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DELIVERABLE ICE T5.5.1

CONSUMER ENGAGEMENT IN MOLENE

DECEMBER 2021

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ICE report T5.5.1

Consumer engagement in Molène

About ICE

Supported by the Interreg VA France (Channel) England programme, the objective of the Intelligent Community Energy (ICE) project is to design and apply innovative intelligent energy solutions for the isolated territories of the Channel. The islands and peripheral territories face specific energy challenges. Many islands are not connected to European electricity grids and are dependent on imported fossil fuels, including oil fired thermal generators. The energy systems on which they depend tend to be less reliable, more expensive and emit more greenhouse gases than those on the European continental grid.

In response to these problems, the ICE project considers the entire energy cycle from production to consumption, integrating mature or new technologies to develop innovative energy solutions. These solutions will be tried and tested at two demonstration pilot sites (Ouessant Island and the University of East Anglia campus) to prove their feasibility and develop a general reproducible method for other isolated intelligent energy systems elsewhere. To transfer this methodology to other isolated territories, ICE will propose a comprehensive commercial offer for low carbon transition. This will include a thorough assessment of local energy resources and conditions, a proposal for a tailor-made model for energy transition, and a package of low-carbon technologies and expertise available from a consortium of selected companies. This ICE-certified consortium will promote this offer to other isolated territories within and outside the Channel zone (5 territories initially). The ICE partnership brings together researchers and SME support organisations and benefits from France–UK mutual support in terms of knowledge and technological and commercial development.

The involvement of local and European SMEs will help to strengthen competitiveness and transnational cooperation.

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1. Introduction

1.1. The importance of consumer engagement in isolated territories

The Aarhus Convention establishes a United Nations-led regulatory framework for environmental projects that emphasises citizens' right to be informed about and comment on environmental issues, and that their comments would be included in decision making. Sustainable energy projects require public participation and support, which are crucial steps for achieving the Paris Agreement's goal of keeping temperature increases well below 2°C and aiming for 1.5°C.

Engagement activities with consumers in projects focused on energy transition is a catalyst in bridging the gap between research and the development or implementation of novel energy technologies that these include. Participation has become an integral part of system evaluation by governments, the energy industry, and academics alike. A close examination of public attitudes is a popular technique for forecasting the spread of novel products, services, or infrastructures. One of the most prominent strategies for forecasting the dissemination of innovative products, services, or infrastructures is the assessment of public views through consumer engagement activities. This entails aligning technical breakthroughs with societal values, needs, preferences, and expectations and striving for socially acceptable and desired futures.

The social or community acceptance of sustainable energy innovations is more than just a welcome feature that helps project development. Energy projects will not be successful unless people adopt and use the necessary infrastructure and technology, modify their behaviour to accommodate the (renewable) energy supply, lower total energy consumption, and accept regulations relating to a sustainable energy transition.

This is especially true for isolated territories since community resistance is one of the key hurdles that impede the adoption of otherwise promising innovative energy technologies in various communities and/or individual households, demonstrating its holistic relevance for project success. In general, people's evaluation of energy initiatives determines whether they support or reject a particular initiative. It manifests itself in how people perceive and act toward energy efforts, as well as in how they respond to these endeavours emotionally. Active opposition, indifference, doubt, passive acceptance, support, and embracement are examples of varied public reaction levels. Misguided, incorrect, and oversimplified ideas about public acceptability can lead to ineffective policies that fail to boost popular support, but instead, inflame conflict between authorities and developers on one side and the public on the other. Misconceptions about the end-users acceptance and problematic integration of a project in their daily lives can lead to ad hoc one-size-fits-all solutions that fail to improve acceptability and may frustrate individuals by leading them to feel they are not taken seriously. Poorly constructed energy transition solutions may unintentionally increase social conflict rather than reduce it.

Therefore, public acceptance of energy projects is not a straightforward concept; it is affected by the characteristics and meanings associated with the areas where projects are located. Most importantly, it is influenced by the psychological and social aspects of end-users to which a project is designed. Prior to developing strategic plans and making governmental decisions, it is critical to engage with consumers so as to minimise difficulties and maximize outcomes of technical interventions. The probability of bad judgments and interventions is reduced by utilising this approach.

1.2. Principles and assessment methods

The three islands in the Iroise sea, Sein, Molène and Ouessant, fall under the heading of NIZs – non-interconnected zones – that is, they are not interconnected with the continental electricity grid, and the majority of the electricity is produced on site by oil fired power stations.

The charter of commitment for the energy transition of the islands of Sein, Molène and Ouessant,

signed on 10 July 2015 by the AIP (Association des Iles du Ponant - Association of Islands of the Ponant), the island communes and their technical and institutional partners, has formalised this momentum for a dramatic reduction in greenhouse-gas (GHG) emissions begun on the islands many years ago.

As part of the implementation of the ICE project, the AIP was selected by the SDEF (Syndicat Départemental d'Energie et d'équipement du Finistère - Energy and Equipment Board of Finistère) to conduct surveys among the permanent inhabitants of the island of Molène, in order to find out about their energy practices and their willingness/ability to engage in the energy transition of their island, the type of equipment in their homes and their awareness of different renewable energies. This information is a necessary prerequisite for the implementation of future smartgrid demonstrators such as those promoted via the ICE project.

This document presents the results of this survey conducted on Molène, as part of the ICE project.

2. Surveys conducted

2.1. Objectives, methodology and limitations of surveys

2.1.1. Survey objectives

The participation and involvement of inhabitants in the implementation of the energy transition on Molène is paramount. It is important to have a clear picture of the energy practices of the inhabitants but also to be familiar with their awareness of the different types of renewable energies and their degree of involvement in the energy transition of their island so that projects are carried out in line with the vision and lifestyle of the inhabitants.

The objectives of this survey are as follows:

- to become familiar with the inhabitants' awareness of the method of electricity generation in place on the island, mainly based on the use of fuel oil, as well as their positioning with regard to the different renewable energies;

- to identify the inhabitants' equipment and energy practices from a quantitative and qualitative point of view (type and age) by producing an inventory, paying particular attention to the production of hot water, heating, cooling and back-up equipment.

- to assess the thermal efficiency of their housing and identify possible levers for reducing energy consumption.

- to understand their level of motivation for participating in the energy transition;

- to discuss with the inhabitants the concept of energy costs and find out if they are aware of the difference between the cost of the kWh they consume and the cost of the kWh produced by the oil fired power station;

2.1.2. Survey procedure

The survey was conducted using a questionnaire – Appendix 1 – that included some 30 questions about energy.

Surveys were conducted amongst residents in September and October 2021.

Most of the questionnaires were administered on a face-to-face basis, in people's homes, in shops, at the port, at the town hall or even at their place of work.

2.1.3. Information/precautions about results

31 questionnaires were collected, representing about 10% of the homes on the island, giving the survey a degree of credibility and good representativeness.

This credibility is based on strategies to limit sample bias by multiplying techniques, locations and interview times. This allowed the questionnaire to be sent to a wide range of inhabitants (elderly people with little mobility, employees with little availability, etc.) and also meant that interviews could be conducted in people's homes.

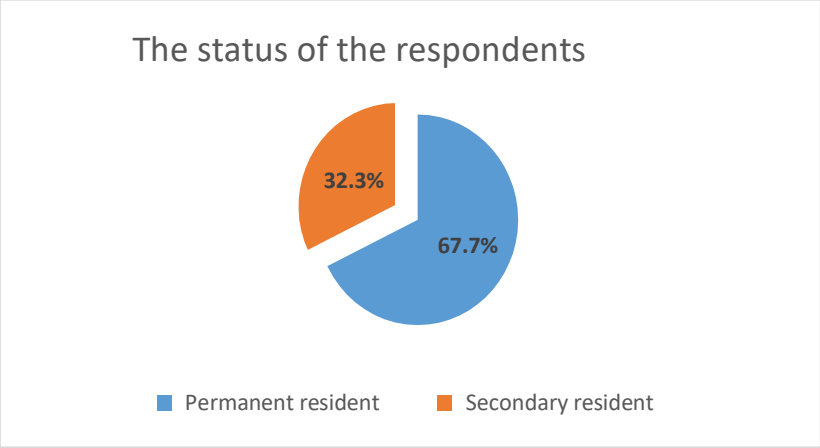
These discussions extended and developed some answers, for example, to questions about renewable energy. The results of this survey are not intended to replace future public surveys, but rather to establish an information base to facilitate exchanges between the population and the sponsors of renewable energy (RE) projects.

Although the sample has been designed in such a way as to achieve a wide variety of profiles, this survey in its current state cannot claim to be representative in the statistical sense of the term as no representativity test has been conducted.

3. Initial assessment of the situation in Molène

In this section, we mainly present the results of the Molène survey, whose purpose was to produce an assessment of the situation in 2021.

3.1.Profiles of the people we met



Of those interviewed, 21 are permanent residents and 10 are secondary residents.

For permanent residents, the average number of people living in the household is 1.76, which is lower than for the island of Sein where the occupancy rate is 1.9.

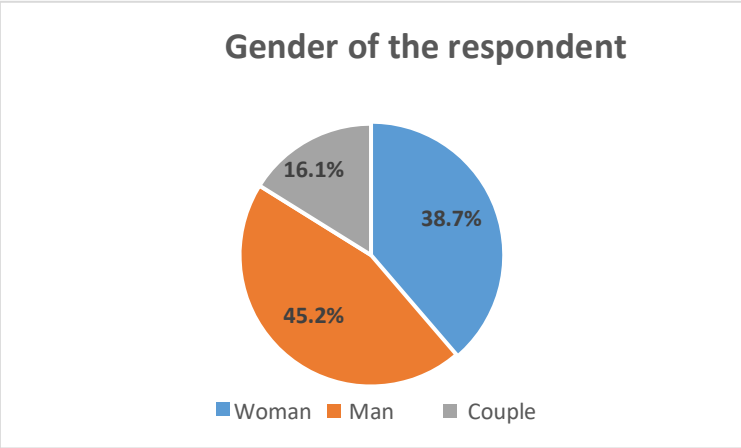
With regard to secondary residents, the majority are present on the island more than 6 months in the year.

Fewer than 4 weeks per year	From 4 weeks to under 8 weeks	8 to 12 weeks	12 to 16 weeks	16 to 20 weeks	20 to 24 weeks	Over 6 months
0	1	0	0	1	2	6

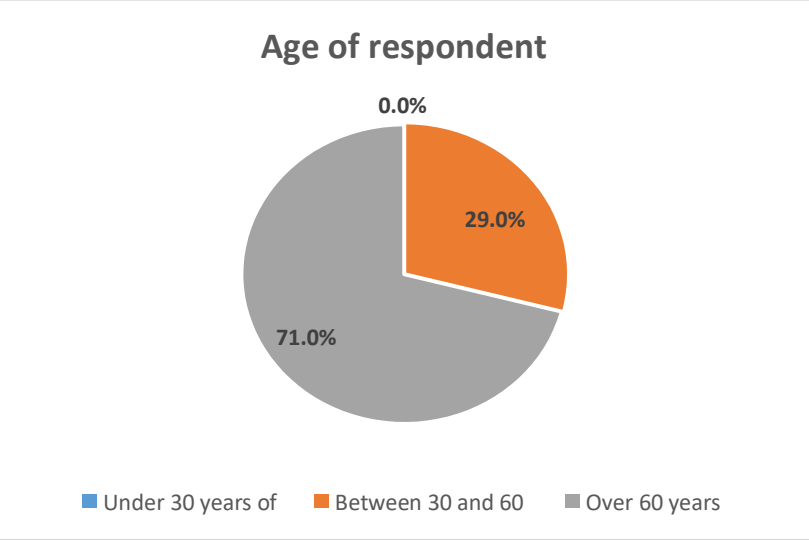
It is important to take this information into account because the status of permanent or secondary resident does not completely reflect the time a home is occupied and therefore the impact on the island's energy consumption. It is therefore essential to involve all owners in the energy transition process, as some secondary inhabitants may spend as much time on the island as a main resident.

