POLICY BRIEF

Cap innovation to renewable energy

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Outline

Executive summary

The energy sector nowadays plays a major role in our greenhouse gas emissions, and is essential since it conditions almost all our actions. The 7th objective of the UN Charter is even to promote "affordable and clean energy"[1]. However, many fossil fuels that emit greenhouse gas are still exploited. It is therefore urgent to make an energy transition in order to promote profitable renewable energies. Innovation in this sector will play a decisive role. In this context, our policy brief proposes to answer the following question:

How to stimulate innovation in the renewable energy sector while respecting the challenges of sustainable development and those of competitiveness in a highly competitive market context?

Therefore, we have designed a public policy consisting in the creation of a large scale innovative community focusing on renewable energies, called Energety. Our goal is to put trust back under the spotlight to enhance competitive cooperation. We will also push further the research and see if this model could suit sustainably in France.

Introduction

To get an idea of what had already been done in this energy transition, which refers to all the transformations of the system of production, distribution and consumption of energy carried out on a territory with the aim of making it more ecological, we studied and compared two different systems; the French energy system and the American energy system.

In the French energy system, there is a certain monopoly, for example with electricity and EDF. Indeed, in France EDF managed the whole electricity branch since 1946[2]. Only since the 90s, the system opens the production and supply of electricity to competition. Only the management of the transport and delivery network remains a monopoly so that each supplier does not deploy its own electric cables. Nevertheless, the cost of entering the electricity market is still too high to allow for real competition, so we find ourselves in a situation of oligopoly. Innovation is therefore not maximized because if EDF is the only company to pay the costs of innovation, it is also the only one to benefit from it. There is a certain compromise to be made but EDF takes fewer risks by not innovating.
Indeed, this extends to the other sectors of energy production and we can see this when we see that renewable energies represent only 19.1% (<more information on the figure 1) of the gross final energy consumption in France in 2020. While the country has as a goal to move to 100% renewable energy consumption by 2050[3].

In contrast, in the American energy system, there is a great deal of innovation due to the multitude of companies competing against each other. However, "innovation does not drive innovation" because there is not enough knowledge sharing in view of this important competition. Indeed, renewable energies will cover only 11.9% of consumption in 2020 (more information in the figure 2.)

Approach and results

Approach

Comparing the US and French systems, we can see from the figures 1 and 2 of the apendix that neither one is effective for an ecological transition. We have therefore thought of a public policy aiming at taking the good sides of these systems by limiting their negative effects.

Energety : a global perspective

The public policy is about building at a national scale an organizational innovation, as Schumpeter named it, called Energety. An organizational innovation is related to the implementation of a new organizational method in the firm's business practices, in the organization of its workplace or in its external relations, to improve the use of knowledge, workflows efficiency or quality of goods or services. Energety is a set of communities gathering firms of the national territory competing in diverse and multiples groups of searchers to innovate in the green energy sector. The groups of searchers that have the best innovation are awarded a certain sum of money fixed by what is called the energetic mix council. But their innovation is instantly shared with the community to allow every group of researchers to move forward in the innovation process. Therefore, the State accelerates the pace of innovation through competition, gives innovation a coherent direction with energetic transition thanks to financial awards, and encourages further innovation because the innovation falls directly in the community domain through a patent. Energety is an organizational innovation which aim is to stimulate innovation in the sector of renewable energies in order to accelerate energetic transition and limit global warming.

Four different communities are created within Energety each focusing on a peculiar sector of renewable energies : the transportation, electrical, heat and gas sectors. What is called the energetic mix council is part of Energety as well. This council's function is to give the directives to each specific sector in terms of directions of innovation and to set for each of them specific objectives, to fix the sum of the financial award for each innovation elected the most efficient and sustainable. It also decides of the energetic mix of the country. It both embodies the figure of the State in the community and the manager of the specific sectors. It is constituted of the minister of the energetic transition and other elective representatives of the State, and elective representatives of each specific sectors. These lasts must not be employed by any firm part of the community or outside the community for fairness concerns. Moreover, each specific subcommunity is constituted of firms that have agreed to be part of the community and which engaged themselves to respect a certain contract with the community, and a scientist council specialized in the specific sector. Each scientist council is specialized in the specific sector they belong to. They constitute the jury who elects the best innovations born in their specific sector. Big and little firms, like start up, are competing each other. However, for fairness concerns, a startup accelerator system is set up : below a capital to be settled, the startups entering the community benefit from state subsidies for their research projects. This way, it also gives incentives to big firms to cooperate with start up in little groups of searchers to compete with the other teams of research.

