

Energy transition: Real issues, false starts?

Patricia Lejoux^a and Nathalie Ortar

Laboratoire d'Economie des Transports, Ecole Nationale des Travaux Publics de l'Etat, 3 rue Maurice Audin, 69518 Vaulx-en-Velin Cedex, France

1. Where are we regarding energy transition?

Within a period of two years, the issue of energy transition has become a topical theme in France, in civil society and in academic circles. Although consensus appears to have been reached on the need to change our energy system based on the consumption of non-renewable energies with negative impacts on the environment, taking action appears more difficult, as shown by the recent demonstrations in Brittany which brought together entrepreneurs, employees and local elected representatives against the levy of an ecotax on the transport of goods by road. After recalling the stakes of energy transition (1.1), we shall attempt to show that it is perhaps the approach taken – an approach taken from the top and essentially technical – which explains in part, the difficulties of making energy transition effective, leading to the assumption of a “false start” (1.2).

1.1 Major issues

The notion of energy transition as it is understood today, means the progressive changeover from an energy system based on the consumption of non-renewable energy resources (oil, coal, natural gas, uranium, etc.) to one based, in part, on the use of renewable energies (solar power, wind power, hydroelectricity, biomass, geothermal energy, etc.), as well as thriftier and more efficient energy behaviour. This change of energy system appears motivated by two factors: the foreseeable rarefaction of energy resources (1.1.1) and the negative impact of our energy system on the environment (1.1.2).

1.1.1 *The rarefaction of energy resources*

The current energy system based on the consumption of fossil and fissile fuels is threatened by the foreseeable rarefaction of energy resources. These energies are non-renewable, thus by definition they are present in limited quantities on the planet. However the exponential increase of worldwide demand for energy driven by the developing countries and henceforth by the emerging economies (China, India) threatens current energy reserves [1]. This is particularly true of oil whose production should start to decline around the period 2020–2030. In addition to the exhaustion of resources and the security of supplies, there is also the question of the cost of this energy, illustrated by the tensions on the

^ae-mail: patricia.lejoux@entpe.fr; nathalie.ortar@entpe.fr

markets caused by the imbalance between supply and demand and the need to call on increasingly costly extraction methods.

1.1.2 Negative impacts on the environment

The current energy system based on the consumption of fossil and fissile fuels is also the cause of negative impacts on the environment. Firstly, it is a source of atmospheric pollution whose noxious effects on health are now acknowledged, stirring adverse public opinion whether in Paris or in Beijing. It also contributes to climatic warming through the greenhouse gases it generates. Regarding this, the latest report from the IPCC (International Panel on Climate Change) warns governments of the need to implement far more vigorous policies than the initiatives taken up to now [2]. Lastly, although nuclear energy does not contribute to climatic warming, it has nonetheless demonstrated its limits, whether through the problems raised by managing radioactive waste or through the ecological disasters that it has caused, Fukushima being the latest illustration.

1.2 A false start?

Once the conclusion of the inevitability of energy transition has been reached, it is then necessary to focus on how it is approached and implemented. At present, it appears that energy transition is mainly driven from the “top”, that is to say by governments, and that its effectiveness mainly depends on technical innovations, demonstrated by the extent of recourse to the hard sciences to find solutions [3]. Although these approaches to energy transition are, of course, vital, should they be the sole paths taken to elucidate the issue of energy transition? Couldn't it be driven from the “bottom”, through the actions that households, companies and territories decide to take at their particular scales (1.2.1)? To understand the reluctance involved in implementing energy transition, shouldn't account be taken of the “frictions” that underlie the reality and notably the constraints facing households, companies and territories, and which the human and social sciences can help to explain (1.2.2)?

