TESTING PROTOCOL

ASSESSMENT REPORT – Hellenic Pilot Test Results

D3.3.2-GR Pilot Test in Greece

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URBAN SCALE ASSESSMENT

1. INITIATION

General information on the selected urban area

City	*Municipality of Fylis - Municipal Unit of Ano Liossia*
Brief description	*The selected area for the pilot is located in the center of the Municipal Unit of Ano Liosia, a moderately dense urban area of 3845 ha total area, 864 ha residential are and about 30000 residents.* *The pilot area covers about 27.1 ha, 50% of which are covered by buildings and 33% of residential buildings. There are about 360 buildings, 55% of which residential, 23% mixed use and 22% non-residential buildings. The specific area has relatively low rise buildings, the majority of which (75%) are one to two floors high.*
Size	*27.1 (ha)*
Residential population	*1330 (residents)*
Average building density	*0.5 (total m²/land surface m²)*
Plan of the urban area	

Significant pictures	
Description of the adjacent areas	*Similar adjacent areas. Mostly residential buildings and small commercial and office buildings.*
Property ownership	*Most of the properties are privately owned. There are 7 public building included in the area, the town hall, an indoor sports hall, and 5 school buildings*
Social and economic context	*Relatively low income.*
Legal /administrative boundary lines	
Energy supply infrastructure	*Main power grid. New central natural gas pipeline in 2018.*
Relevance of the surrounding infrastructures	
Reference stakeholders in retrofit process	*Municipality, Attika Prefecture, residents, commercial owners*
Other significant information	

2. PREPARATION

a. SNTool structure

In this section the structure of the Hellenic SNTool (*HE-Attica-SNTool)* is described.

There was a screening of the initial GF-U **178** available indicators. The first “screening rule” was the applicability to the national conditions, resulting to 118 indicators. The next step was to circulate the screened list of indicators within the National Local Committee Members and have their feedback. Their reaction was that there were too many indicators for an assessment tool, so the second “screening rule” was to exclude those who were very difficult to define or assess, resulting to 77 indicators. Consulting the

National Local Committee Members from Municipalities for the indicators that were most important from the local Authorities' point of view, as well as for data availability, we resulted to 57 indicators. Finally, talking with the National Local Committee Members from Municipality of Fylis, the indicators were limited to 44.

The list of the criteria selected from the CESBA MED Generic Framework ay Urban scale and included in the *HE-Attica-SNTool* is presented in the following Table (KPIs are marked with an *, new or modified criteria are marked with ✎).

A- BUILT URBAN SYSTEMS	
A1	**Urban Structure and Form**
A1.2	*Urban compactness*
A1.4	*Residential density*
A1.5	*Urban street canyons (H/W aspect ratio)*
A1.7	*Conservation of Land* *

B- ECONOMY	
B2	**Economic activity**
B2.3	*Unemployment rate* ✎
B2.4	*Economic viability of commercial occupancies*
B2.5	*Energy poverty of households* ✎
B3	**Cost and Investment**
B3.3	*Use stage energy cost for public office/educational buildings* *

C- ENERGY	
C1	**Non-renewable energy**
C1.1	*Total final thermal energy consumption for building operations* *
C1.3	*Total final thermal energy consumption for public office/educational building operations* ✎
C1.4	*Total final electric energy consumption for building operations* *
C1.6	*Total final electric energy consumption for public office/educational building operations* ✎
C1.7	*Total primary energy demand for building operations* *
C1.9	*Total primary energy demand for public office/educational building operations* ✎
C1.20	*Energy consumption of public lighting*
C2	**Renewable and Decarbonised energy**
C2.1	*Share of renewable energy on-site, on total final thermal energy consumptions for buildings operation* *
C2.4	*Share of renewable energy on-site, on total primary energy consumptions for buildings Operation* *
C2.6	*Share of renewable energy on-site, on total primary energy consumptions for public office/educational buildings operation* ✎
C2.7	*Share of renewable energy on-site, on final electric energy consumptions* *
C2.8	*Share of renewable energy on-site, on final electric energy consumptions for public office/educational buildings operation* ✎
C2.13	*Use of RES for thermal energy production in residential buildings* ✎

D- ATMOSPHERIC EMISSIONS	
D1	**Atmospheric emissions**
D1.2	*Total GHG Emissions from primary energy used in building operations* *

