Benchmarking and financial analysis of the DREEAM pilot sites

D.4.9

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1 EXECUTIVE SUMMARY

The following document includes the basic information, procedures and explanations necessary to characterize the energy consumption of the various Pilot Buildings considered in the Dreeam Project. The report is divided into three main chapters corresponding to the pilot building of each Housing Company Partner: Ater Treviso, Places for People (PfP) and 1892.

The information for each Pilot building is described with the same structure in three main sections:

1. Savings calculation.

In all the pilot Buildings, the energy and economic savings is calculated for the main systems:

- Heating, Domestic Hot Water (DHW), Electricity consumption in communal areas and Tenants electric consumption.

For those situations where tenants' electricity consumption is different between heating and domestic hot water, additional analysis is performed in order to identify if they are using auxiliary heating systems.

The highlights and the working process of consumptions energy baseline in each pilot are summarized in the following points:

Ater Treviso 2nd Pilot Building

- In this pilot, there is little initial available data from some tenants. This report includes an initial description of the energy consumption of tenants. The production of heating and DHW is by an individual boiler, therefore the information from tenants meters is essential. The necessary additional data has been collected by the installation of monitoring equipment and through gas meter readings. Through the analysis of this additional data, it is possible to calculate the energy baseline for some selected tenants.

PfP Pilot Building.

- In this Pilot Building there was no initial available information concerning the energy consumption of the dwellings. Thanks to the monitoring equipment it has been possible to collect detailed information of the energy consumption for the different active systems. The period evaluated in this report is from mid-September 2018 to mid-February 2019. In this initial evaluation of the winter period , baselines have been calculated for the different systems in nine selected dwellings.

1892 Pilot Building.

- In this Pilot Building there was not initial available information about energy consumption of the communal areas.
- Energy consumption baselines is based on several years of data covering the thermal consumption (Heating and DHW) collected by 1892, (before renovations), of the 6 buildings (dwellings and common areas). For electricity, the baselines are based on the electricity consumption data collected by 1892 (before renovations) of the 6 buildings (common areas only).
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The calculation of the savings has been carried out in all cases in the same way:

Energy Savings = Adjusted baseline consumption (using after renovations variables) – Energy Consumption after renovation

The error of the savings calculations is assessed by the regression calculation made to obtain each baseline. As an approximate reference, the R^2 value of each calculation can be used. In general, the higher the R^2, the better the fit of the model to your data. R^2 is always between 0 and 100%

Energy Savings = [Adjusted baseline consumption (using after renovations variables) ± its error] – Energy Consumption after renovation

2 ENERGY PERFORMANCE ATER 2nd BUILDING BEFORE RENOVATION.

2.1 ENERGY SAVINGS CALCULATION

2.1.1 Individual Electric consumption savings for a selected group of tenants

In the beginning of 2017, SinCeO2 together with SAVILLS, listed the technical and social archetypes of households to select in our qualitative research, in order to build a relevant sample with a good qualitative representativeness of the entire pilot site. In the 18 homes of Tower A and the 18 homes of Tower B, according to the description given by the local manager, our body had to be composed of the following various social groupings:

- Couple of older people without children.
- Younger couples with a small child.
- Couples with older children.
- Few people living alone.

Finally, 36 homes were selected with the following characteristics:

Households structures

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

Households size

The set of the 18 households consists mainly of a small size of households with 2 tenants (10 households) and the second most common size is a 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 sample

- 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)

Statics:

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

2.1.1.1 Calculation of electrical savings in Tower A

Figure 1: Via BORGO FURO 35/A (Tower A)

In Tower A, where renovations have ended on May 1, 2019, demonstration period of savings covers the period from from May 1, 2019 until July 31, 2019.

Table 1: Reporting period for the calculation of electricity savings in Treviso tower A

Reporting period	
From May 2019	**Till July 2019**

The following image shows an outline of Tower A with the three types of homes that have been selected: A1, A2 and A3

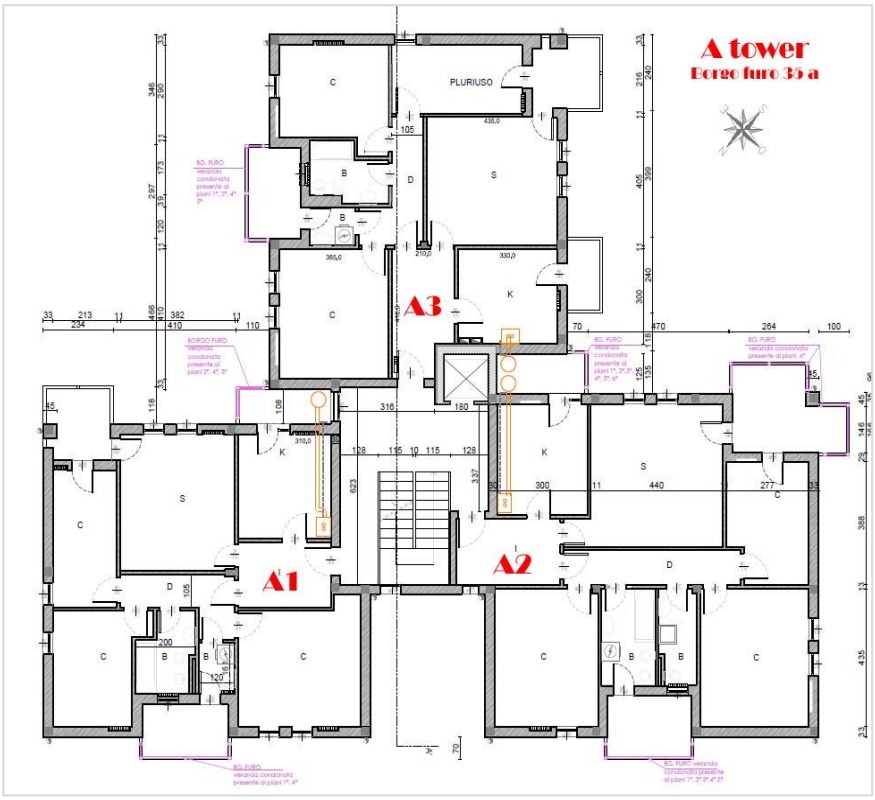


Figure 2: Typology of dwellings in Tower A

The following table shows some of the characteristics of the homes in Tower A monitored:

Table 2: Technical characteristics of monitored dwellings (Tower A)

Codice U.I.	Vecchio Codice UI	ADDRESS	Codice contratto	n Persons	TYPE	FLOOR	BOW WINDOW	SQM	air cond	Nomenclature Sinceo2	Electric kWh savings
1686	108611020101	Via BORGO FURO 35/A	578	1	A1	1	X	79,44		A02	38,06
1692	108611020107	Via BORGO FURO 35/A	584	3	A2	1	X	94,35		A04	30,05
1698	108611020113	Via BORGO FURO 35/A	590	2	A3	1	X	82,97	1	A07	-109,75
1687	108611020102	Via BORGO FURO 35/A	579	1	A1	2	X	79,44	1	A01	86,43
1693	108611020108	Via BORGO FURO 35/A	585	4	A2	2	X	94,35		A05	-12,42
1699	108611020114	Via BORGO FURO 35/A	591	1	A3	2	X	82,97		A08	11,15
1688	108611020103	Via BORGO FURO 35/A	580	1	A1	3		79,44	1	A03	-4,52
1694	108611020109	Via BORGO FURO 35/A	586	3	A2	3	X	94,35	1	A06	-25,09
1700	108611020115	Via BORGO FURO 35/A	8692	4	A3	3	X	82,97		A09	-65,57
1689	108611020104	Via BORGO FURO 35/A	581	3	A1	4	X	79,44		A12	-39,22
1695	108611020110	Via BORGO FURO 35/A	587	2	A2	4	X	94,35		A15	23,72
1701	108611020116	Via BORGO FURO 35/A	592	2	A3	4	X	82,97		A18	-2,64
1690	108611020105	Via BORGO FURO 35/A	582	1	A1	5	X	79,44	1	A13	-10,77
1696	108611020111	Via BORGO FURO 35/A	588	2	A2	5	X	94,35		A16	45,34
1702	108611020117	Via BORGO FURO 35/A	593	2	A3	5	X	82,97	1	A10	134,43
1691	108611020106	Via BORGO FURO 35/A	583	2	A1	6		79,44	1	A14	63,49
1697	108611020112	Via BORGO FURO 35/A	589	2	A2	6	X	94,35	1	A17	347,59
1703	108611020118	Via BORGO FURO 35/A	27624	6	A3	6		82,97		A11	148,85

The savings calculated for each of the apartments are listed below. These savings are those corresponding to the three months used as a demonstration period (from May 2019 to August 2019 for Tower A).

Where:

CDD (Cooling degree days): The cooling degree days are those in which the temperature is above a base temperature, from which it is considered necessary to utilise refrigeration equipment to maintain comfort inside the building. As a base temperature, the temperature at which the best regression value is obtained has been used in each dwelling.

Hours of use(h): Time in which it is considered that there is activity in the house.

Reading days: reading days within each month, since it was not always possible to have constant records since during the project there were communication failures due to 3G coverage problems.

Table 3: Savings electricity consumption in the apartments of tower A of Treviso

1 (AR1-TA-A01)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	1,739218584	**Hours of use (h)**	-0,275887341	**CDD 17**	-23,8703346	**Reading days**	127,7556945
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 17**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	135,54	411	15,61	30	122,59	-12,94	-11%
jun-19	177,41	512	255,45	31	207,35	29,94	14%
jul-19	215,53	558	262,54	31	284,96	69,43	24%
TOTAL	**528,47**	**1.481**	**533,59**	**92**	**614,90**	**86,43**	**14%**

2 (AR1-TA-A02)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,347231069	**Hours of use (h)**	0,58187551	**CDD 26**	-1,325073301	**Reading days**	19,72877264
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 26**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	103,23	439	0,00	30	132,41	29,18	22%
jun-19	86,91	279	21,53	31	88,06	1,15	1%
jul-19	116,78	383	22,27	31	124,51	7,73	6%
TOTAL	**306,92**	**1.101**	**43,80**	**92**	**344,98**	**38,06**	**11%**

3 (AR1-TA-A03)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,676256632	**Hours of use (h)**	-0,137402043	**CDD 19**	0,266554448	**Reading days**	-142,4724509
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 19**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	94,03	281	2,57	30	55,03	-39,00	-71%
jun-19	94,92	389	195,45	31	102,17	7,25	7%
jul-19	100,95	429	200,54	31	128,18	27,23	21%
TOTAL	**289,90**	**1.099**	**398,56**	**92**	**285,38**	**-4,52**	**-2%**

4 (AR2-TA-04)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,249327496	**Hours of use (h)**	0,330372611	**CDD 27**	5,508042389	**Reading days**	-141,9164748
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 27**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	101,418	218	0	30	77,68	-23,74	-31%
jun-19	91,582	272,25	56	31	115,21	23,63	21%
jul-19	97,27	330,5	49	31	127,42	30,15	24%
TOTAL	**290,27**	**821**	**105**	**92**	**320,32**	**30,05**	**9%**

5 (AR2-TA-05)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,260451892	**Hours of use (h)**	-0,032383989	**CDD 25**	2,008772186	**Reading days**	-4,462524355
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 25**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	90,32	121	0,00	30	87,38	-2,94	-3%
jun-19	93,37	129	37,39	31	90,26	-3,11	-3%
jul-19	97,74	134	37,26	31	91,37	-6,37	-7%
TOTAL	**281,44**	**384**	**74,66**	**92**	**269,02**	**-12,42**	**-5%**

6 (AR2-TA-06)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,39048146	**Hours of use (h)**	0,060130297	**CDD 17**	-1,919479821	**Reading days**	103,1503976
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 17**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	163,54	258	15,61	30	147,15	-16,39	-11%
jun-19	129,25	159	255,45	31	121,09	-8,16	-7%
jul-19	136,12	195	262,54	31	135,58	-0,54	0%
TOTAL	**428,91**	**612**	**533,59**	**92**	**403,82**	**-25,09**	**-6%**

7 (AR3-TA-07)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,695170313	**Hours of use (h)**	-0,1723872	**CDD 17**	10,48234134	**Reading days**	-185,4889555
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	172,25	76	15,61	30	178,95	6,70	4%
jun-19	192,55	91	255,45	31	158,51	-34,03	-21%
jul-19	344,33	241	262,54	31	261,92	-82,42	-31%
TOTAL	**709,13**	**408**	**533,59**	**92**	**599,38**	**-109,75**	**-18%**

8 (AR3-TA-08)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,416396093	**Hours of use (h)**	1,438335992	**CDD 22**	-11,10937622	**Reading days**	366,7763255
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 22**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	190,30	416	0,00	30	206,51	16,21	8%
jun-19	397,35	508	107,76	31	388,91	-8,43	-2%
jul-19	391,36	521	108,12	31	394,74	3,37	1%
TOTAL	**979,00**	**1.444**	**215,88**	**92**	**990,16**	**11,15**	**1%**

9 (AR3-TA-09)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,518767668	**Hours of use (h)**	0,145949844	**CDD 21**	12,74923924	**Reading days**	-363,7823039
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 21**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	269,64	441	0,00	30	247,21	-22,43	-9%
jun-19	249,14	445	135,64	31	282,22	33,08	12%
jul-19	388,17	502	138,54	31	311,96	-76,22	-24%
TOTAL	**906,96**	**1.388**	**274,18**	**92**	**841,39**	**-65,57**	**-8%**

10 (AR4-TA-A10)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,782999674	**Hours of use (h)**	1,059080722	**CDD 25**	-7,298227227	**Reading days**	203,054911
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 25**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	165,29	232	0,00	30	165,96	0,66	0%
jun-19	227,45	335	37,39	31	278,52	51,07	18%
jul-19	297,49	465	37,26	31	380,17	82,69	22%
TOTAL	**690,23**	**1.032**	**74,66**	**92**	**824,66**	**134,43**	**16%**

11 (AR4-TA-A11)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,677296653	**Hours of use (h)**	0,276133756	**CDD 25**	3,431469673	**Reading days**	-27,74721891
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 25**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	254,17	308	0,00	30	283,47	29,29	10%
jun-19	196,13	236	37,39	31	248,46	52,33	21%
jul-19	200,50	264	37,26	31	267,72	67,23	25%
TOTAL	**650,80**	**807**	**74,66**	**92**	**799,65**	**148,85**	**19%**

12 (AR4-TA-A12)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,512165048	**Hours of use (h)**	0,464066696	**CDD 27**	1,549867557	**Reading days**	-0,378832824
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 27**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	76,22	52	0,00	30	72,49	-3,72	-5%
jun-19	86,26	43	2,40	31	70,55	-15,71	-22%
jul-19	98,05	59	0,83	31	78,27	-19,78	-25%
TOTAL	**260,52**	**153**	**3,22**	**92**	**221,31**	**-39,22**	**-18%**

13 (AR5-TA-A13)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,30829865	**Hours of use (h)**	2,816318103	**CDD 28**	6,061668328	**Reading days**	-123,7732947
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 28**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	89,55	83	0,00	30	83,74	-5,80	-7%
jun-19	92,74	46	6,10	31	95,34	2,60	3%
jul-19	97,30	45	4,16	31	89,74	-7,56	-8%
TOTAL	**279,59**	**174**	**10,26**	**92**	**268,82**	**-10,77**	**-4%**

14 (AR5-TA-A14)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	1,745368496	**Hours of use (h)**	0,168818386	**CDD 23**	8,828494676	**Reading days**	-209,4098738
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 23**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	220,46	110	0,00	30	246,56	26,10	11%
jun-19	200,36	85	82,13	31	226,93	26,58	12%
jul-19	206,28	80	80,71	31	217,09	10,81	5%
TOTAL	**627,09**	**275**	**162,84**	**92**	**690,59**	**63,49**	**9%**

15 (AR5-TA-A15)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,515960368	**Hours of use (h)**	1,323651301	**CDD 27**	-7,666236318	**Reading days**	149,2220575
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 27**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	181,37	501	0,00	30	177,73	-3,64	-2%
jun-19	140,26	415	11,87	31	141,15	0,89	1%
jul-19	167,30	519	10,99	31	193,77	26,47	14%
TOTAL	**488,93**	**1.434**	**22,86**	**92**	**512,65**	**23,72**	**5%**

16 (AR6-TA-A16)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,154318851	**Hours of use (h)**	1,978488506	**CDD 29**	3,929920019	**Reading days**	-49,47011083
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 29**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	93,27	227	0,00	30	103,42	10,15	10%
jun-19	101,70	282	2,40	31	120,54	18,84	16%
jul-19	112,27	354	0,83	31	128,62	16,35	13%
TOTAL	**307,24**	**862**	**3,22**	**92**	**352,58**	**45,34**	**13%**

17 (AR6-TA-A17)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,467548313	**Hours of use (h)**	1,498405516	**CDD 21**	1,179781738	**Reading days**	86,4587912
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 21**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	218,66	220	0,00	30	224,60	5,93	3%
jun-19	221,20	171	135,64	31	406,35	185,15	46%
jul-19	324,66	322	138,54	31	481,16	156,51	33%
TOTAL	**764,52**	**713**	**274,18**	**92**	**1.112,11**	**347,59**	**31%**

18 (AR6-TA-A18)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,564348048	**Hours of use (h)**	-0,027957234	**CDD 24**	3,329222026	**Reading days**	-73,47690444
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 24**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
may-19	115,38	157	0,00	30	114,72	-0,66	-1%
jun-19	121,15	166	58,60	31	121,91	0,76	1%
jul-19	128,37	173	56,68	31	125,64	-2,74	-2%
TOTAL	**364,91**	**496**	**115,28**	**92**	**362,27**	**-2,64**	**-1%**

The summary of Tower A of Treviso apartment electricity savings is shown below:

Table 4: Summary savings electricity consumption Tower A (kWh)

kWh ELECTRIC SAVINGS																		
Month	**1 (AR1-TA-A01)**	2 (AR1-TA-A02)	**3 (AR1-TA-A03)**	4 (AR2-TA-04)	5 (AR2-TA-05)	**6 (AR2-TA-06)**	**7 (AR3-TA-07)**	8 (AR3-TA-08)	9 (AR3-TA-09)	**10 (AR4-TA-A10)**	11 (AR4-TA-A11)	12 (AR4-TA-A12)	**13 (AR5-TA-A13)**	**14 (AR5-TA-A14)**	15 (AR5-TA-A15)	16 (AR6-TA-A16)	**17 (AR6-TA-A17)**	18 (AR6-TA-A18)	**TOTAL**
may-19	-12,94	29,18	-39,00	-23,74	-2,94	-16,39	6,70	16,21	-22,43	0,66	29,29	-3,72	-5,80	26,10	-3,64	10,15	5,93	-0,66	-7,04
jun-19	29,94	1,15	7,25	23,63	-3,11	-8,16	-34,03	-8,43	33,08	51,07	52,33	-15,71	2,60	26,58	0,89	18,84	185,15	0,76	363,81
jul-19	69,43	7,73	27,23	30,15	-6,37	-0,54	-82,42	3,37	-76,22	82,69	67,23	-19,78	-7,56	10,81	26,47	16,35	156,51	-2,74	302,36
TOTAL (kWh)	**86,43**	**38,06**	**-4,52**	**30,05**	**-12,42**	**-25,09**	**-109,75**	**11,15**	**-65,57**	**134,43**	**148,85**	**-39,22**	**-10,77**	**63,49**	**23,72**	**45,34**	**347,59**	**-2,64**	**659,13**

Table 5: Summary savings electricity consumption Tower A (%)

% ELECTRIC SAVINGS																		
Month	**1 (AR1-TA-A01)**	2 (AR1-TA-A02)	**3 (AR1-TA-A03)**	4 (AR2-TA-04)	5 (AR2-TA-05)	**6 (AR2-TA-06)**	**7 (AR3-TA-07)**	8 (AR3-TA-08)	9 (AR3-TA-09)	**10 (AR4-TA-A10)**	11 (AR4-TA-A11)	12 (AR4-TA-A12)	**13 (AR5-TA-A13)**	**14 (AR5-TA-A14)**	15 (AR5-TA-A15)	16 (AR6-TA-A16)	**17 (AR6-TA-A17)**	18 (AR6-TA-A18)	**TOTAL**
may-19	-11%	22%	-71%	-31%	-3%	-11%	4%	8%	-9%	0%	10%	-5%	-7%	11%	-2%	10%	3%	-1%	
jun-19	14%	1%	7%	21%	-3%	-7%	-21%	-2%	12%	18%	21%	-22%	3%	12%	1%	16%	46%	1%	
jul-19	24%	6%	21%	24%	-7%	0%	-31%	1%	-24%	22%	25%	-25%	-8%	5%	14%	13%	33%	-2%	
TOTAL	**14%**	**11%**	**-2%**	**9%**	**-5%**	**-6%**	**-18%**	**1%**	**-8%**	**16%**	**19%**	**-18%**	**-4%**	**9%**	**5%**	**13%**	**31%**	**-1%**	**7%**

As mentioned above, these savings are corresponding to the three months used as a demonstration period. The savings derived from photovoltaic generation have not been taken into account since it is not yet operational.

