Island stories, geographical limits and electricity system dynamics — what can we learn from a comprehensive reading of electricity supply and consumption modes?

Sophie Bouly de Lesdain EDF Lab Paris Saclay 7 bd Gaspard Monge 91120 Palaiseau France sophie.bouly.de.lesdain@edf.fr

Sylvie Douzou EDF Lab Paris Saclay 7 bd Gaspard Monge 91120 Palaiseau France sylvie.douzou@edf.fr

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Abstract

Current energy policies addressing climate change issues are designed to find solutions for the reduction of energy demand. Such policies are still often formulated in terms of energy efficiency, although they are now clearly targeting household practices and behaviour. In such a perspective, small islands are an interesting territorial context from which one can learn a great deal: these territories impose certain limits to energy demand, because energy production is itself limited and it is for this reason that they call for energy production and consumption to be considered together, an idea especially embodied by the notion of prosumer. But this is not all: load shedding at times of peak demand also reveals concerns relevant to both consumption and production, and behaviours towards the local production system. This is exactly what we propose to discuss in our paper by focusing on air conditioning and heating load shedding in three French island territories (Corsica, Reunion, and Guadeloupe). Despite obvious individual cultural features, they do share certain characteristics and thus constitute privileged fields of observation regarding the dynamics of electricity supply (fossil fuel up to 70 % of electricity mix and intermittent energy up to 30 % of injected power¹; electricity demand grows on average by 3 % a year). They might even be seen as in situ laboratories supporting the French electricity system's transition towards a more place-based approach. To this end, we propose a secondary analysis of a set of original data (63 interviews/393 questionnaires). The multi-situated sociological analysis we adopted allows us to identify common behavioural trends among households interviewed. We will start from interviewees' thermal practices, in order to analyse their logics of use. We will show that they fall within different life contexts and that they can be differentiated according to age groups or socio-economic categories. Our findings argue in favour of local policies that go beyond an ideal "average behaviour" based on strictly economic or efficiency-driven logics. We will conclude our paper with a discussion on future energy demand and the policies to deal with it.

Introduction

The energy and ecological transition is dependent not only on energy efficiency measures but also on change that operates at several social scales among which end-uses' dynamics referring to the variety of household contextualized behaviour, habits, and way of life, as well as social norms and representations of energy. This question of demand management and reduction is already very much an issue in non-interconnected island systems where production capacity is itself limited. That is why the Energy Community stakeholders (industrial players, academics as well as policy-makers) pay more and more attention to these territories through an array of very various contexts from Global North (see for instance Perez & Real, 2008; Newberry, 2016; Strengers & al, 2012) and Global South (see for instance Boräng & al, 2016; Dornan, 2014; Prasad & Raturi, 2016). Such territories require us to consider questions of electricity production and consumption together - a

^{1.} Source: Systèmes Electriques Insulaires.

subject often defined by the notion of "prosumer" (simultaneously "producer" and "consumer") (Cova & al. 2013) - but this is not all: load shedding at times of peak demand also links consumption and households' behaviours to the local production system. Our contribution examines these points, using a sociological analysis of the load shedding of air conditioning and heating on three French islands (Corsica, Reunion, Guadeloupe), initially conducted within an experimental framework². Load shedding is here linked to an internet portal which provides inhabitants with information about their electricity consumption. These two technical devices (load shedding box and internet portal) are designed to shift or reduce demand in a context where production is itself limited. It is no longer merely a question of adapting production to meet increasing demand, but of adapting consumption to production. In this paper, we present the results of a secondary analysis of sociological interviews and telephone questionnaires which revealed a series of issues relating to households' electricity demands and their evolution. More specifically, we will explore the following issues: what can we learn from the thermal practices based on households' logics of use? How is energy conceived and imagined in these cultural settings? What role does the insular context play in representations of energy and its uses? How does the articulation between offer and demand operate? What are the interviewees' perceptions of load shedding? What lessons can we learn for future energy policies?

