

TESTING PROTOCOL

ASSESSMENT REPORT

Version 2.0

Date: 18-10-2018

2.1: To raise capacity for better management of energy in public buildings at transnational level

Work package: WP3 TESTING

Activity: 3.3 Test of transnational assessment methods and indicators

Deliverable: 3.3.2 – Pilot Testing Result – PP5 Government of Catalonia

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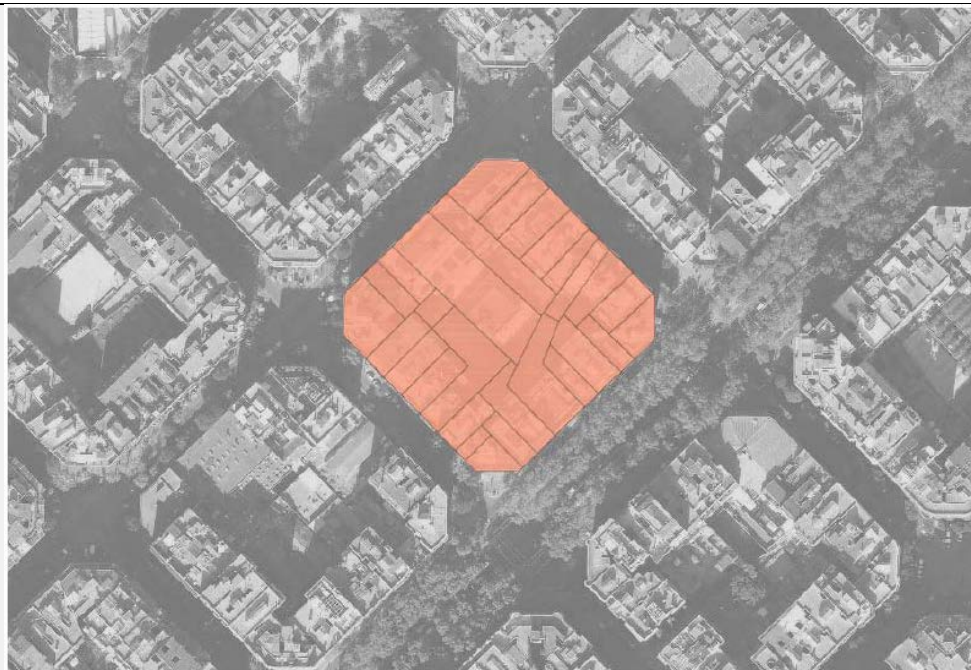
URBAN SCALE ASSESSMENT

1. INITIATION

General information on the selected urban area

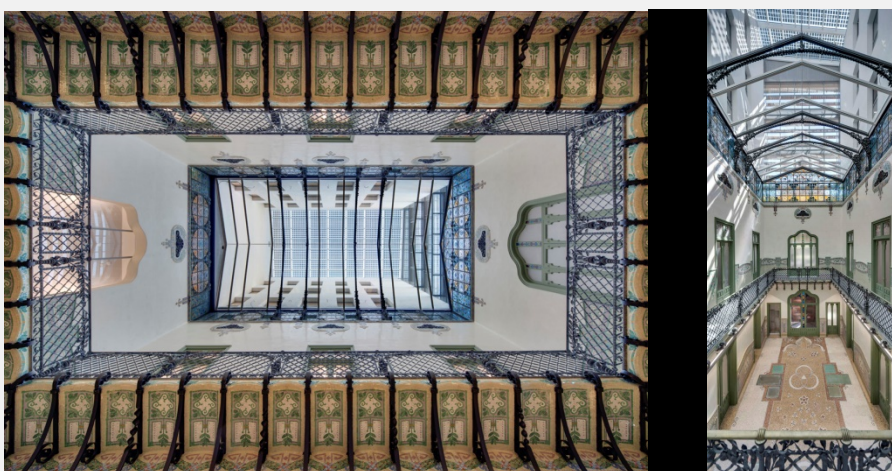
City	Barcelona Experimental area: Illa Eficient
Brief description	Barcelona is located on the northeast coast of the Iberian Peninsula, facing the Mediterranean Sea, on a plain approximately 5 km wide limited by the mountain range of Collserola, the Llobregat river to the southwest and the Besòs river to the north. This plain covers an area of 170 km ² of which 102 km ² are occupied by the city itself. It is 120 kilometres south of the Pyrenees and the Catalan border with France. Experimental area is delimited by the streets Gran Via de les Corts Catalanes, Calàbria, Diputació and Viladomat. This block belongs the Eixample district.
Size (ha)	City area of Barcelona is 102,15 km ² Experimental area: 1,3ha
Residential population	Barcelona has a population of 1.61 million. In the catchment area of the city live about 3.24 million people (2017). Population density is approx. 15,748 inhabitants / km ² . The city district with the largest area (21.50 km ²) is Sants-Montjuïc, the district with the largest population is Eixample with 263,000 inhabitants Experimental area: 766 residents
Average building density (total m ² /land surface m ²)	Experimental area: the building density is 0,637 (building surface / land surface)
Plan of the urban area	





Significant pictures

Buildings in Gran Via de les Corts Catalanes Street



Housing Agency of Catalonia. Back façade with film solar photovoltaic system



Presentation of the Master Plan



Estimation of implementation of Photovoltaic systems on roof.



Description of the adjacent areas	<i>The Eixample was designed as an extension of the historic old town of Barcelona as the city's population swelled in the 19th century. Urban planners needed to find a solution to the housing crisis and resulting sanitary risks, and so conceived of this grid-pattern neighborhood of modern houses, which would connect with the then-independent villages Sarrià and Gràcia.</i> <i>As a result, many of the houses in the Eixample date back to the 19th and early 20th century, when the architectural movement known as Catalan Modernism was in full swing. Leading Modernists such as Antoni Gaudí, Lluís Domènech i Montaner, and Josep Puig i Cadafalch all have buildings in the Eixample.</i> <i>The wide roads of the Eixample are lined with restaurants, bars, and shops, which are mostly frequented by local residents. However, as the Eixample is such a large district there are distinct neighborhoods or areas within it. The experimental area, Illa Eficient, is found at east of the district.</i>
Property ownership	<i>The predominant use of the block is the residential one, in buildings of 5 or 6 floors, with 2 or 4 flats in each floor, and with tertiary use in the ground floor. There are 27 urban estates: 22 are residential, 1 is an office, 1 hotel, 1 Public Administration building, and 2 municipal health's buildings.</i>
Social and economic context	<i>Inhabitants are living on the block, they correspond worker class.</i> <i>The action proposes the energy and comfort conditions improving without modify the social class of the neighborhood.</i>
Legal /administrative boundary lines	<i>The experimental area belongs the neighborhood Nova Esquerra Eixample, which is part of the Eixample District of Barcelona.</i> <i>Not administrative boundary lines exist due to all neighborhoods and districts follow the same administrative rules of Barcelona city.</i>
Energy supply infrastructure	<i>The city of Barcelona has covered the supply of water, gas and electricity in all areas.</i>
Relevance of the surrounding infrastructures	<i>Not relevant</i>
Reference stakeholders in retrofit process	<i>Not relevant</i>
Other significant information	<i>Not relevant</i>



2. PREPARATION

a. SNTTool structure

In this section it is described the structure of your SNTTool.

Please, enter here the list of the criteria selected from the CESBA MED Generic Framework at Urban scale.

Please remember that KPIs are mandatory.

A- BUILT URBAN SYSTEMS	
A1	Urban Structure and Form
A1.2	<i>Urban compactness.</i>
A1.4	<i>Residential density.</i>
A1.7	<i>Conservation of Land.</i>

B- ECONOMY	
B1	Economic Structure and Value
B1.1	<i>Affordability of housing property..</i>
B1.2	<i>Affordability of housing rental.</i>
B2	Economic activity
B2.5	<i>Economic contribution from tourism activity.</i>
B3	Cost and Investment
B3.2	<i>Public contribution in residential retrofitting investments.</i>
B3.3	<i>Operating energy costs for public buildings.</i>

C- ENERGY	
C1	Non-renewable energy
C1.1	<i>Total final thermal energy consumption for building operations.</i>
C1.4	<i>Total final electrical energy consumption for building operations.</i>
C1.7	<i>Total primary energy demand for building operations.</i>
C1.10	<i>Primary energy for heating - residential buildings.</i>
C1.12	<i>Primary energy for cooling - residential buildings.</i>
C1.20	<i>Energy consumption of public lighting.</i>
C2	Renewable and Decarbonised energy
C2.1	<i>Share of renewable energy on-site, on total final energy consumptions for buildings operation.</i>
C2.4	<i>Share of renewable energy on-site, on total primary energy consumptions for buildings operation.</i>
C2.7	<i>Share of electric energy generation from on-site renewable sources on final electric energy.</i>

D- ATMOSPHERIC EMISSIONS	
D1	Atmospheric emissions
D1.2	<i>GHG emissions from energy used for all purposes in building operations.</i>



E- NON - RENEWABLE RESOURCES

E1	Potable water, stormwater and greywater.
E1.6	<i>Consumption of potable water for residential population.</i>
E1.7	<i>Consumption of potable water for non-residential building systems.</i>
E2	Solid and Liquid Wastes
E2.1	<i>Solid waste and recycling collection points.</i>

F- ENVIRONMENT

F1	Environmental impacts
F1.3	<i>Recharge of groundwater through permeable paving or landscaping.</i>
F2	Outdoor environmental quality
F2.3	<i>Ambient air quality with respect to particulates <10 µm (PM10) over a one-year period.</i>
F2.10	<i>Ambient daytime noise conditions.</i>
F2.11	<i>Ambient night-time noise conditions.</i>
F3	Ecosystems and landscapes
F3.1	<i>Green zones & recreation areas availability.</i>
F3.2	<i>Green zones & recreation areas accessibility.</i>
F3.3	<i>Green zones & recreation areas density.</i>

G- SOCIAL ASPECTS

G1	Safety and Accessibility
G1.4	<i>Ease of access to and use of public transport for physically disabled persons.</i>
G2	Traffic and Mobility Services
G2.1	<i>Performance of the public transport service.</i>
G2.4	<i>Quality of pedestrian and bicycle network.</i>
G4	Public and private facilities and services
G4.2	<i>Availability and proximity of key public human services.</i>
G6	Management and community involvement
G6.3	<i>Community involvement in urban planning activities.</i>



b. SNTTool criteria selection rationale

In this section PPs must motivate the selection of the criteria that have been included in the SNTTool. Why the criterion has been included? The reason could depend on regional policies, targets, specific characteristics of the territory (i.e. touristic area, agricultural area, etc....).