Table 6: Total electricity savings Tower A (kWh)

Total electrical savings A Treviso Tower		
TOTAL REFERENCE ELECTRIC CONSUMPTION (kWh)		9.814
TOTAL ELECTRIC SAVING (kWh)		659
TOTAL ELECTRIC SAVING (%)		**7%**

In Tower A of Treviso a 7% electricity saving has been obtained. This percentage of savings is low since the reforms undertaken in the Treviso facilities do not directly affect the electricity consumption of the dwellings, (the energy generated by the photovoltaic installation affects the electrical consumption of the common areas).

Some homes that have high electricity consumption are the ones with the largest number of inhabitants and the largest area, confirming that they are factors that affect the electricity consumption of a dwelling.

2.1.1.2 Calculation of electricity savings in Tower B

In the same way that Tower A has calculated the electricity savings in Tower B.

Figure 3: V.le FRANCIA 1 (Tower B)

The following image shows an outline of Tower B with the three types of homes that have been selected: A1, A2 and A3.

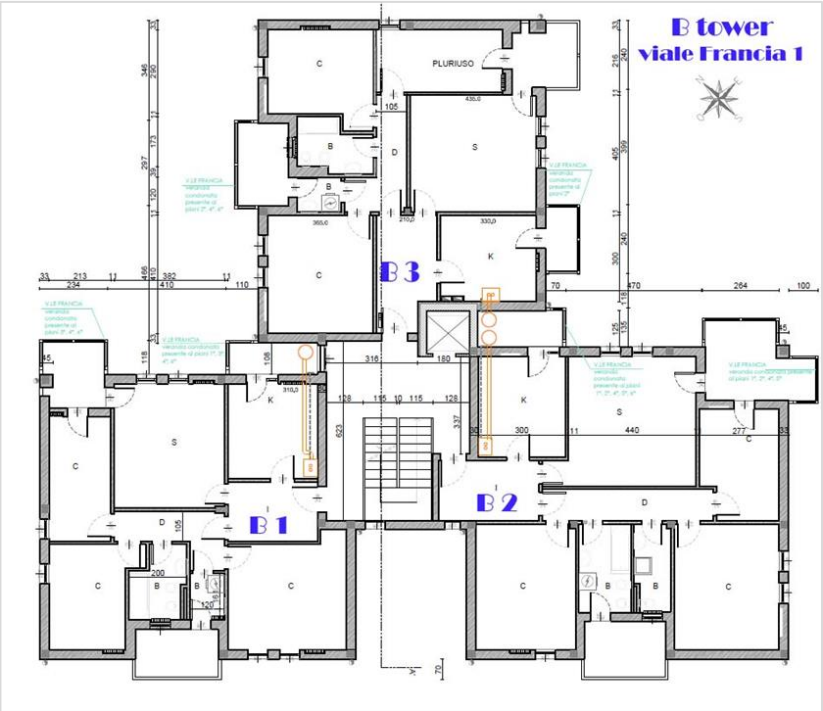


Figure 4: Typology of dwellings in Tower B

The following table shows some of the characteristics of the homes in Tower B that were monitored:

Table 7: Technical characteristics of monitored dwellings (Tower B)

Codice U.I.	Vecchio Codice UI	ADDRESS	Codice contratto	n Persons	TYPE	FLOOR	BOW WINDOW	air cond	SQM	SINCEO2
	108611030107	V.le FRANCIA 1		EMPTY	B1	1	X		79,44	A07
1728	108611030107	V.le FRANCIA 1	7159	4	B2	1	X	1	94,35	A11
1734	108611030113	V.le FRANCIA 1	605	3	B3	1			82,97	A04
1723	108611030102	V.le FRANCIA 1	24313	5	B1	2		1	79,44	A08
1729	108611030108	V.le FRANCIA 1	601	1	B2	2	X	1	94,35	A06
1735	108611030114	V.le FRANCIA 1	606	2	B3	2	X		82,97	A05
1724	108611030103	V.le FRANCIA 1	597	2	B1	3	X		79,44	A01
1730	108611030109	V.le FRANCIA 1	602	3	B2	3		1	94,35	A09
1733	108611030112	V.le FRANCIA 1	604	2	B3	3		1	82,97	A14
1725	108611030104	V.le FRANCIA 1	598	1	B1	4	X		79,44	A12
1731	108611030110	V.le FRANCIA 1	9127	5	B2	4	X	1	94,35	A03
1737	108611030116	V.le FRANCIA 1	607	2	B3	4	X	1	82,97	A15
1726	108611030105	V.le FRANCIA 1	599	3	B1	5			79,44	A16
1732	108611030111	V.le FRANCIA 1	603	3	B2	5	X	1	94,35	A13
1738	108611030117	V.le FRANCIA 1	608	2	B3	5		1	82,97	A10
1727	108611030106	V.le FRANCIA 1	600	1	B1	6	X	1	79,44	A17
1736	108611030115	V.le FRANCIA 1	8281	2	B2	6	X		94,35	A18
1739	108611030118	V.le FRANCIA 1	6217	4	B3	6	X		82,97	A02

In the case of Treviso Tower B, the calculation period of savings, covers the period from November 2018 to July 2019 when renovations ended.

In the calculation of electricity savings of Tower B, it should be noted that in the case of apartment 7 (SinCeO2 nomenclature) there is no data, since there is no one living in that apartment.

In addition, due to data reception problems on the platform, in apartments 13 and 18 (Sinceo2 nomenclature) only data are available from April to July 2019, so they have only been integrated in the calculation of the demonstration period.

Table 8: Reporting period for the calculation of electricity savings in Treviso Tower B

Reporting period	
From November 2018	**Till July 2019**

Table 9: Savings electricity consumption in the apartments of tower B of Treviso

The summary of Tower B of Treviso apartment electricity savings are presented below:

1 (AR1-TB-A01)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,347986555	**Hours of use (h)**	0,479269814	**CDD 22**	11,54478038	**Reading days**	-263,070399
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 22**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	225,56	416,5	0	30	228,21	2,65	1%
dic-18	208,244	379,5	0	31	226,88	18,63	8%
ene-19	194,544	323,75	0	31	207,48	12,93	6%
feb-19	174,038	274,5	0	28	155,71	-18,33	-12%
mar-19	153,561	204,25	0	31	165,89	12,33	7%
abr-19	131,916	166,25	0	30	141,13	9,21	7%
may-19	152,016	188,75	0	31	160,50	8,48	5%
jun-19	250,04	259,5	107,8	30	225,22	-24,82	-11%
jul-19	229,1712857	258,5	108,1	31	236,59	7,42	3%
TOTAL	**1.719,1**	**2.471,5**	**215,9**	**273,0**	**1.747,6**	**28,5**	**2%**

2 (AR1-TB-A02)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	1,428331052	**Hours of use (h)**	-0,146666657	**CDD 17**	-15,4801146	**Reading days**	441,3500425
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 17**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	123,1	130,8	0,0	30,0	163,70	40,59	25%
dic-18	134,8	141,5	0,0	31,0	163,58	28,83	18%
ene-19	136,0	148,5	0,0	31,0	173,57	37,54	22%
feb-19	143,2	133,3	0,0	28,0	198,23	55,06	28%
mar-19	132,3	120,8	0,0	31,0	133,94	1,63	1%
abr-19	120,1	96,0	15,0	30,0	111,86	-8,29	-7%
may-19	120,7	106,0	15,6	31,0	110,58	-10,15	-9%
jun-19	104,4	100,5	255,4	30,0	83,03	-21,41	-26%
jul-19	117,6	135,8	262,5	31,0	116,86	-0,69	-1%
TOTAL	**1.132,2**	**1.113,0**	**548,6**	**273,0**	**1.255,3**	**123,1**	**10%**

3 (AR1-TB-A03)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,481420825	**Hours of use (h)**	26,75367257	**CDD 30**	5,723556387	**Reading days**	-62,92679374
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 30**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	241,0	269,8	0,0	30,0	238,64	-2,33	-1%
dic-18	297,4	362,3	0,0	31,0	288,90	-8,50	-3%
ene-19	269,3	313,3	0,0	31,0	265,31	-4,00	-2%
feb-19	233,6	253,0	0,0	28,0	219,13	-14,43	-7%
mar-19	229,7	242,0	0,0	31,0	231,01	1,28	1%
abr-19	221,4	239,5	0,0	30,0	224,08	2,69	1%
may-19	206,5	208,8	0,0	31,0	215,00	8,52	4%
jun-19	272,4	286,3	0,4	30,0	256,85	-15,58	-6%
jul-19	274,7	303,0	0,0	31,0	260,37	-14,35	-6%
TOTAL	**2.246,0**	**2.477,8**	**0,4**	**273,0**	**2.199,3**	**-46,7**	**-2%**

4 (AR2-TB-04)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,679729202	**Hours of use (h)**	-1,919880724	**CDD 27**	-3,829286848	**Reading days**	151,7978052
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 27**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	138,0	68,5	0,0	30,0	83,48	-54,48	-65%
dic-18	156,0	75,3	0,0	31,0	84,24	-71,79	-85%
ene-19	160,0	76,5	0,0	31,0	85,09	-74,90	-88%
feb-19	147,0	70,5	0,0	28,0	92,50	-54,51	-59%
mar-19	168,9	157,5	0,0	31,0	140,15	-28,74	-21%
abr-19	162,1	242,8	0,0	30,0	201,92	39,78	20%
may-19	144,3	130,0	0,0	31,0	121,45	-22,86	-19%
jun-19	170,4	282,8	11,9	30,0	206,32	35,91	17%
jul-19	184,2	272,8	11,0	31,0	197,39	13,14	7%
TOTAL	**1.431,0**	**1.376,5**	**22,9**	**273,0**	**1.212,5**	**-218,5**	**-18%**

5 (AR2-TB-05)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,243045814	**Hours of use (h)**	5,888384496	**CDD 29**	2,145575027	**Reading days**	-39,95588089
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 29**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	106,0	147,3	0,0	30,0	60,20	-45,84	-76%
dic-18	116,2	146,8	0,0	31,0	62,22	-54,02	-87%
ene-19	124,2	161,0	0,0	31,0	65,69	-58,52	-89%
feb-19	97,2	138,5	0,0	28,0	53,78	-43,46	-81%
mar-19	108,8	360,3	0,0	31,0	114,11	5,29	5%
abr-19	102,2	501,0	0,0	30,0	146,18	43,96	30%
may-19	101,7	544,5	0,0	31,0	158,90	57,17	36%
jun-19	136,0	644,0	2,4	30,0	195,05	59,03	30%
jul-19	176,2	708,0	0,8	31,0	203,49	27,31	13%
TOTAL	**1.068,7**	**3.351,3**	**3,2**	**273,0**	**1.059,6**	**-9,1**	**-1%**

6 (AR2-TB-06)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,786738658	**Hours of use (h)**	3,952223301	**CDD 27**	0,716399571	**Reading days**	25,90146336
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 27**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	80,1	38,5	0,0	30,0	77,68	-2,39	-3%
dic-18	98,0	49,3	0,0	31,0	86,86	-11,17	-13%
ene-19	93,0	46,5	0,0	31,0	84,69	-8,31	-10%
feb-19	69,0	33,8	0,0	28,0	72,51	3,51	5%
mar-19	74,9	33,8	0,0	31,0	74,66	-0,25	0%
abr-19	76,0	32,3	0,0	30,0	72,77	-3,23	-4%
may-19	76,1	29,3	0,0	31,0	71,12	-5,01	-7%
jun-19	244,0	236,3	11,9	30,0	280,18	36,15	13%
jul-19	244,1	230,0	11,0	31,0	272,49	28,42	10%
TOTAL	**1.055,2**	**729,5**	**22,9**	**273,0**	**1.093,0**	**37,7**	**3%**

8 (AR3-TB-08)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,699933319	**Hours of use (h)**	0,785057735	**CDD 26**	1,250826294	**Reading days**	147,4465579
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 26**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	107,4	18,5	0,0	30,0	197,92	90,50	46%
dic-18	79,1	11,5	0,0	31,0	194,27	115,21	59%
ene-19	90,3	11,0	0,0	31,0	193,92	103,65	53%
feb-19	87,8	11,8	0,0	28,0	190,69	102,90	54%
mar-19	78,2	7,8	0,0	31,0	191,65	113,41	59%
abr-19	87,6	11,0	0,0	30,0	192,67	105,02	55%
may-19	97,3	19,0	0,0	31,0	199,52	102,24	51%
jun-19	96,2	15,3	21,5	30,0	212,55	116,39	55%
jul-19	124,5	24,3	22,3	31,0	220,68	96,14	44%
TOTAL	**848,4**	**130,0**	**43,8**	**273,0**	**1.793,9**	**945,5**	**53%**

9 (AR3-TB-09)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,292680938	**Hours of use (h)**	-0,883928486	**CDD 25**	3,784634487	**Reading days**	-44,37882832
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 25**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	183,9	261,0	0,0	30,0	145,55	-38,31	-26%
dic-18	189,9	271,5	0,0	31,0	152,41	-37,53	-25%
ene-19	191,5	288,3	0,0	31,0	157,31	-34,22	-22%
feb-19	152,4	237,3	0,0	28,0	131,03	-21,38	-16%
mar-19	170,3	333,5	0,0	31,0	170,55	0,28	0%
abr-19	173,3	350,8	0,0	30,0	171,82	-1,48	-1%
may-19	171,9	362,5	0,0	31,0	179,04	7,11	4%
jun-19	142,3	360,8	37,4	30,0	141,69	-0,66	0%
jul-19	106,7	257,0	37,3	31,0	115,22	8,54	7%
TOTAL	**1.482,3**	**2.722,5**	**74,7**	**273,0**	**1.364,6**	**-117,6**	**-9%**

10 (AR4-TB-A10)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,428111654	**Hours of use (h)**	-0,085610405	**CDD 17**	-0,670648381	**Reading days**	-0,86119661
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 17**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	119,8	286,3	0,0	30,0	101,57	-18,26	-18%
dic-18	147,3	291,8	0,0	31,0	103,25	-44,05	-43%
ene-19	151,5	292,0	0,0	31,0	103,36	-48,13	-47%
feb-19	114,7	243,5	0,0	28,0	84,61	-30,08	-36%
mar-19	117,8	312,8	0,0	31,0	112,24	-5,51	-5%
abr-19	95,8	285,0	15,0	30,0	99,74	3,95	4%
may-19	102,0	331,0	15,6	31,0	118,72	16,71	14%
jun-19	82,5	310,0	255,4	30,0	89,87	7,32	8%
jul-19	84,7	325,0	262,5	31,0	95,01	10,31	11%
TOTAL	**1.016,1**	**2.677,3**	**548,6**	**273,0**	**908,4**	**-107,8**	**-12%**

11 (AR4-TB-A11)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,521026047	Hours of use (h)	3,11845028	CDD 29	11,78931116	Reading days	-299,2485963
Month	Total Electricity Consumption (kWh)	Hours of use (h)	CDD 29	Reading days	Adjusted baseline consumption	Electric Energy Saving	Percentage of energy savings
nov-18	302,4	459,8	0,0	30,0	293,97	-8,41	-3%
dic-18	319,6	476,3	0,0	31,0	314,36	-5,20	-2%
ene-19	274,5	452,5	0,0	31,0	301,98	27,47	9%
feb-19	275,8	405,5	0,0	28,0	242,13	-33,71	-14%
mar-19	291,9	429,0	0,0	31,0	289,74	-2,18	-1%
abr-19	261,7	367,5	0,0	30,0	245,91	-15,74	-6%
may-19	243,3	319,3	0,0	31,0	232,56	-10,78	-5%
jun-19	288,9	492,5	2,4	30,0	318,51	29,64	9%
jul-19	287,3	588,0	0,8	31,0	375,16	87,87	23%
TOTAL	**2.545,4**	**3.990,3**	**3,2**	**273,0**	**2.614,3**	**69,0**	**3%**