Occupancy status		
Owner	Tenant	Living rent free
29	2	0

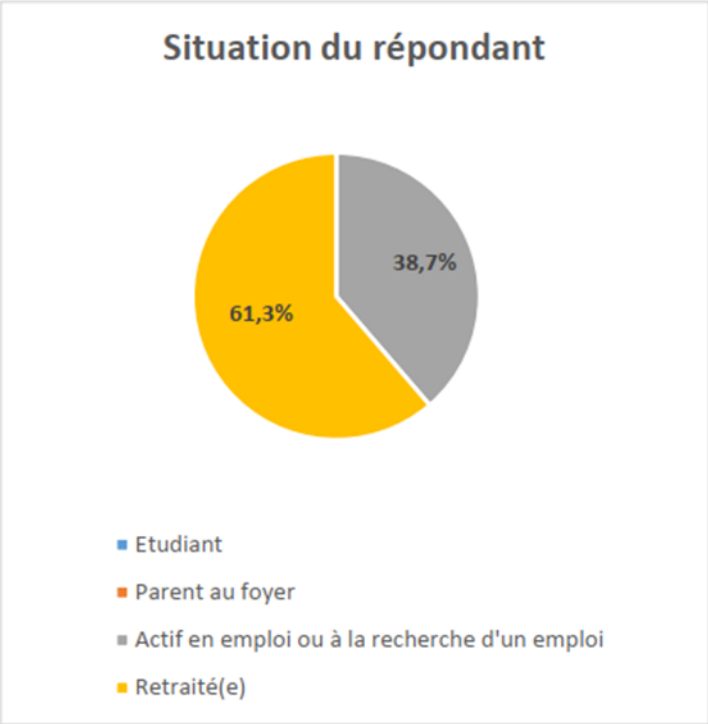
Most of the respondents are owners of their homes in Molène. They are therefore the decision-makers with regard to any work to be undertaken in the home.



Slightly more men took part in the interviews.



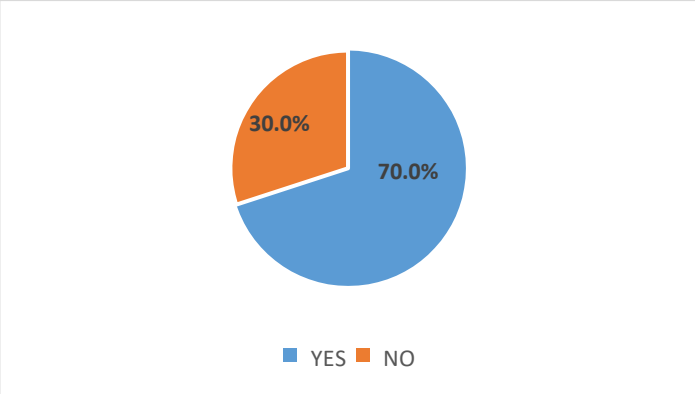
Over 70% of the people we met are over 60 years of age. The average age of the interviewees is higher than that observed on the island of Sein, where more than half of the respondents are between the ages of 30 and 60.



Over 60% of the respondents are retired.

3.2.Inhabitants' awareness of the different sources of energy production

3.2.1. Where the inhabitants stand in relation to the current production of electricity mainly based on fuel oil



Breakdown of inhabitants' answers to the question:

"On Molène, most of the electricity is generated by oil fired generators.

Does this method of production bother you? "

3.2.1.1. ➔ 70% of respondents said they were troubled or even appalled by the use of fuel oil for electricity generation on the island. This figure is lower than that registered on the island of Sein (76.3%)

These people refer to:

- the lack of a real alternative for the island's electricity generation at the moment. They are against the use of fuel oil which they consider polluting and expensive but seem to be rather resigned.

Sample responses:

"Yes, it bothers me! And then, it's pretty obvious, the power station is becoming more and more important, as consumption is increasing! When I was little, the power station belonged to Karit and was smaller! The power delivered was continuous power so you couldn't install a TV or fridge. As soon as alternating current was available, everyone purchased equipment and consumption soared! But, what could we have other than the power station? "

"It's not ideal, it would be good to have a cleaner system but what other solutions do we have? You have to look at the reality of the situation, we make do with what we have…"

"If there were other solutions, systems that worked, that would be good! "

- The non-ecological aspect and the public health problem associated with this method of production.

Sample responses:

"It would be good if we could have something else! It's true that sometimes we see black fumes coming out of the chimney, and that's worrying. "

"Yes very clearly, it bothers me from an environmental point of view! "

"The other day I could smell the smoke. There are normally regulations governing emissions and about the height of the stacks. I don't think they're high enough! "

- Their wish to see an underwater electric cable actually be laid between the mainland and the island.

Sample responses:

"Yes the use of fuel oil bothers me, but I can't see this situation changing!

I am in favour of laying a cable, I'm fairly pro nuclear! "

"We need to develop healthier solutions, but what? In my opinion, a cable would have been sufficient for Molène. "

"Yes, it bothers me but I am in favour of laying a cable, I don't understand why there isn't one! It would certainly be expensive to lay a cable, but it's also expensive to maintain and change generators! "

30% of respondents said they were not bothered about the use of fuel oil for electricity generation on the island.

These people cite the fact that the power station is indispensable for the generation of electricity on the island, that significant progress is being made in terms of generators, and that it is an element rooted in island life. Some people remembered their island when there was no electricity and are satisfied with how easy it is to access energy.

Sample responses:

"We are used to fuel oil. I am eco-friendly but not to the point of wanting to get rid of fuel oil altogether… On the other hand I think the power station is too noisy! But what alternative solution do we have? "

"The oil-fired power station is OK, it's always worked! Ouessant is the same, there's an oil fired power station! We're happy with fuel oil on the islands! "

"No, I'm used to using fuel oil! Vast progress has been made with the engines, it's better than before! There are several stacks for each engine and when you look at them, you can't tell which one is running! "

"I honestly don't mind fuel oil, we're used to it! The power station makes less noise than before, we live right next to it…"

3.2.2. How the residents feel about the development of renewable energies

In general, the respondents are unanimously in favour of the development of renewable energies on the island, but this is sometimes considered too slow. Their remarks are then tempered depending on the different renewable energy networks.

Sample responses:

"We're not against the development of renewable energies but we have to see what the energy is and where it will be! "

"It's important for REs to be developed on Molène. Especially since in the last few months 2 out of the 3 engines at the power station have failed. We're now only existing on 1 engine, and that's the oldest one! "

"I'm in favour of the development of RE but some types spoil the countryside. "

"The development of RE is good, but there's not much of it on Molène. "

Some interviewees are also in favour of the development of renewable energies at domestic level.

Sample responses:

"The development of REs for the island is very good, and we must also encourage the inhabitants to install their own renewable systems! "

A few inhabitants also highlighted the fact that the first priority is to reduce energy consumption.

Sample responses:

"I am in favour of the development of the REs but the fact that electricity requirements are constantly rising on the island is a problem! The priority is to save energy! "

3.2.3. Awareness of solar energy

Amongst the respondents:

- 83% unreservedly embrace the technology (this figure is higher than on Sein: 75%)
- 17% are in favour but have some doubts or questions about the technology (vs Sein: 25%)
- 0% who are against.

➔ Clear support for solar energy

People who support solar energy unreservedly often use as an example the photovoltaic systems installed on the Ledenez gîtes and on the Telecom antenna, which they feel are successful in terms of generation and integration.
These people would like to see more solar panels on the roofs of public buildings and refer to the large surface areas still available.
The impluvium solar project is perceived very favourably by respondents. On the other hand, it appears that incorrect information is circulating on the island because some people believe that the project is being stopped for health reasons due to the quality of drinking water collected from the impluvium.

Sample responses:

"It's a good idea, the impluvium project seems like a good idea, I saw the article published in the Journal des iles du Ponant! "

"I'm totally in favour! I heard that the impluvium project has been stopped! Apparently, scientists were of the opinion that the fact that the water flows over the panels could pose a problem with drinking water quality. Personally, I find this absurd because there have always been droppings of gulls and rabbits on the impluvium and it's not a problem! "

"I know there are projects at the power station and at the impluvium, so if that can help to generate power, that's good! That way, the amount of fuel oil consumed will decrease! Because it's true that lots of houses on the island are heated with electricity! "

"It's a good kind of energy! Regarding the impluvium project, there's a large surface area, so if it works and permits are granted, it doesn't bother anyone over there, it's really good!

I've seen the installation on the Orange aerial. It's very good, they've made quite a lot of savings with photovoltaic energy! "

"It's really good, and it's a good idea to have it on the impluvium, you can't see it! I've heard people talking about the impluvium project but apparently it has fallen through because they're afraid that the panels might pollute the drinking water. I don't understand because I

have a friend with some panels and a rainwater recovery system. The water has to pass over the panels before it reaches the tank and there's no problem…

And why not put panels on the church or on the impluvium at the citerne des anglais? "

"Yes I'm in favour! I agree that the impluvium project is a very good plan! It's a large surface area, you can't build on it and the 2 uses are compatible! There is also the impluvium in the village which could be covered with solar panels! "

"It's great! The solar panels that they're going to put on the impluvium are a good idea! That will also stop the rabbits from doing their business on it, so it's ideal! "

3.2.4.

➔ Support with reservations for solar energy

Interviewees who indicated reservations about solar energy mention:

- Conditions about the type of building they feel suitable for solar panel installation (these people are not in favour of panels being installed on traditional houses on the island)
- Doubts about the success of the impluvium project.

Sample responses:

"Yes, it's great. If I had been able to do it on my house, I would have done it but my house is old and the solar panels don't really look very attractive… They're much more suitable for modern houses! "

"Yes, but as far as the impluvium project is concerned, I'm not in favour. There are cracks on the top, and, in my opinion, the installation of the panels will be complicated unless these are repaired…"

"The projects involving the power station, or the impluvium, are good ideas but I am waiting to see the outcome. "

➔ Lack of support for solar energy

No one said they were completely against the development of solar power on the island of Molène.

3.2.5. Awareness of tidal energy

An experiment with tidal energy has been under way since June 2015 in the "Fromveur Passage" between Ouessant and Molène. This energy could eventually cover over half of the consumption of the inhabitants of Ouessant.

It should be pointed out that when the project began this industrial experiment benefited from extensive media cover both in the local and national press and through information from the Sabella company, which developed the prototype.

The D10 turbine was put in the water several times between 2018 and 2020, and each time was removed shortly thereafter when damage to the machine was observed.

All the inhabitants of Molène are aware of the existence of the project:

- 22% of interviewees support the project unreservedly (this figure is much lower than the one recorded for the island of Sein: 50%)

- 39% of interviewees are in favour but have doubts about the success of the project and question the technology.
- 35% of respondents do not believe that the project will be successful (this figure is higher than the one recorded for Ouessant in the last survey in March 2021, since 11.5% of the inhabitants of Ouessant do not support the tidal energy project, or no longer do so.)

- 4% of respondents said they did not have enough information on this subject to express an opinion.

➔ Clear support for tidal energy

People who strongly support tidal energy cite the fact that there are lots of currents in the water around Molène and that this would be a clean method of producing energy. Most people hope that the project will succeed.

Sample responses:

"This is an interesting project, it's still at an experimental stage… but in absolute terms, it would be advantageous for Molène to be connected to Ouessant when the marine current turbine(s) go into production! "

"If the machine doesn't impact the seabed, I'm in favour! Anything that can reduce fuel oil consumption is going in the right direction! "

"Yes I've been following the Sabella project in the newspapers. We have to try every type of energy possible! "

"I'm hugely in favour of it! If the fishermen agree, it really is a technology that could get us away from fuel oil! I've been following the Sabella project from the outset! "

➔ Support with reservations for tidal energy

People who support tidal energy but with reservations, cite their doubts about the success of the project, the lengthy development times, the high costs that this type of technology generates, the fact that the D10 is an unsuitable size for Molène and the fact that it is important for the project to be conducted in consultation with users of the sea.

Sample responses:

"This project might be OK but if the D10 machine is used around Molène, then no, it won't be possible because of the depth of water, which is too shallow here. Or the machine would have to be positioned further away meaning that the cable would be very long, with significant pressure losses…"

"It's a good thing, but will it ever work? If we could be independent like in Quemenes, it would be great for Molène! "

"Tidal energy is always under water, isn't it? There are lots of concerns I believe… but at the same time, Fromveur isn't an easy place…

It would be good to test wave energy, as in Nordic countries. "

"I'm in favour! Apparently there are some problems. I've heard that the machine stirs up sand which gets inside and then the machine breaks down! It needs to work! "

"This kind of project is very good!! But up to now, a lot of money has been invested for zero results! And then, the most important thing is that we need to ask the fishermen what they think, as they are directly affected! "

➔ Lack of support for tidal energy

People who do not support tidal energy do not believe in the project given the various types of damage suffered by the machine and the money spent. They don't think that the weather and sea conditions around the island are compatible with a project of this kind.

