D.4.4

Preliminary analysis of the qualitative interviews with housing companies and tenants

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DOCUMENT HISTORY

Version	Date	Modified contents	Implemented by
1	30.10.2016	Full transcription of interviews, thematic analysis grid	Savills
2	February 2017	Redaction deliverable 70%	Savills
3	19.03.2017	Redaction deliverable 100%	Savills
4 & 5	31.03.2017	Quality review by Savills, SinCeO2 & final review by PFP	Savills
5	6th April 2017	Final reviews of ATER and Lands	Savills
6	02.05.2017.	Integration of all BOs reviews	Savills

Executive summary

In the current deliverable 4.4 we present the results of the qualitative interviews performed with 2 types of public:

- Building managers and employees from the 3 building owners involved in the DREEAM project who directly manage the pilot site where the DREEAM renovations will be performed;
- A selected group of tenants in the pilot site who will experience the DREEAM renovations process.

The results of these interviews are presented in this report for each Pilot site in different thematic:

- Socio-economical context of the pilot site & households structure;
- Energy & water billing system (for individual and collective consumption and the impact on energy poverty);
- Previous renovations and experiences of tenants with such energy projects/refurbishment/renovations;
- Origin of the choice of this specific pilot site for the DREEAM project and impact on the future replication strategy;
- Mapping of the life quality of tenants inside their dwellings and the pilot site area (thermal comfort, access to energy, fuel poverty situations, water consumption, renovations expected, collective feeling in the building with neighbors, relations with the building owner);
- Mapping of the level of equipment of tenants with electric & electronic devices in the domestic area (lightning, cooking, entertainment & washing devices).

The current deliverable 4.4 describes the work performed from 01.10.2015 to 31.03.2017 for the sociological evaluation by Savills in collaboration with a group of DREEAM partners involved in this task (SinCeO2, PFP, ATER, Lands, Chalmers).

The current report gives many inputs also for the development of a dedicated information platform for tenants that will be part of the DREEAM platform developed by Open Domo. This report will be integrated in the preparatory documents used in 2017 for the 2nd Users meetings organized with the 3 building owners (meetings expected mid-2017).

SUMMARY

1 Introduction: the link between sociological evaluation and the development of DREEAM platform

The present deliverable 4.4 must be read ideally before or directly together with the deliverable 4.5 "Requirements of the building owners and recommendations on the dashboard".

Indeed, in the DREEAM Project the tasks 4.2 and 4.4 are additional and linked:

Task 4.2 Social and behavioral evaluation of tenants and BOs

(M1 – M40)

Task leader: Savills.

Partners involved: PFP, Treviso, Lands, SP

Deliverables

4.2 Strategy and planning for the social and behavioral evaluation

4.4 Preliminary analysis of the qualitative interviews with housing companies and tenants (M13)

4.7 Final analysis on housing companies´ posture towards the energy efficiency renovations (M40)

4.8 Final analysis on the tenants' engagement and communications strategies (M40)

Task 4.4 DREEAM monitoring platform

(M10 – M46)

Task leader: SinCeo2.

Partners involved: Open Domo, B&W, PFP, Treviso, Lands, Savills

Deliverables

4.5 Requirements of the building owners and recommendations on the dashboard (M13)

4.6 Integration of the requirements; first version of the platform developed (M20)

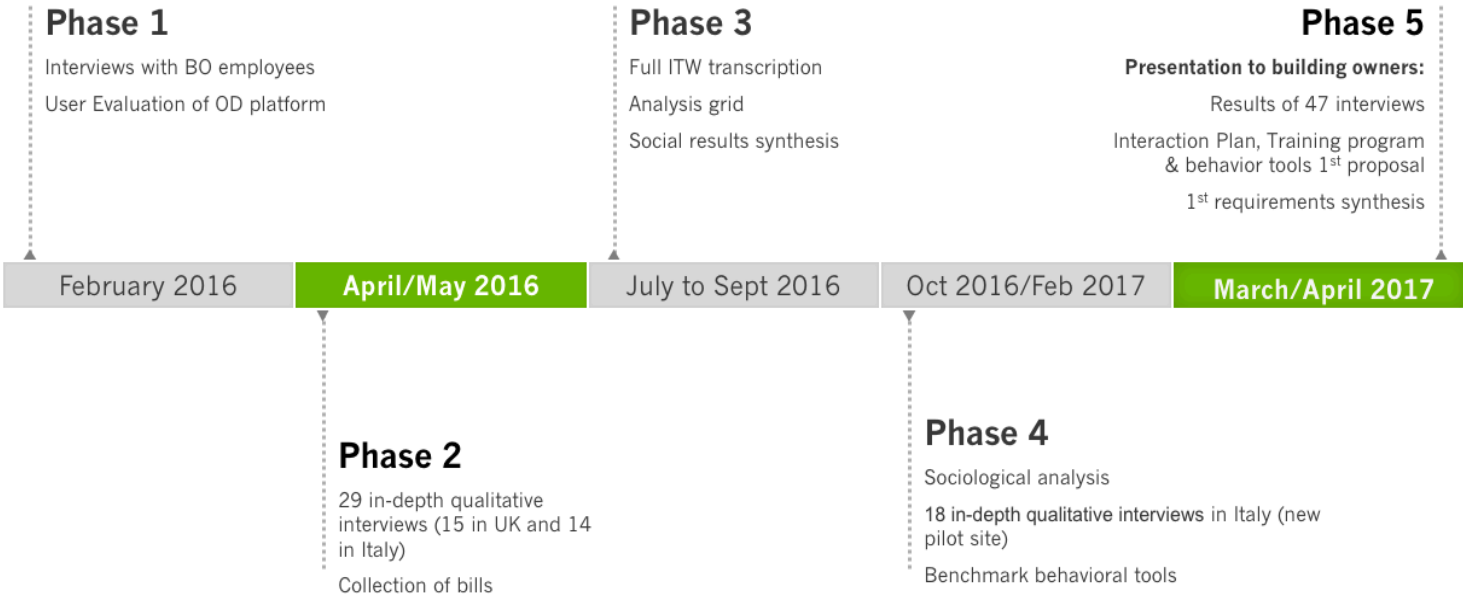
4.10 Validation of the platform with the building owners (M46)

2 METHODOLOGY

The sociological evaluation methodology of the interviews with tenants and building owners' employees is fully described in the dedicated deliverable 4.2.

The deliverable 4.2 introduces the methodology of qualitative interviews and sociological enquiries, and the present deliverable 4.4 presents the complete sociological analysis and the detailed outputs from the interviews organized in 2016 and 2017.

3 Timeline of sociological & User Experience evaluations during the Period 1



4 Partners involved in the deliverable 4.4

Key contributors:

- Savills (Work Package leader, Task leader and sociological expertise).

Other contributors:

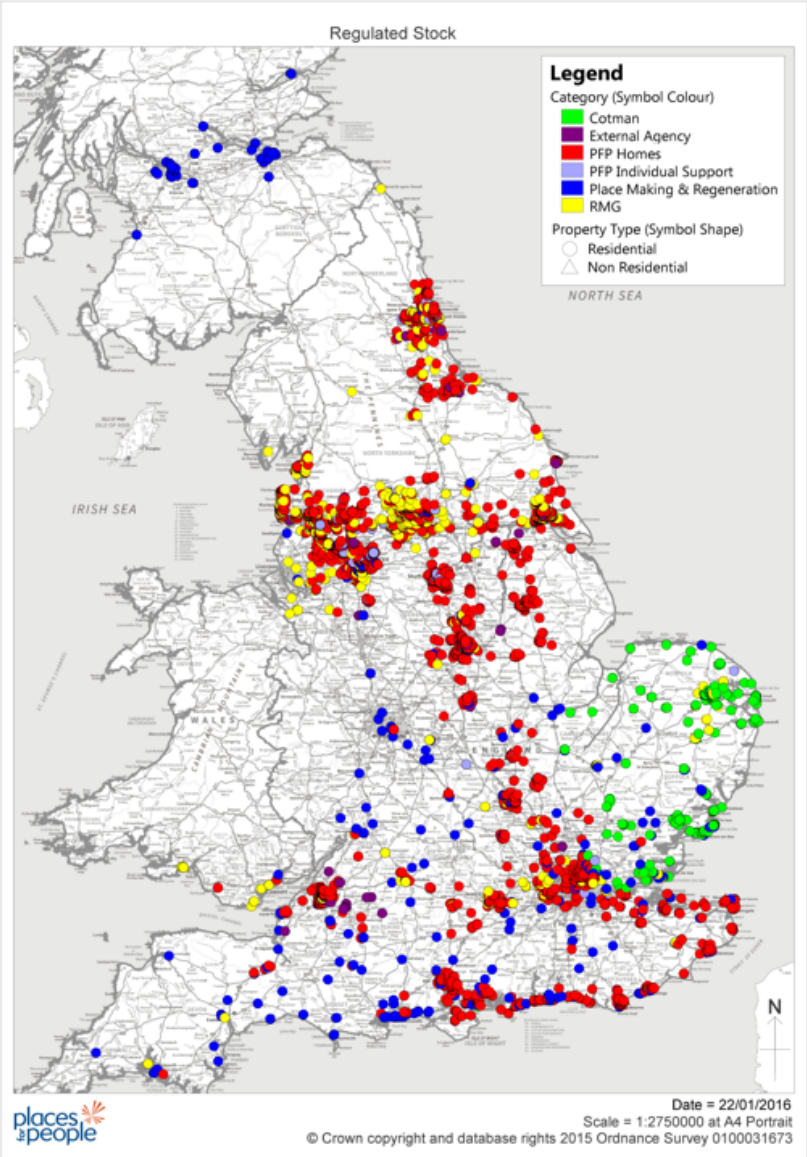
- PFP, Treviso, Lands (preparation of interviews schedule & participation of at least 1 employee during each interview);
- Chalmers (support of the coordination with building owners);
- SinCeO2 and Open Domo (preparation of interviews, definition of the interview guideline with tenants, deliverable review).

5 UK pilot site presentation

5.1 Presentation of Places for People[1]

5.1.1 One of the largest property and leisure management company in UK

Places for People is one of the UK's largest property and leisure management, development and regeneration companies in the UK. The Group operates across over 200 Local Authorities and provides housing across all tenures. PFP own or manage over 148,000 homes and a very diverse range of properties in an extensive geographical area stretching from Edinburgh to the South Coast of England - the properties are located in over 200 local authority areas. The distribution of the English Regulated stock and the PFP stock are outlined in the following map.



[1] *Ref: Key renovations schemes carried out in the past by Places for People, English regulated stock, Asset Investment strategy, January 2016 (PFP corporate document)*

5.1.2 PFP has an important program of investment in renovations

The integrated approach of PFP supports the provision of sustainable neighborhoods and sustainable tenancies and delivery of a quality customer experience.

- The Strategy is underpinned by a significant investment programme of circa £77m in 2015/16 and £73.2m in 2016/17 in relation to the English Regulated stock (£ 14 Million per annum is invested in capex that directly improve energy efficiency for the regulated portfolios only. This is part of circa £ 30 Million wider capex investment e.g. plant & equipment, kitchens, bathrooms etc.). This is approximately 45000 units in the social rented and affordable rented stock owned and or managed by Places for People Homes, Places for People Living and Cotman Housing Association;
- In addition to the investment through the responsive repairs, voids and compliance based activity, in 2015/16 over 4,000 properties will benefit from improvements via the Major Works programme and over 3,800 homes will benefit from the painting programme. Over 2500 windows and doors will be replaced and almost 2,000 kitchens and bathrooms. In addition, 30 schemes will see communal boiler replacements and 7 schemes will have a full lift replacement;
- In 2016/17 the asset investment strategy will see over 4,000 properties improved via the Major Works programme and over 3,000 homes benefitting from the painting programme. Also, significant investment will be made to improve the energy efficiency in our most challenging properties.

The key areas for compliance related to renovations programmes include, but are not limited to:
Gas Safety including annual gas servicing for domestic and communal properties**,** Electrical Testing**,** Fire Safety**,** Asbestos Management**,** Water Hygiene**,** Lifts**,** Automatic doors/gates**,** Working at height systems.
In addition to statutory testing requirements, relevant compliance work programmes incorporate preventative planned maintenance (PPM) and capital replacement to ensure that plant and equipment is in optimum condition. This includes fire alarm systems, lifts and water hygiene systems.

5.1.3 Decent Homes Standard in UK

In 2006, the Department for Communities and Local Government set out a minimum standard for social housing assets. The Decent Homes standard was to be achieved by December 2010.
The Group achieved the Decent Homes Standard ahead of the target date and has continued to maintain the standard since then. The investment strategy ensures that properties which may technically meet the Decent Homes Standard but are not in optimum condition are incorporated into investment programmes.

5.1.4 Investment programmes

The works packages have been designed to prioritise investment at PFP and are set out as follows:

External Enveloping

- Windows and External Doors
- Roofline Works
- External Walls
- Roofing
- Other external building components (e.g. Chimneys, Canopies & Meter Cupboards)

Energy Efficiency

- Electric Storage Heating Upgrades
- Fuel Switches from electric to gas where appropriate
- Boiler and Heating Upgrades to complement Modern Facilities works package
- Loft and Cavity Wall Insulation/External and Internal Wall Insulation
- Other sustainable solutions including Solar Panels and Air Source Heat Pumps, etc.

Modern Facilities

- Kitchen Replacements (including electrical upgrades)
- Bathrooms
- Other internal improvements such as communal/shared facilities

5.1.5 Social Value approach

PFP has developed a specific Social Value approach evaluation with the 4 following elements:

- *Meeting local need*: Our Major Works Social Value Group methodology ensures that social value delivery focuses on local need and is informed by the expectations of our respective neighborhoods and customers.
- *Maximizing value (and value for money):* Contractors provide interventions which add real value to existing Places for People thematic strategies: Young People; Financial Inclusion; Economic Development and Green Spaces, build on existing local partnerships or leverage synergy between our own group companies;
- *Innovation*: develop approaches which go beyond traditional Corporate Social Responsibility methodologies. Our recent make-over project at a Complex Needs scheme for single homeless men exemplified this. Over 40 Skilled tradespeople from our three Major Works contractors volunteered their time and skills and donated resources (including entire kitchens) and came together to renovate this residential unit over a week putting aside the fact they are competitors to work together for the benefit of vulnerable customers;
- *Performance led*: Ensure delivery of Social Value is measurable and performance managed and that our supply chain is supports the delivery of targets. Develop robust monitoring and evaluation frameworks, underpinned by **HACT's Social Return on Investment (SROI) model (HACT is the housing sectors ideas and innovation agency).**

5.1.6 Useful data for replication strategy in the DREEAM project

Following the completion of an initial stock condition survey in 2007, a rolling programme of validation surveys was commissioned. This now provides a 64% sample survey data set across our stock which compares favorably with the wider sector. This data set is continually updated via stock condition validation surveys, investment in void properties and delivery of responsive repairs. In 2014 a block survey programme was commissioned, with the objective of mapping all flats, maisonettes, bedsits and HMO's with their physical 'parent' building across the rented and leaseholder portfolios. **Additionally, this major surveying programme of over 3000 blocks incorporated full measured surveys of each block including:**

- External building component data including age, type, quantity and condition;
- Internal communal facilities including plant and equipment, shared facilities and compliance data;
- Measured building footprints and communal floor areas;
- Links between individual dwellings, sub-blocks (communal areas) and physical buildings.

As a result, the asset data sets have been significantly enhanced with accurate data that facilitates investment planning and compliance management. Additionally, the new physical asset data structure is being implemented across the **Group's business systems including P4C, Northgate and the Agresso finance system.**

5.1.7 Resources

In 2015 / 16 Places for People will invest circa £77m in relation to the English Regulated stock, with a further investment of £73.2m confirmed for 2016/17.

Our approach to asset investment is based upon a two-year confirmed programme alongside a broader 5-year planning cycle supported by a high level 30 years' investment profile which supports the internal landlords function to deliver longer term tenancy management approaches as well as facilitating effective customer communications.

Investment is reviewed annually and incorporates an analysis of the volume of responsive, communal and gas repairs undertaken over the previous three years. This enables the budgets to be calculated based upon known volumes. Over the last three years, repair demand has reduced by over 20% as we have reviewed the repairs that we are responsible for and where customers should take responsibility. The proactive approach undertaken as part of the Asset Investment Strategy aims to reduce the level of responsive repairs as the data analysis enables planned and programmed works to be undertaken. Over £30 Millions of Void and Responsive Repairs are undertaken on an annual basis. This will often include the replacement of building components. In addition, the Group continues to invest over £35 million in major capital works with the Asset Investment Strategy drives the link between capital investment, planned and cyclical works as well as responsive repairs. Effective procurement and external benchmarking enables the future programmes to continually achieve value for money.

The Group's 5 years Asset Investment Plan is based on the following resources:

2015/16	2016/17	2017/18	2018/19	2019/20
£77.6m	£73.2m	£73.2m	£74.7m	£76.2m

The reduced investment requirements for 2016 / 17 are achieved through assessment of the investment requirements as well as efficiencies identified via procurement and consultant / contactor delivery models. Future years investment reflects this approach and also has an uplift of 2% applied in line with the Group's 10-year investment planning approach.

6 Sociological evaluation - UK pilot site

6.1 Technical and social characteristics of the pilot site

Compared to the rest of PFP stocks, the Padiham DREEAM pilot site is representative in terms of:

- Site and dwellings size;
- In terms of households' diversity and family types.

6.1.1 Technical characteristics of the pilot dwellings

101 dwellings are part of the pilot site for the DREEAM project

The entire pilot site is structured as followed:

28	**End terraced house**	Of which	13 End-Terrace with 2 bedroom/s and 15 End-Terrace with 3 bedroom/s
17	**1st Floor flat**		32 Flat with 1 bedroom and 1 Flat with 2 bedrooms
16	**Ground floor flats**		
38	**Mid-terraced house**		30 Mid Terrace with 2 bedroom/s and 8 with Mid Terrace and 3 bedroom/s
1	**semi-detached housed**		1 semi-detached house with undetermined number of bedrooms.
1	**terraced house**		1 terraced house with undetermined number of bedrooms.

6.1.2 Technical characteristics of the 15 households interviewed

Number of households interviewed	**15**
Total number of tenants living in the households interviewed (adults and children included)	**31 tenants**
Number of adults aged from 24 years to 90 years old in our corpus of interviewed households	**22 tenants**
Number of youth or children from 0 to 24 years old in our corpus.	**9 children or young adults**

Household interviewed (anonymous code n°)	Status	Archetype	Number of bedrooms	Energy type
A	Done	1st floor Flat	1 bedroom	All electric
B	Done	1st floor flat	1 bedroom	All electric
C	Done	End Terraced House	2 bedrooms	All electric
D	Done	End Terraced House	2 bedrooms	All electric
E	Done	End Terraced House	2 bedrooms	All electric
F	Done	End Terraced House	2 bedrooms	All electric
G	Done	End Terraced House	3 Bedrooms	Electric + gas
H	Done	Ground Floor Flat	1 bedroom	All electric
I	Done	Ground floor flat	1 bedroom	Electric + gas
J	Done	Mid Terraced House	3 bedrooms	All electric
K	Done	Mid Terraced House	2 bedrooms	All electric
L	Done	Mid Terraced House	2 bedrooms	All electric
M	Done	Mid Terraced House	2 bedroom	All electric
N	Done	Mid Terraced House	2 bedroom	All electric
O	Done	Mid Terraced House	2 bedroom	All electric

6.1.3 Structure of the 9 households monitored

Archetype	Number of households monitored	Why we selected these households?
1st floor flat	1	1st floor flat with a cold air current under the 1st floor, a problem of humidity on/around the windows and a cold floor.
End-terraced house	3	3 different orientations and 2 different occupancy types 2 different energy supply types: electricity + electricity and gas
Ground floor flat	2	Similar size between the 2 dwellings and almost similar orientation but 2 different energy types: 1 dwelling with all electricity, 1 with electricity and gaz. This selection will allow to make efficient comparisons between these 2 properties before/after renovations, and thanks to a limited number of behavioural factors (1 or 2 tenants per dwelling only) we will be able to establish finely the links between equipment types, energy type, renovations and behaviours post-renovations
Mid-terraced house	3	3 different orientations and 2 sizes type (3 bedrooms + 2 bedrooms) and 1 of the household experience fuel poverty

6.1.4 Social structure of households in the pilot site

In the entire pilot site of Padiham Burnley, according to PFP employees the households' structures are quite various but tend to be more composed by:

- Single tenant with housing benefits claimants;
- Single parent families likely to be on housing benefits;
- A mix of working/ non-working families with 2 parents and children, which will likely to be on housing benefits (families either with both parents working or, one or none of the parents working);
- Single elderly (either on private or state pension. The flat may be adapted to tenants needs but without consistent special provision (no special Housing for older People aged of 55 years and more in Padiham).

6.1.5 Social structure of the 15 households selected for the interviews

The selection of the tenants interviewed has been based on the households' diversity of the entire pilot site described in preliminary interviews by PFP local manager, to build a good qualitative representativeness of this diversity. We have indeed structured our corpus of interviewed tenants to reflect faithfully the different key family archetypes and households size living in the Padiham pilot site[2].

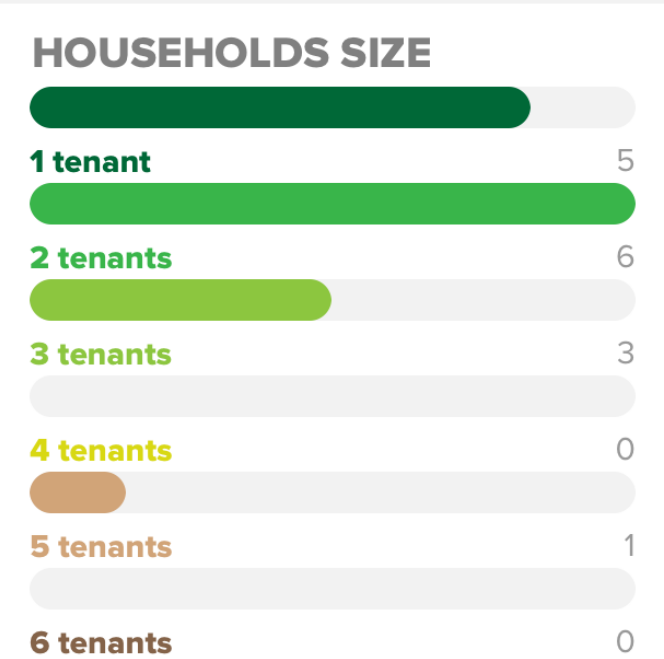
The households' types in our corpus:

- Singles without children including single elderly tenant: 5
- Couples without children (>45 years old or retired): 4
- Couples with 2 children or less: 2
- Couples with more than 2 children: 0
- Single parents with 2 children or less: 3
- Single with more than 2 children: 1

[2] For more explanation related to the "qualitative representativeness" – see our detailed methodology in the deliverable 4.2.

Our corpus of 15 households is composed by little size of households in most cases:

- 5 households are composed with 1 tenant
- 6 households with 2 tenants
- 3 households with 3 tenants
- 1 household with 5 tenants (1 single with 4 children)



6.1.6 Map of the 15 households interviewed and the 9 households monitored

In the beginning of 2016, SinCeO2 and SAVILLS based on a **qualitative representativeness approach**, have identified the key criteria and the archetypal types of dwellings and households that we should be able to interview and to monitor closely during all the duration of the project. Then SinCeO2 and SAVILLS have presented to PFP their synthesis of the dwellings' criteria and the 1st selection of tenants to interview and monitor based on a mix of social and technical criteria.

Then we have organized several exchanges with PFP at the beginning of 2016 to check the 1st selection of households proposed by Savills and SinCEO2, and to establish the final list of tenants in each group (interviewed group & monitored group). More specifically this step has allowed partners to check the evolution of the occupancy profiles in our selected corpus of households in the next years. **The evolution of dwellings' occupancy** is a key factor to track in the energy data collection BEFORE/AFTER the renovations, so we have tried to identify if some tenants were expected to move-out soon and the tenants who recently moved in. In our current selection: only 1 tenant has recently moved in, but this tenant was previously living in the pilot site and in the same block of dwellings. For the project, we should be able to collect the bills of this tenant in the new apartment for an entire year before any renovations (January 2016 to January 2017) and the bills from the tenant's former apartment in the previous 2 years (yearly statement) so we can integrate this tenant in our analysis BEFORE/AFTER renovations.

In our collaboration with PFP employees, we have then finalized at the beginning of 2016 the selection of the households to interview and the households to monitor:

- 15 households in total have been interviewed;
- 9 households have been selected to be monitored inside the group of the 15 households interviewed.

The objective of this selection is to have for a specific group of households both:

- **In-depth qualitative data** about their consumption patterns and their life quality (qualitative interviews);
- **Quantitative data** with bills collection to follow finely the evolution of their energy consumption during all the duration of the project and before/after renovation (monitoring equipment).

This specific group of 9 households should give us very valuable and detailed data to:

- measure the satisfaction of tenants with the DREEAM project;
- measure the evolution of their dwelling's energy consumption;
- establish the evolution of their own behaviors before/after the training program (a program dedicated to tenants, in order to learn them how to use their newly refurbished dwelling and the new equipment installed).

Figure 1: a part of the Padiham pilot site in UK

6.2 Process of interviews with tenants and PFP employees in 2016

6.2.1 Schedule of interviews organized with tenants in UK pilot site

15 households were interviewed in May 2016 inside their homes in Padiham during 3 days

⇒ Method: qualitative semi-structured interviews with tenants inside their home, with a detailed guideline of questions prepared prior to interviews by a sociologist

⇒ Duration: 1 hour per household

⇒ *Reference: the full interview guideline is presented in the deliverable 4.2*

These interviews have been very efficiently prepared and managed by PFP team with tenants

- Before the start of each interview, a PFP employee explained again to the tenants the goal of the DREEAM project and the objective of the sociological interviews, as well as their rights related to the personal data that we collect during interviews;
- Tenants were given the possibility to refuse of course and to ask any questions to the PFP employee and the sociologist before the start of the interview;
- Then each interview lasted 1 hour and has been performed inside the apartment of the tenants, allowing to question tenants on their domestic uses *in situ* with direct demonstrations of their interactions with equipment such as radiators, thermostats, electric shower. The interviews were performed in presence of the sociologist of Savills and one PFP employee;
- At the end of each interview, tenants were given a consent letter and the possibility to ask questions again about the interview, and the consent form that there were asked to sign.
- *Reference: the detailed consent form used in UK is presented in the deliverable 4.2 (part: tenants personal data protection)*

6.2.2 Schedule of interviews & meetings organized with PFP team

After the interviews with tenants, 2 meetings have been directly organized in the next days in May 2016 between Savills and PFP employees at PFP offices:

- 1 meeting has been organized at PFP office directly after the end of the 15 interviews with tenants, in order that the sociologist exchanges with the local manager and the coordinator of the DREEAM project at PFP. The goal of this meeting was to interact on the key feedbacks given by tenants and on the additional information needed for the sociological analysis (partners present: Savills and PFP)
- 1 meeting has been organized between Savills, the project coordinator at PFP, the local manager and a Department Manager at PFP. This meeting has allowed to present the sociological diagnostic approach developed in the DREEAM project, the WP4 achievements and objectives.

Then in July 2016, Savills lead a qualitative semi-structured interview organized with the local tenant manager of PFP in the Padiham Pilot site. This meeting allowed to exchange with her on some specific results obtained during the interviews with tenants, and to collect additional inputs from her experience on the following topic:

- The ideas for the Training Program with tenants during the DREEAM project, and the relevance of communication tools proposed by tenants during interviews;
- The key positive or negative feedbacks expressed by tenants about their quality of life in the dwellings these last years and the improvements expected by tenants from the point of view of the local manager;
- The habits of energy consumption management by tenants, the specific top-up system in UK (pre-paid electricity & gas meters) and the impact on how PFP manage its tenants.

6.3 The experience of PFP with previous renovation programs in Padiham pilot site[3]

6.3.1 A renovation approach "site by site"

According to its employees, PFP has developed a lot of renovation works a few years ago to bring properties up to Decent Homes standard. The key focus of the renovations was the work on roofs and various elements but it didn't cover yet the heating. After the general renovations performed several years ago to align the properties on the Decent Homes standard, PFP has adopted a macro-approach « site by site» and « element by element » to plan renovations. More recently PFP invested in experimental renewable energies with a few energy renovation schemes that included photovoltaic and air heat pumps at some sites, but these schemes have not been successful.

Synthetically there is no holistic/general renovation programs at PFP:

⇒ In general, the renovation works planned by PFP are not part of a big regeneration project;
⇒ PFP focus the actions mainly on the replacement of specific elements instead of launching big renovations schemes, for example to change the old boilers such as gas boilers when this equipment is scheduled to be replaced.

[3] Ref: interviews with PFP employees in February 2016 (the information presented in the following parts are originated from the interviews organized with the employees of PFP and the tenants selected in the pilot site).

6.3.2 PFP has already experienced 2 renovations scheme cancellations in the pilot site of Padiham

The cancellation of solar panels installation in 2015

PFP had planned to install Solar PV in December 2015 in the Padiham pilot site. The PV scheme was run by a contractor that rented the roofs (the solar panels were supposed to be installed on the tenants' roofs), but unfortunately when the tariffs were cut in UK (the feed in Tariff has dropped), the entire cost-benefit model forecasted for the PV was no longer viable, so the contractor made no further installations.

"Renovations works at the pilot site have been planned for a few years: tenants had two bad experiences in the last few years where renovation projects that PFP promised did not go ahead (…) In Autumn, last year the tenants were promised PV panels (half of the dwellings at the site would have benefited from this), the roofs were to be rented to a contractor who would install the PV. On the day when the installation works were scheduled the feed-in tariff funding from government was pulled and works did not commence, there were also some issues around tenant consent to install the PV" (PFP employee-2016)

The cancellation of gas installation planned in 2014 due to financial and social factors

The renovations have been cancelled in 2014 for 2 reasons, financial and social:

- First the original funding was finally no longer available
- Secondly some tenants complained about the installation of gas in the properties.

« Two and a half years ago, PFP carried out initial consultations with tenants to install gas central heating (because it was identified as an area of high fuel poverty). This included questionnaires to tenants (by mail and door knocking) to get evidence of fuel poverty and receipt of benefits. Tenants were generally welcoming the proposed works apart from a few cases, some tenant didn't want second bill or had just decorated, and they were asking for compensation for damages caused by works. Gas heating is standard in the UK, this is the technology tenants expect to be installed. Gas central heating did not get implemented because funding was not available, tenants' expectations were raised and then let down » (PFP employee – 2016).

6.3.3 Social acceptance of gas installation during renovations: an issue for some tenants

The social problem of gas acceptance remains today in the pilot site and the interviews organized in February 2016 allowed PFP and the sociologist to question and list the 3 key complaints of tenants related to the gas.

1. **Gas equals double bills with a risk of increased energy budget & uncertainty**
   If gas is installed, tenants will have 2 meters and 2 types of bills. Most of the tenants interviewed have a pre-payment meter for electricity consumption that is already complicated to use, and the installation of a gas distribution in addition to electricity means more complications. Several tenants were also worried that the total electricity and gas consumption would exceed their current « all electricity » budget as they have no experience of gas and double budget management.

   This representation is not linked to the real experience of tenants who have really adopted gas, these tenants in general have experienced a decrease in their energy costs. But an important part of tenants living in Padiham has a low level of income and very little margin of economic uncertainty, which induces a fear and rejection to any new/uncontrollable variable.

   "In other pilot sites, the question of gas security is not an issue. Obviously different people would have different views on it but it's very normal to have gas central heating supply in a property. Some people in Padiham are struggling to pay bills for electricity, so they think they are going to get another bill for the gas, is it going to be two amounts of money, and they already spend a lot, they don't know how much it will cost them and it's possible that it will cost them more" (Local manager Padiham – 2016)

   TRAINING PROGRAM POST-RENOVATIONS: In this context, we advise PFP to produce budget forecast integrating the precise energy tariff of tenants before the installation of new equipment, to lower the worries of tenants related to the unknown equipment and impact on their budget.

2. **Gas is considered as dangerous by some tenants.**
   Especially the tenants with children are worried of the risk to be intoxicated by a gas boiler leak, or that children would touch buttons and create uncontrolled dispersion of gas with the cooking plaques: "Electricity doesn't kill you in your sleep".

   TRAINING PROGRAM POST-RENOVATIONS: we should explain the difference between the installation of gas boiler and domestic gas for the cooking, as these 2 types of equipment are often mixed in the mind of tenants and don't present the same risk.

3. **The installation of gas boiler would have an impact on the decoration of the dwelling**
   This complaint has been observed also with 2 tenants about the future renovations that will be carried out in the DREEAM project. 1 tenant declared that he will probably oppose to it if there

are important changes to make in his apartment for the decoration after the renovations. A 2nd tenant prefers if there are few changes linked to the renovations (elderly tenant).

6.4 Building "sustainable communities": a key objective for PFP

In general, there is an important diversity of family structures and socio-economic situations in Padiham that is well representative of the mix of households elaborated on purpose by PFP in its other sites. This mix of households is built on purpose by PFP to develop what they call "sustainable communities".