12 (AR4-TB-A12)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,538693207	Hours of use (h)	0,140101897	CDD 18	-0,871740537	Reading days	56,02394063
Month	Total Electricity Consumption (kWh)	Hours of use (h)	CDD 18	Reading days	Adjusted baseline consumption	Electric Energy Saving	Percentage of energy savings
nov-18	123,6	178,8	0,0	30,0	126,16	2,54	2%
dic-18	132,2	187,8	0,0	31,0	130,14	-2,01	-2%
ene-19	129,8	195,3	0,0	31,0	134,18	4,39	3%
feb-19	129,6	178,0	0,0	28,0	127,50	-2,10	-2%
mar-19	136,7	180,5	0,0	31,0	126,23	-10,42	-8%
abr-19	132,8	172,5	4,8	30,0	123,46	-9,35	-8%
may-19	141,4	184,8	7,5	31,0	129,57	-11,79	-9%
jun-19	220,1	306,0	225,4	30,0	226,30	6,23	3%
jul-19	184,6	213,8	231,5	31,0	176,58	-7,97	-5%
TOTAL	**1.330,6**	**1.797,3**	**469,2**	**273,0**	**1.300,1**	**-30,5**	**-2%**

13 (AR5-TB-A13)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,275819757	Hours of use (h)	-1,378777436	CDD 29	-0,268278165	Reading days	15,26718254
Month	Total Electricity Consumption (kWh)	Hours of use (h)	CDD 29	Reading days	Adjusted baseline consumption	Electric Energy Saving	Percentage of energy savings
abr-19	99,09	400	0	30	117,5467405	18,46173027	16%
may-19	98,96	431	0	31	125,8288748	26,86529927	21%
jun-19	124,50	431	2,396784314	30	122,7925208	-1,704116684	-1%
jul-19	131,18	431	0,825478927	31	124,6907231	-6,485506105	-5%
TOTAL	**453,7**	**1.701,8**	**3,2**	**122,0**	**490,9**	**37,1**	**8%**

14 (AR5-TB-A14)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,253693206	**Hours of use (h)**	-0,082798746	**CDD 17**	4,323808457	**Reading days**	-119,2459264
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 17**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	103,0	400,0	0,0	30,0	111,95	8,98	8%
dic-18	112,0	400,0	0,0	31,0	116,27	4,25	4%
ene-19	117,0	400,0	0,0	31,0	116,27	-0,75	-1%
feb-19	93,2	400,0	0,0	28,0	103,30	10,05	10%
mar-19	108,8	400,0	0,0	31,0	116,27	7,46	6%
abr-19	98,2	400,0	15,0	30,0	110,70	12,47	11%
may-19	91,6	400,0	15,6	31,0	114,98	23,43	20%
jun-19	97,5	400,0	255,4	30,0	90,79	-6,73	-7%
jul-19	103,6	400,0	262,5	31,0	94,53	-9,11	-10%
TOTAL	**925,0**	**3.600,0**	**548,6**	**273,0**	**975,1**	**50,1**	**5%**

15 (AR5-TB-A15)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,247693126	**Hours of use (h)**	-0,244395642	**CDD 17**	9,455965317	**Reading days**	-229,9259465
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 17**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	154,1	116,3	0,0	30,0	82,55	-71,58	-87%
dic-18	167,8	126,5	0,0	31,0	94,54	-73,27	-77%
ene-19	162,1	121,3	0,0	31,0	93,24	-68,82	-74%
feb-19	126,0	103,8	0,0	28,0	60,54	-65,41	-108%
mar-19	136,6	530,8	0,0	31,0	194,67	58,10	30%
abr-19	137,9	720,0	15,0	30,0	228,42	90,51	40%
may-19	138,5	744,0	15,6	31,0	243,68	105,21	43%
jun-19	125,0	720,0	255,4	30,0	169,66	44,62	26%
jul-19	132,5	744,0	262,5	31,0	183,33	50,82	28%
TOTAL	**1.280,5**	**3.935,8**	**548,6**	**273,0**	**1.350,6**	**70,2**	**5%**

16 (AR6-TB-A16)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,501823719	**Hours of use (h)**	1,442868737	**CDD 24**	-4,749843986	**Reading days**	256,4967448
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 24**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	204,7	184,3	0,0	30,0	206,46	1,77	1%
dic-18	212,6	198,5	0,0	31,0	208,86	-3,70	-2%
ene-19	208,3	200,0	0,0	31,0	209,62	1,31	1%
feb-19	175,0	157,5	0,0	28,0	202,54	27,59	14%
mar-19	188,8	175,3	0,0	31,0	197,20	8,37	4%
abr-19	192,8	182,5	0,0	30,0	205,58	12,76	6%
may-19	190,0	180,0	0,0	31,0	199,58	9,58	5%
jun-19	188,3	190,5	58,6	30,0	294,15	105,86	36%
jul-19	185,2	148,0	56,7	31,0	265,30	80,12	30%
TOTAL	**1.745,6**	**1.616,5**	**115,3**	**273,0**	**1.989,3**	**243,7**	**12%**

17 (AR6-TB-A17)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,179102985	**Hours of use (h)**	14,09629823	**CDD 30**	-0,111356613	**Reading days**	40,50171353
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 30**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
nov-18	53,2	82,0	0,0	30,0	51,85	-1,32	-3%
dic-18	60,0	111,0	0,0	31,0	56,93	-3,03	-5%
ene-19	70,1	164,3	0,0	31,0	66,47	-3,61	-5%
feb-19	58,4	129,5	0,0	28,0	60,58	2,15	4%
mar-19	62,8	106,0	0,0	31,0	56,03	-6,75	-12%
abr-19	62,6	102,3	0,0	30,0	55,47	-7,14	-13%
may-19	57,4	71,0	0,0	31,0	49,77	-7,68	-15%
jun-19	59,9	78,5	0,4	30,0	56,63	-3,27	-6%
jul-19	65,3	104,0	0,0	31,0	55,68	-9,58	-17%
TOTAL	**549,6**	**948,5**	**0,4**	**273,0**	**509,4**	**-40,2**	**-8%**

18 (AR6-TB-A18)							
Y=	B1*	X1+	B2*	X2+	B3*	X3+	I
Total Electricity Consumption (kWh)	0,298539869	**Hours of use (h)**	-0,89760017	**CDD 25**	6,042896812	**Reading days**	-114,7962645
Month	**Total Electricity Consumption (kWh)**	**Hours of use (h)**	**CDD 25**	**Reading days**	**Adjusted baseline consumption**	**Electric Energy Saving**	**Percentage of energy savings**
abr-19	170,25	359	0	30	173,67	3,42	2%
may-19	168,38	394,75	0	31	190,38	22,00	12%
jun-19	139,88	373	37,3942	30	144,28	4,40	3%
jul-19	104,99	268,5	37,2642	31	119,24	14,25	12%
TOTAL	**583,5**	**1395,25**	**74,65843**	**122**	**627,57**	**44,07**	**7%**

Table 10: Summary savings electricity consumption Tower B (kWh)

kWh ELECTRIC SAVINGS																			
Month	1 (AR1-TB-A01)	2 (AR1-TB-A02)	3 (AR1-TB-A03)	4 (AR2-TB-04)	**5 (AR2-TB-05)**	**6 (AR2-TB-06)**	7 (AR3-TB-07)	**8 (AR3-TB-08)**	**9 (AR3-TB-09)**	**10 (AR4-TB-A10)**	**11 (AR4-TB-A11)**	12 (AR4-TB-A12)	**13 (AR5-TB-A13)**	**14 (AR5-TB-A14)**	**15 (AR5-TB-A15)**	16 (AR6-TB-A16)	**17 (AR6-TB-A17)**	18 (AR6-TB-A18)	**TOTAL**
nov-18	2,65	40,59	-2,33	-54,48	-45,84	-2,39	0,00	90,50	-38,31	-18,26	-8,41	2,54	0,00	8,98	-71,58	1,77	-1,32	0,00	-95,89
dic-18	18,63	28,83	-8,50	-71,79	-54,02	-11,17	0,00	115,21	-37,53	-44,05	-5,20	-2,01	0,00	4,25	-73,27	-3,70	-3,03	0,00	-147,36
ene-19	12,93	37,54	-4,00	-74,90	-58,52	-8,31	0,00	103,65	-34,22	-48,13	27,47	4,39	0,00	-0,75	-68,82	1,31	-3,61	0,00	-113,98
feb-19	-18,33	55,06	-14,43	-54,51	-43,46	3,51	0,00	102,90	-21,38	-30,08	-33,71	-2,10	0,00	10,05	-65,41	27,59	2,15	0,00	-82,14
mar-19	12,33	1,63	1,28	-28,74	5,29	-0,25	0,00	113,41	0,28	-5,51	-2,18	-10,42	0,00	7,46	58,10	8,37	-6,75	0,00	154,31
abr-19	9,21	-8,29	2,69	39,78	43,96	-3,23	0,00	105,02	-1,48	3,95	-15,74	-9,35	18,46	12,47	90,51	12,76	-7,14	3,42	296,99
may-19	8,48	-10,15	8,52	-22,86	57,17	-5,01	0,00	102,24	7,11	16,71	-10,78	-11,79	26,87	23,43	105,21	9,58	-7,68	22,00	319,04
jun-19	-24,82	-21,41	-15,58	35,91	59,03	36,15	0,00	116,39	-0,66	7,32	29,64	6,23	-1,70	-6,73	44,62	105,86	-3,27	4,40	371,39
jul-19	7,42	-0,69	-14,35	13,14	27,31	28,42	0,00	96,14	8,54	10,31	87,87	-7,97	-6,49	-9,11	50,82	80,12	-9,58	14,25	376,14
TOTAL	**28,52**	**123,11**	**-46,70**	**-218,46**	**-9,08**	**37,73**	**0,00**	**945,46**	**-117,65**	**-107,76**	**68,96**	**-30,48**	**37,14**	**50,05**	**70,16**	**243,66**	**-40,23**	**44,07**	**1078,51**

Table 11: Summary savings electricity consumption Tower B (%)

% ELECTRIC SAVINGS																		
Month	1 (AR1-TB-A01)	2 (AR1-TB-A02)	3 (AR1-TB-A03)	4 (AR2-TB-04)	**5 (AR2-TB-05)**	**6 (AR2-TB-06)**	**8 (AR3-TB-08)**	**9 (AR3-TB-09)**	**10 (AR4-TB-A10)**	**11 (AR4-TB-A11)**	12 (AR4-TB-A12)	**13 (AR5-TB-A13)**	**14 (AR5-TB-A14)**	**15 (AR5-TB-A15)**	16 (AR6-TB-A16)	**17 (AR6-TB-A17)**	18 (AR6-TB-A18)	**TOTAL**
1	1%	25%	-1%	-65%	-76%	-3%	46%	-26%	-18%	-3%	2%	0%	8%	-87%	1%	-3%	0%	
2	8%	18%	-3%	-85%	-87%	-13%	59%	-25%	-43%	-2%	-2%	0%	4%	-77%	-2%	-5%	0%	
3	6%	22%	-2%	-88%	-89%	-10%	53%	-22%	-47%	9%	3%	0%	-1%	-74%	1%	-5%	0%	
4	-12%	28%	-7%	-59%	-81%	5%	54%	-16%	-36%	-14%	-2%	0%	10%	-108%	14%	4%	0%	
5	7%	1%	1%	-21%	5%	0%	59%	0%	-5%	-1%	-8%	0%	6%	30%	4%	-12%	0%	
6	7%	-7%	1%	20%	30%	-4%	55%	-1%	4%	-6%	-8%	16%	11%	40%	6%	-13%	2%	
7	5%	-9%	4%	-19%	36%	-7%	51%	4%	14%	-5%	-9%	21%	20%	43%	5%	-15%	12%	
8	-11%	-26%	-6%	17%	30%	13%	55%	0%	8%	9%	3%	-1%	-7%	26%	36%	-6%	3%	
9	3%	-1%	-6%	7%	13%	10%	44%	7%	11%	23%	-5%	-5%	-10%	28%	30%	-17%	12%	
TOTAL	**2%**	**10%**	**-2%**	**-18%**	**-1%**	**3%**	**53%**	**-9%**	**-12%**	**3%**	**-2%**	**8%**	**5%**	**5%**	**12%**	**-8%**	**7%**	**5%**

As mentioned above, these savings are corresponding to the nine months used as a demonstration period.

Table 12: Total electricity savings Tower B (kWh and %)

Total electrical savings B Treviso Tower	
TOTAL REFERENCE ELECTRICAL CONSUMPTION (kWh)	22.491
TOTAL ELECTRIC SAVING (kWh)	1.079
TOTAL ELECTRIC SAVING (%)	**5%**

In Tower B of Treviso a 5% electricity saving has been obtained. This percentage of savings is low since the reforms undertaken in the Treviso facilities do not directly affect the electricity consumption of the dwellings (the energy generated by the photovoltaic installation affects the electricity consumption of the common areas).

Some homes that have electricity overconsumption are the ones with the largest number of inhabitants and the largest area, being able to affirm that they are factors that affect the electricity consumption of a dwelling.

Other important factors in saving electricity consumption in a home are the consumption habits of each tenant and the awareness they have about the use of resources.

2.1.2 Individual Heating and DHW savings calculation for a selected group of tenants

2.1.2.1 Calculation of gas savings in Tower A

For the calculation of the gas supply savings in Tower A, the months of May and June 2019 have been used. They are the only meter reading data available at the time of the report, since the meter measurements of the month of July and August 2019 will only be collected in the month of September 2019.

Table 13: Gas savings period for tower A in Treviso

Reporting period	
From May2019	**Till Jun 2019**

Below is the calculated savings for each of the apartments in Tower A:

Table 14: Savings gas consumption in the apartments of tower A of Treviso

APARTMENT 1 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 17	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	75,73	30	411,25	31	40,73	-35,00	-86%
01/06/2019	30/06/2019	4,99	29	511,75	0	2,51	-2,48	-99%
TOTAL		**80,72**	**59,00**	**923,00**	**31,39**	**43,24**	**-37,48**	**-87%**

APARTMENT 2 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 10	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	4,68	30	439	0	23,67	18,99	80%
01/06/2019	30/06/2019	1,35	29	279	0	12,27	10,92	89%
TOTAL		**6,03**	**59,00**	**718,00**	**0,00**	**35,94**	**29,91**	**83%**

APARTMENT 3 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 20	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	24,11	30	280,75	108	65,88	41,77	63%
01/06/2019	30/06/2019	3,06	29	389,25	0	0,54	-2,52	-463%
TOTAL		**27,17**	**59,00**	**670,00**	**108,13**	**66,43**	**39,26**	**59%**

APARTMENT 4 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 18	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	87,91	30	218	54	126,14	38,23	30%
01/06/2019	30/06/2019	11,43	29	272,25	0	54,20	42,77	79%
TOTAL		**99,34**	**59,00**	**490,25**	**54,25**	**180,34**	**81,00**	**45%**

APARTMENT 5 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 16	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	39,54	30	121,25	16	44,74	5,20	12%
01/06/2019	30/06/2019	9,88	29	129,25	0	36,42	26,54	73%
TOTAL		**49,42**	**59,00**	**250,50**	**15,90**	**81,16**	**31,74**	**39%**

APARTMENT 6 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 15	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	15,21	30	257,75	7	26,78	11,57	43%
01/06/2019	30/06/2019	3,81	29	159	0	23,34	19,53	84%
TOTAL		**19,02**	**59,00**	**416,75**	**7,47**	**50,13**	**31,11**	**62%**

APARTMENT 7 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 14	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	41,53	30	75,75	3	54,95	13,42	24%
01/06/2019	30/06/2019	11,43	29	90,75	0	49,47	38,04	77%
TOTAL		**52,96**	**59,00**	**166,50**	**2,51**	**104,41**	**51,45**	**49%**

APARTMENT 8 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 13	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	25,64	30	415,5	0	23,16	-2,48	-11%
01/06/2019	30/06/2019	10,67	29	508	0	20,63	9,96	48%
TOTAL		**36,31**	**59,00**	**923,50**	**0,45**	**43,79**	**7,48**	**17%**

APARTMENT 9 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 14	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	37,94	30	440,5	3	48,60	10,66	22%
01/06/2019	30/06/2019	17,29	29	445,25	0	44,62	27,33	61%
TOTAL		**55,23**	**59,00**	**885,75**	**2,51**	**93,21**	**37,98**	**41%**

APARTMENT 10 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 13	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	21,46	30	232,25	0	26,71	5,25	20%
01/06/2019	30/06/2019	9,15	29	334,75	0	21,03	11,88	56%
TOTAL		**30,61**	**59,00**	**567,00**	**0,45**	**47,74**	**17,13**	**36%**

APARTMENT 11 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 16	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	40,25	30	307,5	16	33,64	-6,61	-20%
01/06/2019	30/06/2019	12,48	29	235,5	0	24,13	11,65	48%
TOTAL		**52,73**	**59,00**	**543,00**	**15,90**	**57,76**	**5,03**	**9%**

APARTMENT 12 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 15	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	28,01	30	51,5	7	33,7	5,71	17%
01/06/2019	30/06/2019	5,32	29	42,5	0	30,1	24,80	82%
TOTAL		**33,33**	**59,00**	**94,00**	**7,47**	**63,8**	**30,51**	**48%**

APARTMENT 13 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 16	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	19,82	30	83,25	16	20,15	0,33	2%
01/06/2019	30/06/2019	3,52	29	45,5	0	10,38	6,86	66%
TOTAL		**23,34**	**59,00**	**128,75**	**15,90**	**30,52**	**7,18**	**24%**

APARTMENT 14 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 16	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	38,69	30	109,5	16	50,54	11,85	23%
01/06/2019	30/06/2019	6,88	29	85,25	0	42,47	35,59	84%
TOTAL		**45,57**	**59,00**	**194,75**	**15,90**	**93,01**	**47,44**	**51%**

APARTMENT 15 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 15	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	31,11	30	501	7	22,53	-8,58	-38%
01/06/2019	30/06/2019	23,58	29	414,5	0	19,58	-4,00	-20%
TOTAL		**54,69**	**59,00**	**915,50**	**7,47**	**42,11**	**-12,58**	**-30%**

APARTMENT 16 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 14	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	29,72	30	226,75	3	61,63	31,91	52%
01/06/2019	30/06/2019	6,96	29	281,5	0	43,26	36,30	84%
TOTAL		**36,68**	**59,00**	**508,25**	**2,51**	**104,89**	**68,21**	**65%**

APARTMENT 17 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 17	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	64,53	30	219,75	31	65,66	1,13	2%
01/06/2019	30/06/2019	3,46	29	171,25	0	37,37	33,91	91%
TOTAL		**67,99**	**59,00**	**391,00**	**31,39**	**103,03**	**35,04**	**34%**

APARTMENT 18 TOWER A								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 19	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/05/2019	31/05/2019	51,35	30	156,5	80	48,68	-2,67	-5%
01/06/2019	30/06/2019	9,38	29	166,25	0	23,68	14,30	60%
TOTAL		**60,73**	**59,00**	**322,75**	**80,35**	**72,37**	**11,64**	**16%**

The summary of Tower A of Treviso apartment gas savings is shown below:

Table 15: Summary savings GAS consumption Tower A (m^3)

m^3 GAS SAVINGS TOWER A																		
Month	**1 (AR1-TA-A01)**	2 (AR1-TA-A02)	**3 (AR1-TA-A03)**	4 (AR2-TA-04)	5 (AR2-TA-05)	**6 (AR2-TA-06)**	8 (AR3-TA-08)	9 (AR3-TA-09)	**10 (AR4-TA-A10)**	11 (AR4-TA-A11)	12 (AR4-TA-A12)	**13 (AR5-TA-A13)**	**14 (AR5-TA-A14)**	15 (AR5-TA-A15)	16 (AR6-TA-A16)	**17 (AR6-TA-A17)**	18 (AR6-TA-A18)	**TOTAL**
may-19	-35,00	18,99	41,77	38,23	5,20	11,57	-2,48	10,66	5,25	-6,61	5,71	0,33	11,85	-8,58	31,91	1,13	-2,67	140,67
jun-19	-2,48	10,92	-2,52	42,77	26,54	19,53	9,96	27,33	11,88	11,65	24,80	6,86	35,59	-4,00	36,30	33,91	14,30	341,37
TOTAL	**-37,48**	**29,91**	**39,26**	**81,00**	**31,74**	**31,11**	**7,48**	**37,98**	**17,13**	**5,03**	**30,51**	**7,18**	**47,44**	**-12,58**	**68,21**	**35,04**	**11,64**	**482,04**

Table 16: Summary savings GAS consumption Tower A (%)

% GAS SAVINGS TOWER A																		
Month	**1 (AR1-TA-A01)**	2 (AR1-TA-A02)	**3 (AR1-TA-A03)**	4 (AR2-TA-04)	5 (AR2-TA-05)	**6 (AR2-TA-06)**	8 (AR3-TA-08)	9 (AR3-TA-09)	**10 (AR4-TA-A10)**	11 (AR4-TA-A11)	12 (AR4-TA-A12)	**13 (AR5-TA-A13)**	**14 (AR5-TA-A14)**	15 (AR5-TA-A15)	16 (AR6-TA-A16)	**17 (AR6-TA-A17)**	18 (AR6-TA-A18)	**TOTAL**
may-19	-86%	80%	63%	30%	12%	43%	-11%	22%	20%	-20%	17%	2%	23%	-38%	52%	2%	-5%	
jun-19	-99%	89%	-463%	79%	73%	84%	48%	61%	56%	48%	82%	66%	84%	-20%	84%	91%	60%	
TOTAL	**-87%**	**83%**	**59%**	**45%**	**39%**	**62%**	**17%**	**41%**	**36%**	**9%**	**48%**	**24%**	**51%**	**-30%**	**65%**	**34%**	**55%**	**37%**

These savings are corresponding to the two months that have been used as a demonstration period.