A- BUILT URBAN SYSTEMS	
CRITERION	REASON/MOTIVATION
A1.2 Urban compactness	Assess the current use of the land
A1.4 Residential density	Assess the population density in the area to avoid great density zones
A1.7 Conservation of Land	Mandatory KPI

B- ECONOMY	
CRITERION	REASON/MOTIVATION
B1.1 Affordability of housing property	Assess the ratio between the income of the residents and the properties price to avoid an increase price
B1.2 Affordability of housing rental	Assess the ratio between the income of the residents and the rental price to avoid an increase price
B2.5 Economic contribution from tourism activity.	Assess the income from tourism activity in the area
B3.2 Public contribution in residential retrofitting investments.	Assess the public investment
B3.3 Operating energy costs for public buildings.	Mandatory KPI

C- ENERGY	
CRITERION	REASON/MOTIVATION
C1.1 Total final thermal energy consumption for building operations.	Mandatory KPI
C1.4 Total final electrical energy consumption for building operations.	Mandatory KPI
C1.7 Total primary energy demand for building operations.	Mandatory KPI
C1.10 Primary energy for heating - residential buildings.	Assess the ratio of the thermal consumption for heating in residential buildings
C1.12 Primary energy for cooling - residential buildings.	Assess the ratio of the electric consumption for heating in residential buildings
C1.20 Energy consumption of public lighting.	Assess the energy consumption of the public lighting systems and the ratio between energy consumption and resident
C2.1 Share of renewable energy on-site, on total final energy consumptions for buildings operation.	Mandatory KPI
C2.4 Share of renewable energy on-site, on total primary energy consumptions for buildings operation.	Mandatory KPI
C2.7 Share of electric energy generation from on-site renewable sources on final electric energy.	Mandatory KPI



D- ATMOSPHERIC EMISSIONS	
CRITERION	REASON/MOTIVATION
D1.2 GHG emissions from energy used for all purposes in building operations.	<i>Mandatory KPI</i>

E- NON - RENEWABLE RESOURCES	
CRITERION	REASON/MOTIVATION
E1.6 Consumption of potable water for residential population.	<i>Mandatory KPI</i>
E1.7 Consumption of potable water for non-residential building systems.	<i>Mandatory KPI</i>
E2.1 Solid waste and recycling collection points.	<i>Assess the availability of the recycling collection points for the residents in the area</i>

F- ENVIRONMENT	
CRITERION	REASON/MOTIVATION
F1.3 Recharge of groundwater through permeable paving or landscaping.	<i>Mandatory KPI</i>
F2.3 Ambient air quality with respect to particulates <10 µm (PM10) over a one-year period.	<i>Mandatory KPI</i>
F2.10 Ambient daytime noise conditions.	<i>Assess the day noise level in the area to avoid</i>
F2.11 Ambient night-time noise conditions.	<i>Assess the night noise level in the area</i>
F3.1 Green zones & recreation areas availability.	<i>Assess the availability of green zones</i>
F3.2 Green zones & recreation areas accessibility.	<i>Assess the accessibility of green zones</i>
F3.3 Green zones & recreation areas density.	<i>Assess the ratio between the green areas and the gross area</i>

G- SOCIAL ASPECTS	
CRITERION	REASON/MOTIVATION
G1.4 Ease of access to and use of public transport for physically disabled persons.	<i>Assess the reduction and elimination the architectonic barriers to access the public transport</i>
G2.1 Performance of the public transport service.	<i>Mandatory KPI</i>
G2.4 Quality of pedestrian and bicycle network.	<i>Mandatory KPI</i>
G4.2 Availability and proximity of key public human services.	<i>Mandatory KPI</i>
G6.3 Community involvement in urban planning activities.	<i>Mandatory KPI</i>



c. SNTTool weights rationale

In this section PPs must motivate the value of weights assigned to issues, categories and criteria. Why the weight of a particular issue or criterion is higher (or lower)? Weights should reflect the regional political priorities.

ISSUES WEIGHTS

ISSUE	WEIGHTING FACTOR (1 to 3)	MOTIVATION
A- BUILT URBAN SYSTEMS	1	This is an existing neighborhood and therefore there is not much scope of action to influence behavior improvement (for the case of Barcelona). Consultation with Local Committee Members
B- ECONOMY	2	Economically unsustainable cities. This point is important to improve it. Consultation with Local Committee Members
C- ENERGY	3	This is a strategic axis with greater opportunity for action and improvement of results and directly linked to CO ₂ emissions to reduce in the Climate and energy framework 2030. It is considered top priority. Consultation with Local Committee Members
D- ATMOSPHERIC EMISSIONS	3	It is the environmental consequence of issue C. This axis closely linked to the axis C, with the same impact and possibilities of action (Climate and energy framework 2030). It is considered top priority. Consultation with Local Committee Members
E- NON - RENEWABLE RESOURCES	1	It is a consolidated neighborhood where there is little opportunity to promote the use of sustainable materials in new construction. What may have more weight of this axis is the use of drinking water, that it is a limited resource, to guarantee the minimum possible consumption. Consultation with Local Committee Members
F- ENVIRONMENT	3	It is very important due to directly affect the health of people. It is considered top priority. Consultation with Local Committee Members
G- SOCIAL ASPECTS	2	It is not considered priority, although it is important because it takes into consideration the relationship of people with that studied area. Consultation with Local Committee Members



CATEGORIES WEIGHTS

Note: the categories weight results automatically from the criteria level

CATEGORIES	WEIGHT (%)
A1- Urban Structure and Form	100
A2- Transportation Infrastructure	0
TOTAL	100
B1- Economic Structure and Value	40
B2- Economic activity	20
B3- Cost and Investment	40
TOTAL	100
C1- Non-renewable energy	66,67
C2- Renewable and Decarbonised energy	33,33
C3- Energy recycling and storage	0
TOTAL	100
D1- Atmospheric emissions	100
TOTAL	100
E1- Potable water, stormwater and greywater	66,67
E2- Solid and Liquid Wastes	33,33
E3- Resource consumption, retention and maintenance	0
TOTAL	100
F1- Environmental impacts	14,29
F2- Outdoor environmental quality	42,86
F3- Ecosystems and landscapes	42,86
TOTAL	100
G1- Safety and Accessibility	20
G2- Traffic and Mobility Services	40
G3- Communication services	0
G4- Public and private facilities and services	20
G5- Local Food	0
G6- Management and community involvement	20
G7- Society, Culture and Heritage	0
G8- Perceptual	0
TOTAL	100

CRITERIA WEIGHTS

CESBA MED GF-U, sheet WeightsA: B= Impact of the Potential Effect (1-3), C=Extent of potential effect (1-5), D=Duration of potential effect (1-5)

CESBA MED SNTTool, sheet WeightsB: LF = Local Factor

A- BUILT URBAN SYSTEMS						
A1- Urban Structure and Form						
CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
A1.2	1,94	3	2	4	1	Confirmed
A1.4	1,94	3	2	4	1	Confirmed
A1.7	2,58	2	4	4	1	Consultation with Local Committee Members
TOTAL	6,46					



B- ECONOMY

B1- Economic Structure and Value

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
B1.1	2,91	3	2	3	1	Confirmed
B1.2	1,94	3	2	2	1	Confirmed

B2- Economic activity

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
B2.5	1,29	2	2	2	1	Confirmed

B3- Cost and Investment

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
B3.2	1,94	3	2	2	1	Confirmed
B3.3	0,97	3	2	1	1	Consultation with Local Committee Members
TOTAL	9,05					

C- ENERGY

C1- Non-Renewable energy

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
C1.1	1,45%	2	3	3	1	Consultation with Local Committee Members
C1.4	2,18%	3	3	3	1	Consultation with Local Committee Members
C1.7	1,45%	2	3	3	1	Consultation with Local Committee Members
C1.10	2,42%	3	5	2	1	Confirmed
C1.12	2,42%	3	5	2	1	Confirmed
C1.20	0,81%	1	5	2	1	Confirmed

C2- Renewable and Decarbonised energy

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
C2.1	4,36	2	3	3	1	Consultation with Local Committee Members
C2.4	2,91	2	2	3	1	Confirmed
C2.7	8,72	3	4	3	1	Consultation with Local Committee Members
TOTAL	26,74					

D- ATMOSPHERIC EMISSIONS

D1- Atmospheric emissions

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
D1.2	7,3	2	5	3	1	Consultation with Local Committee Members
TOTAL	7,27					

E- NON-RENEWABLE RESOURCES

E1- Potable water, storm water and greywater

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
E1.6	0,97	3	4	1	1	Consultation with Local Committee Members
E1.7	0,97	3	4	1	1	Consultation with Local Committee Members

E2- Solid and liquid wastes

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
E2.1	1,94	2	2	2	1	Confirmed
TOTAL	7,27					



F- ENVIRONMENT

F1- Environmental impacts

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
F1.3	5,82	2	4	3	1	Consultation with Local Committee Members

F2-

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
F2.3	10,90	3	3	5	1	Consultation with Local Committee Members
F2.10	4,36	3	2	3	1	Confirmed
F2.11	4,36	3	2	3	1	Confirmed

F3-

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
F3.1	1,94	2	2	2	1	Confirmed
F3.2	1,94	2	2	2	1	Confirmed
F3.3	1,94	2	2	2	1	Confirmed
TOTAL	31,26					

G- SOCIAL ASPECTS

G1- Safety and Accessibility

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
G1.4	1,94	2	2	3	1	Confirmed

G2- Traffic and mobility services

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
G2.1	1,94	3	3	2	1	Consultation with Local Committee Members
G2.4	5,82	3	4	3	1	Consultation with Local Committee Members

G4- Public and private facilities and services

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
G4.2	5,17	2	4	4	1	Consultation with Local Committee Members

G6- Management and community involvement

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
G6.3	0,48	1	3	1	1	Consultation with Local Committee Members
TOTAL	15,35					



d. SNTool benchmarks rationale

In this section PPs must motivate the value of benchmarks assigned to the different criteria for score zero (minimum acceptable performance) and for score 5 (excellent and ideal performance). The value of indicators corresponding to score zero is usually depends on regulations, standards or a typical performance in the region. Please keep in mind that score 3 represents a best practice performance. Score 5 is an excellent performance.

A- URBAN STRUCTURE AND FORM				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	RATIONALE
A1.2	Urban compactness	m ³ /m ²	0: 10	Minimum value
			5: 40	Increase the urban compactness in the area according to the Urban planning
A1.4	Residential density	pp/ha	0: 125	--
			5: 350	Reduce the residential density in the area according to the Urban planning
A1.7	Conservation of Land	%	0: 4	Minimum value desired
			5: 15	Increase the green zones in the area according to the Urban planning

B- ECONOMY				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	RATIONALE
B1.1	Affordability of housing property	%	0: 30	--
			5: 20	Maximum value desired
B1.2	Affordability of housing rental.	%	0: 30	--
			5: 20	Maximum value desired
B2.5	Economic contribution from tourism activity.	€/resident	0: 250	--
			5: 1000	--
B3.2	Public contribution in residential retrofitting investments.	%	0: 40	--
			5: 25	--
B3.3	Operating energy costs for public buildings.	€/m ² /y	0: 20	Maximum value desired
			5: 10	Passive or NZEB Building



C- ENERGY				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	RATIONALE
C1.1	Total final thermal energy consumption for building operations.	kWh/m ² /y	0: 75	Maximum value desired
			5: 20	Passive or NZEB Building
C1.4	Total final electrical energy consumption for building operations.	kWh/m ² /y	0: 70	Maximum value desired
			5: 20	Passive or NZEB Building
C1.7	Total primary energy demand for building operations.	kWh/m ² /y	0: 225	Maximum value desired
			5: 70	Minimum value desired
C1.10	Primary energy for heating - residential buildings.	%	0: 100	Local minimum value
			5: 70	Value desired
C1.12	Primary energy for cooling - residential buildings.	%	0: 100	Local minimum value
			5: 60	Value desired
C1.20	Energy consumption of public lighting.	kWp/pp	0: 50	Current index
			5: 20	Value desired
C2.1	Share of renewable energy on-site, on total final energy consumptions for buildings operation.	%	0: 25	Value desired
			5: 90	Passive or NZEB Building
C2.4	Share of renewable energy on-site, on total primary energy consumptions for buildings operation.	%	0: 30	Value desired
			5: 80	Passive or NZEB Building
C2.7	Share of electric energy generation from on-site renewable sources on final electric energy.	%	0: 15	Value desired
			5: 75	Passive or NZEB Building

D- ATMOSPHERIC EMISSIONS				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	RATIONALE
D1.2	GHG emissions from energy used for all purposes in building operations.	kg CO ₂ eq /m ² /y	0: 30	Current value
			5: 10	Passive or NZEB Building