In order to address such questions and engage discussions, we will begin by setting out the particularities (energy, economic, social) of these territories (making them "laboratories" for the analysis of future trends in energy demand and supply), the technical devices that were put in place, and the sociological materials that were analysed. This will allow us to then present the main results in these areas by comparing household practices with the envisaged energy and social contexts. To achieve this, we will use a sociotechnical approach in order to explain the interviewees' representations and logics of action explaining how they adopt (or not) the technical devices installed (load shedding and internet portal). We will then look at what these logics tell us about the dynamics of household electricity consumption. We will end with a reflection that goes beyond the island context and which considers what these results allow us to say about future demand and public policies.

Setting the scene: island context, sociotechnical devices and sociological material

This first section sets the scene for our analysis by describing, one by one, the characteristics of the insular contexts analysed, the specificities of the sociotechnical devices installed and the materials collected from the households interviewed.

THE ISLAND SYSTEMS

The three islands (Corsica, Reunion Island, and Guadeloupe) are obviously culturally different, each with its own strong identity; they nevertheless present common characteristics which make them privileged territories for observing the articulation of electricity demand and production systems. First and foremost, insularity imposes geographical limits on the electricity system, because it prevents countries from turning to neighbouring territories when there is an imbalance between electricity production and consumption3. Secondly, these three islands possess a high level of fossil fuels (up to 70 %) and intermittent energies (over 30 % of the power injected into the system at certain times⁴). Finally, since 2007 the French electricity market has been open to competition, with the exception of these islands due to the high production costs. These costs are painless for the islanders, as they benefit from "tariff equalization", whereby in virtue of territorial equality, electricity is sold at the same tariff throughout France and its overseas territories. Electricité de France (EDF) ensures the functions of production, distribution and commercialization throughout the islands.

These particularities explain why these islands are the object of a specific national energy policy which requires them to achieve energy autonomy by 2030 - a target that is even more complicated in that they are relatively well-populated, with a demand in electricity that is increasing by an average of 3 % per year (compared to 1,5 % in 2015 for mainland France) despite the highly precarious economic climate (with a level of employment higher than mainland France). For example, Reunion Island was energy autonomous in 1980 (Savidan & al., 2008), but the demographic growth⁵ and the development of domestic appliances led to an increase in energy consumption of approximately 205 % between 1980 and 2005 (op. cit.). Air conditioning was one of the main contributors to this increased consumption. One third of Guadeloupe's homes have air conditioning, accounting for almost 25 % of electricity consumption; 16 % of Reunion islanders are so equipped (Galenon, 2011). Finally, regarding heating, almost one in two Corsican households have electric heating (compared to one in four on the mainland; INSEE). Remote control of these uses (air conditioning and electric heating) is therefore particularly appropriate on these islands.

What also make these three islands interesting when it comes to analysing energy behaviour are their differences. They are different in terms of size (Corsica is three times larger than Reunion Island, which in turn is almost twice the size of Guadeloupe), in terms of population (the population of Corsica is three-quarters that of Guadeloupe, which is in turn approximately half that of Reunion Island), in terms of political status (Guadeloupe and Reunion Island are French Overseas Departments) and also in terms of climate. Corsica has a mild Mediterranean climate, Reunion Island a tropical southern hemisphere climate with oceanic nuances, whilst Guadeloupe has a temperate tropical climate. Finally, Corsica and Reunion Island are seasonal, which is not true of Guadeloupe. This climate diversity is one of our study's main points of interest, allowing us to test identical technical devices in different climates and to look at how users integrate them in their everyday life.

^{2.} The empirical findings presented here are based on data produced through the EDF-R&D collaborative project (Millener) bringing together industrial partners and Ademe, that we wish to thank. The secondary analysis and readings set out in this paper are nevertheless the sole responsibility of the authors.

^{3.} Corsica is the only one of the three to have two interconnections, one with Italy, the other with Sardinia, which between them account for 31 % of the island's electricity production.

^{4.} Source: Systèmes Electriques Insulaires.

^{5.} Between 1970 to 2010, population almost double: 450,000 inhabitants to more than 828,000 inhabitants.

