BEYONG THE ENERGY SOURCE, WHAT ENERGY SYSTEM ARE WE BUILDING FOR TOMORROW? A SOCIO-ANTHROPOLOGICAL APPROACH

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In this paper we propose a socio-anthropological approach to large electricity grids. Our reflection is based on two fieldworks conducted in France, both relating to environmental controversies. The first fieldwork concerns an extra high voltage (EHV) line project between Spain and France, in order to connect first all European networks, and later Europe with North Africa. The second fieldwork concerns a wind farm project in Bretagne. In both cases, the projects faced protest from local populations resulting from a desire to protect landscape. We will see how this materialization of electricity in local landscapes appears as a possibility for people to take part in the global discussion on energy transition. Technological choices, as energy options, would no longer be limited to an exclusive field of experts and scientists, and would appear as social issues involving other technical, economical, and institutional choices, as well as behaviors, practices and way of being.

But in theses few pages, we will not be able to detail our fieldwork. Rather we will raise certain questions, and some conclusions resulting from these two controversies.

Questioning large electrical grids is a very important yet sensitive issue in the current energy and environmental crisis. The development of interconnected electrical networks, as well as large wind farms, is nowadays considered a response to climate change. It is intended to optimize production while reducing the problem of irregularity of certain renewable energy sources, and thus to promote their use. However, this option suggests a representation of tomorrow's energy as mainly electric. It may involve the maintenance and even the intensification of electricity needs in our demand for energy. Additionally, it implicates that we consider all primary energy sources in their ability to produce electricity for a large power system. As with all technological decisions, the choice of extending large power systems is not neutral as it will influence future technological research and innovations, and hence technological solutions proposed to so-called developing countries.

Even if large wind farms promote renewable energies, they may in correlation increase the disconnection between production and consumption of electricity, materially, but also symbolically (keeping away users). This may therefore maintain energy into an abstract notion, perceived only by its cost. But on the other hand, power networks, as with all modern networks, symbolize social linkage and solidarity in modern society, and are valued in this sense. We have noticed this symbolic value in previous fieldwork around a sustainable district project in Paris, France. Here, even if renewable energies and all the building techniques aimed to allow energy autonomy in the future eco-district, many people could not imagine living outside the network. They did not point out technical reasons for this, but rather social explanations. As one of the district neighbors says: "we can not be apart from the world". From this point of view, extending power networks is also extending social linkage and solidarity. Moreover, Harold Wilhite (2008) and Tanja Winther (2008) show that electricity has the same symbolic significance in India and in Africa. Winther especially emphasizes

how electrification of a village in Zanzibar, Uroa, by the arrival of the grid meant the connection of this village with other villages and towns, moreover acting as a connection to modernity. The landscape change (pylons, lines and transformers) was here the symbol of inclusion into the developed world[1].

The social acceptance of high voltage transmission lines, or of wind turbines in the landscape, is related to the representation of the progress in developing countries as well as in our modern world. And, in the latter, the progress now comes into question, which makes our two controversies very interesting fields of study.