Sample responses:

"Too many mishaps with the project! I am sceptical about keeping materials on the sea bed for any length of time. "

"I don't think it's possible to run a machine like that here, as the sea is violent around the island! The problem is that the waters are shallow here at low tide and the machine will be exposed! It's fine in the Fromveur but maybe it's a bit of a pipe dream? Then, afterwards fishing would have to be banned in that area, there'll be hell to pay! "

"I'm against it, you need to leave the seabed alone! "

"On paper, it's good, but it doesn't work! "

"It'll never work!" I have more faith in energy from waves! "

3.2.6. Awareness of wind energy

The survey reveals that:

- 14% of interviewees support the wind power project without reservation (this figure is much lower than that registered for the island of Sein: 37.5%)
- 32% of respondents are in favour of a wind energy project but issue reservations
- 54% of respondents are against a wind energy project on Molène (compare with the figures from the last survey on Ouessant: 42% of Ouessant inhabitants are against a wind energy project).

➔ Clear support for a wind energy project on Molène

Those interviewed who indicate their unconditional support for the implementation of a wind turbine on Molène mention the need for this type of power in the island's energy mix.

Sample responses:

"Yes it's good! In any case, there'll be no choice; if fuel oil is stopped, we'll have to find solutions! I know that they're not happy with the wind energy project in Ouessant but I think that's where the future lies! "

➔ Support with reservations for a wind energy project on Molène

People who support a wind energy project but have reservations mention:

- The fact that the machine must not be too big:

Sample responses:

"Yes, but pay attention to the size of the machine in relation to the size of the island. "

"Yes very good! But not big wind turbines, as these aren't aesthetically pleasing and then they cause interference with communications! I'm more in favour of developing small wind turbines on a domestic scale. There's plenty of wind here in Molène, so why not make a field of ten small wind turbines? "

"I'm not in favour of a big wind turbine, but I would like to see 2 small rotor wind turbines at the impluvium; the site is right in the prevailing winds! "

No, I'm against a large wind turbine but individually, yes, it would be a good idea for people to put them in their gardens! I had one on the mainland! "

- Location: these people cannot see a wind turbine on Molène:

Sample responses:

"I'm not in favour of this on Molène, but why not put a wind turbine on Ledenez? The sea level is already 15 m so it wouldn't be a problem! "

➔ Lack of support for a wind energy project on Molène

People who reject a wind energy project on Molène cite the aesthetic side, in that they don't like the way the turbines look in the countryside, especially given the small size of the island. These people love the landscape of their island as it is and do not want it to change.

Sample responses:

"NO, not at sea – you have to leave the sea to the users of the sea, and not on the land either – the fauna would suffer! "

"NO I'm against, I can't stand it! I don't like it at all from an aesthetic point of view! I've also heard that the maintenance costs of the wind turbines are very high and that it's not

profitable in comparison with the electricity produced. "

"The intermittent action is a real problem! It's always when there's no wind that we need energy! Molène is too small an island for a wind energy project. "

"NO, I'm not in favour of it for Molène, it's too conspicuous! "

"No, I don't like the aesthetics of a wind turbine, I find it rather spoils the landscape...

"No, visually, the island is too small for the machine to be installed far away from people! Wherever you put it, it will annoy someone! "

"I wouldn't like it, no, I don't like it! Molène is a natural location, it mustn't be spoiled. "

3.2.7. Where the inhabitants stand in relation to a pyrogasification project

The survey reveals that:

- 81.5% of respondents support the project without reservations (this figure is higher than on Sein: 69%)
- 12.5% of respondents are in favour of the project but issue reservations
- 6% of interviewees do not support the project.

➔ Clear support for a pyrogasification project

Over 80% of respondents found the project to be very interesting for the island because it means lower fuel consumption at the power station and it reduces the volume of waste sent back to the mainland.

Sample responses:

"Yes, it's very good, it would be the equivalent of a mini Spernot in Molène! "

"Of course, pyrogasification must be tested, always with a view to reducing fuel oil consumption."

➔ Support with reservations for a pyrogasification project

Residents who voiced reservations about the project highlight the lack of wood or waste wood on the island and the lack of land for installing such a project.

Sample responses:

"This type of project is interesting but I think there'll be a resource problem here in Molène, especially in winter."

"Yes, why not? But think about the space that the machine could take up (there isn't much land available on the island) and about the fact that volumes will be much lower in winter! "

➔ Lack of support for a pyrogasification project

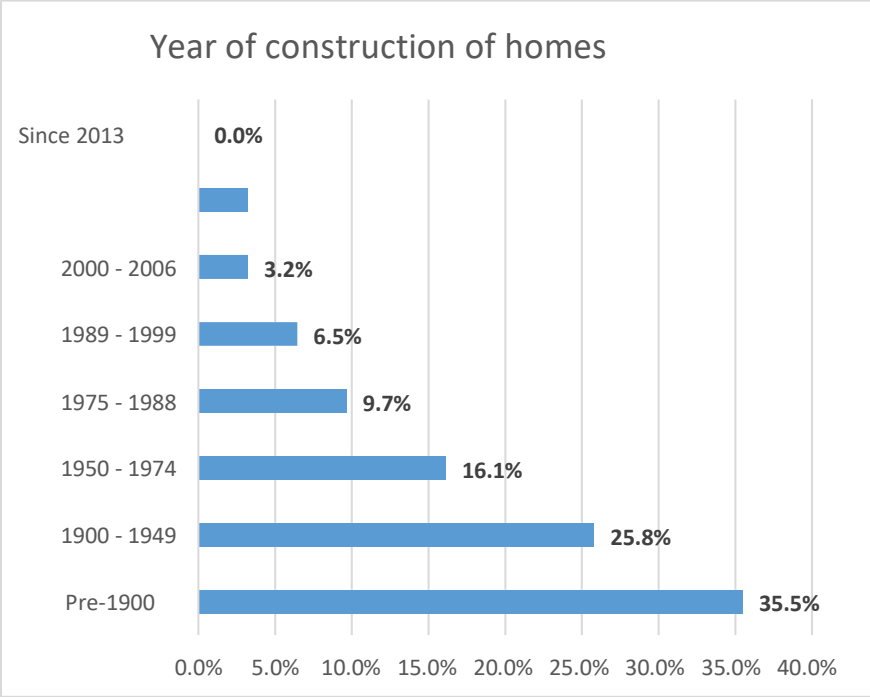
The respondents who do not support the project feel that the volumes produced on the island are not sufficient to supply a machine like this.

Sample responses:

"I'm not in favour, it's not suitable for Molène, there's not enough wood!

3.3. Characteristics of homes and equipment installed

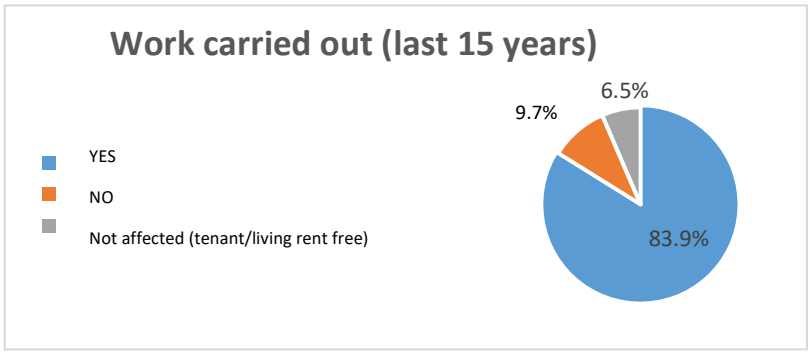
3.3.1. Characteristics of homes



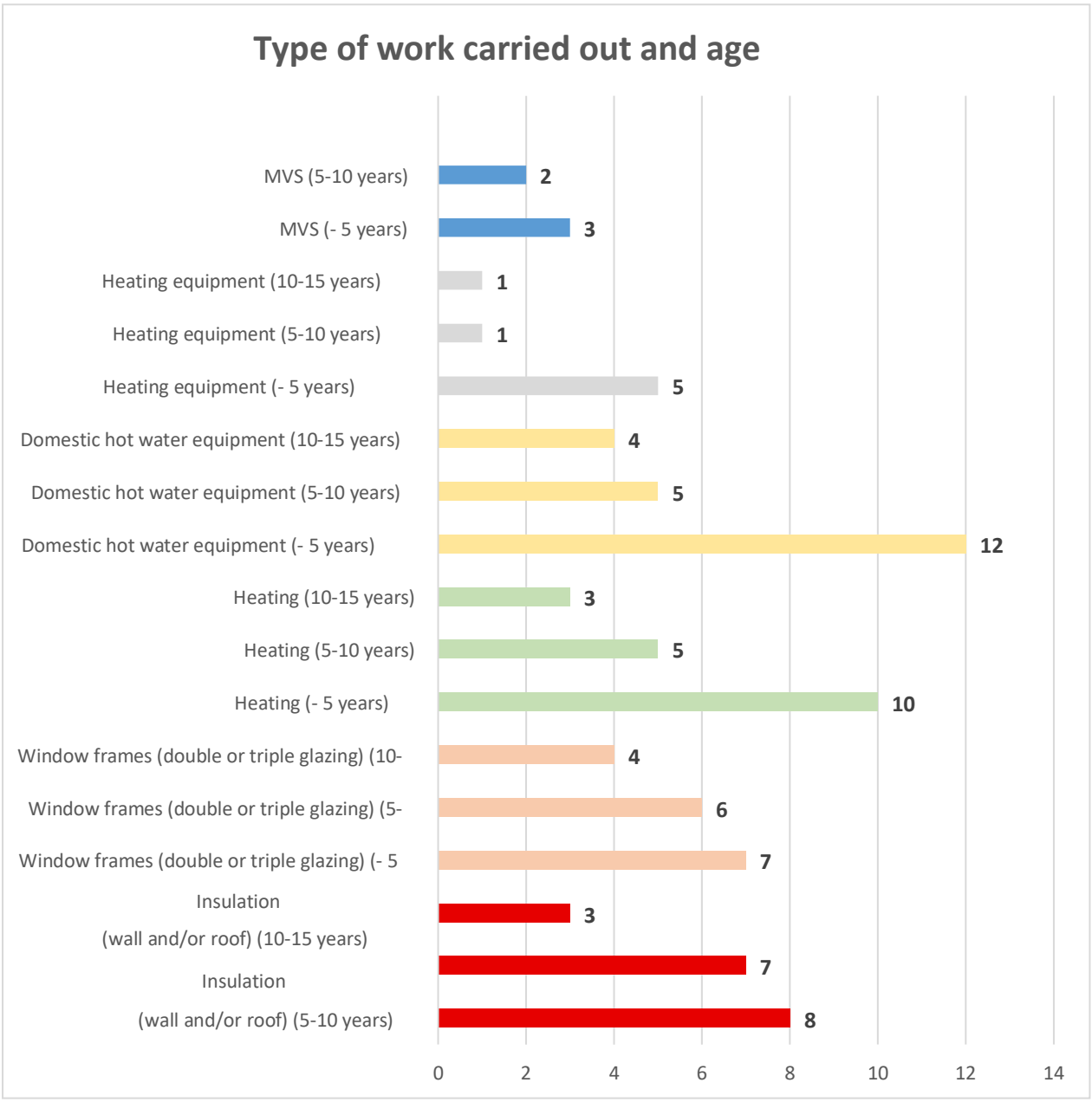
The results of the survey of the islanders show that 35.5% of homes date back to pre-1900.

61% date back to pre-1949. By way of comparison, French housing stock comprises 35% of housing built before 1949 (source: INSEE (Institut national de la statistique et des études économiques National Institute of Statistics and Economic Studies) – housing survey 2017).

77% date back to pre-1974, the date of the first thermal standard that for the first time imposed a minimum thermal performance to be achieved for housing.



