

SUNSHINE



D5.3

ANNEX

Socio-economic impact assessment

WP 5 – Test bed pilots deployment and assessment

Task 5.10 – Socio-economic assessment of the pilots

Amendment of section “Results: assessment per scenarios”

Revision: [final version]

Authors:

Mila Gascó (ESADE)

Charlotte Fernandez (ESADE)

Dissemination level	PU (public)
Contributor(s)	Mila Gascó Charlotte Fernandez
Reviewer(s)	
Editor(s)	Mila Gascó Charlotte Fernandez
Partner in charge(s)	ESADE
Due date	15/05/2016
Submission Date	06/05/2016

REVISION HISTORY AND STATEMENT OF ORIGINALITY

Revision	Date	Author	Organisation	Description
V1	04/05/2016	Charlotte Fernandez	ESADE	Annex development after data compilation
V2	05/05/2016	Mila Gascó	ESADE	Draft revision
V3	06/05/2016	Mila Gascó	ESADE	Final version

Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Moreover, this deliverable reflects only the author's views. The European Community is not liable for any use that might be made of the information contained herein.

Introduction

This document contains the additional information regarding the economic assessment of the pilots requested by the reviewers at the Review Meeting that took place on March 17th, 2016, in the city of Trento (Italy). The information included below complements the results of the deliverable D5.3 Socio-economic impact assessment “WP 5 – Test bed pilots deployment and assessment; Task 5.10 – Socio-economic assessment of the pilots”. In particular, additional details about the economic results from section “Results: assessment per scenarios” are included in this annex.

Important notes:

- The information included in the deliverable D5.3 is still valid. No changes have been made. Our previous assessments are still in place. Therefore, we reconfirm the insights provided in the body of the deliverable. What we do in the Annex is to give further details regarding numbers for the section “Results: assessment per scenarios”.
- As stated in the deliverable, pilots are heterogeneous. The characteristics of the pilots and the way they have been developed are very different (different deployment timeframes, different cost structure,...). In particular, the cost structure is highly diverse. All partners have confirmed their numbers but the heterogeneity is huge. As a result, it has been impossible to develop a comparative assessment. In the following pages, we provide numbers for each pilot and scenario but we are only able to assess economic performance on an individual basis.
- There are limitations to take into account regarding the duration of the pilots. Some pilots’ timeframe was 12 months but others had a shorter timeframe. As a consequence, generalization of the results is not possible. It is not possible to extrapolate savings for a longer period than the pilot itself, mainly because partners have not been able to provide this information (they have not been able to calculate it). However, when possible, we have included quite feasible assumptions related to the sustainability of the pilots in the short and mid-term. On top of this, costs of monitoring are not available either, since pilots have taken place in a very limited period of time and no further monitoring was considered.
- From a methodological point of view, the tables included in this Annex are built on the bases of the information collected among Sunshine’s partners who were in charge of the deployment of a pilot. The notes included after each set of tables are partners’ remarks in order to explain/justify the content of each table. An excel file with each partner’s information is attached. These are some complementary notes related to the meaning of the cells:
 - Value = the value of total consumption, for pilot building or lighting line, related to the pilot phase. it should contain a numerical value (i.e. in Kwh) with the total consumption of the pilot during the SUNSHINE piloting phase

- Measured = check flag selected if the saving are measured really against the past baselines (this imply that the above mentioned value is really driven by choice based on SUNSHINE or similar i.e. specific lighting system profile applied)
- Estimated = check flag selected if the saving are estimated against the past baselines (in this case the saving are estimated on the base on analysis of SUNSHINE monitoring baseline but are not directly measured because the actions (i.e. application of the suggestions system) has not been applied.
- Validation duration = period of the pilot phase (starting date - ending data). The pilot phase phase for validation have to be considered as the initial date from which the consumption data were available through SUNSHINE or the date from which some specific action have been applied (i.e. application of a special lighting system profile.

1 Results: assessment per scenarios

1.1 Scenario 1. Energy Maps

As stated in the deliverable, an Ecomap is a tool that does not lead to direct observation of savings. The Ecomaps are used as tools to gather information about the energy efficiency of buildings that can be used for decision-making regarding a local policy in this respect. They feed the decision-making process regarding energy efficiency. Therefore, the isolated use of Ecomaps does not lead to any energy savings. However, the Ecomap can be used as a diagnosis tool to get knowledge regarding the energy performance of a building stock. This feature is actually greatly appreciated by municipalities involved in the pilots. In some cases, the Ecomaps are even perceived as complementary tools to energy audits (see Ferrara's case and the calculation of possible savings of using Ecomap instead of Certification).

Moreover, information related to pilots in Scenario 1 cannot be processed in an aggregated way since information (number of buildings involved and type of buildings) is not comparable. Therefore, additional information of Scenario 1 and the Ecomaps is shown in the table as follows.

	Tot buildings	# buildings estimated	Tot Gwh/year (estimated)	Averaged (Kwh/m2)
Ferrara	46120	16934	3424	241
Lamia	7957	7801	479	179
Naxxar (Heating)	3267	3189	113	61
Naxxar (cooling)	3050	3050	84	48
Trento (Heating)	5727	2960	324	49
Cles (Heating)	1383	617	152	204
Val di Non (Heating)	15531	6075	632	4477
Trento (cooling)	5727	2960	384	49
Cles (cooling)	1273	543	29	23

Table 1 Scenario 1 Overview.

1.2 Scenario 2. Building Energy Awareness

This section provides additional information about Scenario 2 pilots. Information about baseline energy consumption and final energy consumption during validation is included together with an assessment of the savings obtained during or after the pilot phase. Expected results are compared with savings obtained and costs reported by pilots. For each pilot, three tables are included:

- Baseline and final energy consumption
- Expected results and savings obtained
- Costs description

A complementary analysis of Scenario 2 is included below. Tables are present for each of the pilots.