E- NON-RENEWABLE RESOURCES				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	RATIONALE
E1.6	<i>Consumption of potable water for residential population.</i>	m ³ /occupant/ year	0: 150	Average regional value
			5: 40	Maximum value desired
E1.7	<i>Consumption of potable water for non-residential building systems.</i>	m ³ / m ²	0: 15	Average regional value
			5: 5	Maximum value desired
E2.1	<i>Solid waste and recycling collection points.</i>	%	0: 75	--
			5: 95	Value desired

F- ENVIRONMENT				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	RATIONALE
F1.3	<i>Recharge of groundwater through permeable paving or landscaping.</i>	%	0: 20	Minimum value desired
			5: 70	Maximum value desired
F2.3	<i>Ambient air quality with respect to particulates <10 mu (PM10) over a one-year period.</i>	days/year	0: 15	Maximum value desired
			5: 11	Minimum value desired
F2.10	<i>Ambient daytime noise conditions.</i>	%	0: 30	Maximum value desired
			5: 10	Minimum value desired
F2.11	<i>Ambient night-time noise conditions.</i>	%	0: 20	Maximum value desired
			5: 5	Minimum value desired
F3.1	<i>Green zones & recreation areas availability.</i>	m ² /inh	0: 5	Minimum value desired
			5: 50	Maximum value desired
F3.2	<i>Green zones & recreation areas accessibility.</i>	m	0: 500	Minimum value desired
			5: 100	Maximum value desired
F3.3	<i>Green zones & recreation areas density.</i>	%	0: 20	Minimum value desired
			5: 50	Maximum value desired



G- SOCIAL ASPECTS				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	RATIONALE
G1.4	<i>Ease of access to and use of public transport for physically disabled persons.</i>	%	0: 60	--
			5: 100	Current value
G2.1	<i>Performance of the public transport service.</i>	%	0: 30	--
			5: 100	Current value
G2.4	<i>Quality of pedestrian and bicycle network.</i>	m / 100 inhabitants	0: 20	--
			5: 80	--
G4.2	<i>Availability and proximity of key public human services.</i>	%	0: 30	--
			5: 80	--
G6.3	<i>Community involvement in urban planning activities.</i>	Level	0: 0	Degrees of tokenism: Information / Consultation / Placation (in the Arnstein ladder).
			5:5	Degrees of citizen power: Partnership, delegated power and citizen power (in the Arnstein ladder), at every stages.



e. SNTool Criteria Specifications

In this section PPs must indicate for each selected criterion:

- *Information source:* The source of the data/information that will be used to characterize the value of the indicator. Example: monitored data, measured data, statistic data, models and simulation, studies, data banks, etc.
- *Assessment method:* Short and concise description of the assessment method used to verify the value of indicators. Example: calculation steps, data analysis process, monitoring procedure, content of a study, use of statistic data, etc.
- *Standards:* technical documents taken as reference for the assessment method.

A- BUILT URBAN SYSTEMS

CRITERION	INDICATOR	SPECIFICATIONS	
A1.2	Urban compactnes	Information source	Master Plan and Cadastre
		Assessment method	According its factsheet in the SN-Tool
		Standard	Urban planning
A1.4	Residential density.	Information source	Master Plan and Cadastre
		Assessment method	According its factsheet in the SN-Tool
		Standard	Urban planning
A1.7	Conservation of Land.	Information source	Master Plan and Cadastre
		Assessment method	According its factsheet in the SN-Tool
		Standard	Urban planning

B- ECONOMY

CRITERION	INDICATOR	SPECIFICATIONS	
B1.1	Affordability of housing property..	Information source	Statistical data from Barcelona council
		Assessment method	According its factsheet in the SN-Tool
		Standard	Report ERD 2016 of Barcelona council Report 76 of Barcelona council
B1.2	Affordability of housing rental.	Information source	Statistical data from Barcelona council
		Assessment method	According its factsheet in the SN-Tool
		Standard	Report ERD 2016 of Barcelona council Report 76 of Barcelona council



B2.5	<i>Economic contribution from tourism activity.</i>	Information source	Statistical data from Barcelona council
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA
B3.2	<i>Public contribution in residential retrofitting investments.</i>	Information source	Statistical data from Barcelona council
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA
B3.3	<i>Operating energy costs for public buildings.</i>	Information source	Bills
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA

C- ENERGY

CRITERION	INDICATOR	SPECIFICATIONS	
C1.1	<i>Total final thermal energy consumption for building operations.</i>	Information source	Master plan (surveys) and bills
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA
C1.4	<i>Total final electrical energy consumption for building operations.</i>	Information source	Master plan (surveys) and bills
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA
C1.7	<i>Total primary energy demand for building operations.</i>	Information source	Master plan (surveys) and bills
		Assessment method	According its factsheet in the SN-Tool
		Standard	IDEA, coefficients of primary energy passage of different final energy sources consumed
C1.10	<i>Primary energy for heating - residential buildings.</i>	Information source	Master plan
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA
C1.12	<i>Primary energy for cooling - residential buildings.</i>	Information source	Master plan
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA



C1.20	Energy consumption of public lighting.	Information source	Statistical data from Barcelona council
		Assessment method	According its factsheet in the SN-Tool
		Standard	Municipal regulations
C2.1	Share of renewable energy on-site, on total final energy consumptions for buildings operation.	Information source	Master plan and bills
		Assessment method	According its factsheet in the SN-Tool
		Standard	Municipal regulations
C2.4	Share of renewable energy on-site, on total primary energy consumptions for buildings operation.	Information source	Master plan and bills
		Assessment method	According its factsheet in the SN-Tool
		Standard	Municipal regulations
C2.7	Share of electric energy generation from on-site renewable sources on final electric energy.	Information source	Master plan and bills
		Assessment method	According its factsheet in the SN-Tool
		Standard	Municipal regulations

D- ATMOSPHERIC EMISSIONS

CRITERION	INDICATOR	SPECIFICATIONS	
D1.2	GHG emissions from energy used for all purposes in building operations.	Information source	Master plan and bills
		Assessment method	According its factsheet in the SN-Tool
		Standard	Factor GHG Emissions by Government of Catalonia

E- NON-RENEWABLE RESOURCES

CRITERION	INDICATOR	SPECIFICATIONS	
E1.6	Consumption of potable water for residential population.	Information source	Master plan (surveys)
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA



E1.7	Consumption of potable water for non-residential building systems.	Information source	Master plan (surveys) and bills
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA
E2.1	Solid waste and recycling collection points.	Information source	Master plan
		Assessment method	According its factsheet in the SN-Tool
		Standard	Municipal regulations

E- NON-RENEWABLE RESOURCES

CRITERION	INDICATOR	SPECIFICATIONS	
F1.3	Recharge of groundwater through permeable paving or landscaping.	Information source	Google earths images
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA
F2.3	Ambient air quality with respect to particulates <10 mu (PM10) over a one-year period.	Information source	Statistical data from Barcelona council
		Assessment method	According its factsheet in the SN-Tool
		Standard	Municipal regulations
F2.10	Ambient daytime noise conditions.	Information source	Statistical data from Barcelona council
		Assessment method	According its factsheet in the SN-Tool
		Standard	Municipal regulations
F2.11	Ambient night-time noise conditions.	Information source	Statistical data from Barcelona council
		Assessment method	According its factsheet in the SN-Tool
		Standard	Municipal regulations
F3.1	Green zones & recreation areas availability.	Information source	Statistical data from Barcelona council and Google earth images
		Assessment method	According its factsheet in the SN-Tool
		Standard	Municipal regulations
F3.2	Green zones & recreation areas accessibility.	Information source	Statistical data from Barcelona council and Google earth images
		Assessment method	According its factsheet in the SN-Tool
		Standard	Municipal regulations



F3.3	Green zones & recreation areas density.	Information source	Statistical data from Barcelona council and Google earth images
		Assessment method	According its factsheet in the SN-Tool
		Standard	Municipal regulations

G- SOCIAL ASPECTS

CRITERION	INDICATOR	SPECIFICATIONS	
G1.4	Ease of access to and use of public transport for physically disabled persons.	Information source	Statistical data from Barcelona council
		Assessment method	According its factsheet in the SN-Tool
		Standard	Mobility plan
G2.1	Performance of the public transport service.	Information source	Google maps
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA
G2.4	Quality of pedestrian and bicycle network.	Information source	Statistical data from Barcelona council
		Assessment method	According its factsheet in the SN-Tool
		Standard	Mobility plan
G4.2	Availability and proximity of key public human services.	Information source	Google maps
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA
G6.3	Community involvement in urban planning activities.	Information source	Master plan
		Assessment method	According its factsheet in the SN-Tool
		Standard	NA



3. DIAGNOSIS

a. Performance scores

*Evaluation of the actual performance and relative level of sustainability of the urban area.
PPs have to indicate the scores reached.*

	SCORE
A – BUILT URBAN SYSTEMS	
A1 - Urban Structure and Form	
A1.2 Urban compactness	2,62
A1.4 Residential density	5,00
A1.7 Conservation of Land	-1,00
B - Economy	
B1 - Economic Structure and Value	
B1.1 Affordability of housing property	-1,00
B1.2 Affordability of housing rental	-1,00
B2 - Economic activity	
B2.5 Economic contribution from tourism activity	2,60
B3 - Cost and Investment	
B3.2 Public contribution in residential retrofitting investments.	2,59
B3.3 Operating energy costs for public buildings.	1,72
C - Energy	
C1 - Non-renewable energy	
C1.1 Total final thermal energy consumption for building operations.	1,83
C1.4 Total final electrical energy consumption for building operations.	1,67
C1.7 Total primary energy demand for building operations.	1,70
C1.10 Primary energy for heating for residential buildings.	-1,00
C1.12 Primary energy for cooling for residential buildings.	-1,00
C1.20 Energy consumption of public lighting.	-1,00
C2 - Renewable and Decarbonised energy	
C2.1 Share of renewable energy on-site, relative to total final thermal energy consumption for building operations.	-1,00
C2.4 Share of renewable energy on-site, relative to total primary energy consumption for building operations.	-1,00
C2.7 Share of renewable energy on-site, relative to final electric energy consumption.	-1,00