LOAD SHEDDING AND INFORMATION (INTERNET PORTAL) ON ELECTRICITY CONSUMPTION: TWO VISIONS OF THE PLACE OF USERS IN RELATION TO ELECTRICITY DEMAND

In order to manage and reduce demand, a collaborative project⁶ recruited 523 voluntary households in Corsica, Guadeloupe and Reunion Island. Participants had freely access to two technical devices:

- Firstly, load shedding, which consists in turning off heating and air conditioning during peak hours. It was thus a case of the electricity system reacting to demand. A display unit ("the box") located near the television or the computer allowed participants to turn the heating/air conditioning back on if there was loss of comfort ("derogation"). The level of derogation is thus one of the indicators used to judge how the interviewees assessed the "social acceptability" of load shedding. The interviewees were neither informed of the load shedding, nor remunerated when there was no derogation, as can sometimes be the case in other experiments. This is important to point-out: the experimental framework established rules which were close to "real" conditions⁷.
- Secondly, the implementation of consumption displays on the Internet portal was based on the premise that, once informed, users would be more aware and would therefore tend to better control their consumption. The participants' electricity consumption was translated into euros and CO₂ emissions, in weekly, monthly and yearly steps; a pie chart displayed consumption by use (estimated expenditure); there was also an alert function when a given threshold of consumption was exceeded. The internet portal was offered for free as part of the experiment.

The project design belongs to a body of trials and experimentations which explored the impact of direct and indirect information on energy consumption. Actually, the literature review on this topic shows an abundance of experiments carried out in various contexts and conditions (Strengers, 2010; Rotmann & al, 2013; Neenan, 2009; Darby, 2006; Hargreaves & al, 2010; Laville & al, 2009). In this respect, it is difficult to compare and to generalise outputs in order to give clear conclusions regarding the impact of information on households' behaviours.

SOCIOLOGICAL MATERIALS AND METHODOLOGY

In the present case, we conducted 63 interviews with project participants between 2012 and 2014. The criteria of selection was the diversity of situations regarding their age, family situation, and income. For technical and administrative reasons, we selected individual homeowners. The participants interviewed were between 20 and 62 years old. They were older and financially better off than the average of the Islands considered– which directly relates to the conditions for technical eligibility for this type of technical device. The semi-structured interviews were conducted in participants' homes, sometimes with several members of the household. They lasted from 1,5 to 2 hours. Our presence in their homes was an opportunity for us to observe their facilities, but also their traditional cultural practices (e.g. for instance closing the shutters when it gets too hot). On certain occasions, we consulted the internet interface with the participants themselves, then commented on, or looked at their latest electricity bills. The interviews allowed us to discuss: how the interviewees use electricity on a daily basis, including their management of temperatures within the home; their opinions and representations of the local electricity grid and local sources of electricity production; their expectations and uses regarding the technical devices (internet portal and energy box/load shedding). The interviews were followed up by telephone questionnaires submitted to all participants on the same topics -393 of them answered out of the 523 voluntary households. The same protocol (interviews and questionnaires) was used in all three territories, in order to facilitate a comparative approach. The purpose was to test at a bigger scale the interviews conclusions.

Our multi-situated analysis (Marcus, 1995) allowed us to go beyond local specificities to examine common traits which transcended the cultural diversity of study contexts. Sociological analysis of the "reception" and social appropriation processes of load shedding was thus based on two observations:

- Climate constraints are common to all inhabitants of a given place, but they do not explain choices relating to heating (type and use) or cooling, or the levels of indoor temperatures. This so-called "arbitrary" aspect of practices affects consumption volumes and their structure.
- The volume of a household's electricity consumption says nothing about the diversity of modes of consumption, or of their distribution by use and user.

Interplay between the local insular context and the interviewees' logic(s) of action: between tension, compromise and appropriation of the technical devices

The initial idea behind the experiment was implicitly based on a "conventional" distribution of roles between the electricity system actors (managing the load shedding) and the islanders (with the hypothesis that they would change their behaviour in line with the information provided by the internet portal). Actually, the analysis shows that this is not really how things work ... The sociological surveys conducted on the three islands gave converging results that went beyond the specificities of each territory and which revealed 'typical' logics of action. In all cases, the insular context affects the interviewees' relationships with energy. This was the first result.