Focus on organizational details

Communities' oganizations: put trust back under the spotlight to enhance competitive cooperation.

In order to face the increasing number of challenges and crises, we need to find models which would be both resilient and innovative. Last century was the time of unleaked innovation and secret processes : this is a closed innovation process. Nowadays, due to several factors[4], knowledge isn't locked into firms' "industrial secrets" anymore. Instead, it lives into employees, users, producers, universities, competitors, etc. We don't have time to wait for the diffusion process with the 20 years of patents. We must find fastly adapted solutions to reach carbon neutrality taking into account the countdown. That's why our proposal is to turn ourselves to a large-scale open innovation system.

History of open innovation :

First introduced by Henry Chesbrough in Open Innovation: The New Imperative for Creating and Profiting from Technology. It's a mode of innovation based on sharing and collaboration. There are mostly three types of open innovation[5] that are already used :

- Collaborative project : a firm can decide to associate itself with others if it cannot make a project alone. Example : Ford and GE Health associated themselves to "accelerate and scale ventilators production" during COVID[6].
- Call for proposal : private or public entities define an objective and make a call with rewards to innovative structures in order to reach this goal. Example : EDF gives a 30 000 euros dotation and scale innovative solutions through its "Pulse Start-ups price"[7]
- Ad Hoc network : informal cooperation, but only between firms which are clsed from each other.

We believe that this is not enough, and we want to spread open innovation on a bigger scale, in order to catalyze even more the process and advantages.

Contract/charter which rules communities :

Within communities, participants rule the use of innovation through a co-created charter :

- Participants must put their research department in common, or at least share their innovation to others.
- Knowledge is certified by open patents : it is accessible and free for the community and it belongs to the community as a common.
- Participants must share improvements made on patents with others.
- Joining the community works as a matching market : the joiner chooses the community, and participants decide or not to choose it. It ensures mutual benefits.
- This charter can be improved by participants, if they all agree to do so.

Phases of innovation within communities (figure 4)

In order to stimulate even more innovation, the process is divided into two phases. First, The competition phase where participants associate themselves in groups to find innovative systems. It's a kind of call to proposal, as the scientific committee rewards best innovations as seen. Second, the cooperation phase is where we put in place the open innovation syste: the selected innovation is submitted to other participants for improvement. This process consists in sharing ideas and preparing the innovation to be implemented in the market.

Conclusion

The benefits from Energety are that :

- It stimulates innovation in the conception of renewable energies.
- The open innovation system is resilient to crisis as it relyes on large scale cooperation[5].
- It accelerates the energetic transition by diffusing ideas more largely.
- It reduces the price for consumers benefiting the innovation. Indeed, the cost of producing renewable energies are basically equal to the cost of the infrastructures required. But the energy from the sun, the wind is costless. Therefore, the State could in the first instance could contain the price difference with the current energy price, until the costs of the infrastructures is offset, and the price of energy starts to decrease.
- As it is an energetic transition and not a rude change of energetic mix, the workers from the sector of energy in decline could be formed little by little thanks to subsidies from the State to retrain in a renewable energy sector. Thus, unemployment should not increase.
- The model could be extended to the European scale.
- Externalities of innovations fit better to the society as the use of patents are controlled and users are consultated through the open innovation system.

Implications and Recommendations

A Suitable model in France?