E- NON - RENEWABLE RESOURCES	
E1	**Potable water, stormwater and greywater**
E1.6	*Consumption of potable water for residential population **
E1.7	*Consumption of potable water for public office/educational building systems **
E1.8	*Consumption of potable water in public spaces*
E2	**Solid and Liquid Wastes**
E2.1	*Solid waste and recycling collection points*

F- ENVIRONMENT	
F1	**Environmental impacts**
F1.3	*Recharge of groundwater through permeable paving or landscaping **
F1.10	*Light pollution caused by exterior public lighting systems*
F2	**Outdoor environmental quality**
F2.3	*Ambient air quality with respect to particulates <10 mu (PM10) over a one year period **
F2.6	*Ambient air quality - ozone*
F3	**Ecosystems and landscapes**
F3.3	*Green zones & recreation areas density*
F3.5	*Flood protection*
F3.11	*Emergency response plan*

G- SOCIAL ASPECTS	
G1	**Safety and Accessibility**
G1.1	*Public buildings that are accessible for use by physically disabled persons*
G1.2	*Sidewalks and other pedestrian paths that are accessible for use by physically disabled persons*
G2	**Traffic and Mobility Services**
G2.1	*Performance of the public transport **
G2.3	*Smart services*
G2.4	*Quality of pedestrian and bicycle network **
G4	**Public and private facilities and services**
G4.2	*Availability and proximity of key services **
G4.3	*Availability and proximity of public schools*
G4.6	*Availability and proximity of public leisure facilities*
G6	**Management and community involvement**
G6.3	*Community involvement in urban planning activities **
G8	**Perceptual**
G8.3	*Perceived safety of public areas for pedestrians*
G8.5	*Impact of overhead electric distribution system*

b. SNTool criteria selection rationale

In this section the reason / motivation of the selection of the criteria that have been included in the HE-Attica-SNTool is described.

A- BUILT URBAN SYSTEMS	
CRITERION	**REASON / MOTIVATION**
A1.2 *Urban compactness*	*Useful and can be calculated*
A1.4 *Residential density*	*Useful and relatively easy to calculate*
A1.5 *Urban street canyons (H/W aspect ratio)*	*Very important parameter for the building performance, as it influences the microclimate and determines the solar and daylight access*
A1.7 *Conservation of Land* *****	*KPI*

B- ECONOMY	
CRITERION	**REASON / MOTIVATION**
B2.3 *Unemployment rate*	*More easy to find data for unemployment rates of the specific area's inhabitants from social services of the Municipality*
B2.4 *Economic viability of commercial occupancies*	*Interesting and can be calculated*
B2.* *Energy poverty of households*	*Interesting and can be calculated*
B3.3 *Use stage energy cost for public office/educational buildings **	*KPI*

C- ENERGY	
CRITERION	**REASON / MOTIVATION**
C1.1 *Total final thermal energy consumption for building operations **	*KPI*
C1.3 *Total final thermal energy consumption for public office/educational building operations*	*Municipalities are responsible for public/municipal buildings. Office and educational buildings are the majority of public buildings. More easy to find data. National policy. Programs for funding retrofit projects*
C1.4 *Total final electric energy consumption for building operations **	*KPI*
C1.6 *Total final electric energy consumption for public office/educational building operations*	*Municipalities are responsible for public/municipal buildings. Office and educational buildings are the majority of public buildings. More easy to find data. National policy. Programs for funding retrofit projects*
C1.7 *Total primary energy demand for building operations **	*KPI*
C1.9 *Total primary energy demand for public office/educational building operations*	*Municipalities are responsible for public/municipal buildings. Office and educational buildings are the majority of public buildings. More easy to find data. National policy. Programs for funding retrofit projects*
C1.20 *Energy consumption of public lighting*	*Useful. Municipalities have relevant data*