"PFP always tries to build a good mix of tenants in our estates, we have people working, people with families, people without work, people trying to get into work. It's a good mix of tenants in Padiham" (Local manager Padiham – 2016)

Sustainability is considered here in a wider definition and not only the ecological sustainability. The sustainable management of housings requires taking into consideration 3 key factors: social, economic and technical. The experience of building owners is evidenced in their ability to build sustainable communities that considers and mix favorably the local economic disparities between residents, the cultural differences, the breakdown of residents by age and family structure.

Only the field experience of social housings can answer to this difficult question: how to build and define a sustainable community?

The local manager of Padiham has tried to give us a definition of sustainable communities for her organization: "Generally in short, we try to create sustainable tenancies and sustainable communities so the whole package of how to sustain a tenancy, so to make sure you've got the right people living in right property, in the right area, that you've got the right mix of people, make sure that we look at the properties, that they are maintained, why people are leaving because of any problem with the estate, the cleanliness of the estate, the maintenance of the communal area. The whole package is looked at, then you've got customers who are happy to stay, we are looking after what we should do for this, that they feel settled to live in that property and that area, and to create a home for them. That's generally a sustainable community and sustainable tenancies, that's what we are trying to do" (Local Manager Padiham – 2016)

Synthetically, the key macro factors that indicate that a community is sustainable for PFP are:

- Limited number of complaints related to the quality of housing and life in the residential area (cleanliness, maintenance of collective areas);
- Mixing of socio-economic and family categories in order to guarantee that the residential area is socially heterogeneous and to limit any form of segregation;
- Ability of tenants to pay their rents and bills over the long term, which implies that the energy efficiency of dwellings and appliances allow the inhabitants to warm decently within the limits of their budget;
- Low crime rate and a general feeling of security for the inhabitants;

- Low turnover rate directly linked to the factors cited above (housing, energy expenditure, appropriate mix of tenants, security) and satisfaction of the inhabitants.

6.5 A pilot site with a segregated reputation

In the Padiham sector, PFP is developing special attention to the dimensions linked to social mix and economic sustainability. The various PFP employees we met stressed the importance of composing an important mix within the residential area of Padiham to avoid any social, economic or symbolic segregation.

Today Padiham pilot site is not yet a fully sustainable community, with a higher number of tenants with low income receiving benefits compared to the rest of PFP stocks, as the pilot site has a higher proportion of benefit recipients than the wider area.

Though there is a mix of working and unemployed tenants with about 64% Housing Benefit recipients who have little salaries or no work according to the Local Manager. Despite the efforts of PFP, Padiham pilot site remains a residential area somehow stigmatized in the minds of the other inhabitants of the region, due mainly to past Anti-Social Behaviors that are now mostly resolved. The social stigma though keeps on staying alive in the memories of citizens living in the region, and this has a strong impact on the attractiveness of the dwellings available for rent in Padiham Burnley.

"Padiham as a whole has a bit of a reputation and this particular site does, there has been quite antisocial behaviors in the past, and sometimes people never forget this and there is this reputation that never seems to go away, and we struggle to rent properties again. There is a stigma attached to White Gate Close but people also have positive links to it because of family connections. There are issues with unreported Anti-Social Behaviour (ASB) because of a high tolerance of ASB on the estate, mainly youth nuisance. No major ASB but a lot of this goes unreported, it is tolerated and accepted. Customer engagement is low, tenants do not like to report their neighbours, they don't want to create trouble for their neighbours, it is a closed knit community. Reporting incidents to PFP is kept confidential, PFP finds out about ASB issues when tenants move out and mention it » (Local manager Padiham- 2016).

In terms of social risks associated to the DREEAM project, PFP employees warned that there is a risk that equipment might be stolen.

«There is a possibility that a small proportion of people (mostly youths) could steal the equipment. This is only a small proportion on the site that cause issues, tenants do have previous landlord references and some have police/background checks as PFP not knowingly let the properties to people who will cause a nuisance » (Local manager Padiham- 2016).

The pilot site of Padiham is not attractive for tenants who are not originally from Padiham area

The properties are let through the Choice Based Lettings. Usually PFP get a good number of bids for the properties but mostly from people with high needs backgrounds and high risk groups. There is a small pool of applicants for Padiham that is quite insular with new tenants predominantly from

Padiham. There is limited competition in the area, some tenants have to accept the properties because of their needs. The most difficult properties to rent are the 1 bed flats (there are some flats for elderly person, these are relatively easy to let). Overall, there is just enough demand to fill vacant units.

6.5.1 A higher turn-over of dwelling occupancy mostly due to the low energy efficiency

The pilot site is not representative of the rest of the PFP stock as the percentage of turn-over is higher and reaches 17,65%. The high turnover is directly linked to the low energy efficiency of the heating equipment (storage heaters). The impact of this low efficiency is particularly important on the most economically vulnerable tenants of the pilot site, who have a very limited budget available for energy expenditures. A small proportion of tenants have lived there for many years, new tenants are more likely to move out quickly due to high energy bills.

"We do experience quite a high turnover in Padiham for a number of different reasons. Sometimes because of the storage heater, customers are moving out as they can't afford it and they don't like the system and the property is not warm, others leave because they are not happy with the area, there are people who moved out quite regularly (…) Some people refuse the properties because it's all electric and because of the storage heaters and because they don't know how to use it. There are various reasons why people move out and why we struggle to re-let the properties" (Local manager Padiham- 2016).

The selection of Padiham is due to the high-energy bills and the low energy efficiency of equipment

The site is the 2nd or 3rd worst energy performer across the PFP portfolio (based on stock survey), and PFP has difficulties to re-let because the heating bills are very high. The properties are on a hill, very exposed to the wind and with limited insulation, the houses are in general cold. The decision to invest in Padiham pilot site has been made from an investment aspect and by taking into account the opinion of the neighbourhood. This neighbourhood clearly needed investment.

6.6 Thermal comfort: tenants have opposite perceptions

The interviews with tenants allowed to confirm the statement of PFP about the poor insulation of the dwellings and the high cost of the heating for the tenants. Though, we would like to add a nuance about the representation of the thermal comfort by the corpus of tenants interviewed, as the **results are polarized between 7 households who have a positive perception of the thermal comfort inside their dwellings, opposed to 8 households with a negative perception**. The situation of the dwellings in the pilot site, their exposition to the winds and the quality of the insulation seem to be the 3 key factors explaining this difference.

6.6.1 The positive perceptions of thermal comfort in Padiham dwellings

⇒ **7 households on 15 consider that their apartment is not cold and is comfortable.** These households are n° A, B, C, H, I, M, O

The inside temperature is good for these tenants and they have no complaints related to this topic. For this group of tenants, the toilets and bathroom can remain cold sometimes but it doesn't decrease their general feeling of thermal comfort (especially for n°C).

⇒ **3 households on these 7 households are satisfied with the thermal comfort and by the renovations done previously by PFP.** These households are the n° M, O, C

6.6.2 The negative perceptions of thermal comfort in Padiham dwellings

⇒ **8 households on 15 consider that their apartment is cold to very cold and even freezing** in the following rooms: living-room, bedrooms, bathroom, toilet, hallway, the 2 little spaces/rooms on the ground floor and rarely in the kitchen due to cold air drafts.

⇒ These households are n° D, F, G, J, K, E, L, N and in these 8 households, 7 households have an additional heating equipment.

In our corpus: there is clear opposition between the 7 households experiencing good thermal comfort and 8 households suffering from the cold in their dwellings.

J: "In winter it's freezing"

K: "The kitchen is cold because of an important draft under the 2 doors in the entrance and in the kitchen"

L: "It's very cold (in the kitchen and in the bathroom) because it's on the north side"

H: "It's comfortable"

B: "It's not cold"

I: "It's warm in the apartment"

6.6.3 The specific issue of low efficient storage heaters on thermal comfort and fuel poverty

The key complaints received by PFP from the pilot site tenants are linked to the storage heaters, the air leaks and the humidity feeling inside the dwellings, but the complaint that directly leads to a high turn-over of tenants is related to the inefficient heating system and the impact on the budget of tenants to heat decently their dwellings. Storage heaters only equip 2 sites managed by PFP in Clitheroe and Padiham and in these two sites, tenants have difficulties to maintain a thermal comfort without spending an excessive amount of money, and this situation as created complaints from tenants in both sites.

"We do have another site in Clitheroe, which is a really nice rural area and we have some blocks there for old people and they have storage heaters those customers complain about, our technical teams are looking at this at the moment. It's not new that we are getting complaints about these heating systems, people don't like them (…) It's going to be over 30 degrees today but tomorrow it's going to rain, it's very unpredictable in the UK" (Local manager – 2016)

How do storage heaters work?

- Tenants must anticipate 1 day in advance the weather to settle the level of heat to store in the bricks, the heat is then stored during the night (Economy 7 / low energy tariff). The heat is then released during the day depending of the setting chosen by tenants on the buttons related to the vents (mechanical vents stopping or releasing the heat).
- The control of the heating is indirect and the power and vent scale buttons are not very fine/precise.

Storage heaters are not adapted to the everyday life uses of tenants and even less to a country like UK with very unpredictable weather.

The weather in UK is very unpredictable, so tenants experience many days where they have stored heat in the bricks for nothing, or at the contrary the weather is worst and tenants haven't stored heat and the dwelling remains cold the day after as no heat has been stored in the bricks and can be released with the vent buttons. The consequence is a loss of thermal comfort very often during the year, and energy and money loss with excessive consumption compared to the real needs due to a wrong weather anticipation. Storage heaters involve extra cost for tenants compared to other types of radiators.

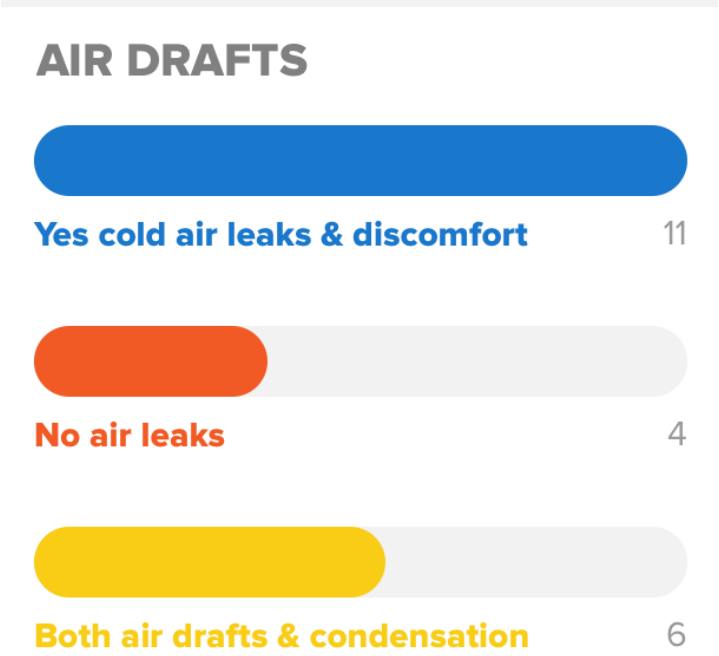
"The storage heaters don't work very well, some storage heaters don't give enough heat (…) we do make a damp inspection and we repair the storage heaters to make sure it's working properly when we have complaints from tenants (…). Some rooms are colder than other rooms, generally when the repairmen come for the storage heaters, they have discussions with tenants to explain that they are old and some parts are obsolete. In the past few years, the major issue was the storage heaters" (Local manager – 2016).

6.6.4 The impact of poor insulation and the air drafts on thermal comfort

We have studied during the interviews the representations of tenants related to the thermal comfort, and we can establish that the extra consumption of heating is also linked to the low energy performance of the dwellings, and the presence of important air drafts/air leaks through several rooms, despite that loft insulation, cavity wall and double glazing in most properties were done a few years ago.

A majority of the tenants we have interviewed experience important air leaks and heat loss in their dwellings. For a majority of tenants who answered yes, the air drafts are localized between the 2 entrance doors and around the windows.

- Several tenants have put tap/scotch on the windows ventilation to limit the air drafts.4 households have no air drafts: G,I,H,M
- 11 households have air drafts: A,B,C,D,E,F,J,K,L,N,O, and this affect considerably their thermal comfort, as described below.
- Amongst these 11 households, 6 households have <u>both</u> air draft and condensation: A,J,K,L,N,O



A: “Air drafts in winter. I have put white plastic around the frame to avoid the air draft. There are seal breaks on the windows, there is condensation inside the windows. Entrance doors have a gap under with lots of air draft. Either way it's a wind tunnel".

B: “Drafts on all windows. In bedrooms there are drafts, in my bedroom curtains are blowing when there is wind. In the living-room, the draft is not so much terrible that I feel uncomfortable in my sofa with the window behind. Walls are insulated, I'm not feeling cold".

C: “The ceiling is very windy, there are 2 air drafts from the ceiling trap. PFP has put black seals 2 weeks ago and it's a bit better, but windows are too old. Drafts under the entrance door”.

D: “Kitchen is a bit cold with the gap under the door entrance and the ventilation. I put a towel on the kitchen ventilation to stop the air. There is a big door gap with air under the entrance doors. Windows are sealed properly but on the entry side (north face), the walls are cold”.

E: “Air leaks on the windows”.

F: “There are drafts in the kitchen and a big air current between the kitchen and the entrance. The ventilation system in the kitchen doesn't shut so I closed it with a knife, we stopped it completely”.

J: “There are drafts all around the windows and more on the north side. When there is wind, it's an air tunnel, you have strong air current, and if you open the windows, they will bang and move”.

K: “Draft between the entrance doors (gap) in the kitchen and in the entrance”.

L: “There is air draft underneath the doors in the kitchen and in the entrance. There are drafts everywhere on every window”.

O: “On the top of each window there is a gap, an old system of air ventilation that creates an important cold air current”.

N: “Air drafts in kitchen, and when it's windy in the adult bedroom (facing north)”.

6.6.5 The impact of humidity on thermal comfort

Our corpus is divided between 2 opposed body perception:

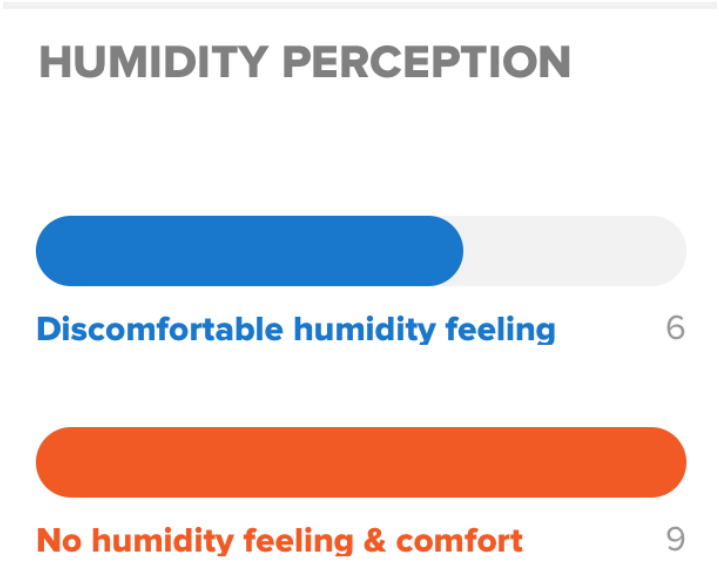
- There is a real humidity feeling in 6 households
  ⇒ These households are n° B,C,D,J,M,N

- There is no humidity feeling for 9 households
  ⇒ These households are n°A,E,F,G,H,L,K,N,0

D: “Bedrooms are humid and creating a feeling of coldness”

J: “There is a general sensation of humidity in the apartment. I dry my clothes in the hallway instead of using a dryer. I let the humidity extractor in the bathroom and the kitchen open all the time but it feels cold. There is problem of humidity with the extractor in the bathroom when it's raining. Water was coming inside the bathroom and dripping, pouring down water on the toilets".

M: “There is condensation on the bedroom window, on the living-room windows. No condensation though in the kitchen. There is a lot of condensation and with the humidity, the air feels like there is a lot of dust”.



6.6.6 The impact of damp on life comfort

Before listing the different representations of tenants related to damp and condensation, it's necessary to explain that there is a potential bias in perception about these 2 phenomena according to the local manager, and that tenants tend to mix/confound them:

"We have a document that we generally issue about the difference between damp and condensation because we have a lot of customers who don't understand the difference between those two things, they will sometimes think that it's damp when it's condensation because they don't ventilate the property appropriately" (Local Manager - 2016).

Knowing this potential representation bias, we have listed below the presence of damp and condensation according to tenants' representations only:

- 8 households in our corpus have no presence of damp according to tenants:
  ⇒ These households are n° A, C, D, E, H, I, K, O

- There is a presence of damp according to tenants in 7 dwellings n° B, F, G, J, L, M, N
  ⇒ The tenants commonly describe the presence of black spots and damp mostly in the bathroom, and on the wall angles around specific windows;
  ⇒ The presence of damp and worst of mould is often directly linked to a misuse of ventilation except for the tenant n° F who declares that she ventilates regularly. The problem of damp is for example in household n°J directly linked to a **"poaching action"** (De Certeau, 1990) on the ventilation system meaning that they don't use the ventilation system accordingly to its original function/optimal scenario (**tenants "resist" and refuse to use the ventilation system in its more energy efficient way for various reasons like comfort, avoiding air leaks/air velocity feeling, lack of information, etc.**). These misbehaviours are recognized by tenants themselves - there would probably be no damp or mould without this type of actions but they continue to have the same behaviour.
  ⇒ There is a particular problem of mould in the households n° L and F.

B: "On the bathroom ceiling, I open the door and the windows after the shower".

F: "Yes in the bathroom (black mould), living-room (on the windows), and on the wall under the living-room window. In the bathroom, in the 2 bedrooms, in the toilet a bit too, in the kitchen, you have mould around the windows".

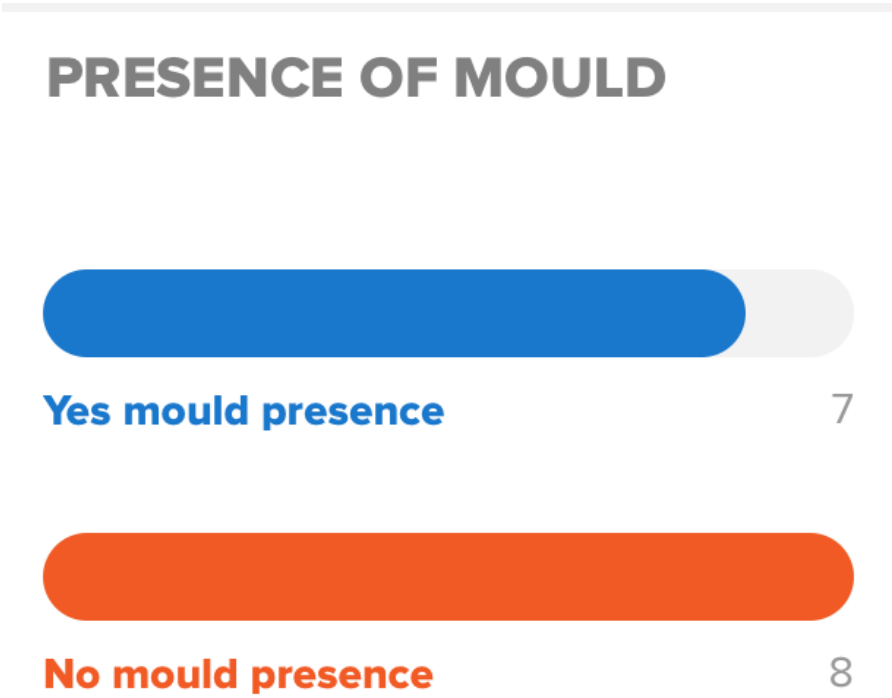
J: "Yes, black spots in the bathroom, at the angle with the hallway. In the bedroom, it was blowing cold air, so I put tape on the vent/aeration and after some black spots appeared, but in the living-room where there is no tape, there are no black spots so there is no problem of damp".

G: "There is a lot of damp in this house".

L: “Yes in the living room, I painted on the mould, there was damp before on all the window side in the living-room. But there is no mold in the kitchen, despite that the ventilation is not working, the ventilation bloc is closed by default, it doesn't work. There is mold on the angles around the windows in the bedroom (1st floor)”.

M: “Yes, in the living-room around the 2 windows”.

N: “Yes, condensation and mold on the kitchen window, only in the kitchen. Here specifically there is inside condensation. The ventilation doesn't work in the kitchen”.



6.6.7 Impact of condensation on life comfort

- There is a presence of condensation especially around or inside the windows for 8 households
  ⇒ N° A,G,N,J,K,L,M,O

G: “It's just condensation on the windows, before we had mould, even mushrooms in the living-room but it's been fixed now after that the kitchen has been refurbished. There is condensation on each window every morning, but we don’t open the windows or we lose the heat. We turn the fan on when we take a shower in the evening (the ventilation installed by PFP). The fan is noisy”.

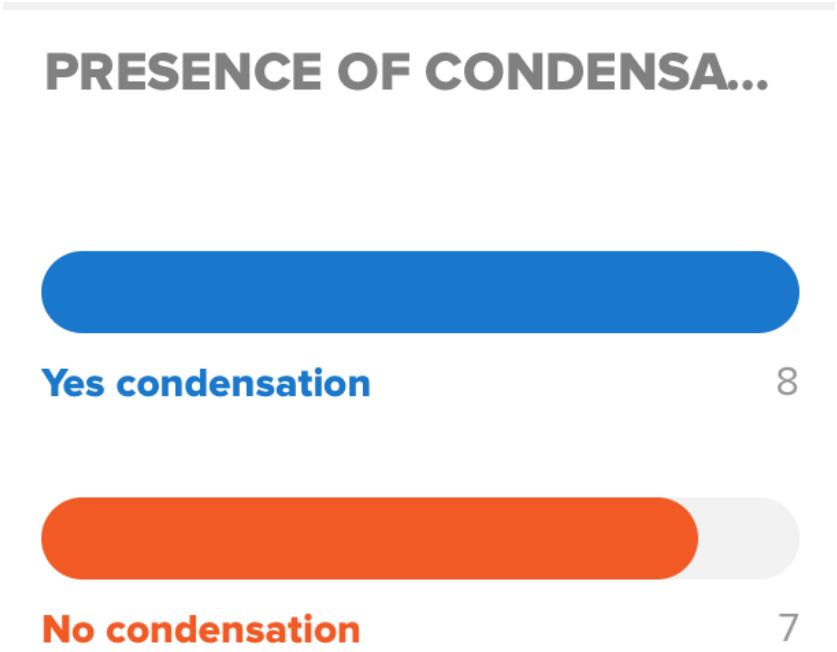
J: “Yes, there is condensation on 1 window on the north side, and condensation and humidity around the ventilation in the kitchen”.

K: Yes, there is condensation on kitchen window and living-room window's bottom. The window has been changed in the living-room and there is no more problem of humidity or mould. No ventilation block in the kitchen so they open a bit the window all day long”.

L: “There is condensation on the windows in the bedrooms”.

M: “Condensation and mould on the kitchen window, only in the kitchen. Here specifically there is inside condensation. The ventilation doesn't work in the kitchen”.

O: “There is condensation between the 2 glasses of the windows”.



6.6.8 Ventilation habits and impact on humidity in the dwellings

- There are 9 households that open their windows to ventilate every day and 3 households don't ventilate each day (3 are unknown)

The tenants who don't ventilate explain that they don't want to lose the heat, and because they don't necessarily feel the need to ventilate in the more occupied rooms such as the bedrooms or the living-room.

C: "The tenant avoids opening the windows to not lose the heat".

J: "I let the living-room and bedroom windows closed all the time".

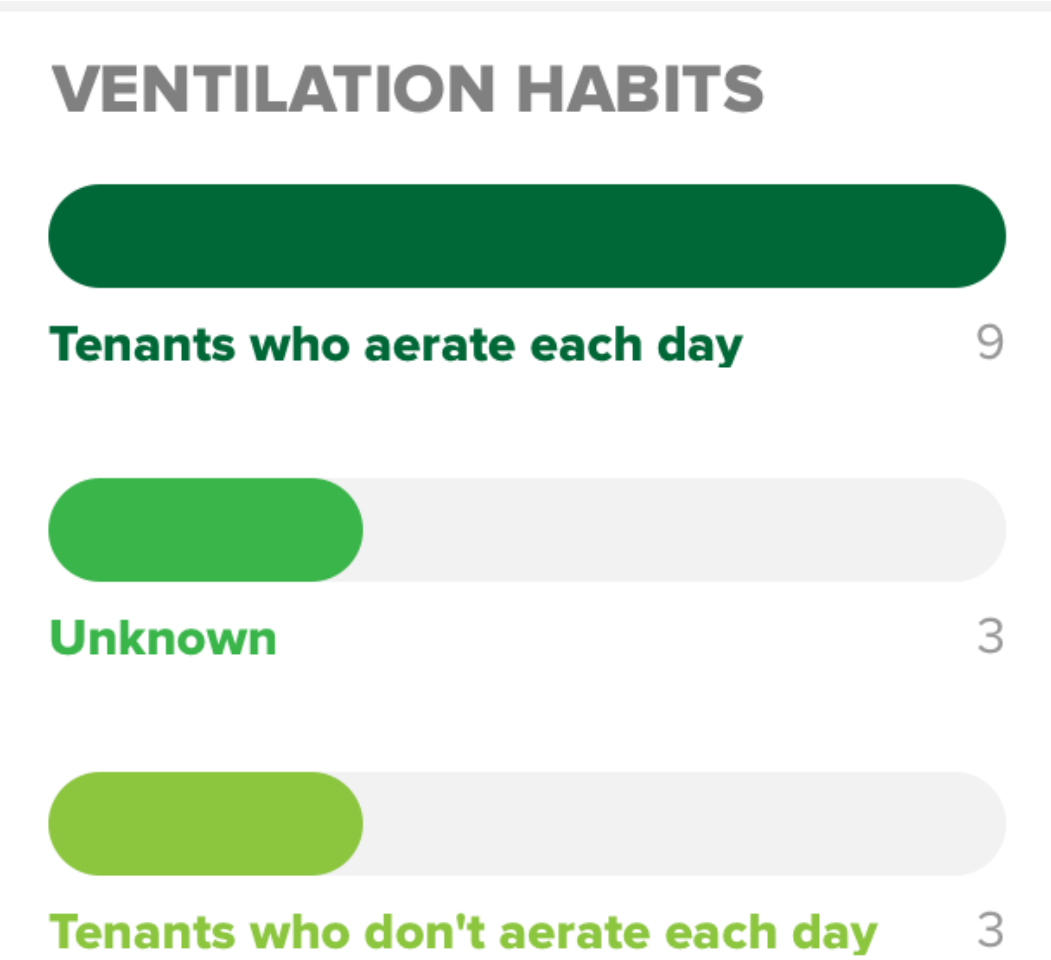
The households who ventilate each day, do it for 2 reasons:

1. **To avoid having too much humidity and to do so, they open a bit some windows all day long:**
   I: "In the kitchen, the window is open a bit all day long, and every morning in the bedroom during 3 hours. I have to open the window also when it's too warm, it depends of the weather".
   J: "I let the living-room and bedroom windows closed all the time. I let the windows and the humidity extractor in the bathroom and the kitchen open all the time but it feels cold. I always let the window in the kitchen a bit open".
   E: "Each night/all night in the bedrooms and in the morning and if needed in toilets/bathroom if there is condensation or humidity".
   G: "Each morning during 1 hour, I shut the bedrooms' doors and I open the windows".
   K: "There is no ventilation block in the kitchen so they open a bit the window all day long".

2. **To avoid bad physical symptoms and poor air quality:**
   There are 3 tenants who mentioned that if they don't ventilate during the night, they feel bad in the morning with either breath difficulties or dizziness:
   K: "In the bedroom, if I don't let the windows open during the night I don't feel well, it feels bad, it was the same problem in my former apartment. If we aerate other rooms, we turn off the switch on the side of the radiator".
   M: "Due to asthma problem, they keep several windows a bit open during the day. They create air current to dry the air".
   J: "This tenant expects to have better isolation with also less humidity feeling and a solution to improve the air quality, that can create according to him throats problem and some dizziness in the morning".

Households who ventilate have 2 different habits per rooms type:

- The bedroom and living-room will be ventilated during a precise number of hours in general in the morning (1 to 3 hours);
- The kitchen, bathroom and toilets will be ventilated all day long with the humidity extractor or the windows left slightly open or widely if there is too much condensation/humidity.



6.6.9 Fuel poverty issue in Padiham

For a majority of households in our corpus, tenants experiment self-restrictions to use energy and many are in situation of fuel poverty if we refer to the particular definition established in the UK: *"a household is in a situation of fuel poverty when it has to spend more than 10% of its income on all domestic fuel use, including appliances, to heat the home to a level sufficient for health and comfort".* An official definition of fuel poverty is not yet set out in the UE and there is a need to *"define common indicators and relevant quantitative data to characterize on a same basis the situation in the different countries" (European fuel Poverty and Energy Efficiency/Intelligent Energy Europe)*[4].

Also to be able to establish a statement of fuel poverty in UK, and in the Italian pilot site we have collected mixed quantitative and qualitative data:

- We have collected the bills of tenants for the heating and electricity or gas consumption;
- We have exchanged with them during interviews on their potential difficulties to pay the energy bills;
- We have used the qualitative indicators promulgated in the final report of the EPEE project to detect fuel poverty that we integrated in our interview guideline (European fuel Poverty and Energy Efficiency project /Intelligent Energy Europe)[5]

If we take into consideration the official UK definition of fuel poverty and the indicators listed by the EPEE, we can state that some tenants in the UK pilot site are in high fuel poverty, with 10% to an estimated 20% of their income used for their domestic fuel use (all included), with a particular high cost linked to the storage heater equipment:

Sociologist: "In the UK pilot site, some tenants are paying 90 Pounds a week, so between 300/400 Pounds per month for the rent, and they are paying around 30 to 50 Pounds per week for the electricity. So, we have some cases where tenants pay for their electricity half the price of their property rent?"

Local Manager in Padiham: "For a number of years, we have customers who have moved out because they couldn't afford the energy cost in the properties. We've got people who still live there who complain every now and then and ask compensations or to repair their system with the storage heaters, we send electrician as they are not working as effectively as they did before. It is something that has been discussed many times in the past (…) Padiham is one of the few site with only electricity and electric storage heaters in properties, we have other sites with electric storage heaters and they also suffer a little bit (…) in Padiham (…) they are definitely spending a lot more money on their system because of the age of it and because it's only electric".

[4] Reference : https://ec.europa.eu/intelligent/projects/en/projects/epee
[5] Ibidem

According to the PFP employees interviewed, the high bills are often mentioned by tenants. The local manager has recently had two new tenants that complained about the high bills.

- One tenant was paying £60-£100 per week for electricity, this tenant has a low income;
- The second tenant was paying around £300 per month for electricity, this tenant also contacted the electricity supplier about the high bills. The electricity supplier advised that the storage heater should be serviced regularly. Storage heaters are used in properties, these units are supposed to be serviced yearly, there are no records of the heaters being serviced. If the heaters are broken they are repaired or replaced as they are relatively cheap, there is no obligation to service storage heaters unlike boilers.

6.6.10 "Eat or heat"

The turn-over is directly linked to the expensive cost of heating in Padiham properties: tenants with high bills will be looking to move out as they cannot afford the bills. According to the local manager « Tenants on Housing Benefit (…) they will reduce their costs/energy consumption to cover their bills » and in some situation, tenants are obliged to cut their electricity and heating consumption drastically to be able to stay under the allocated budget their have for energy.

One tenant mentioned that there is a saying in UK *«eat or heat »,* meaning that tenants (especially those with pre-payment meter) determine only when they top-up their meter how much money left they have (when they put money in their pre-payed electricity meter every day/every couple of days they can read how much money left they can consume electricity or gas) and they determine if they will be able to pay to heat a minimum and use other appliances like oven in the next coming days – or not.

In Padiham in some households, there is a situation of high fuel poverty that has a very important impact on the comfort of tenants. The problem in Padiham is that despite paying an excessive amount of money to use their radiators, the difference between the cost of the heating and the real benefit perceived in the level of thermal comfort is not acceptable for tenants (too expensive).

In Padiham, we can observe 2 key types of behaviors related to the use of budget that are either active or by default:

1. **The "day by day" economy with a budget management built on the money left and on short-term projections on a daily or weekly basis.**
   This category of tenants manages the budget as much as possible with an anticipation of the future days or weeks only, but the budget margins are very limited and the possibilities/habits to make savings in the long term with little acts are not well known.
   These tenants have a low income level and they will be very careful with their energy consumption based on their level of knowledge (which can be very limited). They will self-deprive themselves to use energy even in some cases for basic needs such as cooking, when their budget limit is reached during the week or the month.

These tenants are in a budget mode "by default" or passive as they mostly control their budget only after checking the money left on the pre-paid meter display. Their calculations are based on establishing what money they have for the coming days or weeks, and the money left they must pay for their other costs. From this basis and according to the different expenditures, they will top-up their pre-payment meter accordingly to the money they have left, then they will compensate or modulate their domestic energy consumption for example by using less their radiators or certain equipment such as additional radiators, oven or electric cooker.

There is a constant adaptation of energy consumption to the money available in this type of budgeting behavior.

