debates concerning the status of "prosumer", constitutes an important goal for cooperatives wishing to develop an "alternative" energy model. Yet providers-consumers enjoy a different status in the three national areas of the

[28] Nahrath Stéphane, Gerber Jean-David, Knoepfel Peter, Bréthaut Christina, 2012, « Gestion des ressources communes en Suisse: le rôle des institutions de gestion communautaire dans les politiques environnementales et d'aménagement du territoire », *Natures Sciences Sociétés*, vol. 20, n° 1, p. 39-51.

[29] Christen Guillaume, Hamman Philippe, 2016, « Associer les habitants à la transition écologique: Quelle dimension participative des projets d'énergies renouvelables en Alsace ? », *Cahiers de recherche sociologique* (Montréal), n° 58, p. 119-137: http://id.erudit.org/iderudit/1036209ar

Upper Rhine. Legislation tends to be more favourable to prosumers in Germany when it comes to resale of energy[30], while in France energy cooperatives are not allowed to resell the solar electricity they have produced directly to the user and need to go through an approved supplier. Several respondents have suggested that there were only limited ways in which prosumption could be given concrete actualisation, due to the current regulations or due to the technical capacities required, for instance necessary storage of energy so that the time of production could be distinguished from that of consumption. According to many respondents, the means of storage are expensive and need to be improved from a technical point of view. For instance, on the German side, where intermittent production of renewable energy is more significant than on the French side, the co-president of cooperative *Fesa Energie Geno* expressed concern about a possible "saturation of the grid [*Netzüberlastung*] when storage techniques are not available, for example when solar energy production is too high: we're going to have to disconnect the photovoltaic panels!" (Workshop RES-TMO, September 23, 2019). The creation of and support given to the Solar Cluster programme in Baden-Württemberg in 2020 is to be related to this concern[31]. Several interviewees, when asked about such strong constraints, point to the "physical" reality of electricity production, which is actually consumed at the point closest to where it is produced. Even when RE production is sold into the general grid, a building needing to consume electricity during the period of production would consume that generated by the photovoltaic panels. This argument is strong enough for some not to undertake any energy storage project. In any case, French cooperatives seem to have more limited possibilities than German or Swiss cooperatives, which can at the same time play the role of producers *and* suppliers of energy.

This links up with the issue of activity diversification. While French cooperatives have so far been mostly focused on developing solar installations, i.e. looking for cooperators, rooftops, funding and partnerships with local authorities, cooperatives on the German border have diversified their activities and developed other types of renewable energy (wind turbines, geothermal energy...) or undertaken new projects related to energy consumption but distinct from renewable energy production strictly speaking. Kehl's citizen energy cooperative, which was invited to take part in our first workshop in September 2019 in Strasbourg, provides a telling example: in 2018, the *BürgerEnergieGenossenschaft Kehl* worked in partnership with the City of Kehl to finance and replace public street lighting with energy-saving LED lights (*cf.* fig. 5). German cooperatives are now developing a diversity of projects probably because they have been in existence longer than French cooperatives, but also because they have more financial means. According to our surveys, shares in German cooperatives are sold at a much higher price than in France (500 or 1,000 euros per share, compared to an average of 100 euros in Alsace). Moreover, since part of the German population seem to consider that investing in cooperatives is as or even more profitable a way of saving money than having a savings account, many people do not hesitate to buy several shares.

[30] https://www.erneuerbare-energien.de/EE/Navigation/DE/Recht-Politik/recht-politik.html
[31] https://solarcluster-bw.de/de/

**Fig. 5: This flyer calls for new cooperators to participate in funding new street lighting for Kehl, using environmental and financial arguments (2018)**


Source: BEG Kehl, presentation at the Sept 23, 2019 workshop

Finally, in the three national areas of the Upper Rhine, regional or national networks are providing local energy cooperatives with useful tools and advice in order to help them with economic, technical or regulatory procedures. For instance, the French national network of *Centrales Villageoises*[32] is currently discussing the question of self-consumption. These coordination bodies have permanent employees, whose role is to develop knowledge about new technical or regulatory questions, which is then communicated to cooperatives on the field.