I – The paradox of invisible energy

In the western world, energy makes almost all our activities feasible, from the most mundane to the most vital. More than any other, our society is dependant on energy, mainly from fossil sources, but also (as in France's case) nuclear. Yet it is not visible, especially when it takes the form of electricity: we press the switch to turn on the light; we turn our oven knob to have heat to cook our food; we fill the tank of our car without seeing or even thinking about the energy source, the part of the world it comes from, or the heavy infrastructures it requires to be produced and transported to us. The materiality of energy and of infrastructures does not appear as long as supply and availability are not questioned. The large technical systems it relies upon actually hide energy behind the services they return, as Wilhite pointed it (H. Wilhite, 2005). Thus, the energy that was abstracted out of local concerns became a global issue. For this reason, people do not feel directly concerned by the necessary transformation of energy systems. Energy is often regarded as a phenomenon belonging to experts, scientists and engineers (take the case in France for example, where production and distribution of electricity remains highly centralized). In this context, people can not change their behaviors, reduce their energy consumption, and change their way of life to achieve simplicity. In other words, they can not control something that eludes them, that remains invisible and opaque in its origin and production, especially since the most threatening environmental deteriorations are invisible for them as well. Because the most devastating effects are global (like climate change), they are not linked locally to energy consumption. Our commitment can only rest on the belief in what scientists and experts reveal to us. The invisibility of energy and the difficulty to act and be concerned locally, seems to assume a global scale solution. The development of large distribution networks for electricity follows this aim. Extension of super grids and of large interconnection between countries is directed to allow different energy sources to combine, reducing waste and optimizing production. Also, development of large scale wind power or solar power (as the "Desertec" project[2]) aims to improve and adapt the current energy system to climate change by substituting clean to polluting energy. How, in this context, are people to be concerned by the energy issue, and take measures to become actors in this domain?

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[1] From this point of view, it would be interesting to compare this very interesting study of Uroa to the electrification of a village (in a comparable county) through local production of energy via renewable sources. Is that will be seen as an inclusion to the modernity as well as the grid « arrival » ?

[2] « Desertec » is the project to install solar panels in the Sahara to provide « clean » energy to Europe. The interconnection between France and Spain also aims for this purpose, Spain being already connected to North Africa.

II - When energy becomes a local concern

Some individuals and communities, aware of their week capacities to change the state of things, decide to break with conventional energy systems. They develop local energy systems (that is to say, new technologies, but also news ways of life: of consuming, of social relations, etc.), more or less independent (as eco-villages or "transition towns" movement), or they contribute to organized micro-grids. Renewable energies then play a significant role in connecting energy sources to users, production with consumption, having positive consequences on perceptions. But we find here voluntary and often militant behaviors, with no reason to think they will become generalized. Most of the time we can only be aware of our powerlessness, and energy stays an abstract notion.

But, our two fieldworks have led us to understand how energy could become a more concrete notion, able to be seized locally, and to invite people into discussions where they were not at first invited. The development of large electric networks, that answer at a global scale to a global problem, was confronted by local resistance. Indeed, at some point the abstract perception of energy and of environment came to take root in a territory, by expanding infrastructures in landscapes, as with high voltage transmission lines and large scale wind farms.

In the current context of crisis, confusion and misunderstanding of what should be our future energy system, we question this visible materiality of new heavy infrastructures which often results in controversy.

I will illustrate this with our two fieldworks: one around a five wind turbines project in Bretagne-France, and one raised by an interconnection project between France and Spain in the Pyrénées-Orientales. In both cases, it was at first the deterioration of the landscape that mobilized residents. Most of the people were afraid to see pylons or wind turbines next to the places where they were living. Their landscapes were not only viewpoints, but "cultural environments". When we consider it locally, environment is not an abstract notion anymore, threatened by global warming, but a tangible environment where its inhabitants are involved. Here it becomes socio-natural, not only in the sense of techno-natural arrangement, but more generally in the sense that it is a nature full of private and collective memory and meaning.

This was very clear in the case of the EHV line project at the Spanish border. After all the different sites proposed by RTE (the French network of electricity transmission) to install pylons had been rejected, they planned to put them in the Vallespir valley, where few people live. But this reinforced the conflict. The Vallespir Valley was not only a place where the fauna and flora were very rich, and where environment was still wild and unspoiled, but it contained also the memory of Catalonian history. The Vallespir valley is in the north of Catalonia (which extends mostly into Spain) and was attached to the kingdom of France in 1659. From this time on, Catalans were separated by a border. Therefore, the valley symbolizes the past unity of these people, and the pain of their separation. To defend the Vallespir valley from pylons was to defend the memory of a united Catalonia, and the integrity of its people. As a local resident said: "to fight against the EHV line project in the valley, you must have the Vallespir running through your veins".