The model having been presented above, it is now appropriate to ask whether, in particular, it would be applicable or not to France. In reality, implementing it in the short term may be difficult, for several reasons.:

A radical change of model, acceptabilty issues

First of all, it seems complicated to implement such a system quickly, given that it requires a radical change of the contemporary model (thus raising problems of acceptability among the population). Indeed, the energy market in France is already highly centralized, whether it is for production, transport or distribution. EDF and Engie are two state-owned companies that produce almost all of our electricity, the gas that we buy from Russia -in residual quantity- is also transported by two state-owned companies: GRDF and GRTgaz,... In this context, the creation of communities with multiple actors supposed to ensure the supply of energy is a radical change, which may be badly perceived and feared by the French population. All the more so since in reality the French are not so critical of our current system, and therefore do not necessarily perceive the need for innovation.Indeed, 60% of the French population is in favor of our nuclear park (producing 70% of our electricity with only &_ plants), which provides a quasi-decarbonated, cost-effective, and continuously functional energy source.

Little control over energy prices

Another complicating factor is the fact that France has little control over energy prices, making it difficult for a new economic model of this scale to emerge. In fact, this phenomenon is found throughout different European countries, and is explained by the European energy market. Indeed, wholesale electricity prices are set according to the last type of energy purchased by a country to meet its needs. Gas is often used as a complementary energy source, which explains why France is strongly impacted by the rise in gas prices, even though gas only represents between 6 and 7% of our electricity production.

But then, how do you implement this policy?

In order to introduce our model in France, it may be necessary to do so over time, so that there is a transition period that favors acceptance by the population. For example, we could imagine the creation of communities, even though EDF has a primordial role at first, which will decrease with time. In addition, perhaps it is necessary to emphasize to the population the interest of innovating in the energy sector: many of our central plants are coming to the end of their life, we can rely on the renewable energy (already 11% of hydraulic energy in our electricity production, 6% of wind energy,...). Finally, perhaps we should review our dependence on the European energy market prices, in order to make this kind of policy more possible and controllable.