D - Atmospheric emissions	
D1 - Atmospheric emissions	
D1.2 Total GHG Emissions from primary energy used in building operations	0,90
E - Non-Renewable Resources	
E1 - Potable water, stormwater and greywater	
E1.6 Consumption of potable water for residential population	5,00
E1.7 Consumption of potable water for public non-residential building systems.	5,00
E2 - Solid and Liquid Wastes	
E2.1 Solid waste and recycling collection points.	5,00
F - Environment	
F1 - Environmental impacts	
F1.3 Recharge of groundwater through permeable paving or landscaping.	-1,00
F2 - Outdoor environmental quality	
F2.3 Ambient air quality with respect to particulates <10 µ (PM10) over a one-year period.	5,00
F2.10 Ambient daytime noise conditions.	-1,00
F2.11 Ambient night-time noise conditions.	-1,00
F3 - Ecosystems and landscapes	
F3.1 Green zones & recreation areas availability	1,21
F3.2 Green zones & recreation areas accessibility	1,21
F3.3 Green zones & recreation areas density	-1,00
G - Social Aspects	
G1 - Safety and Accessibility	
G1.4 Ease of access to and use of public transport for physically disabled persons.	5,00
G2 - Traffic and Mobility Services	
G2.1 Performance of the public transport system.	5,00
G2.4 Quality of pedestrian and bicycle network.	5,00
G4 - Public and private facilities and services	
G4.2 Availability and proximity of key services	5,00
G6 - Management and community involvement	
G6.3 Community involvement in urban planning activities	3,00



b. Key Performance Indicators value

KPI	Indicator	Unit of measure	Value
A 1.7 Conservation of Land	Area of undeveloped land with ecological or agricultural value / area of the neighborhood	%	0,00
B.3.3 Running costs energy for public buildings	Aggregated annual operating energy cost per aggregated indoor useful floor area	Euro/m ² /year	16,57
C.1.1 Total final thermal energy consumption for building operations	Aggregated annual total final thermal energy consumption per aggregated indoor useful floor area	kWh/m ² /year	54,82
C.1.4 Total final electric energy consumption for building operations	Aggregated annual total final electric energy consumption per aggregated indoor useful floor area	kWh/m ² /year	53,28
C.1.7 Total primary energy demand for building operations	Aggregated annual total primary energy consumption per aggregated indoor useful floor area	kWh/m ² /year	172,16
C.2.1 Share of thermal energy generation from on-site renewable sources on final thermal energy	Annual total thermal energy consumption from on-site renewable energy sources / annual total final thermal energy consumption	%	1,25
C.2.7 Share of electric energy generation from on-site renewable sources on final electric energy	Share of renewable electric energy in final electric energy consumptions	%	0,73
D.1.2 Total GHG Emissions from primary energy used in building operations	CO ₂ equivalent emissions per useful internal floor area per year	kg CO ₂ eq./m ² /yr	26,39
E.1.6 Consumption of potable water for residential population	Annual potable water consumption per occupant	m ³ per occupant*yr	35,80
E.1.7 Consumption of potable water for non-residential building systems	Annual water consumption per occupant	m ³ /m ²	0,58
F.1.3 Recharge of groundwater through permeable paving or landscaping	Area of permeable surfaces on total neighborhood area	%	0,12
F.2.3 Ambient air quality with respect to particulates <10 µm (PM10) over a one year period	Number of days exceeding the daily limits in a year	days/year	5
G.2.1 Performance of the public transport	Percentage of inhabitants that are within 400 meters walking distance of at least one public transportation service stop	%	100
G.2.4 Quality of pedestrian and bicycle network	Total walkway meters of dedicated pedestrian paths and meters of bicycle path or "shared space" per 100 inhabitants.	m/100 inhabitants	115,54
G.4.2 Availability and proximity of key services	Percentage of inhabitants that are within 800 meters walking distance of at least 3 key services.	%	100
G.6.3 Community involvement in urban planning activities	Level of involvement of users in urban planning	Level (score)	2



c. SWOT analysis

Where are we now?

A SWOT analysis is a study undertaken to identify its strengths, weaknesses, available opportunities, and possible threats. The analysis is based on a quadrant matrix, in which strengths and weaknesses (internal factors) are presented above the x-axis, and opportunities and threats (external factors) are presented below. Typically, strengths and opportunities (positive factors) are listed on the left of the y-axis, while weaknesses and threats (negative factors) are listed on the right.

STRENGTHS - Good performance of the public transport service - Good performance of recycling process - Good performance of solid waste and recycling collection points	WEAKNESSES - Non land to development - High residential density - High density of traffic - High noise level
OPPORTUNITIES - Increase the implementation of renewable energy (thermal solar and photovoltaic) - Reduce the energy consumption in public buildings - Reduce the cost of operational energy in public buildings - Reduce the energy consumption in residential buildings (master plan)..... - Increase the quality of pedestrian and bicycle network - Increase the community involvement in urban planning activities	THREATS - Ageing of the population - Increased the cost of the housing price (both rental and properties) - New energy national regulations more strict - Impoverishment of the population



4. STRATEGIC DEFINITION

a. Performance targets

The overall Environmental, Social and Economic targets have to be described

Environmental targets	<i>The environmental targets have a common central focus with city targets in the improvement of air quality and in increasing the green zones. Specifically the area should reduce the CO₂ emissions per inhabitant through increasing the use of renewable energy in buildings and mobility.</i>
Social targets	<i>The mechanisms to involve users and land lords should be improved and innovated.</i>
Economy targets	<i>The access to public funds for urban renovation should be facilitated by public administrations with competences in this field.</i>

Each partner must establish a target value for each criterion in the SNTTool reflecting the overall targets.

A – BUILT URBAN SYSTEMS			
A1 - Urban Structure and Form			
A1.2 - Urban compactness		Actual value	25,73
Relation between the usable space of the buildings (volume) and the urban space (area).	m ³ / m ²	Target value	30,00
A1.4 - Residential density		Actual value	900,12
The ratio of total residential population relative to the total land area for all developed residential blocks within the local area.	pp/ha.	Target value	610,00
A1.7 - Conservation of Land		Actual value	0,00
Area of undeveloped land with ecological or agricultural value / area of the neighborhood	%	Target value	0,01
B - Economy			
B1 - Economic Structure and Value			
B1.1 - Affordability of housing property		Actual value	32,70%
Housing properties in the local area that are financially accessible for purchase by the lowest 50% of the area population.	%	Target value	22,00%



B1.2 - Affordability of housing rental		Actual value	46,20%
Percentage of the average salary of the lowest quintile of the population used for rental payments.	%	Target value	30,00%
B2 - Economic activity			
B2.5 - Economic contribution from tourism activity		Actual value	640,48
Estimate of iaverage annual income from tourism activity (overnight stays and local purchases) on a per-resident basis.	€ / resident	Target value	1000,00
B3 - Cost and Investment			
B3.2 - Public contribution in residential retrofitting investments.		Actual value	32,22%
Funds provided by governments or other public sources provided over a 5-year period, as a proportion of total investments in residential renovation projects in the local area, percent.	%	Target value	40,00%
B3.3 - Operating energy costs for public buildings.		Actual value	1657,00%
Aggregated annual operating energy cost per aggregated internal useful floor area	€/m ² /y	Target value	1000,00%
C - Energy			
C1 - Non-renewable energy			
C1.1 - Total final thermal energy consumption for building operations.		Actual value	54,82
Aggregated annual total final thermal energy consumption per aggregated internal useful floor area	kWh/m ² /y	Target value	20,00
C1.4 - Total final electrical energy consumption for building operations.		Actual value	53,28
Aggregated annual total final electric energy consumption per aggregated internal useful floor area	kWh/m ² /y	Target value	15,00
C1.7 - Total primary energy demand for building operations.		Actual value	172,16
Aggregated annual total primary energy consumption per aggregated internal useful floor area	kWh/m ² /y	Target value	75,00
C1.10 - Primary energy for heating for residential buildings.		Actual value	1,56
Ratio of average total primary energy consumption for heating of residential buildings to the local minimum value (%).	%	Target value	0,80
C1.12 - Primary energy for cooling for residential buildings.		Actual value	1,13
Ratio of average total primary energy consumption for cooling of residential buildings to the local minimum value (%).	%	Target value	0,90
C1.20 - Energy consumption of public lighting.		Actual value	54,00
Annual electrical consumption by outdoor public lighting systems (MWh/y).	kWh/pp	Target value	35,00



C2 - Renewable and Decarbonised energy			
C2.1 - Share of renewable energy on-site, relative to total final thermal energy consumption for building operations.		Actual value	1,25%
Annual total thermal energy consumption from on-site renewable energy sources / annual total final thermal energy consumption	%	Target value	75,00%
C2.4 - Share of renewable energy on-site, relative to total primary energy consumption for building operations.		Actual value	0,99%
Aggregated total annual primary energy consumption from on-site renewable energy sources / aggregated total annual primary energy consumption	%	Target value	40,00%
C2.7 - Share of renewable energy on-site, relative to final electric energy consumption.		Actual value	0,73%
Share of renewable electric energy in final electric energy consumption.	%	Target value	40,00%
D - Atmospheric emissions			
D1 - Atmospheric emissions			
D1.2 - Total GHG Emissions from primary energy used in building operations		Actual value	26,39
CO2 equivalent emissions per useful internal floor area per year	kg CO ₂ eq /m ² /y	Target value	20,00
E - Non-Renewable Resources			
E1 - Potable water, stormwater and greywater			
E1.6 - Consumption of potable water for residential population		Actual value	35,80
Annual water consumption per occupant	m ³ /occupant/year	Target value	25,00
E1.7 - Consumption of potable water for public non-residential building systems.		Actual value	0,58
Annual water consumption per m2.	m ³ /m ²	Target value	0,10
E2 - Solid and Liquid Wastes			
E2.1 - Solid waste and recycling collection points.		Actual value	95,00%
Proximity of the resident population to the solid waste and recycling collection point.	%	Target value	100,00%
F - Environment			
F1 - Environmental impacts			
F1.3 - Recharge of groundwater through permeable paving or landscaping.		Actual value	0,12%
Area of permeable surfaces on total neighborhood area	%	Target value	10,00%



F2 - Outdoor environmental quality			
F2.3 - Ambient air quality with respect to particulates <10 µm (PM10) over a one-year period.		Actual value	5
Number of days exceeding the daily limits in a year.	days/year	Target value	0
F2.10 - Ambient daytime noise conditions.		Actual value	100,00%
Percentage of building area over noise limit.	%	Target value	75,00%
F2.11 - Ambient night-time noise conditions.		Actual value	100,00%
Proportion of population exposed to non recommended levels of night noise.	%	Target value	75,00%
F3 - Ecosystems and landscapes			
F3.1 - Green zones & recreation areas availability		Actual value	15,92
Availability of green zones & recreation areas	m ² /inh	Target value	25,00
F3.2 - Green zones & recreation areas accessibility		Actual value	403,00
Accessibility of green spaces within the area.	m	Target value	150,00
F3.3 - Green zones & recreation areas density		Actual value	0,00
Density of green spaces within the area.	%	Target value	0,10
G - Social Aspects			
G1 - Safety and Accessibility			
G1.4 - Ease of access to and use of public transport for physically disabled persons.		Actual value	100,00%
Features of public transport to facilitate access physically disabled persons, such as kneeling buses and wide entries..	%	Target value	100,00%
G2 - Traffic and Mobility Services			
G2.1 - Performance of the public transport system.		Actual value	100,00%
Percentage of inhabitants that are within 400 meters walking distance of at least one public transportation service stop	%	Target value	100,00%
G2.4 - Quality of pedestrian and bicycle network.		Actual value	115,00
Total walkway meters of dedicated pedestrian paths and meters of bicycle path and "shared space" per 100 inhabitants.	m/100 inhabitants	Target value	250,00
G4 - Public and private facilities and services			
G4.2 - Availability and proximity of key services		Actual value	100,00%
Percentage of inhabitants that are within 800 meters walking distance of at least 3 key services.	%	Target value	100,00%



G6 - Management and community involvement			
G6.3 - Community involvement in urban planning activities		Actual value	2
Level of involvement of users in urban planning	Level	Target value	3



b. Constraints and restrictions

CONSTRAINTS / RESTRICTIONS	
<i>Legal constraints</i>	<i>The studied area is within a Cultural Heritage Protection plan of Barcelona council. The majority of residential buildings in the area are more than 100 years old and their façades (both, front and back) are modernist architecture style. These buildings have several architectural constraints when it comes to carry out energy efficient measures, for instance the improvement the external thermal isolation with SATE and also the improvement the windows frames. In some cases, the municipality forces the properties to maintain the windows and the wooden shutters, having to restore them instead of exchanging them for other aluminum ones.</i>
<i>Technical constraints</i>	<i>The only technical constraints would be when carrying out photovoltaic systems on roof due to lack of available space.</i>
<i>Financial constraints</i>	<i>The investments cost for carry out all measures to improve the studied urban system is high. The most financial constraints are from the residents, who don't have enough money to carry out the analyzed energy efficient measures to reduce the energy consumption in their residential buildings. These analyzed EEMs are both passive and actives measures.</i>
<i>Environmental condition constraints</i>	<i>Not relevant</i>
<i>Stakeholder based restrictions</i>	<i>No relevant</i>
<i>Other relevant constraints</i>	<i>No relevant</i>