So, it has been made clear that controversies emerge from landscape problems, paving the way for a possible discussion on energy issues. Once individuals and collectives make these

issues their own, they realize just how much energy is a social problem, and consider options in this field as societal choices.

The controversy was not often expressed in these terms for the EHV line project, where militants were strategically chosen to focus on theirs goals: get rid of the pylons. But it was explicit for the wind farm controversy. Even if the use of the future's wind turbines will not be decentralized, it is a fundamentally local and visible energy: we can feel if it is windy or not, we see if the blade is running or not. The energy production does not seem so complicated (as in a power or nuclear plant) or so remote from common sense. The fact that people can more easily imagine this energy also allows them to express themselves on the debate.

III – "What for?"

Some current controversies have a great impact, potentially endangering projects. For example, after almost 30 years of controversy surrounding the electricity interconnection between France and Spain, militants have forced RTE to bury the line, costing them 700 million euros which is 10 times more than an aerial power line.

The Nimby (Not In My Backyard) syndrome, firstly highlighted to explain the local refusal of EHV lines or wind turbines, is no longer a central argument (see Patrick Devine-wright, 2005; Derek Bell & al., 2010 ; Charles R. Warren & al., 2005). Aesthetic in these cases is obviously a subjective issue referring to representation of nature and of the relationship between nature and society.

Michael Woods (2003) discusses the different approaches and discourses on nature to understand the various types of acceptance of wind turbines in rural landscapes. The relationship between rurality and nature is questioned, showing that the protection of nature is often likened to a protection of rurality. He shows how the different conceptions of nature lead to different perceptions of poles and wind turbines. It depends on whether nature is considered as wild (everything which is not related to human agency) or as a "social nature" which could include all kinds of human artifacts (from crops or pastures, to roads, or sometimes modern technologies). It also depends on the representation of nature as vulnerable or resilient. On this point, debates on the position of birds can be enlightening. At the beginning of the conflicts around wind turbines, the argument over the detrimental impact on birds, especially migratory birds, was very important. Today we no longer use that argument, and the idea of a resilient nature is often preferred. Manuela de Lucas & al. (2004) show for example that birds change their flight direction when they detect the presence of turbines.

In these discussions on wind farms, we noticed key actors were all on the side of the environment: birds, biodiversity, pollution and climate change. Each one defended a different conception of environment or of nature to support his point of view. For M. Woods (2005), nature and environment are constructed to actually transform a conflict of interest (the conflict between lobbies) into an environmental controversy.

Controversies over wind power refer not only to different conceptions of nature, but also to different conceptions of progress. Therefore, even if undoubtedly there are conflicts of interest, these controversies also express disagreement over the representation of progress and of the appropriate role of technology in the energy transition.

Therefore we are faced with different positions in the controversy:
- Those who defend the wind farm project because they support large renewable energies.
- Those who are opposed to the wind farm project because they think such energy is ineffective, costly, space consuming, and unsuitable for our energy system and our society.
- Those who, on the contrary, are opposed to the project to favor decentralized renewable energies, and to allow a real energy transition.

Ecological problems, energy and climate crisis, the media tells us, make a legitimate question about the validity of new energy infrastructures. This is likely why current controversies over EHV lines have are much stronger than in the 1950's or in the 1960's when these high voltage transmission lines spread in the country. Because we presently question progress, and the ability of science and technology to solve our environmental problems, we can now give a societal significance to these controversies. Moreover, several sources of energy are today competing with each other, contrary to in the 1960's.

As we have just seen, the impact on the landscape is what enables individuals and groups to approach the energy issue, but the equivocal or doubtful notion of progress is what gives great scope to the controversy.

When militants begin to express the problem in terms of "what these infrastructures are for", we are no longer facing a simple landscape controversy (comparable to a NIMBY phenomena). When people we interviewed wondered if these new EHV lines were useful, that is to say, if we really needed a new interconnection between France and Spain for our own or for the Spanish current supply, it became more than a local problem of landscape.