BETWEEN AWARENESS OF THE LIMITS OF THE ISLAND'S ELECTRICITY SYSTEM AND THE DESIRE FOR EVERYDAY COMFORT

The interviewees' representations of the electricity grid and locally used energies were marked by the insular nature of their land. Due to the power cuts and voltage variations that they endure on a daily basis and which they know to be more frequent than on the mainland, they were fully aware of their island's limited production capacity. They mentioned concrete events which

^{6.} Project Millener (2011 to 2015) funded by the European Union (Fonds FEDER), ADEME, La Collectivité Territoriale Corse, Réunion Island and Guadeloupe territories. Led by EDF, this project gathered 7 industrials.

^{7.} The other section of the project, which involves PV installations in the interviewees' homes, with full sale or sale of surplus, is in the same spirit, as participants had to pay the market price for these production units, with the exception of the battery.

had directly impacted their everyday lives and which made the system's limits very obvious. For example, our Corsican interviewees talked about the famous 2005 power cut which had plunged parts of the island into darkness for several days or even weeks. As far as they were concerned, reducing their electricity consumption or accepting remote management of their heating would help those living in the centre of the island, who were more prone to power cuts. The Reunion islanders focused more on major climatic events (hurricanes) which regularly deprive them of electricity. Finally, the Guadeloupians mostly spoke about the port strikes which frequently prevent energy from being imported onto the island. In all cases electricity was a subject of debate recogizing that permanent access to it – necessary for everyday living – is not always easy and guaranteed.

On these islands, with their limited resources, the interviewees valorise local forms of energy which they feel to be free and environmentally friendly (sun, water, wind): they oppose them with imported fuels (domestic fuel), considered to be expensive and pollutant. The insularity of these territories thus affected the interviewees' representations of energy (local/green vs. imported/polluting). This type of representation coincides with a more global social pro-local trend that we find in other sectors of everyday life, such as food (short and locavore circuits). The interviewees felt that having to manage one's own consumption has a greater impact in an insular context than would be the case in an interconnected territory where it is possible to call upon outside resources. Following Strauss & al. (2013: 14), we can see that "how people describe, discuss, and debate energy as a substance reflects their fundamental values regarding power and agency, and impacts their everyday uses and abuses of energy resources".

That being said, this awareness of local constraints has its limits when it comes to collective norms of comfort. This is the second result: norms of comfort mean adapting to levels of electricity consumption that not everyone is prepared to accept. The increase in electricity demand on these islands relates in particular to a context of "catching up" in terms of comfort compared to the mainland. This is especially true of Reunion Island and Guadeloupe (i.e. the overseas departments). To demographic growth must be added an increased standard of living which, since 1990, has led to improved levels of home comfort and equipment. In all three of the islands we studied, there has been substantial growth in the use of air conditioning, which has in turn impacted electricity demand - one third of homes in Guadeloupe (more than half of which are in Baie-Mahault) are so equipped. Over the last ten years there has been a 253 % increase on Reunion Island, with 16 % of the island's homes now having at least one room with air conditioning. In Corsica, 17 % of households now have air conditioning, but this figure could reach 45 % by 20308. These trends are likely to continue; for the islanders we met, this new comfort is a sign of modernity as defined in western countries (on modernity see Chesneaux, 1989), or, in Guadeloupe, even of a levelling of social differences. Actions to restrict or shift demand can therefore be seen as a form of social regression.

The interviewees thus aspire to a certain level of comfort which conflicts with their understanding of the limits of the local electricity system. To resolve this tension, they do not all adhere to the same logics of action, nor do they have the same expectations with regard to the technical devices installed.

DISTINCT HOUSEHOLD LOGICS OF ACTION, BUT A SHARED NEED TO "MAINTAIN CONTROL"

Sociotechnical analysis here provides the theoretical frame needed to understand what, for the interviewees, is at stake during load shedding. The notion of "appropriation" thus highlights the active role that users play in the social construction of technologies and their uses. In the present case, the interviewees considered the load-shedding according to their own needs. For all three islands, they can be divided into three typical profiles relating to three claimed registers of action: 1) 'the altruists' (wishing to preserve the environment and support the grid); 2) the 'thrifty' (looking for ways to reduce their bills, or for energy efficiency); and 3) the 'comfort-seekers' (for whom comfort is a priority, particularly with regard to indoor temperature). On all of the islands, the interviewees are either part of a collective approach (saving energy, reducing the number of power cuts and CO₂ emissions) or a domestic approach (reducing bills, having a better understanding of their bills, taking advice)9.