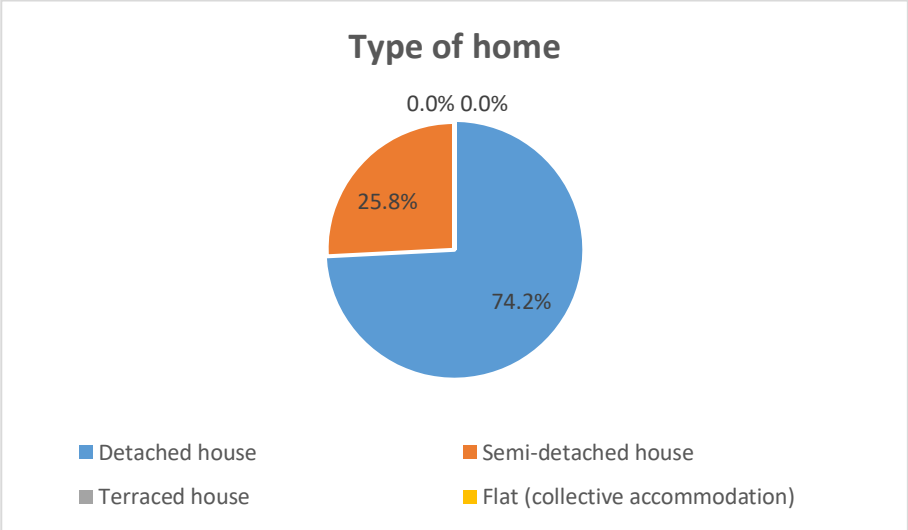
Over 84% of interviewees have carried out work in the last 15 years.



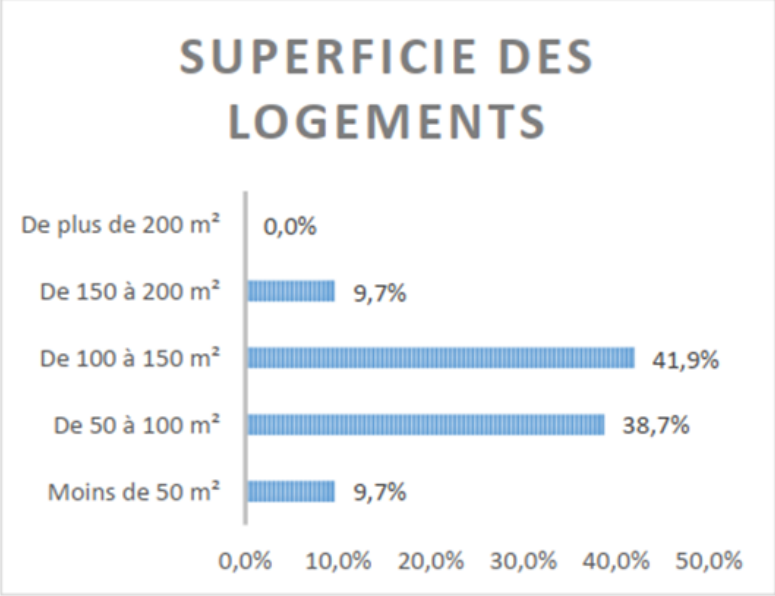
The work carried out mainly concerns domestic hot water and heating systems:

- The replacement of hot water storage tanks: The majority of immersion tanks are under 5 years old.
- Heating systems, with the recent increased popularity of freestanding stoves burning logs and pellets on the island.

We can see that very little of the work carried out concerns the shell of the building, with the inhabitants mainly concentrating on equipment, which they often change as an emergency when a water heater or heating system fails. The building is not always considered as a whole, in terms of improving the outer shell, first of all, and then making the heating systems the appropriate size.



About 26% of homes have 1 or 2 party walls, which is less than half the figure for the island of Sein (58%).



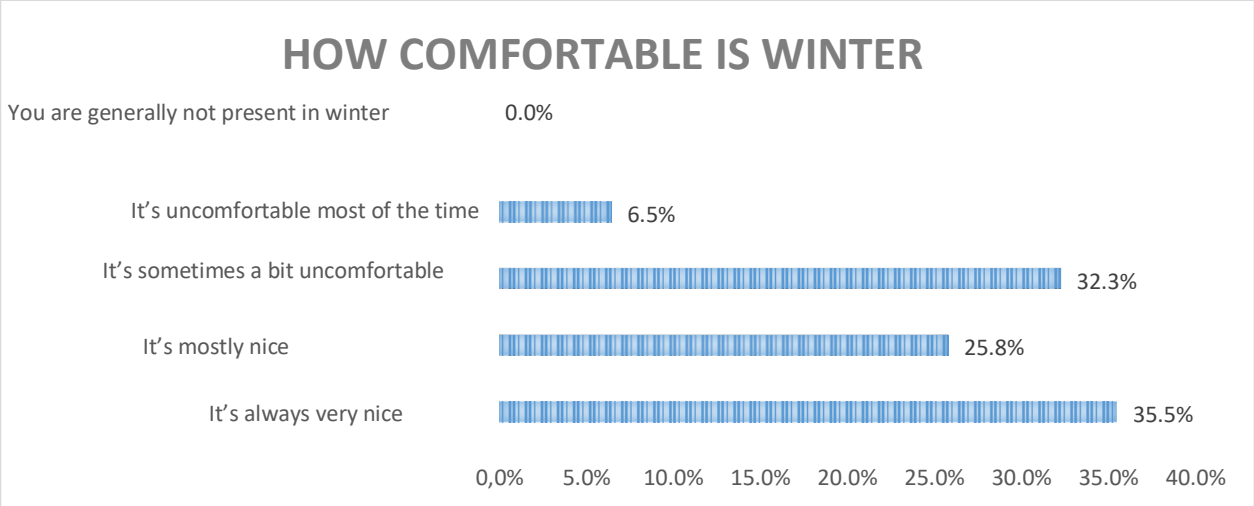
On Molène, the majority of homes have a living area of between 100 and 150 m^2.

Nearly 57% of homes on Molène do not have a MVS.

MVS	NO	YES, single flow MVS	BMV (blown mechanical ventilation)
NUMBER	17	13	0
%	56.7%	43.3%	0.0%

Among the homes without an MVS, there are some which actually have an MVS but this has been out of order for several years and the owners have not managed to bring in an electrician to repair it, or in other cases the MVS is working in principle but the owners do not turn it on because they cannot find a tradesman to service it and are afraid of the fire risk.

Consequently the installation, repair and maintenance of MVSs could really save energy and improve inhabitants' comfort, especially when you consider that nearly 40% of the people interviewed find their homes uncomfortable in the winter. due to difficulties in heating their homes and/or very damp conditions.

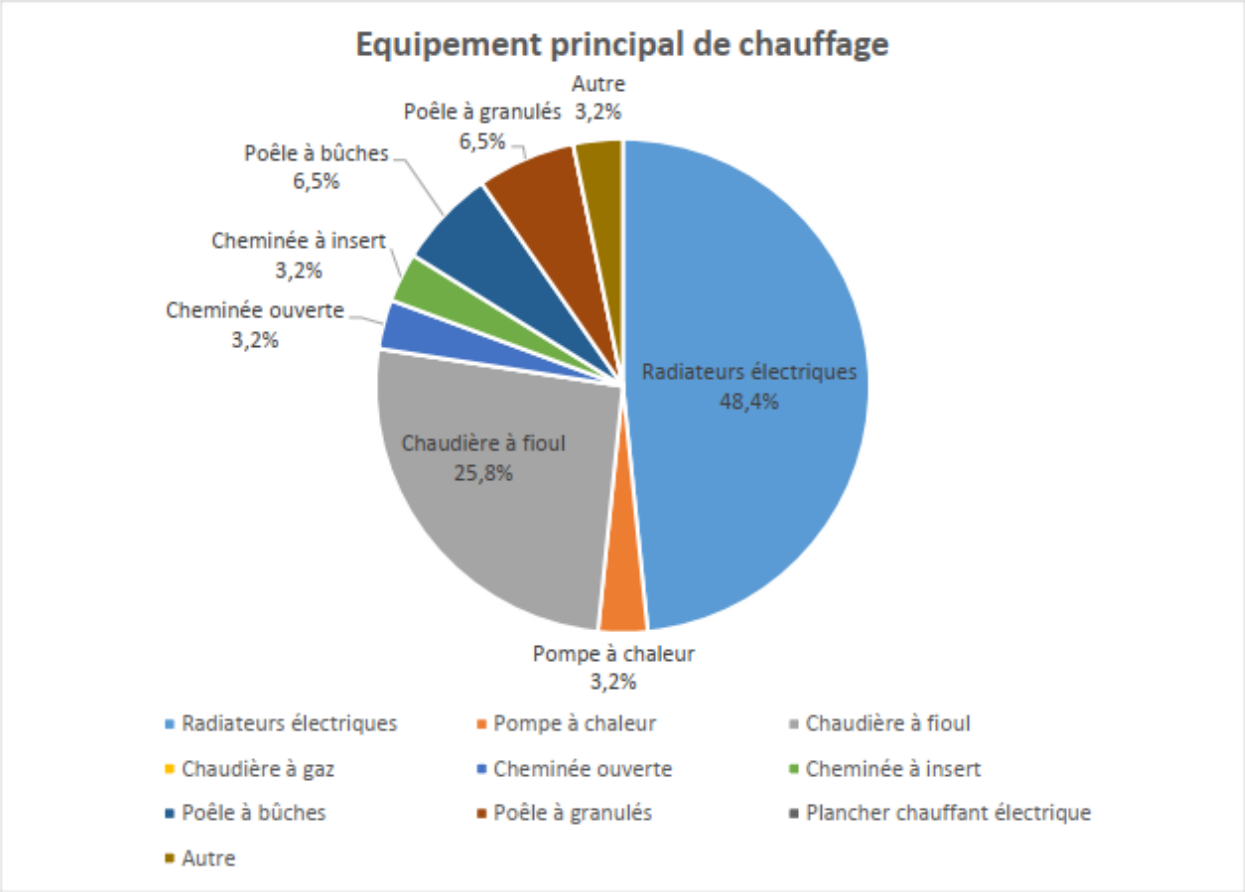


People who feel that their home is always nice in winter in most cases have new wood burners, which heat and dry out homes quickly or fuel oil boilers supplying the central heating whose comfort is greatly appreciated.

Equipment present

3.3.1.1. The heating

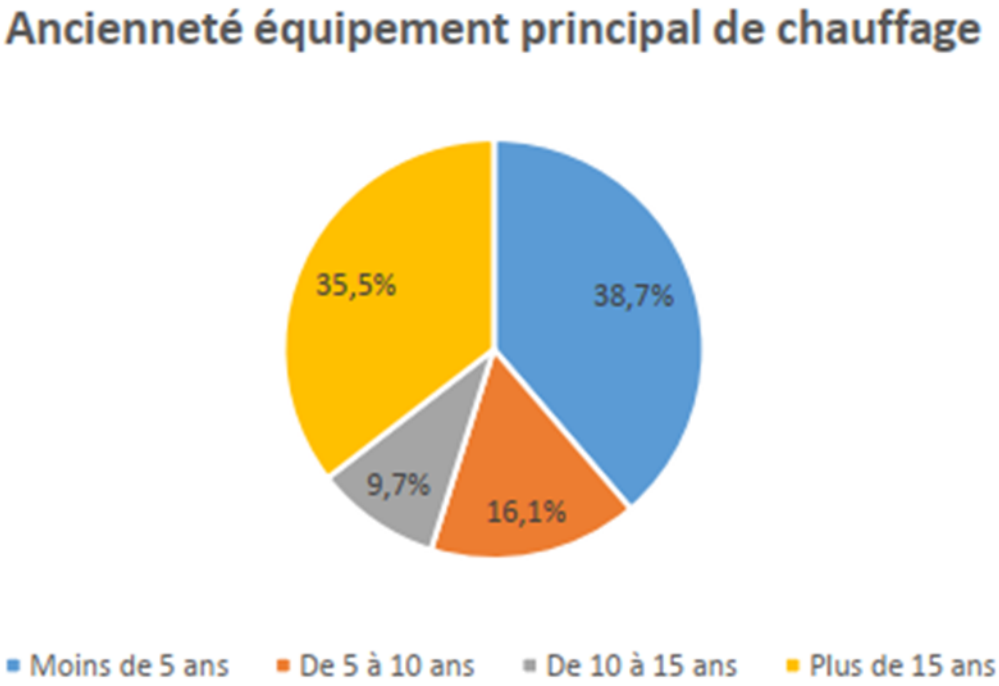
As far as the main heating system is concerned, heating by electric radiators accounts for just over 48% (vs 63% on the island of Sein) and wood heating systems for about 23% (vs 26% on the island of Sein).