2. **The very precise management of the money on a daily and weekly basis with the objective to find levers to make money savings: "long-term budgeting"**

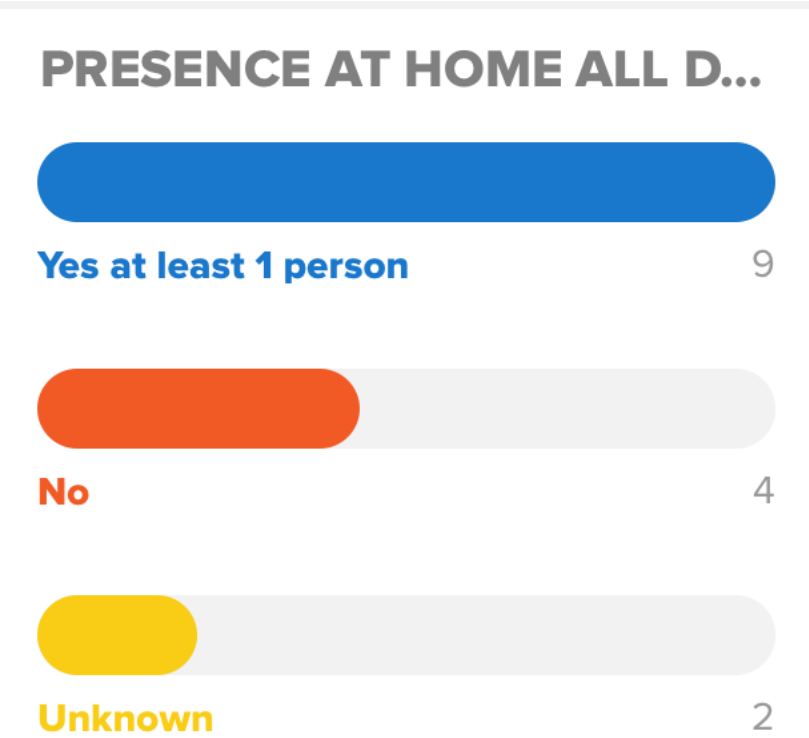
   Some tenants with in general a higher income level will adopt long term energy saving habits based on researches they have made on energy tariffs, energy tips and they will efficiently control their consumption and make little but added money savings that lead to a global control of their costs. In this model, the tenants think in long term and can adopt new daily behaviors because they are perfectly aware of the impact of little additional efforts on the general bill. These tenants know how to handle a budget in general and this applies also to the energy consumption sector.

6.6.11 A high “presence at home” for retired and unemployed parents with a strong impact on thermal comfort

The impact of low efficient storage heaters and expensive costs is particularly problematic for an already vulnerable population of tenants who is unemployed or for retired tenants who spend most of their days inside their dwellings. For this group of tenants, the situation is particularly unfair as the number of hours during which they must keep a decently comfortable temperature inside is much more important that compared to active tenants, who are absent during daytime.

When we study the situation of tenants in Padiham, we noticed quickly that just in our corpus of 15 interviewed households, most of them (9 on 15) were composed of at least 1 tenant spending most of the daily hours inside his dwelling.

In 9 on 15 households interviewed, at least 1 person stays inside the dwelling most of the day.



SOCIAL INDICATOR: the “presence at home” indicator

For tenants with low income level, this indicator is particularly important to check as the tenants will experience 2 co-dependent issues: fuel poverty and low thermal comfort that are conjointly increased by the high presence at home.

The category of tenants staying at home must on average heat their dwelling 8 hours more than an active tenant. Some families simply can’t afford to heat all day long and we have noticed 2 situations where housewives were settling the minimum of heat during the day, until the return of their child in the afternoon, when they would release the temperature to ensure that the thermal comfort is

good for their child. As an employee of PFP mentioned during our interviews, renovating Padiham is an important matter to allow many tenants to access to a decent comfort standard while avoiding a situation of self-deprivation. This category of tenants has been integrated in priority in the monitored group to identify the best equipment and advises that can lead to a better management of their energy budget

More specifically, on the 9 households with a high occupancy of the dwellings, 2 kinds of tenants are more susceptible to stay at home during the day:

1. **The unemployed parents**
   Especially the housewives with 3 single mothers and 1 single father (4 singles with children households) and 1 housewife (1 couple household) in our corpus group. These parents (mostly mothers) take care of the children and for some of them go directly to accompany and pick them at the pre-school situated only 200 meters away from the dwellings.
   A link between children's schedule and heating patterns:
   For these tenants, the patterns of occupancy are directly linked to the children's daily schedule and school hours with a short absence in the morning to bring the children at school, also before/after lunch time for pre-school children and after 4pm to take back the children from school. This information is important to mention because some mothers in fuel poverty might align their uses of the heating on their children's presence, and one mother declared that she avoids using the radiators during the day even when she's at home to make savings, she only starts to release the heat when her child comes back from school.

   B: "There is a switch, I put power 6 on the radiator, with the vent off during the night and then 4/5 on the vent (at 4pm). **When I open the vent, all the heat leaves so I wait when my son comes back from school to open the vent at 4pm, before I have been at home all day long**. The radiator only releases heat until 5:30pm when it should release heat until 8pm at least (with power 6)"

2. **The retired tenants** (5 households with 1 household also part of the single parent category) are very present inside their dwellings during the day and the evening. This category of tenants is characterized by a low difference of habits patterns between the week-days and the week-ends. At the contrary in families, the week-ends are characterized by a stronger presence at home with both the companion/husband-wife and the children present at home with a multi-use of multi-equipment.

6.6.12 Affordability checking and control of fuel poverty by PFP

The problem of budget skills in vulnerable households is well known and documented by PFP. This is a topic that they have integrated in their management of tenants and in the selection process of their future customers. PFP makes affordability checking and an analysis of the tenants' income and their future expenditures in the dwelling they are applying before accepting to rent a new apartment. PFP participates positively in this manner to avoid energy poverty situation with their customers.

"We have a team dealing with these topics, we can help vulnerable tenants and we support customers to do assessment on their incomes, to check that they receive everything they are entitled to, to inform them of any benefit that they could apply to and help them manage their budget. Prior to offer a property to somebody, we do an affordability check, so we will never offer a property to customers who can't afford to rent that property, in the process of customers applying for a rent, we will make an interview about their situation, we will go through how much money they receive, incomes or benefits and then how much the bills are going to be in the rent. We do an income expenditures analysis to check that the customers can afford the properties, how much the bills are going to be in the rent, how much electricity and gas it is going to cost them, and we do an income expenditures analysis to check that the customer can afford the property. If not, at the end of the analysis they will be refused the property and this applies to any property we propose" (Local Manager – 2016).

6.6.13 The introduction of universal credit and the future impact on tenants' budget

Despite the affordability checking, and the support PFP gives to tenants to claim the benefit they are entitled to, the turn-over in Padiham keeps on being high compared the rest of PFP stocks because of the storage heaters and the low energy efficiency of the buildings. And a new difficult challenge is about to rise for building owners in UK. Indeed, the benefits cycle payment will change from weekly to a monthly basis with the introduction of Universal Credit, despite that the population receiving these benefits often have issues to manage their budget and to handle an important amount of money.

"The Government in England has changed the way people who are on benefit receive their benefits. In the past, different benefits would be paid weekly or bi-weekly, child benefit, job seeking allowances, tax benefits, some would be paid weekly some other bi-weekly, but the Government introduces Universal Credit, anybody who claims benefits rather than getting different benefits every week, these payments will be made on monthly basis. It's still new and it's being implemented across the country, it is slowly being rolled out in the country, the people receiving the benefit on a monthly basis, so they receive their income once a month rather than every week, and they get the housing benefit paid to them rather than paid directly to the landlord. Normally housing benefit comes directly to PFP on a monthly basis but now with the Universal credit, customers receive every month a lot of money: housing benefit and all the other benefits, and it's their responsibility to pay

their landlord, so that is causing some issues with some vulnerable customers who are struggling with their budget, who were always used to have a little money left each week, and they get out of money every week before the next money payment. Now they receive a large amount of money and they need to settle an arrangement to pay the landlord, and some tenants use the housing benefits money to do something else. So, there is a new way for people to manage their money. We've got some customers on Universal credit but not everybody in Padiham" (Local Manager – 2016).

6.6.14 Vulnerable tenants chose a payment meter more expensive but totally controllable

For a majority of households in our corpus, tenants experiment energy restrictions and even fuel poverty. This situation encourages many tenants to keep a pre-payment system (top-up meter where tenants put money in advance in their meter (5/10/20 Pounds at a time for example) then they adapt their consumption depending of their budget and their capacity to top-up again in the next days or the week later. For the local manager: "probably about 2/3 of tenants are on pre-payment meters to help them manage their budget. The advantage of pre-payment is that tenants can manage their budget better, some tenants cannot pay by direct debit because they have a bad credit history".

The pre-payment meter is indeed sometimes the only solution to get a contract with an energy supplier for vulnerable households. The problem of this system is that the energy cost with pre-payment meter is higher than on direct debit and post-payment system.

6.6.15 The « day by day economy »: a crucial concept to understand fuel poverty in UK

It is important to understand that in UK pilot site, many tenants live in a "day by day economy" and the budget allocated to electricity is established every 2/3 days or every week. This is the reason why **the pre-payment meter presents a sort of "security"** for tenants as they can't exceed their budget: the meter is paid before the consumption of electricity or gas, so they are sure to control that they won't be in debt later. Pre-payment meter is the more common system to pay electricity in our corpus (2/3 of tenants according to the Local Manager).
Unfortunately, the pre-payment meter contracts are more expensive than direct debit contracts, but many tenants prefer to keep this system because:

- they feel that they can really control their energy budget;
- they consume only what they can really afford;
- they avoid any "surprise" of excessive extra cost that they can't control with a direct debit contract: **"The key is not to pay for what you have consumed but to consume for what you can afford and accept to pay"(O).**

The pre-payment meter symbolizes for them an efficient energy control tool and an indirect energy consumption feed-back, in a context where no other tools are given to customers to really control their consumption and to fix budget limits. The other reason behind this preference of "pre-payment meter" is that many tenants have difficulties to handle an important amount of

money and a budget, and to anticipate their equipment uses several days in advance in an optimized way, such as by using low energy tariff during the night (Economy 7).

F: “We have a top-up system, with a meter outside: you check the amount of money and you put some money with a key. It's my husband who is handling the top-up system. We pay 50 Pounds a week when it's really cold”.

B: “Now on pre-payment meter I pay around 30 Pounds a week and in winter 56 pounds a week, it's expensive. The tariff I pay is higher with the top-up system, but I don't want the bills with direct debit, I'm paying for what I'm using and I can anticipate, I have the choice to consume less but it's a problem (the top-up system) if I have to pay so much to have it" (extra cost).

The interviews tend to show that the more vulnerable a household is, the more regular is the rhythm of pre-payment meter verification:

- from a verification 3 to 4 times a month (every week approximately);
- to an average verification every 2/3 days to a daily check for the most deprived households.

These checking appear to be done in the morning at the departure from the dwelling or in the evening when tenants go back home. The design of the interface dedicated to tenants developed by Open Domo for the DREEAM project should integrate the display of money left, and the global consumption of the household with tips and maybe alarms especially in the morning and the evening (6-8am / 6-8pm).

On the other side, the tenants who changed for direct debit are more satisfied with their energy bills than before with their pre-payment meter system:

- 3 households on the 4 households who consider that their energy cost is ok, have a direct debit system either by monthly or bi-weekly direct debit and they consider that they benefit economically from this system compared to the pre-payment system;
- But the cost to access to this service of direct debit can be too expensive according to some tenants on pre-payment meter.

A: “Before in winter, 90% of my income was going to the tariff meter. For the previous 12 years I struggled with the top-up system before switching to the tariff plan. They should make a pre-payment set, it should have a basic level of consumption with a budget for extra consumption. Before I was on pre-payment meter, you have an added payment for monitoring and I have changed with (supplier name) to a standard payment with direct debit. I have a standard meter. It allows us to pay 100 Pounds per 1 month when before it was 70 pounds a week only for the heating”.

J: “I have a pre-payment meter. My supplier asked 80 Pounds to have a direct debit, just to have this service so I said no. I would prefer the direct meter but it's too expensive to just access the service”.

6.6.16 Conclusion on pre-payment meter

The consumption behaviors of tenants are strongly shaped by the equipment and their energy billing system. **The lack of money generates the favorable conditions for the adoption of a more costly but beneficial behavioral system for tenants: the prepaid meter that allows the delegation of expenditure control to an external device.** But with this system tenants don't learn to actively control their budget, and have real difficulties to understand the link between their practices, their consumption and the final cost paid. At a certain level of fuel poverty, where every pound matters, the margin of uncertainty existing in the direct debit system is not acceptable: tenants don't receive sufficient information from their energy suppliers to actively control their consumption in a contract with direct-debit.

Local Manager in Padiham: "You will get different profiles: some people working who are able to afford the rent and the energy cost, some people who are trying to get into work and maybe who don't know how to use their systems properly and who are struggling to pay the bills, and some tenants who receive benefits and they have a lower amount of money coming in. These are the tenants who are struggling the more, they have pre-payment meters and they pay more to have access to this system, and these people are in fuel poverty, they also might have previous debts".

6.6.17 The ideal budget for energy consumption according to tenants

Most of tenants of our corpus consider that the cost of energy is too expensive for their budget.

⇒ 11 households on 15 interviewed believe that their energy costs are too high (10 of them have all electricity and only 1 household with a mix electricity and gas).

⇒ Only 4 households consider that their energy costs are not too expensive:

- 1 household on these 4 households has a mix of electricity and gas;
- 1 household on these 4 considers though that the electricity consumption is fine except for the costs related to the use of radiators (C: "it's ok but the cost of normal radiators is too expensive compared other electric radiators");
- 3 households on these 4 households who consider that the energy cost is ok, have a direct debit system either by monthly or bi-weekly direct debit, and they consider that they benefit economically from this system compared to the pre-payment system.

Many tenants have difficulties in winter to top-up their electricity meter

The target or ideal budget for electricity consumption expressed by many tenants is around 40/50% less than their current expenses in winter.

⇒ In summer the ideal budget is around the same to 30% less.

Local Manager in Padiham: “For a number of years, we have customers who have moved out because they couldn’t afford the energy cost in the properties. They could get a cheaper property, with the same level of rent but not as expensive for the energy in the property”.

A: “If I had one budget objective? It would be 25/30 Pounds a week over the winter time”.

D: “Target: ideally I would like to pay 20 Pounds a week for electricity (instead of 40 pounds)”.

F: “My objective? To pay maximum 30 Pounds every 2 weeks and if I can save 10 Pounds each week” (compared to the current budget of 35 Pounds every 2 weeks for electricity and gas in summer and 60 Pounds every 2 weeks for electricity and gas in winter).

6.7 Key expectations of tenants for renovations

The key expectations of tenants for the renovations is the replacement of the storage heaters by radiators with a direct and fine heating control, the improvement the dwellings insulation and the limitation of humidity and damp.

1. **Replace the storage heaters by another type of equipment with fine variations and direct control**

⇒ Indeed, the key complaint is related to storage heaters according to the local manager and tenants: “The storage heaters don’t work very well, some storage heaters don’t give enough heat (…) in the past few years, the major issue was the storage heaters” (Local Manager, 2016).

2. **Spend less money for energy especially for the heating and the hot water**

⇒ 11 households on 15 interviewed believe that their energy costs are too high (10 of them have all electricity and only 1 household with a mix electricity and gas).

⇒ Expectations of savings are very high and illustrate the economic vulnerability of many tenants in the UK pilot site: many tenants ideally would like to spend 40%/50% less in electricity in winter

3. **Limit the air drafts created by the gap under the 2 entrance doors and improve the drafts around the windows**

⇒ 11 households have a problem with air drafts linked to these 2 aspects (doors gap and windows ventilation system)

4. **Limit the condensation and the presence of damp**

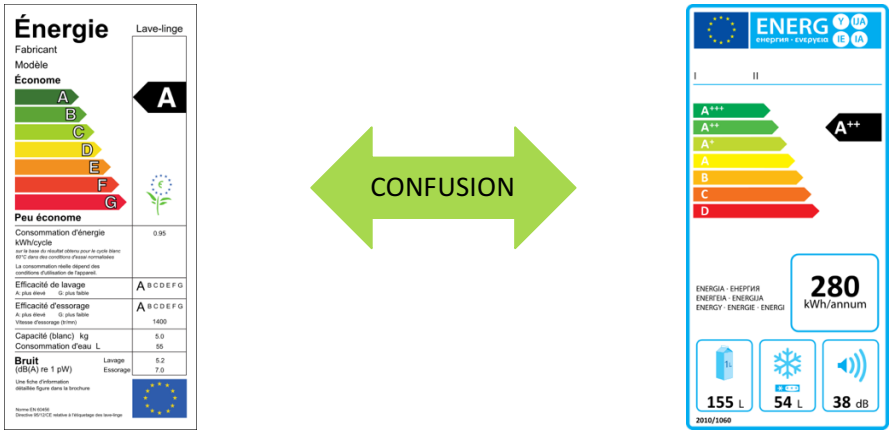
⇒ 8 households experience important condensation in or around the windows and 7 households have damp (tenants’ representations)

5. **Improve the thermal comfort in the 8 households** (cold to freezing feeling)

⇒ Especially since in a part of these households, some tenants stay at home all day.

6.8 Energy efficiency of equipment owned by tenants

Important: the information presented below are "representations" that tenants have about their equipment. These representations can be wrong or imprecise sometimes after that we have checked the equipment' characteristics during energy audits or in live with them during the interviews inside their homes, then we correct the list given by tenants with them. Though we can't check each device during interviews so the equipment list presented below is informative only and might include errors. It is interesting though to question the level of equipment of each household to analyze the level of tenants' knowledge about the different energy class, and their interest for the topic of energy & water consumption. In our future Training Program, we advise to improve the knowledge of tenants related to the energy efficiency category of their equipment (class A to G), and also their understanding of the difference between the A class from A+ to A+++. Most of the time, tenants are confused between the different energy efficiency scales and they don't make the difference between A or A+++ fridge for example, they will just describe that they have a device class A *"and maybe more"* but without certainty.



- There is a clear division between 2 categories of equipment owned by our corpus of households:
  - ⇒ **A and up categories:** a typical category of equipment composed mostly by the washing-machine, the dryer and less commonly by the fridge and the freezer;
    11 out of 15 households have at least 1 equipment in the category A or more, and 8 of them have more than 2 devices in A category.
  - ⇒ **Below A Category (B and less):** this category of equipment is composed by all the other types of equipment and machines that are bought without consideration for their energy efficiency. The more used equipment each day with low energy efficiency are: kettle, electric cooker, fridge, TV;
    14 households on the 15 accounted have equipment in the category below A, which means after analysis that UK tenants have less energy efficient equipment than the tenants in the Italian pilot site on average. Italian tenants change more frequently their equipment and many of them own several devices in the category A and more.

- 7 out of 15 households have all their bulbs or most of their bulbs as low energy bulbs.

6.9 The experience of PFP employees with tenants' engagement

6.9.1 Participation of tenants in renovation program

It is important to mention that tenants theoretically must have the work renovation carried out due to their tenancy agreement. Though PFP communicates with tenants in order to never impose renovations but to show the interest for tenants. PFP can persuade tenants through communication and outline the benefits of the end results. In general residents will only get involved if there is a benefit to them so there is a strong need to develop a communication allowing the technical renovations to be understandable by tenants both in terms of functions, services and clear benefit for them.

6.9.2 A strong involvement of PFP to get tenants acceptance for renovation programs

Tenants can't refuse the renovations but PFP communicates a lot to make sure that tenants are well informed about the interest of renovations and will agree with them. Neighbourhood officers will usually be in charge of informing tenants. Contractors of renovations works also employ a tenant liaison officer. Generally, tenants cannot refuse works, this is part of their contract. PFP expect that tenants will want to take part in the scheme, using good communication. At PFP, there is no set way of involving tenants but a strong involvement to reach a consensus with tenants.
Tenants are usually not engaged in making decisions about specific technologies to be implemented when these renovations are mandatory and standards. PFP provides basic information about the different technologies available and the best option for that particular site. Usually PFP have a preferred technology that they will promote to get tenants acceptance of the proposed works.
"It is important not to impose the works on tenants. Renovations will not work without tenants buy in. PFP will communicate in a way that shows tenants the options - advocating the best option - and gets tenants buy in for the best option » (Local Manager – 2016)

6.9.3 Customers surveys in less standards renovations

Though in some occasion when renovations are less standards, PFP believes that customers should be involved in the decision making process and will try to consult them. PFP has for example organized a survey to understand the acceptance of tenants in Padiham for the installation of gas in their properties before deciding to launch renovations. The experience of PFP is that if tenants are informed and influential in the decision making process and during exchanges with PFP employees, they will be likely to take part in the renovations as the final decision takes into account their idea, and this will guarantee that they embrace what is happening.

"Occasionally we do survey if we feel the need on particular site, if initially we want to understand customers' views, we can write a document with questions for whatever it is we try to find out" (Local Manager – 2016).

6.9.4 Communication tools used with tenants by PFP to integrate in our Interaction Program

There is no tenant association active on the pilot site. Until recently, PFP was proposing a 1 day presence of a PFP employee in an office at the pilot site. Now PFP organizes instead regular visits of the local manager. There is no tenants' association and «tenant engagement group » in the area. A group of « referent tenants » or « engagement group » is a communication process used by PFP in other pilot sites: "We have tenants' referents who are able to show to other tenants how to use equipment, it's the better option for that area. I don't think we have particularly "champions tenants" in Padiham but we had this approach in the past. "Champions" they've been trained on how to do it, like representative/referent or spoke person. We have positive experience of champions tenants in other pilot sites. Generally, if we have a major change happening, then we will try to get champions tenants on board but we haven't had any need in Padiham, it depends on what has been happening and if there is a need for this" (Local Manager – 2016).

Tenants are informed in various ways:

- Local manager or neighbourhood officers will usually be in charge of informing tenants;
- Tenants struggling to pay their bills are also referred to Money Advice services. But tenants at the site are normally not the type of people who asks for help according to the local manager;
- Emails/ newsletters/ letters / telephone & "let's talk local" meetings;
- Contractors of renovations works also employ a tenant liaison officer;
  Contractors of renovation schemes would usually hand over new technologies that have been installed. The contractor must employ a dedicated tenant liaison officer for this task.
  Previously, PFP experienced problems with sub-contractors' process to interact with tenants, and in the quality of work performed. This observation has been confirmed during the qualitative interviews where 2 tenants mentioned their disappointment both about the cancellation of the PV installation and the lack of information received. We strongly recommend that before the renovations for the DREEAM project, the building owners follow a detailed Tenants Experience & Satisfaction check list to control that sub-contractors are performing the requested tasks to inform the customers.

"The contractor, through a specialist Tenant Liaison Officer, was responsible for contacting tenants to arrange installations and also for contacting tenants to cancel installations. Some tenants could not be reached in time to cancel and they took time off work to provide access to the homes. The local manager held a meeting a few days after the installations were scheduled to take place, many tenants came and complained about not having enough/or no notice about the works being cancelled (there was no direct communication from PFP about the installations as it was agreed that the sub-contractor would do this directly). Tenants were disappointed for a second time. Some tenants had a negative experience when the last renovation works (bathrooms and wirings) were carried out in 2008, the sub-contractors sometimes created a big mess and did not always leave the properties tidy. There are knock-on effects of this now, this is still mentioned to the local manager by some tenants » (PFP employee – 2016).

6.10 Proposal for sociological evaluation & the future training program for tenants

6.10.1 A positive context with collaborative tenants that we should fully integrate in our project

- 14 households on 15 interviewed accepted to be equipped with the monitoring equipment;
- There are no worries related to the DREEAM project for 12 households and at the contrary a positive opinion about future changes of equipment and renovations for the households n° B, C,D,E,F,G,J,K,L,M,N,O;
- Tenants are very collaborative, easy to talk with and give detailed explanations;
- 11 households have strong expectations to spend less money for their electricity consumption;
- There is a lack of knowledge on the energy bills and the energy consumption of their equipment that offers important opportunities of energy savings. Tenants don't understand very well their bills. Tenants on direct debit will have estimated bills (the utility company usually charges and will refund the difference at the end of the year);
- Tenants often chose pre-payment meters as these systems give them a better control over their bills. Pre-payment meters are around 15% more expensive than direct debit but allow tenants to have zero budget surprise and zero debt;
- 5 tenants accepted the proposal to become “referent tenants” and to help us to co-develop information tools including options for the DREEAM platform (the part dedicated to tenants). These 5 households also accepted to help other tenants/neighbors to understand and use the future equipment installed in the context of the DREEAM project. This is very positive for the project as the approach of “referent tenants” or “champions tenants” has been efficient in other pilot sites according to the local manager of Padiham.

6.10.2 Build a training program on energy consumption & efficient use of equipment

The opportunities of economy savings are real for tenants especially the tenants in fuel poverty by teaching them how to use better the Economy 7 tariffs (low energy tariff hours). In Padiham, the tenants interviewed have in general a very low level of knowledge related to equipment consumption of electricity and the low energy tariff hours’ contract. In the UK pilot site, there is a real margin of savings linked to the energy costs, by optimizing the uses of the low electricity tariffs. Many of the tenants with difficulties to handle their budget need to get better information about electricity and heat consumption, and need to be trained to use the low energy tariff on daily basis;

- 13 households on 15 interviewed have a washing machine and 7 of them also own a dryer. **The use of these equipment each week is important even for household with 1 single tenant, but a majority of the households in our corpus are not using the low electricity hours’ tariff on regular basis (Economy 7);**
- Only 5 households on 15 explain that they organize their uses of washing machine and dryer aligned on the low energy tariff Economy 7;

- 9 households expressed that they are not careful to use these devices efficiently during low electricity hours' tariff. The paradox is that these 9 households would like to spend less money for electricity but they don't make the efforts needed yet to adapt their uses to the low tariff hours.

The final electricity cost that tenants pay can be reduced thanks to several identified margins:

- Low energy tariffs hours' contract;
- Optimized uses of equipment (at full capacity only, use of eco-button, low temperatures, etc.).
- Changes in the use of radiators and electric shower (avoid the use of "boost button" for the electric shower that is very expensive for example).

6.10.3 Build energy budget coaching

In the DREEAM project, we recommend experimenting an energy budget training program for tenants in the context of the WP4 during and after the renovations. This option is already discussed by PFP: « Places for People staff don't have discussions with tenants on their understanding of their energy bills. Money advice is offered to tenants which is an internal department within PFP. We discuss about giving energy advices to tenants, it would be beneficial for them and for the comparison of the heating costs before and after the renovations » (PFP employee – 2016)

The difficulty with the population of tenants with low income level is that they often don't request any help or support to understand their bills as the local manager explained to us. In addition, the behavioral levers to make the information understandable and efficient on a daily basis will need to be studied in 2017 with tenants, and this requires qualitative interactions with a group of selected tenants (focus groups) to co-develop the budget training program with them (co-design meetings with individual tenants so that we build a training program according to what tenants really need).

6.10.4 Integrate the households who are the best energy managers to help us to build information documents & training program

In our corpus of interviewed tenants, we have identified a group of tenants who have very good budgeting skills related to electricity and heating consumption. It would be very valuable and innovative to build a training program for tenants in direct collaboration with tenants themselves, and ideally tenants who have an excellent understanding of their equipment, and the margins of savings they can do. We will propose to develop this option to PFP during our next collaborative meeting by mid-2017.

A: "Washing machine and dryer used in the week-end at 11 pm to have the night tariff".

B: "The washing machine has a pre-heat system so I have to put my washing machine at midnight. I only wash at 30 degrees because of the electricity cost".

J: “Use of the washing machine at night during Economy time. The economy tariff is around 3am to 7am so I put the washing machine during the night with a timer”.

K: “We cook in advance in the week-end for all the week”. These tenants are particularly careful and use the equipment such as washing machine depending of the Economy 7 hours.

O:” I have a timer to use cheap electricity on the washing machine but I don't know how to use it. I use the washing machine in the evening”.

6.10.5 Building a team of “reference tenants”’ to help other tenants during the DREEAM project

A group of “referent” or “champion” tenants consists in informing and training in particular a limited group of voluntary tenants who will help PFP to inform other tenants. These tenants will speak to their neighbours and share the information provided, and even help other tenants to understand how the renovations and new equipment will work. Interviews have allowed to identify a group of 5 households who would be relevant to help us to involve other tenants during the duration of the project, and to co-design with them the interface part dedicated to tenants & the training program.

This approach of “referent tenants” has been proposed during interviews to tenants themselves in full transparency and revealed to be positively welcomed for a majority of them. We would like to propose this option in 2017 to the building owners and integrate it in our global sociological evaluation approach before/after renovations as this approach worked in previous successful projects (Hallbara Jarva Project & Transforming Rosengard projects in Sweden, WBG & Gebowa projects in Germany, ACER Modena in Italy).

“PFP usually works closely with 4 to 5 tenants at the site and get them on board with the renovation works. We have representatives who are able to show to other tenants how to use equipment, it’s the better option for that area. I don’t think we have particularly champions in Padiham but we had this approach in the past. Champions they’ve been trained on how to do it, like representative or spoke person. We have positive experience of champions tenants in other pilot sites. Generally, if we have a major change happening, then we will try to get champions tenants on board but we haven’t had any need in Padiham, it depends on what has been happening and if there is a need for this” (Local Manager – 2016).

Sociologist: “We have discovered “natural referent tenants” who have accepted to help us in the project, maybe it could be interesting to know how you organize this status of champions in other pilot sites, what kind of training, and documents you give them if we decide that several tenants in our DREEAM project become referents, that we can adapt it to the way PFP works with champions usually ?”

Local Manager in Padiham: “That would be fine, yes”.

6.10.6 Build real-life based energy efficiency indicators before/after renovations to attract new tenants in the neighbourhood

To attract new customers, it could be interesting to make the detailed analysis for the group of monitored tenants of the evolution of their heating bills before and after the DREEAM renovations.

This analysis and its conclusions if they are positive could make the pilot site area more attractive for future tenants with a quantified proof of the dwellings' energy performance post-renovations based on the real-life experience of tenants living on these dwellings, and based on their real bills. The methodology to apply to make such an analysis, its feasibility as well will be discussed with building owners, SinCeO2, Open Domo and Savills by mid-2017.

6.11 Social risks with UK tenants

There is a big issue of fuel poverty and budget restrictions so the DREEAM partners must be very transparent about any additional costs linked to the installation and use of any new equipment during the DREEAM project (especially the monitoring equipment for the monitored group of tenants only. PFP has been particularly transparent with the tenants about this topic, with a precise estimation of the extra costs linked to the monitoring equipment in the electricity bills of tenants and a full reimbursement of this extra cost. The details related to this estimation and reimbursement are full explained in the deliverable 4.2a).

A detailed assessment of energy bills evolution before/after the DREEAM renovations should be proposed - as one of the key goals for tenants and for PFP in the project is to help tenants to spend less money for their energy consumption and for their heating in particular.

- ⇒ The pre-payment system is mandatory for many tenants to control and budget their energy expenses;
- ⇒ The margin of savings linked to anticipation behaviours are limited for many tenants;
- ⇒ Only 5 households in our corpus of 15 households have adopted saving habits built on anticipation and optimization of equipment uses;
- ⇒ The sociological approach must focus in particular for the UK pilot site on the development of tools to inform/coach tenants.

3 households have some worries related to the project: A, I, H

- ⇒ The worries are related to the use of tracking devices such as smart meters for 1 tenant, and related to the renovations and their impact on the decoration "the cost and the work linked to the renovations";
- ⇒ 1 tenant declared that he will probably oppose to it if there is important change to make in his apartment for the decoration after the renovations;
- ⇒ The 3rd tenant prefers if there are few changes linked to the renovations (elderly tenant);
- ⇒ 1 person refused the monitoring equipment because she is worried about tracking devices like smart meter.

The sociological evaluation must integrate an evaluation of the "rebound effect" after the renovations. The "rebound effect" is originally a theory in economics applied nowadays in social sciences to describe take-back effects in various fields including energy consumption. This concept refers in sociological/behavioral sciences to the adaptation of tenants' behaviors after energy efficiency improvements in housing. Tenants experiencing new high energy efficient dwellings can feel less "guilty" to consume and use more their different electric equipment and radiators than before renovations, or they can start to purchase more equipment with the money they save (Zelem, 2013)[6], which results in the end in a decrease of the projected energy savings expected by building owners.

It would be positive in our project to build communication tools in our training program in order to lower the "rebound effect". The risk for some PFP employees is that for tenants, the thermal comfort is important and the houses in Padiham are cold. Also, tenants may increase the use of radiators in their homes once they can afford to do so after the renovations, in order to reach a high level of comfort with really "warm" rooms.

This "rebound effect" is also an important qualitative indicator that we will integrate in the final measurement & assessment of the energy efficiency post-renovations (not only quantitative indicators related to energy consumption of dwellings & tenants, but also qualitative indicators to understand if tenants' behaviours remained similar or if they have changed in a positive or negative way/meaning towards more energy savings or less energy savings than before renovations).