Yet do these logics of action necessarily lead to changes in energy behaviour? As many authors have already noted, there is a difference between intention (acting for the environment or in relation to home management) and action (changing behaviour). The interviewees sometimes display values or logics which do not automatically lead to any change in behaviour. Let us take the "altruistic" interviewees as an example: they took a highly moral line on the absolute need to change individual practices in order to benefit the common good. Some of them made very limited use of their heating (Corsica) or air conditioning (Reunion Island/Guadeloupe). They thus felt themselves to be minor users of electricity, despite the fact that their overall level of consumption placed them in the major user category - this profile was validated for the "Corsica" study by cross referencing the sociological questionnaires with load curve data. Among our interviewees, heating and air conditioning thus became "emblematic" uses which allowed people to describe themselves as minor or major users of electricity. Changes in behaviour therefore depended on the interviewees' perception of their levels of electricity consumption. In that case, one low 'emblematic' use (heating, air-conditioning) allow them to consider themselves in conformity with their values. On another level, the second category of interviewees (the "thrifty") already made very limited use of electricity, essentially for reasons of economy or energy efficiency. It was difficult for them to reduce their already low levels of consumption. Finally, the priority for the third category of islanders (the "comfort-seekers") was without any ambiguity thermal comfort, however much this might cost them - and in some cases despite their strong environmental values. A change of behaviour was not practicable for people in this last category.

Under these conditions, the information that the internet portal provides on a household's electricity consumption is not relevant to people who do not wish to modify their demand (comfort profile) or to those who are unable to reduce con-

^{8.} Sources: Electricité de France – Systèmes Electriques Insulaires. (EDF-SEI).

^{9.} More often than not, several reasons coexist, but the order of priority varies from one interviewee to another.

sumption any further (very financially limited profile). Whilst it remains a key element for behavioural change, it is insufficient – sometimes inefficient – for certain islanders. The majority of our interviewees nevertheless liked the portal, because it helped them to understand their electricity consumption but hardly helped to change it. According to them this information should go hand in hand with concrete levers for action. Such levers might consist of advice on everyday uses, or promote the energy efficiency of appliances. In this respect, it was very clear that none of our interviewees had a maintenance contract for their air conditioning. Similarly, the information might explain how even small gestures can benefit the island as a whole. This would increase the feeling of being empowered to act among islanders whose levels of consumption are relatively low.

Dynamics of appropriation and dimension enabling change process grasp on a complex and comprehensive socio-technical system involving multiple players and social mechanisms. In view of this, we can differentiate between the interviewees in terms of their capacity to act in relation to their electricity consumption, and also with regard to the modalities of the action taken. For some of them, load shedding helps with the domestic management of electricity use: as they see it, load shedding either takes place when there is over-consumption of electricity, or else makes it possible to identify any dysfunctions of their electrical appliances. We thus find a difference between the device's initial objective (that of matching electricity demand with its production) and the objective assigned by the interviewees (management of household consumption – which the device may very well not be able to provide).

This brings to mind the diversion practices described by Madeleine Akrich (1998), whereby an object is used for a purpose different from that envisaged by its designers. As far as the interviewees were concerned, load shedding does not occur solely for the benefit of the electricity system; it also makes it possible to delegate the management of personal consumption to the electricity system. The interviewees are thus actors and not agents (Akrich, 1990: 17, 18 and 19): they delegate performance of the action to the electricity system. Or at least, that is their intention - one that is not fulfilled by the load shedding. Yet here we find the islanders asking for a service (management of their consumption) upon which public policies might be based. On the other hand, the interviewees see no connection between load shedding and their own electricity consumption; they consider that the load shedding serves the electricity system alone. These modes of appropriation thus reveal different ways of looking at load shedding in relation to heating and air conditioning.