NB : « Autre » = Chaudière à granulés

These figures can be compared with the results of the survey carried out in 2016 on Molène by the AIP under the heading of the Boucle Energétique Locale (BEL - *Local Energy Loop*). Heating by electric radiators seems to have lost ground in the last 5 years, falling from 55% to 48%, while heating with wood rose slightly from 20% to 23%.

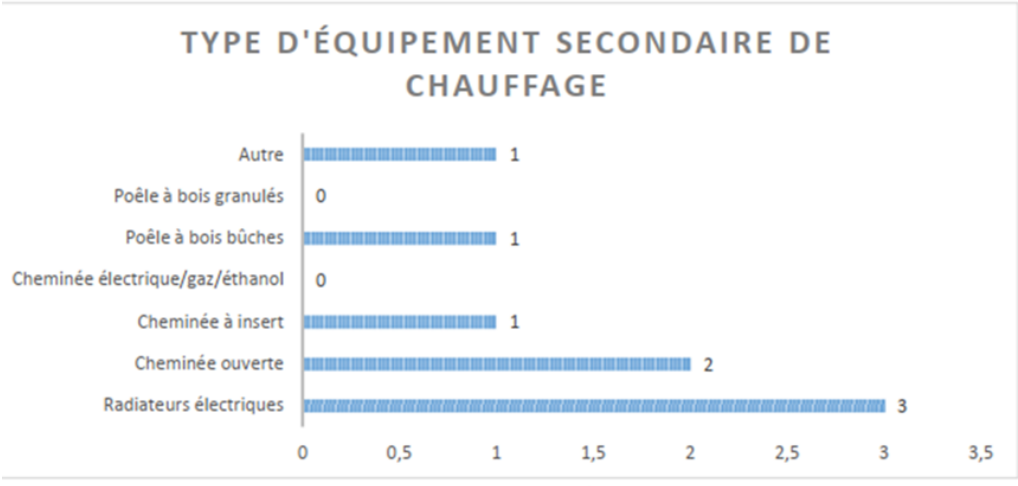
This graph shows that there is still a significant number of oil boilers (almost 26%) on Molène, mostly over 15 years of age.



In Molène, the main heating systems are mostly very old or very new. 2/3 of the main heating systems are over 15 years old (this figure is 2 times higher than on Sein – 19%).

Secondary heating systems	YES	NO
NUMBER	8	23
%	25.8%	74.2%

Nearly 26% of homes on Molène have secondary heating systems (vs 47% on the island of Sein), most comprising electric radiators, always as a supplement to a wood burner using logs or pellets.



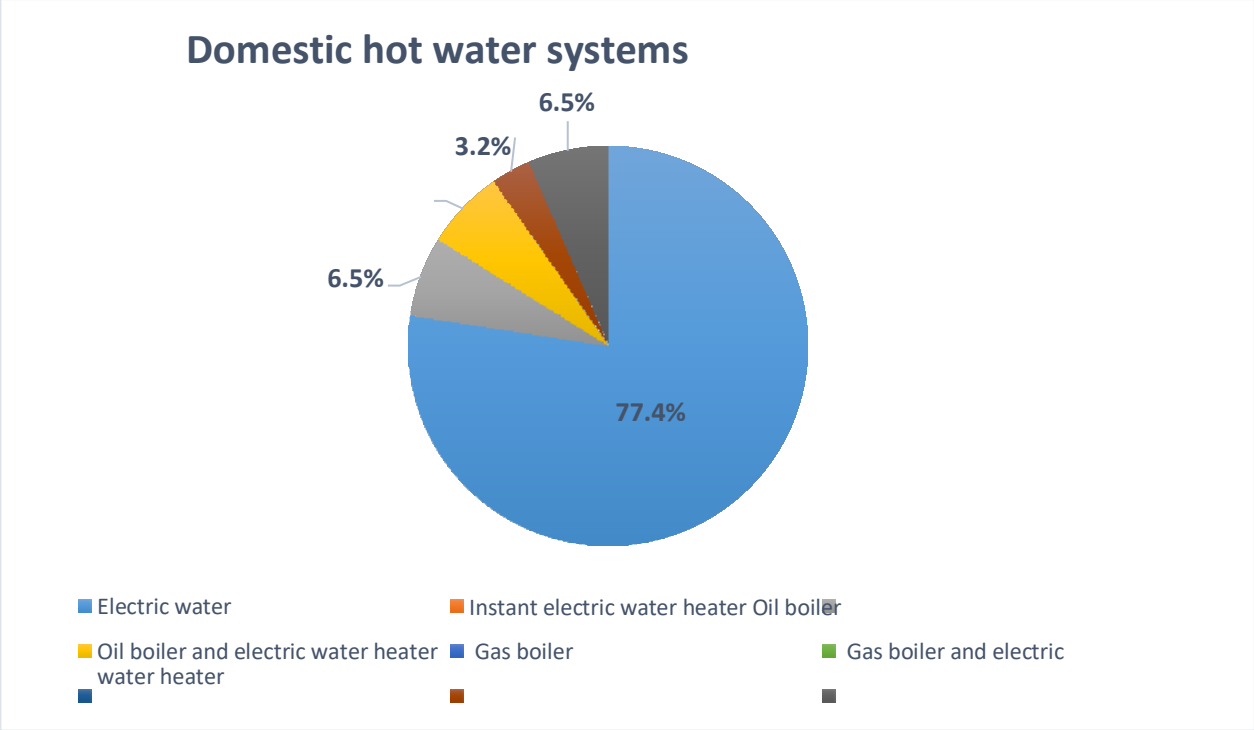
NB : « Autre » = Poêle à gaz

If we take into consideration all the main and secondary heating systems, 11 homes out of 31, or nearly a third, have a wood-burning appliance, which is generally beneficial in terms of reducing

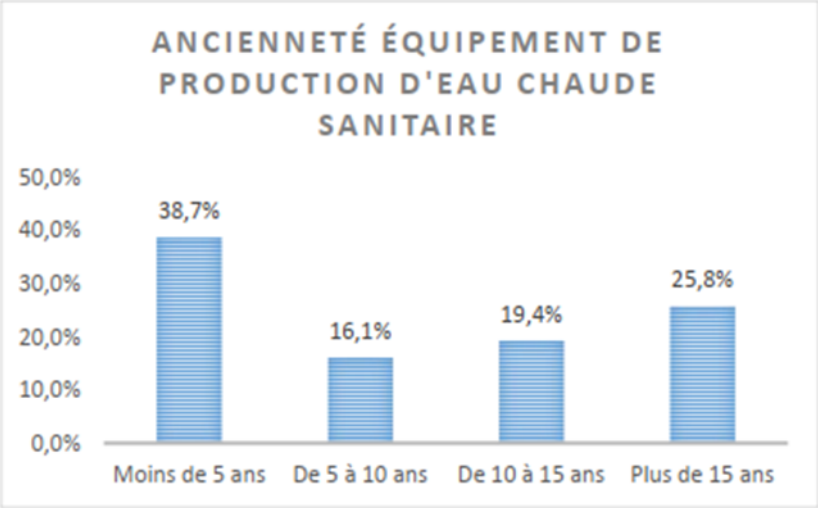
fuel consumption at the power station. By comparison, this figure is 42% on the island of Sein.

3.3.1.2. The production of domestic hot water

Domestic hot water is mainly (over 77%) produced by electric water heaters (vs 89.5 % on Sein).



In 12% of the homes in the sample, domestic hot water is produced by an oil boiler. This is not the case on the island of Sein.



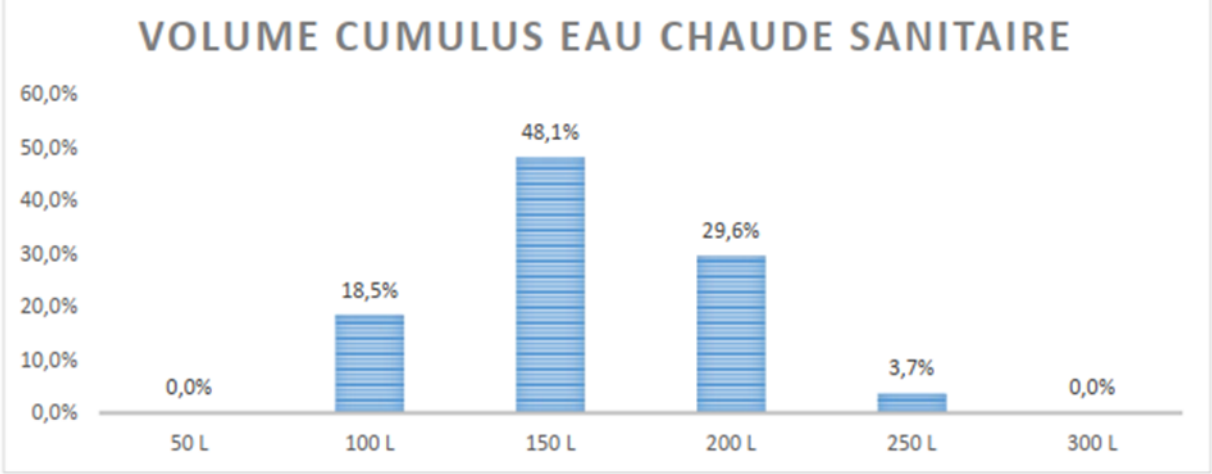
The stock of hot water storage tanks is very new since nearly 40% of the equipment is under 5 years of age. By comparison, the average lifetime of water heaters on the mainland is 11.7 years (Source: Eco- Systems– 2012 data).

The islanders interviewed point to a significant renewal rate for electric water heaters that they explain is due to variations in voltage on the electricity grid that damage immersion heaters.

We can see that the high representation of electric immersion heaters that do not require regular maintenance means that professional experts are not able to intervene and recommend more energy-efficient systems before the equipment breaks down.

In any event, it would be advantageous to set up a more thorough study of the cause or causes of hot water immersion tank malfunctions, by analysing immersion heaters left at civic amenity sites over a period of several months.

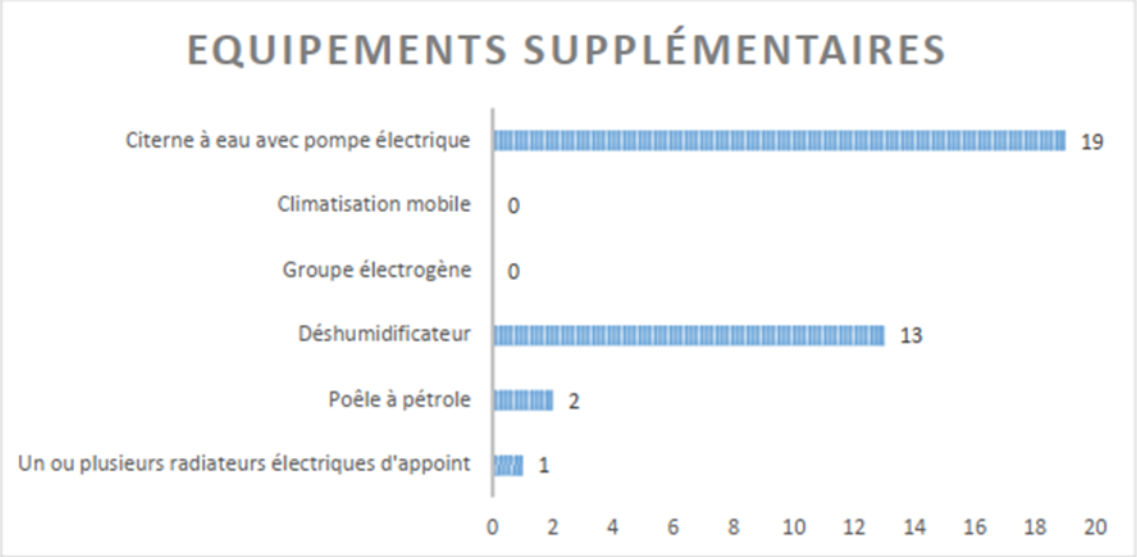
The production of domestic hot water accounts for a significant amount of electricity consumption and therefore fuel oil consumption at the power station. This study of user electric immersion heaters is a necessary prerequisite for the development of alternative methods for producing domestic hot water apart from basic electric immersion heaters, such as solar thermal water heaters or thermodynamic tanks.