C2.1 *Share of renewable energy on-site, on total final thermal energy consumptions for buildings operation **	*KPI*
C2.4 *Share of renewable energy on-site, on total primary energy consumptions for buildings operation **	*Useful*
C2.6 *Share of renewable energy on-site, on total primary energy consumptions for public office/educational building operations*	*Municipalities are responsible for public/municipal buildings. Important to show the public authority's attitude towards environmental friendly strategies, More easy to find data. National policy. Programs for funding retrofit projects*
C2.7 *Share of renewable energy on-site, on final electric energy consumptions **	*KPI*
C2.8 *Share of renewable energy on-site, on final electric energy consumptions for public office/educational building operations*	*Municipalities are responsible for public/municipal buildings. Important to show the public authority's attitude towards environmental friendly strategies, More easy to find data. National policy. Programs for funding retrofit projects*
C2.13 *Use of RES for thermal energy production in residential buildings*	*Easy to calculate*

D- ATMOSPHERIC EMISSIONS

CRITERION	REASON / MOTIVATION
D1.2 *Total GHG Emissions from primary energy used in building operations **	*KPI*

E- NON - RENEWABLE RESOURCES

CRITERION	REASON / MOTIVATION
E1.6 *Consumption of potable water for residential population **	*KPI*
E1.7 *Consumption of potable water for public office/educational building systems **	*KPI*
E1.8 *Consumption of potable water in public spaces*	*Significant for municipalities.*
E2.1 *Solid waste and recycling collection points*	*Recycling is becoming more and more popular. Easy to define.*

F- ENVIRONMENT

CRITERION	REASON / MOTIVATION
F1.3 *Recharge of groundwater through permeable paving or landscaping **	*KPI*
F1.10 *Light pollution caused by exterior public lighting systems*	*This could be described through "minor, moderate, major" but it's better to be associated with the type of the street lights causing discomfort*
F2.3 *Ambient air quality with respect to particulates <10 mu (PM10) over a one year period **	*KPI*
F2.6 *Ambient air quality - ozone*	*Significant criterio for urban areas*
F3.3 *Green zones & recreation areas density*	*Green areas are of vital importance for the sustainability*

F3.5 *Flood protection*	*Significant criterio for urban areas*
F3.11 *Emergency response plan*	*Significant criterio for urban areas*

G- SOCIAL ASPECTS	
CRITERION	**REASON / MOTIVATION**
G1.1 *Public buildings that are accessible for use by physically disabled persons*	*Municipalities are responsible for public/municipal buildings. Important for public authority's to demonstrate "good practice"*
G1.2 *Sidewalks and other pedestrian paths that are accessible for use by physically disabled persons*	*Significant criterio*
G2.1 *Performance of the public transport **	*KPI*
G2.3 *Smart services*	*Significant criterio for the future*
G2.4 *Quality of pedestrian and bicycle network **	*KPI*
G4.2 *Availability and proximity of key services **	*KPI*
G4.3 *Availability and proximity of public schools*	*Better to evaluate puiblic schools in one indicator.*
G4.6 *Availability and proximity of public leisure facilities*	*Better to evaluate public leisure facilities in one indicator.*
G6.3 *Community involvement in urban planning activities**	*KPI*
G8.3 *Perceived safety of public areas for pedestrians*	*Safety is significant for urban areas*
G8.5 *Impact of overhead electric distribution system*	*Significant criterio since it affects human health*

c. SNTool weights rationale

In this section the motivation for the value of weights assigned to issues, categories and criteria is presented.

ISSUES WEIGHTS

ISSUE	WEIGHTING FACTOR (1 to 3)	MOTIVATION
A- BUILT URBAN SYSTEMS	1	Consultation from National Local Committee Members
B- ECONOMY	2	Consultation from National Local Committee Members
C- ENERGY	3	Consultation from National Local Committee Members
D- ATMOSPHERIC EMISSIONS	3	Consultation from National Local Committee Members
E- NON - RENEWABLE RESOURCES	2	Consultation from National Local Committee Members
F- ENVIRONMENT	2	Consultation from National Local Committee Members
G- SOCIAL ASPECTS	3	Consultation from National Local Committee Members