6.12 Conclusion about the UK pilot site

- **15 households interviewed**
  - ⇒ Method: qualitative semi-structured interviews with tenants inside their home
  - ⇒ Duration: 1 hour – interview guideline in the deliverable 4.2a

- **14 households on 15 have accepted during interviews the monitoring equipment, 1 tenant refused**

- 9 households have been selected in collaboration with SinCeO2 and PFP for the installation of monitoring equipment with a priority given to select households with very restricted energy budget

- **All the tenants have accepted to help PFP to collect their energy bills to establish the energy consumption baseline before renovations**

[6] Zelem Marie-Christine, *University Negawatt conference*, 4-5 October 2013, Mèze.

Opinion as a sociologist

- A very good pilot site to experiment new technologies in transparent collaboration with tenants, and to co-design with them better communication tools for tenants in general (not only in Padiham but to replicate in other pilot sites) and to improve the use of existing and future equipment related to energy consumption;

- A lot of different misuses and resistance acts against the imposed equipment exist also called "poaching actions" by Michel de Certeau (The practice of everyday life, 1990). These misuses/resistances were particularly important to study in detail in this report in order to find in 2017/2018 the appropriate tools to improve the current situation;

- A strong community feeling and exchanges between tenants that we could involve in our Training Program especially with a group of volunteers "referent tenants".

7 Swedish pilot site

7.1 Presentation of the pilot site

7.1.1 DREEAM project is part of a large sustainable redevelopment plan called Karlslund 2030

The north part of the Landskrona area called “Koppargården” where the pilot site is situated, is part of sustainable redevelopment project for the larger area called Karlslund 2030 that has been decided by the municipality in 2016.

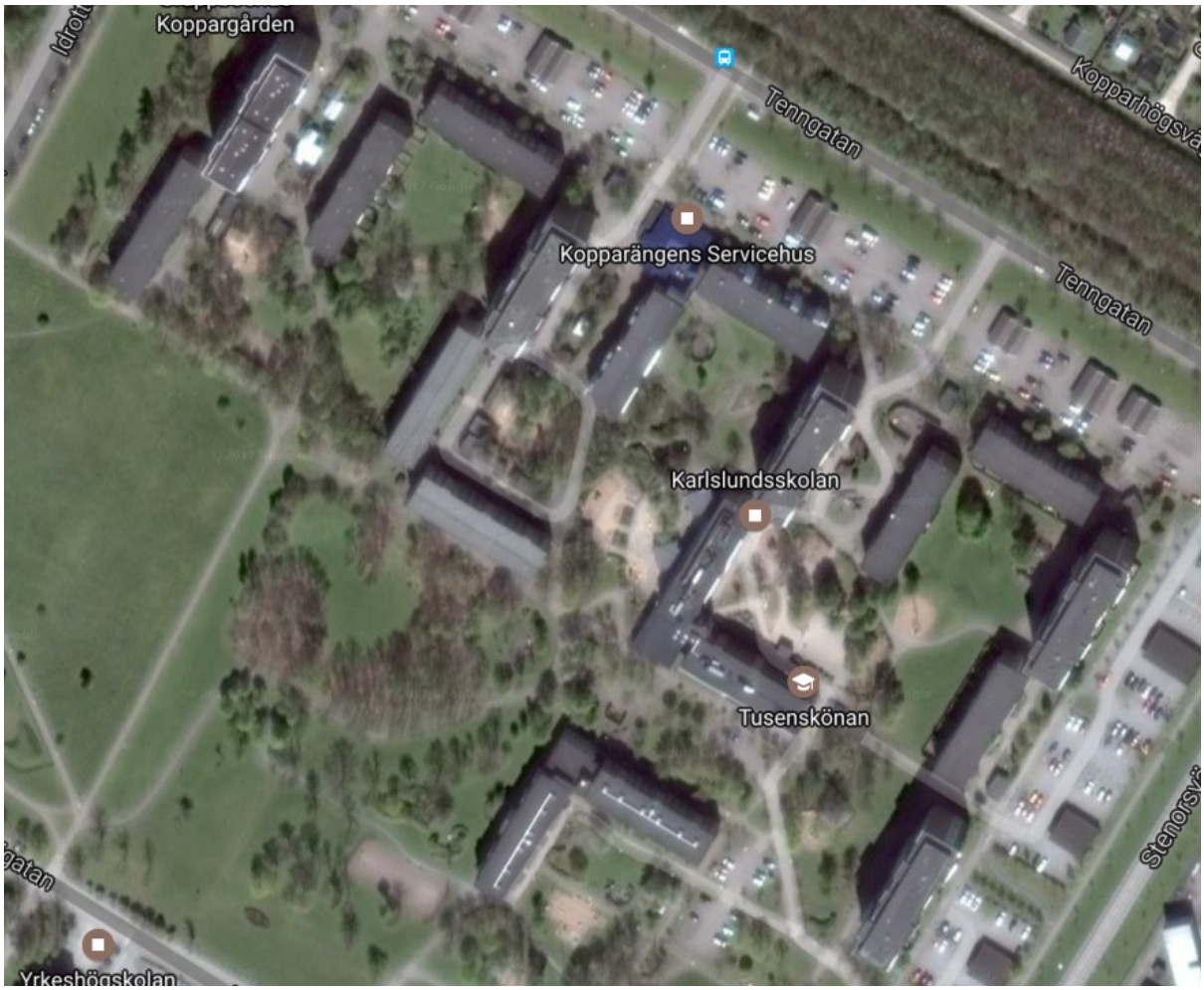


Figure 2: The pilot site area of Koppärgarden in Landskrona - Sweden (Google maps)

The development of Karlslund 2030 should transform the area into a sustainable neighbourhood that becomes attractive for new tenants, property owners and other actors to the area. Karlslund 2030 is the new demo site for sustainable redevelopment of residential multi-family housing projects in Landskrona. The global goal is to develop into an area that is considered interesting to locate to, that attracts new tenant target groups and businesses.

Reference: more information can be found on the official Landskrona city plan 2030 here http://np.netpublicator.com/netpublication/n21941559

The ambition of Karlslund 2030 is to develop solutions for both social, ecological and technical environment:

- An innovative sustainable energy neighbourhood will be developed where new solutions are demonstrated and evaluated;
- To further develop and enhance the “soul” of the neighbourhood with a focus on an active healthy lifestyle and small scale fruit and vegetable cultivation for the residents;
- To create a safe and attractive neighborhood that sets the standard for further redevelopment in the area.

The aim of Karlslund 2030 in comparison to 2015 in the pilot site area of “Koppargården” is to ideally reach the following goals:

- A unique area with a variety of housing forms and available service functions
- The storm water system of the area has been upgraded and refitted with new technology
- Infrastructure for electric vehicle charging is installed with 30 charging stations
- Karlslund is 20 % self-sufficient in local production of renewable energy
- 10 new businesses have been established in the area
- The employment rate of the area has increased by 10 %
- The number of dwellings in the area has increased by 50%
- Smart technologies will be implemented with the building of smart/digital/connected home where new smart technology will be tested
- The collaboration between Landskronahem and other key actors will be developed to promote innovation and the development of new solutions for the area. The key actors can be the district heating company, the municipality and/or other property owners in the area.

In this context, the DREEAM project will gain from:

- This important investment from Landskronahem in the development of sustainable solutions in the global pilot site area;
- The exchanges with Landskronahem on their experiments and results with other stakeholders in the larger program Karlslund 2030.

The perspectives of replication of the DREEAM approach are also very interesting if the results expected are obtained in the project.

7.1.2 The selection of the pilot buildings in Koppargården

The key reason why Landskronahem has chosen the pilot site of Koppargården is the socio-economic weakness of the area and the integration in the larger project Karlslund 2030. Historically the buildings in the pilot area were built in the 70s and the last building is from 1978. The area has known an important development following the wave of immigration in the seventies, with the building of many habitations in the context of the national building program called “the Million Program”. The buildings have been built for a standard of 2 kids and 2 adults and are also very representative of the other buildings’ structure in this part of the town: “Koppargården is a good choice for the project because the buildings selected are very similar to the rest of the area” (Lands employee – 2016). The replication potential is important due to the representativeness of the buildings selected to be part of the DREEAM project: *“New architecture in DREEAM, if it works well we can replicate it on other areas, both for buildings that we own and other building owners are interested” (Lands employee – 2016).*

7.2 Landskronahem has defined several objectives for their pilot site

7.2.1 Technical and social objectives

Landskronahem has defined a set of objectives to reach in the pilot site of Koppargården during the project:

- To improve the standard of buildings, to innovate and test new equipment with tenants: 110 dwellings in 4 properties has been energy efficiently retrofitted; ;
- To reduce the consumption of heating and hot water of tenants & to reduce the electricity consumption of common areas with an objective of energy use in the DREEAM buildings decreased by 60 %;
- The energy efficiency DREEAM measures are replicated in other properties in the area;
- The DREEAM approach is spreading and similar initiatives has been made in other areas;
- New forms of collaboration/partnership have been established with Landskrona Energi (district heating and electricity supplier) and the municipality of Landskrona;
- The model for reducing energy usage in the area is successfully implemented and can be used in other areas;
- The residents in the area has been involved and engaged in the energy discussion;
- To attract new tenants after the renovations;
- To get a better satisfaction of tenants after the renovations & develop social indicators on the life in the area;
- As a mean of reaching the energy reduction, the neighbourhood has been further developed with new construction leading to a denser usage of energy;
- Smart business cases for energy efficiency measures has been demonstrated;
- New target groups and businesses has been established in the area, due to the enhanced attractiveness of the area.

7.2.2 Rising the life condition of tenants to a higher standard

The pilot site is not situated in the centre of Landskrona but in its direct periphery. In the centre town, the properties are very attractive despite that the tenants are mostly from the middle class and the rent can be quite expensive compared to the closed suburb. The DREEAM project should allow to experiment new technologies and to improve the attractiveness of the renovated area for new tenants.

7.3 The objective to test both technical and social sustainability issues

In the pilot site of Koppargården, the DREEAM renovations will allow to experiment the factors improving the life of local tenants with ideally: better comfort inside dwellings, better control of energy consumption and energy budget for low income households, participation to the revival of a community feeling and new social dynamics. The DREEAM renovations could allow to make the area more attractive for new tenants, and contribute to reach a better social cohesion in the area like PFP does in their different pilot sites (building "sustainable communities"). The DREEAM project will at last allow to identify what factors will attract new tenants in the renovated dwellings. According to Landskronahem employees, the pilot site area has a good chance to become an attractive residential area.

7.4 Energy consumption in the pilot buildings

7.4.1 The electricity consumption of households is not known by Landskronahem

Landskronahem doesn't have access to the individual consumption of their tenants, like the other building owners and they won't collect the bills of their tenants like ATER and PFP, as the tenants living currently in the pilot buildings will be different after the renovations. In this context, the important human resources that are needed to collect bills directly with tenants is not relevant when the group of tenants will be different before and after the renovations.

7.4.2 But Landskronahem monitors the electricity consumption in the collective areas

Landskronahem has access to the collective electricity consumption in their buildings in the Landskrona energy platform with a metering at distance: "We receive the date automatically. It's a metering at distance, the electricity collective meter, I can have the hourly billing for each building for electricity. We can ask to have a finer time pattern of consumption monitoring but in that case, we have to change the meter" (Lands employee, 2016).

In 2016, the statement of Landskronahem's employees during our first interview was that the collective electricity consumption in the pilot buildings was more important than their objective: "It's more than what we want it to be. We have a problem with that, we want to decrease the electricity consumption. We don't have the power for the moment over the tenants, we can give them advises but we can't command them to use less electricity. The more consuming parts for electricity in the collective areas are the lightning together with elevators and pumps. During the years, we have measured the pumps for example, and the other equipment. It is experience based statistics and conclusions about the consumption of the different equipment in the buildings" (Lands employee, 2016).

For the DREEAM platform, Landskronahem's team agreed that it would be a very good idea to have a graph that displays the consumption for each of these important consuming equipment: pumps, elevators, lightning to see the evolution and make comparisons, and to propose some actions based on that (optimization options).

7.5 The evaluation by Landskronahem of the heating and hot water in their buildings

7.5.1 Domestic hot water and district heating are available data from the Landskrona energy

The quantity of heating and district hot water that Landskronahem is not displayed in the existing corporate platform used by Landskronahem employees, but they have access to these information in another platform from their energy supplier: Landskrona energy, then they integrate these data in their own corporate platform. This system is not ideal as they must transfer the data from Landsrkona energy platform to theirs: "We have a platform, a billing system and an automation system for the temperature, as customer of Landskrona energy we have access to almost the same platform than end-customers for energy metering. With the metering of the consumption, we put it in the system to see our energy consumption. This is not done automatically yet for the moment but before we had the platform, we looked around and looked at every meter to take that value monthly and put it in the system. For the moment, we are in between 2 IT worlds (Information & Technology), not yet completely automatic neither totally manually" (Lands employee, 2016).

7.5.2 A situation of 6% energy consumption increase between 2015 and 2016

Landskronahem employees explained us during the meeting that during the winter 2015/2016 they: "were up 6% this year for heating consumption when it's normalize and it's not good. For the moment, more or less all our apartments are rented (full occupancy), if we consider that we have the same situation than last year, we are up and we don't know why. It's up 6% and it's interesting because we don't know why" (Lands employee, 2016).

This evolution cannot be explained by a difference in dwellings occupancy as the pilot site buildings were and still are fully occupied "we totally rent all our apartments".

This evolution could be explained by the work done on equipment and the new real consumption metering of heating, with thermostat installed on the radiator closed to the windows: "my assumption is that we have been able this year to improve and fix some of our equipment and they are working well now" (Lands employee, 2016).

7.5.3 A context of guaranteed access for tenants to a comfortable 20° inside temperature

The rule for Lands is that they must deliver 20° degrees inside. The tenants have the right to complain and to get reimbursed if they can prove that they don't have access to this minimum temperature of 20° inside their dwellings: "nowadays it's measured the temperature inside, the rule for tenant is that if you can show that you don't get 20° degrees during 24 hours, you should get your heating payment back" (Lands employee, 2016).

Lands receives complaints about the temperature inside their dwellings

"We receive heating complaints, but as we have temperatures measures inside the dwellings we can show when these complaints are not correct and that tenants had 20°" (Lands employee, 2016).

Landskronahem doesn't use system with automatic shut-down of the radiators when the windows are open: "We don't have indicators for the windows being opened, I can't see the payback time for the installation of censors on the windows" (Lands employee, 2016).

7.5.4 The situation of collective heating in Sweden

There is no difference for tenants if they consume more or less heating: "We can't bill more to tenants. If they have consumed more or less they won't pay differently, they pay the same always. But there has been a lot of discussion to give the possibility to tenants to pay more in order to have access to a higher temperature inside their dwelling like 21° and more, simply tenants would pay more to have extra heat. Landskronahem doesn't use such a system, as tenants pay the normal price" (Lands employee, 2016).

7.6 Landskronahem monitors the temperature inside dwellings but doesn't use it for the billing

Landrskronahem doesn't have a meter for the heating consumption of each apartment, but more usually a collective heating meter for each building or in worst case for several buildings, like in the DREEAM project pilot site where they have 2 heating meters for the group of the 5 buildings. Landskronahem doesn't have sub-meters in each apartment, though they collect the temperature measures in each apartment. They indeed have censors to measure the inside temperature for all the apartments of the pilot site, and these measures are made available for the DREEAM partners. The temperatures measures are though not used by Lands to calculate the reallocation of the collective charges for the domestic hot water and the heating at a household level (individual bill). All the tenants will pay a price that is not linked to their actual consumption. "We don't use the temperature value to bill, tenants will pay the same whether they get 19 degrees or 25 degrees inside their dwelling, or whether they take long showers, they will pay the same in their bills. Every month we are evaluating the hot water, the heating and the electricity consumed for each building because we don't have the figures for the tenants, but for the building we evaluate it every month at least. The hot water and the heating are included in the rent for the tenants" (Lands employee, 2016).

7.7 Individual billing for the heating is not a perspective for Landskronahem

In the periods when the collective consumption has been inferior to the global individual bills payment collected, there is a refund system. Though Landskronahem doesn't want to reopen a discussion about the individual billing and metering because they already: "go out of a discussion about this, it was too long and complicated" so now they have decided to keep the collective metering and billing even if: "it's not the better in term of costs, but it's not wise to reopen the subject" (Lands employee, 2016).

7.8 Lessons learnt for future projects about the way to collaborate with tenants

The feedbacks received by Landskronahem in other renovation projects are ok: "we are not doing it better or worse than anyone else in Sweden. If some tenants are unhappy we have discussions with them, and sometimes we offer them 1 or 2 months of bills if they haven't been able to use some equipment" (Lands employee, 2016).

7.8.1 The reason why it was impossible to organize interviews with tenants

The pilot site experiences issues related to Anti Social Behaviors (ASB). The employees of Landskronahem have received threats from local tenants and this is why the sociological evaluation and interviews before the renovations are not possible to organize in this context. Landskronahem have formally informed the project manager and the WP4 partners that the visits or interviews inside dwellings wouldn't be possible to organize prior to renovations.

The solution we have proposed for the WP4 is to organize interviews post-renovations with a group of tenants who will come to live in the refurbished dwellings. The detailed methodology proposed for the sociological evaluation in the Swedish pilot site is described in the deliverable 4.2.

7.9 Communication experience with tenants

To inform tenants about the renovations, Landskronahem sends a letter to every household with the starting date and closing date of the work, and 2 or 3 contacts in the team of the building owner if tenants want more information before the start of the work.

In this letter, information is also given to allow the access to tenants' dwellings during renovation. The time lapse to inform tenants is short: when the renovations are done inside the dwellings, the information letter is sent 4 weeks before the start of the work, and 2 weeks before when the renovations are done outside the dwellings. Another way to inform tenants is with meeting notes that are put in the public areas.

7.10 Conclusion

In the WP4 we will focus our sociological evaluation for the Swedish pilot site in 2017 and 2018 on:

- **Building a training program for tenants after the renovations to:**
  - support an appropriate use of the new refurbished dwellings and the new installed equipment;
  - give advises for tenants and support them to better control their electricity, heating and hot water domestic consumption;

- This training program will be developed for Landskronahem based on exchanges between Savills, Open Domo, SinCeO2 and the BOs in 2017/2018 and validated by their team in order to be adapted to their objectives & work process;

- Building a detailed guideline for the interviews with tenants after the renovations with a set of indicators to evaluate the improvement of life conditions, thermal comfort and attractiveness of the renovated buildings. A 1st proposal of social indicators is presented in the deliverable 4.2 (Sociological evaluation strategy).

8 The 1st Italian pilot site

8.1 Introduction on ATER and the pilot site

8.1.1 ATER Treviso

ATER Treviso is the Territorial Agency for Social Housing with public body status, having legal personality, self-organizational, self-financial and self-accounting. In order to meet the needs of the least well-off, ATER Treviso manages the building heritage for social housing within the territory of Treviso. It also works closely with various municipalities of the Province as well as with the Veneto Region through the network of ATER Veneto (ARAV). ATER Treviso manages about 6,000 lodgings to be leased for residential purposes[7].

Because the international crisis, from November 2016 Veneto Region is carrying out a reform process in Veneto social housing public companies, that has started with the Regional Law n. 13 of 28th June 2013. This reform process is progressively reducing the funding for social housing (retrofitting and new constructions) and getting ATER Treviso under the control of Veneto Region.

8.1.2 ATER Treviso is leading building renovations experiments for the group ATER

Currently ATER Treviso is called to be the 1st actor to give the kind of feedbacks the company will get from the DREEAM project for all the group ATER in Italia. ATER Treviso is a sort of the pilot site of all ATER Italy with various experimental projects. The information gathered during the various projects of ATER Treviso will also be very useful for other social housing companies in Italy as they don't have this kind of data.

8.1.3 ATER has one inspirational renovation project before DREEAM: the TIMBER project

ATER is currently testing a platform proposed by the company CAME HOME AUTOMATION in the context of a renovation project in Mogliano. This project is called "Near zero energy timber building" where 20 dwellings have been built near Treviso. These dwellings are made available for socio-economic vulnerable households.
This platform CAME tested by ATER is a building automation energy management with:

- An optimization of the synergy between various renewable energies to avoid giving energy to the public grid;
- An action on behaviors with consumption display and alerts for tenants;
- A calibration of supplies according to the actual situation via remote monitoring.

[7] Official ATER presentation (http://dreeam.eu/partners/)

The detailed description of the Timber building is available in this document presented in 2015 by ATER to Eurhonet:http://www.eurhonet.eu/wp-content/uploads/2015/12/151117-Day-1-02-ATER-Treviso-presentation.pdf

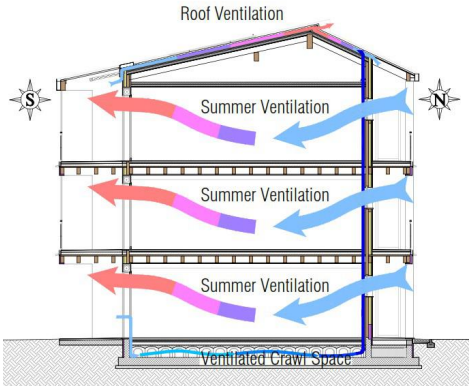
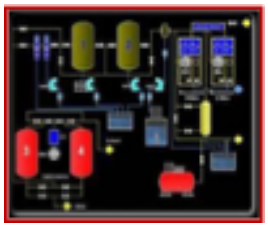


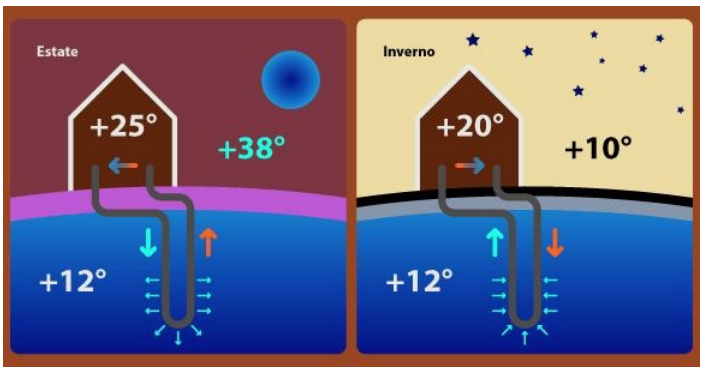
Figure 3: the NEAR ZERO ENERGY TIMBER BUILDING IN MOGLIANO

The CAME Platform used by ATER in the Near Zero Energy Timber building

Between ATER TREVISO and the company CAME HOME AUTOMATION was born a partnership, aimed to create a NZE «tailor made» building model and to create an efficient monitoring and ICT systems: NEAR ZERO ENERGY RETROFITTING: *« Energy consumption monitoring and ICT control experience ».*

ATER TREVISO wants to gain experience in energy consumption monitoring and ICT control to better understand actual project investment ROI, and EPC conditions (Energy Performance Certificate).





With this type of CAME Platform, ATER wants also to reduce energy consumption of the building portfolio with 3 actions:

1° ACTION: Optimize the synergy between the various renewable energy (geothermal, solar and photovoltaic) to avoid giving energy to the public grid. The home automation system manages accumulations (eg. solar energy in tanks) and peak demand;

2°ACTION: Minimize waste heat by acting on behaviours. Through a classic and well known Intrusion and Probes plant in every room, it is signalled to the tenant by an alarm the maximum time in which the window opening does not involve use of additional energy for heating. The sensors record the temperature in each room. The house is divided into areas of temperature that can be set for that purpose;

3° ACTION: Calibrate supplies according to the actual situation via remote monitoring. The plant is designed according to data that are derived from abstract models. To avoid discomfort and thermal waste due to the inevitable discrepancies between model and reality, in this building a system of remote monitoring allows you to record on a computer, the data on the behaviour and external and internal temperatures. This registration also allows you to compare the different performances of the two buildings and to perform a cost benefit analysis of the technical choices.

8.1.4 Key objectives of ATER with the DREEAM platform & renovations' visualization

The interviews with ATER team in 2016 allowed us to understand that the key information ATER would like to be displayed in a dedicated platform for building owners are:

- Tenants' consumption of heating & domestic hot water;
- Lights consumption even if the consumption related to lights should be low;
- Elevators consumption;
- Ventilation consumption;
- Individual consumption of the 7 monitored dwellings in the new pilot site;
- Tenant's behaviors to save energy.

And the key other services that ATER is expecting in the DREEAM platform are:

- Display the final assessed energy efficiency of the buildings thanks to the renovations especially the display of heating consumption;
- Ideally: optimize the use of renewable energy thanks to the software;
- Ideally: display the CO2 impact of the buildings' consumption (ATER wants to control the emissions of CO_2). And an option to display the CO_2 savings after the renovations compared to other similar buildings not renovated could be interesting;
- Allowing the **engagement of tenants in renovation benefits** – alleviation of split incentives, encouragement of consumption monitoring data sharing with the introduction and the use of ICT tools (mobile APP, PC dedicated portal), improvement of positive behaviors in energy saving;
- Promoting a **method to replicate the use of EPC in residential social buildings** – currently not widely disseminated – by the verification of the operational requirements (feasibility, cost/benefits, legal constrains) at the end of the project in the frame of transferability/replication strategy, as possible management option for the Italian social housing companies, that by law can't manage energy directly. This alternative is analyzed and conceptualized in the DREEAM, although the EPC ESCO contract is not implemented for the pilot building due to the still existing normative barriers in Italian public companies legislations.

8.2 The 1st Italian Pilot Site

8.2.1 Technical characteristics of the pilot dwellings

Not all the ATER building pictured in the Figure 4 below was part of the DREEAM project in the 1st pilot site. Only the blocks 24 and 26 (in orange) were part of our project. The renovations that were supposed to happen in the blocks 24 and 26 would have had a key importance for the rest of the building, as the final adopted solutions for DREEAM would most probably have been later adopted for all the buildings of this bloc.

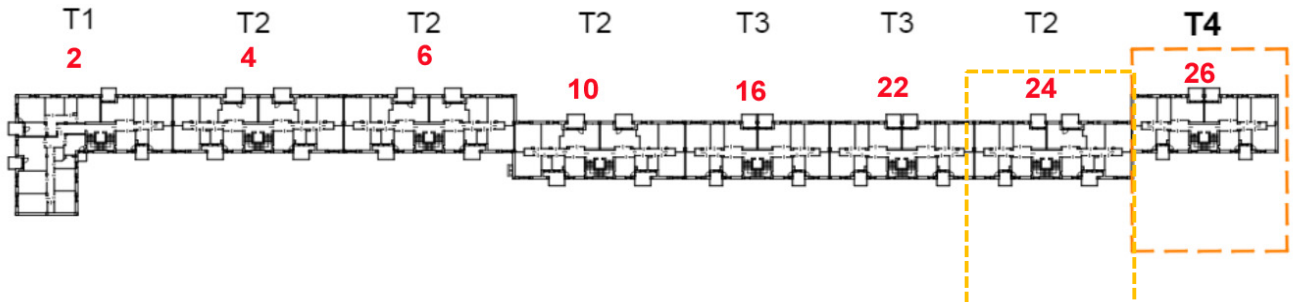


Figure 4 - Map view of the 1st pilot site

Figure 5: Aerial view of the 1st and 2nd pilot sites in Treviso

The 1st pilot site was composed by the building blocks 24 and 26. These 2 blocks are different by the architecture of their dwellings:

- The block 24 is composed by 6 floors with 2 identical T2 dwellings at each floor & 1 bathroom;
- The block 26 is composed by 6 floors with 2 identical T4 dwellings at each floor & 2 bathrooms.

Shortly, the 1st pilot site was characterized by a poor insulation of the dwellings, important air leaks through the windows structure and heat waves in summer that we will describe precisely in the next parts.

8.2.2 Socio-economic context of the 1st pilot site

The 1st pilot site was not a segregated area, despite that an important part of the tenants have low incomes. The collective feeling inside the pilot buildings is more a “village atmosphere” according to both tenants and the building manager. Many of the tenants living there have moved inside their dwellings when the building has been built, so there is a strong link with the area and the site for many tenants. There are no criminal issues and ASB (Anti-Social behavior) in the 1st pilot site.

8.3 Process of interviews with tenants and ATER employees in 2016

8.3.1 Schedule of interviews organized with tenants in Italy pilot site

14 households interviewed in April 2016 during 3 days

⇒ Method: qualitative semi-structured interviews with tenants inside their home, with a detailed guideline of questions prepared prior to interviews by a sociologist
⇒ Duration: 1 hour
⇒ Reference: the full interview guideline is presented in the deliverable 4.2a

These interviews have been very efficiently prepared by ATER team with tenants.

- Before the start of each interview, ATER employee explained again to the tenants the goal of the DREEAM project and the objective of the sociological interviews, as well as their rights related to the personal data that we collect during interviews;
- Tenants were given the possibility to refuse the interview or to ask any questions to ATER employees and the sociologist before the start of the interview;
- Then each interview lasted 1 hour and has been performed inside the apartment of the tenants, allowing to question tenants on their domestic uses *in situ* with direct demonstrations of their interactions with equipment such as radiators, windows, electric appliances. The interviews were performed in presence of the sociologist of Savills and 1 ATER's employee.

8.3.2 Schedule of interviews & meetings organized with ATER team

Before the interviews with tenants, 2 interviews have been organized with the ATER team and the local building manager to discuss about the socio-economical context of the 1st pilot site, and about the most relevant selection of tenants to interview and monitor;

- 1 group meeting has been organized at ATER office in February 2016 in presence of 3 ATER employees, the local building manager of the 1st pilot site, Savills, SinCeO2, Open Domo & Chalmers;
    - Savills lead the interviews with ATER team (group exchanges with a guide/ a prepared list of qualitative semi-directive questions for the group of participants, in that case the 3 employees of ATER)
    - Savills also lead a qualitative semi-structured interview of the local tenant manager during this meeting. The exchanges have been prepared with an interview guideline to collect the opinion of the local manager on the specific topics that are:
        - The key positive or negative feedbacks expressed by tenants about their quality of life in the dwellings these last years, their thermal comfort and the improvements expected from the point of view of the local manager;
        - The habits of energy consumption management by tenants;
        - The best communication process with tenants;
        - The social and economic context and the potential situation of fuel poverty.

- 1 phone meeting has been organized between ATER, Savills, SinCeO2 and the local building manager 1 month after this 1st meeting to check the 1st selection of tenants for interviews and monitoring, and to start scheduling the interviews and the installation of monitoring equipment in the pilot buildings.

8.4 Social structure of households in the pilot site & households in our corpus

The typical types of household in the global pilot site

Compared to the rest of the ATER stocks, the 1st DREEAM pilot site is representative of the entire building bloc in terms of:

- Site and dwellings size. The 1st site is not particular and ATER manages larger and smaller sites in terms of the number of properties covered;
- In terms of households' diversity and family types with a good mix between families, elderly tenants, tenants with work & tenants without work.

In the 1st pilot site, according to ATER employees the households' structures are various but a majority of households are mostly composed by:

1. Retired tenants present all the morning, leaving sporadically or sometimes in the afternoon but mostly at home all day long and 1 family with the 2 parents unemployed staying at home (searching sometimes work outside);
2. Families: a mix of active tenants leaving in the morning and tenants staying at home during the day (housewives, unemployed children). It is important to notice that except families with young children going to school, the other families are composed of parents living with older unemployed children (with age range from 20 to 40 years). Indeed, several singles and couples live with not young children but adult children and the household is mostly occupied during the day by at least 1 or 2 persons using several electric equipment simultaneously. On the other side, almost a third of our selected tenants are retired and stay at home most of the day.

The households selected to be interviewed (corpus of 14 households)

14 households: 7 households in block 26 and 7 households in block 24

Total number of tenants living in the households interviewed (adults and children included): **41**

Gender structure: 21 men and 20 women

Key statistics about the corpus selected in Pilot 1

Households structure

The more common types of family in our corpus are retired tenants with no children at home and families (couples or singles adults not retired with children).

Statistics:

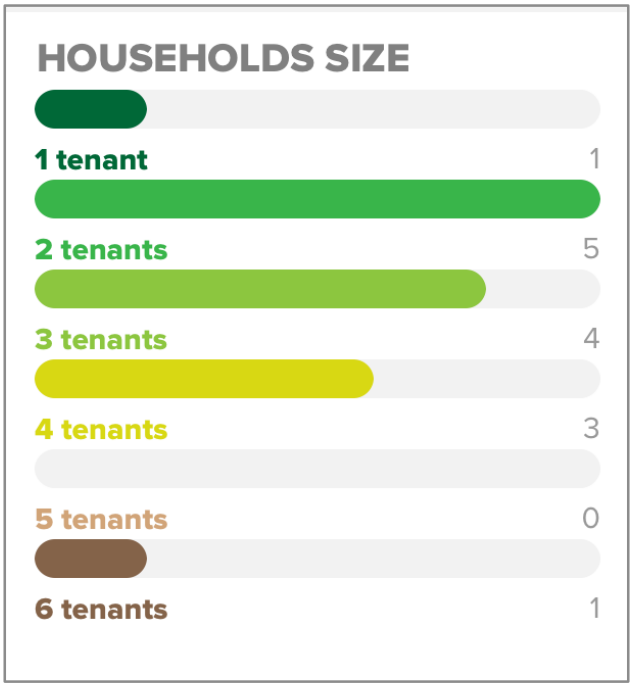
- Singles without children including single elderly tenant:1
- Couples without children (>45 years old or retired): 3
- Couples with 2 children or less: 6
- Couples with more than 2 children: 1
- Single parents with 2 children or less: 3
- Single with more than 2 children: 0

Households size

Our corpus of 14 households is composed by little size of households in most cases: households with 2 to 4 tenants are the most common in the Italian pilot site.

