# Childhood and energy efficiency issues at school and at home: the role of information, teaching, upbringing and infrastructures

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#### Abstract

Might children be the solution to environmental and energy problems? Nowadays they are under considerable pressure to become ambassadors for energy moderation in different areas of life, learning about these issues at school and receiving recommendations from children's newspapers and TV programmes. Yet to put children at the "heart" of this system is to forget that they have little agency and that their learning process is essentially based on adults who are stakeholders in their education.

So in a net zero-energy school, technical performance, the ostentatious visibility of energy production and moderation devices, and the local council's (which owns the premises) pedagogical determination, come into conflict with the educational projects and practices of the teaching staff; in turn, the latter have problems developing their own professional autonomy, implementing their pedagogical practices and constructing the gradual autonomy of their pupils, in buildings where such uses and objectives have not been taken into account.

Children are taught about sustainable development at school, and try to put this knowledge into practice at home, among members of their family. But family configurations only permit such practices to a certain extent, depending on the educational strategies of the parents, pre-existing energy cultures and the legitimacy that parents give the school as a socializing agent in this matter. As far as behavioural instructions are concerned, social mechanisms for transmitting knowledge are not taken into account. In both cases the instructions are supposed to turn children into energy and environmental actors, but they are not free and autonomous actors; like adults, they are caught up in action systems, constraints, logics and projects related to concrete situations. Furthermore, when passing the information on to adults, there is the problem of the latter's own definition of autonomy, based on progressivity, support, reflexivity.

#### Introduction

Might children be the solution to environmental and energy problems? Nowadays they are under considerable pressure from public and private actors to become ambassadors for energy moderation in different areas of life, learning about these issues at school and receiving recommendations from children's newspapers and TV programmes at home. Whilst research on children shows that, far from being passive in their socialisation, they are indeed "actors", it also shows that they are part of broader system of coordinated actors who have varying margins for manoeuvre. Putting children at the "heart" of this system is to forget that they have little agency and that their learning process is essentially based on adults who are stakeholders in their education. In particular, children's empowerment is built gradually, in their different areas of socialisation (essentially school and home), in relation to different actors (teachers, parents, peer groups, public actors, etc.) and depending on their age bracket.

This raises the question of energy action messages and messengers. Children receive different messages from different actors who hope not just to educate children but also to ensure that they spread the good word in their different life situations and within their family.

We are therefore going to examine two situations of behavioural prescription as it relates to energy and to children attending primary school (i.e. children between the ages of 6 and 10): a zero-energy school, where energy education is designed to develop in relation to the building's energy performance; and a more "traditional" situation, where children receive education at school and through their different media, and are encouraged to put energy recommendations into practice in their families. In both cases we will look at how the messages are taken on board, not only by the children, but also more generally by all of the socializing agents. We will see that the "message  $\rightarrow$  child  $\rightarrow$  diffusion" premise does not stand up to an analysis of concrete situations. The messages are interpreted, appropriated and cannot be implemented without active participation from the other actors. Yet this is only possible if the latter have good reasons to change their practices and if said evolutions are compatible with the pedagogy implemented in relation to the process of making children autonomous. This knowledge of the system of actors who are stakeholders in the children's education, of their action logics and of their own educational practices, is essential if we are to understand the "successes" and "failures" of "pedagogical" actions aimed at children.

## Children and energy: an area of research under construction in the social sciences

Children have become a subject of study in the social sciences and in comprehensive qualitative sociology in particular. This research is developing in both the sociology/anthropology of the family (de Singly 2004), of the school (Filiod 2007), of education (Pollard 1987) and of consumption and use (Desjeux et al. 1996; Martens et al. 2004)<sup>1</sup>. In these fields of research, children are considered to be "actors of their socialisation", their point of view is taken into account, as are their contributions to the education they receive ("what children do with what we do to them", to take the expression used by Montandon, Osiek 1997, cited in Delalande 2007).

Sociological research on children and energy is being developed as part of work on the relationship between age or generation and energy consumption. The study of elderly people, within the context of demographic ageing, raises the question of the evolution of the structure and level of energy consumption in the future (Huebner et al. 2013). At the other end of the age pyramid, the issue of children, their education and their new ways of living in a highly "technological" consumer society, raises the question of energy-moderation practices and of the link between energy efficiency per appliance and the number of appliances per person (Schmidt et al. 2014).

Within this context, we have already performed an exploratory analysis in order to find the link between life ages, generations and consumption logics (Garabuau-Moussaoui 2011a), demonstrating that the social groups of different generations acted as a channel for different energy-concern practices which varied in intensity, but even more so in significance and repertoires of action (i.e. in action logics).

Life experience, learning processes, transmissions and the historical period in which social actors construct their primary and secondary socialisation are therefore very important factors in the construction of an "energy culture" (Wallenborn 2008). Life ages and rites of passage are also factors which structure a certain relationship with energy and a dynamic in stages (passage from childhood to adolescence and then to adulthood, for example). These different elements bring us back to the question of learning processes, which we can approach through the notion of dispositions, in the sense of acquired habitus, i.e. the sedimentation of experiences in incorporated social practices (Bourdieu 1994).