The average volume of hot water storage tanks does not entirely correspond to the occupancy figures of homes. Homes are occupied on average by 1 or 2 people, which should correspond to average hot water tank volumes in the order of 50 or 100 litres. The over-dimensioning of hot water tanks can be explained by the increased need for hot water in the summer period when people are visited by family or friends.

A number of interviewees reported that their hot water tank is too large for their daily needs.

3.3.1.3. Other equipment



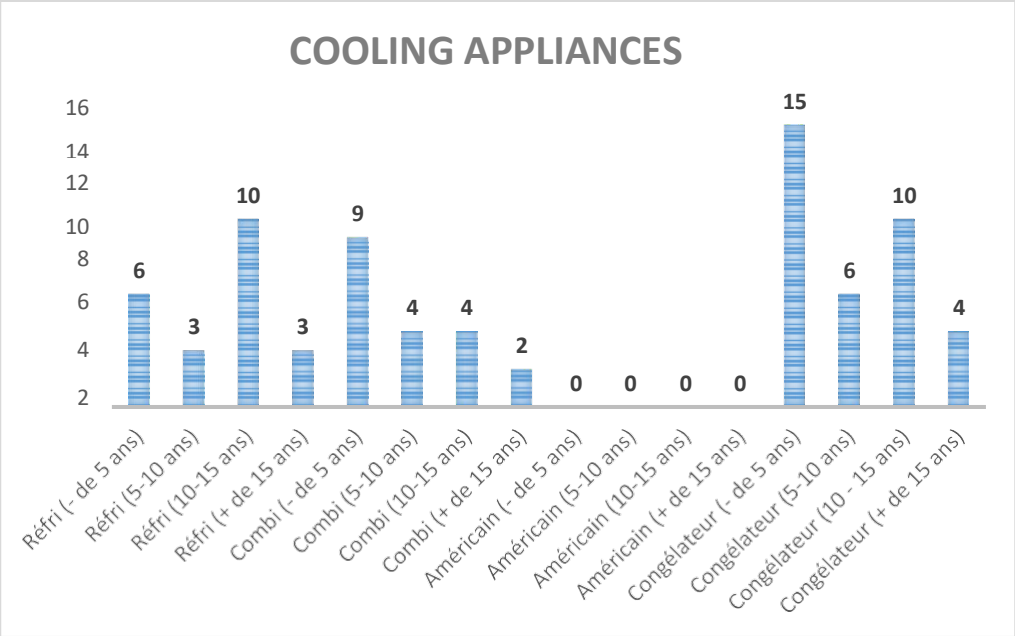
Homes with cisterns represent 61 % of the sample (substantially identical to the figure recorded for the island of Sein). Of the 19 homes with cisterns, 3 are currently unused due to a lack or malfunction of the pump or a leak in the tank.

42% of respondents have one or more dehumidifiers, which is consistent with the high rate of housing without an MVS.

Just over 6% of respondents have an oil stove as a means of heating.
Although oil stoves emit numerous pollutants that have significant health and environmental impacts (which must be correlated with the fact that half the population do not have an MVS), people who choose this mode of heating appreciate the speed at which the system heats up.

3.3.1.4. Cooling appliances

	Number	Average number per household
TOTAL cooling appliances	67	2.16
Refrigerators	38	1.23
Freezers	30	0.97



The survey reveals a particular feature to be linked with the island lifestyle, namely, a number of cooling appliances which is slightly higher than the average observed on the mainland.

For example, the survey shows an average of 2.16 cooling appliances per home (vs 2 on the island of Sein), even though the occupancy rate of homes is relatively low. By way of comparison, the average number of cooling appliances per home on the mainland is 1.8 (Source: Study 2016 IPSOS for Eco-Systems).

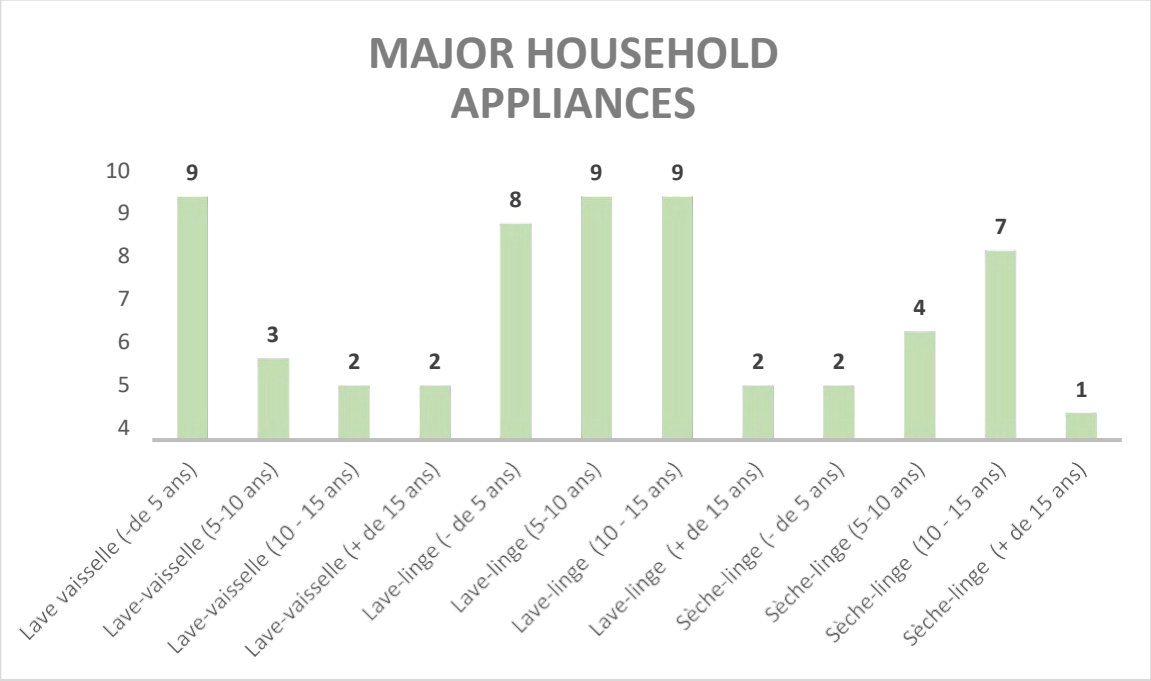
By analysing these numbers more closely, it appears that this discrepancy is due to an overcapacity in freezers whose number is almost 2 times higher than on the mainland:

Island data		National data (Source: 2016 IPSOS [market research company] study for Eco-Systems)	
Average number of refrigerators/ fridge-freezers per home	Average number of freezers per home	Average number of refrigerators/ fridge-freezers per home	Average number of freezers per home
1.23	0.97	1.3	0.5

The overcapacity of freezers can be explained by local practices, with amateur fishing appearing to be an important factor determining the doubling of freezers even for people living alone. Most anglers and beneficiaries of amateur fishing activities prefer to store fish products in a dedicated freezer.

Moreover, for economic reasons or due to the availability of certain products, many islanders bulk buy their food on the mainland and then freeze it. If we add to that a desire to control the risk of no boat links in bad weather, we can see why there are more freezers than the average number found on the mainland.

3.3.1.5. Major household appliances (excluding cooling appliances)



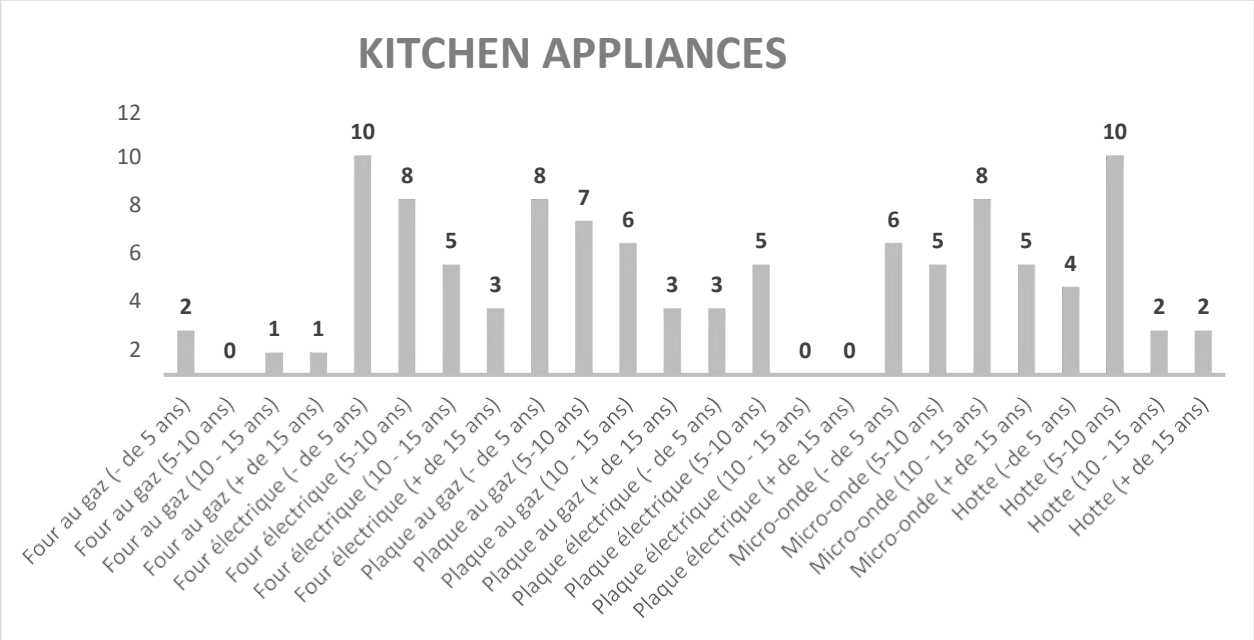
The washing machine is the appliance found most frequently in homes (90% of respondents have a washing machine).

52% of people own a dishwasher and 45% own a tumble dryer.

These three types of major household appliances present on the island are under 5 years old in 1/3 of homes.

For tumble dryers, the equipment rate on the island is about 45%, while the national average is 40% (Source: Study 2016 IPSOS for Eco-Systems).