5. DECISION MAKING

a. Description of scenarios

NAME OF SCENARIO	DESCRIPTION
A – ILLA EFICIENT	Illa Eficient' is an initiative by the Department of Territory and Sustainability of the Government of Catalonia along with Grup Habitat Futura, with the support of Barcelona City Council. The aim is to stimulate a new form of solving sustainable renovation projects by getting citizens actively involved in the process which will change their home. Sustainable renovation is about lots of things, not just energy efficiency, which is the main advantage, as it also means comfort for the residents. The first step was organizing a contest for ideas, where a total of 15 proposals had been selected on how to sustainably renovate an entire block of the Eixample district of Barcelona. The participants were to present the design of a new business model for energy rehabilitation of a block of buildings, financial and legal structuration of the project. The winning proposal in the contest is carrying out an information process for local residents get underway to explain the advantages and benefits of the suggested renovation, finance options and existing grants available The challenge is for the 22 different residents groups that live there to reach agreement. There are a variety of technical proposals and if they agree which project and commission it jointly the cost of the renovation work will be much lower. Nowadays, there are different agreements between the Housing Consortium of Barcelona (Government of Catalonia and Barcelona council) and the communities of owners: - 4th. Semester of 2018: Agreements Communities of Owners and obtaining of aids - 2nd. Semester of 2019: Start of works in five communities and agreements in 8 communities (pending to confirm) The estimated investments cost into the 5 first communities amount to 7.587.762,30€, pending to final revision.



b. Scenarios raking

i. Performance Scores

Issues	Current state	Scenario A
TOTAL SCORE	1,63	2,95
A – Built Urban Systems	1,29	1,90
B – Economy	1,38	4,45
C – Energy	-0,48	2,85
D – Atmospheric	0,90	2,50
E – Non-renewable sources	5,00	5,00
F - Environment	1,74	1,74
G – Social aspects	4,84	4,84

ii. Key Performance Indicators

SCENARIO A			
KPI	Indicator	Unit of measure	Value
A 1.7 Conservation of Land	Area of undeveloped land with ecological or agricultural value / area of the neighborhood	%	4,0
B.3.3 Running costs energy for public buildings	Aggregated annual operating energy cost per aggregated indoor useful floor area	Euro/m ² /year	10
C.1.1 Total final thermal energy consumption for building operations	Aggregated annual total final thermal energy consumption per aggregated indoor useful floor area	kWh/m ² /year	2015
C.1.4 Total final electric energy consumption for building operations	Aggregated annual total final electric energy consumption per aggregated indoor useful floor area	kWh/m ² /year	75
C.1.7 Total primary energy demand for building operations	Aggregated annual total primary energy consumption per aggregated indoor useful floor area	kWh/m ² /year	75
C.2.1 Share of thermal energy generation from on-site renewable sources on final thermal energy	Annual total thermal energy consumption from on-site renewable energy sources / annual total final thermal energy consumption	%	40
C.2.7 Share of electric energy generation from on-site renewable sources on final electric energy	Share of renewable electric energy in final electric energy consumptions	%	40
D.1.2 Total GHG Emissions from primary energy used in building operations	CO ₂ equivalent emissions per useful internal floor area per year	kg CO ₂ eq./m ² /yr	20
E.1.6 Consumption of potable water for residential population	Annual potable water consumption per occupant	m ³ per occupant*yr	25



E.1.7 Consumption of potable water for non-residential building systems	Annual water consumption per occupant	m ³ /m ²	0,10
F.1.3 Recharge of groundwater through permeable paving or landscaping	Area of permeable surfaces on total neighborhood area	%	10
F.2.3 Ambient air quality with respect to particulates <10 mu (PM10) over a one year period	Number of days exceeding the daily limits in a year	days/year	0
G.2.1 Performance of the public transport	Percentage of inhabitants that are within 400 meters walking distance of at least one public transportation service stop	%	100
G.2.4 Quality of pedestrian and bicycle network	Total walkway meters of dedicated pedestrian paths and meters of bicycle path or "shared space" per 100 inhabitants.	m/100 inhabitants	250
G.4.2 Availability and proximity of key services	Percentage of inhabitants that are within 800 meters walking distance of at least 3 key services.	%	100
G.6.3 Community involvement in urban planning activities	Level of involvement of users in urban planning	Level (score)	3

iii. Financing mechanisms evaluation

Scenario A	For the moment the majority of buildings owners communities will constitute a cooperative to develop a renovation project of these buildings with the support of National, Regional and Local public Administrations.
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6. RETROFIT CONCEPT

SELECTED SCENARIO	DESCRIPTION
A. ILLA EFICIENT	1. Making a cooperative to reduce the investment cost of implementation measures 2. Recovering space for public use 3. Implementation of renewable energies 4. Encouraging the residents to energy refurbishment in buildings 5. Increase the public grants and aid 6. Removing the access barriers buildings

KEY ELEMENTS OF THE CONCEPT

Retrofits Strategies	Implementation of photovoltaic systems (PV on roof and walls, BIPV)
	Changing the engines of old lifts
	Improvement of the thermal isolation in façades
	Improvement of the windows frames and glasses
	Implementation of green roofs
	Implementation of aerothermal systems to production of DHW and Heating /Cooling
Performance improvement	Environment: - Reduction of GHG emissions - Reduction of energy consumption
	Society: - Promoting the contact among neighbor thanks of the cooperative. - Increase the thermal comfort inside buildings
	Economy: - Reduction of the energy cost
Financial mechanism	Housing Consortium of Barcelona has made a special program for the Illa efficient, where the 50% of energy measures will be subsidized.
	The residents may be requested National aids for refurbishment residential buildings



BUILDING SCALE ASSESSMENT – BUILDING 1

1. INITIATION

General information on the selected building	
Housing Agency of Catalonia	
Address	92 Diputació Street 08015 Barcelona
Building use	Offices
Owner	Government of Catalonia
Year of construction	1976
Building method	<i>This building was renovated in 1989 when the Government of Catalonia became owner. The main structure is the concrete. The windows were reformed ten years ago, with double glasses and broken thermal bridge. The east wing has solar protections blades, provides a highly efficient solar protection in windows.</i>
Number of levels above earth	10
Number of levels underground	4 parking floor s 1 of them is for the use of the public building and the other 3 of them are for renting for the area residents
Heating system	Boilers in the technical room on the roof
Cooling system	Cooler in the technical room on the roof
DHW system	Not existing
Ventilation system	Including in the air-conditioned system
Lighting system	Fluorescent system. The lighting system needs a renovation
Average U value	3.5
Number of occupants	310
Hours of occupation per year	3.132



2. PREPARATION

a. SBTool structure

*In this section it is described the structure of your CESBA MED SBTool.
Please, enter here the list of the criteria selected from the CESBA MED SBT Generic Framework.*

A – SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE	
A1	Site regeneration and development
A1.12	Provision and quality of bicycle pathways and parking
A2	Urban Design
A2.3	Impact of orientation on the passive solar potential of building(s)
A3	Project Infrastructure and Services
A3.6	Provision of solid waste collection and sorting services
A3.13	Provision of on-site parking facilities for private vehicles

B – ENERGY AND RESOURCES CONSUMPTION	
B1	Total life cycle non-renewable energy
B1.1	Primary energy demand
B1.2	Delivered energy demand
B1.3	Delivered electric demand
B1.4	Energy from renewable sources in total primary energy consumption
B1.5	Energy from renewable sources in total thermal energy consumption
B1.6	Energy from renewable sources in total electrical energy consumption
B1.7	Consumption of renewable energy for all building operations
B1.11	Embodied non-renewable primary energy – Not applicable
B2	Electrical peak demand
B2.1	Electrical peak demand for building operations
B2.2	Scheduling of building operations to reduce peak loads on generating facilities.
B3	Use of Material
B3.5	Recycled materials – Not applicable
B4	Use of potable water, stormwater and greywater
B4.5	Potable water consumption for indoor uses.

C- ENVIRONMENTAL LOADINGS	
C1	Greenhouse Gas Emissions
C1.3	Global Warming Potential



C3	Solid and Liquid Wastes
C3.1	Construction and demolition waste – Not applicable
C3.2	Solid waste from building operations
C5	Other Local and Regional Impacts
C5.8	Degree of atmospheric light pollution caused by project exterior lighting systems

D- INDOOR ENVIRONMENTAL QUALITY

D1	Indoor Air Quality and Ventilation
D1.4	TVOC concentration in indoor air – Not applicable
D1.5	CO2 concentration in indoor air
D1.10	Ventilation rate.
D2	Air Temperature and Relative humidity
D2.1	Time outside of the thermal comfort range
D2.2	Thermal comfort index

E- SERVICE QUALITY

E1	Safety and Security
E1.3	Risk to occupants and facilities from flooding
E1.6	Maintenance of core building functions during power outages
E2	Functionality and Efficiency
E2.5	Service quality and efficiency of vertical or horizontal transportation systems in building.
E3	Controllability
E3.1	Effectiveness of facility management control system
E3.2	Capability for partial operation of facility technical systems
E3.3	Degree of local control of lighting systems
E3.4	Degree of personal control of technical systems by occupants
E4	Flexibility and Adaptability
E4.5	Adaptability to future changes in type of energy supply
E5	Optimization and Maintenance of Operating Performance
E5.1	Operating functionality and efficiency of key facility systems
E5.6	Retention of as-built documentation

F- SOCIAL, CULTURAL AND PERCEPTUAL ASPECTS

F1	Social Aspects
F1.1	Universal access on site and within the building



G- COST AND ECONOMIC ASPECTS	
G1	Cost and Economics
G1.4	Use stage energy cost
G1.5	Use stage water cost – Only for Residential occ.

b. SBTool criteria selection rationale

In this section PPs must motivate the selection of the criteria that have been included in the regional CESBA MED SBTool. Why the criterion has been included? The reason could depend on regional policies or targets.

A - SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE		
CRITERION		REASON/MOTIVATION
A1.12	Provision and quality of bicycle pathways and parking	Assess the quality of bicycle pathways
A2.3	Impact of orientation on the passive solar potential of building(s)	Assess the passive solar solutions potential
A3.6	Provision of solid waste collection and sorting services	Assess the capacity of recycled
A3.13	Provision of on-site parking facilities for private vehicles	Assess the use of private vehicle in the workers

B – ENERGY AND RESOURCES CONSUMPTION		
CRITERION		REASON/MOTIVATION
B1.1	Primary energy demand	Assess the energy consumption
B1.2	Delivered energy demand	Assess the energy consumption
B1.3	Delivered electric demand	Assess the energy consumption
B1.4	Energy from renewable sources in total primary energy consumption	Assess the potential of the implementation renewable energy
B1.5	Energy from renewable sources in total thermal energy consumption	Assess the potential of the implementation renewable energy
B1.6	Energy from renewable sources in total electrical energy consumption	Assess the potential of the implementation renewable energy
B1.7	Consumption of renewable energy for all building operations	Assess the potential of the implementation renewable energy
B2.1	Electrical peak demand for building operations	Assess the required power for building operations
B2.2	Scheduling of building operations to reduce peak loads on generating facilities.	Assess the reduce the energy power
B4.5	Potable water consumption for indoor uses.	Assess the water consumption for the building operations



C- ENVIRONMENTAL LOADINGS		
	CRITERION	REASON/MOTIVATION
C1.3	Global Warming Potential	Assess the GHG emissions to reduce
C3.2	Solid waste from building operations	Assess the capacity of recycled
C5.8	Degree of atmospheric light pollution caused by project exterior lighting systems	Assess the lighting pollution

D- INDOOR ENVIRONMENTAL QUALITY		
	CRITERION	REASON/MOTIVATION
D1.5	CO ₂ concentration in indoor air	Assess the quality of interior air
D1.10	Ventilation rate.	Assess the quality of interior air
D2.1	Time outside of the thermal comfort range	Assess the thermal comfort
D2.2	Thermal comfort index	Assess the thermal comfort

E- SERVICE QUALITY		
	CRITERION	REASON/MOTIVATION
E1.3	Risk to occupants and facilities from flooding	Assess the risk of flooding
E1.6	Maintenance of core building functions during power outages	Assess the auto-energy-capacity of the building
E2.5	Service quality and efficiency of vertical or horizontal transportation systems in building.	Assess the work properly of the lift
E3.1	Effectiveness of facility management control system	Assess the management system of facilities
E3.2	Capability for partial operation of facility technical systems	Assess the management system of facilities
E3.3	Degree of local control of lighting systems	Assess the management system of facilities
E3.4	Degree of personal control of technical systems by occupants	Assess the management system of facilities
E4.5	Adaptability to future changes in type of energy supply	Assess the management system of facilities
E5.1	Operating functionality and efficiency of key facility systems	Assess the management system of facilities
E5.6	Retention of as-built documentation	Assess the management

F- SOCIAL, CULTURAL AND PERCEPTUAL ASPECTS		
	CRITERION	REASON/MOTIVATION
F1.1	Universal access on site and within the building	Assess the universal access of the building

G- COST AND ECONOMIC ASPECTS		
	CRITERION	REASON/MOTIVATION
G1.4	Use stage energy cost	Assess the cost of the energy



c. SBTool weights rationale

In this section PPs must motivate the value of weights assigned to the different issues, categories and criteria. Why the weight of a particular issue or criterion is higher (or lower)? Weights should reflect the regional political priorities.

ISSUE	WEIGHT (1 to 3)	MOTIVATION
A - SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE	1	This is an existing building and therefore there is not much scope of action to influence in its design. Consultation with Local Committee Members
B – ENERGY AND RESOURCES CONSUMPTION	3	This is a strategic axis with greater opportunity for action and improvement of results and directly linked to CO ₂ emissions to reduce in the Climate and energy framework 2030. It is considered top priority. Consultation with Local Committee Members
C- ENVIRONMENTAL LOADINGS	3	This is a strategic axis with greater opportunity for action and improvement of results and directly linked to CO ₂ emissions to reduce in the Climate and energy framework 2030. It is considered top priority. Consultation with Local Committee Members
D- INDOOR ENVIRONMENTAL QUALITY	2	It is very important due to directly affect the health of people. Consultation with Local Committee Members
E- SERVICE QUALITY	2	It is not considered priority, although it is important because it takes into consideration the relationship of people with that studied building. Consultation with Local Committee Members
F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS	3	It is considered top priority due to directly affect the quality of the workers. Consultation with Local Committee Members
G- COST AND ECONOMIC ASPECTS	2	This is a strategic axis with greater opportunity for action and improvement of results and directly linked to CO ₂ emissions to reduce in the Climate and energy framework 2030. Consultation with Local Committee Members

CATEGORIES	WEIGHT (%)
A1- Site regeneration and Development	25,00
A2- Urban design	25,00
A3- Project Infrastructure and Services	50,00
TOTAL	100
B1- In use energy consumptions	77,78
B2- Embodied energy	11,11
B3- Use of materials	0,00
B4 – Use of water, stormwater and greywater	11,11
TOTAL	100



C1- Greenhouse gas emissions	33,33
C2- Other atmospheric emissions	0,00
C3- Solid and liquid waste	33,33
C4- Impact on project site	0,00
C5- Other local and regional impacts	33,33
TOTAL	100
D1- Indoor air quality and ventilation	50,00
D2- Thermal comfort	50,00
D3- Visual comfort	0,00
D4- Acoustic comfort	0,00
TOTAL	100
E1- Safety and Security	20,00
E2- Functionality and efficiency	10,00
E3- Controllability	40,00
E4- Flexibility and adaptability	10,00
E5- Optimization and maintenance of operating performance	20,00
TOTAL	100
F1- Social aspects	100
F2- Culture and heritage	0
F3- Perceptual	0
TOTAL	100
G1- Cost and economics	100
TOTAL	100

CRITERIA WEIGHTS

SBTool file A – WeightA-G

A- SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE						
A1- Site Regeneration and Development						
CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
A1.12	0,84	2	3	2	1	Confirmed
A2- Urban Design						
A2.3	2,11	1	5	3	1	Confirmed
A3- Project Infrastructure and Services						
A3.6	0,28	2	3	2	1	Confirmed
A3.13	1,69	2	2	3		Confirmed
TOTAL	4.92%					

B- ENERGY AND RESOURCES CONSUMPTION						
B1-Total Life Cycle Non-Renewable Energy						
CRITERION	Weight(%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
B1.1	7,02	5	5	2	1	Confirmed
B1.2	7,02	5	5	2	1	Confirmed
B1.3	7,02	5	5	2		Confirmed
B1.4	7,02	5	5	2		Confirmed



B1.5	7,02	5	5	2		Confirmed
B1.6	7,02	5	5	2		Confirmed
B1.7	10,53	5	5	3		Confirmed
B2-Electrical Peak Demand						
B2.1	6,32	5	5	3	1	Confirmed
B4-Use of potable water, stormwater and greywater						
B1.1	3,79	4	3	3	1	Confirmed
TOTAL	62,78%					

C- ENVIRONMENTAL LOADINGS

C1-Greenhouse Gas Emissions

CRITERION	Weight(%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
C1.3	13,2	5	5	3	1	Confirmed
C3-Solid and Liquid Wastes						
C3.2	2,53	4	3	2	1	Confirmed
C5-Other Local and Regional Impacts						
C5.8	3,37	4	3	2	1	Confirmed
TOTAL	19,07%					

D- INDOOR ENVIRONMENTAL QUALITY

D1-Indoor Air Quality and Ventilation

CRITERION	Weight(%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
D1.5	0,63	1	3	3	1	Confirmed
D1.10	0,21	1	3	2	1	Confirmed
D2-Air Temperature and Relative Humidity						
D2.1	0,63	1	3	3	1	Confirmed
D2.2	0,63	1	3	3	1	Confirmed
TOTAL	2,11%					

E- Service Quality

E1-Safety and Security

CRITERION	Weight(%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
D1.3	2,53	2	4	3		Confirmed
D1.6	1,90	2	3	3		Confirmed

E2-Functionality and efficiency

D2.15	0,63	1	3	3		Confirmed
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E3-Controllability

E3.1	0,14	1	2	2		Confirmed
E3.2	0,14	1	2	2		Confirmed
E3.3	0,14	1	2	2		Confirmed
E3.4	0,28	1	2	2		Confirmed

E4-Flexibility and Adaptability

E3.1	1,26	1	3	3		Confirmed
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E5-Optimization and Maintenance of Operating Performance

E5.1	0,21	1	2	3		Confirmed
E5.6	0,11	1	1	3		Confirmed

TOTAL	7,97%					
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F- SOCIAL, CULTURAL AND PERCEPTUAL ASPECTS

F1-Social Aspects

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
F1.1	1,90	2	3	3		Confirmed
TOTAL	1,9%					

G- COST AND ECONOMIC ASPECTS

G1-Cost and Economics

CRITERION	Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
G.1.4	0,63	2	3	3		Confirmed
G1.5	0,21	2	3	1		Confirmed
TOTAL	0,84%					



d. SBTool benchmarks rationale

In this section PPs must motivate the value of benchmarks assigned to the different criteria for score zero (minimum acceptable performance) and for score 5 (excellent and ideal performance). The value of indicators corresponding to score zero is usually depends on regulations, standards or a typical performance in the region. Please keep in mind that score 3 represents a best practice performance. Score 5 is an excellent performance.

A- URBAN STRUCTURE AND FORM				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	RATIONALE
A1.12	Provision and quality of bicycle pathways and parking	--	0: 0	Confirmed by CLC members
			5: 5	Confirmed by CLC members
A2.3	Impact of orientation on the passive solar potential of building(s)	--	0: 0	Confirmed by CLC members
			5: 5	Confirmed by CLC members
A3.6	Provision of solid waste collection and sorting services	--	0: 0	Confirmed by CLC members
			5: 5	Confirmed by CLC members
A3.13	Provision of on-site parking facilities for private vehicles	Spaces / 100m ²	0: 1,50	Confirmed by CLC members
			5: 0,50	Confirmed by CLC members

B- ENERGY AND RESOURCES CONSUMPTION				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	RATIONALE
B1.1	Primary energy demand	kWh/m ² /y	0: 225	Confirmed by CLC members
			5: 70	Confirmed by CLC members
B1.2	Delivered energy demand	kWh/m ² /y	0: 22	Confirmed by CLC members
			5: 12	Confirmed by CLC members
B1.3	Delivered electric demand	kWh/m ² /y	0: 75	Confirmed by CLC members
			5: 20	Confirmed by CLC members
B1.4	Energy from renewable sources in total primary energy consumption	%	0: 25	Confirmed by CLC members
			5: 90	Confirmed by CLC members
B1.5	Energy from renewable sources in total thermal energy consumption	%	0: 30	Confirmed by CLC members
			5: 100	Confirmed by CLC members



B1.6	Energy from renewable sources in total electrical energy consumption	%	0: 40	Confirmed by CLC members
			5: 100	Confirmed by CLC members
B1.7	Consumption of renewable energy for all building operations	kWh/m ² /y	0: 2	Confirmed by CLC members
			5: 5	Confirmed by CLC members
B2.1	Electrical peak demand for building operations	W/m ²	0: 100	Confirmed by CLC members
			5: 20	Confirmed by CLC members
B4.5	Water consumption for indoor uses (in use stage)	m ³ /per/y	0: 100	Confirmed by CLC members
			5: 20	Confirmed by CLC members

C- ENVIRONMENTAL LOADINGS				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	DERIVATIONS
C.1.3.	Global Warming potential - GHG emissions from primary energy	kgCO ₂ eq/m ² /y	0: 30	Confirmed by CLC members
			5: 10	Confirmed by CLC members
C.3.2.	Solid waste from building operations	%	0: 15	Confirmed by CLC members
			5: 100	Confirmed by CLC members
C.5.8	Degree of atmospheric light pollution caused by project exterior lighting systems	%	0: 25	Confirmed by CLC members
			5: 0	Confirmed by CLC members

D- INDOOR ENVIRONMENTAL QUALITY				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	DERIVATIONS
D.1.5	CO ₂ concentrations in indoor air	ppm	0: 600	Confirmed by CLC members
			5: 500	Confirmed by CLC members
D.1.10	Ventilation rate	l/s/m ²	0: 6	Confirmed by CLC members
			5: 12	Confirmed by CLC members
D.2.1.	Time outside of thermal comfort range	%	0: 30	Confirmed by CLC members
			5: 10	Confirmed by CLC members
D.2.2.	Thermal comfort index - PMV/PPD	%	0: 25	Confirmed by CLC members
			5: 5	Confirmed by CLC members