Statistics:

Households composed with 1 tenant: 1
Households with 2 tenants: 5
Households with 3 tenants: 4
Household with 4 tenants: 3
Households with 6 tenants: 1



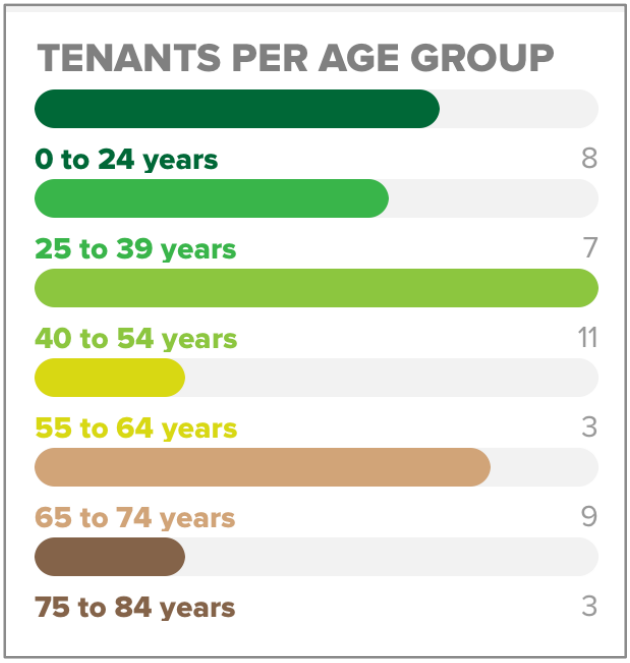
Age groups

The tenants present a good diversity in age groups, except in the oldest range: no tenants in our selected group is aged more than 84 years. The 3 main age groups are 40 to 54 years old, 64 to 74 years old and 0 to 24 years old.

12 tenants are in the age to be retired with a rising concern over the life quality of elderly people in the building with a strong thermal difference between cold, humid winters during 2 months and very humid and warm summer.

Statistics:

8 tenants are aged from 0 to 24 years
7 aged from 25 to 39
11 aged from 40 to 54
3 aged from 55 to 64
9 aged from 65 to 74
3 aged from 75 to 84
0 aged up to 85 years



8.5 Patterns of presence inside the dwellings

In our guideline used during the interviews with tenants, we have integrated indicators related to the wake-up time and the periods of the day where tenants are at home and when they use the most and the less their various domestic appliances, and their heating system, in order to build 2 additional relevant social indicators to our sociological evaluation strategy before renovations.,
These 2 social indicators are:

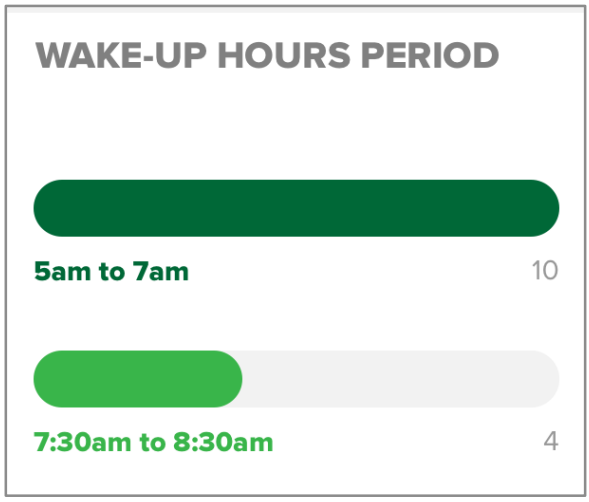
1. "Full time dwelling occupancy": for the full-time presence at home of at least 1 tenant;
2. "Domestic cycles indicator": for the time patterns of presence inside the dwelling.

Value of these 2 indicators for the social and statistical analysis

These 2 indicators allow to establish the daily cycles of energy consumption inside the dwellings, and the situations of high heat demand & thermal comfort priority for tenants who stay at home most of the day (such as retired tenants or unemployed tenants). These 2 indicators also allow to determine opportunities for energy load models with peak-demand, off-peak demand periods, time-related consumption habits and opportunities of Demand Respond scenarios. The answers of tenants on their daily patterns have been analyzed and we present below the detailed results that will be useful for the technical partners of the WP1/WP2/WP4.

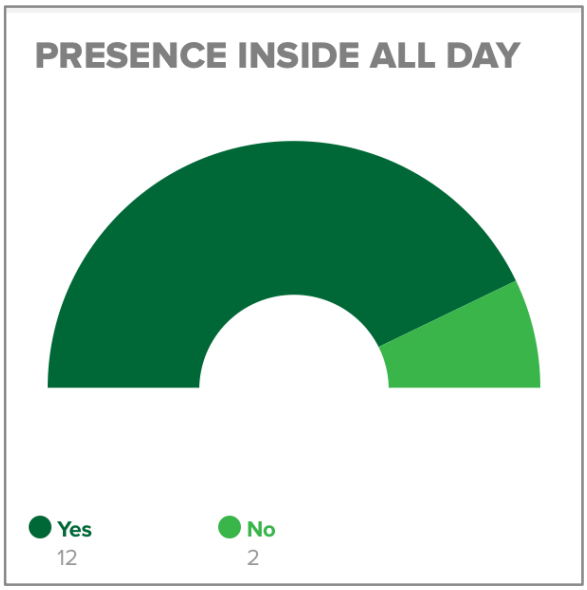
An early wake-up time

10 households wake-up between 5am to 7am with a linked peak demand of electricity and heating consumption during the 2 following hours.
Only 4 households wake up between 7:30 and 8:30am.
Only several tenants (and 2 to 3 tenants regularly) are not present each day in the dwelling or leave very early before 6am.



An almost continuous presence inside the dwelling during the day

The classical dwelling use patterns opposes working hours with empty dwelling (from 9 am to 6pm) versus domestic life time with an occupied dwelling (morning and evening). But this classical use pattern is not common in the 1st Italian pilot site with a strong presence at home during the day for a majority of households:
92% of tenants (12 households on 14) have at least 1 person who is present in the dwelling during daily hours, meaning that each dwelling is rarely completely empty. The continuous users of dwellings are retired tenants, unemployed and staying-at home housewives.



8.5.1 Peak and off-peaks periods during week-days (Monday to Friday)

Peak-demand periods

There are 2 peaks demand periods with multi-occupancy and multi-energy uses of various electronic equipment, as well as the use of multi-radiators inside the dwellings: breakfast and dinner.

But there is also an important demand period during lunch time with 63% of the tenants who come back during 1 to 2 hours inside their dwelling between 12am to 2pm.

Off-peak demand periods

Middle of mornings and afternoons are off-peak demand periods with only 34% to 39% of tenants present at home.

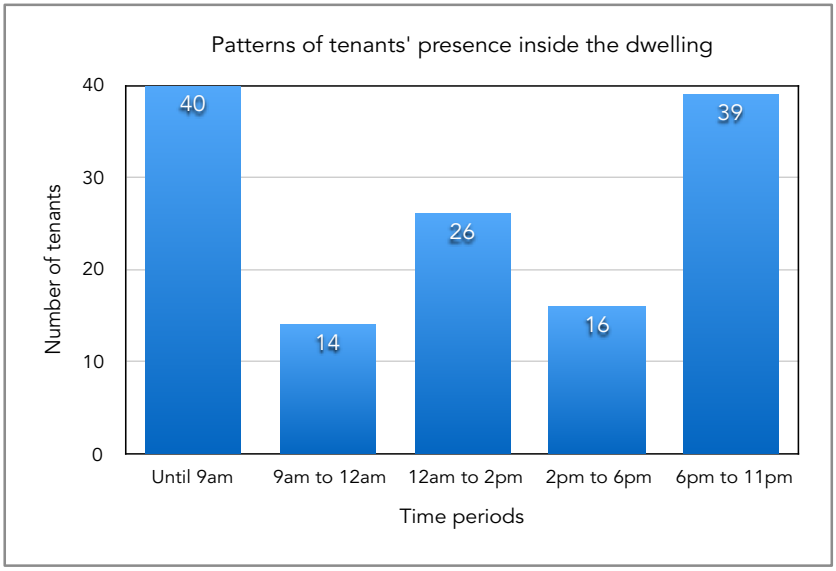


Figure 6: number of tenants at home during hours' period

Wake up hour	Presence in the morning until 9am	Presence during the morning from 9am to 12am	Presence during lunch 12am to 2pm	Presence from 2pm to 6 pm	Presence from 6pm to 11 pm
6am	4	2	3	2	4
7am	2	2	2	2	2
07:30/8am	2	0	1	1	2
8am	6	2	4	2	6
7am	3	0	0	1	1
6am	3	1	1	1	3
07:30/8am	2	2	2	0	2
6am	2	2	2	2	2
6am	4	3	2	2	4
7am	1	1	1	1	1
7am	2	2	3	0	3
5am	3	1	3	0	3
08:30am	2	1	1	1	2
6am	4	0	1	1	4
Nb tenants	40	14	26	16	39

Figure 7: detailed data per household on presence patterns inside dwellings

The differences between the total numbers of tenants in our corpus (41 tenants) and the total numbers displayed in the table in the morning and evening (40 and 39 tenants), are explained by the absence of tenants during very early hours or late hours, as these tenants are not present in the dwelling but they work.

8.6 Comfort of collective equipment & areas

8.6.1 Light comfort in collective stairs and entrance

The light system is fine in collective areas for all the tenants interviewed. The bulbs are powerful enough in entrance and stairs and are not an issue for elderly people.

The question of light comfort is important in buildings where many elderly tenants and children live as low energy bulbs can generate difficulties to move, and to see clearly. Indeed the low energy bulbs can take several seconds to light at their full power and don't allow tenants to see well enough in the corridors. We have noticed only one tenant who declared that in the underground tunnel, where the tenants have a private locker cell, the lights could be changed for more powerful ones.

8.6.2 Thermal comfort in collective spaces

The temperature in stairs and entrance is fine for all tenants both in winter and summer. The windows in the stairs could be replaced by better windows according to some tenants because of cold air leaks. A tenant mentioned that we could install an extractor of humidity and smell in the stairs. Tenants don't want to heat the collective spaces and then to pay more for the heating.

8.7 Thermal comfort in dwellings in winter

8.7.1 An important difference of thermal comfort between the floors

The interviews with tenants show an important difference of thermal comfort between the different floors where the dwellings are situated.

- **The dwellings at the 1st floor** are very cold with a lot of humidity (80%), and a lot of mushrooms/mould (in the north bedroom on the walls angle, on the walls, even on the ceiling and in the North bathroom). Some tenants spend a lot of money to repaint up to the mushrooms present on the walls and ceiling.
- **The so-called "sandwich apartments"** (2nd or 3rd floors) is the best situation with a good thermal comfort, with low humidity, no mushrooms and nice temperatures on both west and north side. The apartments on these floors are indirectly warmed by the apartments downstairs and upstairs.
- **The upper apartments** with north side rooms that are cold to very cold, with humidity and sometimes mushrooms/damp.

8.7.2 The thermal comfort inside dwellings

9 households consider that their apartment is cold and humid.

These are the households n° A,B, G, O, S, T, U, X, Y

⇒ "This is the worst apartment for the cold because we are at the 1st floor and there is a lot of cold air flow under the floor with the entrance" (A-Floor 1)

⇒ I would like higher temperature in the apartment because it's particularly cold. We are at the 1st floor and we have a lot of air under the apartment, so it's very cold inside (O-Floor 1)

⇒ “It’s cold” (B-Floor, G-Floor 4, T-Floor 4, U-Floor 4, X-Floor 4)

⇒ “We are cold in the bedroom because of the North position and the structure of the ceiling, we are at the 6th floor” (Y-Floor 6)

5 households consider that their apartment is not cold and is comfortably situated at a sandwich level (Floors 2 and 3) or an upper floor (Floor 5).

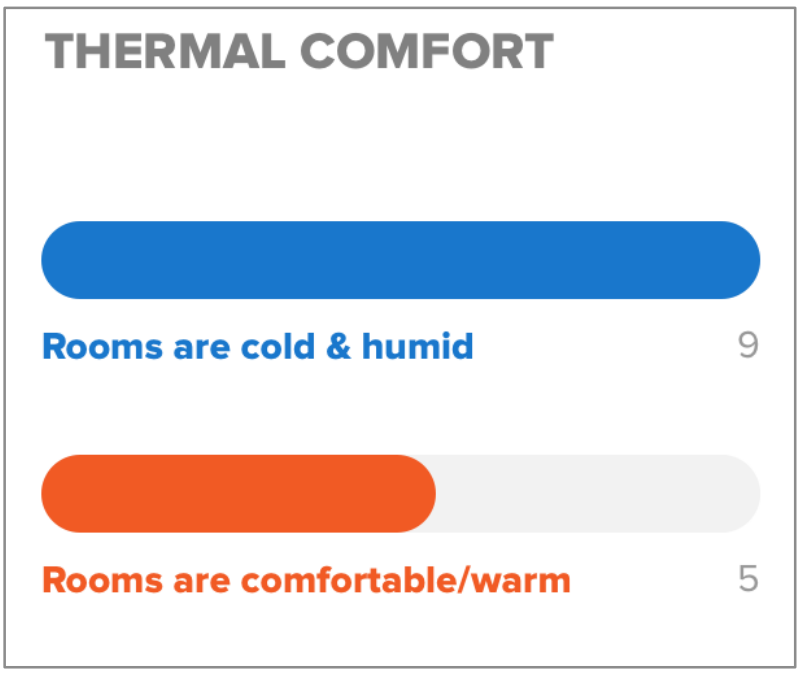
These households are n° C, D,E,K, V

⇒ "During the winter, the west side bedroom is cold but the north side is fine, there is no humidity problem in winter (…) it's comfortable as we are a sandwich apartment" (C-Floor 2)

⇒ The apartment is very well for them after their previous experience in a bad apartment with lots of humidity, and problems. They are in this apartment and in the building for 1 year and they like it here compared to before, so they have no particular critics to address, it is warm usually in winter" (D-Floor 2)

⇒ “All the rooms are equal and are warm enough in winter, only the living-room is a bit colder” (E-Floor 3)

⇒ “It’s comfortable” (V-Floor 5)



8.7.3 The impact of orientation on thermal comfort

There is an important difference of thermal comfort in the dwellings divided between the cold rooms situated on the north side and the warm rooms situated on the west side: “We are cold in the bedroom because of the North position and the structure of the ceiling, we are at the 6th floor. There is a big thermal difference between the kitchen (west) and the living-room (N)”

There is only 1 household where the temperature is felt and considered as equal between the different rooms, opposed to the perception of the other tenants: “All the rooms are equal and are warm enough in winter, only the living-room is a bit colder (E-Floor 3)”

Rooms on the north side are colder and more humid

9 households consider that their apartment in general is cold and humid, especially in the living-room and bedrooms on the north side have a lot of humidity.

These are the households: A,B,F, G, O, S, T, U, X

11 households consider the living-room as cold and even the coldest room in the dwelling.

11 household consider the bedroom on north side as cold.

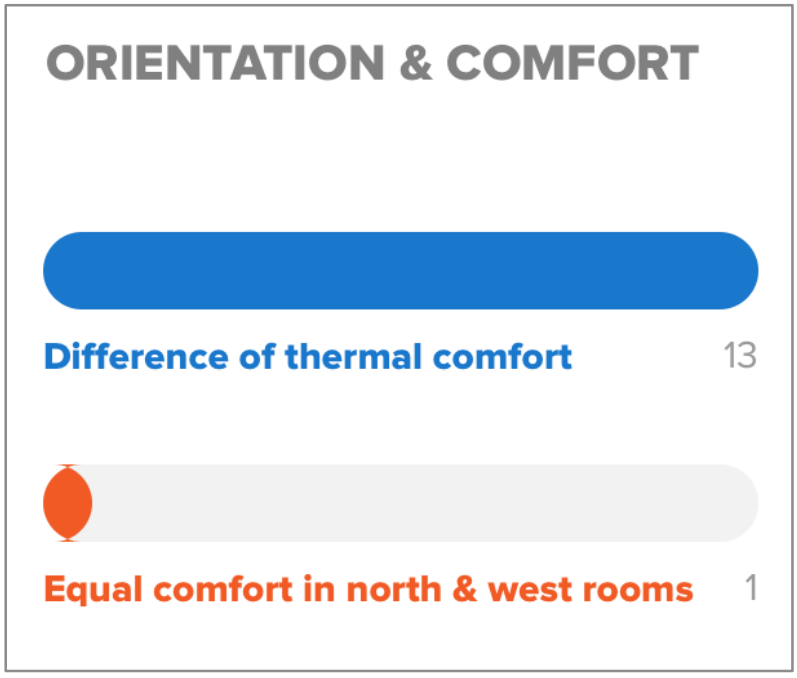
Rooms are neutral to comfortable on the west side

The rooms that are perceived as comfortable, not only neutral but really comfortable and warm are on average: the kitchen and the bedrooms on the west side.

This observation is common amongst most of the households in our corpus, which illustrates the strong difference of thermal comfort between the west/south and the north side of the dwellings.

12 households consider the kitchen on the west side as warm or comfortable

11 households consider the bedrooms on the west side as warm or comfortable: "Best room/warm and comfortable"(B-Floor 1)



8.7.4 The impact of humidity feeling on thermal comfort

10 households experience problem with humidity when 4 households at the contrary have no experience of humidity perception impacting their thermal comfort.

The households with humidity problem are n° A, B, C,O, S, T,U, V, X, Y

There is a big difference of thermal comfort perception between sandwich apartments where there are lower to no humidity feeling, with the other apartments.

Some tenants use a “deshumidificator” in winter (not the heating option) to dry the air. The important humidity increases the discomfort and cold feeling for tenants.

During our discussion with tenants we have learned that before the last building's work 15 years ago, there was no humidity, they have discovered that the cover was made in concrete, and this is what created the humidity problem inside the building and inside their dwelling. The project manager also explained that the other tenants have discovered the same phenomenon and that when ATER did this renovation work with concrete, they were the first ones to do that in the region and they have realized their mistake with the façade very quickly after and the impact on the humidity in the building. The tenants have discussed a lot about this problem with other tenants, technicians, and the building manager.

⇒ "Humidity is so important both in winter and summer that we have bought a dehumidificator" (A)

⇒ "Humidity is quite ok in winter, but sometimes we use the AC system to dry the air during cold humid days" (B)

⇒ "Humidity is not a problem in winter but it's a big problem in summer!" (C)

⇒ "There is no problem of humidity, it's very dry in this apartment, I feel well in this apartment" (E)

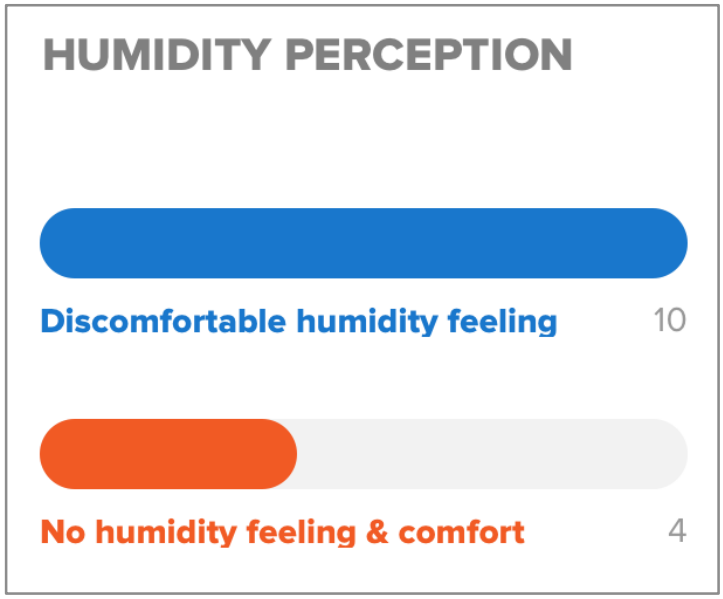
⇒ "There is no problem of humidity in winter" (G)

⇒ “There is humidity in the rooms on the north-side, with mould not only around the windows but on the rest of the surface on the north side” (O)

⇒ “Big humidity problem in the north big bedroom but not in the West bedroom except on the linked angle with the North side” (S)

⇒ "We have bought a humidity absorber. The south side is comfortable but it's cold on the north side” (U)

⇒ “It's very humid with the normal radiator but if feels dry and warmth with the AC option heating” (V)



8.7.5 The presence of mould

There is a presence of mould in 8 households: A, B, O, S, U, V, X, Y. At the contrary, all the other 7 households have no mould.

⇒ "In the angle between the bedroom wall and the terrace" (A)

⇒ "In the corner and angles but not on the ceiling" (B)

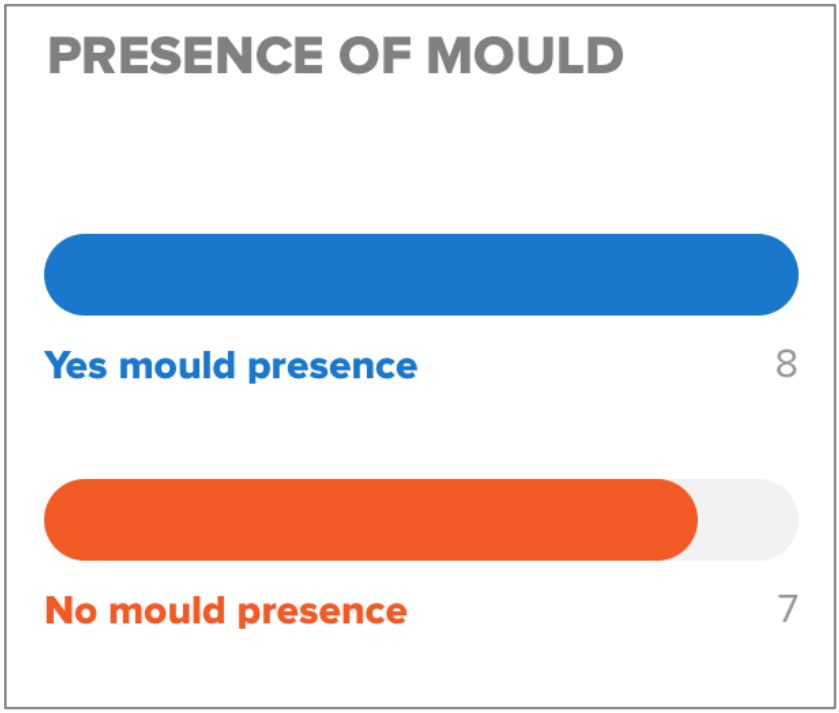
⇒ "Big problem, yes around windows especially for 2 years" (O)

⇒ "Mould on the wall and on the angle with the south bedroom" (S)

⇒ "Between radiators and windows on the north side" (U)

⇒ "Very bad for the mould, very big mould presence and lots of humidity. There is mould on the wall and in the angle, under the window but not on the ceiling. It's the worst room for humidity/north bedroom" (V)

⇒ "There is a disastrous situation with the mould, the heating and the humidity in the dwellings, and heating bills are too high. We have repainted all the wall and the ceiling that were black of mould. There was mould everywhere on the ceiling and on the walls. At the 6th floor there is more and more air leaks, it's colder. We are very attentive to the official dates of the central heating opening as we feel very cold in the apartment in winter" (Y)



8.7.6 Heating demands difference between apartments

The structural difference between the “sandwich apartments” and the other apartments on the thermal comfort, has an important impact on the heating consumption of households depending of which floor they live. We notice an important difference of the heating patterns between the households: the ones living in the sandwich apartments heat less often, during less hours and at an inferior set points on the radiators than the households living in dwellings at other floors.

Apartments at a “normal floor” have important heating consumption

⇒ "We open all radiators at full (5) everywhere all day long except in the entrance. We never have to open the windows because it's was getting too warm" (B)

At the contrary, in the “sandwich apartments” tenants have lower needs for heating

⇒ “We would like to have a shorter period of collective heating, it's too long for us. We are in a "sandwich apartment" so it's well warm usually but there is a problem of humidity and mould. The collective heating shut-down period is good for the other dwellings but our apartment has different needs and I close often the radiators, we only use radiators in the 2 bedrooms and the living-room. I am happy with the consumption of this apartment” (S)

⇒ “We use the radiators very few days in winter in the 2 bedrooms and in the living-room during the day. We open in the kitchen every day at 12am for 2 hours and the evening a little bit. In the bathroom, we open at 6pm for the shower and during 2 hours. In the entrance the radiator is always closed and in the little bedroom” (C)

Tenants are themselves aware of this injustice between the different dwellings & floors

⇒ "I know that the "sandwich apartments'" use only the power 3 and don't need more to get warm, instead of here. I know very well how the thermostats on the radiators are working and the impact on our charges. We discuss between neighbours about the temperature comfort and we also compare charges sometimes. I want more information about the charges and the bills. There is an inequality between people living on the 1st floor and the rest of the building especially the sandwich apartment, we have to pay more to warm. We discuss between neighbours about the temperature comfort and we also compare charges sometimes" (O)

⇒ “I feel cold despite the power of the radiator (5)" (O)

⇒ “We oblige ourselves to open them during the coldest days in winter, when we see 17° on the thermometer. We used radiators only around 25 days last winter. We feel good during the day with the radiators on” (V).

8.7.7 Rooms heating patterns

More heated rooms: living-room & 2 bedrooms

The analysis of interviews show that in our corpus the 3 rooms that are heated during winter days are: the living-room, and the bedrooms on the north and west side.

- 8 households heat all day long these rooms to get a comfortable feeling.
- The other households only heat a limited number of hours each day.

Less heated rooms: entrance & kitchen

On average, 2 rooms are never heated as they are warm indirectly without the use of radiators: the entrance and the kitchen are almost never heated.

8.8 The impact of air leaks on thermal comfort

For the majority of tenants interviewed, there is a problem on each window especially on the north side. Tenants feel the cold air leaks from the little slide out of which the ribbons of the external curtains pass through, and also from the wood bloc inside which are contained the external curtains.

11 households have important air leaks: A, B, C, E, G, O, S, T, U, V, Y

The origin of the problem is the curtain system with the wood bloc and the ribbon creates an important heat loss and a strong feeling of cold air current velocity in the north rooms that increase the low thermal comfort perceived by tenants.

Only 3 households don't experience air leaks: D, K, X

⇒ "We have air leaks through wood blocs in the living room" (A)

⇒ "Yes, in the living room and bedrooms" (C)

⇒ "From the terrace to the living room, and on the windows on North face (U)

⇒ All the windows have air leaks. There is a lot of air current from the terrace, the windows are not very efficient" (V)

⇒ "Cold air current through the window in the living-room" (Y)

8.8.1 Central heating system, daily closure and link with tenants' ventilation habits

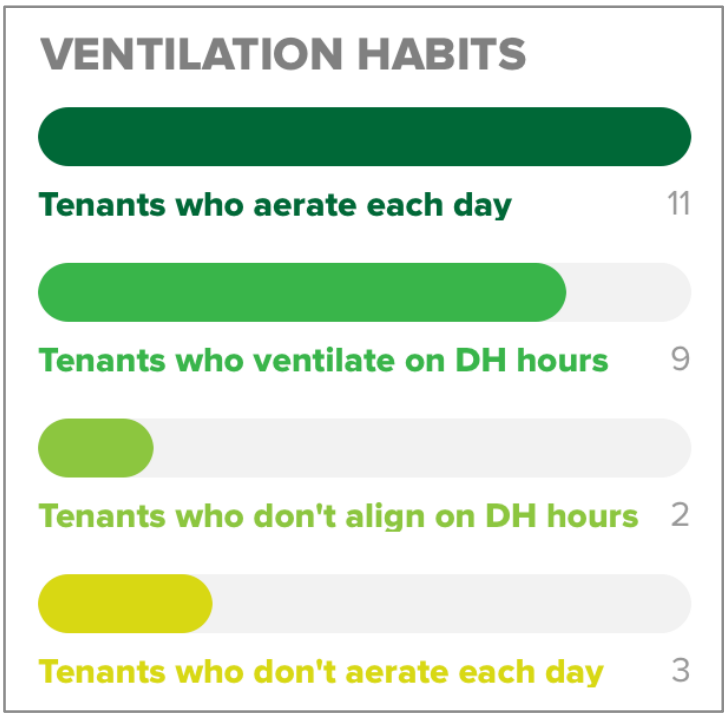
The official opening period of the collective district heating system is from mid-October or November to mid-March or April. During interviews, we have questioned tenants to check that they knew the precise dates, as well as the collective daily closing hours of the heating system. According to tenants, each day the heating system stops all the radiators in the morning (around 10am and during 2 hours).
This system has an impact on the tenants' life patterns: each day, all the tenants aerate their apartment from 10 mins to 1 hour during the time lapse when the central heating system closes the radiators in the morning. So even in winter, each morning all the dwellings are aerate completely and become colder during a specific and similar time lapse. Tenants also like to open a lot during summer, some tenants leave many windows open during the days even in winter. This is important to take into consideration for new ventilation efficient system during renovations as tenants have strong habits related to windows opening and it will be difficult to change their behaviours.

Number of households who declare that they don't aerate often and certainly not each day: 3
Number of households who declare that they aerate their dwellings each day: 11

On these 11 households, 7 households aerate between 15 to 30 mins. The others ventilate from few minutes to all day long with the windows left a bit open to keep a continuous aeration and fresh air. This habit to keep the windows open is very common in the Italian pilot site. On these 11 households: 9 households declare that they align the time when they open the windows exactly on the time lapse during which the collective district heating system shuts down the radiators.

In the 1st pilot site, we have witnessed a very good adaptation of consumption behaviours thanks to an efficient communication from ATER on the functioning hours of the radiators, and thanks to very good interactions between tenants as they discuss together about the equipment in the dwelling.

This similar time patterns of tenants shows a common cultural habit of ventilation during the domestic tasks linked to the cleaning in the morning.
These tasks are mostly performed by women in our corpus, and they share very similar time patterns and actions each morning (preparation of the breakfast, cleaning of the apartment and aeration, preparation of the day and the lunch cooking).



8.9 Thermal comfort inside dwellings in summer and climate change

8.9.1 The west/south side rooms are not « livable » in July and August

The west side of all the apartments become "unliveable" according to tenants in July and August and sometimes during days or weeks in June. Due to the climate change, the heat wave period tends to expand these last years according to tenants.

The humidity is terrible for tenants and adds to the thermal discomfort in summer: a lot of them use their cooling system to "dry" the air and some tenants have a "deshumidificator" option (they even bought a cooling system device for the service it gives to lower the humidity, not to cool the air).

⇒ "80% humidity (tenants have a censor). The warmth is unacceptable on the west side. In July, August and more and more in June" (A)

⇒ "Humidity is a real problem in summer, not so much in winter. The West side is very hot, we close windows and shutters. The hot month are July and August. We have 38° and 90° humidity in summer" (B)

⇒ "The kitchen is unliveable on all the west side. We use 2 fans on the ceiling of living-room and bedrooms, 1 fan on the kitchen ceiling so a total of 4 fans that we use all day long in summer, with an extra-cost directly on our bill, we pay 80 Euros in summer, it's more expensive than in winter. In summer, we close all the shutters to try to cool down the rooms, but we don't close the windows because I hate when the windows are closed, I like the air flow" (G)

⇒ "All the west façade is too hot. Humidity is an increasing problem in summer, in the last few years the humidity has really increased. In the afternoon in summer they can't stay in the kitchen and even by closing all shutters and windows it's crazily hot and unbearable. They use 2 fans all day long or they leave the apartment. They want an AC to stop the humidity, not for cooling" (K)

⇒ "In July and August, it's too warm, it's difficult. In Treviso it's warm in summer, 35° and very humid. I avoid the kitchen and the bedroom in summer, I would like to have renovations so I can use these rooms instead" (O)

⇒ "We close completely the persians and the windows but it is still impossible. We suffer a lot of the heat" (S)

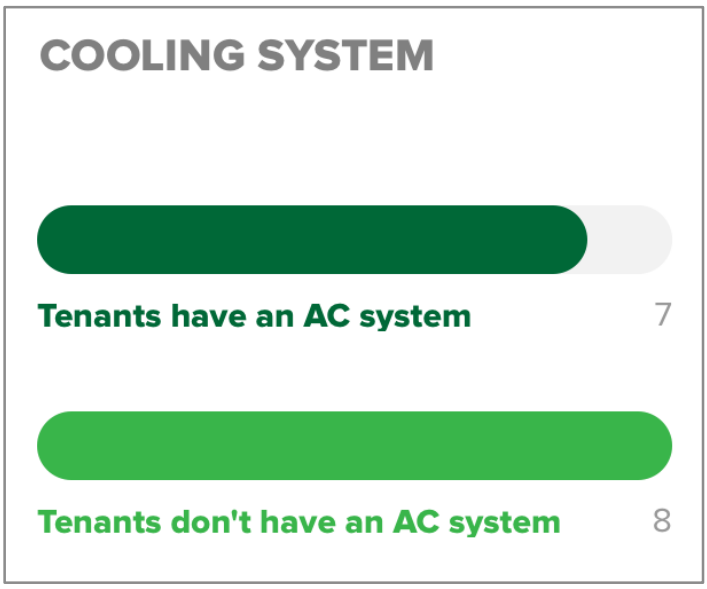
⇒ "The heat problem in summer has increased the last 10 years, the very warm period has increased and now it last from June to August. The sun protection works a bit but it's not enough. It's too warm from 11am to the evening. Humidity is very high, we have tried everything to lower it. When you close the AC, the warmth increases very quickly" (U)

⇒ "We feel very bad in summer because it's too warm (they like to live around 18°). We only have an umbrella on the terrace. It's too warm from 10am to 8pm in June, July and August. In some days during the night it's really too warm and it feels very bad" (V)

⇒ "July and August are very warm. During some summer, there is a lot of rain, and there is real change of climate in Italy" (X)

8.9.2 A situation of fuel poverty in summer

In our corpus: 7 households own a cooling system with 1 or 2 splits inside their dwelling (in the corridor and in the living-room or main bedroom) and 7 households don't own a cooling system.