These questions were not raised in the 1950's or 1960's because these transmission lines were then the symbol of modernity and progress, synonymous with greater well-being. This gave them an aesthetic quality (like we can now find wind turbines beautiful, due to the symbol of communion with nature to which it refers).
In the case of power lines, the current only passes, coming from upstream and supplying areas downstream. Activists are wondering where this current comes from and where it winds up. Then the question of the source of energy and of electricity production upstream is raised.

As we already have an over-production of electricity in France, the projects planning for wind development zones[3] leads some individuals or groups to ask themselves what these turbines will be used for. The landscape impact raises the question of energy policy: why encroach on the landscape with wind turbines for so marginal and intermittent a production, compared alongside our global needs?

But other questions are also raised, this time in a different way: why these wind farms (which must include at least 5 turbines since a law passed in July of 2010) and not a decentralized and scattered development of turbines on the territory, as is more frequently encountered in Germany or in Denmark?
Thus, different representations of progress and of perspectives are confronted, and the local problem is then transformed into a global issue.

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[3] What is called « Zone de Développement Éolien (ZDE) » in France, where the turbines are installed.

Is wind energy able to satisfy a significant portion of our energy needs? Is it economically sustainable? Will the development of large wind farms be able to give a real position to RES in the energy system?

Conflicts over EHV lines projects are rooted in their local problem, but some activists wonder what kinds of energy system these new interconnections are promoting. In France, the issue of nuclear energy is always underlined, often being explicitly addressed. For a large majority of activists, the purpose of these lines is commercial (to sell our nuclear energy) and does not respond to a social or ecological logic.

Why then have conflicts over high voltage power lines not resulted in a more general debate, although activists from different parts of France, or even from other countries, interact?

Probably because, unlike the wind farms, high voltage power line sites, are not production sites. EHV lines make currents circulate, but its production remains a mystery. On the contrary, the renewable energies, including wind, make visible the power source. This is evident in the case of local energy independence. However it remains true, although to a lesser extent, in the case of large scale wind power. The local nature of the energy source, that we can not move or store, implies an active participation of the territory, and thereby of its residents. Wind turbines are installed on what we call a "wind field" (as we talk about oilfield or a gas field). This might be the reason why the controversy on the landscape is necessarily linked to the debate on the energy source involved and electricity production.

IV – Renewable energies: technological solution or paradigm shift?

But it is not easy to have a critical approach in a constructive way to these power networks, as they are at the heart of all our energy system, and thereby of our western societies.

As P. Hughes (1983) shows, western societies were physically, cognitively and symbolically developed on these power networks, and more precisely on the power grid after 1880.

These networks have structured our economy, our political and social systems, as well as our collective representations and our technical imaginary. As T. Hughes wrote in 1983, at the beginning of his book: "of the great construction projects of the last century (meaning the 19th century), none has been more impressive in its technical, economic and scientific aspects, none has been more influential in its social effects, and none has engaged more thoroughly our constructive instincts and capacities than the electric power system. A great network of power lines, which will forever order the way in which we live, is now superimposed on the industrial world. Inventors, engineers, managers, and entrepreneurs have ordered the man-made world with this energy network". Later he adds: "Power systems reflect and influence the context, but they also develop an internal dynamic" (T. Hughes, 1983, p.1-2).

This is probably why the first response to climate change and energy crisis emerges from this power system itself, for example by developing large interconnected electrical networks or by substituting fossil for renewable energies. It implies that we consider any primary energy sources in its ability to produce electricity for a large power system. But this is not the greatest asset of RES, which are not adapted to a system based on control of flows (see L. Raineau, 2010). The intermittent and random nature of the availability of sources (for wind especially) then becomes an almost insurmountable problem facing our energy system and the dependence on electricity it introduced. We know, for example, that in France the development of nuclear energy since the 1970's led to replacing the heating systems then in place with electric heaters in homes and offices, which created a path to dependency and increased the need for electricity in our country today.