Important notes:

- The results presented here refer to the pilot phase and only to the duration of the pilot. Savings are those obtained during this, often, short period of time (between 3 and 12 months). One important feature of costs (installation costs) during this period is that they are usually extremely high in comparison with the savings during the same time frame. Unfortunately, no further information has been provided regarding future savings and costs. Therefore, it has not been possible to generalize the results.

1.2.1 Scenario 2. Complementary analysis

- **Ferrara:**

- The expected impact (see DoW) has not been met for Ferrara. There has been a quite a big difference for the DoW established a value of 15% while real results have only ranged from 2% to 6%.
- If we look at the savings obtained, they refer to the validation phase that oscillated from 2 to 12 months. There are 7 cases in which savings obtained are lower than the cost of installation reported. In fact, this is a general trend for all pilots, in which the cost of installation in the first year is almost always higher than savings obtained during the same period of time.
- However, Ferrara also presents cases in which savings are higher than costs of installation. Some of those examples are related to the fact that there were no costs of equipment related and a low effort of installation was included.
- As stated previously, probably, the cost of installation is the highest cost. However, this does not seem to condition sustainability since cost of installation happens only once. According to numbers, we can assume that, in a posterior phase, major savings might be reached.
- Finally, the isolated installment of smart meters does not mean that savings are automatically achieved. Impact is maximized when, along with the new equipment, decisions are made in order to change energy-related behaviors. Unfortunately, this information is not available in the context of Sunshine.

- **Trentino:**

- The validation duration of this pilot is 12 months.

- This partner was not able to provide data about savings obtained or costs related to the pilot. They have reported that no comparison was possible due to several facts such as several changes in the baseline consumption, very different weather settings from 2014 to 2015 and the different sources of information (see note 1 in the Trentino tabular overview section).
 - However, based on the data available, we can conclude that, in one year period, only 5 shelters reduced their energy consumption.
- **Croatia:**
 - The validation duration of this pilot is 12 months. However, HEP reported that the suggestion service did not provide measurable savings until the end of the project (see notes in the Croatia tabular overview). Therefore, results provided are only an estimate.
 - The results show that the expected results (between 15 and 20% in the DoW) happen to be higher than the estimated results obtained (10%). In this pilot, it is important to take into account the high installation costs (both in terms of equipment and effort). In fact, there is only one building (HEP ODS Elektra Zagreb, Gunduliceva) that shows estimated savings higher than reported costs.
 - In fact, although expected results had been met, the cost of installation would have been still be higher. The partner explained that HEP facilities are old and that a major challenge was isolation. This is very relevant and shows that Sunshine tools, by themselves, are not enough to reduce energy consumption. Instead, several interrelated measures need to be implemented in order to optimize energy consumption in a specific setting.
 - **Lamia:**
 - The validation period of this pilot is 12 months and the results provided were measured and validated.
 - Comparison between expected results and final results is different depending on buildings. The DoW established a 20% of savings and 3 buildings of the pilot have not met this goal (“Admin”, “Lib”, “Health care”). On the other hand, there are 2 buildings (Techn 01 and Techn 02) for which savings reported are higher than expected: 30,74% and 44,38% respectively.
 - In addition, pilots in those buildings with poorer results also show lower savings than costs. Again, this is related to the typology of the buildings in which, despite the equipment installed, energy behavior does not change automatically. In the particular case of the “Admin” building, meeting expected results would not guarantee a benefit.
 - Finally, regarding future sustainability, we will assume the cost of maintenance will be low (or, at least, it will be similar to the cost of installment – effort). If this is so, after the second year, this pilot would be sustainable.

- **Naxxar:**
 - For this pilot, the validation duration phase lasted only 3-4 months. This is a very short period of time to be assessed. Therefore, the results obtained are not generalizable to longer periods. In addition, results provided are estimated.
 - Results for the two buildings are different. There is one case (MCAST-1) in which estimated savings obtained are higher than expected results (15,9% instead of 10% expected from the DoW). However, MCAST-2 throws lower results with 6% of estimated savings.
 - For MCAST2, even if expected results were met, savings would be lower than costs.
 - From a sustainability perspective, as a common trend to most of the pilots, during the first year, savings are lower than the investment in equipment.

- **Val di Non**
 - The validation duration of this pilot is about 9 months. Therefore, the results obtained are not generalizable to longer periods.
 - Scenario 2 in Val di Non includes a leisure center and results show that the expectations from the DoW were met (10%).
 - Moreover, savings obtained for this short period of time appear to be higher than the cost of installation.
 - From a sustainability point of view, and as long as the energy management of the leisure center really makes good use of the information collected, in the mid-term, savings could still be around 10% or even higher.

A tabular overview of each pilot for Scenario 2 is included in the next section.