However, research on children also reveals that it is important to consider the arena in which the learning takes place, i.e. both the concrete situations in which the processes take place and the social and organisational conditions. The sociology/ anthropology of the school show that school is a "life place", governed both by formal rules of the teacher-pupil group and by more informal social interactions, such as those of the peer group (during playtime, for example) (Delalande 2007). Furthermore, children are "actors in the educational process" and, more broadly, "actors in [their] socialisation", which leads some researchers to talk about the "pupil profession" (Perrenoud 1994). In this context, studying energy concerns by children at school is really fruitful, showing how this specific arena relates to actions and concern. For instance, a study on energy savings by children in two schools reports that "children are more enthusiastic about taking action at school" (Fell, Chiu 2014, p. 354).

It is in this context that we will be asking the specific question of the role that situation plays in the appropriation of environmental and energy messages: in what way does the place in which the learning process is performed affect practices? In the notion of place, what is the influence exerted by the infrastructure, by the actors in the place, by the rules governing the place? We will therefore explore these questions in relation to one common actor, the child, at the intersection of the two places he/she frequents: school and home.

#### Presentation of the studies and methods

To this end, we correlated the results of two studies, one on a zero-energy school and the other on families with children who attend primary school.

The study of French families with children was conducted in 2007.<sup>2</sup> The objective was to understand how children are influenced in relation to environmental and energy concerns, and how they interpret and use these influences within the home. The study included a comparative section<sup>3</sup> which we will not

<sup>1.</sup> Children nevertheless remain largely neglected, with little direct examination, for reasons that are theoretical (are they able to give a meaning to their actions), methodological (how can one gather a "constructed" speech?) or ethical (does a sociologist have the right to question a child?).

<sup>2.</sup> The majority of the fieldwork was carried out by Marjorie Filliastre, as part of her Master's thesis done at EDF's R&D department; the remainder was carried out by Isabelle Garabuau-Moussaoui, researcher at EDF R&D, who was M. Filliastre's corporate tutor. The work led to an analysis report, written by Marjorie Filliastre under I. Garabuau-Moussaoui's supervision, and to a number of published articles: Garabuau-Moussaoui, Bartiaux, Filliastre, 2009; Garabuau-Moussaoui, 2011a; Garabuau-Moussaoui, 2011b.

Comparison between France and Belgium: the Belgian study was piloted by Françoise Bartiaux. See Garabuau-Moussaoui, Bartiaux, Filliastre, 2009; Bartiaux, 2009.

be discussing here. In France, we conducted a qualitative study of 18 families, children and parents, based on comprehensive interviews and observation of homes. The interviewees live in an urban or periurban environment (Paris, Greater Paris, west of France), and have homogeneous levels of income (close to the median income of French families). In each family we met at least one child who attends primary school (6-10 years old), sometimes their brothers or sisters (younger or older) and, where possible, one or both parents. The children were interviewed with or without their parents, depending on the family's wishes, but in the case of individual interviews with a child there was always an adult present nearby. The guide for interviewing the children covered two main themes: the daily itinerary and the relationship with energy. Marjorie Filliastre created a die that could be thrown, with different colours, to ask thematic questions and to stimulate the children's interest, and this proved to be a highly successful technique. The interview guide for adults was divided into three parts: the education of their children, sensitivity to environmental issues and the family's energy practices.

The study in the zero-energy school was carried out during the 2012–2013 school year,4 as part of an EDF R&D project which consisted in analysing energy-production and consumption measurements. When the school was designed in 2004, its objective was to be one of the first "zero-energy" schools in France (i.e. when considering the annual review, to have produced at least as much energy as it consumed). After five years of operation (2007-end 2012), this annual consumption/production objective was not entirely met, but in financial terms was achieved and even exceeded.5 The installation of additional solar photovoltaic panels in 2013 helped improve energy production.6 In this context, the aim of the sociological study was to understand how the occupants appropriate the building and whether its "energy-efficient" nature has an impact on how the school is used. To this end, we met: the "designers",7 in order to understand the sociotechnical and political logics employed; the actors involved in maintenance/operation,8 to learn about equipment settings, evolutions over time and adjustments made due to user feedback; and the actors occupying the school (local council personnel,9 director and interim director), to understand how they had appropriated this new place of work. However, with the exception of the two directors we met,<sup>10</sup> no other members of staff wished to be interviewed. We were nevertheless able to learn about how the building is used from our interviews with the two directors, from the minutes of school council meetings; from the answers that one person gave to a questionnaire we sent to the teaching staff, and from our observation of a scientific workshop attended by 10-year-old pupils. We also carried out a documentary analysis of official documents produced by the actors of this school or by intermediary actors.<sup>11</sup>

The two studies are quite different, both in their purpose and in where they took place. Despite these differences, we found one point in common, the latter being the subject of this article: the "ultimate" aim of transmitting different types of knowledge from adults to children is the process of making children autonomous. Yet the different forms that environmental and energy concern can take (zero-energy buildings, awareness campaigns, eco-gestures, etc.) recompose the notion of autonomy and the ways of passing it on. They also modify the social relations, the statuses and the roles of the various socialising actors (children, parents, teachers, stakeholders). All of this takes place without the consequences being properly analysed, particularly with regard to what is asked of children.