The 7 households who own a cooling system, a deshumidificator or 1 fan have a higher electricity bills in the summer months. For some tenants, this additional cost is really a problem and they must limit their use of the cooling system to a certain number of hours.
Tenants use the cooling system especially during the night to be able to sleep because the heat is still very high during summer nights.

In the apartments of the 1st and last floors, by closing all the windows and putting all the shutters, the temperature in the west rooms become a bit better not comfortable but it is possible to stay a bit longer, but these apartments have a low thermal comfort in winter at the contrary.

- ⇒ "We have the AC with both cooling and heating options. We installed it last October and for the winter our bill was 242 euros for 2 months for the 1st winter use (they only use the heating during the day)" (Y)
- ⇒ "We use a lot of electricity with this device. Last summer, we have spent 150 euros for 2 months, compared to the 80 euros/ 2 months in winter" (C)
- ⇒ "20 Euros more each 2 months in summer" (G)
- ⇒ "18 Euros more for 2months in summer" (K)
- ⇒ "70 Euros more in summer (for 2 months bill)" (S)
- ⇒ "The AC has costed us 80 Euros more compared to normal bills for the first 2 summer months of use so 150 Euros for 2 months"(U)

For the tenants who are just about to buy a cooling system, the future electricity bills in summer is a real concern: "We are worried in advance about the cost of the AC use in summer in 2016, it will be our first summer of use".

8.10 Social risks useful from the 1st pilot site for the new pilot site

Risk with new ventilation system and local habits

It is important to note that if we install new ventilation system we will have to produce an efficient training program as many tenants don't want to live with closed windows, and most tenants have strong habits to ventilate each morning, and to leave some windows open slightly all day long (see the parts before "ventilation habits"). The same applies for the change of gas plaques by electric plaques as many tenants are not used to cook with electricity.

Risk related to the use of terraces and bow-windows

The kitchen is a very important room for a lot of tenants, especially for housewives and retired ladies who spend a lot of hours in the morning, lunch and evening to organize the domestic life and prepare the meals. In summer though the kitchen becomes "unliveable" for all the tenants met during at least 2 months (July and August) as well as the other rooms on the West side.
June starts also to become unbearable during some days or even weeks for some tenants (the period of extreme heat in the west rooms is expanding according to tenants, compared to years before).
Some tenants have difficulties in summer to prepare the meals for the lunch as they can't stay in the kitchen due to the heat.
In this context, a lot of tenants stay in the living-room in summer and use a lot their terraces on the north side. The tenants who own a bow-window on the north side are very attached to this room, which is a part of the apartment, not just an appendix and they use this room a lot as well in summer during the heat wave. 5 households have a bow-window in our corpus.

We have noticed during our visit that:

- The complex decoration inside these bow windows and on terraces. Also tenants can watch the collective life in the front park from the north side on terraces and bow-windows. There is a real life presence in the north alleys, the shop under the arcades, and the park is most of the time occupied by several people, teenagers and women with their children. The retired persons meet and discuss in the alleys, in the entrance areas. The north terraces and bow windows are important "links" between tenants and the collective life of the building and the activities in the park on the north side.
- At the contrary, the terraces on the south side are less used during summer period because the sun and heat are too strong. Some tenants use the terraces on west side to store the recycling bins (each household has 3 medium recycling bins)

In general, for all tenants, the north side terraces and bow-windows are a key element of the life quality, especially from April to October when tenants open the windows and use the terraces in their everyday life. In this context, the renovations shouldn't include options to cut the terraces and bow-windows to put a new isolation coating and several tenants have directly expressed their worries and refusal of this solution.

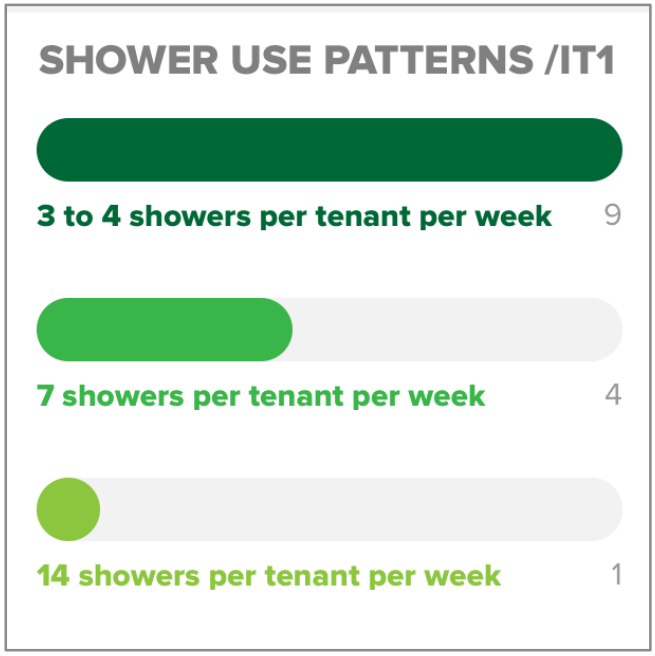
8.11 The issue of water consumption and water costs

Water uses and saving practices

Tenants take their shower mostly in the morning between 7 to 9 am and part of them in the evening. Not all tenants take a shower each day.

- 9 households are composed of tenants who take 3 to 4 showers each week per person
- 4 households are composed of tenants who take a shower each day per person
- 1 household is composed of tenants who take 2 showers per day/14 showers per week per person.

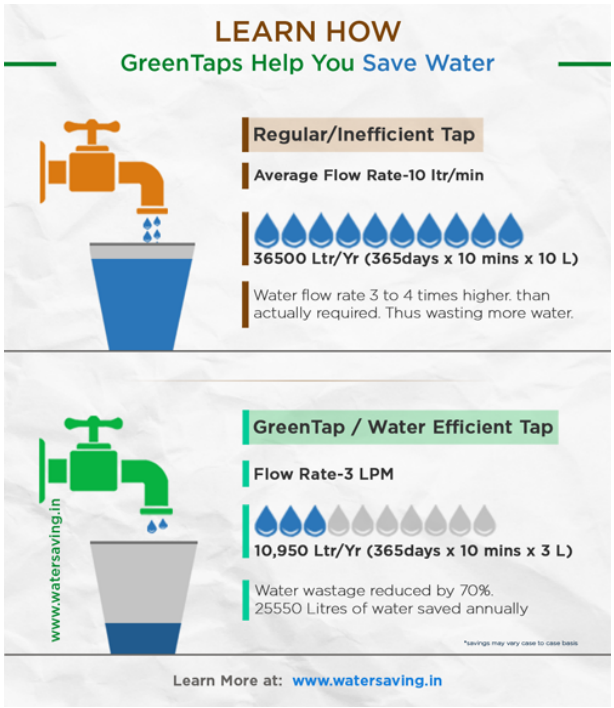
In summer, 11 households don't take more showers due to the heat, when 3 households are composed by tenants who change their habits and take many 2 to 3 showers each day because of the hot temperatures.

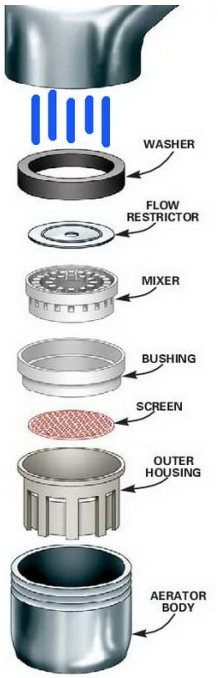


Saving practices for water and heating

9 households are very careful with the use of water and heating as their charges are considered too expensive. At the contrary 5 households are not particularly careful about their daily consumption habits including 3 households who are though interested to make changes and even to install equipment such as water "mousseur/tap aerator" product that helps to reduce the water use.

The "mousseur", also called "tap aerator", "green taps" in the illustration below are interesting for several tenants so it could be an option to propose for the 2nd pilot site, to reduce the global amount of domestic water consumed by tenants These aerators could be installed on the taps of the kitchen and the bathroom.





Quotations of tenants on their water & heating saving practices

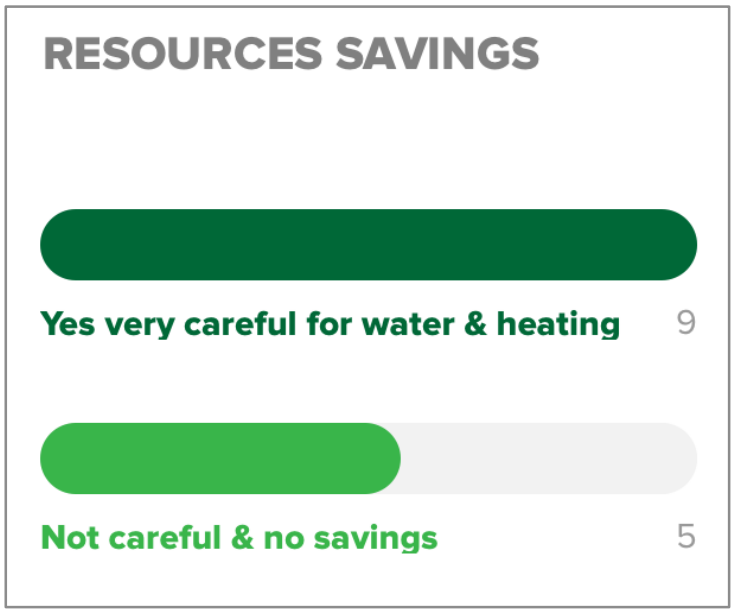
⇒ “The mother doesn’t put the water at high force/power to not consume too much. They use the washing machine only at full charge” (A)

⇒ “Low uses of warm water from the collective heating. Use of the eco-button on the dish-washer and the washing-machine. We try to not stay too long under the shower. The water is very expensive, at a point that sometimes I prefer to wash the dish by hand after having boiled the water with the gas plaques instead of the collective heated water. Tenants in the buildings discuss a lot about the excessive cost of the water. There is a long time between the water starts to run and when it becomes warmer so we lose a lot of water in general. We could install a new heating pump maybe to solve this problem" (C)

⇒ "We are careful to save money, it's expensive" (D)

⇒ "I am very careful with water use, I don't spend too much time under the shower and I use short cycle with the washing machine" (E)

⇒ “They care about water a lot but the result is the same on their bills, it's terribly expensive according to them and despite that they have installed a mitiger (water flow aerator). The wife thinks that their consumption is normal but not their bills” (G)



⇒ “I close the radiator from the central heating and I use the heat option of the air conditioner system instead because the central heating is too expensive. I prefer to be independent from the central heating because I know its final cost for us. I only know that the hot and cold water is expensive but I never made comparisons to know if this cost is normal compared to other tenants. It's expensive for us and I pay attention to use only cold water and to use only hot water from the central heating in showers. I have decided to use this system because I have seen a neighbour doing it and she made big money saving by using an independent heating system instead of using the central heating system. So, I decided to do the same” (X)

⇒ “I don't know how much water we consume but it's a lot. I am very interested by a mitiger” (S)

⇒ “The tenants use the AC option heating instead of the central heating system to make money savings. In the shower they have a mitiger/water flow aerator to save water but “we don't like it because we don't have the feeling that it has a result on our bills. We have compared and we haven't seen a difference of consumption before/after. We know that even if we close all the radiators we still pay 40% for the collective use, so we warm the apartment a bit” (Y).

8.12 The cost of the heating and water for tenants

Most of tenants are complaining about the lack of information they receive about their water consumption and the final cost they pay, as the charges are considered too expensive. There is an assumption given by tenants and the bloc "captain" (bloc intendant) that the collective district heating system is not calibrated in an optimal way and, the heat needed in the central system to deliver warm water is too important.

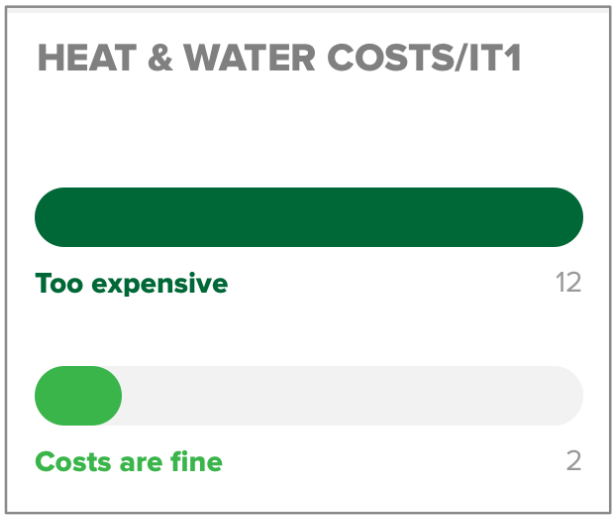
The situation is very problematic for some tenants who live in a hot water poverty as the cost is too high for their budget and they strongly restrain their consumption.

Some tenants replace the collective hot water radiators by the use of the heating option of their cooling system to heat their dwelling but at a lower cost. Most the tenants have very little knowledge about the water tariffs and the link between their energy consumption and their final bills. Many tenants don't how that the costs are divided between the cost of the general heating consumption and the cost of the maintenance.

There is a centralized heating system but ATER doesn't know how the energy supplier manages to monitor and bills the tenants. ATER explained to us during interviews that they are not in charge of the hot water supply and billing with tenants. A company is in charge of the heating supply and billing with tenants, that ATER is in contract with until the end of 2017. Tenants will then be able to choose a new contractor. ATER has to give some input for the decision of tenants and this is why ATER needs to check if the historical data is available for the DREEAM project, to understand better the situation about this high cost of hot water experienced by a majority of tenants. The situation is that ATER can't ask the details about the water consumption of tenants and the historical bills for the DREEAM project.

On 14 households of our corpus:

- **12 households consider that their charges are too expensive;**
- 7 households are not interested to have more information on their bills;
- At the contrary 7 households want to have more information and justification about the high cost of the heating, the hot water and even the high cost of cold water.



Quotations of tenants on the information & costs of heating and water

⇒ "It's impossible for us to know the cost of water and heating as the amount is not divided in the bill received. We pay for 3 months, then we don't pay for 2 months, then we pay for 3 months again, so we don't know how much we pay each month for water and heating. We pay 480 euros for each period but we don't know exactly what it refers to" (A)

⇒ "The charges are very expensive we pay 3000 to 4000 euros per year" (B)

⇒ Yes, we would like more information. We receive the detailed charges 1 time a year with all the details but I don't remember how much were the hot water or heating. I know that it depends of our real consumption though, and the water is very expensive" (C)

⇒ "We are not interested at all to have more details about the charges" but they are interested to understand why the water and the heating are so expensive" (V)

⇒ "I don't care about the cost of the charges. I know that charges are expensive but I don't know exactly how much it is" (E)

⇒ "She uses the AC system to heat the apartment and doesn't use the central heating system anymore because it's too expensive and she doesn't how is calculated her consumption and the impact on the bill" (X)

8.12.1 Information about electricity

There are 2 bills for the electricity for tenants:

- 1 bill for the electricity consumption in communal areas that is paid by an ESCO and then redistributed to tenants, the highest consumption is linked to the elevator. The ESCO is called SYRAM. Tenants can't ask to the ESCO their data of the previous year and ATER doesn't know how the cost related to electricity consumption is redistributed to tenants. ATER has also a limited access to consumption data, they receive the collective bill 1 time a year at their administration.
- 1 bill for individual consumption with a supplier chosen by tenants. It is important to mention that in the Italy pilot site some tenants pay more for their energy bills than in rent as the rent are very low. Also in Italy, there is no special tariff for low income households like in France.

8.12.2 Energy budget of tenants and comparison of electricity suppliers

According to ATER employees, except for 25 families who can't pay their electricity bills, the rest of tenants don't have a strong interest to know the detail of their bills in the 1st pilot site. **ATER is interested in reducing tenants' energy bills to help tenants to control their energy budget and to reduce rent arrears.** One way to help tenants to reduce their electricity consumption would be to support a better knowledge about energy contracts and competitive tariffs as today, the tenants interviewed have no or little knowledge about the different electricity tariffs.

During our interview with ATER in February 2016, the building owner's team appreciated the idea to display a comparator of power companies on the platform dedicated to tenants, like a "Tripadvisor" to display the different prices offered by companies, the Co2 impact and the quality of customer service they offer. This would be interesting to inform tenants about also the customer relations as some electricity suppliers have aggressive marketing strategies that end-up being not beneficial for customers on the long term. There is for example in Treviso area a real issue of aggressive marketing by electricity suppliers for several months, with bad behaviors of sales persons and poor customer relation services once that tenants have signed up for a new contract (difficulties of tenants to check their bills and the calculated cost, or to get proper responds if they have a shortening of their electricity supply in case of personal economic issues). There are many deceptions about power companies according to tenants, and not necessarily a good experience with cheaper suppliers, which generates distrust.

As ATER is not a welfare company (they are not in charge of tenants' problems, for example they won't install new bulbs for tenants and help to change of supplier/resolve issues tenants have with their electricity supplier) **their level of margins is very tight** but they would like to be able to support tenants to get better information, to make electricity savings, to better control their energy budget and ideally to generate a better security/margin for the payment of the rent.

8.13 Equipment level and electricity & water savings

Equipment owned by Italian tenants

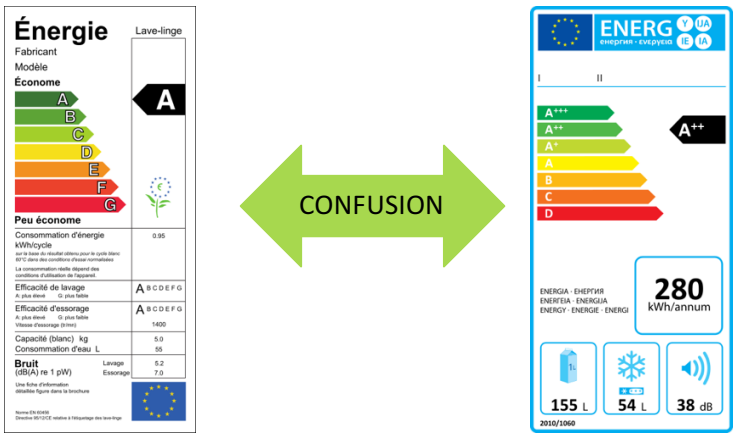
We have mapped the detailed list of equipment for each household interviewed and their energy efficiency category in order that SinCeo2 can make statistics on energy consumption for each interviewed and monitored households. This complete list is available in the analyse grid to each DREEAM partner.
The equipment that almost all the households we have met own and that we can consider as typical of the Italian pilot site equipment level are:

- Electric oven
- Gas plaques
- Microwave
- Washing machine
- Dishwasher
- Vacuum cleaner
- TV

Italian tenants rarely own a kettle or a dryer that are quite common in UK. Also, only 5 households in our corpus own 1 or several computers, a situation that will have an impact on the Interaction Plan to elaborate for tenants (mix of communication tools with letter and meeting, and not only an online web platform).

Equipment owned in energy efficiency Class A and more

Like in the UK pilot site, Italian tenants can have difficulties to describe the category of their equipment in the class A category, meaning the difference between Class A + to A+++ but they know when they have an equipment below the A category.



Shortly, we can describe that the common equipment owned by our tenants in the Class A category are the washing machine, fridge, and microwave.
In the corpus of 14 households:

- 5 households have most of their equipment in Class A and more;
- for the rest of tenants, the level of equipment in high energy efficiency category is important compared to the UK pilot site where few tenants own low consumption item;
- In the Italy pilot site all the households own at least 1 or several Class A items.

8.14 Saving habits

Equipment uses patterns

- The average use of dishwasher for the households who own one is 2-3 times a week
- The oven is used only 1 to 2 times a week
- The TV is used each day and during at least half of the day to all day in 10 households
- The detailed patterns of consumption for each household interviewed is listed in the analyse grid.

In behavioural studies related to consumption behaviours, there are classically 3 types of saving practices: purchase action, usage and maintenance-related behaviours (Van Raaij, 1983).

- In our corpus of 14 households: 6 households haven't adopted any electricity saving habits
- 8 households at the contrary have already adopted various electricity saving which is very positive for the future interaction plan
- Most of the 14 households try to be careful with their water consumption especially the hot water consumption.

In our corpus, we have noticed 2 types of electricity & water saving habits:

1. **Savings linked to specific purchase**
   - Most of tenants have low energy bulbs or a mix between normal with low energy bulbs (and a progressive replacement of the old bulbs)
   - Most of tenants own 1 or more electric equipment such as washing machine, fridge and dishwasher in A to A+ categories.

2. **Savings linked to specific restrained uses**
   - 8 households in our corpus are careful with their use of hot water both for money and environmental reasons but they mostly consider themselves as normal consumers, not big water consumers. Some tenants are also unhappy to see that despite being careful with water, they still have very expensive water bills. This situation decreases the interest of many tenants to improve their consumption habit to eco-friendly habits, because they can't benefit directly from this attitude;
   - 8 households in our corpus of 14 household are careful in practice with their electricity consumption, and not only in the description of their value. It is important to precise this distinction as some tenants tend to exaggerate their saving efforts or eco-friendly practices, but they have difficulties to describe practical habits embodied in their domestic routines. Therefore during our interviews, we question tenants both on their values first about energy savings, then we check the impact of these values on the real attitudes of tenants, and their actions with precise examples.
   - The 8 households who have adopted energy & water saving practices have described us their concrete and daily actions to limit the waste of resources. The key types of savings habits are:
     ⇒ The use of eco-buttons & low temperatures for the washing machine/dishwasher

- ⇒ The control over the time of use (not too long) or to stop the items that are not useful anymore (like the bulbs, the TV or any other equipment)
- ⇒ Deplug the equipment to avoid consumption in standby & optimized use of equipment: women who oversee the "cleaning tasks" in our corpus wait until the machines are full to use them. The patterns to use washing machine and dishwasher are pretty stable with 2 to 3 washing machine per week and 1 to 2 dishwasher per week both used when they are full.

⇒ "Careful to not use the equipment too long, in general they are careful with their electricity consumption" (D)
⇒ "The husband learned the impact of standby on energy consumption recently so he tries to be careful and stop standby equipment, but the wife doesn't care at all. But they care about water" (G)
⇒ "She is careful to not use too much electricity and bulbs. She follows her needs but she needs very little of energy in the apartment" (E)
⇒ "We don't leave equipment on standby. We use 40 degrees in washing machine" (K)
⇒ "We try to make savings for the money, not the environment. We have normal bulbs though" (O)

Savings linked to maintenance action

We haven't noticed any saving practice linked to a habit to maintain equipment such as defrosting the freezer.

There is a 4th type of saving not listed in Van Raaij classification, that we have noticed in our corpus: the economical saving with the use of low energy tariffs by 3 households.

These tenants wait the evening/ night/early morning hours to use equipment such as their washing machine and their dishwasher. For tenants who have adopted this attitude, this habit now strongly shapes the schedule of domestic tasks that is aligned on the hours with lower electricity tariffs:

⇒ "We use the washing machine and the dishwasher early in the morning 2 times a week to save money (hour contract with night hour cost). They also use light variation system (variators) to use less electricity with the lamps. They have LED bulbs that cost 7 Euros each" (B)
⇒ "We use the dishwasher: 3 times during the week-end, the washing-machine 3 times a week, both at 9pm to save money (hour contract. They use the eco-button for the washing machine and the dishwasher)" (C)
⇒ "We use the dishwasher in the evening to have lower electricity cost (hour contract). She only uses dishwasher and washing machine when they are full. AC and ironer consume a lot according to the mother" (S)

⇒ “We are careful about the use of the washing machine, it's the only equipment where I can be actively careful. We are waiting before the machine is full, we use it during the evening” (U)

This last type of action with the use of low energy hours’ tariff doesn’t have an impact on the volume of energy consumed by tenants but on the cost of the electricity paid by tenants. In our training program for tenants we will integrate information related to the hour contracts as we have noticed a lack of knowledge of many tenants about the existence of this type of contract. We have also noticed that tenants with hour contract are not entirely sure of the precise hours when they benefit from lower electricity tariffs. This would be very beneficial for our tenants that we train them to better use this type of contract.
It is important also to note that the origin of these saving practices is not linked to tenants’ concern about their impact on environment or their CO2 footprint. These factors are only important for 1 household, the other tenants are interested to control their electricity budget and the key factor affecting their behaviour is the economical factor.

8.15 The key expectations of tenants for renovations

- Lower the warmth on west side in summer: 5 answers
- Change ribbons for less heavy ones: 1 answer
- Build 1 more bathroom: 1
- Water pipes desegregated in the underground: 1
- New heating pump: 1
- Isolate the ribbons entries: 2
- Windows more energy efficient and resisting to the rain: 5
- New external wall coating to help save heating: 8
- Windows in collective corridor to renovate: 1
- Improve heat in winter: 2
- Renovate the electric plans (paths/alleys outside): 2
- Lower the humidity: 6
- Anti-mold actions: 3
- Lower the water cost: 1
- Fight against pigeons’ disturbance: 1
- Extractor of humidity and smell in the stairs: 2
- Lower mold and humidity in the garage (deteriorate affairs stored): 1
- Holes on the street floor (Garage side): 1
- Something more efficient than solar tent: 1
- Net anti mosquitoes: 1

8.15.1 Conclusion on the 1st sociological enquiry in the 1st Italian pilot site

An excellent collaboration with ATER and tenants

- The preparation of the interviews was extremely well done by ATER team and the local "bloc captain".
- The team of ATER was extremely collaborative and efficient during interviews to make the translation from English to Italian for Savills' sociologist, and to interact with tenants during the long interview and to follow rigorously the in-depth qualitative questionnaire prepared by the sociologist before the interviews;
- Tenants are very collaborative, easy to talk with and give detailed explanations like in UK;
- As in UK, most of tenants accepted to be interviewed again in the future and to participate to discussions about the training program for tenants and the web platform.

Renovations were really expected by the tenants of the 1st pilot site

- Renovations are very positive for the majority of tenants but there are worries related to the DREEAM project for several households about the renovations scenarios involving to cut the terraces and the bow windows;
- Households would like in priority a better isolation to improve the thermal comfort both in summer & winter, to solve the issue of mold presence for those whom experience this inconvenience, and they also would like to have better windows to avoid air leaks inside the dwelling;

Strong need of better information by tenants

- There is a lack of information received on the collective water & heating costs & individual bills, but ATER is not in charge of this task so this won't be improved during the DREEAM project;
- Lack of knowledge on low electricity tariffs & precise hours;

A rising "double fuel poverty" both in winter and summer

- In Italy, there are 2 seasons with high electricity consumption: winter and summer with the use of additional heating devices and cooling systems. In summer particularly, we notice the emergence of a new fuel poverty type linked not to the difficulty for tenants to keep a warm temperature inside their home but to keep a decent cool temperature during the heat waves of July and August;
- Common situation of economic vulnerability and fuel poverty amongst our corpus;
- Tenants experience the impact of climate change according to them. Many of the tenants interviewed have lived in the building for more than 3 decades and declare that the temperature and humidity in summer are increasing and become a real concern especially for elderly tenants. Some tenants simply don't buy a cooling system because they couldn't afford the cost of the electricity.

9 The 2nd Italian Pilot Site

9.1 Technical characteristics of the pilot dwellings

The new pilot site is composed with 2 buildings called Tower A & Tower B. The 2 buildings have a similar structure, orientation, size and dwellings' architecture. Both buildings have 6 residential floors and 3 dwellings per floor. Shortly, the 2nd pilot site is characterized by poor windows and important air leaks through the windows structure and wood bloc curtain.

Figure 8: 2nd Pilot site with Tower A

Figure 9: 2nd Pilot site with Tower B

Figure 10: aerial view of the 2nd pilot site in Treviso (Towers A & B)

9.2 Socio-economic context

A nice area not segregated

The 2nd pilot site is not a segregated area and the economic vulnerability is similar between the 1st pilot site and the 2nd pilot site according to the local building manager with a mix of working and non-working tenants.

"It's not a segregated area, it's a quite nice district like the 1st pilot site" (Local building manager – 2017).

According to the local manager, the levels of incomes between the 2 pilot sites are quite similar with various socio-economic profiles, from vulnerable households who experience periodic fuel poverty to middle class categories with less important concerns regarding their energy budget. There are no criminal issues and ASB in the 2nd pilot site.

"We have no crime problem in the pilot site. We have anti-social behavior/crime situation in the 3rd Tower though" (Local building manager – 2017).

The community feeling is very strong like in the 1st pilot site

The collective feeling inside the pilot buildings A & B is like the previous pilot site, with a "village atmosphere" according to both tenants and the building manager. The previous pilot site and the new pilot buildings are situated in the exact similar area and they share the same collective recreational areas and garden, so this explains the great similarity of inhabitant perception between the 2 pilot sites. Many of the tenants living in the building A especially, have moved inside their dwellings when the buildings have been built, so there is a strong link with the area and the site for many tenants. The A tower is more friendly, communicative with few change of tenants in the past according to the local manager compared to Tower B with a highest turn-over.

"The tenants have been changed a lot, there was different reasons for this turn-over but it was not a choice from ATER. So, the community feeling is less strong in the Tower B in this context" (Local building manager – 2017).

A population of elderly people in majority

According to the building manager, both the 2 towers have old people living inside and they live there since the towers were built in 1976. Most of tenants in the new pilot site are elderly people. There are fewer young families with children. In our corpus we have tried to select a minimum of 50% of elderly tenants and a good proportion of other household structures involving families and singles with children in order to have a good picture of the diversity of households described by the local building manager (qualitative representativeness).

9.3 Technical characteristics

Key technical issues in the pilot site according to the building manager

- The door of the elevator doesn't allow people with handicap to enter the elevator because the door is too small (not by law but by current model of wheelchair). People with a handicap must move in another building;
- The 2nd problem is the high mobility of people that creates social problem because lots of new family are foreigners who don't necessarily know well the rules to have a good living together with the other tenants. There are lots of problem with the culture differences, and especially elderly tenants don't like this difference.

The high costs of individual heating and water consumption for tenants

The new pilot site has different rules than from the 1st pilot site. The tenants have their own boilers for hot water & heating so the building manager knows very little about energy issues of tenants because it's not linked to ATER. Though the building manager knows that the cost of winter heating and hot water is very high and tenants keep very low temperature inside their house.

- Tenants complain a lot about the cost of the natural gas for winter heating. Some tenants keep around 15° degrees because the heating is too expensive and some elderly tenants have disease due to this situation. In this context, tenants they are very happy to have these renovations.
- Tenants also complain about the cost of the water. The similar situation has been observed in the 1st pilot site where tenants were complaining a lot about the cost of the water.

  ⇒ "The bill of water is global for each building and tenants complain a lot about the cost of water cube meter and the increase of the water cost in the last years, lots of tenants don't pay these bills, they can't pay. Tenants have very low income and they are often not able to pay. They try to spend as less water as possible but still they have difficulty to pay the costs of the water" (Local building manager – 2017).

The role of ATER and the municipality to help tenants who can't pay the bills

If tenants don't pay their bill for hot water and heating, ATER must pay it for them. In some situation where households have a very low income, the municipality gives a little amount of money to ATER to pay these bills, but a lot of tenants don't pay with no consequences on their supply, they still have access to hot water. ATER has no information about socio-economic statistics related to tenants, so ATER can't know if tenants who don't pay are in economic difficulty or if they don't want to pay. Generally, some disrespectful people consider that to pay their bills is not a good thing, it's a behavioral problem according to the local managers.

"The average is that in each building 6 households don't pay and the other pay their bills" (Local building manager – 2017).

The other charges with the rent

The charges linked to the rent integrate:

- The volume of water consumed;
- The electricity consumption in the collective spaces (tenants pay the maintenance of elevator, the engine of elevator, the engine for machines related to water supply and electricity in the stairs);
- The maintenance for the dirty water;
- The gardening.

The local manager takes care of the administration and the reallocation of these charges to the different households. The tenants expressed their satisfaction regarding the work done by the current local managers for their excellent transparency, information and calculation of the collective building charges. They would be happy though that the electricity bills related to the consumption in the collective spaces would be less expensive.

