
	<p>Project no. 238889 BEST ENERGY PROJECT Built Environment Sustainability and Technology in Energy</p>	
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Project no. 238889
BEST ENERGY PROJECT
Built Environment Sustainability and Technology in Energy

Competitiveness and Innovation Framework Programme
ICT Policy Support Programme (ICT PSP)

D1.2: List of Indicators

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Organisation name of lead contractor for this deliverable: Fomento de San Sebastian

Revision [1]

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1. Introduction

The BEST Energy project concept is based on the integration of building and lighting technology and state of the art ICT technology into innovative control and monitoring systems.

The main objective of this project is to improve the energy efficiency in public buildings and street public lighting, by the ICT-based centralized monitoring and management of the energy consumption and production, and to provide decision makers with the necessary tools to be able to plan energy saving measures.

The initially quantified objective is to achieve a 12% reduction on the energy consumption of the buildings, and at least a 30% reduction of the energy consumption of the public lighting systems.

This document contains a list of indicators used by the BEST Energy project as basis for the evaluation of the impact of the project and documentation that the project fulfils the overall objectives concerning energy savings.

The methodology and the argumentation for using specific indicators are described in D1.4 where the methodology for each pilot is shown.

In section 2, a list of primary indicators that are common for the projects are listed. This is a short list containing only the most important indicators, where the buildings can be directly compared. These indicators are such for instance the yearly primary energy consumption and savings in energy consumption. These are called "success indicators".

Besides from the primary indicators, in section 3, there is a list of secondary, or "performance indicators". This list includes data that are different for each of the projects. This could for instance be the energy which is used for taking a shower.

In practice, all projects use the same list of success indicators, which allows for comparison, while the performance indicators are specific to the individual pilots and can be used to pinpoint the actual focus of the achieved energy savings.

2. List of Symbols, Indices and Units

The project terminology is defined according to the European Performance of Buildings Directive and related documents as defined in EN standards – mainly EN 15603:2008 "Energy performance of buildings – Overall energy use and definition of energy ratings".

For definition of the terms used, please also refer to EN 15603:2008.

Where no relevant standard symbol or index exists, a suitable nomenclature will be introduced.

2.1 List of Symbols

Symbol	Description
E	Energy
Q	Heating (energy)
m	Mass
η	Efficiency
L	Luminous flux
COP	Coefficient of performance
SAV	Savings
r	Ratio
COST	Economic cost in currency units

2.2 List of Indices

The following general explanations are valid for all documents if not otherwise defined, for example Index "p" in "E_p" to indicate primary energy.

Index	Description
P	Primary
del	Delivered (final) energy
b	Used (building) energy
E	Electrical



H	Heating
C	Cooling
T	Thermal
PV	Photovoltaics
Lum	Luminaries
ren	Renewable
W	Hot water
HX	Heat exchanger
rel	Relative
pool	Swimming pool
shower	Shower
€	Economic
'	Specific value (pr. m ² of net floor area in buildings)
life	Lifetime of equipment
inv	Investment cost

Index f (e.g. E_p) Primary energy

Index b (e.g. E_b) Used energy

Etc.

2.3 List of Units

Unit	Description
kWh	Energy consumption
ton(CO ₂)	Amount of CO ₂ emission related to indicator
%	Percent
–	dimensionless
m ²	Net floor area, if not mentioned otherwise
m ³	Net Volume
CO ₂	Carbon dioxide emission
€	Monetary unit

°C	Temperature
User	Number of users
Lux	Illuminance
a	year

Specific values are marked with a apostrophe, for example E_p' for the Specific annual Primary Energy consumption in $[kWh_p/(m^2a)]$.

All areas refer to the net floor area of buildings in $[m^2]$ that is the sum of the total areas of each floor less the construction area of each floor

3. List of Success Indicators

The success indicators will be used to evaluate the overall success of each pilot and replication pilot and the overall project success.

The following general explanations are valid for all documents if not otherwise defined, for example Index “p” in “ Q_p ” to indicate primary energy.