CATEGORIES WEIGHTS

Note: the categories weight results automatically from the criteria level

CATEGORIES	WEIGHT (%)
A1- Urban Structure and Form	4.6
TOTAL	**4.6**
B2- Economic activity	3.2
B3- Cost and Investment	0.7
TOTAL	**3.9**
C1- Non-renewable energy	15.3
C2- Renewable and Decarbonized energy	15.8
TOTAL	**31.1**
D1- Atmospheric emissions	13.6
TOTAL	**13.6**
E1- Potable water, stormwater and greywater	6.8
E2- Solid and Liquid Wastes	3.9
TOTAL	**10.7**
F1- Environmental impacts	4.2
F2- Outdoor environmental quality	6.2
F3- Ecosystems and landscapes	6.4
TOTAL	**16.8**
G1- Safety and Accessibility	1.5
G2- Traffic and Mobility Services	6.9
G4- Public and private facilities and services	4.4
G6- Management and community involvement	2.2
G8- Perceptual	4.4
TOTAL	**19.3**

CRITERIA WEIGHTS

CESBA MED GF-U, sheet WeightsA: B= Impact of the Potential Effect (1:minor, 2:moderate, 3:major), C=Extent of potential effect (1:block, 2:neighborhood, 3:district, 4:urban region, 5:global), D=Duration of potential effect (1:1-3years, 2:3-10 years, 3:10-30 years, 4:30-75 years, 5:>75 years)

CESBA MED SNTool, sheet WeightsB: LF = Local Factor

The pre-assigned values of weighting factors in the CESBA MED GF-U have been reviewed and some of them were accepted and some were modified.

The L.F. weighting factors were reviewed with experts from Municipality of Fylis.

A- BUILT URBAN SYSTEMS

A1- Urban Structure and Form

CRITERION	Weight (%)	B	C	D	L.F.	REASON / MOTIVATION
A1.2	*1.2*	3	2	4	*1*	
A1.4	*1.2*	3	2	4	*1*	
A1.5	*0.8*	2	2	4	*1*	*The duration of potential effect is based on the life cycle of buildings*
A1.7	*0.6*	2	2	3	*1*	*The duration of potential effect is based on current practices*
TOTAL	3.8					

B- ECONOMY

B2- Economic activity

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
B2.3	*0.6*	*3*	*3*	*1*	*1*	*The extent of potential effect is based on common demographics that unemployment is not so localized*
B2.4	*0.8*	*2*	*2*	*2*	*1*	
B2.5	*1.8*	*2*	*2*	*2*	*1.5*	

B3- Cost and Investment

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
B3.3	*0.9*	1	*2*	*3*	*1.5*	
TOTAL	4.1					

C- ENERGY

C1- Non-renewable energy

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
C1.1	*2.69*	3	*2*	*3*	*1.5*	
C1.3	*2.69*	3	*2*	*3*	*1.5*	The duration of potential effect is based on the life cycle of mechanical system
C1.4	*2.69*	3	*2*	*3*	*1.5*	The duration of potential effect is based on the life cycle of mechanical system
C1.6	*2.69*	3	*2*	*3*	*1.5*	The duration of potential effect is based on the life cycle of mechanical system
C1.7	*2.69*	3	*2*	*3*	*1.5*	The duration of potential effect is based on the life cycle of mechanical system
C1.9	*2.69*	3	*2*	*3*	*1.5*	The duration of potential effect is based on the life cycle of mechanical system
C1.20	*2.69*	3	*2*	*3*	*1.5*	The impact of Potential Effect is based on a national average of 36% of the energy cost of municipalities for public lighting. The duration of potential effect is based on the life cycle of lighting systems

C2- Renewable and Decarbonized energy

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
C2.1	*2.7*	3	*3*	*3*	*1*	The extent of potential effect is based on common practices
C2.4	*2.7*	3	*3*	*3*	*1*	The impact of Potential Effect is instrumental in meeting the national/ regional objectives and goals. The extent of potential effect is based on common practices
C2.6	*0.9*	1	*3*	*3*	*1*	The impact of Potential Effect is limited due to the low number of public buildings. The extent of potential effect is based on common practices
C2.7	*6.1*	3	*3*	*3*	*1.5*	The impact of Potential Effect is instrumental in meeting the national/ regional objectives and goals
C2.8	*1.3*	1	*3*	*3*	*1.5*	The impact of Potential Effect is limited due to the low number of public buildings. The extent of potential effect is based on common practices
C2.13	*1.8*	2	*3*	*3*	*1*	The extent of potential effect is based on common practices
TOTAL	34.4					

D- ATHMOSPHERIC EMISSIONS

D1- Atmospheric emissions

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
D1.2	*16.8*	3	*5*	*5*	*1.5*	
TOTAL	16.8					