9.4 Previous experiences of renovations & expectations with DREEAM project

Tenants have no experience of important renovations

This is the first big renovation that the tenants will experience. In the A tower, the elevator has been renovated and is adapted to handicapped persons but in the B tower the elevator is not renovated yet. The buildings were originally built in the 1976 and they remained more or less in the same conditions, except they had an important structural consolidation of the external walls in the early '90.

Expectations of tenants for renovations

According to the building manager, tenants are very happy about the future DREEAM renovations and they are very collaborative with the DREEAM partners, they immediately accepted to share their bills to help the project. This declaration will be confirmed later during the interviews.

The tenants are not very experts about renovations according to the local manager so it is not necessarily easy for them to answer about the type of technical improvements they expect, but the more important requests/ expectations that she receives are:

- Windows replacement to limit the air drafts;
- Wall insulation refurbishment.

9.5 Building managers' opinion on sociological evaluation & training program for tenants

Our qualitative approach is positive & the only relevant method for the Italian tenants

The qualitative approach is mandatory in the 2nd Italian pilot site. For the building manager and ATER project manager, our approach with direct semi-directive interviews is the only relevant and efficient method to collect answers from tenants and to collect trustful data as a quantitative survey with questionnaire is by experience not adapted to their tenants.

- First, with a quantitative questionnaire few tenants would read it and send their answers, the engagement would be probably too low. Therefore it is relevant to take appointment with tenants directly and to exchange with them in face-to-face;
- Secondly, the answers given by tenants in a survey questionnaire would potentially be biased or not precise. It would be difficult to check that tenants have understood the questions, and for complex topics like thermal comfort and energy saving habits, it is needed to interact with tenants in live to check that they have understood the various questions, to double question the relevance of their answers by asking practical examples (technic called "relance"). The project manager explained that tenants wouldn't take the time to read in detail the questions in a survey especially if it is long, which finally wouldn't guarantee a good quality of answers;
- The double questioning with a focus on the "how" (practical examples from real-life of interviewed tenants) is a classical and efficient tool in sociological qualitative survey (Becker, 1998) to evaluate if tenants in their answers tend to underestimate or overestimate their perception and their practices. The identification of potential declaration bias and the focus on experienced-based answers are more difficult to perform in a quantitative survey by questionnaire compared to qualitative interviews.

"It is impossible to make only a questionnaire: it's impossible by letter for the questionnaire: you have to ask personally and directly the questions, if you give them a questionnaire they won't give the real answers, or they won't answer, we need to meet them and ask directly" (ATER employee-2017).

Social risks according to the local manager

Perspectives of turn-over: no knowledge of tenants willing to move out of their dwellings. The people would like to move out but they can't as they can't afford it.

Training is needed for future new ventilation system

The potential social risk existing the new pilot site for the local manager is the installation of new mechanical ventilation system because tenants don't know these systems and how to use it, so they will need information and receive training. The same hypothesis is true for the other equipment that will be installed in the context of the DREEAM project.

9.6 Presentation of the 18 households interviewed

Social structure of households in the pilot site

Compared to the rest of the ATER stocks, the 2nd DREEAM pilot site is representative in terms of:

- Site and dwellings size. The 2nd site is not particular and ATER manages larger and smaller sites in terms of the number of properties covered;
- In terms of households' diversity and family types with a good mix between families, elderly tenants, tenants with work & tenants without work with an important proportion though of retired and elderly tenants.

Synthesis & archetypes of the 18 households interviewed

In the beginning of 2017, Savills organized an interview with ATER project manager and the local building manager of the Tower A & B to establish the social context and the key characteristics of the tenants living in the new pilot site. Based on this interview, SinCeO2 and SAVILLS have listed the technical and social archetypes of the households to select in our qualitative inquiry, in order to build a relevant corpus with a good qualitative representativeness of the entire pilot site.

On the 18 households of the Tower A and the 18 households of the Tower B, according to the description given by the local manager, our corpus had to be composed with the variety of following household structures to be well representative:

- Couple of elderly people without children
- Younger couples with a young child
- Couples with elderly children
- Few people living alone

In total 18 households composed with 46 tenants have been visited and interviewed.

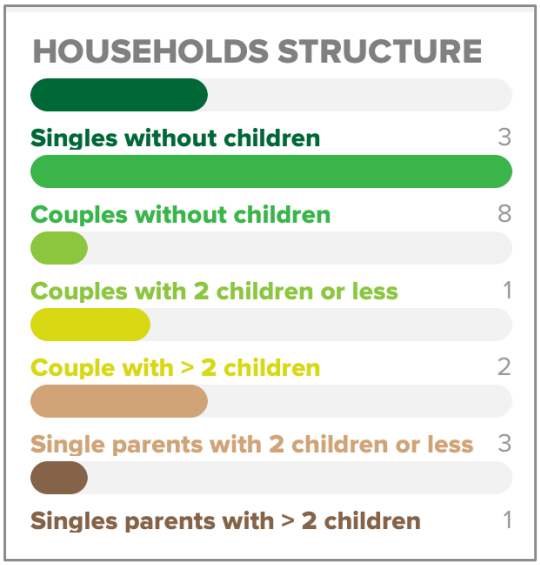
In total, our qualitative survey integrates 50% of the 36 households in the 2nd pilot site with 18 households interviewed.

Number of households interviewed	**18** 9 households in building A 9 households in building B
Total number of tenants living in the households interviewed (adults and children included)	**46 tenants** **19 men and 27 women**
Number of adults aged more than 24 years old in our corpus of interviewed households	**39**
Number of tenants under 24 years in our corpus	**7**

9.7 Social structure of the 18 households selected for the interviews

Households structures

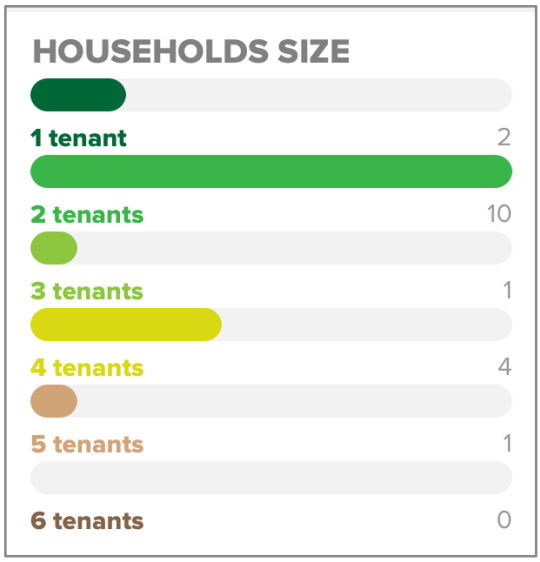
- Singles without children including single elderly tenant: 3
- Couples without children (>45 years old or retired): 8
- Couples with 2 children or less: 1
- Couples with more than 2 children: 2
- Single parents with 2 children or less: 3
- Single parents with more than 2 children: 1



Households size

Our corpus of 18 households is composed mostly by little size of households with 2 tenants (10 households) and the 2nd more common size is family of 4 tenants.

- Households with 1 tenant: 2
- Households with 2 tenants: 10
- Households with 3 tenants: 1
- Households with 4 tenants: 4
- Households with 5 tenants: 1



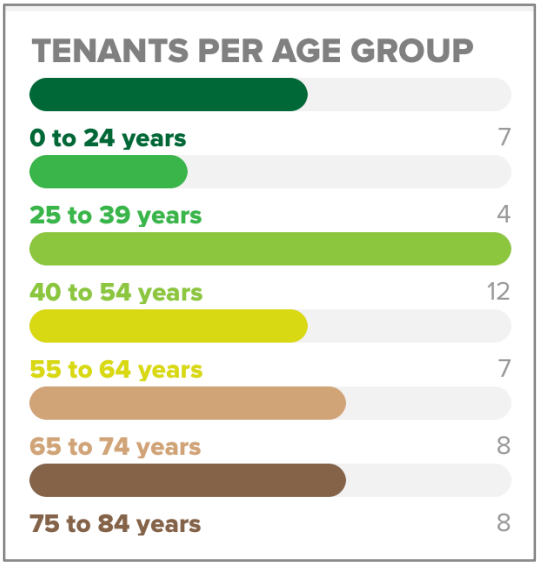
Age groups

There are 2 key age categories in our corpus:

- Parents from 40 to 54 years old: 12 tenants (26% of tenants);
- Seniors & elderly tenants (up to 55 years old: 23 tenants (50% of tenants)

Statistics:

7 tenants aged from 0 to 24 years
4 aged from 25 to 39
12 aged from 40 to 54
7 aged from 55 to 64
8 aged from 65 to 74
8 aged from 75 to 84
0 aged up to 85 years



9.8 Patterns of presence inside the dwellings

In our guideline used during the interviews with tenants, we have integrated indicators related to the wake-up time and the periods of the day where tenants are at home and when they use the most and the less their various domestic appliances, and their heating system, in order to build 2 additional relevant social indicators to our sociological evaluation strategy before renovations.
These 2 social indicators are:

1. "Full time dwelling occupancy": for the full-time presence at home of at least 1 tenant;
2. "Domestic cycles indicator": for the time patterns of presence inside the dwelling.

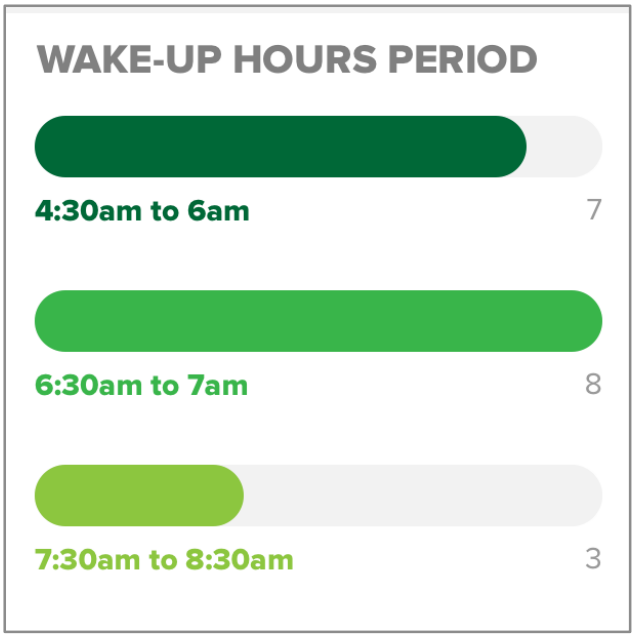
Value of these 2 indicators for the social and statistical analysis

These 2 indicators allow to establish the daily cycles of energy consumption inside the dwellings, and the situations of high heat demand & thermal comfort priority for tenants who stay at home most of the day (such as retired tenants or unemployed tenants). These 2 indicators also allow to determine also opportunities for energy load models with peak-demand, off-peak demand periods, time-related consumption habits and opportunities of Demand Respond scenarios. The answers of tenants on their daily patterns have been analyzed and we present below the detailed results that will be useful for the technical partners of the WP1/WP2/WP4.

An early wake-up like in the 1st pilot site

The Italian households of the 2nd pilot site have 2 peaks of energy consumption:

- Peak 1 between 05:30am and 7am in the morning according to the wake-up hours described during interviews and the linked habits: shower & breakfast preparation
  - ⇒ There are 7 households between 04:30 to 6am
  - ⇒ There are 8 households between 06:30 and 7am
  - ⇒ Only 3 households wake-up after 07:30 to 08:30am
- After 08:30/9am the housewives and retired tenants start to open the windows and to clean the apartment until the middle of the morning and use both domestic hot water and electric appliances during 1 to 2 hours.



An almost continuous presence inside the dwelling during the day

The classical dwelling use patterns opposes working hours with empty dwelling (from 9 am to 6pm) and domestic life time with an occupied dwelling (morning and evening). But this classical use pattern is not common in the 2nd Italian pilot site like in the 1st pilot site with a strong presence at home during the day for a majority of households.

- **Presence at home: 77% of households (14 households on 18) have at least 1 person who is present in the dwelling during daily hours;**
- In only 4 households, the dwelling is not occupied all day long;
- The continuous users of dwellings are retired tenants, unemployed and staying-at home tenants such as housewives or unemployed children.

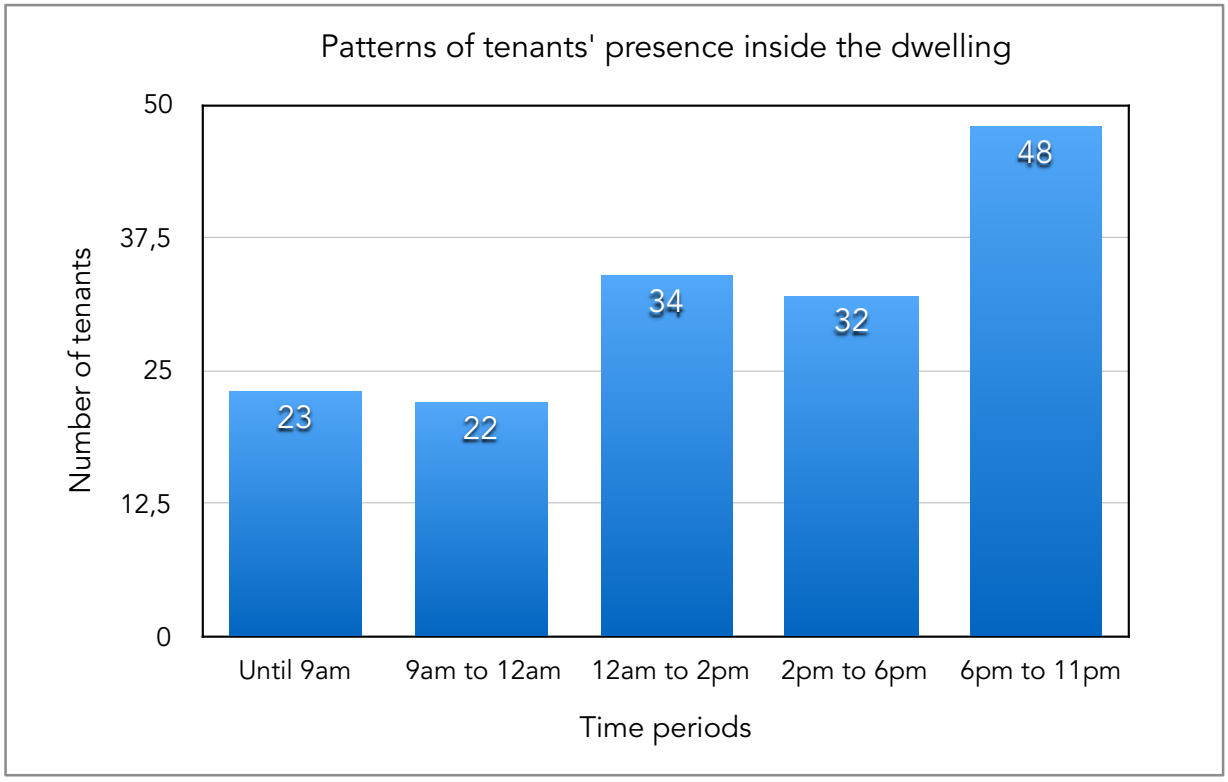


Figure 11: number of tenants at home during hours' period

Precision: the difference between the total of tenants living in the pilot buildings and superior total number of tenants counted in the time period from 6pm to 11pm is due to the fact that the tenants interviewed have included the 2 relatives who stay for dinner almost each day at their home.

9.8.1 Peak and off-peak periods

There are 3 peak demand periods with multi-occupancy and multi-energy uses inside home: lunch, afternoon and dinner. During the morning, the presence of tenants inside the dwellings until 9am is very atomized with various wake-up hours from 4:30am to 8:30am and not a concentration of "morning routines" during the same 1 or 2 hours. The energy consumption is dispersed from 4.30am to 9am in the morning in the 2nd pilot site.

Wake up hour	Presence in the morning until 9 am	Rest of the morning 9/12 am	Lunch 12 am to 2 pm	Afternoon 2 to 6 pm	Evening and dinner 6pm to 11 pm
8:30am	3	2	2	6	2
7am	1	1	1	1	2
8am	1	1	1	1	1
7am	2	2	2	2	2
6 to 7am	1,5	1,5	4	1,5	5
5am	3	3	3	3	3
5:30am	0	0	2	2	4
6:30am	1	1	2	1	2
6am	1,5	1,5	2	1,5	4
4:30am	0	0	2	1	2
5:30am	2	2	2	2	4
6:30	1	0	1	1	2
7am	1	1	1	1	1
6:30am	1	1	2	1	2
6:30am	1	1	1	2	2
7:30am	1	2	4	1	4
4:30am	0	0	0	4	4
5:45am	2	2	2	0	2
Nb tenants	**23**	**22**	**34**	**32**	**48**

Precision: the difference between the total of tenants living in the pilot buildings and superior total number of tenants counted in the time period from 6pm to 11pm is due to the fact that the tenants interviewed have included the 2 relatives who stay for dinner almost each day at their home.

9.9 Comfort of collective equipment & areas

9.9.1 Light comfort in collective stairs and entrance

The light system is fine in collective areas for all the tenants interviewed.

The bulbs are powerful enough in entrance and stairs and are not an issue for elderly people.

⇒ The question of light comfort is important in buildings where many elderly tenants and children live as low energy bulbs or low power bulbs can generate difficulties to move, and to see clearly (as they take several seconds to reach their full lightning power).

9.9.2 Thermal comfort in collective spaces

The temperature in stairs and entrance is fine for all tenants both in winter and summer.

Tenants don't want to heat the collective spaces.

9.10 Thermal comfort in dwellings in winter

9.10.1 A similar thermal comfort feeling between the different floors of apartments

The interviews with tenants show that there is a less important difference of thermal comfort between the different floors compared to the 1st pilot site where “sandwich apartments” benefited from a better inside temperature compared to the other floors, especially the 1st and last floors that were particularly cold. In the 2nd pilot site, the tenants experience a very similar and homogenous type thermal comfort between the different dwellings and floors.

9.10.2 But an important difference of thermal comfort perception between west-south and north-east

There is an important difference of thermal comfort in the dwellings divided between the cold rooms situated on the north-east side and the warm rooms situated on the west-south side. The mapping of the interviews result shows that the cold rooms are mostly concentrated in 1 particular area in the 2 buildings: the north-east orientation. The more comfortable rooms are concentrated on the west-south side. The north side can become colder due to air leaks and local wind called “tramontane”.

9.10.3 Consecutively, a difference of thermal comfort between the different orientated spaces

North side bedrooms

From the 1st to the 6th floor 18 households so 100% of the households experience a lower thermal comfort in the bedrooms situated on the north side with both colder temperature a more important humidity feeling compared to the other rooms. These rooms also have a more important presence of mould in our corpus.

Living-room is comfortable but the dwelling in general is quite cool and requests extra heating to reach a perception of "comfort"

For 16 households on 18 so 88% of households, the living-room is comfortable and warm, and is often the warmer room in the apartment, except for 2 households who don't like the global thermal comfort in their apartment including in the living-room (the general temperature is too low for them to call it "comfortable", the apartment is considered as globally "cool" but liveable though it is not comfortable);

11 households on the 14 households who own a cooling device, use the "heating option" of this equipment to increase the global thermal comfort in the apartment in winter. This is a good indicator that the thermal comfort of the apartment with only the collective heating system is not enough for 77% of the group of households who own an AC system and use the "heat option" to reach a "comfortable" feeling.

Bathrooms are cold and kitchen are comfortable

For 5 households on 18 so 27% of households, the bathroom is directly expressed as cold but we can state that the bathroom is cold for 10 households in total, as 10 households (55% of tenants) need to use an extra electric radiator to heat the bathroom before the use of showers;

For a majority of households, the kitchen is at the right temperature and for 8 households (44% of households) this room is even considered as "warm", "comfortable", "it feels good";

The impact of the structural thermal comfort difference on the use of radiators

The more heated rooms are living-room and the 3 bedrooms on the north and west sides.

The less heated rooms are the entrance and the kitchen.

9.11 Heating consumption

9.11.1 The need for heating is very high in winter period for most tenants as the dwelling is cold

The 18 households use all the radiators in winter and set the temperature on the general thermostat that regulates the heating of all the different radiators. Only 5 households don't use the radiators in the kitchen and in the entrance, and shut them down to avoid too much heat consumption.

⇒ "They spend a lot of money to keep the warmth, to keep 20° in the rooms they have to keep the radiators open 12 hours per day. They put 21/22° the maximum possible but the real temperature in the living room is about 20° and in the bedrooms it is 16°. They can put more temperature than 22° but they don't need to" (K)

⇒ "All day long, we put 20/21° on the thermostat, they can't have more temperature, it's not comfortable (…) The tenant has to put pull-over, it's cold, he would like to have more heat" (H)

Many households have adopted saving habits to avoid excessive heat consumption

10 households on 18 have adopted rigorous daily habits to start and stop using the radiators at specific hours. This habit is directly correlated to the objective of tenants to avoid heat waste and an important collective bill. Also many tenants have adopted the habit to shut down the radiators on the general thermostat when they leave the apartment or to lower the temperature to a minimum when they leave their dwelling.

- "She uses the programming, she opens at 8am, she closes at 10am, then reopens at 5pm until 9pm" (C)
- "All radiators except kitchen and the entrance, they open from 12am to 3pm, and from 5 to 8pm" (D)
- "They set 20° manually when they need/around 3 hours per day" (E)
- "She opens at 6am until 8am then at 12am to 2pm and again from 5pm until 8/9pm.She doesn't like very hot temperatures" (I)
- "Each day from 5 to 11pm only during winter season, at 18°/19°. She feels good this way" (J)
- "She opens the radiators only when she is at home, she puts 22°, when she leaves she closes the radiators on the general thermostat" (L)
- "21°on the thermostat, she opens at 7am until 12am when she opens the windows, then she puts again at 2pm until 10pm" (N)
- "She opens the radiators at 6:30 to 8:3Oam then from 5pm to 7pm. Each day and radiators except kitchen and entrance" (O)
- "They put 18°, it starts for 3 hours a day, but they use air conditioning like a heating pump. From 8pm to 11pm" (P)
- "All the radiators used, from 4pm to 10pm. 20° set point" (Q)
- "All radiators from 5pm to 8:30" (R)

9.11.2 The temperature selected by tenants on the general thermostat on average in winter

Household code	Temperature settled on the general thermostat by tenants	Temperature metered in the rooms
A	20°	19°
B	20°	17/18°
C	22°	17/18°
D	20°	Don't know
E	20°	19° to 20°
F	18/19°	15° in the bedroom and 20° in the other rooms
G	17°	19° in the kitchen and living-room and 17° in the bedrooms
H	20/21°	Don't know
I	18°	18°
J	18/19°	18/19°
K	21/22°	16° to 20° depending of the rooms
L	22°	Don't know but the bedrooms are colder with this set point than the other rooms
M	17° during the night & 18/19° during the day	The tenant doesn't know and only adapts the temperature to the body feeling "it's my body feeling that matters"
N	21°	Don't know
O	20°	The thermostat in the kitchen displays 24° because it's very sunny and in summer you can have 40° inside all day long
P	18°	Don't know
Q	20°	Don't know
R	18° to 20° during the coldest days	Don't know

9.11.3 A positive experience of collective heating thanks to communication and tenants' empowerment

In the 2nd Italian pilot site, tenants are very aware of their individual impact on the global collective water consumption and costs as all the calculations are very detailed each year by the building manager. The clear individual reallocation rules are very detailed and allow tenants to figure their own impact, and the impact of big consumers on the collective bill. Many tenants complain about the tenants who consume to much water and all tenants benefit from controlling their consumption of water. If some tenants don't pay their water bills, the rest of the tenants must share this extra cost and pay it to the building manager.

- "They complain a lot with people that use a lot of water. There is only 1 bill received for 3 buildings and then the building manager calculates for each household based on the individual sub-meter, but the problem remains for people who don't pay the bills, as the other tenants have to pay anyway (and the pursuits of claims fail to produce a result). The local manager advances the cost of the bill and then the tenants reimburse her" (A).

Most of the tenants interviewed consume by thinking "collectively" no only individualistically despite the system of collective consumption.

It is important to remember that most of tenants consider that the charges are too expensive in general, especially the cost of the water, even if the information they receive about the individual calculation of the charges is very detailed and transparent thanks to the new building manager. A lot of tenants discuss together about the charges, and many of them complain about the households who don't pay their water bills or who don't control their water consumption. This topic is a key issue in the 2nd Italy pilot site.

Experience in the residential sector about collective heating and water

In the residential sector, by experience the collective calculation system such as for the heating system (DH) or the hot water (DHW), usually have an important impact on the disinterest of tenants to make savings and to control their consumption behaviors. Tenants tend to use the heating or water without restriction because the charges are collective and they don't necessarily consider that their individual acts, their own consumption will have an important impact on the final global consumption and on the charges paid then by all tenants individually.

In previous projects, we have noticed that when a majority of tenants believe that, the global consumptions of heating and hot water can be very high, and very little behavioral tools have an impact except by illustrating to tenants their own individual impact on the collective consumption and the final bills. In previous projects, we also noticed that tenants are often very suspicious about the other inhabitants and are instinctively critical about the other tenants' consumption habits that they don't necessarily know, but the suspicion is the more instinctive representation instead of a trust in other tenants' behaviors.

A perception bias of other tenants' values and attitudes towards energy consumption

In general tenants believe instinctively that the other tenants consume more than them, and are not as careful as they are with energy/water consumption. This is a "perception bias", and this belief is in general not based on experience but on "interpersonal projections". In this biased perception, a lot of tenants don't want to be amongst the rare persons who make effort for the community so they don't make savings / eco-friendly acts.

A way to correct this "perception bias" is to present to tenants the results of qualitative interviews with the other inhabitants, and to explain how many tenants in the community share the same values to avoid energy and water waste, and how many tenants have also started to adopt micro-daily habits also called "routines" to control their consumption of electricity, heating and water.

It is crucial in our future training program to create links between the various savings and eco-friendly practices already adopted by the households, to strengthen the feeling of tenants to belong to a community, and to prove that excessive consumptions and wasting habits are a minority of situation.

A very positive situation in Italy to disseminate

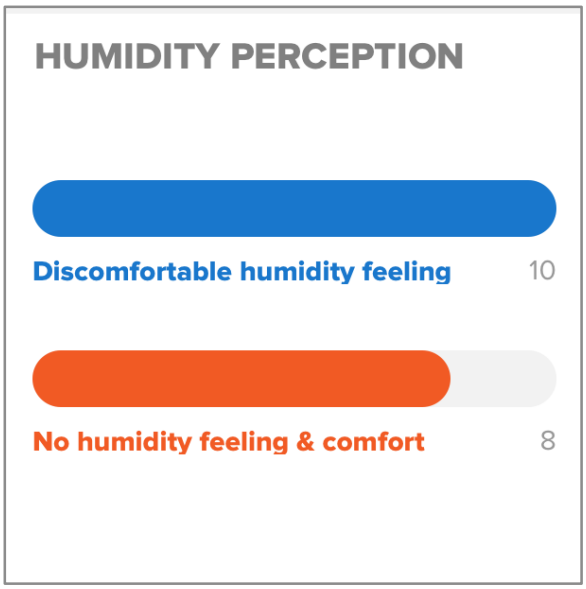
In conclusion, the negative projection on other tenants' behaviors has a strong impact on the low willingness of tenants to make effort in a context where heating and water are collectively metered and billed. So, the positive behaviors in the 2nd Italy Pilot site that are linked to the very transparent reallocation of collective water costs to an individual/household level should be taken into consideration in our Training Program and replicated.
Most tenants in the 2nd Italy pilot site indeed share a common interest to keep the water charges as low as possible, as they have an excellent visibility on the way the global consumption is metered and then how the costs are reallocated to each household. This transparency has allowed to really empower tenants with the collective charges, and to allows them to understand their personal impact on the global consumption. This situation should be considered as a very positive example to replicate in other pilot sites and projects.

- "Tenants complained in the past because they had an incorrect subdivision of common expenses, now they give this to the new building manager, and she does the right calculation" (B)

9.11.4 The impact of humidity feeling on thermal comfort

There is a big difference of experience between the tenants about the presence of humidity:

- 10 households experience an important humidity feeling in their dwelling and even water infiltration on the terraces or in some walls
- The households with humidity problem are n° C, D, F, G, H, K, L, N, P, R
- Though no tenants use a “deshumidificator” in winter to dry the air despite.
- 8 households don’t experience any humidity feeling



- “Yes it's humid, especially in the bedrooms” (G)
- “Yes, a lot of humidity on all windows each morning, condensation” (F)
- “Yes on the walls, because in summer they open all day long, it's very good ventilation, but in winter the humidity is important. Long time ago they had more mold but they use painting to avoid mold. There is probably condensation near the bow windows, bad sensation of humidity in the little bedroom” (H)
- “A lot in the bedrooms and in the rest of the apartment” (K)
- “Feeling of humidity everywhere and water infiltration on the ceiling of her bedroom (West side)” (L)
- “Lots of humidity in the north/east bedroom” (N)
- “Humidity in the bedroom” (P)

9.11.5 The presence of mould

There is a presence of mould in 13 households: B, F, G, H, I, J, K, L, N, O, P, Q, R

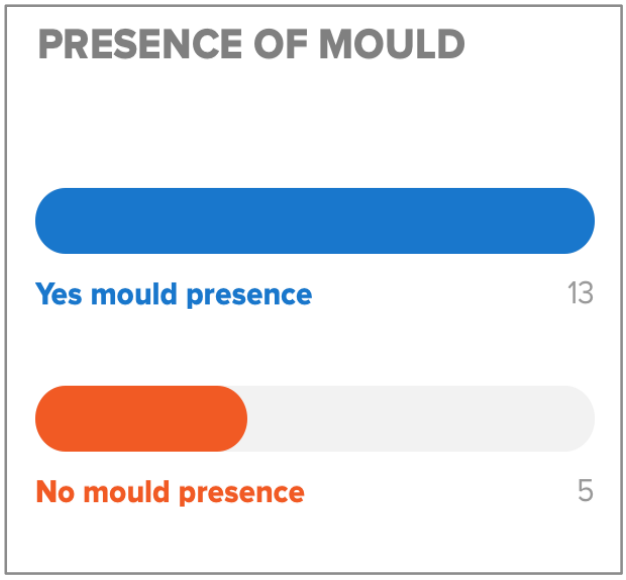
- "The bedroom in the East side with mold in the corner, on the angles but not like in the other apartments where there is more mold, the other tenants complain about the mold issue" (B)

Including 2 Households experience a big problem with mould: K, N

- "There is water infiltration on the terrace of the living room, mould on the angles and between the ceiling and the wall, lots of mold" (N)

At the contrary, 5 households never have any mould presence, including 3 Households had mould several years before but they have started to use anti-mould painting and they ventilate a lot so they have no more problem today: A, D, M

- "No mould but they open very frequently and they use painting products against mould. 10 years ago they had more mould but after aerating, putting anti-mould painting it's fine" (A)
- "Long time ago there was mould in the corner of the north bedroom, but probably the work on external wall in the 80s caused that problem, but they use a special product against damp and they ventilate very often so the mold has disappeared. They ventilate each day all the different rooms" (D)



- "No but in the past they had mould but long time ago, not anymore" (M)

9.12 The impact of air leaks on thermal comfort

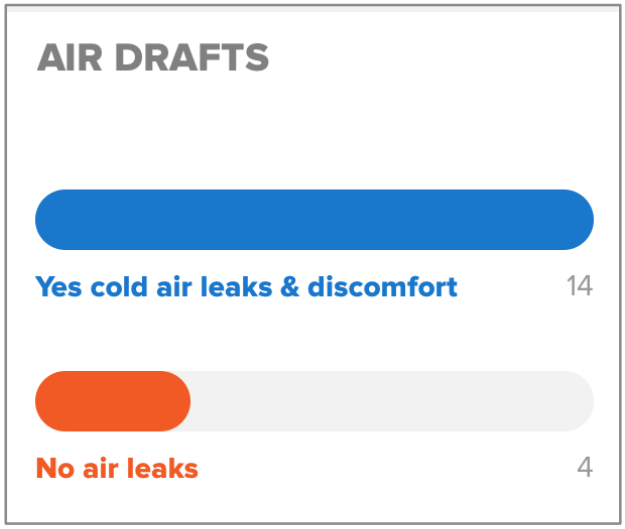
14 households have important air leaks everywhere around the windows

The origin of the problem is the poor windows isolation with important gap between the metallic window doors and the wall. The curtain blocs are also a problem as the air infiltrates the dwelling through it massively. Tenants have a daily experience of strong air velocity especially and the worst air leaks are situated in the rooms that are the more exposed to the local air current and regional wind (tramontane).