Table 17: Total gas savings Tower A (m^3, kWh and %)

TOTAL GAS SAVINGS TOWER A	
TOTAL REFERENCE GAS CONSUMPTION (m3)	1313,91
TOTAL GAS SAVING (m3)	482,04
TOTAL GAS SAVING (%)	**37%**
TOTAL REFERENCE GAS CONSUMPTION (kWh)	15.372,8
TOTAL GAS SAVING (kWh)	5.639,9
TOTAL GAS SAVING (%)	**37%**

*Conversion factor of natural gas used (from m^3 to kWh)=11,7 kWh/m^3

In Tower A, a 37% saving in gas has been obtained. It is important to note that as a demonstration period of savings, only the months of May and June have been used, (the works ended in April and the invoices for July and August are not available until September). Even so, compared to the electricity savings shown in Table 10, the gas savings are much higher. This is because the works carried out mainly affect thermal consumption.

This is important because they are months in which the heating demand has minimum values, so it is not a representative saving. It would be necessary to extend the demonstration period of savings to the winter months.

As for the dwellings where there is a high consumption (apartment 1 and 15), it may be due to different static factors such as an increase in the interior temperature of the dwelling or an increase in the number of occupants of the dwelling.

In the specific case of apartment 15 of tower A, it should be borne in mind that it is a dwelling of type A2, which are the homes that have the largest area (94.35 sqm). Transmission losses through enclosures depend on the size of the homes, larger dwellings need more heating and, therefore, their energy consumption is higher.

2.1.2.2 Calculation of gas savings in Tower B

For the calculation of the gas supply savings in Tower B, the same months have been used as in the case of electricity savings (except July, because there is no data).

In the calculation of gas savings of Tower B, in the case of apartment 7 (SinCeO2 nomenclature) there is no data, since there is no one living in that apartment.

In addition, due to data reception problems on the platform, in apartments 13 and 18 (Sinceo2 nomenclature) data are available only from April to July 2019, so they have only been integrated in the calculation of the demonstration period.

Table 18: Gas savings period for Tower B in Treviso

Reporting period	
From Nov 2018	**Till Jun 2019**

The calculated savings for each of the apartments in Tower B is shown below:

Table 19: Savings gas consumption in the apartments of tower B of Treviso

APARTMENT 1 TOWER B (AR1-TB-A01)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 18	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	80,16	29	416,5	187	99,70	19,54	20%
01/12/2018	31/12/2018	139,61	30	379,5	383	218,02	78,41	36%
01/01/2019	31/01/2019	146,02	30	323,75	408	239,33	93,31	39%
01/02/2019	28/02/2019	85,41	27	274,5	347	205,60	120,19	58%
01/03/2019	31/03/2019	71,33	30	204,25	216	142,84	71,51	50%
01/04/2019	30/04/2019	19,59	29	166,25	36	42,62	23,03	54%
01/05/2019	31/05/2019	10,82	30	188,75	54	51,87	41,05	79%
01/06/2019	30/06/2019	5,06	29	259,5	0	10,76	5,70	53%
TOTAL		**451,20**	**116,00**	**1394,25**	**1324,28**	**762,65**	**311,45**	**41%**

APARTMENT 2 TOWER B (AR1-TB-A02)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 15	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	60,8	29	130,75	107	100,76	39,96	40%
01/12/2018	31/12/2018	136,9	30	141,5	293	230,62	93,70	41%
01/01/2019	31/01/2019	152,2	30	148,5	318	248,88	96,66	39%
01/02/2019	28/02/2019	75,0	27	133,25	266	209,72	134,71	64%
01/03/2019	31/03/2019	29,4	30	120,75	126	113,05	83,68	74%
01/04/2019	30/04/2019	20,9	29	96	2	24,77	3,91	16%
01/05/2019	31/05/2019	20,7	30	106	7	29,94	9,24	31%
01/06/2019	30/06/2019	10,6	29	100,5	0	23,79	13,22	56%
TOTAL		**506,4**	**234,00**	**977,25**	**1118,28**	**981,51**	**475,07**	**48%**

APARTMENT 3 TOWER B (AR1-TB-A03)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 16	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	31	29	269,75	132	141,18	110,58	78%
01/12/2018	31/12/2018	57	30	362,25	323	294,27	237,72	81%
01/01/2019	31/01/2019	72	30	313,25	348	312,41	240,23	77%
01/02/2019	28/02/2019	37	27	253	293	263,78	226,65	86%
01/03/2019	31/03/2019	25	30	242	156	159,93	134,55	84%
01/04/2019	30/04/2019	21	29	239,5	6	42,14	21,28	50%
01/05/2019	31/05/2019	23	30	208,75	16	49,96	26,80	54%
01/06/2019	30/06/2019	10	29	286,25	0	39,13	28,98	74%
TOTAL		**276,00**	**234,00**	**2174,75**	**1272,12**	**1302,79**	**1026,79**	**79%**

APARTMENT 4 TOWER B (AR2-TB-A04)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 17	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	84	29	68,5	158	167,38	83,75	50%
01/12/2018	31/12/2018	169	30	75,25	353	288,19	119,05	41%
01/01/2019	31/01/2019	202	30	76,5	378	303,56	101,93	34%
01/02/2019	28/02/2019	141	27	70,5	320	260,28	119,32	46%
01/03/2019	31/03/2019	94	30	157,5	186	169,65	76,13	45%
01/04/2019	30/04/2019	35	29	242,75	17	46,89	12,32	26%
01/05/2019	31/05/2019	20	30	130	31	80,46	60,50	75%
01/06/2019	30/06/2019	9	29	282,75	0	28,49	19,14	67%
TOTAL		**752,76**	**234,00**	**272,75**	**1442,43**	**1344,90**	**592,13**	**44%**

APARTMENT 5 TOWER B (AR2-TB-A05)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 14	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	45	29	92,5	84	132,77	88,14	66%
01/12/2018	31/12/2018	105	30	101,25	263	294,01	188,92	64%
01/01/2019	31/01/2019	129	30	113,25	288	315,24	186,73	59%
01/02/2019	28/02/2019	68	27	88,5	239	266,98	198,95	75%
01/03/2019	31/03/2019	33	30	111,5	97	144,36	111,75	77%
01/04/2019	30/04/2019	11	29	159,5	0	48,82	37,66	77%
01/05/2019	31/05/2019	9	30	111	3	59,49	50,48	85%
01/06/2019	30/06/2019	5	29	202	0	42,82	37,74	88%
TOTAL		**404,12**	**234,00**	**979,50**	**973,42**	**1304,51**	**900,38**	**69%**

APARTMENT 6 TOWER B (AR2-TB-A06)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 17	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	62,38	29	38,5	158	109,01	46,63	43%
01/12/2018	31/12/2018	96,20	30	49,25	353	218,28	122,08	56%
01/01/2019	31/01/2019	95,53	30	46,5	378	232,66	137,13	59%
01/02/2019	28/02/2019	53,37	27	33,75	320	198,19	144,82	73%
01/03/2019	31/03/2019	22,45	30	33,75	186	125,30	102,85	82%
01/04/2019	30/04/2019	17,48	29	32,25	17	30,28	12,80	42%
01/05/2019	31/05/2019	16,9	30	29,25	31	39,09	22,19	57%
01/06/2019	30/06/2019	3,38	29	236,25	0	11,95	8,57	72%
TOTAL		**367,69**	**234,00**	**499,50**	**1442,43**	**964,76**	**597,07**	**62%**

APARTMENT 8 TOWER B (AR3-TB-A08)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 20	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	8,775	29	264	245	32,915	24,14	73%
01/12/2018	31/12/2018	42,193	30	164,75	443	50,274	8,08	16%
01/01/2019	31/01/2019	91,510	30	207,5	468	51,119	-40,39	-79%
01/02/2019	28/02/2019	79,680	27	229	401	43,498	-36,18	-83%
01/03/2019	31/03/2019	15,73	30	174,5	276	37,948	22,22	59%
01/04/2019	30/04/2019	8,22	29	192,25	89	23,294	15,07	65%
01/05/2019	31/05/2019	12,35	30	197	108	25,299	12,95	51%
01/06/2019	30/06/2019	5,28	29	231	0	15,928	10,65	67%
TOTAL		**263,74**	**234,00**	**1660,00**	**2029,13**	**280,28**	**16,54**	**6%**

APARTMENT 9 TOWER B (AR3-TB-A09)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 16	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	82,34	29	261	132	80,0	-2,37	-3%
01/12/2018	31/12/2018	145,03	30	271,5	323	169,1	24,03	14%
01/01/2019	31/01/2019	179,51	30	288,25	348	181,5	2,02	1%
01/02/2019	28/02/2019	138,58	27	237,25	293	153,0	14,47	9%
01/03/2019	31/03/2019	117,68	30	333,5	156	94,2	-23,43	-25%
01/04/2019	30/04/2019	50,59	29	350,75	6	25,4	-25,15	-99%
01/05/2019	31/05/2019	27,25	30	362,5	16	30,8	3,53	11%
01/06/2019	30/06/2019	10,6	29	360,75	0	23,1	12,51	54%
TOTAL		**751,58**	**234,00**	**2465,50**	**1272,12**	**757,17**	**5,59**	**1%**

APARTMENT 10 TOWER B (AR4-TB-A10)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 17	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	52,71	29	286,25	158	80,01	27,30	34%
01/12/2018	31/12/2018	95,58	30	291,75	353	147,97	52,39	35%
01/01/2019	31/01/2019	105,29	30	292,00	378	156,67	51,38	33%
01/02/2019	28/02/2019	76,57	27	243,50	320	135,73	59,16	44%
01/03/2019	31/03/2019	61,43	30	312,75	186	88,75	27,32	31%
01/04/2019	30/04/2019	26,7	29	285,00	17	31,79	5,09	16%
01/05/2019	31/05/2019	19,16	30	331,00	31	34,21	15,05	44%
01/06/2019	30/06/2019	7,24	29	310,00	0	23,59	16,35	69%
TOTAL		**444,68**	**234,00**	**2352,25**	**1442,43**	**698,72**	**254,04**	**36%**

APARTMENT 11 TOWER B (AR4-TB-A11)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 15	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	85,3	29	459,75	107	115,56	30,24	26%
01/12/2018	31/12/2018	182,3	30	476,25	293	265,38	83,08	31%
01/01/2019	31/01/2019	228,7	30	452,5	318	286,59	57,87	20%
01/02/2019	28/02/2019	150,6	27	405,5	266	241,49	90,92	38%
01/03/2019	31/03/2019	97,28	30	429	126	132,82	35,54	27%
01/04/2019	30/04/2019	38,46	29	367,5	2	34,15	-4,31	-13%
01/05/2019	31/05/2019	36,13	30	319,25	7	41,61	5,48	13%
01/06/2019	30/06/2019	12,63	29	492,5	0	28,45	15,82	56%
TOTAL		**831,4**	**234,0**	**3402,3**	**1118,3**	**1146,0**	**314,6**	**27%**

APARTMENT 12 TOWER B (AR4-TB-A12)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 18	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	66,58	29	178,75	187	123,59	57,02	46%
01/12/2018	31/12/2018	119,40	30	187,75	383	231,99	112,58	49%
01/01/2019	31/01/2019	135,88	30	195,25	408	246,02	110,14	45%
01/02/2019	28/02/2019	92,49	27	178	347	210,03	117,54	56%
01/03/2019	31/03/2019	64,68	30	180,5	216	139,93	75,25	54%
01/04/2019	30/04/2019	31,36	29	172,5	36	40,26	8,90	22%
01/05/2019	31/05/2019	39,72	30	184,75	54	51,06	11,34	22%
01/06/2019	30/06/2019	7,32	29	306	0	20,67	13,35	65%
TOTAL		**557,43**	**234,00**	**1583,50**	**1630,01**	**1063,55**	**506,12**	**48%**

APARTMENT 13 TOWER B (AR5-TB-A13)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 16	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/04/2019	30/04/2019	37,26	29	102,25	6	39,28	2,02	5%
01/05/2019	31/05/2019	13,73	30	89,75	16	45,62	31,89	70%
01/06/2019	30/06/2019	10,17	29	106,25	0	36,35	26,18	72%
TOTAL		**61,16**	**88,00**	**298,25**	**21,82**	**121,24**	**60,08**	**50%**

APARTMENT 14 TOWER B (AR5-TB-A14 (A))								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 17	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	132,88	29	105	158	170,135	37,25	22%
01/12/2018	31/12/2018	201,29	30	117,5	353	334,406	133,12	40%
01/01/2019	31/01/2019	225,95	30	124	378	355,409	129,46	36%
01/02/2019	28/02/2019	166,05	27	98,25	320	303,372	137,32	45%
01/03/2019	31/03/2019	128,8	30	102,75	186	194,788	65,99	34%
01/04/2019	30/04/2019	74,69	29	106,5	17	51,481	-23,21	-45%
01/05/2019	31/05/2019	52,49	30	103,75	31	65,040	12,55	19%
01/06/2019	30/06/2019	5,66	29	98,5	0	37,470	31,81	85%
TOTAL		**987,81**	**234,00**	**856,25**	**1442,43**	**1512,10**	**524,29**	**35%**

APARTMENT 15 TOWER B (AR5-TB-A15)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 16	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	70,94	29	116,25	132	160,9	90,00	56%
01/12/2018	31/12/2018	123,68	30	126,5	323	278,8	155,13	56%
01/01/2019	31/01/2019	140,95	30	121,25	348	295,1	154,18	52%
01/02/2019	28/02/2019	83,60	27	103,75	293	253,9	170,33	67%
01/03/2019	31/03/2019	54,24	30	530,75	156	112,0	57,74	52%
TOTAL		**473,41**	**146,00**	**998,50**	**1250,30**	**1100,79**	**627,38**	**57%**

APARTMENT 16 TOWER B (AR6-TB-A16)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 14	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	58,71	29	184,25	84	77,88	19,17	25%
01/12/2018	31/12/2018	101,95	30	198,5	263	164,19	62,24	38%
01/01/2019	31/01/2019	106,79	30	200	288	176,30	69,51	39%
01/02/2019	28/02/2019	53,50	27	157,5	239	149,83	96,33	64%
01/03/2019	31/03/2019	49,79	30	175,25	97	86,09	36,30	42%
01/04/2019	30/04/2019	32,82	29	182,5	0	37,89	5,07	13%
01/05/2019	31/05/2019	22,17	30	180	3	40,56	18,39	45%
01/06/2019	30/06/2019	10,82	29	190,5	0	37,33	26,51	71%
TOTAL		**436,55**	**234,00**	**1468,50**	**973,42**	**770,07**	**333,52**	**43%**

APARTMENT 17 TOWER B (AR6-TB-A17)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 15	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/11/2018	30/11/2018	42,83	29	82	107	115,89	73,1	63%
01/12/2018	31/12/2018	81,90	30	111	293	292,52	210,6	72%
01/01/2019	31/01/2019	121,63	30	164,25	318	313,60	192,0	61%
01/02/2019	28/02/2019	77,72	27	129,5	266	263,61	185,9	71%
01/03/2019	31/03/2019	40,32	30	106	126	132,62	92,3	70%
01/04/2019	30/04/2019	12,92	29	102,25	2	13,77	0,9	6%
01/05/2019	31/05/2019	8,25	30	71	7	21,58	13,3	62%
01/06/2019	30/06/2019	1,82	29	78,5	0	13,33	11,5	86%
TOTAL		**387,39**	**234,00**	**844,50**	**1118,28**	**1166,92**	**779,53**	**67%**

APARTMENT 18 TOWER B (AR6-TB-A18)								
Initial period	Final period	Gas Reading (m^3)	Reading Days	Hours of use	HDD 12	Adjusted baseline consumption	Gas Energy Saving	Percentage of energy savings
01/04/2019	30/04/2019	12,92	29	359	0	43,01	30,1	70%
01/05/2019	31/05/2019	8,25	30	394,75	0	44,90	36,6	82%
01/06/2019	30/06/2019	1,82	29	373	0	43,26	41,4	96%
TOTAL		**22,99**	**88,00**	**1126,75**	**0,00**	**131,17**	**108,18**	**82%**