From an organisational and institutional standpoint, French schools are complex places. The land and building belong to the local council, which is the developer, works manager (for renovations, new equipment, etc.) and employer of all technical and maintenance personnel and cleaning staff. The local council<sup>12</sup> is responsible for all of the pupils' activities outside school hours: morning and evening crèche and childcare facilities, canteen, Wednesday activity centres,<sup>13</sup> etc. Furthermore, as the owner of the premises, it plans and organises activities outside school hours when the children are no longer there. These activities might relate to local life (elections, public meetings, visits, etc.), but the local council can also "rent" the premises to associations who organise regular activities or special events (sports lessons, meetings, etc.). The teachers, on the other hand, fall under the supervision of the French ministry of education and are therefore institutionally and hierarchically affiliated to the Academy (regional section of the ministry of education). Discussions relating to a school's operation take place within a formal body, that of the school council, made up of the following members: the teaching staff, the school director, the mayor and the deputy mayor in charge of schools, representatives of the parents association (one seat per class) and the departmental delegate of national education.

<sup>4.</sup> Study conducted by myself.

<sup>5.</sup> i.e. the equation: consumption × sale price - production × purchase price < 0. 6. In 2013, solar panels increased energy production, but a change in building management (from municipal technical services department to a private company) caused a slight rise in consumption, due to changes to ventilation settings. The overall result for 2013 thus remained stable compared to 2012, with improved production being compensated by a slight increase in consumption.

<sup>7.</sup> Discussions with the architects, the deputy mayor in charge of schools, and the local council's sustainable development (SD) manager; in addition, a guided visit of the school with the latter.

Interviews with the local council's technical services manager (but we were unable to meet the company which recently took over the maintenance contract) and with a technical expert from EDF R&D, who analysed the energy consumption.
 A meeting with cleaning/kitchen staff and a guided visit of the school with one

of them.

<sup>10.</sup> A teacher from the school took over as interim director during the director's long period of leave. We met her at the end of this interim period and then we met the director upon her return to work.

<sup>11.</sup> Technical documents (feedback organised by an engineering agency, EDF R&D energy reports, a report written by students from the Ecole Centrale de Paris); communication documents (local council newsletter and press file on the school, press articles on the school); minutes from school council meetings.

<sup>12.</sup> We use the term "local council" for the political and administrative institution that governes the town.

<sup>13.</sup> Generally speaking, in France there is no school on Wednesday afternoons.

## Who/what shapes children's energy concerns and social practices?

From these two studies, we are going to try to understand how environmental and energy concerns are passed on, both in specific places (school, home) and in their relationships with one another (from school to home), by socializing actors (adults, parents and teachers, but also children, as actors of their own socialisation), and the way in which these concerns are (or are not) diffused and mobilised in practice. Above and beyond these environment and energy-related practices, we will see that autonomy skills are transmitted and are recomposed by their transmission through the energy/environment vector.

### ENERGY CONCERNS AT SCHOOL: WHAT DO INFRASTRUCTURE AND EDUCATION TRANSMIT TO CHILDREN?

What does school transmit in terms of energy and the environment? How do children understand this knowledge and how do they use it?

## Teaching children about energy and sustainable development: part of the curriculum, but dependent on the teaching staff at each individual school

In France, elementary school curricula include learning about energy. Our study showed that the content comprises three types of knowledge: technical knowledge (electrical circuits, the different sources of energy production, notions of renewable energy), domestic knowledge (managing the domestic risks of energy-related objects) and ecological knowledge (information and awareness about the environment, pollution, waste, sustainable development, etc.) which combine very general information (climate change, etc.) with very specific recommendations (saving energy, sorting waste, etc.). The environment and energy also seem to be recurring subjects in primary schools' "annual themes" which offer a range of transversal activities relating to this theme.

National school curricula provide the generic axes, and teaching staff have a range of toolboxes at their disposal. The children we met as part of our "family study" all mention actions relating to energy and the environment in their school:

Even the punishments are based on that [the waste and recycling theme]. For example, they make us clean the playground.

#### (Girl, 9 years old)14

In the zero-energy school studied, one teacher arranged for an outside teacher to come and give a series of "scientific workshops" on the theme of sustainable development. The aim was to make children aware of what could be done within their own school and to get them to work on a presentation to give to other classes.

The theme can therefore be found in all schools, but what action should be taken is left up to the teaching staff who have varying levels of enthusiasm and different amounts of time, skills and resources (material and financial) with which to create themed pedagogical activities. Our study of children showed how they attribute a large part of their knowledge of the environment, energy and electricity to what they learn school, because it is constructed in a clearer, more direct and more legitimate manner than that gleaned from other forms of media (Garabuau-Moussaoui, Bartiaux, Filliastre 2009). Some of the children mentioned the ambivalence of TV programmes ("There are ecology messages just before the ads ..." [Girl, 10 years old]) and parents tend to be considered as giving orders of an anti-waste and energy-saving nature. Children give greater value to the school discourse, to the detriment of the incorporated practices of their parents.

The children we met had very much taken environmental discourses on board, particularly issues relating to pollution, wasting resources and north-south inequalities. Energy is closely associated with pollution, which is the word that children tend to use to refer to environmental problems. They are very worried about the state of the planet. The deterioration of the environment (or in any case awareness that a bad environmental situation exists) is taken for granted. They feel that they have been "tasked" with taking action to deal with the problem. In addition, whilst adults often see their actions as "a drop in the ocean" of environmental issues, children make a more direct link between their everyday practices and the state of the planet. Certain practices "disgust" them or "annoy" them. They see their individual actions as a way of resolving environmental issues on a global scale, and this creates real anguish due to a high level of individual responsibility combined with very little agency.