1.2.2 Ferrara tabular overview

BUILDING	Baseline energy consumption		Smart metering measurement		Final energy Consumption (validation phase) {1}			
	Starting date	Frequency	Starting date	Frequency	Value {3} (during validation)	Measure d	Validate d	Validati on duration {2} [months]
U.O. ENERGIA - SERV. PATRIMONIO	1/4/12	monthly bills	9/1/15	Hourly	2016	yes	yes	2
SETTORE OPERE PUBBLICHE	1/2/12	monthly bills	19/2/15	Hourly	(meter fault)	no	no	n.a.
NIDO RAMPARI S. PAOLO	1/2/12	monthly bills	24/12/14	Hourly	15299	yes	yes	14
MATERNA LA MONGOLFIERA - CASSANA	1/2/12	monthly bills	24/12/14	Hourly	17696	yes	yes	14
EX SCUOLA ELEMENTARE MIZZANA	1/2/12	monthly bills	15/1/15	Hourly	9204	yes	yes	14
ELEMENTARE MANZONI	1/2/12	monthly bills	9/1/15	Hourly	9461	yes	yes	6
BIBLIOTECA G. BASSANI	1/2/12	monthly bills	15/1/15	Hourly	852	yes	yes	1
CASA DI LUDOVICO ARIOSTO	1/2/12	monthly bills	9/1/15	Hourly	2015	yes	yes	5
SERV. SPORT + CITTA' SOSTENIBILE (EX PROT. CIVILE BAGNI DUCALI)	1/2/12	monthly bills	20/12/14	Hourly	7296	yes	yes	12
PALESTRA PONTELAGOSCURO	1/2/12	monthly bills	19/1/15	Hourly	5676	yes	yes	2
ELEMENTARE POLEDRELLI	1/2/12	monthly bills	25/9/14	Hourly	94289	yes	yes	8
MUSEO DI STORIA NATURALE	1/2/12	monthly bills	25/9/14	Hourly	117947	yes	yes	12
ELEMENTARE A. COSTA	1/2/12	monthly bills	30/12/14	Hourly	252102	yes	yes	12
PALAZZINA MARFISA	1/2/12	monthly bills	30/12/14	Hourly	121440	yes	yes	12
EX CONVENTO S.MARIA DELLA CONSOLAZIONE - COFE	1/2/12	yearly bills	30/12/14	Hourly	16175	yes	yes	12
EX CONVENTO S.MARIA DELLA CONSOLAZIONE	1/2/12	yearly bills	30/12/14	Hourly	56176	yes	yes	12

"This project is partially funded under the ICT Policy Support Programme (ICT PSP) as part of the Competitiveness and Innovation Framework Programme by the European Community" (http://ec.europa.eu/ict_psp).

- Biblioteca Medica								
EX CONVENTO S.MARIA DELLA CONSOLAZIONE - ER.GO	1/2/13	monthly bills	30/12/14	Hourly	356084	yes	yes	12
SETTORE SERVIZI DEMOGRAFICI E DECENTRAMENTO	1/2/12	monthly bills	30/12/14	Hourly	177374	yes	yes	12
Polisportiva Bociofila Comunale	1/2/12	yearly bills	30/12/14	Hourly	168127	yes	yes	12
CIRCOSCRIZIONE GIARDINO ARIANUOVA - CPF	1/2/12	monthly bills	15/1/15	Hourly	328747	yes	yes	12
PROCURA	1/2/12	monthly bills	15/1/15	Hourly	432946	yes	yes	12

Table 2. Ferrara Baseline and Energy consumption

BUILDING	Consumption reduction			Cost of installation		
	Expected from DOW [%]	Estimated {4} [%]	Estimated {5, 6} [€/year]	Equipment {7}	Effort {8}	Other costs
U.O. ENERGIA - SERV. PATRIMONIO	15%	6%	€ 226	€ 380	€ 200	€ -
SETTORE OPERE PUBBLICHE	15%	6%	€ 951	€ 380	€ 200	€ -
NIDO RAMPARI S. PAOLO	15%	6%	€ 652	€ 380	€ 200	€ -
MATERNA LA MONGOLFIERA - CASSANA	15%	6%	€ 523	€ 380	€ 200	€ -
EX SCUOLA ELEMENTARE MIZZANA	15%	6%	€ 355	€ 380	€ 200	€ -
ELEMENTARE MANZONI	15%	6%	€ 813	€ 380	€ 200	€ -
BIBLIOTECA G. BASSANI	15%	6%	€ 545	€ 380	€ 200	€ -
CASA DI LUDOVICO ARIOSTO	15%	2%	€ 58	€ 380	€ 200	€ -
SERV. SPORT + CITTA' SOSTENIBILE (EX PROT. CIVILE BAGNI DUCALI)	15%	6%	€ 534	€ 380	€ 200	€ -
PALESTRA PONTELAGOSCURO	15%	4%	€ 334	€ 380	€ 200	€ -
ELEMENTARE POLEDRELLI	15%	6%	€ 2.838	€ -	€ 100	€ -
MUSEO DI STORIA NATURALE	15%	4%	€ 1.067	€ -	€ 100	€ -
ELEMENTARE A. COSTA	15%	5%	€ 2.766	€ -	€ 100	€ -
PALAZZINA MARFISA	15%	2%	€ 388	€ -	€ 100	€ -
EX CONVENTO S.MARIA DELLA CONSOLAZIONE - COFE	15%	6%	€ 200	€ -	€ 100	€ -

EX CONVENTO S.MARIA DELLA CONSOLAZIONE - Biblioteca Medica	15%	6%	€ 696	€ -	€ 100	€ -
EX CONVENTO S.MARIA DELLA CONSOLAZIONE - ER.GO	15%	2%	€ 868	€ -	€ 100	€ -
SETTORE SERVIZI DEMOGRAFICI E DECENTRAMENTO	15%	5%	€ 1.598	€ -	€ 100	€ -
Polisportiva Bociofila Comunale	15%	4%	€ 1.336	€ -	€ 100	€ -
CIRCOSCRIZIONE GIARDINO ARIANUOVA - CPF	15%	4%	€ 3.092	€ -	€ 100	€ -
PROCURA	15%	4%	€ 3.076	€ -	€ 100	€ -