Table 20: Summary savings GAS consumption Tower B (m^3)

m3 GAS SAVINGS TOWER B																		
Month	1 (AR1-TB-A01)	2 (AR1-TB-A02)	3 (AR1-TB-A03)	4 (AR2-TB-04)	**5 (AR2-TB-05)**	**6 (AR2-TB-06)**	**8 (AR3-TB-08)**	**9 (AR3-TB-09)**	**10 (AR4-TB-A10)**	**11 (AR4-TB-A11)**	12 (AR4-TB-A12)	**13 (AR5-TB-A13)**	**14 (AR5-TB-A14)**	**15 (AR5-TB-A15)**	16 (AR6-TB-A16)	**17 (AR6-TB-A17)**	18 (AR6-TB-A18)	**TOTAL**
nov-18	19,54	39,96	110,58	83,75	88,14	46,63	24,14	-2,37	27,30	30,24	57,02	0,00	37,25	90,00	19,17	73,06	0,00	744,42
dic-18	78,41	93,70	237,72	119,05	188,92	122,08	8,08	24,03	52,39	83,08	112,58	0,00	133,12	155,13	62,24	210,62	0,00	1681,15
ene-19	93,31	96,66	240,23	101,93	186,73	137,13	-40,39	2,02	51,38	57,87	110,14	0,00	129,46	154,18	69,51	191,97	0,00	1582,11
feb-19	120,19	134,71	226,65	119,32	198,95	144,82	-36,18	14,47	59,16	90,92	117,54	0,00	137,32	170,33	96,33	185,89	0,00	1780,42
mar-19	71,51	83,68	134,55	76,13	111,75	102,85	22,22	-23,43	27,32	35,54	75,25	0,00	65,99	57,74	36,30	92,30	0,00	969,70
abr-19	23,03	3,91	21,28	12,32	37,66	12,80	15,07	-25,15	5,09	-4,31	8,90	2,02	-23,21	0,00	5,07	0,85	30,09	125,40
may-19	41,05	9,24	26,80	60,50	50,48	22,19	12,95	3,53	15,05	5,48	11,34	31,89	12,55	0,00	18,39	13,33	36,65	371,42
jun-19	5,70	13,22	28,98	19,14	37,74	8,57	10,65	12,51	16,35	15,82	13,35	26,18	31,81	0,00	26,51	11,51	41,44	319,48
TOTAL	**452,75**	**475,07**	**1026,79**	**592,13**	**900,38**	**597,07**	**16,54**	**5,59**	**254,04**	**314,64**	**506,12**	**60,08**	**524,29**	**627,38**	**333,52**	**779,53**	**108,18**	**7574,10**

Table 21: Summary savings GAS consumption Tower B (%)

% GAS SAVINGS TOWER B																		
Month	1 (AR1-TB-A01)	2 (AR1-TB-A02)	3 (AR1-TB-A03)	4 (AR2-TB-04)	**5 (AR2-TB-05)**	**6 (AR2-TB-06)**	**8 (AR3-TB-08)**	**9 (AR3-TB-09)**	**10 (AR4-TB-A10)**	**11 (AR4-TB-A11)**	12 (AR4-TB-A12)	**13 (AR5-TB-A13)**	**14 (AR5-TB-A14)**	**15 (AR5-TB-A15)**	16 (AR6-TB-A16)	**17 (AR6-TB-A17)**	18 (AR6-TB-A18)	**TOTAL**
nov-18	20%	40%	78%	50%	66%	43%	73%	-3%	34%	26%	46%	0%	22%	56%	25%	63%	0%	
dic-18	36%	41%	81%	41%	64%	56%	16%	14%	35%	31%	49%	0%	40%	56%	38%	72%	0%	
ene-19	39%	39%	77%	34%	59%	59%	-79%	1%	33%	20%	45%	0%	36%	52%	39%	61%	0%	
feb-19	58%	64%	86%	46%	75%	73%	-83%	9%	44%	38%	56%	0%	45%	67%	64%	71%	0%	
mar-19	50%	74%	84%	45%	77%	82%	59%	-25%	31%	27%	48%	0%	34%	52%	42%	70%	0%	
abr-19	54%	16%	50%	26%	77%	42%	65%	-99%	16%	-13%	22%	5%	-45%	0%	13%	6%	70%	
may-19	79%	31%	54%	75%	85%	57%	51%	11%	44%	13%	22%	70%	19%	0%	45%	62%	82%	
jun-19	53%	56%	74%	67%	88%	72%	67%	54%	69%	56%	65%	72%	85%	0%	71%	86%	96%	
TOTAL	**41%**	**48%**	**79%**	**44%**	**69%**	**62%**	**6%**	**1%**	**36%**	**27%**	**48%**	**50%**	**35%**	**57%**	**43%**	**67%**	**82%**	**50%**

These savings are corresponding to the eight months that have been used as a demonstration period.

Table 22: Total gas savings Tower B (m^3, kWh and %)

TOTAL GAS SAVINGS TOWER B	
TOTAL REFERENCE GAS CONSUMPTION (m3)	15241,08
TOTAL GAS SAVING (m3)	7479,13
TOTAL GAS SAVING (%)	**49%**
TOTAL REFERENCE GAS CONSUMPTION (kWh)	178.320,6
TOTAL GAS SAVING (kWh)	87.505,8
TOTAL GAS SAVING (%)	**49%**

*Conversion factor of natural gas used (from m^3 to kWh)=11,7 kWh/m^3

In Tower B, a 47% saving in gas consumption has been obtained. In this case, the demonstration period used covers winter months in which there is significant heating consumption. There is no apartment that stands out for having gas over-consumption.

The apartments where the lowest gas savings have been achieved are 8 and 9 (according to the SinCeO2 nomenclature). This may be because the tenants of these homes have used the heating system or the domestic hot water system more than the rest of the homes. This could be checked by analyzing the interior temperature of the dwellings, but in Tower B the monitoring of the interior temperature of the dwelling has not been carried out.

2.1.3 Communal Services Energy savings calculation

Table 23: Savings period for communal services Tower A in Treviso

Reporting period	
From May 2019	**Till Jul 2019**

Table 24: Savings results for communal services Tower A in Treviso

Date	Electric Consumption (kWh)	Daylight hours (h)	Adjusted baseline consumption (kWh)	Electric Energy Saving (kWh)	Percentage of energy savings (%)
may-19	112,6	14,88	82,97	-29,63	-36%
jun-19	91,2	15,62	76,40	-14,84	-19%
jul-19	104,0	15,30	79,24	-24,79	-31%
Total	**307,9**	**45,8**	**238,6**	**-69,3**	**-29%**

Table 25: Savings period for communal services Tower B in Treviso

Reporting period	
From Nov 018	Till Mar2019

Table 26: Savings results for communal services Tower B in Treviso

Date	Electric Consumption (kWh)	Daylight hours (h)	Adjusted baseline consumption (kWh)	Electric Energy Saving (kWh)	Percentage of energy savings (%)
nov-18	243,835	10	503,9	260,0	52%
dic-18	264,79	9	529,8	265,1	50%
ene-19	210,401	9	516,9	306,5	59%
feb-19	217,439	10	475,7	258,2	54%
TOTAL	**936,5**	**37,7**	**2026,3**	**1089,8**	**54%**

The operating hours of both towers during the reference period (April 2017-December 2017) and the demonstrative savings period (from November 2018 to July 2019 in Tower B, and from May to July 2019 in Tower A). It is observed that while in Tower A the operating hours have increased, while in Tower B they have decreased. This explains the difference in savings between both Towers.

Table 27: Comparison of occupation hours in Treviso Tower A

Month (reference period)	Occupation time (h)	Month (reporting period)	Occupation time (h)
may-17	214,75	may-19	301,5
jun-17	144,75	jun-19	113,5
jul-17	56	jul-19	80,75

Table 28: Comparison of occupation hours in Treviso Tower B

Month (reference period)	Occupation time (h)	Month (reporting period)	Occupation time (h)
abr-17	294	abr-19	243,25
may-17	249,75	may-19	264,25
jun-17	229,5	jun-19	185,5
jul-17	260,25	jul-19	249,25

2.2 ECONOMIC SAVINGS CALCULATION

For the calculation of the economic savings, since the updated invoices are not available, an estimate of the saving has been made with the official energy data of Italy (Eurostat database). So the savings shown are not really those obtained by ATER Treviso, but an estimate. When the updated rates of Ater Treviso are available, the savings calculations will be updated.

The price of electricity in Italy in the domestic sector is 21.6 € per 100 kWh.

The price of gas in Italy in the domestic sector is 9.5 € per 100 kWh.

Table 29: Economic gas and electricity savings in Treviso

TOWER A TREVISO			Electricity (kWh)	%	Gas (kWh)	%
REPORTING PERIOD	may-19	June 2019				
ADJUSTED BASELINE ENERGY (kWh)			9.814	39%	15.373	61%
REPORTING PERIOD MEASURED ENERGY (kWh)			9.155	48%	9.733	52%
SAVINGS OR AVOIDED ENERGY CONSUMPTION (kWh)			659		5.640	
ECONOMIC SAVINGS (€)			**142,37 €**		**535,79 €**	
TOTAL ELECTRIC SAVING (%)			**7%**		**37%**	

TOWER B TREVISO			Electricity (kWh)	%	Gas (kWh)	%
REPORTING PERIOD	November 2018	June 2019				
ADJUSTED BASELINE ENERGY (kWh)			22.491	11%	178.321	89%
REPORTING PERIOD MEASURED ENERGY (kWh)			21.413	19%	90.815	81%
SAVINGS OR AVOIDED ENERGY CONSUMPTION (kWh)			1.079		87.506	
ECONOMIC SAVINGS (€)			**232,96 €**		**8.313,05 €**	
TOTAL ELECTRIC SAVING (%)			**5%**		**49%**	

2.3 ENERGY SAVINGS CALCULATION CONCLUSIONS

- A saving of the electricity consumption of 7% and a saving in the consumption of gas of 37% has been obtained in the dwellings in tower A.
- A saving of the electricity consumption of 5% and a saving in the consumption of gas of 49% had been obtained in the dwellings in tower B.
- It is important to note that in Tower A a sufficient demonstration period has not been used due to lack of data. Only the months of May, June and July of 2019 have been used since the renovations ended in the month of April 2019. According to the International Performance Measurement and Verificaion Protocol (IPMVP), the demonstration period must cover at least one normal operating cycle of the installation or of the equipment, to achieve a complete characterization of the effectiveness of savings in all normal operating conditions. In the case of Tower B, there is a broader demonstration period that allows characterizing the behaviour of household consumption. The demonstration time used goes from November 1, 2018 to July 31, covering winter and summer months.
- The percentage differences between the electricity and gas savings obtained in both towers are due to the fact that the renovations undertaken have a lower impact on the electricity consumption of the buildings. The generation of the photovoltaic system has an effect on the electricity savings of the common areas, but today, it is not in operation.
- The number of occupants and the floor areas of the dwellings are factors that affect their energy consumption. Factors such as the consumption habits of each tenant and their awareness of the use of resources also have an influence.

- In the case of electricity baselines, there is a calculation error due to regression calculations ranging from 0.11% to 9% of the adjusted reference consumption, so that the savings are within the uncertainty range. The error of saving calculations is that of the regression calculation performed to obtain each baseline. As an approximate reference, the R^2 value of each baseline calculation has been used.
- In the case of natural gas savings, they are within a range of uncertainty ranging from 0.1% to 10%, of the adjusted reference consumption. The value of R2 has been used to calculate this error.
- In order to calculate the energy savings of the dwellings, a non-routine type adjustment (IPMVP methodology) should be included in the baseline equation. This type of adjustment is due to parameters that influence energy and are not expected to change over time: size of the installation, design and operation of existing equipment, number of work shifts or type of occupants. The possible changes experienced by these static variables have to be monitored throughout the demonstration period of savings.

Table 30: Relationship results with each of the apartments and their characteristics. Tower A

Codice U.I.	Vecchio Codice UI	ADDRESS	Codice contratto	n Persons	TYPE	FLOOR	BOW WINDOW	SQM	air cond	Nomenclature Sinceo2	Electric kWh savings	%Savings	kWh elect savings/m2	Gas m3 savings	Gas kWh savings	%Savings	kWh gas savings/m2
1686	108611020101	Via BORGO FURO 35/A	578	1	A1	1	X	79,44		A02	38,06	11%	0,5	29,12	340,72	83%	4,29
1692	108611020107	Via BORGO FURO 35/A	584	3	A2	1	X	94,35		A04	30,05	9%	0,3	18,62	217,89	16%	2,31
1698	108611020113	Via BORGO FURO 35/A	590	2	A3	1	X	82,97	1	A07	-109,75	-18%	-1,3	7,04	82,33	12%	0,99
1687	108611020102	Via BORGO FURO 35/A	579	1	A1	2	X	79,44	1	A01	86,43	14%	1,1	-36,22	-423,75	-81%	-5,33
1693	108611020108	Via BORGO FURO 35/A	585	4	A2	2	X	94,35		A05	-12,42	-5%	-0,1	69,88	817,63	59%	8,67
1699	108611020114	Via BORGO FURO 35/A	591	1	A3	2	X	82,97		A08	11,15	1%	0,1	7,28	85,15	17%	1,03
1688	108611020103	Via BORGO FURO 35/A	580	1	A1	3		79,44	1	A03	-4,52	-2%	-0,1	31,25	365,65	53%	4,60
1694	108611020109	Via BORGO FURO 35/A	586	3	A2	3	X	94,35	1	A06	-25,09	-6%	-0,3	28,79	336,87	60%	3,57
1700	108611020115	Via BORGO FURO 35/A	8692	4	A3	3	X	82,97		A09	-65,57	-8%	-0,8	26,23	306,88	32%	3,70
1689	108611020104	Via BORGO FURO 35/A	581	3	A1	4	X	79,44		A12	-39,22	-18%	-0,5	64,15	750,50	66%	9,45
1695	108611020110	Via BORGO FURO 35/A	587	2	A2	4	X	94,35		A15	23,72	5%	0,3	-13,31	-155,78	-32%	-1,65
1701	108611020116	Via BORGO FURO 35/A	592	2	A3	4	X	82,97		A18	-2,64	-1%	0,0	-10,29	-120,34	-16%	-1,45
1690	108611020105	Via BORGO FURO 35/A	582	1	A1	5	X	79,44	1	A13	-10,77	-4%	-0,1	25,20	294,79	52%	3,71
1696	108611020111	Via BORGO FURO 35/A	588	2	A2	5	X	94,35		A16	45,34	13%	0,5	30,10	352,11	45%	3,73
1702	108611020117	Via BORGO FURO 35/A	593	2	A3	5	X	82,97	1	A10	134,43	16%	1,6	1,02	11,98	3%	0,14
1691	108611020106	Via BORGO FURO 35/A	583	2	A1	6		79,44	1	A14	63,49	9%	0,8	4,45	52,11	9%	0,66
1697	108611020112	Via BORGO FURO 35/A	589	2	A2	6	X	94,35	1	A17	347,59	31%	3,7	14,40	168,46	18%	1,79
1703	108611020118	Via BORGO FURO 35/A	27624	6	A3	6		82,97		A11	148,85	19%	1,8	6,14	71,80	10%	0,87

Table 31: Relationship results with each of the apartments and their characteristics. Tower B

Codice U.I.	Vecchio Codice UI	ADDRESS	Codice contratto	n Persons	TYPE	FLOOR	BOW WINDOW	air cond	SQM	SINCEO2	Electric kWh savings	%Savings	kWh savings/m2	Gas m3 savings	Gas kWh savings	%Savings	kWh savings/m2
	108611030107	V.le FRANCIA 1		EMPTY	B1	1	X		79,44	A07	0,00	0%	0,00	0,00	0,00	0%	0,00
1728	108611030107	V.le FRANCIA 1	7159	4	B2	1	X	1	94,35	A11	68,96	3%	0,73	324,19	3793,04	28%	40,20
1734	108611030113	V.le FRANCIA 1	605	3	B3	1			82,97	A04	-218,46	-18%	-2,63	673,91	7884,72	47%	95,03
1723	108611030102	V.le FRANCIA 1	24313	5	B1	2		1	79,44	A08	945,46	53%	11,90	19,40	227,03	7%	2,86
1729	108611030108	V.le FRANCIA 1	601	1	B2	2	X	1	94,35	A06	37,73	3%	0,40	592,28	6929,66	62%	73,45
1735	108611030114	V.le FRANCIA 1	606	2	B3	2	X		82,97	A05	-9,08	-1%	-0,11	888,56	10396,15	69%	125,30
1724	108611030103	V.le FRANCIA 1	597	2	B1	3	X		79,44	A01	28,52	2%	0,36	441,08	5160,64	40%	64,96
1730	108611030109	V.le FRANCIA 1	602	3	B2	3		1	94,35	A09	-117,65	-9%	-1,25	-6,71	-78,52	-1%	-0,83
1733	108611030112	V.le FRANCIA 1	604	2	B3	3		1	82,97	A14	50,05	5%	0,60	530,10	6202,22	35%	74,75
1725	108611030104	V.le FRANCIA 1	598	1	B1	4	X		79,44	A12	-30,48	-2%	-0,38	506,65	5927,81	48%	74,62
1731	108611030110	V.le FRANCIA 1	9127	5	B2	4	X	1	94,35	A03	-46,70	-2%	-0,49	1045,63	12233,87	79%	129,66
1737	108611030116	V.le FRANCIA 1	607	2	B3	4	X	1	82,97	A15	70,16	5%	0,85	890,99	10424,63	63%	125,64
1726	108611030105	V.le FRANCIA 1	599	3	B1	5			79,44	A16	243,66	12%	3,07	205,97	2409,84	32%	30,34
1732	108611030111	V.le FRANCIA 1	603	3	B2	5	X	1	94,35	A13	37,14	8%	0,39	59,76	699,16	49%	7,41
1738	108611030117	V.le FRANCIA 1	608	2	B3	5		1	82,97	A10	-107,76	-12%	-1,30	184,94	2163,82	29%	26,08
1727	108611030106	V.le FRANCIA 1	600	1	B1	6	X	1	79,44	A17	-40,23	-8%	-0,51	658,25	7701,52	63%	96,95
1736	108611030115	V.le FRANCIA 1	8281	2	B2	6	X		94,35	A18	44,07	7%	0,47	92,58	1083,21	80%	11,48
1739	108611030118	V.le FRANCIA 1	6217	4	B3	6	X		82,97	A02	123,11	10%	1,48	-311,87	-3648,91	-160%	-43,98

The characteristics of each type of housing in Tower A is shown in the following tables:

Table 32: Characteristic dwellings Type A1

TYPE	n Persons	FLOOR	BOW WINDOW	SQM	air cond	Sinceo2 Nomenclature
A1	1	1	X	79,44		A02
A1	1	2	X	79,44	1	A01
A1	1	3		79,44	1	A03
A1	3	4	X	79,44		A12
A1	1	5	X	79,44	1	A13
A1	2	6		79,44	1	A14

Table 33: Characteristic dwellings Type A2

TYPE	n Persons	FLOOR	BOW WINDOW	SQM	air cond	Sinceo2 Nomenclature
A2	3	1	X	94,35		A04
A2	4	2	X	94,35		A05
A2	3	3	X	94,35	1	A06
A2	2	4	X	94,35		A15
A2	2	5	X	94,35		A16
A2	2	6	X	94,35	1	A17

Table 34: Characteristic dwellings Type A3

TYPE	n Persons	FLOOR	BOW WINDOW	SQM	air cond	Sinceo2 Nomenclature
A3	2	1	X	82,97	1	A07
A3	1	2	X	82,97		A08
A3	4	3	X	82,97		A09
A3	2	4	X	82,97		A18
A3	2	5	X	82,97	1	A10
A3	6	6		82,97		A11

The characteristics of each type of housing in Tower B is shown in the following tables:

Table 35: Characteristic dwellings Type B1

TYPE	n Persons	FLOOR	BOW WINDOW	air cond	SQM	Sinceo2 Nomenclature
B1		1	X		79,44	AR3-TB-A07
B1	5	2		1	79,44	AR3-TB-A08
B1	2	3	X		79,44	AR1-TB-A01
B1	1	4	X		79,44	AR4-TB-A12
B1	3	5			79,44	AR6-TB-A16
B1	1	6	X	1	79,44	AR6-TB-A17

Table 36: Characteristic dwellings Type B2

TYPE	n Persons	FLOOR	BOW WINDOW	air cond	SQM	Sinceo2 Nomenclature
B2	4	1	X	1	94,35	AR4-TB-A11
B2	1	2	X	1	94,35	AR2-TB-A06
B2	3	3		1	94,35	AR3-TB-A09
B2	5	4	X	1	94,35	AR1-TB-A03
B2	3	5	X	1	94,35	AR5-TB-A13
B2	2	6	X		94,35	AR5-TB-A18

Table 37: Characteristic dwellings Type B3

TYPE	n Persons	FLOOR	BOW WINDOW	air cond	SQM	Sinceo2 Nomenclature
B3	3	1			82,97	AR2-TB-A04
B3	2	2	X		82,97	AR2-TB-A05
B3	2	3		1	82,97	AR5-TB-A14
B3	2	4	X	1	82,97	AR5-TB-A15
B3	2	5		1	82,97	AR4-TB-A10
B3	4	6	X		82,97	AR1-TB-A02

The following graph compares the electricity savings in Towers A and B, by type of building.