#### The zero-energy school: a piece of equipment for energy care?

Over recent years we have seen the development of high energy performance buildings, including schools. We therefore need to examine the question of a building's impact and characteristics in relation to energy performance, especially in places with an educational vocation (Zélem et al. 2010). In a zero-energy school, does the building itself offer its occupants – and in this case, children in particular – a greater agency (Wilhite, 2007)?

Analysis of the discourses of the different actors involved in its design show that this device is held to have numerous qualities: it's a pioneering (innovative) project, a showcase (which it must be possible to exhibit) and it is ecological. These are the aspects which are considered to be a challenge, both for the local council and for the firm of architects. The building's "school" function is considered to be easy to grasp:

It wasn't anything extremely complicated, just a school. There are classrooms, people circulate. When you do a competition, there's a programme, if it's done properly it summarises pretty much everything. All the needs. Generally speaking, architects are able to sum it all up. A hospital would be a different matter ...

#### (Architects)

The emphasis was therefore placed on the ecological aspect of the building rather than on its different functions.

The local council has widely publicised the "ecological" qualities of the school (bioclimatic design, energy performance, sustainable neighbourhood, Agenda 21) and all of the actors use the same term, though each one gives it a different definition and appropriates the ecological aspect in a different manner.

<sup>14.</sup> Words and sentences with quotation marks and italics refer to interviews.

The architects wished to create a semi-automated building, looking for a balance between human intervention and piloting. This was in line with the project put forward by the local council, which did not want "full automation", not just for reasons of cost and maintenance, but also, according to a local official, because they wished to make it an exemplary building in terms of the education afforded to occupants, visitors and, more generally, to the townspeople. The local council had significant ambitions in this area: consultative meeting, awareness campaigns in the school, pedagogical visits, etc. The school's press file envisages numerous actions.

However the local council's pedagogical objectives came into conflict with those of the group of teachers. Whilst the local council owns the premises, the teachers have the prerogative regarding pedagogy and its content during school time. Hierarchically speaking they do not report to the school's director, who is also a teacher, but to the regional education authority inspector (belonging to the regional section of the French ministry of education). They are very strong defenders of this professional identity of being independent from elected officials and above all else they construct their work in the "classroom space" and not in a "school" group (Barrère 2002; Malet 2007). Any attempt at pedagogy by the local council in relation to the children is thus deemed to be an incursion into their professional territory. At the time of our study, this defensive stance was strongly mobilised within the zero-energy school, for two reasons: the first relates to a national policy to revamp "school rhythms" (changing lesson times during the week), supported at local level by the local council, which modifies the teachers' working hours; the second relates to the school itself and to the way in which the spaces were designed. We have seen that the classroom is a territory owned by each individual teacher, who spends a large amount of time there and who imbues it with a great deal of their professional identity. In primary schools in France, teachers have the pedagogical tradition of putting things on the classroom walls: timelines, rules of grammar and conjugation, portraits of famous people in history, and artwork done by the children. But in our zero-energy school, the architects proposed a bioclimatic design (north/south orientation) with spaces being divided up in consequence: the "noble" rooms (the architects' term) to the south, with large bay windows: classrooms, library, refectory and multi-purpose room. To the north, "blind" rooms (without windows) such as kitchens, utility rooms, etc. The classrooms thus have an outside wall which is taken up by bay windows. Furthermore, the opposite wall, giving onto a wide corridor, is also taken up by bay windows, so that the corridor does not require artificial lighting during the day. Classrooms thus have two walls with windows, one wall with a whiteboard, and the final wall, at the back, where the storage cabinets are located. Then there is the recommendation not to block the windows, so that the school can meet its energy-consumption objectives. It is therefore impossible for teachers to put the walls to their traditional use. Some have tried to hang certain documents from the ceiling, but the natural ventilation makes them move, and this sets off the alarm system which is based on movement sensors. The teachers' pedagogical practice is thus called into question, not only by the building, but also, in their opinion, by the building's owners and those who make decisions about layout: the local council. They have therefore rejected the recommendation and display their work and that of the children on the bay windows. Only one teacher wished to "play the game" of environmental and energy requirements, because she is personally committed to environmental issues. With help from the specialist consultants who work on the school, she has tried to resolve the paradox: she now writes on the bay windows with a special felt pen which blocks out no light (or very little), whilst at the same time allowing her to pursue her pedagogical practice. Her colleagues have not adopted this technique, because their resistance does not relate to the building itself, but to the actor they believe to be responsible for hindering the way they teach: the local council. Indeed, she understands the attitude of her colleagues:

The building engineer has agreed to allow me to write on the windows. I do my best to respect the way the school operates, but I understand my colleagues who are forced to stick documents on the windows in order to teach properly and to ensure the well-being of the children. Our priority is to teach the children.

#### (Teacher's answers to the questionnaire)

The classroom is a territory of which teachers take full control as part of their own process of autonomy and of the lessons they give their children. But the building was not designed on the basis of the actual practices and uses of the occupants. The walls were considered as objects of no particular value that could be replaced by bay windows which would offer meaning and value (in terms of saving energy and image). This demonstrated the actors' lack of understanding of these walls as pedagogical supports.<sup>15</sup>

The teachers are not "against" the environmental and energy actions as such. They create pedagogical activities on this theme in the school: lessons, exhibitions, scientific workshops. They even use the school's design as a pedagogical support, taking the children into the gardens for their science lessons.