Table 3. Ferrara Expected results and savings obtained

BUILDING	Cost of installation		
	Equipment {7}	Effort {8}	Other costs
U.O. ENERGIA - SERV. PATRIMONIO	€ 380	€ 200	€ -
SETTORE OPERE PUBBLICHE	€ 380	€ 200	€ -
NIDO RAMPARI S. PAOLO	€ 380	€ 200	€ -
MATERNA LA MONGOLFIERA - CASSANA	€ 380	€ 200	€ -
EX SCUOLA ELEMENTARE MIZZANA	€ 380	€ 200	€ -
ELEMENTARE MANZONI	€ 380	€ 200	€ -
BIBLIOTECA G. BASSANI	€ 380	€ 200	€ -
CASA DI LUDOVICO ARIOSTO	€ 380	€ 200	€ -
SERV. SPORT + CITTA' SOSTENIBILE (EX PROT. CIVILE BAGNI DUCALI)	€ 380	€ 200	€ -
PALESTRA PONTELAGOSCURO	€ 380	€ 200	€ -
ELEMENTARE POLEDRELLI	€ -	€ 100	€ -
MUSEO DI STORIA NATURALE	€ -	€ 100	€ -
ELEMENTARE A. COSTA	€ -	€ 100	€ -
PALAZZINA MARFISA	€ -	€ 100	€ -
EX CONVENTO S.MARIA DELLA CONSOLAZIONE - COFE	€ -	€ 100	€ -
EX CONVENTO S.MARIA DELLA CONSOLAZIONE - Biblioteca Medica	€ -	€ 100	€ -
EX CONVENTO S.MARIA DELLA CONSOLAZIONE - ER.GO	€ -	€ 100	€ -
SETTORE SERVIZI DEMOGRAFICI E DECENTRAMENTO	€ -	€ 100	€ -
Polisportiva Bociofila Comunale	€ -	€ 100	€ -
CIRCOSCRIZIONE GIARDINO ARIANUOVA - CPF	€ -	€ 100	€ -
PROCURA	€ -	€ 100	€ -

Table 4. Ferrara Costs description

"This project is partially funded under the ICT Policy Support Programme (ICT PSP) as part of the Competitiveness and Innovation Framework Programme by the European Community" (http://ec.europa.eu/ict_psp).

Notes:

1) Validation phase indicates globally all the activities done to test that data is flowing to the central platform and the services related to Scenario 2 are performing correctly.

2) Validation duration indicates the length of the validation phase that varies from a couple of months to 12 or more depending on the pilot building.

3) Value corresponds to measured consumption (m³ of gas or thermal kWh, depending on the meter: see column D) during the validation phase.

4) Savings are estimated from the impact of the suggestion service on the average yearly consumption (4-year baseline) of each pilot building.

All estimated savings range between 4-6%, excluding 3 pilot building having an estimated saving of 2%. This is expected as these 3 buildings all keep the heating on 14h/7d as per law (two are museums, one is a student dorm).

5) Cost (€/m³ natural gas) for Gas Heating derived from HERA s.p.a. official pricing:

http://www.gruppohera.it/reti/gas/gas_cliente_finale/tariffe_ambito_anno/

6) Cost (€/kWh thermal) for District Heating derived from HERA s.p.a. official pricing:

http://www.gruppohera.it/binary/hr_clienti/preamboli/TLR_2015_gennaio_COMUNICATO.1424939127.pdf

7) Gas meters are analogic and have been equipped with 2 devices each: 1 optical reader to digitalize readings, 1 GPRS gateway (equipped with 1 data SIM each) to collect readings from reader and relay them to the server.

8) Effort cost relate to software configuration to connect each meter. For gas meters extra effort was required for on-site installation and calibration.

1.2.3 Trentino tabular overview

Trentino (TNET)	Baseline energy consumption		Smart metering measurement		Final energy Consumption (validation phase)			
	Starting date	Frequency	Starting Date	Frequency	Value (kw)	Measured	Estimated	Validation duration
shelter code		monthly			greenbutton july 2015			
MOR	nov-13	monthly	dic-14	15 min	1968	x		12 months
ALA	nov-13	monthly	dic-14	15 min	2316	x		12 months
CAV	nov-13	monthly	dic-14	15 min	4591	x		12 months
CAL	nov-13	monthly	mar-14	15 min	1129	x		12 months
ALB	nov-13	monthly	jul-14	15 min	1170	x		12 months
AND	nov-13	monthly	mar-14	15 min	832	x		12 months
CON	nov-13	monthly	mar-14	15 min	1310	x		12 months
DEN	nov-13	monthly	mar-14	15 min	1196	x		12 months
FOR	nov-13	monthly	mar-14	15 min	1554	x		12 months
PRD	nov-13	monthly	mar-14	15 min	1564	x		12 months
REV	nov-13	monthly	dic-14	15 min	1154	x		12 months
RON	nov-13	monthly	may-14	15 min	827	x		12 months
CAN	nov-13	monthly	mar-14	15 min	756	x		12 months
CAT	nov-13	monthly	mar-14	15 min	1044	x		12 months
BAP	nov-13	monthly	feb-14	15 min	967	x		12 months
BED	nov-13	monthly	dic-14	15 min	822	x		12 months
BES	nov-13	monthly	dic-14	15 min	1008	x		12 months
BEZ	nov-13	monthly	feb-14	15 min	782	x		12 months
BLI	nov-13	monthly	may-14	15 min	986	x		12 months
BRZ	nov-13	monthly	dic-14	15 min	1655	x		12 months
CLD	nov-13	monthly	mar-14	15 min	1052	x		12 months
CAS	nov-13	monthly	ago-14	15 min	1479	x		12 months
CVR	nov-13	monthly	mar-14	15 min	873	x		12 months
CHZ	nov-13	monthly	dic-14	15 min	1474	x		12 months
CIV	nov-13	monthly	may-14	15 min	944	x		12 months
COM	nov-13	monthly	mar-14	15 min	1021	x		12 months
GRI	nov-13	monthly	mar-14	15 min	1978	x		12 months
LEV	nov-13	monthly	mar-14	15 min	1566	x		12 months
MOE	nov-13	monthly	feb-15	15 min	591	x		11 months
MOC	nov-13	monthly	may-14	15 min	1249	x		12 months
MOL	nov-13	monthly	mar-14	15 min	1171	x		12 months
OSS	nov-13	monthly	mar-14	15 min	962	x		12 months
PNZ	nov-13	monthly	mar-14	15 min	807	x		12 months
POZ	nov-13	monthly	mar-14	15 min	709	x		12 months

"This project is partially funded under the ICT Policy Support Programme (ICT PSP) as part of the Competitiveness and Innovation Framework Programme by the European Community" (http://ec.europa.eu/ict_psp).