E- SERVICE QUALITY				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	DERIVATIONS
E1.3	Risk to occupants and facilities from flooding	--	0: 0	Confirmed by CLC members
			5: 5	Confirmed by CLC members
E1.6	Maintenance of core building functions during power outages	Days	0: 1	Confirmed by CLC members
			5: 5	Confirmed by CLC members
E2.5	Service quality and efficiency of vertical or horizontal transportation systems in building.	Minutes	0: 0	Confirmed by CLC members
			5: 5	Confirmed by CLC members
E3.1	Effectiveness of facility management control system	--	0: 0	Confirmed by CLC members
			5: 5	Confirmed by CLC members
E3.2	Capability for partial operation of facility technical systems	--	0: 0	Confirmed by CLC members
			5: 5	Confirmed by CLC members
E3.3	Degree of local control of lighting systems	m ²	0: 25	Confirmed by CLC members
			5: 10	Confirmed by CLC members
E3.4	Degree of personal control of technical systems by occupants	--	0: 0	Confirmed by CLC members
			5: 5	Confirmed by CLC members
E4.5	Adaptability to future changes in type of energy supply	--	0: 0	Confirmed by CLC members
			5: 5	Confirmed by CLC members
E5.1	Operating functionality and efficiency of key facility systems	--	0: 0	Confirmed by CLC members
			5: 5	Confirmed by CLC members
E5.6	Retention of as-built documentation	--	0: 0	Confirmed by CLC members
			5: 5	Confirmed by CLC members

F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	DERIVATIONS
F1.1	Universal access on site and within the building.	--	0: 0	Insert your comment here
			5: 5	Insert your comment here

G- COST AND ECONOMIC ASPECTS				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	DERIVATIONS
G.1.4.	Use stage energy cost	€/m ² /y	0: 60	Insert your comment here
			5: 40	Insert your comment here



e. SBTool Criteria Specifications

In this section PPs must indicate for each selected criterion:

- *Information source:* The source of the data/information that will be used to characterize the value of the indicator. Example: monitored data, measured data, statistic data, models and simulation, studies, data banks, etc.
- *Assessment method:* Short and concise description of the assessment method used to verify the value of indicators. Example: calculation steps, data analysis process, monitoring procedure, content of a study, use of statistic data, etc.
- *Standards:* technical documents taken as reference for the assessment method.

A- SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE

CRITERION	INDICATOR	SPECIFICATIONS	
A1.12	Provision and quality of bicycle pathways and parking	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
A2.3	Impact of orientation on the passive solar potential of building(s)	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
A3.6	Provision of solid waste collection and sorting services	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
A3.13	Provision of on-site parking facilities for private vehicles	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA

B- ENERGY AND RESOURCES CONSUMPTION

CRITERION	INDICATOR	SPECIFICATIONS	
B1.1	Primary energy demand	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
B1.2	Delivered energy demand	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA



B1.3	Delivered electric demand	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
B1.4	Energy from renewable sources in total primary energy consumption	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
B1.5	Energy from renewable sources in total thermal energy consumption	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
B1.6	Energy from renewable sources in total electrical energy consumption	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
B1.7	Consumption of renewable energy for all building operations	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
B2.1	Electrical peak demand for building operations	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
B4.5	Water consumption for indoor uses (in use stage)	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA

C- ENVIRONMENTAL LOADINGS

CRITERION	INDICATOR	SPECIFICATIONS	
C.1.3.	Global Warming potential - GHG emissions from primary energy	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
C.3.2.	Solid waste from building operations	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA



C.5.8	Degree of atmospheric light pollution caused by project exterior lighting systems	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA

D- INDOOR ENVIRONMENTAL QUALITY

CRITERION	INDICATOR	SPECIFICATIONS	
D.1.5	CO ₂ concentrations in indoor air	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
D.1.10	Ventilation rate	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
D.2.1.	Time outside of thermal comfort range	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
D.2.1.	Time outside of thermal comfort range	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA

E- SERVICE QUALITY

CRITERION	INDICATOR	SPECIFICATIONS	
E1.3	Risk to occupants and facilities from flooding	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
E1.6	Maintenance of core building functions during power outages	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
E2.5	Service quality and efficiency of vertical or horizontal transportation systems in building.	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA



E3.1	Effectiveness of facility management control system	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
E3.2	Capability for partial operation of facility technical systems	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
E3.3	Degree of local control of lighting systems	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
E4.5	Adaptability to future changes in type of energy supply	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
E5.1	Operating functionality and efficiency of key facility systems	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA
E5.6	Retention of as-built documentation	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA

F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS

CRITERION	INDICATOR	SPECIFICATIONS	
F1.1	Universal access on site and within the building.	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA

G- COST AND ECONOMIC ASPECTS

CRITERION	INDICATOR	SPECIFICATIONS	
1.4	Use stage energy cost	Information source	Maintenance staff
		Assessment method	According its factsheet in the SB-Tool
		Standard	NA



3. DIAGNOSIS

a. Performance scores

*Evaluation of the actual performance and relative level of sustainability of the Building.
PPs have to indicate the scores reached.*

	SCORE
A - Site regeneration and development, Urban design and infrastructure	
A1 - Urban Design	
A1.12. Provision and quality of bicycle pathways and parking	3,00
A2 - Urban Design	
A2.3. Impact of orientation on the passive solar potential of building(s)	1,00
A3 - Project Infrastructure and Services	
A3.6. Provision of solid waste collection and sorting services	5,00
A3.13. Provision of on-site parking facilities for private vehicles	0,50
B - Energy and Resource Consumption	
B1 - Total life cycle non-renewable energy	
B.1.1. Primary energy demand (in use stage)	-1,00
B.1.2. Delivered thermal energy demand (in use stage)	1,88
B.1.3. Delivered electric energy demand (in use stage)	-1,00
B.1.4. Energy from renewable sources in total primary energy consumption (in use stage)	-1,00
B.1.5. Energy from renewable sources in total thermal energy consumption (in use stage)	0,00
B.1.6. Energy from renewable sources in total electric energy consumption (in use stage)	-1,00
B.1.7. Consumption of renewable energy for all building operations	0,27
B2 - Electrical peak demand	
B.2.1. Electrical peak demand for building operations	4,02
B3 - Use of materials	
B4 - Use of water	
B.4.5. Water consumption for indoor uses (in use stage)	4,13
C - Environmental loadings	
C1 - Greenhouse Gas Emissions	
C.1.3. Global Warming potential - GHG emissions from primary energy	4,70
C3 - Solid and Liquid Waste	
C.3.2. Solid waste from building operations	5,00
C5 - Solid and Liquid Waste	
C.5.8 Degree of atmospheric light pollution caused by project exterior lighting systems	5,00
D - Indoor Environmental Quality	
D1 - Indoor Air Quality and Ventilation	
D.1.5 CO2 concentrations in indoor air	5,00
D.1.10 Ventilation rate	5,00
D2 - Air Temperature and Relative Humidity	
D.2.1. Time outside of thermal comfort range	5,00
D.2.2. Thermal comfort index - PMV/PPD	4,50



E - SERVICE QUALITY		
E1 - Safety and Security		
E1.3	Risk to occupants and facilities from flooding	1,50
E1.6	Maintenance of core building functions during power outages	0,00
E2 - Functionality and Efficiency		
E2.5	Service quality and efficiency of vertical or horizontal transportation systems in building.	3,00
E3 - Functionality and Efficiency		
E3.1	Effectiveness of facility management control system	0,00
E3.2	Capability for partial operation of facility technical systems	1,00
E3.3	Degree of local control of lighting systems	3,33
E3.4	Degree of personal control of technical systems by occupants	3,00
E4 - Flexibility and Adaptability		
E4.5	Adaptability to future changes in type of energy supply	3,00
E5 - Optimization and Maintenance of Operating Performance		
E5.1	Operating functionality and efficiency of key facility systems	3,00
E5.6	Retention of as-built documentation	4,00
F - Social, Cultural and Perceptual Aspects		
F1 - Social Aspects		
F1.1	Universal access on site and within the building.	4,00
G - Cost and Economic Aspects		
G1 - Cost and Economics		
G.1.4.	Use stage energy cost	0,00



b. Key Performance Indicators value

KPI	Indicator	Unit of measure	Value
B.1.1 Primary energy demand	Primary energy demand per internal useful floor area per year	kWh/m ² /yr	279,39
B.1.2 Delivered thermal energy demand	Delivered thermal energy demand per internal useful floor area per year	kWh/m ² /yr	18,47
B.1.3 Delivered electric energy demand	Delivered electric energy demand per internal useful floor area per year	kWh/m ² /yr	128,26
B.1.5 Energy from renewable sources in total final thermal energy consumption	Share of renewable energy in final thermal energy consumptions	%	0
B.1.6 Energy from renewable sources in total final electric energy consumption	Share of renewable energy in final electric energy consumption	%	1,68
B.1.11 Embodied non-renewable primary energy	Embodied primary non-renewable energy	MJ/m ²	Not applicable
B.3.5 Recycled materials	Weight of recycled materials on total weight of materials	%	Not applicable
B.4.5 Potable water consumption for indoor uses	Potable water consumption per occupant per year	m ³ /occupant /year	6,74
C.1.3 Global Warming potential	CO ₂ equivalent emissions per internal useful floor area per year	kg CO ₂ eq./m ² /yr	11,22
C.3.1 Construction and demolition waste	Weight of waste and materials generated per 1 m ² of useful floor area demolished or constructed	kg/m ² /life cycle stage	Not applicable
C.3.2 Solid waste from building operation	Ratio of the number of collectable solid waste categories within a 100 m distance from the building's entrance to the reference solid waste categories	%	100
D.1.4 TVOC concentration in indoor air	TVOC concentration in indoor air	µg/ m ³	Not applicable
D.1.10 Ventilation rate	Ventilation rate normalized per useful floor area	l/s/m ²	12
D.2.2 Thermal comfort index	Predicted Percentage Dissatisfied (PPD)	%	7
G.1.4 Use stage energy cost	Energy annual cost per usable floor area	€/m ² /yr	16,90
G.1.5 Use stage water cost	Water annual cost per usable floor area	€/m ² /yr	1,01



c. Actual performance analysis

WEAKNESSES ASPECTS	- Old and pre-existent building - High energy consumption - Low use of renewable energies - Low thermal comfort
STRENGTH ASPECTS	- Good universal access on site and within the building - Good levels of indoor air quality - High levels of waste recycling - Implementation of campaigns to increase users' consciousness about recycling. - Easy access by public transport
POTENTIAL FOR PERFORMANCE IMPROVEMENT	- Reduction of the energy consumption - Reduction of the cost of operational energy - Increase the implementation of renewable energy (photovoltaic) - Improvement of the energy efficiency of the building



4. STRATEGIC DEFINITION

a. Performance targets

Each partner must establish a target value for each criterion in the SBTool.

The target values have to reflect the global Environmental, Social and Economic targets established at urban level.