Ultimately, the interviewees can be differentiated in terms of their capacity to change their electricity consumption and by the ways they do so. In relation to demand, we find three logics of change which might be levers of action for public policy:

- Changing energy behaviour → pedagogical actions, making information attractive, being consistent with a feeling of having the power to act i.e. collective gains -; suggesting levers of action to be integrated into everyday activities;
- Delegating their energy management to technology → technical and financial actions (i.e. aid) to promote energy efficiency;

• Delegating their energy management to EDF → developing services to detect faulty appliances or to alert households when consumption is deemed to be abnormally high.

It is not possible to establish any unequivocal link between these logics of action and the profiles of the interviewees (comfort, environment, making savings). However, certain profiles tend to favour one mode of action over another. For example, the face-to-face interviews showed how those with the comfort profile tended to favour delegation to the electricity system; interviewees with major financial constraints found it difficult to favour delegation to technology, as this means investing in more efficient electric equipment that is often expensive. Public policies could nevertheless provide financial aid to assist with such investments as it is already the case for housing refurbishment and building insulation.

In all cases, it was important for the interviewees to be able to take back control of their heating or air conditioning systems (i.e. to "derogate") whenever they so wished – even if few of them actually did so. They were not particularly affected by the load shedding; indeed, most of them had access to energy other than electricity. For example, 44 % of the Corsicans of the project have firewood that they generally use between seasons, either to keep warm or to create a warm atmosphere. On the other islands, inhabitants alternate between air conditioning, fans and natural airing (Douzou & Bouly, 2012). This energy mix demonstrates how the islanders dynamically manage the indoor temperatures of their homes, depending on their need and constraints (climatic, financial, etc.).

The importance they attach to being able to "derogate" supports another more general observation: the feeling of independence and control is one of the energy choice criteria. In Sweden, Annette Henning (2000) observed that households refused to have communal heating installed (more efficient and cheaper) through fear of losing control of their heating system. In a similar vein, our interviewees demonstrated that low (Corsica) or high (Guadeloupe, Reunion Island) indoor temperatures are acceptable if they result from a choice (e.g. the "virtuous" profile). *Comfort is therefore more than just temperatures –* it also relates to the feeling of being able to control said temperatures. It might also be a case of "not having to think about it" (the bill, the temperature) or of helping with the common good. Here again, public policies are not limited to financial levers of action alone.

This said, it is not just a question of changing behaviour in order to reduce energy demand, but also of preventing any increase (at least during peaks time). It is sometimes easier to act upstream than to change habits and routines which are embedded in social practices. Demand-side management thus also means preventing energy-intensive behaviour. This is the second major section of our study, which deals with the dynamics of electricity demand.

Weak signals concerning the dynamics of household electricity consumption: what the islands teach us about future demand

In terms of consumption dynamics, air conditioning is a textbook case. It has become far more popular over recent decades and not just on French island territories. This increase corre-

sponds to a standardisation of thermal norms which explains an increased demand for electricity but which has not occurred in the same manner in all zones (Shove & Walker, 2009; Wilhite, 2008). Our studies nevertheless led to one clear observation: the way air conditioning is used varies from one island to another. Its use has become routine in Guadeloupe, with most of our interviewees turning it on in the evening, before going to bed; In Reunion Island it is used less frequently. So the use of air conditioning has not led to any standardisation of practices that remains first and foremost performed at a given time in a specific place according to various logics (see in particular Reckwitz, 2002). Similarly, it does not concern all sociological categories or ages to the same extent. On the three islands we found that air conditioning is popular with teenagers. They want it and use their prolonged use of computers (which might suffer from the heat) and the length of time they spend in their bedrooms as justification. The adoption of an energy intensive appliance can therefore take place within the space of a single generation and then become a permanent feature of sociological practices, thus increasing electricity consumption. On Reunion Island, our interviewees showed that air conditioning is primarily installed when there are pregnant women, young children or elderly persons in the home. It can then be used on a permanent basis to cool or dehumidify the air. Consumption dynamics demonstrate that the representations linked to the body and its needs, which vary in accordance with age, occur at "key" moments of the life cycle to favour the use of energyintensive equipment.