RZI	nov-13	monthly	dic-14	15 min	2692	x		12 months
SLB	nov-13	monthly	dic-14	15 min	1082	x		12 months
SMI	nov-13	monthly	mar-14	15 min	3569	x		12 months
SZE	nov-13	monthly	mar-14	15 min	1672	x		12 months
SEG	nov-13	monthly	dic-14	15 min	1144	x		12 months
SOV	nov-13	monthly	dic-14	15 min	1145	x		12 months
TAI	nov-13	monthly	mar-14	15 min	1318	x		12 months
TIO	nov-13	monthly	may-14	15 min	7097	x		12 months
VGN	nov-13	monthly	dic-14	15 min	1535	x		12 months
VOL	nov-13	monthly	abr-14	15 min	1126	x		12 months
TUE	nov-13	monthly	mar-14	15 min	1737	x		12 months
TES	nov-13	monthly	mar-14	15 min	873	x		12 months
NAG	nov-13	monthly	dic-14	15 min	1309	x		12 months
TER	nov-13	monthly	feb-14	15 min	1229	x		12 months
FAI	nov-13	monthly	dic-14	15 min	767	x		12 months
TRG	nov-13	monthly	dic-14	15 min	1093	x		12 months
GRU	nov-13	monthly	mar-14	15 min	1228	x		12 months
LAS	nov-13	monthly	feb-14	15 min	1082	x		12 months
LAV	nov-13	monthly	mar-14	15 min	2010	x		12 months

Table 5. Trentino Baseline and Energy consumption

	Expected results (DoW)	Savings	Savings in %	Savings in EUROS
Trentino (TNET)				
shelter code		Comparison of Consumption Data (July-14 - July-15) Kw		
MOR	10% (non committal)	1159	see note 1)	see note 1)
ALA	10% (non committal)	1257	see note 1)	see note 1)
CAV	10% (non committal)	105	see note 1)	see note 1)
CAL	10% (non committal)	262	see note 1)	see note 1)
ALB	10% (non committal)	450	see note 1)	see note 1)
AND	10% (non committal)	-32	see note 1)	see note 1)
CON	10% (non committal)	625	see note 1)	see note 1)
DEN	10% (non committal)	489	see note 1)	see note 1)
FOR	10% (non committal)	686	see note 1)	see note 1)
PRD	10% (non committal)	701	see note 1)	see note 1)
REV	10% (non committal)	432	see note 1)	see note 1)
RON	10% (non committal)	175	see note 1)	see note 1)
CAN	10% (non committal)	35	see note 1)	see note 1)
CAT	10% (non committal)	327	see note 1)	see note 1)

"This project is partially funded under the ICT Policy Support Programme (ICT PSP) as part of the Competitiveness and Innovation Framework Programme by the European Community" (http://ec.europa.eu/ict_psp).

BAP	10% (non committal)	16	see note 1)	see note 1)
BED	10% (non committal)	104	see note 1)	see note 1)
BES	10% (non committal)	-772	see note 1)	see note 1)
BEZ	10% (non committal)	75	see note 1)	see note 1)
BLI	10% (non committal)	34	see note 1)	see note 1)
BRZ	10% (non committal)	346	see note 1)	see note 1)
CLD	10% (non committal)	104	see note 1)	see note 1)
CAS	10% (non committal)	334	see note 1)	see note 1)
CVR	10% (non committal)	236	see note 1)	see note 1)
CHZ	10% (non committal)	670	see note 1)	see note 1)
CIV	10% (non committal)	327	see note 1)	see note 1)
COM	10% (non committal)	85	see note 1)	see note 1)
GRI	10% (non committal)	612	see note 1)	see note 1)
LEV	10% (non committal)	668	see note 1)	see note 1)
MOE	10% (non committal)	-307	see note 1)	see note 1)
MOC	10% (non committal)	351	see note 1)	see note 1)
MOL	10% (non committal)	273	see note 1)	see note 1)
OSS	10% (non committal)	64	see note 1)	see note 1)
PNZ	10% (non committal)	-91	see note 1)	see note 1)
POZ	10% (non committal)	-189	see note 1)	see note 1)
RZI	10% (non committal)	1794	see note 1)	see note 1)
SLB	10% (non committal)	184	see note 1)	see note 1)
SMI	10% (non committal)	938	see note 1)	see note 1)
SZE	10% (non committal)	774	see note 1)	see note 1)
SEG	10% (non committal)	315	see note 1)	see note 1)
SOV	10% (non committal)	461	see note 1)	see note 1)
TAI	10% (non committal)	602	see note 1)	see note 1)
TIO	10% (non committal)	457	see note 1)	see note 1)
VGN	10% (non committal)	632	see note 1)	see note 1)
VOL	10% (non committal)	384	see note 1)	see note 1)
TUE	10% (non committal)	694	see note 1)	see note 1)
TES	10% (non committal)	243	see note 1)	see note 1)
NAG	10% (non committal)	434	see note 1)	see note 1)
TER	10% (non committal)	673	see note 1)	see note 1)
FAI	10% (non committal)	306	see note 1)	see note 1)
TRG	10% (non committal)	195	see note 1)	see note 1)
GRU	10% (non committal)	664	see note 1)	see note 1)
LAS	10% (non committal)	473	see note 1)	see note 1)
LAV	10% (non committal)	743	see note 1)	see note 1)

Table 6. Trentino Expected results and savings obtained

"This project is partially funded under the ICT Policy Support Programme (ICT PSP) as part of the Competitiveness and Innovation Framework Programme by the European Community"
http://ec.europa.eu/ict_psp.