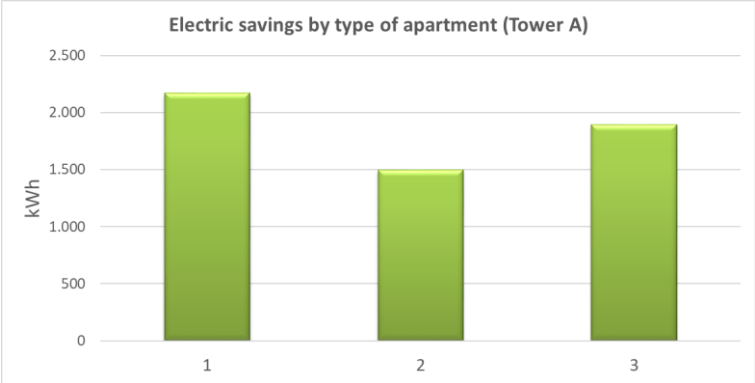


Figure 5: Electricity savings by type of apartment (Tower A)

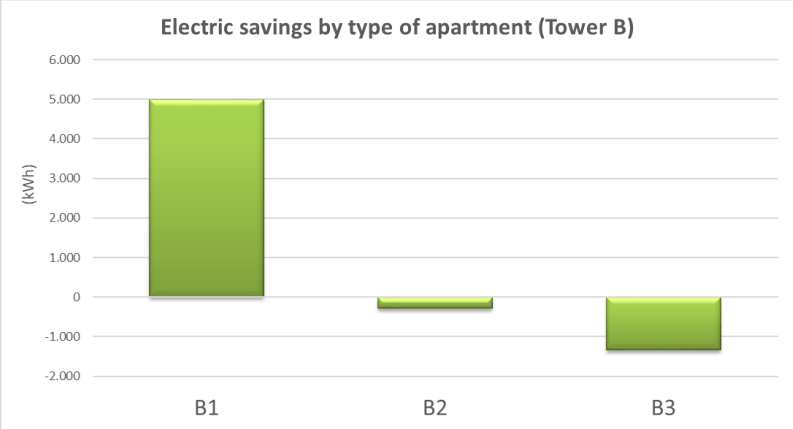


Figure 6: Electricity savings by type of apartment (Tower B)

The following graph compares the gas savings in Towers A and B, by type of building.

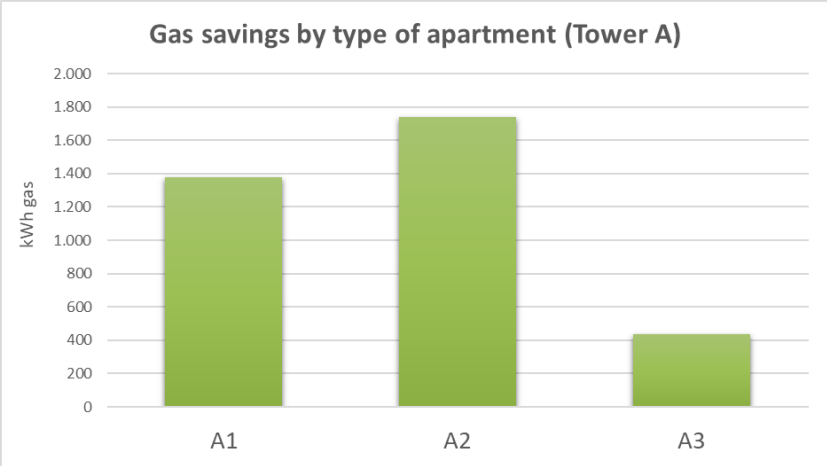


Figure 7: Gas savings by type of apartment (Tower A)

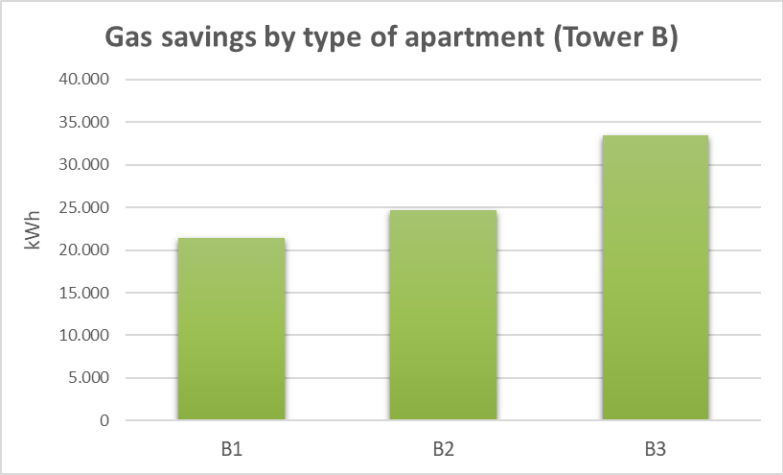


Figure 8: Gas savings by type of apartment (Tower B)

3 ENERGY PERFORMANCE PADIHAM PILOT BEFORE RENOVATIONS

3.1 SAVINGS CALCULATION

The relationship between energy consumption and variables does not have to be linear, and could be adjusted to another type of function, such as exponential, quadratic, logarithmic, etc. In those facilities where variations in energy consumption may depend on more than one variable, the formula that could relate them would be:

$$F(x, y, z, ...n) = Ax + By + Cz + ... + Nn + D$$

In this case, the dependent variable is the monitored electricity consumption (In the case of gas consumption, meter readings are available). In addition, three independent variables have been used for the calculation of the baseline, heating degree days, hours of occupation and days of measurement.

To calculate the heating degree days, the data collected from the external probe being monitored has been used as the outside temperature and as a base temperature, the interior temperature of each home.

Table 38: Base temperature for HDD calculation

Dwelling	Average indoor temperature (ºC)
D1	22
D2	19
D3	21
D4	22
D5	16
D6	20
D8	19
D9	17

In the event that some external temperature data is not valid, due to coverage problems, due to problems in the platform, because there was no record or because it was a value that is very distant from the official outdoor temperature record, erroneous values have been replaced with temperatures collected in a meteorological station in Padiham.

To calculate the hours of operation, the 15 minute energy demand records are used, it is established whether it is of activity or not, comparing the recorded power with the power at the average moments of "no activity", which correspond to the night periods. That is, if during the day, "the

same" power is recorded as during the night, it is considered that at that time, there was no activity in the house.

Therefore, the total hours of activity or hours at which consumption occurs in households each month have been established.

Finally, the third variable used was that of reading days within each month, since it was not always possible to have constant records since during the project there were communication failures due to 3G coverage problems.

3.1.1 Analysis for dwelling D1

3.1.1.1 D1 ELECTRICITY SUPPLY

For the calculation of Dwelling 1 electricity savings, the data from November 2018 to July 2019 has been used as a demonstration period.

Table 39: Electricity savings calculated in dwelling 1

D1	Main Switch Consumption (kWh)	Measured Days	Hours of use	HDD INDOOR Tª	Adjusted baseline consumption (kWh)	Electric Energy Saving	Percentage of energy savings
nov-18	156,4	30	195,25	406,9	94,2	-62,2	-66%
dic-18	158,1	31	200,5	453,8	97,3	-60,8	-62%
ene-19	173,5	31	213,75	527,6	101,9	-71,6	-70%
feb-19	143,5	28	177,5	404,1	87,1	-56,4	-65%
mar-19	160,0	31	248,75	436,9	110,4	-49,6	-45%
abr-19	153,0	30	299,5	357,8	122,4	-30,7	-25%
may-19	126,7	31	234,5	296,4	104,7	-22,0	-21%
jun-19	130,5	30	241,75	217,2	104,7	-25,8	-25%
jul-19	76,2	21	130,5	138,1	63,3	-12,9	-20%
TOTAL	**1277,83**	**263,00**	**1942,00**	**3238,70**	**885,99**	**-391,84**	**-44%**

3.1.1.2 D1 GAS SUPPLY

In the case of gas savings, the only data available are two gas readings between 07/11/2018-13/12/2018 and 13/12/2018-28/03/2019. The following gas readings are currently missing but it would be useful to extend the demonstration period after this period.

Table 40: Gas savings calculated in dwelling 1

Initial reading date	Final date reading	Consumption (m^3)	Reading days	Hours of use (h)	HDD INDOOR T	Adjusted baseline consumption (m3)	Gas Saving	Percentage of energy savings
07/11/2018	13/12/2018	541,4	36	236,25	499,4978921	216,74	-324,66	-150%
13/12/2018	28/03/2019	836,17	105	724,5	1595,734672	676,54	-159,63	-24%
TOTAL		1377,6	141,0	960,8	2095,2	893,3	-484,3	-54%

3.1.2 Analysis for dwelling D2

For the calculation of Dwelling 2 electricity savings, the data are collected from November 2018 to July 2019 and has been used as a demonstration period.

Table 41: Electricity savings calculated in dwelling 2

D2	TOTAL Consumption (kWh)	Hours of use	HDD INDOOR Tª	MEASURED DAYS	Adjusted baseline consumption (kWh)	Electric Energy Saving	Percentage of energy savings
nov-18	946,1	122,8	336,7	30,0	1306,3	360,3	28%
dic-18	1132,8	130,0	381,3	31,0	1498,2	365,4	24%
ene-19	1260,3	163,5	455,1	31,0	1772,1	511,9	29%
feb-19	880,1	118,5	338,6	28,0	1325,7	445,6	34%
mar-19	806,4	114,5	364,3	31,0	1451,3	644,8	44%
abr-19	507,7	72,8	287,6	30,0	1181,4	673,7	57%
may-19	363,7	63,5	223,8	31,0	903,0	539,3	60%
jun-19	341,8	49,5	148,6	30,0	582,5	240,7	41%
jul-19	331,7	54,5	75,9	31,0	232,6	-99,1	-43%
TOTAL	**6570,4**	**889,5**	**2611,9**	**273,0**	**10253,2**	**3682,7**	**35,92%**

3.1.3 Analysis for dwelling D3

For the calculation of Dwelling 3 electricity savings, the data were collected from November 2018 to July 2019 and has been used as a demonstration period.

Table 42: Electricity savings calculated in dwelling 3

D3	TOTAL Consumption (kWh)	Hours of use	MEASURED DAYS	HDD INDOOR Tª	Adjusted baseline consumption (kWh)	Electric Energy Saving	Percentage of energy savings
nov-18	1110,3	226,25	30	400,9	1438,8	328,5	23%
dic-18	1403,3	259,25	31	447,6	1623,2	219,9	14%
ene-19	1642,7	261,5	31	521,4	1871,3	228,6	12%
feb-19	1182,2	225,25	28	398,5	1444,0	261,9	18%
mar-19	1303,1	296,25	31	430,6	1606,9	303,8	19%
abr-19	870,0	237	30	351,7	1286,8	416,8	32%
may-19	661,0	223,25	31	290,1	1059,7	398,7	38%
jun-19	555,3	159,75	30	211,1	734,6	179,3	24%
jul-19	308,4	137,75	31	132,4	441,5	133,1	30%
TOTAL	**9036,2**	**2026,3**	**273,0**	**3184,3**	**11506,7**	**2470,6**	**21%**

3.1.4 Analysis for dwelling D4

For the calculation of Dwelling 4 electricity savings, the data were collected from November 2018 to July 2019 and has been used as a demonstration period.

Table 43: Electricity savings calculated in dwelling 4

D4	TOTAL Consumption (kWh)	Measured Days	Hours of use	HDD INDOOR Tª	Adjusted baseline consumption (kWh)	Electric Energy Saving	Percentage of energy savings
nov-18	604,9	30,0	231,5	412,1	1127,2	522,3	46%
dic-18	721,9	31,0	290,0	459,2	1264,2	542,3	43%
ene-19	864,2	31,0	332,0	533,0	1464,9	600,8	41%
feb-19	644,7	28,0	244,3	409,0	1118,4	473,7	42%
mar-19	729,4	31,0	288,8	442,2	1219,9	490,5	40%
abr-19	519,7	30,0	253,8	363,0	1004,6	484,9	48%
may-19	401,3	31,0	175,5	301,7	830,2	428,9	52%
jun-19	303,6	30,0	161,5	222,4	619,4	315,8	51%
jul-19	160,3	31,0	139,3	142,9	410,1	249,8	61%
TOTAL	**4949,9**	**273,0**	**2116,5**	**3285,5**	**9058,8**	**4108,9**	**45%**

3.1.5 Analysis for dwelling D5

3.1.5.1 D5 ELECTRICITY SUPPLY

Due to the problems of data failing to reach the platform, a demonstration period in the calculation of electricity savings in dwelling 5 of November 2018 to February 2019 has been used.

Table 44: Electricity savings calculated in dwelling 5

D5	TOTAL Consumption (kWh)	Measured Days	Hours of use	HDD INDOOR Tª	Adjusted baseline consumption (kWh)	Electric Energy Saving	Percentage of energy savings
nov-18	149,2	30,0	328,3	238,6	91,0	-58,2	-64%
dic-18	183,0	31,0	403,5	279,9	130,3	-52,7	-40%
ene-19	216,8	31,0	525,0	353,7	200,2	-16,5	-8%
feb-19	132,8	28,0	288,8	247,1	79,0	-53,8	-68%
mar-19	116,3	27,0	342,8	262,9	111,5	-4,8	-4%
TOTAL	**798,1**	**147,0**	**1888,3**	**1382,2**	**612,1**	**-186,014257**	**-30%**

3.1.5.2 D5 GAS SUPPLY

In the case of gas savings, the only data available are four gas readings between 22/11/2018 and 21/03/2019. The following gas readings are currently awaited, as it would be necessary to extend the demonstration period.

Table 45: Gas savings calculated in dwelling 5

Initial reading date	Final date reading	Consumption (m^3)	Reading days	Hours of use (h)	HDD INDOOR T	Adjusted baseline consumption (m3)	Gas Saving	Percentage of energy savings
22/11/2018	19/12/2018	46,56	27,00	267,75	264,74	93,58	47,02	50%
19/12/2018	18/01/2019	78,77	30,00	539,50	266,04	105,22	26,45	25%
18/01/2019	26/02/2019	93,17	39,00	470,00	375,98	138,36	45,19	33%
26/02/2019	21/03/2019	58,38	23,00	269,50	216,19	77,76	19,38	25%
TOTAL		276,88	119,00	1546,75	1122,95	414,92	138,05	33%

3.1.6 Analysis for dwelling D6

For the calculation of Dwelling 6 electricity savings, the data from November 2018 to February 2019 has been used as a demonstration period. Once the platform data is analyzed and corrected, the demonstrated savings period will be extended.

Table 46: Electricity savings calculated in dwelling 6

D6	TOTAL Consumption (kWh)	Measured Days	Hours of use	HDD INDOOR Tª	Adjusted baseline consumption (kWh)	Electric Energy Saving	Percentage of energy savings
nov-18	627,592	30	397,25	355,0	1009,9	382,3	38%
dic-18	731,556	31	314,25	400,3	1157,0	425,5	37%
ene-19	847,83	31	357,25	474,0	1367,7	519,9	38%
feb-19	560,574	28	191	355,7	1043,2	482,6	46%
TOTAL	**2767,552**	**120**	**1259,75**	**1585,1**	**4577,8**	**1810,3**	**40%**

3.1.7 Analysis for dwelling D7

The data collected in the DEXMA platform are not coherent (for example, there are negative consumptions, etc.). There was internal failure in some of Opendomo's devices that Opendomo corrected when the data arrived at its platform. SinCeO2 is helping DEXMA solve this problem as soon as possible due to the importance of the data collected after the renovations for calculating the energy savings. DEXMA has indicated that once the problem solved, the data can be corrected and used in the calculation.

3.1.8 Analysis for dwelling D8

For the calculation of Dwelling 8 electricity savings, the data from November 2018 to July 2019 has been used as a demonstration period.