The technical is inherently social, wrote Jane Summerton (1994). H. Wilhite (2008) pointed out that for India, changes in consumption, behavior, norms and even in social obligations or relations, are all linked, and are embedded in technical systems. Also, Tanj Winther (2008) showed how the arrival of electricity in a village (Uroa) in Zanzibar has influenced social life (gender relationship, generation relations, human-spirit relations) and produced new needs and consumption norms. By technical system, Bertrand Gille (1978) meant that all technologies embedded in a system are coherent with one another. The coherence of a technical system includes behaviors, practices, desires, needs and ways of being. Therefore new technologies must first find their meaning and coherence within the system. Which does not exclude a dynamic change in systems, as the B. Gille stated: "The dynamic of systems is reflected in practice by a number of invention-innovation introducing imbalances, and thereby leading to the search for a new coherence, a new system" (Gille, 1978, p.13). Could renewable energies play this role, even if they are developed centrally? Is it the reason why they seem so threatening, especially for certain groups in France?

The RES may be a threat to the large power system because it can affect our representations, our expectations and our desires. The source of energy and the infrastructure in which it expends is not neutral, and has many consequences on representations of well-being, nature and the environment. The technology is not only a tool to solve the problems raised previously by other technologies. It is above all what stands between us and nature, and what will shape our representation of and our action upon it.

Renewable energies may also be a threat to the large power system because they refer to traditional knowledge and know-how which have been eradicated by modernity. Even the more innovative one, such as solar photovoltaic, is inherited from past civilizations. It is then very difficult for renewable energies to find legitimacy in a technical system that defines progress as an "overstepping" of past knowledge and technologies (see J.-M. Lévy-Leblond, 1996). Modernity stands on the neglect of traditional skills.

Bibliography

Bell, Derek; Gray, Tim; Haggett, Claire, "The 'Social Gap' in Wind Farm Siting Decisions: Explanations and Policy Responses", *Environmental Politics*, Vol.19, Issue 1, p.45-60, 2010.
Devine-wright, Patrick, « Beyong Nimbyism : towards an integrated framework for understanding public perceptions of wind energy », *Wind Energy*, vol. 8, Issue 2, pages 125-139, 2005.
Gille, Bertrand, *Histoire des techniques*, Paris, Gallimard, encyclopédie de la Pléiade, 1978.
Hugues, Thomas P., *Networks of power*, Baltimore, The Johns Hopkins University Press, 1983.
Lévy-Leblond, Jean M., *La pierre de touche*, Paris, Gallimard, coll. Folio Éssais, 1996.
Lucas, Manuela (de); Janss, Guyonne; Ferrer, Miguel, "The effects of a wind farm on birds in a migration point: the Strait og Gibraltar", *Biodiversity and conservation*, Vol. 13, n°2, p. 395-407, 2004.
Raineau, Laurence, "Vers un nouveau paradigme énergétique?", *Natures, Sciences, Sociétés*, to be publish, last semester 2010.
Summerton, Jane (ed.), *Changing Large Technical Systems*, Westview Press, 1994.

Warren, Charles R.; Lumsden, Carolyn; O'Dow, Simone; Birnie, Richard V., "Green On Green': Public perceptions of wind power in Scotland and Ireland", *Journal of Environmental Planning and Management*, Volume 48, Issue 6 November, pages 853-875, 2005.

Wilhite, Harold, *Consumption and the transformation of everyday life*, Palgrave Macmillan, 2008.

Wilhite, Harold, "Why energy needs anthropology", *Anthropology today*, June, vol. 21, n°3, 2005.

Winther, tanja, *The Impact of Electricity: Development, Desires and Dilemmas*, Berghahn Books, 2008.

Woods, Michael, "Conflicting Environmental Visions of the Rural: Windfarm Development in Mid Wales", *Sociologia Ruralis*, Vol. 43, Issue 3, pages 271–288, July 2003.