	Cost of installation: equipment	Cost of installation: effort	Other costs: please specify which and its quantification in EUROS
Trentino (TNET)			
All shelters	no equipment installed	no equipment installed	no equipment installed

Table 7. Trentino Costs description
Notes:

1) During the project the consumption baseline of the shelters has change so a comparison is not feasible; the main reason for this is that in many shelters new equipment has been activated; moreover the weather conditions in 2014 and 2015 were quite different; so 2015 consumptions are greater than 2014. 2014 measurements were taken from the bills, 2015 consumptions were measured via GreenButton and it was noted that consumption measured via Green Button are generally 10% greater than those reported in the bills making it harder to make some meaningful comparison.

1.2.4 Croatia tabular overview

Croatia	Baseline energy consumption		Smart metering measurement		Final energy Consumption (validation phase)			
	Starting date	Frequency	Starting Date	Frequency	Value	Measure	Validated	Validation duration
Upravna zgrada, ulica grada Vukovara	1/2/09	monthly	13/2/14	15 min	571840 kWh	Yes	No	1.1.2015.-31.12.2015.
Upravna zgrada, Kupska ulica	15/7/14	15 min	15/7/14	15 min	826690 kWh	Yes	No	1.1.2015.-31.12.2015.
Restoran, ulica grada Vukovara	-	-	10/3/14	15 min		Yes	No	1.1.2015.-31.12.2015.
HEP Toplinarstvo, Zagreb, Misevecka	19/2/14	15 min	19/2/14	15 min	311210 kWh	Yes	No	1.1.2015.-31.12.2015.
HEP ODS Elektra Zagreb, Gunduliceva	1/2/10	monthly	18/2/14	15 min	128763 m3	Yes	No	1.1.2015.-31.12.2015.
HEP ODS Elektra Zagreb, Izidora Krsnjavoga	1/2/10	monthly	18/2/14	15 min	44644 m3	Yes	No	1.1.2015.-31.12.2015.
HEP ODS Elektra Varazdin	1/2/10	monthly	18/2/14	15 min	101220 m3	Yes	No	1.1.2015.-31.12.2015.
HEP ODS Elektra Kriz	1/2/10	monthly	11.3.2014, 14.8.2014	15 min	29810 m3	Yes	No	1.1.2015.-31.12.2015.

Table 8. Croatia Baseline and Energy consumption

Croatia	Expected results (Dow: a %)	Expected Results (Eur)	Savings in %	Savings in EUROS
Scenario2				
Upravna zgrada, ulica grada Vukovara	15 - 20 %	3417 - 4556	10	2.278
Upravna zgrada, Kupska ulica	15 - 20 %	4940 - 6587	10	3.293
Restoran, ulica grada Vukovara	15 - 20 %	-	10	n/a
HEP Toplinarstvo, Zagreb, Misevecka	15 - 20 %	1859 - 2479	10	1.239
HEP ODS Elektra Zagreb, Gunduliceva	15 - 20 %	11799 - 15732	10	7.866
HEP ODS Elektra Zagreb, Izidora Krsnjavoga	15 - 20 %	4090 - 5454	10	2.727
HEP ODS Elektra Varazdin	15 - 20 %	9275 - 12366	10	6.183
HEP ODS Elektra Kriz	15 - 20 %	2732 - 3642	10	1.821

Table 9. Croatia Expected results and savings obtained

Croatia	Cost of installation of equipment	Cost of installation effort	Other costs: please specify which and its quantification in EUROS
Scenario2			
Upravna zgrada, ulica grada Vukovara	2.450	2.365	0
Upravna zgrada, Kupska ulica	2.472	2.387	
Restoran, ulica grada Vukovara	863	833	
HEP Toplinarstvo, Zagreb, Misevecka	2.494	2.408	
HEP ODS Elektra Zagreb, Gunduliceva	1.515	1.462	
HEP ODS Elektra Zagreb, Izidora Krsnjavoga	1.531	1.478	
HEP ODS Elektra Varazdin	3.286	3.172	
HEP ODS Elektra Kriz	5.361	5.175	
.....			
Total	19.972	19.279	

Table 10. Croatia Costs description
Notes:

- 1) Period of pilot testing is year 2015.
- 2) * Total costs includes ALL incurred costs related to installation and implementation of the service as well as monitoring and analysis of energy consumption. Therefore, the expected investment return is in approximately the third year.
- 3) Please, also note several important explanations:
 - Regarding Scenario 2, the column “expected results” represents those written in the DOW (% and Euro).
 - The suggestion service did not incur any measurable savings until the end of the project. It has become semi functional only towards the end of the project and even then it was

on and off for periods of time. Therefore, there is no measured and verified savings for scenario 2 in this moment.

- The column “savings in % and Euro” represent ESTIMATED savings. The estimations were done in order to satisfy the DOW requirements and were calculated based on HEP ESCO experience in other projects.
- Only after our last meeting in Trento it became possible to start using the suggestion service on a regular basis. The heating season is almost over due to an early spring so reliable and representative measuring can start only at autumn.