These examples show energy and environment-related practices as the intersection between several mechanisms: "conditions", i.e. the roles and statuses of the actors, who construct their identity and their territories by employing or rejecting certain practices, and who sometimes find themselves in conflict with one another in certain areas (pedagogy for example); disposition, i.e. personal stances which can impact these organisational conditions (a teacher trying to reconcile different approaches because she is personally engaged); situations<sup>16</sup> which are both a framework and a resource for the action (the different spaces in the zero-energy school; this school compared to more traditional schools).

Additionally, we have seen the emergence of the issue of teacher autonomy in their pedagogical practices. It is also true that the zero-energy school makes children's autonomy more difficult. There are some cases where the mechanisms proposed at school give children an "enjoyment of the responsibility involved in helping to save energy at school and sometimes at home" (Fell, Chiu 2014, p. 356), but overall, this is not the case in the school we studied. The teachers mention a certain num-

<sup>15.</sup> This same problem is found in office buildings, with the return of open-space offices; designers and managers see walls as separating and enclosing, whereas the occupants see them as creating and protecting territories.16. See Pink, 2012.



Figure 1. Practices at the intersection of situations, conditions and dispositions.

ber of devices and uses which, in their opinion, are obstacles to the children's autonomy. For example, triple glazing makes the exterior doors very heavy; the toilet doors are also very heavy and have handles which are too high for the younger children, which hinders circulation and the autonomous learning of cleanliness. The teachers have thus diverted use by keeping the toilet doors open (with door wedges). But this means that when someone walks past the toilets, the lights in the room come on, thus consuming electricity. Furthermore, although one class's scientific workshop had highlighted the problem of waste in the school, no rubbish-sorting system has been implemented in classrooms. Some teachers have taken the initiative of separating paper from other rubbish, and the maintenance personnel have sorting bins at their disposal for the collection of sorted waste (originally envisaged only for the kitchen). These members of staff complain about the children, who are little inclined to put their rubbish in wastepaper baskets and sort it, but the infrastructure is not designed to help them in such an approach.

The zero-energy school was not designed to support the school's traditional socializing actors (the teachers) and did not take into account the specific organisational context of French schools: two institutional actors, each with its prerogatives (local council and the teaching body). Furthermore, it did not take into account the objective of passing on knowledge and more particularly that of the process of making children autonomous; its design was focused more on a technical and visual demonstration of its energy-efficient ecological characteristics. It has to be said that these objectives have been achieved: the school is very energy-efficient and all of the different actors (local council, teachers and parents) agree that the school is an aesthetic success and that it clearly demonstrates its ecological nature. It might seem an obvious thing to say, but "installing renewable energy in schools without a pedagogical foundation that actively supports educational and environmental learning outcomes will not result in the uptake of energy efficiency and energy conservation behaviours" (Tabert 2007, p. 467). Consideration of uses and users (of the different categories of user, in particular, and their coordination in relation to the children's education) might have facilitated the transmission of knowledge from the building to other actors, from parents to children - children who are autonomous users of the building - in a logic of practice routinisation rather than in a technical and ostentatious logic.

To take a caricatural approach, we might say that, traditionally speaking, the power of parents is to forbid or to allow, whilst the power of children is to contradict and to transgress. The role of parents is to help empower children by adjusting the boundaries of what is forbidden or allowed, depending on the life stage of the child.

Consumption and energy management in the learning process

The families we met for our study are trying to develop what we might call a "democratic" (Fize 1990) education for their children, with a balance between authority and complicity. Indeed, they talk simultaneously about confidence and respecting rules, about being open towards others and politeness, about

Energy management at home creates interpersonal relationships within the domestic group. It can be a source of conflict or at least of uncertainty (Desjeux et al. 1996). In particular we noted conflicts between parents and children, in relation to various areas of energy consumption (lighting, heating, etc.), one issue being "the recognition of parental authority" (p. 105). This power struggle is played out on three levels: the management of energy consumption and expenditure, the management of comfort (for example, parents want calm and thus want to lower the noise that their children are making with their electrical appliances), management of domestic safety (parents consider certain electrical appliances to be dangerous and thus restrict certain uses).

Energy is also a "power" issue between families and institutions (Bovay et al. 1987, Wallenborn 2007). The institutions say that they give power to consumer-citizens, but the latter are not always able to mobilise them. Numerous institutions provide consumers with environmental information (government agencies conducting awareness campaigns, private companies distributing guides, etc.). But this does not lead to the expected moderation of behaviour. Sociologists have shown that the problem is the way in which households manage to transform information into know-how (Bovay et al. 1987).

In such a context, children are needed as actors for the transmission of environmental and energy concerns. How do children appropriate their mission as "messengers"? How are their messages diffused throughout the home? Do these messages make it possible to develop individual or collective competency?

autonomy and obedience, about punishment and accountability. Being concerned about energy and the environment is not an educational value in itself. However, it traverses the concrete practices that these values drive. One characteristic of this environment-energy theme is that the recommended education is caught in a paradoxical injunction: the consumer society and the moderation society now live alongside one another and are finding it hard to achieve a balance (Moussaoui 2007).