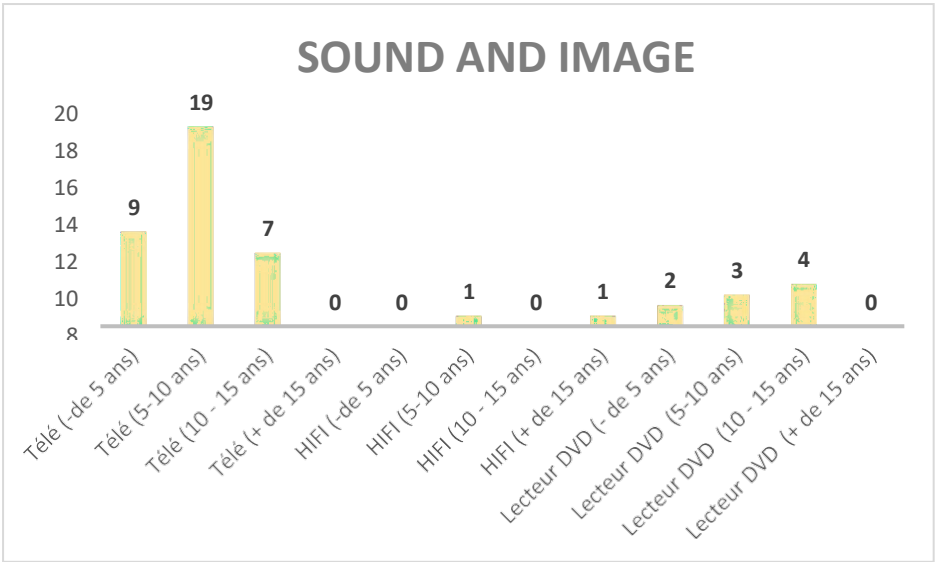
3.3.1.6. Kitchen appliances



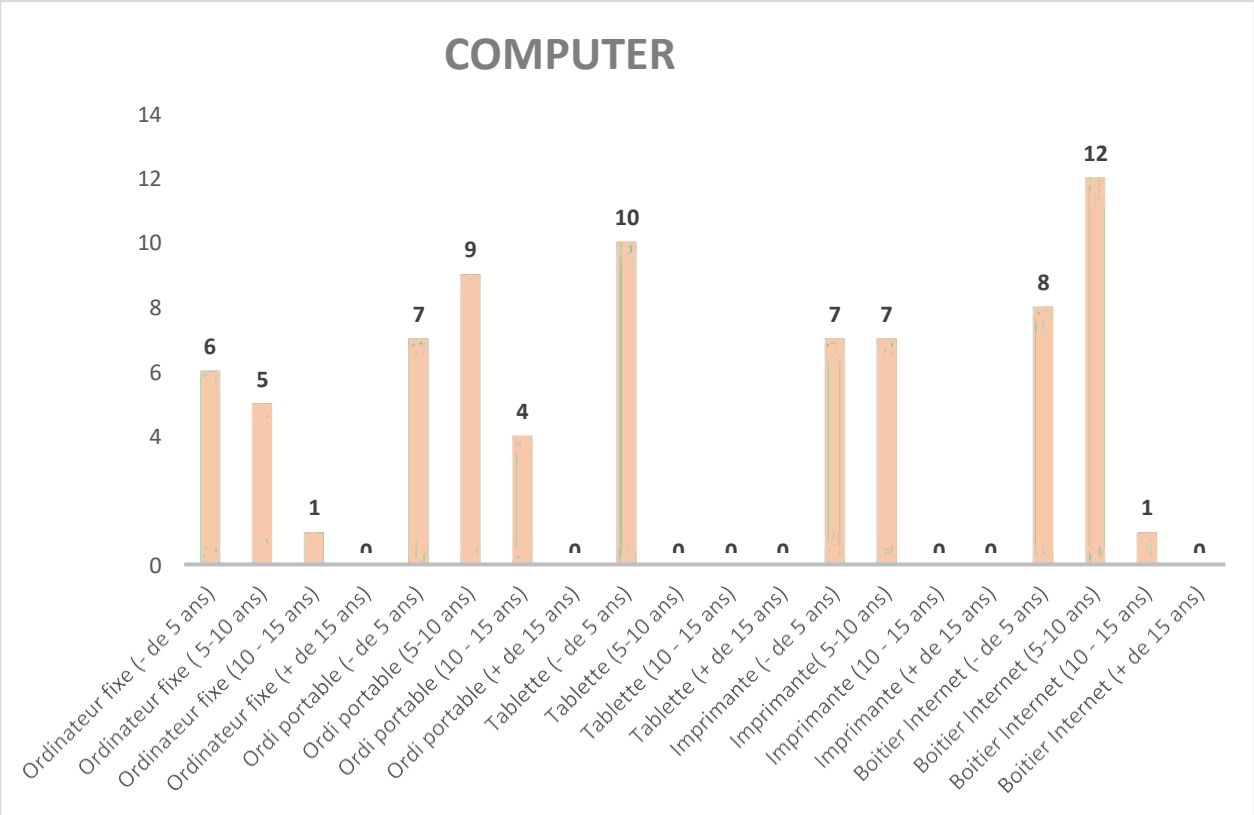
One third of the kitchen appliances is under 5 years old.

Some of the equipment is very old, as it is second hand. This equipment is often obtained by islanders from friends or island families.

3.3.1.7. Sound, image and computers



It appears that HIFI equipment and DVD players are losing ground in the light of the new ways of accessing music and series/films/documentaries.



50 % of the computer equipment on the island is under 5 years old.

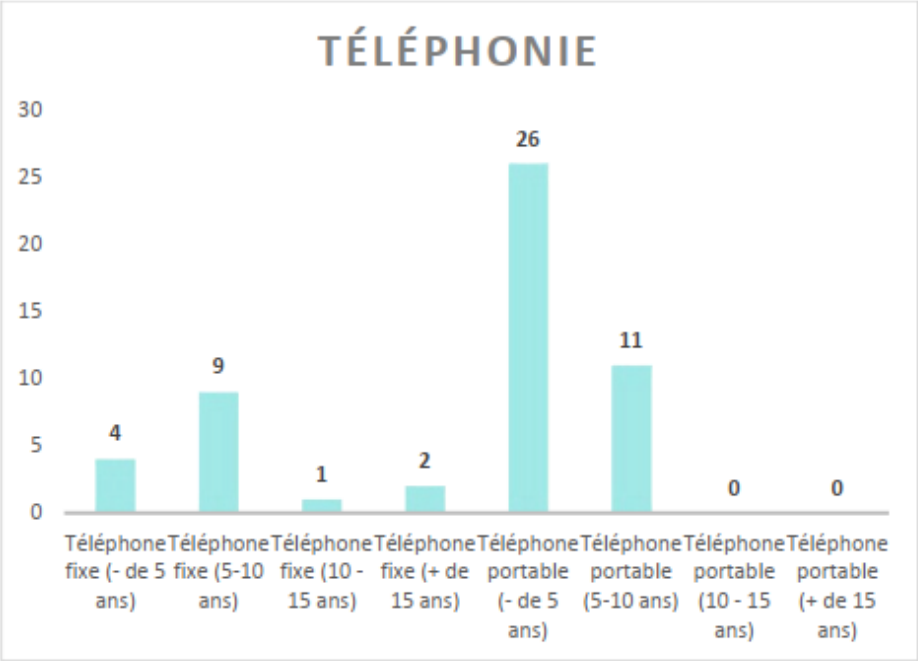
	MOLENE	FRANCE (Data 2017 – CSA source "Observatory of audiovisual equipment in households in metropolitan France")
Average number of screens per household	2.48	3.6
Television	1.13	1.6
Computer	1.03	1.4
Tablet	0.32	0.6

The average number of screens per household on Molène is lower than in France as a whole.

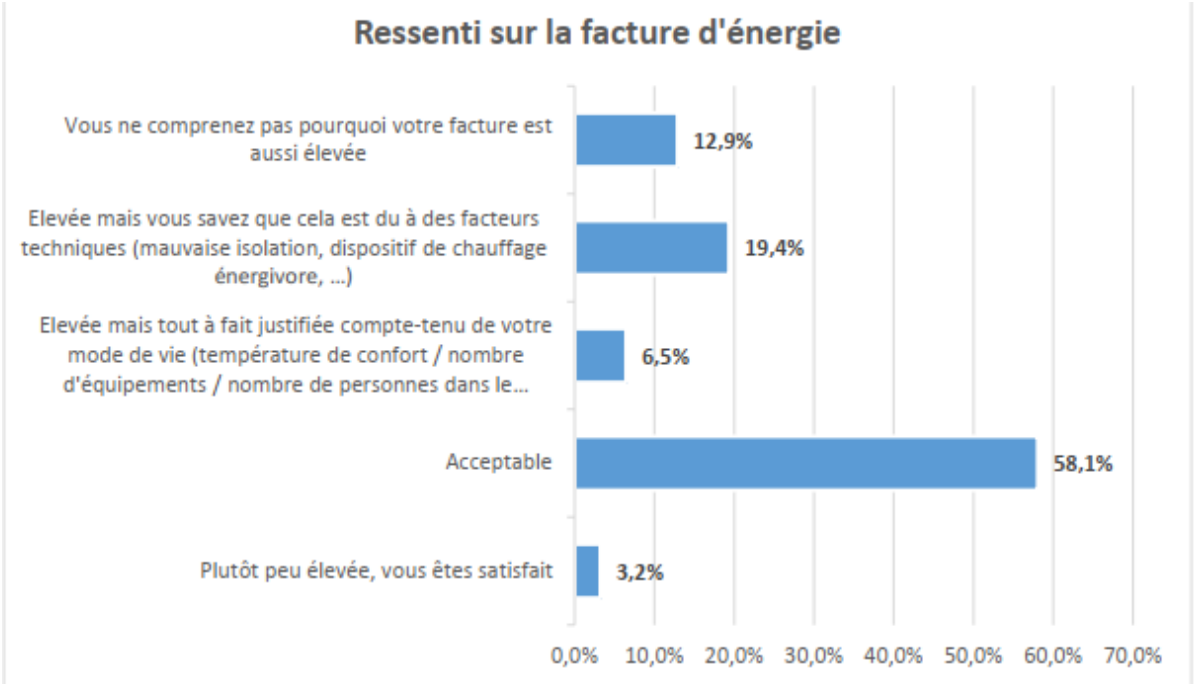
	NUMBER	%
HOUSEHOLDS WITH INTERNET	21	67.7%

68% of respondents have access to the Internet in their homes (vs 71% on the island of Sein). By way of comparison, this figure amounts to 85% in France (Source: CREDOC study – November 2016). However, 4G is very effective on Molène and a number of inhabitants who do not have an internet box use WiFi via their telephone.

3.3.1.8. Telephony



3.3.2. Impact on the invoice



Energy bills are considered low or acceptable by 61% of respondents (this is lower than the percentage recorded for the island of Sein: 73%).

When invoices are considered high, this is usually deemed to be totally justified either because the amount is associated with a personal choice (comfortable temperature for example) or because this amount is explained by one or more technical factors (poor insulation, energy-intensive heating

device, etc.).

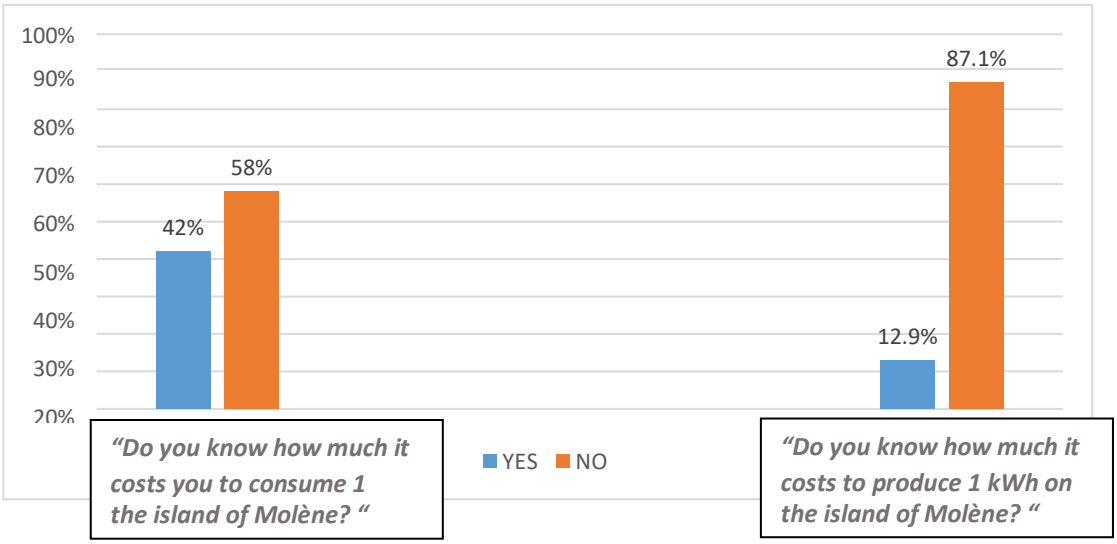
Nearly 13% of people do not understand why their bill is so high. It would therefore be useful to raise these people's awareness of the specific situation, with an analysis of load curves to check that there are no malfunctions within the electrical system, and to carry out a further diagnosis of homes to identify possible ways of saving energy.

3.4. The inhabitants and the cost of energy

42% of respondents know the cost of the kWh they pay for on their invoices (vs. 50% on the island of Sein).

About 13% know the cost of producing 1 kWh on the island (vs 24% on the island of Sein).

One third of people know that production costs much more than the price actually paid by the inhabitants.



3.5. Participation of inhabitants in the energy transition

3.5.1. Participation in the energy transition

Participation in the energy transition of the island	YES	NO
NUMBER	24	7
%	77.4%	22.6%

77% of interviewees are ready to participate in the island's energy transition

(This figure is lower than on Sein: 87%).