1.2.5 Lamia tabular overview

	Baseline energy consumption		Smart metering measurement		Final energy Consumption (validation phase)				
	Starting date	Frequency	Starting Date	Frequency	Value(k Wh)	Measured	Estimated	Validated	Validation duration
Techn_01	29/12/10	per month	13/1/15	per hour	224968,7191	x		x	13/1/2015 - 29/2/2016
Techn_02	29/12/10	per month	13/1/15	per hour	66349,80071	x		x	13/1/2015 - 29/2/2016
Admin	29/12/10	per month	13/1/15	per hour	49397,28973	x		x	13/1/2015 - 29/2/2016
Lib	29/12/10	per month	13/1/15	per hour	87614,59241	x		x	13/1/2015 - 29/2/2016
Health care	29/12/10	per month	13/1/15	per hour	59459,27808	x		x	13/1/2015 - 29/2/2016

Table 11. Lamia Baseline and Energy consumption

	Expected results(%)	Savings in %	Savings in EUROS
Techn_01	20	30,74	12980,01319
Techn_02	20	44,38	3828,182389
Admin	20	12,11	884,4383589
Lib	20	12,11	1568,703602
Health care	20	12,11	1064,594163

Table 12. Lamia Expected results and savings obtained

	Cost of installation: equipment	Cost of installation: effort	Other costs: please specify which and its quantification in EUROS
Techn_01	1756,876	200 €	Monitoring, support and analyses
Techn_02	1756,876	200 €	Monitoring, support and analyses
Admin	1756,876	200 €	Monitoring, support and analyses
Lib	1756,876	200 €	Monitoring, support and analyses
Health care	1756,876	200 €	Monitoring, support and analyses

Table 13. Lamia Costs description

1.2.6 Naxxar tabular overview

Scenario 2	Baseline energy consumption		Smart metering measurement		Final energy Consumption (validation phase)			
	Starting date	Frequency	Starting Date	Frequency	Value	Measured	Estimated	Validation duration
MCAST-1	1/1/12	1 month	14/3/14	15 min	(KWH) 445294		x	4 Months
MCAST-2	1/1/12	1 month	1/4/14	15 min	(KWH) 169258		x	3 Months

Table 14. Naxxar Baseline and Energy consumption

Scenario 2	Expected results	Savings in %	Savings in EUROS
MCAST-1	10%	15,90	€ 841,03
MCAST-2	10%	6,00	€ 158,27

Table 15. Naxxar Expected results and savings obtained

Scenario 2	Cost of installation: of equipment	Cost of installation: effort	Other costs: please specify which and its quantification in EUROS
MCAST-1	€ 250,00	€ 200,00	Monitoring, support and analyses
MCAST-2	€ 250,00	€ 200,00	Monitoring, support and analyses

Table 16. Naxxar Costs description

1.2.7 Val di Non tabular overview

Scenario 2	Baseline energy consumption		Smart metering measurement		Final energy Consumption (validation phase)			
	Starting date	Frequency	Starting Date	Frequency	Value	Measured	Validated	Validation duration
Leisure centre CTL Cles (TN)	Oct-13	Monthly	22/6/15	15 min	390339 KWH	YES	No	9 Months

Table 17. Val di Non Baseline and Energy consumption

Scenario 2	Expected results	Savings (%)	Savings (€)
Leisure centre CTL Cles (TN)	10% savings	10%	5.314 €

Table 18. Val di Non Expected results and savings obtained

	Cost of installation (HW)	Cost of installation: effort	Other costs: please specify which and its quantification in EUROS
Scenario 2			
Leisure centre CTL Cles (TN)	2.500 €	1.485 €	Network configuration and test (350€)

Table 19. Val di Non Costs description

1.3 Scenario 3. Remote Control of Lighting Networks

This section provides additional results about Scenario 3 pilots. Information about baseline energy consumption and final energy consumption during validation is included together with an assessment of the savings obtained during or after the pilot phase. Expected results are compared with savings obtained and costs reported by pilots. For each pilot, three tables are included:

- Baseline and final energy consumption
- Expected results and savings obtained
- Costs description

A complementary analysis of Scenario 3 is included below. Tables are present for each of the pilots.

Important notes:

- The results presented here refer to the pilot phase and only to the duration of the pilot. Savings are those obtained during this, often, short period of time (between 3 and 12 months). One important feature of costs (installation costs) during this period is that they are usually extremely high in comparison with the savings during the same time frame. Unfortunately, no further information has been provided regarding future savings and costs. Therefore, it has not been possible to generalize the results.

1.3.1 Scenario 3. Complementary analysis

- **Croatia:**

- The validation phase of this pilot is 12 months and results have been measured and verified.

- The results obtained (30% of savings) are higher than expected (between 15 and 20%, as stated in the DoW). However, the costs of installation (both equipment and effort) are as high as 6.300€. This is extremely high compared to the savings obtained (218€) for the same timeframe.
 - As a result, in the long term, sustainability might be affected. Number show that only after a high number of years, the investment will be paid off.
- **Bassano:**
 - The validation period for this pilot is only 3 months. This is a very short period of time to be assessed. Therefore, the results obtained have to take into account the high cost of equipment. This cost is extremely high and several years are needed in order to paid the investment off.
 - Costs reported are different for Piazza Guadagnin (pedestrian street) since there was an old lighting system that had to be changed whereas the two other only include the set-up of the control unit and dimming.
 - The savings obtained are higher than expected in the DoW. For Piazza Guadagnin, they are particularly high (75% versus the expected 25%). However, the cost of installation is exceedingly high. Via Monte and Via Boschetto also surpass expected savings (45% versus the expected 25%) but, again, costs for the first year are even higher.
 - From a sustainability point of view, 10 to 15 years are needed to pay the investment off (more details are provided in the Business Plan of Graphicalight. See WP7.1 Annex).
 - **Rovereto:**
 - The validation duration of this pilot is 2 months for San Giorgio and 4 months for Rot.Marco. This is a very short period of time to be assessed. Therefore, the results obtained are not generalizable to longer periods. On top of that, validation took place during summer when there is more daylight and, therefore, less energy consumption.
 - Savings are higher than expected in the DoW: 19% for San Giorgio and 21% for Rot.Marco versus the expected 14%. However, the costs of installation are very high and savings, even if higher than expected, are lower than costs.
 - The conclusion in terms of sustainability is very similar to Bassano del Grappa. Up to 10 to 15 years are needed to pay the investment.
 - **Val di Non:**
 - The validation duration of this pilot is 9 months. Moreover, it is worth mentioning that this pilot only includes one classroom. Therefore, results are not generalizable to longer periods because of the short period of measurement and validation.