Health arguments are also mobilised during the dengue and chikungunya epidemics which affect Guadeloupe and Reunion Island: inhabitants close their windows to prevent mosquitos from coming into their homes; this increases the temperature indoors and can lead to air conditioning being installed. This situation might one day occur in southern Europe, which is increasingly affected by the presence of mosquitos. The interviewees also close their windows and switch on the air conditioning when they have a siesta, so as to shut out the noise or reduce the risk of burglary. These examples highlight the transfers of use, from the initial objective of cooling the home, to protecting against health or security problems, which once again contribute towards the popularity of air conditioning. They also show that non-human factors affect electricity demand - which means finding another way to prevent it from increasing than by just using information on individual consumption levels.

These factors *interact with broader social evolutions* which help to modify demand. This is the case with working from home, which concerns 17 % of the Reunion Island interviewees, 11 % of Guadeloupians and 6 % of Corsicans. This dual use (private and professional) of the home can lead to increased domestic consumption and, on these islands already subject to problems on the grid, to requests for specific services (back-up batteries, for example).

Finally, the widespread use of air conditioning is not due to end-users alone. Market conditions, with significant drops in the price of air conditioners (Wilhite, 2008), and professionals from the building sector, have also played a considerable role in its development (Shove & al., 2008; Chapells & Shove, 2005). The installation of air conditioning units is now part of the comfort options provided by upmarket real estate operations. The technological offering well organised into market and distribution networks enables and supports the evolution of demand for electricity services.

The use of air conditioning thus reveals consumption dynamics that differ in accordance with lifestyle and categories of age (siesta, security), which bring into play representations relating to the body and its needs, to distinct sectors of activity (health, security, construction, etc.), and to societal (such as working from home) and sociodemographic evolutions (number of retired persons).

Similar dynamics for transforming energy behaviour (and therefore consumption) can be found in mainland France, but they have particular significance in territories such as these, with fragile electricity systems.

Conclusion: Public policy perspectives

The island territories are an encouragement to shift focus so as to adapt demand to suit limited production capacity. These electricity systems, characterised both by large amounts of renewable energies (including variable energies), are thus innovation models for energy and ecological transition. We are now going to take a look at some of the more significant points of our results. First of all, let us turn to the interplay between the social and material factors. Seeing demand and perceptions of energy as place-based is something that has been observed in other contexts (Howe & Boyer, 2015). This means that there is no miracle solution when it comes to changing behaviours; instead there are tools adapted to suit specific local contexts. In this respect, the island contexts we studied are marked by their efforts to catch up in terms of comfort (particularly in the French overseas departments), i.e. via lifestyles that involve higher levels of electricity consumption. These lifestyles contribute to the consumption dynamics which enter in conflict with the islanders' awareness of the limits of their insular electricity system.

These dynamics – observed notably in the use of air conditioning – underline the need to go beyond analyses based on average and standardized behaviours. The increasing use of energy-intensive equipment such as air conditioning underpins logics which are differentiated in terms of sociological groups or age. It also brings into play dynamics that include vast social fields (such as health, construction).

This implies public *policies aimed first and foremost at targeted publics whose life is to be understood as a whole.* Similarly, not all of these logics of action fall within the scope of financial savings, which means that public actions relating to the management and restriction of demand could be based on other levers (such as a citizen approach). We reach the same conclusion when we examine the notion of comfort found in the islanders' discourses and practices. As we have already seen, this observation cannot be reduced to a simple issue of temperature within the home.

In terms of thermal comfort, the islanders are thus ready to accept harsher conditions than we might have imagined, as long as they result from a choice – which brings us to distinguish between *chosen constraints* and *imposed constraints*. It would therefore seem important for public policies to adapt to the islanders' desire for control. The latter must have the last word when it comes to managing domestic uses, choosing the temperature of their homes, or any other decision affecting their everyday lives. But then how can we ensure that this desire for control leads to a reduction in electricity consumption? By offering other solutions (e.g. delegation) that also, but not only, provide information (including information on the collective benefits of behaviour change), and by implementing actions which prevent energy-intensive behaviours. Especially as the consumption dynamics showed revealed some social transformations which may increase electricity demand in the future (such as an increase in the proportion of elderly persons or of people working from home). This is also valid for territories other than those examined in our study.

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