Table 47: Electricity savings calculated in dwelling 8

D8	ENERGY MEASURED (kWh)	MEASURED DAYS	Hours of use	HDD INDOOR Tª	EBL Consumption (kWh)	Electric Energy Saving	Percentage of energy savings
dic-18	696,6	19,0	210,5	386,1	1967,0	1270,4	65%
ene-19	1345,6	31,0	409,8	459,9	2233,3	887,7	40%
feb-19	1033,8	28,0	350,0	342,9	1620,9	587,1	36%
mar-19	1033,6	31,0	531,8	369,1	1644,8	611,1	37%
abr-19	615,3	30,0	442,3	292,2	1273,3	657,9	52%
may-19	505,3	31,0	405,3	228,6	939,4	434,1	46%
jun-19	489,0	30,0	267,0	153,1	607,4	118,4	19%
jul-19	256,8	21,0	175,8	79,9	269,5	12,7	5%
TOTAL	**5976,1**	**221,0**	**2792,3**	**2311,7**	**10555,5**	**4579,4**	**43%**

3.1.9 Analysis for dwelling D9

For the calculation of Dwelling 9 electricity savings, the data from November 2018 to February 2019 has been used as a demonstration period. Once the platform data is analyzed and corrected, the demonstrated savings period will be extended.

Table 48: Electricity savings calculated in dwelling 9

D9	TOTAL Consumption (kWh)	Measured Days	Hours of use	HDD INDOOR Tª	Adjusted baseline consumption (kWh)	Electric Energy Saving	Percentage of energy savings
nov-18	632,882	30	531,5	263,8	714,7	81,8	11%
dic-18	670,362	31	574	305,9	799,8	129,4	16%
ene-19	797,184	31	611,5	379,7	945,4	148,2	16%
feb-19	698,996	28	472,5	270,5	735,9	36,9	5%
TOTAL	**2799,424**	**120**	**2189,5**	**1220,0**	**3195,8**	**396,4**	**12%**

3.2 ECONOMIC SAVINGS

For the calculation of the economic savings, since the updated invoices are not available, an estimate of the saving has been made with the official energy data of United Kingdom (Eurostats database). So the savings shown are not really those obtained by Places for People, but an estimate. When the updated rates of Places for People are available, the savings calculations will be updated.

The tariff of electricity in United Kingdom in the domestic sector is 18 GBP per 100 kWh (Eurostat database).

The tariff of gas in United Kingdom in the domestic sector is 4,6 GBP per 100 kWh (Eurostat database).

The average change during the savings calculation period from GBP to euros has been excerpted from the ECB website: EUR 1 = GBP 0.8872 -0.00093 (-0.1%)

Table 49: Economic gas and electricity savings (GBP)

		ELECTRIC							GAS					
DWELLING	Supplies	Period	Adjusted Electric Baseline Energy (kWh)	Reporting period measured electric energy (kWh)	Electric savings or avoided energy consumption (kWh)	PV production	Electric savings (%)	Electrical Economic savings (GBP)	Period	Adjusted Gas Baseline Energy (kWh)	Reporting period measured Gas energy (kWh)	Gas savings or avoided energy consumption (kWh)	Gas (%)	Economic gas savings (GBP)
D1	Electric and gas	nov 18 - jul 19	886,0	1.277,8	-391,8	517,7	14%	£ 22,65	nov 18 - apr 19	10.451,5	16.117,6	-5.666,1	-54%	-£ 260,64
D2	Electric	nov 18 - jul 19	10.253,2	6.570,4	3.682,7	517,7	41%	£ 756,07		-	-	-		-
D3	Electric	nov 18 - jul 19	11.506,7	9.036,2	2.470,6	517,7	26%	£ 537,88		-	-	-		-
D4	Electric	nov 18 - jul 19	9.058,8	4.949,9	4.108,9	517,7	51%	£ 832,79		-	-	-		-
D5	Electric and gas	nov 18 - mar 19	612,1	798,1	-186,0	102,8	-14%	-£ 14,98	nov 18 - apr 19	4.854,6	3.239,5	1.615,1	33%	£ 74,30
D6	Electric	nov 18 - feb 19	4.577,8	2.767,6	1.810,3	50,0	41%	£ 334,85		-	-	-		-
D8	Electric	dec 18 - jul 19	10.555,5	5.976,1	4.579,4	504,6	48%	£ 915,13		-	-	-		-
D9	Electric	nov 18 - feb 19	3.195,8	2.799,4	396,4	50,0	14%	£ 80,34		-	-	-		-

Table 50: Economic gas and electricity savings (€)

		ELECTRIC							GAS					
DWELLING	Supplies	Period	Adjusted Electric Baseline Energy (kWh)	Reporting period measured electric energy (kWh)	Electric savings or avoided energy consumption (kWh)	PV production	Electric savings (%)	Electrical Economic savings (€)	Period	Adjusted Gas Baseline Energy (kWh)	Reporting period measured Gas energy (kWh)	Gas savings or avoided energy consumption (kWh)	Gas (%)	Economic gas savings (€)
D1	Electric and gas	nov 18 - jul 19	886,0	1.277,8	-391,8	517,7	14%	25,42 €	nov 18 - apr 19	10.451,5	16.117,6	-5.666,1	-54%	- 294,64 €
D2	Electric	nov 18 - jul 19	10.253,2	6.570,4	3.682,7	517,7	41%	848,48 €		-	-	-		-
D3	Electric	nov 18 - jul 19	11.506,7	9.036,2	2.470,6	517,7	26%	603,63 €		-	-	-		-
D4	Electric	nov 18 - jul 19	9.058,8	4.949,9	4.108,9	517,7	51%	934,57 €		-	-	-		-
D5	Electric and gas	nov 18 - mar 19	612,1	798,1	-186,0	102,8	-14%	- 16,81 €	nov 18 - apr 19	4.854,6	3.239,5	1.615,1	33%	83,99 €
D6	Electric	nov 18 - feb 19	4.577,8	2.767,6	1.810,3	50,0	41%	375,77 €		-	-	-		-
D8	Electric	dec 18 - jul 19	10.555,5	5.976,1	4.579,4	504,6	48%	1.026,97 €		-	-	-		-
D9	Electric	nov 18 - feb 19	3.195,8	2.799,4	396,4	50,0	14%	90,16 €		-	-	-		-

3.3 ENERGY SAVINGS CALCULATION CONCLUSIONS

The monitored dwellings in Padiham, show a saving in electricity consumption between 14% and 51%, except in dwelling D5 where there was an increase in consumption of 14%.

The electricity over-consumption of dwelling D5 may be due to the so-called "rebound effect". The rebound effect occurs when an increase in energy efficiency does not translate into the expected energy savings because there is a reduction in the cost of the energy service affected, which ends up resulting in a greater demand for it, compensating for all or part of the savings derived from greater efficiency

In the case of D1 there is an important overconsumption, but it has been verified that the interior conditions of use of the house have been modified, with an increase in the interior temperature. To this end, the monitored indoor temperature of dwelling 1 during the month of January 2017 (before the renovations) and the indoor temperature during the month of January 2019 (after the improvements) have been compared.

The graph shows how the indoor temperature has increased, which means that they have consumed more energy for heating.

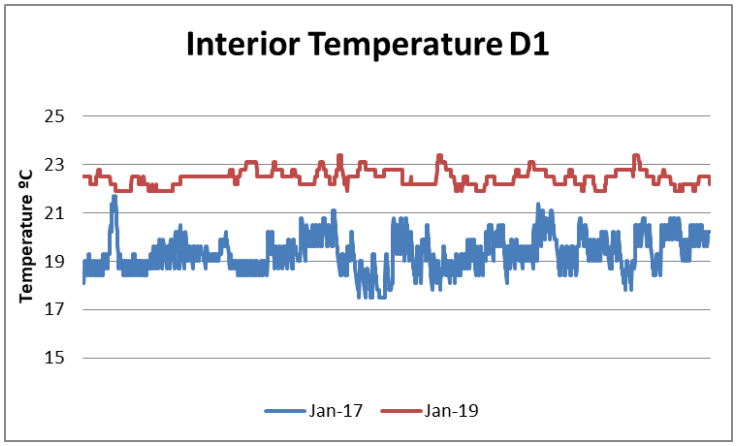


Figure 9: Comparison of indoor temperature D1 between January 2017 and January 2019

In the following graph, the same comparative of interior temperature in D4 housing is shown, where an electricity saving of 51% has been obtained. It is observed how the setpoint temperature of the interior of the house has decreased with respect to the year 2017.

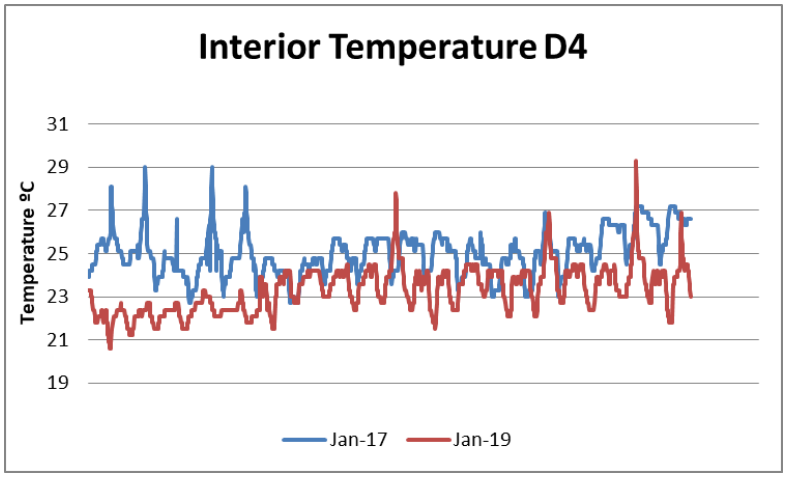


Figure 10: Comparison of indoor temperature D4 between January 2017 and January 2019

It is important to note that in dwellings D5, D6 and D9 a sufficient demonstration period has not been used due to lack of data. Only the months between November 2018 and February 2019 have been used. According to the IPMVP protocol, the demonstration period must cover at least one normal operating cycle of the installation or equipment, to achieve a complete characterization of the effectiveness of the savings in all normal operating conditions. In the rest of the dwellings, there is a broader demonstration period that allows characterizing the behaviour of household consumption. The demonstration time used ran from November 1, 2018 to July 31, covering winter and summer months.

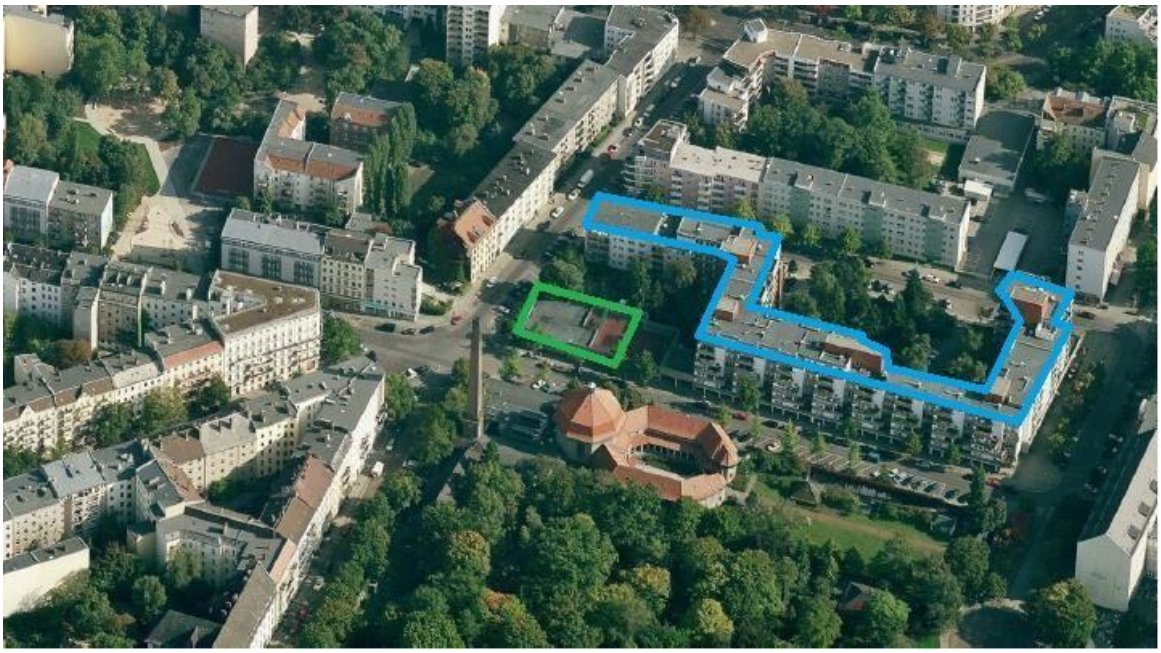
In the case of electricity baselines, there is a calculation error due to regression calculations ranging from 0.01% to 4% of the adjusted reference consumption, so that the savings are within the uncertainty range. The error of saving calculations is that of the regression calculation performed to obtain each baseline. As an approximate reference, the R^2 value of each baseline calculation has been used.

In the case of natural gas savings, they are within a range of uncertainty ranging from 0,5% to 9%, of the adjusted reference consumption. The value of R^2 has been used to calculate this error.

4 ENERGY PERFORMANCE NETTELBECKPLATZ- 1892 BUILDING BEFORE RENOVATION

4.1 INITIAL INFORMATION

The residential area of Nettelbeckplatz was developed as a result of a fundamental renewal of a former workers' area in the 1970s. Consequently, the traditional buildings with 7 nested backyards and a total of 300 flats were gradually demolished and the local residents moved into the newly build modern communal housing complex. The latter (marked blue on the below picture) is a meander-shaped and partly-terraced condominium with 7 floors and an open courtyard. The complex includes 164 social flats with 1-4 rooms and has a parking lot with 45 parking spaces. Thanks to numerous common rooms inside the house, as well as rest zones and playgrounds outside, the condominium offers free-time options for all age groups.



Aerial view

New building *Existing building*

From a demographic point of view, the residential area of Nettelbeckplatz is characterized by an ageing population. Although initially, there were mainly families with small children who moved in, today 40% of the residents are older people living alone, or couples in the age range of 65 and more. This quota of elderly people is much higher than in other communal housing complexes, or generally in Berlin as a whole. This is also a reason to redesign the area in a way that will make it both more accessible and suitable for the needs of elderly people.

4.2 ENERGY SAVINGS CALCULATION

The calculation of the heating, DHW and electricity baseline of the common areas of the 6 buildings as a whole has been made from the consumption data provided by the building owner (an annual consumption from 2009 to 2016). 2009 data are not included because we could not find historical data of external temperature of that year.. As there is no monitored data before the renovations, the calculated baselines have less precision than in the rest of the pilots. This is due to the fact that, as indicated in the IPMVP (Measurement and Verification Protocol), if the invoices are used, it should be taken into account that the performance of the measuring equipment of the supply company is usually not as high as the of Measurement and Verification. Sometimes invoices usually have estimated data,. Sometimes, you can't tell with the invoices if the data is estimated or real. The best way to carry out a measurement and verification plan is to measure before and after renovations.

4.2.1 District Heating System (Heating Thermal Consumption)

To calculate the thermal savings in heating, a baseline has been established with the consumption provided by 1892 (from 2010 to 2016) as a dependent variable. As an independent variable that affects consumption, the annual heating degree days from 2010 to 2016 have been used.

The resulting baseline is:

Annual Thermal Consumption Heating (kWh)= 278,41*(Annual HDD 17º) - 86.803

With this equation, and considering that the annual HDD 17^{o}C of 2019 will be the same as in 2018, an **adjusted thermal heating consumption of 634.000 kWh** has been obtained.

On the other hand, to measure the thermal consumption of reference heating only measures are available from January 30th until now. It has been estimated what will be the consumption of the whole year 2019.

For this, another baseline has been established, which relates the consumption of the heating months that have been measured, with the heating day degrees corresponding to said months.

The resulting baseline is:

Thermal Consumption Heating (kWh) = 228,23*(Monthly HDD 17º)-866,02

From this equation, a **heating consumption in 2019 of 525.499 kWh** has been estimated.

With all this, and considering:

Thermal Heating Saving (kWh): Adjusted baseline consumption (kWh) –Thermal Consumption Heating 2019 (kWh)

A **heating thermal consumption saving** of **108.501 kWh** has been established.

Table 51: Thermal Consumption Heating Pasewalker 7 (HDD 17) savings calculation

PASEWALKER 7 SAVINGS CALCULATION					
	Thermal Consumption Heating (kWh)	HDD 17	Adjusted baseline consumption (kWh)	Thermal Consumption Heating (kWh)Saving	Percentage of energy savings
2019	525.499	2.589	634.000	108.501	17%

To calculate the thermal savings in heating of Pasewalker 8 the same methodology has been carried out.

In Pasewalker 8, the established baseline is:

Annual Thermal Consumption Heating (kWh)= 103,24*(Annual HDD 17º)+128.606

With this equation, and considering that the annual HDD 17ºC of 2019 will be the same as in 2018, an **adjusted thermal heating consumption of 395.894 kWh** has been obtained.

On the other hand, to measure the thermal consumption of reference heating only measures are available from February 20th until now. It has been estimated what will be the consumption of the whole year 2019.

For this, another baseline has been established, which relates the consumption of the heating months that have been measured, with the heating day degrees corresponding to said months.

The resulting baseline is:

Thermal Consumption Heating (kWh) = 86,204*(Monthly HDD 17º)+1.482,7

From this equation, a **heating consumption in 2019 of 228.805 kWh** has been estimated.

With all this, and considering:

Thermal Heating Saving (kWh): Adjusted baseline consumption (kWh) –Thermal Consumption Heating 2019 (kWh)

A **heating thermal consumption saving** of **167.089 kWh** has been established.

Table 52: Thermal Consumption Heating Pasewalker 8 (HDD 17) savings calculation

PASEWALKER 8 SAVINGS CALCULATION					
	Thermal Consumption Heating (kWh)	HDD 17	Adjusted baseline consumption (kWh)	Thermal Consumption Heating (kWh)Saving	Percentage of energy savings
2019	228.805	2589	395.894	167.089	42%

4.2.2 District Heating System (Hot Water Thermal Consumption)

The following table shows the thermal savings of domestic hot water. It cannot be guaranteed that they are real savings since with the available data it has not been possible to establish a baseline of energy behaviour. Savings have been calculated by comparing the consumption of 2019 with the reference consumption (for 2016).

The static factor that affects the consumption of domestic hot water is the number of users.

The information available regarding the occupancy of the buildings is the number of unoccupied homes, but not the number of users. There is only data of the rental contract partner, but not of other people who live there (for example, children).

Table 53: Number of unoccupied dwellings

Year	Number of unoccupied dwellings
2010-12-31	3
2011-12-31	1
2012-12-31	3
2013-12-31	1
2014-12-31	0
2015-12-31	2
2016-12-31	1
2017-12-31	8

To calculate the real savings, it would be necessary to know the number of users of each building per year, from 2010 to 2016, which is not available.

DHW data available from the building PS7 since May 13th, 2019 (In January 2019 we detected a broken cable in our installation and the new cable was correctly installed in that date).