- "Air leaks everywhere especially around the metallic bloc and the ribbons (all the windows)" (A)
- "Yes especially in the living-room with bad windows and strong wind. The curtains used to move due to the air leaks" (B)
- "There is a lot of air leaks, it decreases the feeling of warmth, it doesn't feel hermetic with air currents inside, it is not terrible but it is less comfortable than without air leaks" (C)
- "Lots of air leaks in all the apartment especially around the windows" (I)
- "Everywhere, it creates a lot of cold, there are "terrible air leaks" (K)

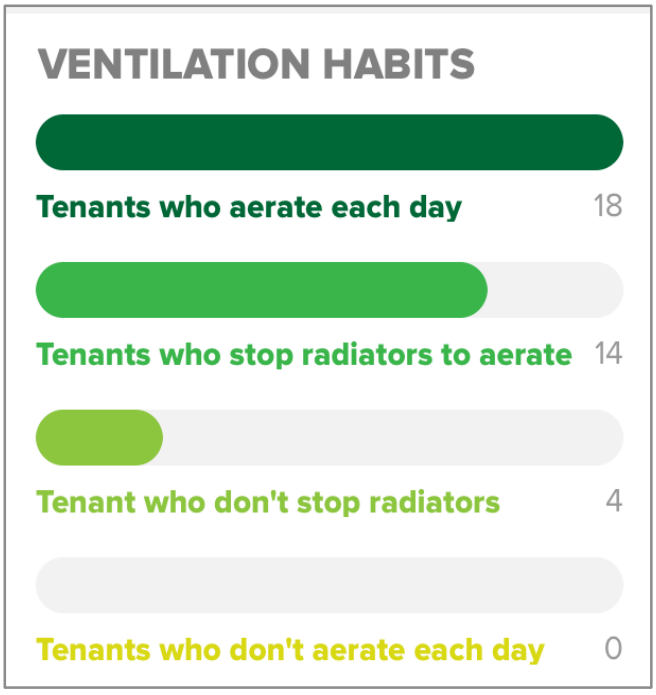
Only 4 households don't experience air leaks amongst which 3 households have installed double windows, which has resolved greatly the issue of air leaks.

- "They have double windows now so it's better, they have not too much air leaks because they have installed themselves double windows" (E)
- "Lot of air leaks, now they have less because they have put double windows, it was expensive, they discussed about it with other tenants but they decided individually" (F)
- "Air leaks everywhere. They have put double windows except on the windows doors. They have strong air current from the door windows where it's not double windows" (G)



9.13 Tenants' ventilation habits

- 0 households declare they don't aerate often or not each day
- 18 households declare that they aerate their dwellings each day
- On these 18 households, 4 households declare that they don't stop their radiators while they ventilate the different rooms in the apartment.



Each day, all the tenants aerate their apartment from 10 mins to 1 hour on average, and until several hours for some tenants who are used to leave the windows a bit open all day long. So even in winter, each morning all the dwellings are ventilated completely by habit, to lower the humidity feeling and for the air quality.

In winter from 9am to 10am on average, most of the dwellings are ventilated and become colder during a specific and similar time lapse. Like in the 1st pilot site, there is a common habit amongst tenants who stay at home during the day to clean the apartment in the morning, and the ventilation of different rooms is part of this daily routine. Tenants also like to leave all the windows open during the summer and to create a natural ventilation in their apartment.

These domestic "routines" should be integrated in our training program to learn tenants to use the new ventilation system.

9.14 Thermal comfort inside dwellings in summer and climate change

9.14.1 The west/south side rooms are very hot in July and August

The west/south side of all the apartments become very warm during a period from June to September, and during the yearly heat waves of July and August. Though, the tenants in the 2nd pilot site don't experience extreme situation like in the 1st pilot site where the rooms on the south side were becoming "unliveable" in summer for the tenants.

- "Its' very hot in the living room and the kitchen but they use a lot the natural ventilation, they can stay inside these rooms though, it's not like in the other building of the 1st pilot site" (D)

The humidity is terrible for tenants and adds to the thermal discomfort in summer. A lot of them use their cooling system to "dry" the air and some tenants have a "deshumidificator" option (they even bought a cooling system device for the service it gives to lower the humidity, not to cool the air). The temperature is getting better with use of the plastic shutters. In summer, many tenants live with the shutters completely closed in the rooms oriented on the south/west side.

- "All rooms are too hot, especially the kitchen, they use natural ventilation, they close all the shutters and then the temperature is better" (E)
- "Very hot in all the rooms in summer" (K)

Due to the climate change, the heat wave period tends to expand these last years according to tenants and this has an important impact on the life quality of elderly tenants.

- "She can't live without AC, it's way too warm in all the apartment, she uses the AC depending of the weather from July to August and sometimes also in June, all day long, all night long. They live here for 37 years (from 1979) when she was young she was out of the house for long hours instead of now when she stays inside home, she can't go out to take some fresh air like years before, so they feel more the heat for this reason, the elderly people suffer in general from this situation" (N)
- "Everywhere it's too warm, they are at the last floor and its very warm, they suffer a lot of the big humidity in summer" (Q)

9.14.2 A situation of fuel poverty in summer

Only few people have air conditioning system probably because they are too poor to buy these systems and to pay the high electricity bills linked to the AC, according to the local manager.

- "The other problem with air conditioning is that ATER asks to people who install an AC system an amount of 50 euros to authorize this installation, people don't want to pay so they don't want to declare that they have it. The list of AC cooling systems owned by tenants was given to SinCeO2.The only possibility is to visit and ask directly. It is impossible to see from the outside, it will be only declarative. We can maybe guess it with bills in summer" (Local manager, 2016).

In our corpus: 14 households own a cooling system on 18 with 1 or 2 splits inside their dwelling (in the corridor and in the living-room or main bedroom) and 4 households don't own a cooling system. On the 14 households who own a cooling system: 7 households have quite similar electricity bills in winter and summer, and this can be explained because their heating bills in winter are also quite high.

- "No, in their opinion they have no higher bills in summer, 65 euros per 2 months on average" (A)
- They don't see a big difference between their bills in winter and summer, 60/70 euros per 2 months for the electricity, in summer around 80 euros per 2 months" (F)
- "No, it's more expensive in winter because they use a lot a little electric heater in the shower in winter" (P)
- "They spend for gas, for 5 months 900 euros in winter, in winter 146 euros for 3 months of electricity, 153 euros for 3 months in summer" (Q)

But 7 households have a higher electricity bills in the summer months. For certain tenants, this additional cost is really a problem and they must limit their use of the cooling system to a certain number of hours especially during the night, to be able to sleep because the heat is still very high during summer nights.

- "Yes it's more expensive, very high compared to no use the AC" (B)
- "She spends a lot in electricity: 150 euros per 2 months because she has washing machine once a day, and dishwasher once a day, a little bit more expensive in summer with the deshumidificator. She has 3 "must": washing machine, dishwasher and vacuum cleaner, she wants to use them daily and she doesn't want any change in her routine, she would like to save money but not to change her habits" (J)
- "In summer they spend 100 euros more for 2 months for AC" (K)
- "Yes difference: high consumption of natural gas in winter and higher consumption of electricity in summer." (L)

9.14.3 A rising phenomena due to climate change, the "double fuel poverty" in winter and summer

In summer, temperatures are rising for 2 decades, and the North of Italy starts to be as warm as during summer in south of Italy a decade ago according to several tenants, and at the same time, in the north there is a lot of humidity, much more than in the south.

Tenants in Italy who own a cooling system experience 2 high peaks of consumptions nowadays: in winter and in summer. Most of the tenants in our corpus who don't own a cooling system haven't chosen to not own such a system, but they simply can't afford it and it has an impact on their life quality. Some tenants also experience in summer an increase in the number of showers they take. Some tenants take 2 to 3 showers per day in summer because of the extreme heat, compared to the habit of 1 shower per day in winter. Some tenants can't take that many shower because it is too expensive. The important cost of water and hot water in general that tenants complain about, also increases in summer when they have to take more showers due to the heat and the humidity.

The environmental and Co2 footprints of this situation are also important: more electricity and more water are needed in summer, and this situation will increase. The pilot site in Italy gives us an overview of what will happen in northern latitudes within the next decades as we can already witness a general trend for example in France, Switzerland and Germany of increasing temperatures and heat waves each summer, and incidentally a raising concern over the energy and water demands during the summer season. The situation in the Italy pilot site offers a "future time perspective" of what might probably happen in other countries of Europe in the next decades due to the climate change.

In this context, we want to highlight the difficulties experienced already by tenants in Treviso now in 2016-2017. What we call in our analysis the **"double fuel poverty"** linked to the increasing energy and water consumption in summer in the Italian pilot site, illustrates well the challenges that public housing companies will have to face with climate change in the coming years with rising health risks due to the fuel poverty in summer and winter like in Spain[8], increasing fuel poverty, difficulty of tenants to pay their bills and incidentally their rent. Other researches have observed similar phenomena of "double fuel poverty"[9] that will accentuate in countries already affected like Italy, Spain, Portugal, Greece, and this issue will progressively affect the other countries of Europe.

[8] "In 2010, pre-mature deaths attributed to energy poverty exceeded those from car accidents" (Castaño-Rosa, Smith, 2016).

[9] Reference: *Where does fuel poverty exist? Summer heat drives fuel poverty in Spain*, September 19, Castaño-Rosa, Smith, 2016
http://www.coldathome.today/where-does-fuel-poverty-exist-basic

We integrate in the next two pages a long abstract from a research of EnAct on the European countries where we currently observe the more fuel poverty in summer:

"The new rising social crisis linked to this phenomena of "double fuel poverty" for EnAct

"According to the report, between 2010 and 2012 the number of households that need to spend a disproportionate amount of their income on electricity and gas bills increased to 16,6% from 12.4% in 2010. In real life, these percentages translate to 7 million people who live in unhealthy conditions of homes that are very cold in the winter and very hot in the summer. A sharp rise in the number of Spaniards living in the risk of energy poverty was revealed in a report published by the Spanish Association of Environmental Sciences (ACA). According to the report, between 2010 and 2012 the number of households that need to spend a disproportionate amount of their income on electricity and gas bills increased to 16,6% from 12.4% in 2010. Coupled with mold and humidity and electricity cuts, due to unpaid bills, energy poverty is a social crisis resulting from rising energy prices (roughly 60% since 2007) and decreasing incomes (…). According to ACA, energy poverty is defined as the inability of a household to meet a minimum amount of energy services that satisfy basic needs, such as maintaining a home temperature of 18-20oC in the winter and 25oC during the summer. Tenants will start to struggle to pay their bills and by incidence their rent not only in winter, but even more in summer. This analysis is shared by many observers including specialists of the EE Fuel poverty network and EnAct, especially after the summer 2016 with very high temperatures in Europe compared to seasonal averages".

"The example of Spain with double fuel poverty identical situation

"Fuel poverty has been linked to countries with cold winters where people cannot either keep their houses adequately warm or pay their energy bills. Nowadays people in countries with hot summers have to expend more than 10% of income to pay their energy bills. There are several factors which lead households to expend such a high amount of money to pay their energy bills, although the most important two are the inadequate systems and poor quality of buildings. This summer (2016) has been very hot in central and southern European countries leading the highest recorded temperatures to be exceeded. Regarding this fact, our coordinator Raúl Castaño-Rosa in collaboration with Marilyn Smith (EnAct) make the following post. Promoting the relation between fuel poverty and energy efficiency in buildings, fuel poverty in hot seasons is the base of this investigation. Day-time highs of 40°C (112°F) are not unusual in Sevilla, Cordoba and other cities in the south of Spain during July and August. But the financial crisis that has plagued the country since 2008 is making scorching days much more unbearable for many more residents. Their situation draws attention to the reality that fuel poverty is not only about being 'COLD@HOME', in regions with cold winters and for people living in cooler homes, or only about long-standing root problems such as old, poorly constructed dwellings. Between 2006 and 2012, the rate of Spanish households who couldn't afford adequate heating in winter rose from 6% to 9%; those in arrears on utility bills rose from 4% to 6%. Over the same period, a staggering 25% of households self-reported they could no longer afford to keep comfortably cool in summer. These percentages translate to 7 million people who live in unhealthy conditions, in homes that are very cold in winter and/or very hot in summer. An annual 7 200 deaths can now be attributed to energy poverty in Spain, according to the World Health Organisation. In 2010, pre-mature deaths attributed to energy poverty exceeded those from car accidents. Yet the issue of fuel poverty was largely unrecognised in Spain until the late 2000s, when a report published by the *Asociación de Ciencias Ambientales* identified improving the energy efficiency of homes as a potential means of stimulating employment (Tirado Herrero et al., 2012)".

"The example of Greece with double fuel poverty identical situation:

"Whether old or new, many Greek dwellings are the enemy of their inhabitants. The vast majority are simply not well insulated: 32% of homes in Athens recently received an energy efficiency rating of 'Category H' on a scale that spans from A to G in most European countries. On that foundation, the ongoing economic crisis has pushed many people past the tipping point. Since May 2012, unemployment has been stubbornly above 20% (peaking at 27% in 2013), meaning many households are trying to make ends meet on substantially reduced incomes. As the crisis began, heating oil prices almost tripled as the global market spiked and the Greek government added new taxes.
But there is also a boom cycle element to the current situation: although the Greek government introduced insulation requirements into building codes in 1979, they were largely ignored during the rapid construction of the 1990s. A shortage of inspectors meant no one was verifying compliance, and owners of relatively recent homes now find their properties to be substandard. But high levels of collective, oil-based heating in apartment buildings, particularly in large cities such as Athens and Thessaloniki, are making the fuel poverty situation even worse than it should be. In such buildings, if 50% of residents (whether owners or renters) can no longer pay their energy bills, the oil supply is cut off completely. Mrs. Katerina Hatzivasileiou is a classic case: still professionally employed, fuel bills are not a problem for her – but staying adequately warm is. She is reduced to using electric room heaters while her radiators stand cold. In the winter of 2012/13, all of Athens suffered from fuel poverty in a different way. Vast numbers of households returned to using fireplaces for heating, burning almost any wood or waste they could acquire cheaply. The air was thick with smog as levels of small particulate matter jumped by 30% in mid-December. Worse yet, the concentrations of organic compounds known to cause cancer increased fivefold during this period. These pollution spikes could lead to higher health costs for Greece down the road, as these small particles can lodge in lung tissue and trigger health conditions that only become evident many years later"

Reference: *Where does fuel poverty exist? Summer heat drives fuel poverty in Spain*, September 19, Castaño-Rosa, Smith, 2016)

http://www.coldathome.today/where-does-fuel-poverty-exist-basic Raúl Castaño-Rosa, University of Seville & Marilyn Smith, enact

9.15 Social risks in the 2nd pilot site

9.15.1 Risk with new ventilation system and local habits

It is important to note that if we install new ventilation system, we will have to produce an efficient training program as many tenants don't want to live with closed windows, and most tenants have strong habits to ventilate each morning and to leave some windows open slightly all day long both in winter and summer (see the parts before "ventilation habits").

9.16 The issue of water consumption and water costs

Tenants complain a lot about their charges and the very expensive cost of water. Tenants are also very divided: on one side the tenants who are careful with their water consumption and to pay their

bills, and on the other side the tenants who consume too much water and sometimes don't pay their bills.

This situation creates:

- a pressure on the more "ethical" tenants;
- sometimes a distrust in the global community and with the other tenants;
- a disillusion about water saving practices as very little changes are observed by "ethical" tenants on their final water bills due to some disrespectful tenants.

9.17 The "double fuel poverty" issue

As described before, in the Italy pilot site tenants experience 2 seasons of fuel poverty: winter and summer. Many tenants have difficulties to pay their bills in the more cold and warm months of the year, and with the climate change this situation is not getter better. At the contrary, the extreme temperatures increase in summers, and the winters are sometimes warmer and sometimes are cold according to tenants.

9.18 Water uses and saving practices

9.18.1 Shower use patterns

Tenants take their shower equally in the morning and the evening.
Not all tenants take a shower each day:

- 10 households are composed of tenants who take a shower each day per person;
- 6 households are composed of tenants who take 3 to 4 showers each week per person;
- 2 household is composed of tenants who take 2/3 showers per day per person.

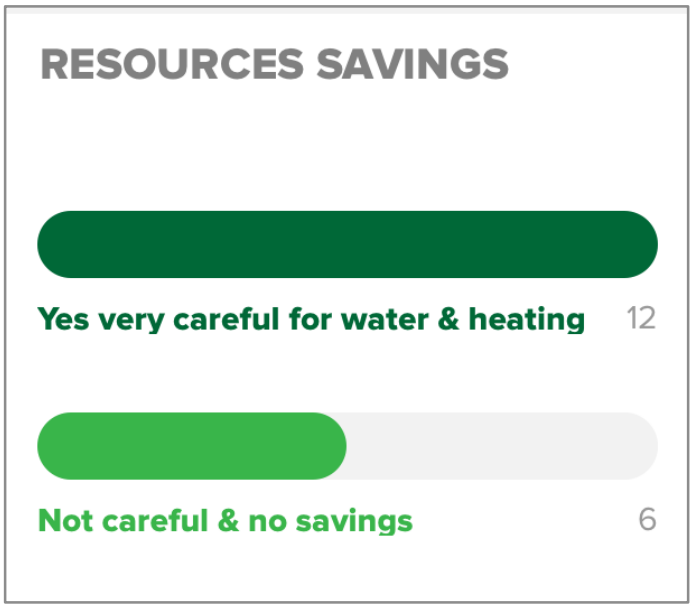
In summer, 16 households don't take more showers due to the heat, when 2 households are composed by tenants who change their habits and take many showers each day (2-3) because of the hot temperatures.

9.18.2 Saving practices for water

The pilot site is divided between tenants who have no particular interest to save water because they don't really see the impact on their bills, and also because they are not interested in the topic of environmental protection.

6 households are not particularly careful about their daily consumption.

12 households are very careful with the use of water and heating as their charges are considered too expensive. The tenants who already have saving habits do it mostly for 2 key reasons: the cost of water and the generational habit with elderly tenants: "to not waste".



The environmental concern is not a key factor of behavioural changes in the Italy pilot site.

- ⇒ "They try to save water but they have no particular devices to save water. It is for the cost not the environment » (A)
- ⇒ "No particular careful, they try to pay attention but it is not a priority" (B)
- ⇒ "Normal, no savings in particular, she doesn't use lots of water, as she takes no shower" (C)
- ⇒ "She uses a lot of water because she likes to have a frequent shower, to clean the house" (J)
- ⇒ "Very high consumption of water, 120 cube meters of consumption per year" (K)

9.18.3 The generational habit "to not waste"

The elderly tenant share a common "social norm" inherited from the education of the 50s and the 60s to avoid extravagant consumption, with a common rhetoric "to not waste" resources of any kind.

This phenomenon of "generational saving habit" with elderly tenants is not specific to the 2nd Italy pilot site but was observed in previous energy projects in Europe (Zoonnekindt, IEPEC, 2011)[10].

The younger generations (tenants <40 years old) also start to share common cultural references & social norms of environmental awareness with daily saving practices and a common rhetoric of the "individual impact" on the global resources. Though we must highlight that no tenants have made any reference to the CO2 footprint during our survey in Italy, this concept is generally unknown for tenants.

[10] https://www.iepec.org/conf-docs/papers/2014/Kathleen%20Zoonnekindt.pdf

⇒ “They try to save on all their expenses in general, there are used to not waste, it's their education to not waste, it's a habit” (D)
⇒ “They are very careful about the use of water, they stop the water while brushing their teeth, when they wash dishes, when they use soap and they try to use less water” (D)
⇒ “They are careful because they have this habit to use very few, they have nebulization system for the taps to use less water” (G)
⇒ “In the last period, they have started to be careful about the water consumption, for the cost, they don't how much they pay for the water but they try to be careful anyway. The charges are very expensive according to them (600 Euros per year) and they discuss about it a lot with the other tenants” (H)
⇒ “Yes careful, they stop the water when she uses soap” (I)
⇒ “Yes as if they are not careful the bills are too expensive” (R)

Eco-technology

Some tenants who are particularly careful to not use too much water, have already adopted many saving routines such as:

- avoiding to let the water run for nothing in the tap or under the shower;
- using a nebulization system (tap aerator system).

The “nebulization” option is interesting for several tenants so it could be an option to propose for the 2nd pilot site to reduce the global amount of domestic water consumer by tenants. 1 household already owns a “nebulisation system” to save water and the tenants are satisfied with this system so we could show it as an example for other tenants.

9.18.4 Information about electricity

There are 2 bills for the electricity for tenants:

- 1 bill for the electricity consumption - the highest consumption is linked to the elevator and some tenants complain about the calculation rules for collective areas (the single pay as much for the use of the elevator than a big family for example). But they often misunderstand /exchange the elevator maintenance cost (very high) with the electric collective consumption on the rest of collective spaces (not so high);
- 1 bill for individual consumption with a supplier chosen by tenants. It is important to mention that in the Italy pilot site some tenants pay more for their energy bills than in rent as the rent are very low. Also in Italy, there is no special tariff for low income households like in France, but recently the Government introduced contribution to the family allowances.

During our interview with ATER, the building owner’s team appreciated the idea to display a comparator of power companies on the platform dedicated to tenants, like a “Tripadvisor” to display the different prices offered by companies, the Co2 impact and the quality of customer service they offer. This would be interesting to inform tenants but also warn them against some

aggressive marketing strategies that end-up being not beneficial for customers. There is for example in Treviso area a real issue of aggressive marketing by electricity suppliers for several months, with bad behaviors of sales persons and a poor customer relation service once that tenants have signed up for a new contract (difficulties of tenants to check their bills and the calculated cost, or to get proper responds if they have a shortening of their electricity supply in case of personal economic issues). There are many deceptions from power companies according to tenants, and not necessarily a good experience with cheaper suppliers, which generates distrust. As ATER is not a welfare company: they are not in charge of tenants' problems, for example they won't install new bulbs for tenants, their level of margins is very tight but they would like to be able to support tenants to get better information, to make electricity savings, to better control their energy budget and ideally to generate a better security/margin for the payment of the rent.

9.18.5 Equipment typically owned by Italian tenants

We have mapped the detailed list of equipment for each household interviewed and their energy efficiency category in order that SInCeo2 can make statistics on energy consumption for each interviewed and monitored households. The equipment that almost all the households we have met own and that we can consider as typical of the Italian pilot site equipment level are:

- Electric hoven
- Gas plaques
- Microwave
- Washing machine (and very rarely a dryer)
- Dishwasher
- Vacuum cleaner
- TV

Italian tenants rarely own a kettle or a dryer that are quite common in UK. Also, only 7 households on the 18 interviewed own 1 or several computers, a situation that will have an impact on the Training Program to elaborate for tenants (mix of communication tools with letter and meeting, and not only an online web platform).

9.18.6 Key equipment uses patterns

- The average use of dishwasher for the households who own one is 2-3 times a week
- The oven is used only 1 to 2 times a week

9.18.7 Equipment owned in energy efficiency Class A and more

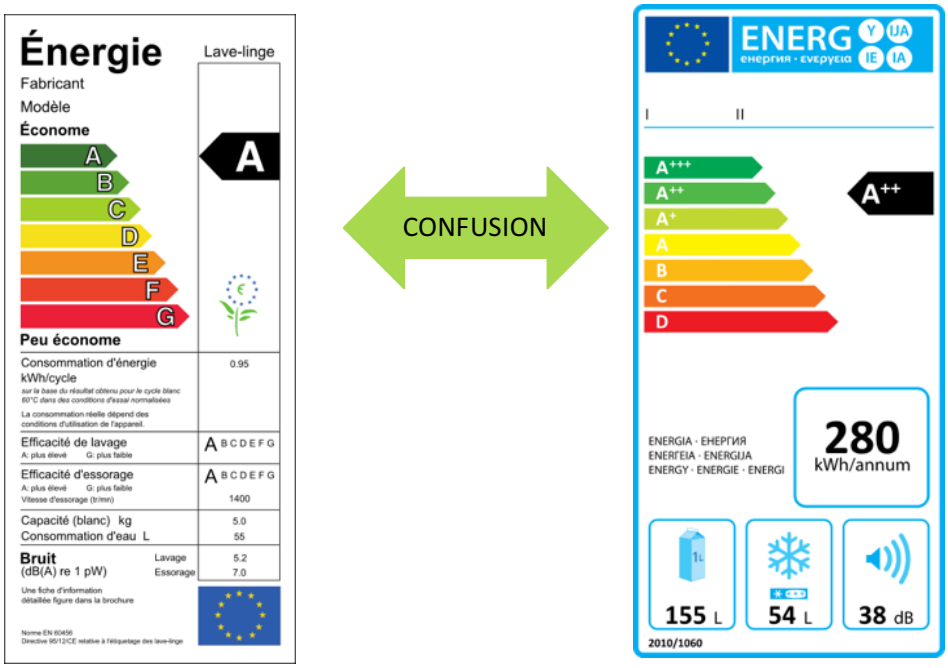
Shortly, we can describe that the common equipment owned by our tenants in the Class A category are the washing machine, fridge, and microwave.

- In the corpus of 18 households, 12 households have most of their equipment in Class A and more, and we have noticed that for the rest of tenants, the level of equipment in high

energy efficiency category is important compared to the UK pilot site where fewer tenants own low energy consumption devices.

- In the Italy pilot site, all the households own at least 1 or several Class A items.

Like in the UK pilot site, Italian tenants can have difficulties to describe the category of their equipment in the class A category, meaning the difference between Class A + to A+++ but they know when they have an equipment below the A category.



9.18.8 Saving habits of electricity

In behavioural studies related to energy consumption behaviours, there are classically 3 types of saving practices: purchase action, usage and maintenance-related behaviours (Van Raaij, 1983).

⇒ In our corpus of 18 households: 6 households have adopted electricity saving habits by not letting the lights on when it is not useful. These households are particularly careful about this in their daily routines;

⇒ Most of the households interviewed are not very interested in low electricity hours' contracts, mostly because these contracts are not practical and adapted to the life inside the 2 buildings. Indeed, the low energy tariffs are only accessible during the evening and the night, but using equipment during these time periods is not respectful for the other tenants as the building is not well isolated and the noise diffuses a lot between the different floors. Several tenants explained also that it is not practical to use washing machine or dishwasher during the night, as it is not possible to dry the clothes directly after.

⇒ We have 1 tenant though in our corpus of 18 households who use low energy tariffs: "She uses the low tariff habits, she uses her equipment during the night. Especially during Sunday morning, the low tariff is from 7pm to the morning, she doesn't know exactly which hour" (M)

In our corpus, we have noticed 2 types of electricity & water saving habits:

1. **Savings linked to specific purchase**
    - Most of tenants have low energy bulbs or a mix between normal with low energy bulbs (and a progressive replacement of the old bulbs);
    - Most of tenants own 1 or more electric equipment such as washing machine, fridge and dishwasher in A to A+ categories.

2. **Savings linked to specific restrained uses**
    - Most of the households in our corpus are careful with their use of hot water for money reasons (12 households);
    - 6 households on 18 are careful with their uses of light/bulbs;
    - The patterns to use washing machine and dishwasher are pretty stable in the 2nd pilot site like in the 1st pilot: with 2 to 3 washing machines per week and 1 to 2 dishwashers per week both used when they are full.

Savings linked to maintenance action: we haven't noticed any saving practice linked to a habit to maintain equipment such as defrosting the freezer.

9.19 The key expectations of tenants for renovations

We should start this part about expectations by the fact that most tenants interviewed are very happy about their dwellings: the size, the big rooms, the light inside thanks to big windows, the building area are some of the very positive aspects described by tenants.

Though, tenants are mostly very happy about the future renovations and their key expectations are:

- To change the windows with double glass windows and new structure to avoid air leaks;
- To improve the isolation of the dwelling to have a better thermal comfort in winter and in summer;
- To change the old boilers;
- To have less humidity inside the apartment.

➢ "The windows as they are not closing properly, and there are cold leaks around the windows, the radiators should be changed, and the wall insulation should be improved" (B)
➢ "The windows are the priority, the boiler is very old and she thinks it is better to change it" (C)

- "They appreciate the future renovations, the windows are the priority, solar panels are positive, it's good because it's innovative and to save energies, both for the cost and for the environment, they have no worries on the renovations, they learn to their children to be careful with energy consumption. For him it's important to transmit values about ecology to children but it's not common in Italy, people think that it's not expensive and they don't care to consume not too much, they don't give the example at school, they speak but don't act, people start to be aware of the climate change, in Treviso area the weather has changed, he comes from the Pouilles area, and in Treviso the winter was 20 years ago with snow, grey sky, now it is high temperature, lots of rain and sunny day, it looks like the winter typical of the Pouilles comes in Treviso now" (E)
- "They expect double glazing for the windows. The windows and the opening should be changed as there is a big gap between the wall and window closures" (F)
- "The apartment is great because it is big and very light, no worries about renovations, we are very happy for the renovations, they expect low consumption for electricity, less humidity at home and less air leaks" (H)
- "She loves this apartment. Expectations of renovations: the windows, and she would like to have new floor but she knows that this kind of work is not part of the project" (J)
- "The panorama, the view here is beautiful. There is life in the area. The expectations are linked to the isolation, all the external insulation, and the windows" (K)
- "She loves her apartment, the area, the view and the space. No worries. Insulation is the priority, because she has water infiltration" (L)
- "No opinion about the choice of renovations, she would like to have something that allows her to pay less for energy as simply as it is" (M)
- "They like the apartment except the windows, they have very high bills for the heating with gas, 2000 euros per year of gas" (P)
- "The windows are expected, she would like vasistas opening" (Q)
- "They like the design of the apartment, the kitchen separated from living room, the big entrance. Expectations: they are happy to have renovations of the windows" (R)

9.20 The experience of ATER employees with tenants' engagement

9.20.1 Participation of tenants in renovation program

The tenants can't refuse the renovations but ATER communicates a lot to make sure that tenants are well informed about the interest of renovations and will agree with them. Tenants cannot refuse works, this is part of their contract and in ATER, tenants are not engaged in making decisions about specific technologies to be implemented.

Communication tools used with tenants by ATER to integrate in our Interaction Program

There is no tenant association active in the 1st and 2nd pilot sites. ATER is working with local managers who are in charge of various administrative or maintenance tasks. ATER doesn't organize

collective meetings but privileges the intermediation of the building manager/tenants with special roles/captain, face-to face discussion directly at tenants' home, and information by letters as many tenants don't have computers and don't use emails (an important part of the 2 pilot sites population is composed by elderly tenants).
Local managers will usually be in charge of informing tenants with regular face to face meetings. In the Italy pilot site, tenants discuss a lot together or with the "captain" and "local manager" of the building, the "captain" is the referent tenant working for ATER and who makes the link with the tenants of his bloc.

9.20.2 Customers surveys

ATER doesn't make tenants surveys, this is not something common in Italy where tenants are considered as users and not customers. This distinction is important and has been highlighted several times by the team of ATER.
In this context, the sociological evaluation performed in the DREEAM project is quite a new experience for ATER team in Treviso.
The sociological evaluation offered new information on tenants' engagement process and life quality inside the buildings to the local ATER team. Especially the project manager who performed the interviews with Savills' sociologist has been able to witness the willingness of tenants to participate to qualitative enquiries, and their willingness to collaborate with ATER in future training programs for tenants & actions related to energy efficiency.

9.20.3 Conclusion on the 1st sociological enquiry in the 2nd Italian pilot site

- **The preparation of the interviews was extremely well done by ATER team and the local manager during the 2st series of interviews in 2017;**
- The team of ATER was extremely collaborative and efficient during interviews to make the translation from English to Italian for Savills' sociologist, to interact with tenants during the long questionnaire, and to follow rigorously the in-depth qualitative guideline of questions prepared before the interviews;
- Renovations are very positive for the majority of tenants;
- There is only 1 tenant who is worried about the potential disturbances and noise during the refurbishment, the other tenants are not worried at all and are very happy about the renovations;
- Tenants are even more collaborative, easy to talk with and give even more detailed explanations than in UK and in the 1st Italy pilot site where tenants are already very proactive and friendly. This is a very positive point for the Training Program that we want to develop after the renovations, and to develop specific information tools to help tenants to better control their energy consumption;

- Tenants would like in priority better windows & better isolation to improve the thermal comfort both in summer & winter, to have less air leaks and humidity inside the dwellings, and to solve the issue of mold presence for those who experience this inconvenience;
- Very good information received about the water consumption from the local manager and strong feeling of individual responsibility in the community for a majority of tenants met, but the collective charges for water and maintenance are considered too expensive;
- Lack of interest for low electricity tariffs that are not adapted to the life patterns of tenants in the 2 buildings and the problem of noise resonance between the different floors (equipment can't be used during the night or it disturbs the tenants themselves and their neighbours);
- In Italy, there are 2 seasons of high electricity consumption: winter and summer with the use of additional heating devices in winter and cooling systems in summer;
- In summer particularly, we notice the emergence of a new fuel poverty type that is not linked to the difficulty for tenants to keep a warm temperature inside their home - but to keep a decent and cool temperature during the hot waves of July and August, a situation that we call "**double fuel poverty**";
- Several households equipped with a cooling system pay 50% to 100% more in electricity in summer, the other tenants have already a big consumption in winter so they have expensive electricity consumption both in winter and summer;
- Tenants experience the impact of climate change according to them. Many of the tenants interviewed have lived in the building for more than 3 decades and declare that the temperature and humidity in summer are increasing and become a real concern especially for elderly tenants;
- Some tenants simply don't buy a cooling system because they couldn't afford the cost of the electricity.
- **All tenants were positive with the interview meetings and accepted to be interviewed again in the future when needed for the project, and they also accepted to participate to discussions about the training program for tenants**;
- Only 7 households on 18 have computers, so we should develop a web platform for tenants who have Internet access but also other communication tools for the other Italian tenants: face-to-face meetings at their home (the preferred way to communicate for most tenants), information from their local manager and paper communication tools such as brochure/leaflets.

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