The study showed that energy and its objects are stakeholders in education as a process of achieving autonomy, and are linked to the gradual accountability of children. Whilst children have increasing access to electrical objects as they grow older, and therefore to autonomous energy consumption, they also become increasingly responsible for energy management at home. To begin with, they have access to lights and received the classic instruction to turn them off when they leave a room. As they get older, they gradually learn to manage the appliances in their bedroom (radio, computer, etc.). They then gain access to appliances in "common" rooms (television, hi-fi system, etc.). At this point they must manage the standby modes of the equipment and turn them off when they have finished using them. On the other hand, they have very little access to heating equipment, which is managed by the adults (though they can "poach" (Certeau et al. 1990) the heating by using the buttons on the radiators). They also manage how much water they use. They are thus led to find a balance between hygiene and comfort on the one hand, and resource management on the other. As they grow older, they have access to more and more equipment, to more and more areas of the home and hence to a larger number of consumption and energy management practices. They gradually assimilate the rules for managing energy, water and waste. These rules might be explained verbally by their parents, but are also very much incorporated in a nonverbal sense, by imitating the actions of their parents.

The evolution of children's identity and role within the family unit is thus supported by material objects and social practices, including the consumption and management of energy. Here we enter the heart of the difficulty surrounding energy moderation: social identity develops to some extent through the moderation of behaviour, but to a large extent through consumption (Moussaoui 2007). Parents spare their children even during an economic crisis, "because they believe that energy-related activities are a key element of being young, and an indispensable variable of social affirmation and cultural integration of their offspring" (Schmidt et al. 2014, p. 197) This is even more true in that whilst parents consider their children under the age of 10 to be "reasonable", teenagers are deemed to be major energy consumers and to pay little attention to how much they use (Garabuau-Moussaoui 2011a; Schmidt et al. 2014). There is in fact an "alignment of children's and parents' motivations towards maintaining or increasing children's energy use" (Fell, Chiu 2014, p. 356).

The education provided by the parents we met during the study nevertheless includes aspects of energy management and environmental concern. But daily constraints and the parents' life plans sometimes relativize the importance that they attach to these principles within the hierarchy of their domestic practices.

For example, although the families we met expressed environmental concerns about the pollution caused by cars (helped by the rise in petrol prices at the time of the study), family life relies heavily on car journeys. In these families, the children's education involves numerous extra-curricular activities and the management of these activities is significantly facilitated when a car is used, especially for those who do not live in the inner city of Paris. Furthermore, parents consider the home-school journey to be risky and prefer to make the trip by car rather than letting their children travel by foot or by bike. Finally, cars remain the preferred mode of transport for the entire family in the winter or when it rains. It should nevertheless be noted that some of the families are trying to change their travel arrangements to incorporate environmental considerations. They are experimenting with new ways of travelling, such as car-pools for their children's activities, or the walking school bus<sup>17</sup> for the journey to school. It should be noted that the "ecological" practice of modes of transport can also reinforce children's demands for independence: children perceive the use of a car to travel to school as dependency on their parents; they want to emancipate themselves by using public transport, by walking or by taking their bikes. But parents sometimes reject these demands in order to manage risks and life rhythms.

Another example concerns the use of "screens" (television, game consoles and computers). Parents try to restrict the time their children spend using these screens, not in the name of energy consumption, but once again in order to manage risks. They mention several types of risk: social risk (meeting the wrong people on the internet, "real" sociability replaced by "virtual" sociability), the cultural risk of their children becoming "mindless" due to the content of TV programmes, the health risks of screens being bad for the eyes, etc. This does not however stop them from buying said objects. Parents feel obliged to give in to social pressure from peer groups, expressed by their children:

[Why did you want a game console?] Because my friends had one, so I wanted to have one too.

#### (Boy, 7 years old)

In their everyday relations, parents and children build a level and structure of energy consumption which is proper to their household and which is a compromise between the social functions of consumption and those of energy concern. Environmental arguments are just a tiny part of what goes on in families. But we will see that even though they are caught up in consumption logic, children modify and reconfigure educational dynamics by using the environmental socialisation provided by the school to change their role within the family, and even to reverse power relations.

#### When children become the messengers of environmental and energy concerns

The education and information which children receive at school, and the audio-visual supports and magazines, encourage them to reverse the direction of transmission: they are supposed to "teach" their parents by suggesting changes to

<sup>17.</sup> The walking school bus is a school bus system introduced by local councils and/or parents which operates like a normal bus route (with "bus stops") but which takes place on foot, allowing a group of children to go to school under adult supervision.

#### Implementation



Figure 2. Typology of parents' stances in relation to their children as socializing agents.

their daily practices (Garabuau-Moussaoui, Bartiaux, Filliastre 2009). This institutional demand reconfigures both interactions between parents and children, and the mechanisms for transmitting values and practices.

Children have understood that whilst there are diverse energy management logics (financial, anti-waste, civic, etc.), it is environmental logic which has the most legitimate arguments. They therefore play on this in order to acquire new power within the family unit. They try to be "the good pupil". Brothers and sisters thus compete to do the "right" thing and blame their siblings for the "wrong" things, "snitching" to their parents or the researcher about lights which are left on or taps which are left running:

You shouldn't leave the lights on when you go out of a room like my big sister does. Yeah, because one time for example, I think it was yesterday, she put the light on in the toilet and she came out and left it on until the afternoon, and I was the one who turned it off. That happens quite a lot.

#### (Girl, 10 years old)

Children see environmental rules as a way of getting one over on their parents, of confronting them with their limitations, whereas it is normally the latter who lay down the rules. This power game also shows that children need their parents to be exemplary and need them to practice what they preach. But we can also see that when constructing the legitimacy of "environmental" actors, some children are more receptive to discourse than to everyday acts. Thus in several interviews where both parents and children were present, a gap appeared between the parents, who described their energy-moderation practices and various action logics (financial, environmental, anti-waste, etc.), and the children who focused on school and the media as sources of environmental discourse and who ignored the education provided by their parents. Finally, interactions between children and parents and the effects of the advice given by children are various, ranging from rejection to support.