1.2.1 Impetus from the “top” and from the “bottom”?

For the most part, energy transition seems to be driven by governments, with the exception of environmental aspects that are included in international framework agreements, especially European ones. The importance of the role played by governments in driving energy transition can be explained both by the specific situation of each country regarding its energy resources and by the extremely important geopolitical issues raised by concerns over energy. Each country remains free to determine its energy mix, its sources of supply and how it exploits its energy resources, testified, for example, by the different choices made by countries such as Germany, which has decided to abandon nuclear energy, and the United States of America which has chosen to take the direction of exploiting non-conventional energies such as shale oil, oil sands and shale gas in order to achieve energy independence. In France, although the laws derived from the Grenelle Round Tables on the Environment 1 and 2 led to laying the first foundations, the issue of energy transition became evident in the public arena on the occasion of the Environmental Conference on Sustainable Development organised by the government in September 2012. This was followed by a national debate on energy transition during 2013, which should serve as the basis of a draft law aimed at committing France to energy transition.

Although it is vital for States to involve themselves in this issue, is this involvement sufficient to initiate energy transition? To what extent can these hierarchical top-down decisions respond to the different situations of households, companies and territories confronted by energy transition? Do the regional adaptations of national targets, as in the case already of regional climate-air-energy frameworks (SRCAE) and climate-energy-territory plans (PCET), permit appropriate responses? The stakes of

energy transition and the responses required obviously differ in the case of a rural territory in comparison to a world class city, a multinational corporation to an SMB, and a household receiving minimum social security benefit to a well-heeled one. Shouldn't greater attention be given to the way in which energy transition is treated at the scale of a household, company and territory, since it is they which seem to best fitted to identify the veins of sobriety, efficiency and renewable energies that can be exploited? They can also, along with governments, be the driving forces of the actions to be organised and the resources to be deployed to achieve energy transition.

Here the aim is not to oppose two approaches, a "top-down" approach versus a "bottom-up" one, as is often done, but to emphasise their synergies. In order to initiate energy transition, it appears vital to reconcile both planning and regulation "from the top" on the one hand, with decentralisation and innovation "from the bottom" on the other [4]. But to do this, it is first necessary to understand how energy transition is initiated at the scales of household, company and territory.

1.2.2 Recourse to the hard sciences and to the human and social sciences?

As for the implementation of energy transition, it appears narrowed down to a simple question of technology. The contribution of the hard sciences appears essential here as they break down barriers to the formulation of new technologies and the movement towards a new energy system. The issue consists in developing specific facilities (wind farms, solar panels, etc.) and finding efficient tools that permit reducing energy consumption (smart grids, cleantech, etc.). Regarding housing, for example, energy transition appears essentially linked to the construction of low energy buildings, improving their thermal isolation and the efficiency of heating and air-conditioning, etc. Likewise, in the field of transport, it entails improving the environmental performances of gasoline driven vehicles, increasing the battery life of electric vehicles, developing recourse to biofuels, etc.

However energy transition, which, it should be remembered, consists in changing progressively from one energy system to another, cannot be reduced to simply making available technical solutions. It also implies changes of practices that affect every aspect of daily life: the way we use heat, light, move around, work, produce, choose our dwellings, chose investments, etc. It demands a radical change of lifestyles, values and political, economic and social systems. But the question remains that of knowing to what extent households, companies and territories are ready to undertake these changes. How do they apprehend the issue of energy transition which augurs, according to the words of J. Rifkin, "a third industrial revolution" [5]? What are the elements that permit understanding how, at the scale of a household, company or territory the decision is made to adopt more sober and efficient behaviour regarding energy and have recourse to renewable energies? For example, what are the elements involved in the choice of a dwelling that have meaning in terms of energy? What are the factors that explain that a company decides to invest in a policy of sustainable development or that a territory commits itself to the development of a wind farm? Are the availability of new technologies, adhesion to environmental values, and awareness of energy issues sufficient explanations? On the other hand, what are the rationales and constraints that make it possible to understand why the energy practices of households, companies and territories diverge from the behaviours expected by the public authorities?

The question of implementing energy transition indubitably comprises a crucial technical dimension to which the contribution of the hard sciences is essential in order to break through technological deadlocks. However, it also has political, economic, social and territorial dimensions that are no less important and which the human and social sciences can help to elucidate. By placing the issue of energy within a context social, economic and spatial rationales of practices and constraints, the human and social sciences can lead to better understanding and explaining the energy practices of households, companies and territories. It is therefore by orienting efforts towards more synergy and exchange between the hard sciences and between human and social sciences that the issue of energy transition can be dealt with.