Number	Indicator	Symbol	Unit
1	Annual primary energy consumption	E_p	kWh_p/a
1a	Specific annual Primary Energy consumption	E_p'	$kWh_p/(m^2 \cdot a)$ $kWh_p/(lum \cdot a)$
2	Annual delivered electrical energy	$E_{E,f}$	kWh_f/a
2a	Specific annual delivered electrical energy	$E_{E,f}'$	$kWh_f/(m^2 \cdot a)$ $kWh_f/(lum \cdot a)$
3	Annual delivered heating energy	$Q_{h,f}$	kWh_f/a
3a	Specific annual delivered heating energy	$Q_{h,f}'$	$kWh_f/(m^2 \cdot a)$
4	Annual delivered cooling energy	$E_{c,f}$	kWh_f/a
4a	Specific annual delivered cooling energy	$E_{c,f}'$	$kWh_f/(m^2 \cdot a)$
5	Annual CO ₂ Emissions	m_{CO_2}	$ton(CO_2)/a$
5a	Specific annual CO ₂ Emissions	m_{CO_2}'	$ton(CO_2)/(m^2 \cdot a)$

Number	Indicator	Symbol	Unit
			ton(CO ₂)/(lum · a)
6	Relative reduction of CO ₂ emissions	SAV _{rel,CO2}	%
7	Relative energy savings in primary energy	SAV _{rel,Ep}	%
8	Energy cost savings using actual local energy prices	SAV _€	€/a
8a	Relative energy cost savings using actual local energy prices	SAV _{rel,€}	%

4. List of secondary Indicators

The secondary indicators will be used to analyse in detail the success of the implemented measures in each pilot and pilot replication. The list of indicators is where this is possible defined according to the European Performance of Buildings Directive and national implementations.

If, in the progress of the project, other indicators than those stated here are needed these indicators will be introduced according to standard definitions and included in the relevant documents describing the pilot or replication. Conversely, if any indicators mentioned in the list below prove to be dysfunctional, they will be removed based on a documented need to do so.

The cost related indicators are used according to the amortization method defined in the German VDI 6025–1996.

4.1 Overall list of secondary indicators

Number	Indicator	Symbol	Unit	(used by)
S1	Thermal Efficiency of Boilers	η_T	%	B1
S2	Cogeneration Electric Efficiency	η_E	%	B1
S3	Cogeneration Thermal Efficiency	η_T	%	B1
S4	Swimming Pools Thermal Consumption	Q _{T,pool}	kWh/user	B1



Number	Indicator	Symbol	Unit	(used by)
S5	Swimming pool electric consumption	$Q_{E,pool}$	kWh/user	B1
S6	Shower useful Energy	$Q_{b,shower}$	kWh/user	B1
S7	Hot water consumption	E_w	m ³ /user	B1
S8	Coefficient of performance of a cooling system	COP_C	–	B2
S9	Electrical Energy Savings	$SAV_{,Rel,E}$	%	L2
S10	Energy cost per luminaire	$COST_{E,Lum}$	€/ Lum	L2
S11	Luminous flux per energy consumption	L_E	Lux/kWh	L2
S12	CO ₂ reduction cost per ton	$COST,SAV_{,CO_2}$	€/ton(CO ₂)	L2
S13	Electricity generated by renewable (PV cells)	E_{PV}	kWh	R1.2
S14	Ratio of waste heat utilization (heat recovery system)	r_{HX}	%	R1.2
S15	Energy used for heating	$E_{H,b}$	kWh/m ²	R2.1
S16	Energy used for cooling	$Q_{C,b}$	kWh/m ²	R2.1
S17	Share of local renewable energy for heating	$r_{H,ren}$	%	R2.1
S18	Share of local renewable energy for cooling	$r_{C,ren}$	%	R2.1



4.2 Distribution of secondary indicators

Indicator	B1	B2	L1	L2	R1.1	R1.2	R2.1
1	x						
2	x						
3	x						
4	x						
5	x						
6	x						
7	x						
8		x					
9				X			
10				X			
11				X			
12				X			
13						x	
14						X	
15							X
16							X
17							X
18							X