## 6) Recommendations. The regulatory, economic, technical and socio-political challenges for the development of an integrated renewable energy market in the Upper Rhine

Following our work in the RES-TM0 programme, we are able at this stage to formulate a few recommendations in order to foster the development of an integrated renewable energy market in the Upper Rhine, which can be summed up in the four following points:

Concerning **regulatory issues,** the development of RES is hampered by numerous legal constraints, both due to the national regulatory context and to the need for translation between different regulatory contexts when cross-border cooperation projects are undertaken. A possible option would be to relax certain regulations (for instance, in France, the standards enforced by the architects in charge of public heritage – *Architectes des Bâtiments de France* – make it difficult to install photovoltaic panels) and to reconcile the different texts governing renewable energy

[32] http://www.centralesvillageoises.fr/

production at the European level, or even at the interregional level in the Upper Rhine. Should thus be revised both the norms for urban planning documents – i.e. concerning the implantation of renewable energy installations in specific areas with specific conditions – and the feed-in tariffs which are very different depending on the country.

This leads us to **economic issues**. To organise an integrated market in the Upper Rhine, renewable energy production needs to gain a competitive advantage over nuclear or fossil fuel-based energy production. Incentives, such as new regulatory tools and financial support, should be able to increase their competitive edge and limit the role of big non-renewable energy producers. That is why local authorities who are promoting new projects are asking for the means to hire new employees familiar with the issues raised by the *Plans Climat* and the future of the areas' energy systems.

As far as **technical issues** are concerned, the development of RES is still being carried out within the framework of the dominant socio-technical systems. Debates may thus arise as to the ecological impact of some of the technical innovations designed to increase the share of RES. The use of geothermal energy, for instance, can be questioned, given its limitations and impacts on the ground, especially in the Upper Rhine area where numerous seismic tremors have brought geothermal drilling projects in the Basel region to a halt[33]. Similarly, means of RES storage or smart meters are still raising controversies and are far from being unanimously accepted by the key players involved in RES projects. It is therefore necessary to remain cautious and take the various views into account, even though that means questioning the very foundations of the energy transition and of the different existing energy models.

Finally, **the socio-political points** developed in this working paper should invite political authorities to take the various actors involved in the production and consumption of renewable energy into consideration, and, in particular, to avoid granting only exemplary status to citizen projects. Such initiatives, which are dependent on strong political and financial support, aim to relocate energy issues and give a role to citizens in an energy system that is all too often dominated by national industrial companies and works in dematerialised ways limiting the appropriation of energy issues by inhabitants and consumers. Better awareness of the relationships between producers and consumers would contribute to a better, more concrete apprehension of current and future challenges. The price of energy, nevertheless, remains a central factor, as argued by certain community project leaders who are demanding a rise in the price of nuclear or fossil fuel-based electricity to make RES more competitive. One of the main issues is to avoid creating new socio-economic divides on the (selective) grounds of ecology, as was the case following the closure of nuclear power plants in Germany[34] or during the "Yellow Jacket" movement in France[35].

[33] This happened in 2006 but also in 2013, despite the use of another technique. In Alsace too, the recent seismic tremors which occurred in Strasbourg in 2019-2020 and were attributed to geothermal drilling have reopened the debate about the safeness of this renewable energy source. Source: https://www.rts.ch/info/regions/autres-cantons/5080077-forage-geothermique-suspendu-a-stgall-apres-un-seisme.html; https://www.lepoint.fr/societe/alsace-un-projet-de-geothermie-profonde-a-l-origine-de-seismes-26-11-2019-2349537_23.php; https://www.dna.fr/environnement/2020/10/28/les-seismes-de-la-nuit-dernieres-lies-au-site-de-geothermie

[34] Bourgeois Isabelle, 2011, « Sortie du nucléaire – quelques pistes de réflexion », *Regards sur l'économie allemande*, vol. 101, p. 33-37, http://journals.openedition.org/rea/4296

[35] The Yellow Jacket movement (*Gilets Jaunes* – after the visibility waistcoats worn during demonstrations) appeared in France in October 1918 to protest against the rise of the price of motor fuels resulting from the increase of the domestic consumption tax on energy products (TICPE). Their demands then extended to other social and political issues and led the State to launch a national debate: Bourmeau Sylvain (ed.), 2019, *« Gilets jaunes »: hypothèses sur un mouvement*, Paris, La Découverte.