2. TransEnergy research

In order to better understand these political, economic, social and territorial dimensions of energy transition, we wanted to bring together researchers working on this issue at an international conference. Called, “Energy transition: real issues, false starts?” this international conference organised by the LET (CNRS, ENTPE, Université Lyon 2) was held on 21 and 22 October 2013 in Lyon in the premises of the Ecole Nationale des Travaux Publics de l’Etat. The objective of this conference was twofold: on the one hand it entailed the presentation of the results of a research programme we carried out on the theme of energy transition and, on the other, exchanges with other researchers working on the same issue and belonging to the human and social sciences. After having recalled the objectives of the research performed in the framework of Trans-Energy (2.1), we will present the theme of the conference (2.2).

2.1 The spirit of the Trans-Energy research

2.1.1 *Analysing the strategies of adaptation of households and companies to energy transition in a metropolitan context*

The objective of the Trans-Energy project, financed by the National Research Agency (ANR) in the framework of the Sustainable Cities programme 2010–2013, was to provide researchers and professionals in the subject with elements of knowledge on the strategies of adaptation to energy transition implemented by households and companies, by using a comparative study carried out on the cities of Lille and Lyon.

From the standpoint of public actors the choice of localisation of households and companies, which contribute to shaping the spatial organisation of cities, appears to contradict the demands that must be satisfied in order to achieve energy transition. In particular, the preference demonstrated by households and companies to locate themselves in the urban outskirts of cities appears to be a factor likely to increase energy consumption and CO₂ emissions, both on the level of mobility, which means greater use of roads, and on that of housing, where the demand for detached houses is higher. But what is the opinion held by households and companies on these questions? How do they consider these new energy constraints? Can a change of mobility practices and housing usage be perceived that is liable to favour a decrease of energy consumption and CO₂ emissions? Are these energy constraints being taken into account in the locations chosen by households and companies and could this awareness lead to modifying the spatial organisation of cities in time?

To answer all these questions, the Trans-Energy project was performed in four phases. The first was devoted to the analysis of the spatial organisation of the cities of Lille and Lyon, on the basis of a study of the localisations of households and companies and mobility behaviour. In particular, it permitted measuring and mapping the energy consumption and CO₂ emissions generated by transport to and from places of residence and places of employment. The second phase was devoted to performing an in the field survey of companies to study their mobility management policies and their localisation strategies in the context of energy transition. The third was devoted to performing an in the field survey of households to analyse their decisions regarding their choice of localisation, their mobility practices and housing usage in the face of new energy constraints. Finally, the last phase was devoted to methodological work comprising the measurement of energy consumptions and CO₂ emissions related to mobility.

2.1.2 *A systematic, exploratory and comparative approach*

The aim of the Trans-Energy project was first to develop a systemic approach in order to analyse the different dimensions of energy transition together, by focusing on issues of housing, transport, business activities and territories. This systemic approach took the form of a dialogue between qualitative and quantitative methodologies and recourse to multidisciplinary research, since the diversity of the themes

dealt with required combining the expertise of several disciplines belonging to both engineering sciences and human and social sciences.

Another objective of the Trans-Energy project was then to develop an exploratory approach. Since the modalities of energy transition have, to a great extent, yet to be determined, we felt it was important to call on qualitative methods to study them. These methods are especially pertinent for identifying changes in actors' behaviour in a context of change, as holding face-to-face interviews appeared better adapted for identifying the constraints, margins of manoeuvre, and the decisions of the actors. The objective of these methods was to gain in-depth understanding of the logics underlying the actors' actions; they do not aim at generalising results in the same way as quantitative methods and rely on small samples.

Lastly, the final objective of the Trans-Energy project was to develop a comparative approach between the cities of Lille and Lyon as this provided the advantage of presenting different spatial organisations (monocentric for Lyon and polycentric for Lille) for cities of comparable size.