- Results are higher than expected in the DoW (36% versus the expected 20%). However, once more, the cost of installation is higher than the savings for the same period of time.
- From a sustainability perspective, it is difficult to draw a conclusion. Many factors have to be taken into account: the will from the school to purchase equipment for all classrooms, the decision to change the energy management policy but, also, to take into account the amount of hours of daylight during the year in order to achieve relevant savings in this facility.

A tabular overview of each pilot for Scenario 3 is included in the next section.

1.3.2 Croatia tabular overview

Croatia	Baseline energy consumption	Smart metering	Final energy Consumption (validation phase)
Scenario3			
HEP Toplinarstvo, Zagreb, Misevecka	19/2/14 15 min	19/2/14 15 min	6843 kWh Ye s Ye s 1.1.2015.- 31.12.2015.

Table 20. Croatia Baseline and Energy consumption

Croatia	Expected results (Dow: a %)	Expected Results (Eur)	Savings in %	Savings in EUROS
Scenario3				
HEP Toplinarstvo, Zagreb, Misevecka	15 - 20 %	109 - 145	30	218

Table 21. Croatia Expected results and savings obtained

Croatia	Cost of installation of equipment	Cost of installation effort	Other costs: please specify which and its quantification in EUROS
Scenario3			
HEP Toplinarstvo, Zagreb, Misevecka	5.902	398	

Table 22. Croatia Costs description

Notes:

1) The only savings that have been measured and verified are those on Scenario 3 (marked red in the table). Measurements and verification savings have been going on for more than one year in this scenario.

1.3.3 Bassano del Grappa tabular overview

Bassano	Number LP	Baseline energy consumption		Smart metering measurement		Final energy Consumption (validation phase)			
		Starting date	Frequency	Starting Date	Frequency	Value	Measure	Validated	Validation duration
piazza Guadagnin (pedestrian street)	11	1/1/09	monthly	1/8/14	15 minutes	7864 kWh	YES		01/12/2015-29/02/2016
viale Monte Grappa (vehicular road)	40	1/1/09	monthly	1/8/14	15 minutes	9414 kWh	YES	YES	01/12/2015-29/02/2016
via Boschetto (parking Angarano)	18	1/1/09	monthly	1/8/14	15 minutes	953 kWh	YES		01/12/2015-29/02/2016

Table 23. Bassano Baseline and Energy consumption

Bassano	Expected results (DoW)	Savings in %	Savings in EUROS
Scenario3			
piazza Guadagnin (pedestrian street)	25%	75,0%	451,60 €
viale Monte Grappa (vehicular road)	25%	45,0%	175,40 €
via Boschetto (parking Angarano)	25%	45,0%	95,80 €

Table 24. Bassano Expected results and savings obtained

Bassano	Cost of installation: equipment and effort	Total Cost of installation
Scenario3		
piazza Guadagnin (pedestrian street)	650 €/LP (lighting devices + control unit 580€ + work 70€ total 650€)	7.150,00 €
viale Monte Grappa (vehicular road)	150 €/LP (control unit 120€ + work 30€ total 150€)	6.000,00 €
via Boschetto (parking Angarano)	150 €/LP (control unit 120€ + work 30€ total 150€)	2.700,00 €

Table 25. Bassano Costs description

1.3.4 Rovereto

Rovereto	Baseline energy consumption		Smart metering measurement		Final energy Consumption (validation phase)			
	Starting date	Frequency	Starting Date	Frequency	Value	Measure	Validated	Validation duration
Scenario3	17/9/13	15 minutes	17/9/13	15 minutes	19.146 kWh	Yes	Yes	01/07/2015 - 30/09/2015
San Giorgio (59 lamps)	17/9/13	15 minutes	17/9/13	15 minutes	19.146 kWh	Yes	Yes	01/07/2015 - 30/09/2015
Rot. Marco (37 lamps)	1/6/13	15 minutes	1/6/13	15 minutes	20.053 kWh	Yes	Yes	01/08/2015 - 30/11/2015

Table 26. Rovereto Baseline and Energy consumption

Rovereto	Expected results	Savings in %	Savings in EUROS
Scenario3			
San Giorgio	14%	19%	837 €
Rot. Marco	14%	21%	969 €

Table 27. Rovereto Expected results and savings obtained

Rovereto	Cost of installation: equipment	Cost of installation: effort
Scenario3		
San Giorgio	9735€ (165€ each light)	1180€ (20€ each light)
Rot. Marco	6105€ (165€ each light)	740€ ((20€ each light)

Table 28. Rovereto Costs description

1.3.5 Val di Non

Scenario	Baseline consumption	energy	Smart measurement	metering	Final energy Consumption (validation phase)			
Scenario 3								
ITET Pilati Class room	1/1/15	Yearly	5/5/15	30 min	105 KWH	YES	No	9 Months

Table 29. Val di Non Baseline and Energy consumption

Scenario	Expected results	Savings (%)	Savings (€)
Scenario3			
ITET Class room Pilati	>20% savings	36%	15 €

Table 30. Val di Non Expected results and savings obtained

Scenario	Cost of installation (HW)	Cost of installation: effort	Other costs: please specify which and its quantification in EUROS
Scenario3			
ITET Pilati Class room	1.200 €	330 €	Network configuration and test (350€)

Table 31. Val di Non Costs description