Apendix

Figures

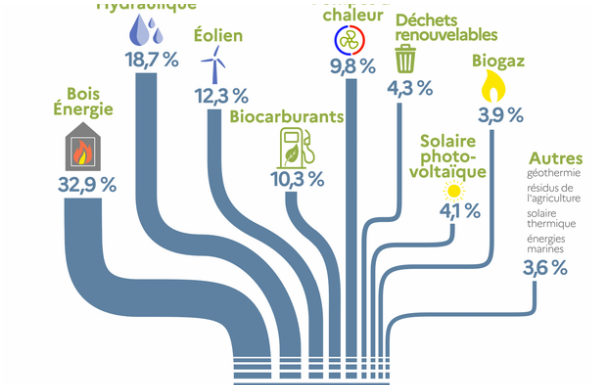

Figure 1 – Renewable energies in France in 2020

from the French government website

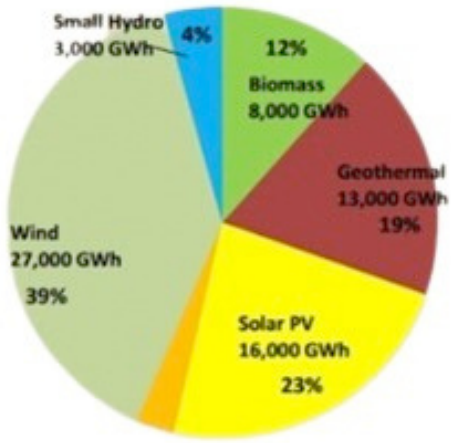

Figure 2 – Renewable energy in the united states 2020

from US energy, information admnistration

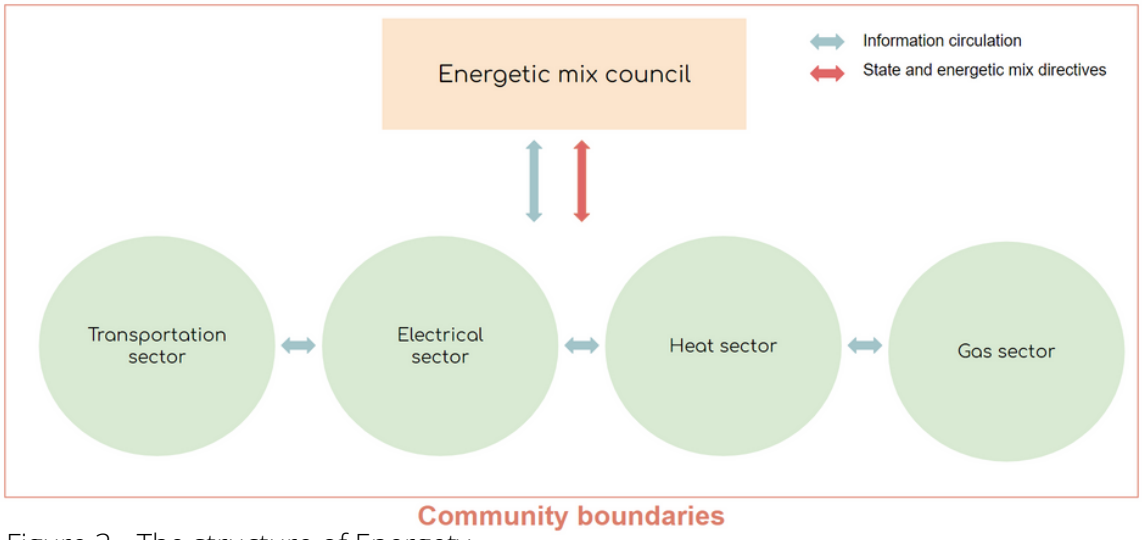

Figure 3 - The structure of Energety

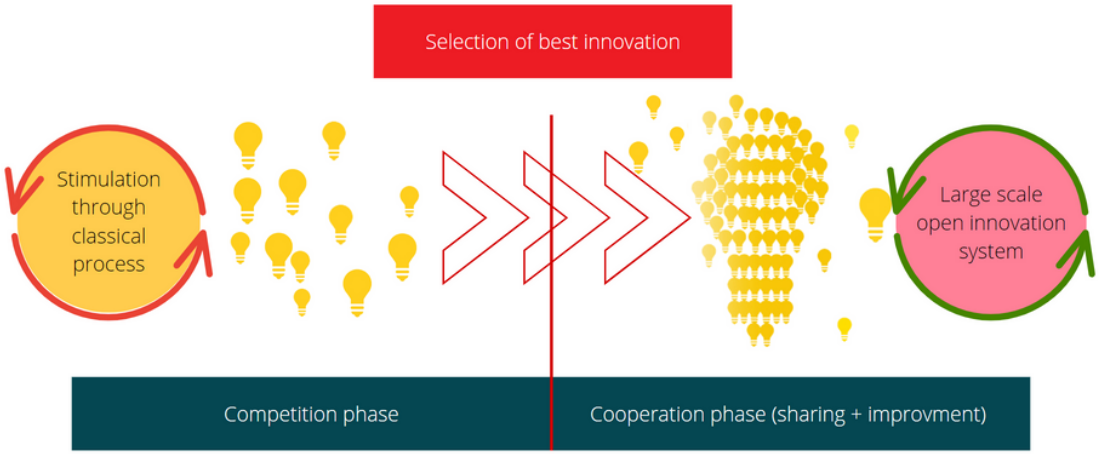

Figure 4 - Innovation process within Energety communities

References

[1] : According to the UN 17 goals for a sustainable world, in its policy brief#6 "Sustainable ENergy Technology Innovation"
[2] : According to the "Loi n° 46-628 du 8 avril 1946 sur la nationalisation de l'électricité et du gaz - Légifrance."
[3] : France took this objective through the "Stratégie Natinoale bas Carbone". In the report, France is drawing ways to reach carbon neutrality by 2050.
[4] : Those factors are mobility of skilled employees, increase capacity of suppliers, increase of capital-risk markets. Found on wikipedia common
[5] : more information and description of the three ùetjods on the Quatre façons de faire de l'open innovation (bpifrance.fr) website
[6] : GE Healthcare Takes Additional Actions to Help Clinicians Combat Coronavirus | GE News. It's an interesting example of firms counseling business and goof externalities.
[7] : https://www.edf.fr/pulse/prix-start-up-2022
[8] : According to Harvard Business review's article : Why Now Is the Time for "Open Innovation". Relying on several studies through the subject, writers conclude that open innovation is a first step to cooperation. "Urgency leads transformation", as they say : recent time are propice to switch system.

Other general references :

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