Among those who do not want to participate, some have mentioned:

- that they are not always present on the island,

- that the current situation suits them
- that they prefer to wait for feedback about projects before taking a stand
- that they are too old to participate.

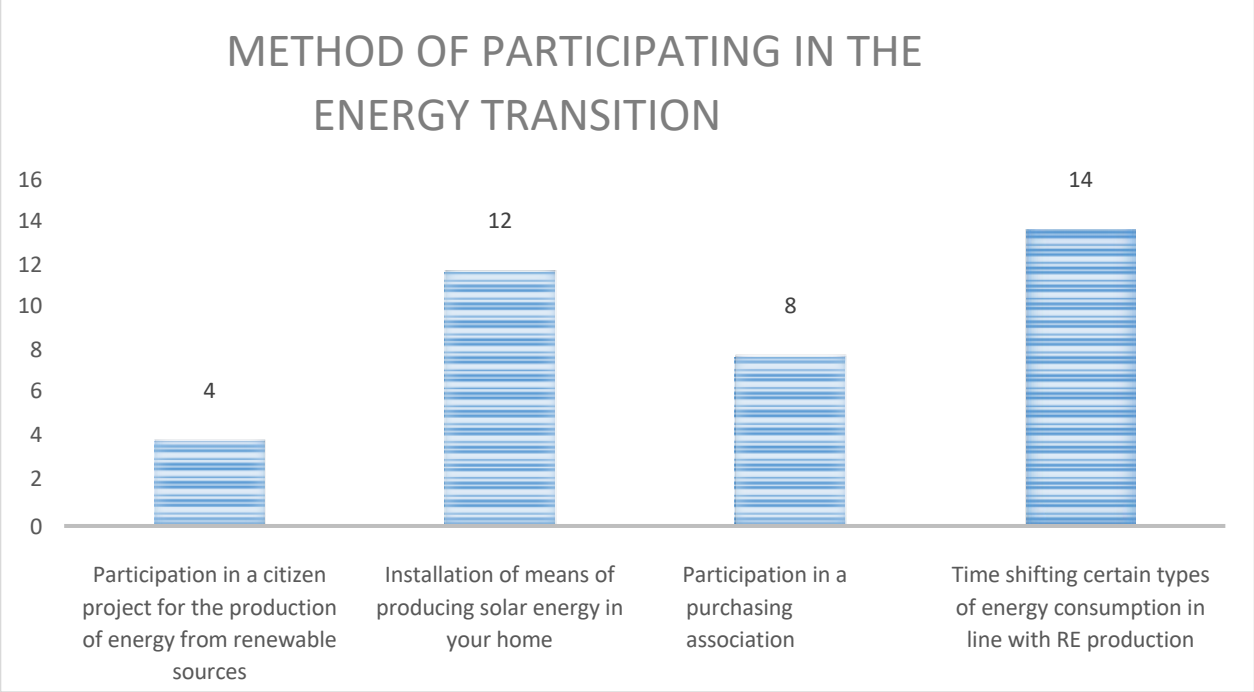
Sample responses:

"My schedule is random, I travel quite a lot, I am not available all the time. "

"I am too old to participate in the energy transition."

"No, I don't want to participate at the moment, I'm waiting for the projects to tried and tested! "

3.5.2. Method of participating in the energy transition



The majority of people interviewed who are prepared to participate in the energy transition agree about time shifting certain types of electricity consumption in line with renewable energy production. Some compare this approach to that adopted in an EJP (Peak Day Withdrawal) or Tempo contract.

Sample responses:

"Time-shift some consumption, yes, I'm ready to do that, I have an EJP contract on the mainland, it's a bit of a similar principle.

If you know in advance the best days or times for consumption, you can organize yourself! When we lived on the mainland, we had the EJP tariff so we made adjustments on "red" days. But it was very tiresome when we had several "red" days in a row!

"Time shifting consumption is about changing habits, it's a bit restrictive but we comply with it, it's about the future! "

"I am concerned about the environment and I would gladly participate in the experiments! "

Other people are not prepared to time shift some of their electricity consumption either because they feel that this approach is too restrictive, or because some daily practices are constricting in terms of times or because they work during the day so they aren't at home.

Sample responses:

"It's difficult for us to time shift our consumption because we run tourist accommodation and sheets have to be washed within a tight timeline. "

"I'm prepared to make an effort, but time shifting consumption seems complicated to me as I work every day. "

"I couldn't move some consumption times because I work every afternoon. "

12 people are interested in installing a solar thermal or photovoltaic system in their home. These people would like more information. Some of them are interested but do not know if an installation of this kind is technically possible in their home.
The significant costs of implementing this are also raised by the people we interviewed.

Sample responses:

"I would be interested in solar energy at home but I think it's expensive. "

"I am personally interested in solar thermal energy. "

"We are interested in a solar installation to feed a pump from a water tank that we have at home and also to recharge an electric bike. "

In contrast, only 4 people chose to take part in a citizen project.

Sample responses:

“I am interested in participating in a citizen’s project especially if its ultimate aim is to get rid of the power station…”

Yes I definitely want to participate unless our financial contribution is just a donation!

“No, I don't think it’s for Molène, as soon as you hit people in the wallet, it's complicated! “

Annex 1: Survey questionnaire

ENERGY TRANSITION QUESTIONNAIRE - MOLENE

CHARACTERISTICS OF YOUR HOME

1 - You live in:

- ❍ A detached house
- ❍ A semi-detached house
- ❍ A terraced house
- ❍ A flat (collective accommodation)

2 - What is the liveable area of your home?

- ❍ Under 50 m²
- ❍ Between 50 and 100 m²
- ❍ Over 200 m²
- ❍ Between 100 and 150 m²
- ❍ Between 150 and 200 m²

3 - Are you a(n):

- ❍ Owner
- ❍ Tenant
- ❍ Living rent free

4 - Date of construction of your home:

- ❍ Pre-1900
- ❍ 1975 - 1988
- ❍ 2007 - 2012
- ❍ 1900 - 1949
- ❍ 1989 - 1999
- ❍ After 2013
- ❍ 1950 - 1974
- ❍ 2000 - 2006
- ❍ Don't know

5 - Have you done any work in the last 15 years?

- ❍ Yes
- ❍ No work
- ❍ Not affected (tenant/living rent-free)

6 If yes, please describe:

	Less than 5 years ago	Between 5 and 10 years ago	Between 10 and 15 years ago
Insulation (wall and/or roof)	❍	❍	❍
Window frames (double or triple glazing)	❍	❍	❍
Heating systems	❍	❍	❍
Domestic hot water systems	❍	❍	❍
Heating related equipment (radiators, programming, thermostat, etc.)	❍	❍	❍
MVS	❍	❍	❍

YOUR EQUIPMENT

7 - What is the main equipment used to produce heat? (One answer only)

- ❍ Electric radiators
- ❍ Gas boiler
- ❍ Wood burner (Logs? Pellets?)
- ❍ Heat pump
- ❍ Open fire
- ❍ Heated floor
- ❍ Oil boiler
- ❍ Insert fireplace
- ❍ Other, please specify:

8 - How old is your main heat production equipment?

- ❍ Under 5 years old
- ❍ Between 5 and 10 years old
- ❍ Between 10 and 15 years old
- ❍ Over 15 years old

9 - do you have secondary equipment for generating heat in this home?

- ❍ Yes
- ❍ No

10 If yes, what is it?

- ❍ Electric radiators
- ❍ Insert fireplace
- ❍ Wood burner (Logs? Pellets?)
- ❍ Open fire
- ❍ Electric/gas/ethanol fire
- ❍ Other, please specify:

11 - Does your home have an MVS?

- ❍ No
- ❍ Yes, single flow MVS
- ❍ Yes, double flow MVS

12 - from the point of view of the comfort experienced in winter, you would say that:

- ❍ It's always very nice
- ❍ Sometimes it's not very cosy
- ❍ You aren't generally here in winter
- ❍ It's mostly nice
- ❍ Most of the time it's not very cosy

13 - What equipment is used to produce domestic hot water?

- ❍ Electric immersion heater
- ❍ Oil boiler and immersion heater
- ❍ Solar water heater
- ❍ Instant electric water heater
- ❍ Gas boiler
- ❍ Heat pump
- ❍ Oil boiler
- ❍ Gas boiler and immersion heater
- ❍ Other, please specify:

14 - If you have an immersion heater, indicate the volume:

15 - How old is your main equipment for producing hot water?

- ❍ Under 5 years old
- ❍ Between 10 and 15 years old
- ❍ Between 5 and 10 years old
- ❍ Over 15 years old

16 - Do you own the following equipment:

- ❍ One or more electric booster radiators
- ❍ A dehumidifier (how many?)
- ❍ A water cistern with an electric pump
- ❍ Oil stove
- ❍ A generator set
- ❍ One or more mobile air conditioning units (how many?)
- ❍ Other

17 - Your household appliances (indicate a number in the corresponding boxes):

	Under 5 years old	Between 5 and 10 years old	Between 10 and 15 years old
Single refrigerator	❍	❍	❍
Fridge-freezer	❍	❍	❍
American-style refrigerator	❍	❍	❍
Freezer	❍	❍	❍
Dishwasher	❍	❍	❍
Washing machine	❍	❍	❍
Tumble dryer	❍	❍	❍
Gas oven	❍	❍	❍
Electric oven	❍	❍	❍
Gas hob	❍	❍	❍
Electric hob	❍	❍	❍
Microwave oven	❍	❍	❍
Extractor hood	❍	❍	❍
Television	❍	❍	❍
HIFI chain	❍	❍	❍
Fixed computer	❍	❍	❍
Laptop	❍	❍	❍
Tablet	❍	❍	❍
Printer	❍	❍	❍
Land line	❍	❍	❍
Mobile phone	❍	❍	❍
Internet box	❍	❍	❍
DVD player	❍	❍	❍

18 - Does your energy bill currently seem:

❍ Maybe a bit high, you are satisfied	❍ Acceptable	❍ High but completely justified considering your lifestyle (comfortable temperature/number of appliances/number of people in the home…)
❍ You don't understand why your bill is so high		❍ High but you know that this is due to technical factors (poor insulation, energy-guzzling heating system, etc.)

QUESTIONS ON PERCEPTION AND ACCEPTABILITY

20 "On Molène, most of the electricity is generated by oil-fired generators. Does this method of production bother you?

❍ Yes ❍ No

Can you expand your response?

21 "Do you know how much it costs to produce 1 kWh on Molène?

❍ 5 ct€/kWh ❍ 15 ct€/kWh ❍ 25 ct€/kWh ❍ 40 ct€/kWh

22 - Do you know how much it costs to produce 1 kWh on Molène? (vs cost of production on the mainland: 5 ct€/kWh)

❍ 5 ct€/kWh ❍ 15 ct€/kWh ❍ 25 ct€/kWh ❍ 40 ct€/kWh

23 - What is your opinion with regard to the development of renewable energies on Molène?

In general

Solar (projects under way at the EDF power station and at the impluvium)

Tidal energy

Wind energy

Biomass

24 - Would you be willing to be involved in the energy transition of your island?

❍ Yes ❍ No

25 - If yes, in what ways? (several possible responses)

❍ Participation in a citizen project for the production of energy from renewable sources

❍ Installation of means of producing solar energy in your home

❍ Participation in a/some purchasing association(s)

❍ Time shifting certain types of energy consumption in line with RE production

ADDITIONAL INFORMATION:								
26	- Are you a(n):							
	❍ Permanent resident	❍	Secondary resident					
27	- If you are a permanent resident, how many people live in your household:							
28	- If you are a secondary resident, during the year your accommodation is occupied by yourself or your guests (family, friends, etc.):							
	❍ Fewer than 4 weeks per year	❍	From 4 weeks to under 8 weeks					
	❍ 8 to 12 weeks	❍	12 to 16 weeks					
	❍ 16 to 20 weeks	❍	20 to 24 weeks					
	❍ Over 6 months							
29	- Gender of respondent (representing the home)							
	❍ Woman	❍	Man					
30	- Your age:							
	❍ Under 30 years of age	❍	Between 30 and 60 years of age	❍	Over 60 years of age			
31	- Your situation:							
	❍ Student	❍	Retired					
	❍ Stay-at-home parent	❍	Working (employed or looking for a job)					
32	- Indicate your name and contact details:							