If we take up the notion of "educational strategy" (Kellerhals, Montandon 1991), we might add children to the actors who participate in strategies, alongside parents and socialising agents. Like parents, children are led to "coordinate, orchestrate, or at least mediate the various educational influences" (p. 30). The four "coordination styles" developed by Kellerhals and Montandon might be completed by an analysis in terms of the capacity of children in the family to take strong or weak action (Bartiaux 2009). What children say is more or less taken into account, in accordance with previous knowledge and the norms of the social milieu to which they belong. On the basis of these categorisations, we suggest an additional typology, which is that of the "stance" that the parents adopt towards their children as socializing agents, and of the type of actions they take in reaction. This typology is constructed along two axes (see Figure 2):

- the first axis relates to parental judgements, from rejection to acceptance, concerning the legitimacy accorded to children as socialising agents who bring environmental or energy "advice" into the home;
- the second relates to the implementation of this advice within the home.

Note that this typology is a typology of behaviour, not of people, and is "ideal-typical". Each ideal-type produces specific capacities for children to act or limits to their action. The four ideal-types are thus:

 Criticism, the stance in which parents think it is illegitimate for children to want to orient energy and consumption behaviours towards greater consideration for the environment, and are reluctant to implement the advice that their children bring home from school or from the media, believing the latter to be unrealistic or to stem from an illegitimate source:

[Child] We don't often have a bath, that's a start. [Mother] That really is the only thing we hear on TV, "we don't have baths". Who says we shouldn't have a bath? You really seem to believe everything you hear ...

(Boy, 10 years old, and his mother).

This stance can cause parents to turn the criticism back towards their children, to show them they are not "exemplary" in terms of environmental or energy practices. Or else they respond from a "grown-up" standpoint (financial register) to a problem that the child puts forward as being environmental. For example, when one little girl tells her father that he has left the light on, he replies: "you're not the one who pays the bills" – his way of telling the child to mind her own business. In such cases, children do not obtain any agency and there is no change in family practices. But this stance can also lead to discussions and to teaching children to have a critical mind, with the parents trying to help them to "tell the difference" between constraints, possibilities and ideals.

• Benevolence is a stance which gives a high level of legitimacy to children and to their advice, but which does not lead to any particular parental action, because the latter believe themselves to be too constrained to change their behaviour. They delegate to school the job of environmental education:

[Do you discuss the environment with your children?] They are already made aware of that at school. It's true that it's probably more effective when it's at school.

(Mother of two children, 4 and 7 years old)

In this register of action, the parents let their children commit to energy moderation and environmental practices, as long as they don't affect the family's equilibrium. The child can thus acquire a capacity for personal action, which is not passed on at a family level.

- Nuance is a stance that parents use to put their children's discourse into perspective, whilst at the same time implementing their recommendations. These parents thus maintain a certain distance from the environmental discourse at school, although they themselves have already introduced a high level of energy concern. Capacity for action at home is therefore limited, as practices considered to be feasible have already been implemented. When asked about how the school impacts family practices, they simply reply with "We already do that ...".
- Finally, support is the stance adopted by parents who believe their children's actions to be legitimate, and who support them in their daily practices, just like one father who, after a comment made by his daughter, uses a cup when brushing his teeth; or like the family who accept having messages stuck around the home, saying things such as "Press here before leaving" on a light switch, or "How about not taking the car?" next to where the car keys are kept. Here children have a very receptive family audience and practices are passed on and implemented within the family unit.

So we find a diverse appropriation of discourses from the media, from institutional awareness campaigns and school learning processes. Children who develop the strongest environmental and energy management discourses are those where the discourse of their family, their school and the media to which they have access, have a coherent approach to the subject. However, a favourable opinion does not always mean "consistent" practices, and energy concern practices are not always implemented in the name of ecological principles. Financial logic is also very much present in everyday acts and in the remarks made by parents, such as "This isn't Versailles" (very frequently used when lights are left on). Another powerful logic is that of anti-waste, which relates more to the fact of not "losing" energy or water "for no reason". Finally, several parents mentioned their rejection of ambient over-consumption by refusing to buy electrical equipment for their children, like the parents who rejected their daughter's requests for a mobile phone when she started junior school, because they refused to give in to the consumer "pressure" exerted by their daughter's peer group; she wanted a phone "because everyone in my year has one".

In these processes for the transmission of environmental values and concerns by children, institutions "forget" that family transmission is already structured, both by an existing energy culture surrounding family resources and constraints (which might already be moderate, or whose energy-hungry practices have a meaning), by the gradual progression of learning processes towards the increasing autonomy of children and by an inequality of status (Garabuau-Moussaoui 2011b).

Asking children to be messengers of decontextualized discourses and practices can cause even greater conflict and a rejection of the messages. As with the case of the school, socialising actors do not take account of social learning mechanisms, of how energy is embedded in everyday practices, how constraints are resolved, what action logics are developed to manage the domestic system. Support which takes into account these uses and users of consumption and energy might help to resolve the greatest paradoxical injunction for families with children: that of the society of profusion/society of sobriety.