Table 54: Hot water Thermal Consumption Pasewalker 6 and 7 savings calculation

Hot Water Thermal Pasewalker 6 and 7	
Annual hot water thermal consumption Pasewalker 6 and 7 reporting period (m^3)	2.546
Reference hot water thermal consumption 2016 (m^3)	2.102
Savings calculation (m^3)	-444
Savings calculation (%)	**-21%**

DHW data available from the building PS8 since March 3rd, 2019 (This is because the integration of this device in the thermal router concentrator in DEXCell was not carried out until this date).

Table 55: Hot water Thermal Consumption Pasewalker 8 savings calculation

Hot Water Thermal Pasewalker 8	
Annual hot water thermal consumption Pasewalker 8 reporting period (m^3)	683
Reference hot water thermal consumption 2016 (m^3)	1.311
Savings calculation (m^3)	628
Savings calculation (%)	**48%**

4.2.3 Communal Electricity Consumption

Only three months of measurement are available (June, July and August 2019), as mentioned above, the consumption reference values that are available are annual, so it is necessary to extrapolate the measure to one year. It has been proven that consumption remains constant throughout the months, so it is possible to extrapolate the consumption to a year in a simple way.

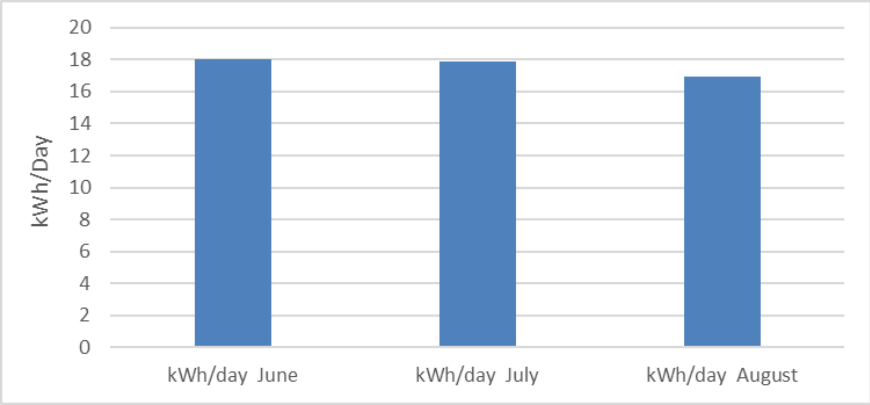


Figure 11: kWh / day obtained in each of the measurement months in Adolfstr.3

Table 56: Electricity Consumption Adolfstrase 3 savings calculation

Adolfstase 3	
Annual electric consumption Adolfstase 3 reporting period (kWh)	6.423
Reference electric consumption 2016 (kWh)	32.862
Savings calculation (kWh)	26.439
Savings calculation (%)	**80%**

Table 57: Electricity Consumption Adolfstrase 2 savings calculation

Adolfstase 2	
Annual electric consumption reporting period (kWh)	6.744
Reference electric consumption 2016 (kWh)	12.687
Savings calculation (kWh)	5.943
Savings calculation (%)	**47%**

Table 58: Electricity Consumption Pasewalker Str 7 (Main Meter) savings calculation

	Pasewalker Str 7 Main Meter
Annual electric consumption reporting period (kWh)	9.254
Reference electric consumption 2016 (kWh)	29.733
Savings calculation (kWh)	20.479
Savings calculation (%)	**69%**

Table 59: Electricity Consumption Pasewalker Str 7 (Meeting Room Meter) savings calculation

	Meeting Room Meter Pasewalker Str 7
Annual electric consumption reporting period (kWh)	3.241
Reference electric consumption 2016 (kWh)	3.937
Savings calculation (kWh)	696
Savings calculation (%)	**18%**

The electricity consumption data monitored in the Pasewalker 8 building, were downloaded on site on September 3, 2019. Therefore, the demonstrative saving period of this building includes the months of June, July, August and two days of September.

Table 60: Electricity Consumption Pasewalker Str 8 (Main Meter) savings calculation

	Pasewalker Str 8 Main Meter
Annual electric consumption reporting period (kWh)	6.624
Reference electric consumption 2016 (kWh)	12.894
Savings calculation (kWh)	6.270
Savings calculation (%)	**49%**

In the case of the Adolfstrase 1 building, data are only available from September 4, the day on which the transformers were connected to the main switch lines.

4.3 ECONOMIC SAVINGS

As a price to calculate the economic savings, 21.042 Cent / kWh net was used, data provided by 1892. This is the electricity bill of one meter in the Nettelbeckplatz in 2018. The electricity rate is the same for all meters. The price is always the same regardless of time or consumption.

A price of 6.13 euros / m^3 has been estimated to calculate the economic savings of domestic hot water consumption. It has been established from the data provided by 1892 (with all consumption data from 2009 to 2016), dividing the cost of consumption in 2016 by the consumption of domestic hot water (m^3). To calculate the economic savings of the heating system, a price of 0.08 euros / kWh has been estimated, in the same way as for the thermal price of domestic hot water.

Table 61: Summary energy and economic savings in Berlin

Typology (*)	Measured electric power	Reference electric consumption (kWh)	Annual electric consumption reporting period (kWh)	Electric savings or avoided energy consumption (kWh)	Electric savings (%)	Economic savings (€)	Measured thermal power	Reference thermal consumption	Annual thermal consumption reporting period	Thermal savings or avoided energy consumption	Thermal savings (%)	Economic savings (€)
PWS7	AR1-PWS7-Main Meter	29.733	9.254	20.479	69%	4.309,09 €	Heating Thermal Consumption (kWh)	634.000	525.499	108.501	17%	8.245,88 €
	AR2-PWS7-Meeting Room	3.937	3.241	696	18%	146,42 €	Domestic Hot Water (PSW 6 and 7) (m^3)	2.102	2.546	-444	-21%	- 2.724,12 €
ADS3	AR1-ADS3-Main Meter	32.862	6.423	26.439	80%	5.563,30 €						
ADS2	AR1-ADS2-Main Meter	12.687	6.744	5.943	47%	1.250,52 €						
ADS 1	AR1-ADS1-Main Meter	11.313	5.256	6.057	54%	1.274,47 €						
PWS8	AR1-PWS8-Main Meter	12.894	6.624	6.270	49%	1.319,31 €	Heating Thermal Consumption (kWh)	395.894	228.805	167.089	42%	12.698,44 €
						- €	Domestic Hot Water (m3)	1.311	683	628	48%	3.849,98 €

*In the calculation of savings the photovoltaic generation is not included

4.4 ENERGY SAVINGS CALCULATION CONCLUSIONS

Significant savings in electricity supply were obtained, (in one case, up to 80% savings). This is because the savings are calculated in the common areas of the buildings, where all the lighting has been changed to LEDs. The elevators have also been replaced. That is, the energy efficiency improvements made in the Berlin pilot directly affect the consumption that has been measured.

It is important to note that in the case of electricity consumption and domestic hot water consumption, the calculated energy saving is not real. As previously mentioned, there is no annual information (from 2010 to 2016) of variables that affect these consumptions, such as the number of inhabitants. So it was not possible to calculate a baseline. The savings have been calculated based on the reference consumption (electricity consumption and domestic hot water in 2016).

In addition, only a few months of measurement are available, so it has had to extrapolate consumption to one year.

With the works (modernization of windows and additional roof insulation) that have been carried out the district heating has achieved a thermal saving in heating of 17% and 42% in Pasewalker 7 and Pasewalker 8, respectively.

5 GENERAL CONCLUSIONS

5.1 MONITORING INSTALLATION

The conclusions drawn from the installation carried out in the three pilots of the DREEAM project are:

- Field visits are absolutely necessary to have a complete understanding of buildings and tenants.
- Key success factor for implementing a monitoring kit:
  - Well-prepared information for tenants
  - Involvement of building manager
  - Collaboration with local electrician for the installation of the equipment
  - Tenant engagement
- In anticipation of possible failures in the communication due to the lack of 3G coverage in a location, as has happened in Padiham and Berlin, the following actions must be carried out:
  - Configure the communications router with a 'reconnect' option automatically every time they lose the connection. This way it won't be necessary to ask the BO to restart the monitoring equipment manually.
  - Provide enough internal memory into the equipment to not lose data during periods of lack of communication.

- To avoid possible damage to installed monitoring equipment, it is recommended to carry out the installation always one year before the renovations, or if this can be possible, once all the renovations work are finished. And always the BOs should inform the contracted companies for the renovations that the equipment should not touch.
- The process of installation has been discussed and designed by Savills & SinCeO2 in a real empathetic and human centred approach. The conclusion is that with the right approach and comprehensive interactions with tenants, tenants are willing to participate in such procedures as the installation of monitoring equipment.
- If well explained by the experts, tenants understand very well why the data monitoring is so important for the quality of the methodology to estimate the efficiency of the technical interventions during renovations. Some tenants are experts themselves and are very interested to receive the results of both the energy consumption monitoring and the energy efficiency assessment.

5.2 BASELINE CALCULATION AND ENERGY SAVINGS.

Regarding the calculation of energy savings, during this project it has been considered:

- To obtain a baseline that is as close to reality as possible, must have as much data as possible, which is why we monitor and not only perform the calculation based on the bills.
- To minimize errors in the calculation of savings, we have to make sure that the measured data is correct. For this we ask for the corresponding bills for the same period. This also helps us to complete the lack of data.
- If a test group is selected to meausure energy taking into account the occupancy level of dwellings, it is important that the number of tenants is not altered in that test group during the whole project. If it altered, notify it as soon as possible to be able to take it into account in the calculation of the baselines.
- Try to collect the greatest number of changes in the factors that can affect the consumption of a dwelling in the qualitative interviews after the renovations to make the corresponding adjustments in the calculated savings.
- Help solve possible incidents in the monitoring of comfort conditions of dwellings, as these data will also help us make adjustments in the calculated savings.
- In order to calculate the energy savings of the dwellings, a non-routine type adjustment (IPMVP methodology) should be included in the baseline equation. This type of adjustment is due to parameters that influence energy and are not expected to change over time: size of the installation, design and operation of existing equipment, number of work shifts or type of occupants. The possible changes experienced by these static variables have to be monitored throughout the demonstration period of savings.

- The number of occupants and the floor areas of the dwellings are factors that affect their energy consumption. Factors such as the consumption habits of each tenant and their awareness of the use of resources also have an influence.

5.3 RESULTS OF SAVINGS OBTAINED

In the Treviso pilot the following results have been obtained:

Table 62: Economic gas and electricity savings in Treviso

TOWER A TREVISO			Electricity (kWh)	%	Gas (kWh)	%
REPORTING PERIOD	may-19	June 2019				
ADJUSTED BASELINE ENERGY (kWh)			9.814	39%	15.373	61%
REPORTING PERIOD MEASURED ENERGY (kWh)			9.155	48%	9.733	52%
SAVINGS OR AVOIDED ENERGY CONSUMPTION (kWh)			659		5.640	
ECONOMIC SAVINGS (€)			**142,37 €**		**535,79 €**	
TOTAL ELECTRIC SAVING (%)			**7%**		**37%**	

TOWER B TREVISO			Electricity (kWh)	%	Gas (kWh)	%
REPORTING PERIOD	November 2018	June 2019				
ADJUSTED BASELINE ENERGY (kWh)			22.491	11%	178.321	89%
REPORTING PERIOD MEASURED ENERGY (kWh)			21.413	19%	90.815	81%
SAVINGS OR AVOIDED ENERGY CONSUMPTION (kWh)			1.079		87.506	
ECONOMIC SAVINGS (€)			**232,96 €**		**8.313,05 €**	
TOTAL ELECTRIC SAVING (%)			**5%**		**49%**	

- A saving of the electricity consumption of 7% and a saving in the consumption of gas of 37% has been obtained in the dwellings in tower A.
- A saving of the electricity consumption of 5% and a saving in the consumption of gas of 49% had been obtained in the dwellings in tower B.
- It is important to note that in Tower A a sufficient demonstration period has not been used due to lack of data. Only the months of May, June and July of 2019 have been used since the renovations ended in the month of April 2019. According to the International Performance Measurement and Verificaion Protocol (IPMVP), the demonstration period must cover at least one normal operating cycle of the installation or of the equipment, to achieve a complete characterization of the effectiveness of savings in all normal operating conditions. In the case of Tower B, there is a broader demonstration period that allows characterizing the behaviour of household consumption. The demonstration time used goes from November 1, 2018 to July 31, covering winter and summer months.
- In homes where savings are not achieved and there is an overconsumption, it may be due to the so-called "rebound effect" or because they have such low consumption compared to other homes, that any change in the activity of the tenants can mean An important consumption.
- The percentage differences between the electricity and gas savings obtained in both towers are due to the fact that the renovations undertaken have a lower impact on the electricity consumption of the buildings. The generation of the photovoltaic system has an effect on the electricity savings of the common areas, but today, it is not in operation.

- In the case of electricity baselines, there is a calculation error due to regression calculations ranging from 0.11% to 9% of the adjusted reference consumption, so that the savings are within the uncertainty range. The error of saving calculations is that of the regression calculation performed to obtain each baseline. As an approximate reference, the R^2 value of each baseline calculation has been used.
- In the case of natural gas savings, they are within a range of uncertainty ranging from 0.1% to 10%, of the adjusted reference consumption. The value of R^2 has been used to calculate this error.

In the Padiham pilot the following results have been obtained:

- The monitored dwellings in Padiham, show a saving in electricity consumption between 14% and 51%, except in dwelling D5 where there was an increase in consumption of 14%.
- The electricity over-consumption of dwelling D5 may be due to the so-called "rebound effect". The rebound effect occurs when an increase in energy efficiency does not translate into the expected energy savings because there is a reduction in the cost of the energy service affected, which ends up resulting in a greater demand for it, compensating for all or part of the savings derived from greater efficiency
- In the case of D1 there is an important overconsumption, but it has been verified that the interior conditions of use of the house have been modified, with an increase in the interior temperature. To this end, the monitored indoor temperature of dwelling 1 during the month of January 2017 (before the renovations) and the indoor temperature during the month of January 2019 (after the improvements) have been compared.
- It is important to note that in dwellings D5, D6 and D9 a sufficient demonstration period has not been used due to lack of data. Only the months between November 2018 and February 2019 have been used. According to the IPMVP protocol, the demonstration period must cover at least one normal operating cycle of the installation or equipment, to achieve a complete characterization of the effectiveness of the savings in all normal operating conditions. In the rest of the dwellings, there is a broader demonstration period that allows characterizing the behaviour of household consumption. The demonstration time used ran from November 1, 2018 to July 31, covering winter and summer months.
- In the case of electricity baselines, there is a calculation error due to regression calculations ranging from 0.01% to 4% of the adjusted reference consumption, so that the savings are within the uncertainty range. The error of saving calculations is that of the regression calculation performed to obtain each baseline. As an approximate reference, the R^2 value of each baseline calculation has been used.
- In the case of natural gas savings, they are within a range of uncertainty ranging from 0,5% to 9%, of the adjusted reference consumption. The value of R^2 has been used to calculate this error.

Table 63: Economic gas and electricity savings in Padiham

		ELECTRIC							GAS					
DWELLING	Supplies	Period	Adjusted Electric Baseline Energy (kWh)	Reporting period measured electric energy (kWh)	Electric savings or avoided energy consumption (kWh)	PV production	Electric savings (%)	Electrical Economic savings (€)	Period	Adjusted Gas Baseline Energy (kWh)	Reporting period measured Gas energy (kWh)	Gas savings or avoided energy consumption (kWh)	Gas (%)	Economic gas savings (€)
D1	Electric and gas	nov 18 - jul 19	886,0	1.277,8	-391,8	517,7	14%	25,42 €	nov 18 - apr 19	10.451,5	16.117,6	-5.666,1	-54%	- 294,64 €
D2	Electric	nov 18 - jul 19	10.253,2	6.570,4	3.682,7	517,7	41%	848,48 €		-	-	-		-
D3	Electric	nov 18 - jul 19	11.506,7	9.036,2	2.470,6	517,7	26%	603,63 €		-	-	-		-
D4	Electric	nov 18 - jul 19	9.058,8	4.949,9	4.108,9	517,7	51%	934,57 €		-	-	-		-
D5	Electric and gas	nov 18 - mar 19	612,1	798,1	-186,0	102,8	-14%	- 16,81 €	nov 18 - apr 19	4.854,6	3.239,5	1.615,1	33%	83,99 €
D6	Electric	nov 18 - feb 19	4.577,8	2.767,6	1.810,3	50,0	41%	375,77 €		-	-	-		-
D8	Electric	dec 18 - jul 19	10.555,5	5.976,1	4.579,4	504,6	48%	1.026,97 €		-	-	-		-
D9	Electric	nov 18 - feb 19	3.195,8	2.799,4	396,4	50,0	14%	90,16 €		-	-	-		-

In the Berlin pilot the following results have been obtained:

Table 64: Summary energy and economic savings in Berlin

Typology (*)	Measured electric power	Reference electric consumption (kWh)	Annual electric consumption reporting period (kWh)	Electric savings or avoided energy consumption (kWh)	Electric savings (%)	Economic savings (€)	Measured thermal power	Reference thermal consumption	Annual thermal consumption reporting period	Thermal savings or avoided energy consumption	Thermal savings (%)	Economic savings (€)
PWS7	AR1-PWS7-Main Meter	29.733	9.254	20.479	69%	4.309,09 €	Heating Thermal Consumption (kWh)	634.000	525.499	108.501	17%	8.245,88 €
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ADS 1	AR1-ADS1-Main Meter	11.313	5.256	6.057	54%	1.274,47 €						
PWS8	AR1-PWS8-Main Meter	12.894	6.624	6.270	49%	1.319,31 €	Heating Thermal Consumption (kWh)	395.894	228.805	167.089	42%	12.698,44 €
						- €	Domestic Hot Water (m3)	1.311	683	628	48%	3.849,98 €

*In the calculation of savings the photovoltaic generation is not included

Significant savings in electricity supply were obtained, (in one case, up to 80% savings). This is because the savings are calculated in the common areas of the buildings, where all the lighting has been changed to LEDs. The elevators have also been replaced. That is, the energy efficiency improvements made in the Berlin pilot directly affect the consumption that has been measured.

It is important to note that in the case of electricity consumption and domestic hot water consumption, the calculated energy saving is not real.

As previously mentioned, there is no annual information (from 2010 to 2016) of variables that affect these consumptions, such as the number of inhabitants. So it was not possible to calculate a baseline. The savings have been calculated based on the reference consumption (electricity consumption and domestic hot water in 2016).

With the works that have been carried out the district heating has achieved a thermal saving in heating of 17% and 42% in Pasewalker 7 and Pasewalker 8, respectively.


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