			SCORE	
A - Site regeneration and development, Urban design and infrastructure				
A1 - Urban Design				
A1.12. Provision and quality of bicycle pathways and parking			Actual value	3,00
Type and extent of bicycle paths in the project, connectivity with off-site bicycle paths, amount of sheltered and unsheltered bicycle parking, location of bicycle parking facilities relative to building entrances.	---		Target value	5,00
A2 - Urban Design				
A2.3. Impact of orientation on the passive solar potential of building(s)			Actual value	1,00
Deviation, in degrees (°) of main building axis from East-West (to ensure a maximum possible insolation)..	---		Target value	1,00
A3 - Project Infrastructure and Services				
A3.6. Provision of solid waste collection and sorting services			Actual value	5,00
Solid non-organic waste generation during operations, excluding amounts used for energy production, capacity and location of communal (multi-building) non-organic solid waste and sorting facilities, and provision of appropriate management and staffing.	---		Target value	5,00
A3.13. Provision of on-site parking facilities for private vehicles			Actual value	1,40
The ratio of parking spaces for private vehicles per dwelling unit, plus the ratio of parking spaces for private vehicles per 100 m2 of usable area (ua) of non-residential occupancies.	spaces/100 m2		Target value	1,00
B - Energy and Resource Consumption				
B1 - Total life cycle non-renewable energy				
B.1.1. Primary energy demand (in use stage)			Actual value	279,39
Primary energy demand per internal useful floor area per year	kWh/m2/y		Target value	163,00
B.1.2. Delivered thermal energy demand (in use stage)			Actual value	18,47
Delivered thermal energy demand per internal useful floor area per year	kWh/m2/y		Target value	14,30
B.1.3. Delivered electric energy demand (in use stage)			Actual value	128,26
Delivered electric energy demand per internal useful floor area per year	kWh/m2/y		Target value	53,00



B.1.4.	Energy from renewable sources in total primary energy consumption (in use stage)		Actual value	1,49
	The predicted or actual proportion of the total primary energy consumption of the building that is met by renewable energy during the use phase, expressed as a percent of the annual total.	%	Target value	25,00
B.1.5.	Energy from renewable sources in total thermal energy consumption (in use stage)		Actual value	0,00
	Share of renewable energy in final thermal energy consumptions	%	Target value	0,00
B.1.6.	Energy from renewable sources in total electric energy consumption (in use stage)		Actual value	1,68
	Share of renewable energy in final electric energy consumption	%	Target value	64,00
B.1.7.	Consumption of renewable energy for all building operations		Actual value	2,16
	Average annual kWh of renewable energy, including power produced by photovoltaics or wind turbines, per m2 of net area as predicted by means of an acceptable method or tool.	kWh/m2	Target value	4,10
B2 - Electrical peak demand				
B.2.1.	Electrical peak demand for building operations		Actual value	35,63
	Average of peak monthly electrical demand for one year, W/m2, as predicted by means of an acceptable method or tool.	W/m2	Target value	20,00
B3 - Use of materials				
B4 - Use of water				
B.4.5.	Water consumption for indoor uses (in use stage)		Actual value	6,74
	Potable water consumption per occupant per year	m3/per/y	Target value	5,00
C - Environmental loadings				
C1 - Greenhouse Gas Emissions				
C.1.3.	Global Warming potential - GHG emissions from primary energy		Actual value	11,22
	Annual CO2-equivalent emissions per Kg. per m2 of net area, as determined by an hour-by-hour simulation program and calculations based on regional fuel emission values.	kgCO2eq/m2/y	Target value	10,00
C3 - Solid and Liquid Waste				
C.3.2.	Solid waste from building operations		Actual value	100,00
	Facilities provided in the design for the storage and sorting of solid wastes in both dispersed and central locations.	%	Target value	100,00
C5 - Solid and Liquid Waste				
C.5.8	Degree of atmospheric light pollution caused by project exterior lighting systems		Actual value	0,00
	Percentage of total exterior light output that lies outside a vertical 120 degree cone, as indicated by drawings and specifications.	%	Target value	0,00
D - Indoor Environmental Quality				
D1 - Indoor Air Quality and Ventilation				
D.1.5	CO2 concentrations in indoor air		Actual value	450,00
	During design phase, designs for HVAC systems that conform to ASHRAE, CIBSE or other acceptable protocol; actual monitoring results during use phase.	ppm	Target value	450,00



D.1.10 Ventilation rate		Actual value	12,00
Percent of ventilation air reaching work surfaces, as indicated by an analysis of proposed HVAC system and room characteristics.	l/s/m2	Target value	12,00
D2 - Air Temperature and Relative Humidity			
D.2.1. Time outside of thermal comfort range		Actual value	2,50
Compliance of mechanical ventilation systems with recognized design standards such as ASHRAE or CIBSE.	%	Target value	2,50
D.2.2. Thermal comfort index - PMV/PPD		Actual value	7,00
Predicted ability of natural ventilation systems to maintain temperatures within an acceptable range, as indicated by drawings and specifications.	%	Target value	5,00
E - SERVICE QUALITY			
E1 - Safety and Security			
E1.3 Risk to occupants and facilities from flooding		Actual value	1,50
Probability of injury or death or major property damage in case of 100-year flood event or other foreseeable flood risk.	---	Target value	3,00
E1.6 Maintenance of core building functions during power outages		Actual value	1,00
Probability of injury or death or major property damage in case of an accidental or wilful explosion in or near the building.	Days	Target value	3,00
E2 - Functionality and Efficiency			
E2.5 Service quality and efficiency of vertical or horizontal transportation systems in building.		Actual value	4,00
Adequacy of the facility unloading and temporary storage capacity and measures to prevent excessive noise and visual pollution from disturbing occupants.	Minutes	Target value	3,00
E3 - Functionality and Efficiency			
E3.1 Effectiveness of facility management control system		Actual value	0,00
The presence of a computerized building management control system whose capability is consistent with the complexity of building systems.	---	Target value	3,00
E3.2 Capability for partial operation of facility technical systems		Actual value	1,00
The predicted ability of building systems to provide partial heating, ventilation, cooling or lighting services, according to design documentation.	---	Target value	3,00
E3.3 Degree of local control of lighting systems		Actual value	15,00
The area of typical lighting control zones in perimeter areas in m2, as shown in design documentation.	m2	Target value	10,00
E3.4 Degree of personal control of technical systems by occupants		Actual value	1,50
The degree of control over key indoor environment systems that can be exercised by occupants, according to design documentation.	---	Target value	3,00



E4 - Flexibility and Adaptability			
E4.5 Adaptability to future changes in type of energy supply		Actual value	3,00
The ease or difficulty in installing heating or cooling equipment that require a different fuel, or to install photovoltaic systems.	---	Target value	5,00
E5 - Optimization and Maintenance of Operating Performance			
E5.1 Operating functionality and efficiency of key facility systems		Actual value	3,00
Commissioning plans developed and/or implemented and commissioning staff assigned.	---	Target value	5,00
E5.6 Retention of as-built documentation		Actual value	4,00
The scope and quality of design documentation retained for use by building operators, according to design documentation.	---	Target value	5,00
F - Social, Cultural and Perceptual Aspects			
F1 - Social Aspects			
F1.1 Universal access on site and within the building.		Actual value	4,00
The scope and quality of design measures planned to facilitate access and use of building facilities by persons with disabilities.	---	Target value	5,00
G - Cost and Economic Aspects			
G1 - Cost and Economics			
G.1.4. Use stage energy cost		Actual value	16,90
Energy annual cost per usable floor area	€/m2/y	Target value	10,00

b. Constraints and restrictions

CONSTRAINTS / RESTRICTIONS	
<i>Legal constraints</i>	<i>Not relevant</i>
<i>Technical constraints</i>	<i>The only technical constraints would be when carrying out photovoltaic systems on roof due to lack of available space.</i>
<i>Financial constraints</i>	<i>The Government of Catalonia cannot get into debt because of political issues</i>
<i>Environmental condition constraints</i>	<i>Not relevant</i>
<i>Stakeholder based restrictions</i>	<i>Not relevant</i>
<i>Other relevant constraints</i>	<i>Not relevant</i>



c. Potential strategies at building scale

Synergy zones	
<i>Energetic synergies</i>	<i>A contract ESCO is under development to reduce the energy consumption of the building. The contract is focusing on the lighting and air-conditioned systems.</i>
<i>Water synergies</i>	<i>Not at the moment</i>
<i>Waste synergies</i>	<i>The building has a strict waste collecting</i>
<i>Mobility synergies</i>	<i>The building has three electrical charge points for electrical vehicles into the parking.</i>
<i>Other synergies</i>	



5. DECISION MAKING

a. Description of scenarios

NAME OF SCENARIO	DESCRIPTION
1. Scenario A	The scenario A would be the best practice that the manager of the building would like to achieve. The great focus is to achieve the reduction of energy consumption without reducing the thermal comfort of the users. In addition, the reduction of the cost of operational energy, the increase of the implementation of renewable energy (photovoltaic) and the improvement of the energy efficiency of the building. A contract ESCO is under development to reduce the energy consumption of the building. The contract is focusing on the lighting and air-conditioned systems. The building has a good universal access on site and within the building, a good levels of indoor air quality, high levels of waste recycling and the implementation of campaigns to increase users' consciousness about recycling.

b. Scenarios raking

i. Performance Scores

Issues	Current state	Scenario A
TOTAL SCORE	1,65	2,63
A – Site regeneration	1,4	2,4
B – Energy and Resources C.	0,5	1,7
C – Environmental Loadings	4,8	5,0
D – Indoor Env. Quality	4,9	5,0
E – Service Quality	1,7	3,0
F – Social Aspects	4,0	5,0
G – Cost and Economic Asp.	1,6	5,0



ii. Key Performance Indicators

SCENARIO A			
KPI	Indicator	Unit of measure	Value
B.1.1 Primary energy demand	Primary energy demand per internal useful floor area per year	kWh/m ² /yr	163
B.1.2 Delivered thermal energy demand	Delivered thermal energy demand per internal useful floor area per year	kWh/m ² /yr	14,30
B.1.3 Delivered electric energy demand	Delivered electric energy demand per internal useful floor area per year	kWh/m ² /yr	53
B.1.5 Energy from renewable sources in total final thermal energy consumption	Share of renewable energy in final thermal energy consumptions	%	25
B.1.6 Energy from renewable sources in total final electric energy consumption	Share of renewable energy in final electric energy consumption	%	0
B.1.11 Embodied non-renewable primary energy	Embodied primary non-renewable energy	W/m ²	20
B.3.5 Recycled materials	Weight of recycled materials on total weight of materials	%	Not applicable
B.4.5 Potable water consumption for indoor uses	Potable water consumption per occupant per year	m ³ /occupant/year	5
C.1.3 Global Warming potential	CO ₂ equivalent emissions per internal useful floor area per year	kg CO ₂ eq./m ² /yr	10
C.3.1 Construction and demolition waste	Weight of waste and materials generated per 1 m ² of useful floor area demolished or constructed	kg/m ² /life cycle stage	Not applicable
C.3.2 Solid waste from building operation	Ratio of the number of collectable solid waste categories within a 100 m distance from the building's entrance to the reference solid waste categories	%	100
D.1.4 TVOC concentration in indoor air	TVOC concentration in indoor air	µg/ m ³	Not applicable
D.1.10 Ventilation rate	Ventilation rate normalized per useful floor area	l/s/m ²	12
D.2.2 Thermal comfort index	Predicted Percentage Dissatisfied (PPD)	%	5
G.1.4 Use stage energy cost	Energy annual cost per usable floor area	€/m ² /yr	10
G.1.5 Use stage water cost	Water annual cost per usable floor area	€/m ² /yr	5



iii. Financing mechanisms evaluation

Scenario A	The government of Catalonia cannot get into debt, therefore it need a alternative financing schemes to achieve its targets (over all in energy and resource consumption). For instance, a contract ESCO is a good solution to achieve them.
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iv. Synergies at building level

Scenario A	This project is being developed in the framework of the ECREE (Catalan Strategy for the Energy Renovation of Buildings)
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6. RETROFIT CONCEPT

SELECTED SCENARIO	DESCRIPTION
1. Scenario A	A contract ESCO is under development to reduce the energy consumption of the building. The contract is focusing on the lighting and air-conditioned systems.

KEY ELEMENTS OF THE CONCEPT

Retrofits Strategies	Improve lighting systems
	Improve air-conditioned systems
	Reduce energy consumption
Performance improvement	Reduce GHG emissions
	Implementation of campaigns to: - increase users' consciousness about recycling - reduce the energy consumption
	Easy access by public transport
Financial mechanism	ESCO contract
	Synergies with other European projects