#### Conclusion

#### CHILDREN ARE PARTIALLY ACTORS, BUT CAN'T BE THE ONLY MESSENGERS AND MANAGERS OF ENERGY SAVINGS

Children now find themselves from a very early age at the intersection of several sources of influence. It is therefore important to understand what they learn and remember of these different influences and how this might affect their day-to-day practices. The studies showed that, far from being passive and simple recipients of messages or behavioural orientation, transmission is achieved through interpretation, appropriation, deviation, and even through the non-performance of the objectives set by awareness campaigns or technical displays. Children have capacities to act which are embedded in wider action systems with which they interact, depending on the role and status that they have co-constructed, producing more or less room for manoeuvre.

Furthermore, just like other socialising agents (Kellerhals, Montandon et al. 1991), children are also "messengers" between different arenas, particularly between school and home, and are caught up in diverse cultures and varying groups of actors (teaching staff, family, peer groups, etc.). We focused more specifically on two arenas of action and their connections: school and home. At school there are two types of influence: in all French schools, the environment and energy are part of the curriculum, and in the zero-energy school studied, this determination to make pupils aware is supported not only by the building and its energy performances, but also by the actors who are stakeholders in its management, considering that a zero-energy school has a duty to educate about energy. There are multiple influences on children at home too (television, children's magazines, etc.).

What these different social arenas and different constructions of the agency have in common is the empowerment of children, which is achieved not only by the children themselves, but also through the support of the adults who are stakeholders in the various arenas. Yet said empowerment – traditional process for actors interacting with children – can be reconfigured by awareness messages and by energy-efficient devices which carry with them other definitions of the action (or non-action).

More particularly, at the same time as acquiring certain responsibilities, the social process of empowerment enables children to acquire rights and statuses, i.e. capacities to act and greater control over their environment. To some extent, the latter comes into being through negotiation and through a certain amount of conflict between parents and children, between parents and socializing institutions, and between children and socializing institutions. Energy, in its uses and its management, is traditionally a source of power struggles or conflict between family members (Desjeux et al. 1996; Garabuau-Moussaoui 2011b). The social resolution of this conflict helps with family construction and empowerment. But we are now seeing the emergence of new energy actors/agents (efficient buildings, local councils, architects, energy experts, energy management agencies, ministry of the environment, etc.) in the socialisation of children, defending an action "morality" which can be very different from that promoted by more traditional socializing agents (parents, teachers). These new socializing agents reconfigure family roles and teacher-pupil relations, especially with regard to the definition and modalities of the autonomy learning process.

#### GIVING POWER, BUILDING BEHAVIOURS: AND SO WHAT IF THE SOCIAL CONTEXT IF THE COLLECTIVE PROCESS OF EMPOWERMENT IS NOT TAKEN INTO ACCOUNT?

The status of pupil receiving an education in sustainable development (condition), the energy culture incorporated into the family framework (disposition) and the fact of studying in an energy-efficient building (situation) are not always in "sync" when it comes to energy moderation. This is not just because the practices are not "coherent" (an energy-hungry family culture or a dilapidated building might explain a pupil's difficulties in putting theory into practice, for example). Even when the conditions, dispositions and situations are supposed to be oriented towards moderation, there are obstacles to this being achieved. The diffusion of information and of recommendations for action does not take place in a linear and mechanical fashion in different areas of life, but is conveyed by actors with varying (or even diverging) roles, constraints, objectives and action logics, and with limited agency.

In particular, the energy and environmental education which children are supposed to pass on to adults, ignores the pedagogical objectives of adults and their way of doing things, their existing educational practices, built around the definition of autonomy as a process and not as an immediate given. Children cannot bear sole responsibility for the diffusion of environmental and energy recommendations.

On the other hand, nor can efficient infrastructures be the sole channel for an objective of energy moderation. They are spaces which will be occupied in different ways, depending on social, cultural and organisational contexts, "activated" in a concrete situation, bringing actors together, creating their territories, their priorities, arbitrating between their different practices and priorities, and creating a group which is based on negotiation and compromise. In terms of design, each building has its own story and is the recipient of all of the individual and collective stories of its occupants.

These two elements – that of focusing on the hope that pedagogy will be diffused through children, and that of focusing on the building's technical performance in order to influence behaviour – must be put into perspective when it comes to solving energy moderation. It is especially necessary to take account of the interplay between actors and between "groups", and of their social practices (and not just of their relationship with energy), in order to better understand what is at stake in a given situation and, in the long run, to understand the role and place of energy consumption and management within said interplay.

Finally, the question of education on autonomy, as a process and as a collective action, would appear to be vital if we are to gain a better understanding of environmental education, because whether we are talking about teachers or parents, notions of reflexivity, of critical thinking can be used to construct citizens, and not just consumers, however moderate.

#### WHAT IS THE NEXT STEP?

These conclusions may have concrete translations into institutional worldviews: including the users and sociological knowledge into building design process, broadening the environmental messages towards families (rather than individuals), taking into account the existing practices, constraints and agency rather than interpret the world as an aggregation of rational agents. It requires a paradigm shift in the community of the actors of the energy efficiency. For instance, the zero-energy buildings may be imagined and designed to be liveable and efficient. Nowadays, it is not enough to try to meet the current definition of the good life. The challenge is to succeed in codefining the sustainable good life, during a collaborative process of designing and implementing buildings, including users, designers and stakeholders, accepting compromises, in order to propose shared objectives and means. Each actor has a step to do, architects and designers, users, social scientists, to become a part of a common project.

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