2.2 The spirit of the conference

The organisation of an international conference on the issue of energy transition was the occasion to present the results obtained from the Trans-Energy research, and to open the discussion by allowing other colleagues working on the same subject to speak. The aim of the conference was to participate in current debate on energy transition, by highlighting the contribution of the human and social sciences. After having recalled the objectives of the conference (2.2.1), we will present the contributions which were grouped into three themes (2.2.2).

2.2.1 A critical and multidisciplinary approach

As part of a critical perspective, this conference was aimed at emphasising the gaps in the political, social and territorial challenges linked to energy transition. It aimed at improving understanding of these challenges from the "bottom": at the scale of the individual, family, company, local authority, a sub-national territory, etc. How do households, companies and territories perceive the issue of energy transition? Do signals exist that allow thinking that changes are in progress? What are the elements that favour, or on the contrary, hinder awareness of these energy issues? In order to structure the premise put forward, the conference focused on two areas with high stakes for energy transition: housing and mobility.

In the framework of this conference we attempted to get different disciplines belonging to the human and social sciences to dialogue with each other on the issue of energy transition. The different contributions gathered here reflect the diversity of approaches to energy transition and testify to the considerable openness of these disciplines that brought together urban developers, anthropologists, geographers, political scientists and sociologists.

2.2.2 Three inputs: households, companies and territories

The conference permitted dealing with the issue of energy transition through three questions, providing an array of different responses on this issue.

The first series of communications aimed at questioning the relationship of households with energy transition: how do they incorporate the issues of energy transition and how do they react to them confronted by the implementation of public policies intended to promote energy transition? By using a highly original approach based on the use of on-line forums, Jérémy Bouillet sought to explain the way in which individuals integrate discourses on energy, adapt them and take them into account or not in their daily lives. As for Nathalie Ortar et Félicie Drouilleau, they had carried out an in-depth study of

how these new energy constraints could contribute or not to the decisions taken by households regarding mobility practices and housing use within the conurbation of Lyon. Working on the same interviews, Joël Meissonnier focuses on the reasons for not adopting more sustainable localization choices in accordance with sustainable mobility principles and the nature of the adjustments that allow dealing with changes according to energy prices. Estelle Durant focused on development policies and sought to know the conditions of acceptance of a “Post-Carbon City” for the inhabitants of the conurbation of Tours.

The second series of communications dealt with the question of the relation of companies with energy transition, by focusing on two areas representing challenges for companies: building management and mobility. The contribution of Isabelle Garabuau-Moussaoui shed novel insight into the energy practices of the occupants of energy efficient buildings in the service sector, by setting out the three sometimes contradictory logics on which they are based: a logic of usage, a logic based on labour costs and a community logic. Likewise, Magali Pierre showed how an electric vehicle made available by a company certainly contributed to reconfiguring the mobility of employees, but how it also represented a vector of stakes, where the professional register (stakes of recognition, exemplariness) dominated in comparison to the environmental one. Lastly, Patricia Lejoux, Nicolas Jouve and Ludovic Vaillant focused on explaining the challenges faced by companies in committing themselves or not the introduction of sustainable mobility policies, with particular emphasis being given to the specific case of companies installed in the enterprise parks of the urban outskirts of Lille and Lyon, where economic and social concerns appear to take precedence over environmental ones.

Lastly, the third series of communications focused on the links between territories and energy transition: how does the emergence of these new territorial challenges contribute to rethinking territorial deployment? Giving emphasis to the question of mobility, Rémy Canavesio showed how new energy constraints acted to reformulate the question of the isolation/accessibility of the different territories of Oceania, highly dependent on air transport, by using the concept of “space/energy”. As for Maximin Chabrol, he focused on energy consumption linked to the habitat in the Provence-Alpes-Côte d’Azur region. On the basis of painstaking mapping, he identified specific consumption profiles within regional sub-areas and highlighted the diversity of territorial issues in energy transition in the housing sector. Lastly, by focusing on spatial planning policies, and in particular on planning policies related to economic activities, Christophe Demaziere showed how local actors reformulated the principles of sustainability decreed at national level. Using two different institutional contexts, that of France and of the United Kingdom, these works contributed to explaining the difference sometimes encountered between the principles of sustainability decreed at national level, intended to initiate energy transition, and local accomplishments.

References

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