E- NON-RENEWABLE RESOURCES

E1- Potable water, stormwater and greywater

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
E1.6	*3.0*	3	*4*	*2*	*1.25*	The extent of potential effect is based on water availability which is (or maybe) a regional issue
E1.7	*2.0*	*2*	*4*	*2*	*1.25*	*The impact of Potential Effect depends on building use which is significant for hotels, hospitals, sports facilities. The extent of potential effect is based on water availability which is (or maybe) a regional issue*
E1.8	*1.6*	*2*	*4*	*2*	*1*	*The extent of potential effect is based on water availability which is (or maybe) a regional issue*

E2- Solid and Liquid Wastes

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
E2.1	*4.0*	2	*4*	*4*	*1.25*	The extent of potential effect is based on the impact scale. The duration of potential effect is based on the average lifetime of waste
TOTAL	10.6					

F- ENVIRONMENT

F1- Environmental impacts

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
F1.3	*2.7*	3	*3*	*3*	*1*	The impact of Potential Effect is instrumental in preventing floods. The extent of potential effect is based on the impacts that may extend beyond neighborhood boundaries to nearby districts
F1.10	*0.8*	*2*	*2*	*2*	*1*	

F2- Outdoor environmental quality

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
F2.3	*2.7*	3	*3*	*3*	*1*	
F2.6	*2.4*	*2*	*3*	*1*	*1*	*The extent of potential effect refers to the entire district not to the neighborhood scale, unless there are major topographic irregularities. The duration of potential effect is based on average lifetime of 0.05 years*

F3- Ecosystems and landscapes

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
F3.3	*0.8*	2	*2*	*2*	*1*	
F3.5	*3.4*	*3*	*3*	*3*	*1.25*	
F3.11	*1.8*	*3*	*3*	*2*	*1*	
TOTAL	14.5					

G- SOCIAL ASPECTS

G1- Safety and Accessibility

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
G1.1	*0.6*	2	*2*	*1*	*1*	The duration of potential effect is based on practical time frame for adapting existing infrastructures and buildings
G1.2	*0.6*	*2*	*2*	*1*	*1*	*The duration of potential effect is based on practical time frame for adapting existing infrastructures and buildings*

G2- Traffic and Mobility Services

CRITERION	Weight (%)	B	C	D	L.F.	REASON/MOTIVATION
G2.1	*2.7*	3	*2*	*3*	*1*	
G2.3	*1.2*	*2*	*2*	*2*	*1*	

G2.4	*1.8*	*2*	*2*	*3*	*1*	
G4- Public and private facilities and services						
CRITERION	**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
G4.2	*1.2*	2	*2*	*2*	*1*	The duration of potential effect is based on practical time frame for reallocation of public services
G4.3	*1.2*	*2*	*2*	*2*	*1*	*The duration of potential effect is based on practical time frame for reallocation of public schools*
G4.6	*1.2*	*2*	*2*	*2*	*1*	*The duration of potential effect is based on practical time frame for reallocation of public sports and cultural infrastructures*
G6- Management and community involvement						
CRITERION	**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
G6.3	*1.8*	2	*2*	*3*	*1*	The duration of potential effect is based on practical time frame for urban design plans
G8- Perceptual						
CRITERION	**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
G8.3	*1.8*	3	*2*	*2*	*1*	The impact of Potential Effect is detrimental for the citizens' quality of life
G8.5	*1.8*	*2*	*3*	*2*	*1*	
TOTAL	15.9					

L.F. REASON/MOTIVATION: the municipality's priorities is to reduce energy consumption and energy cost, to produce electricity from PV, to reduce CO2 emissions. Self-efficiency in water, recycle and anti-flooding protection are secondary targets.

d. SNTool benchmarks rationale

In this section the motivation of the value of benchmarks assigned to the different criteria for score 0 (minimum acceptable performance) and for score 5 (excellent and ideal performance) is described. In order to set the benchmark values, we have integrated national/ local policies, guidelines, statistics and good practice. The Regional benchmarks are set for Attica Prefecture, while the Local benchmarks for the Municipality of Fylis (differentiation only in C1:Non-renewable energy, presented in brackets).

A- URBAN STRUCTURE AND FORM				
CRITERION	INDICATOR	UNIT	BENCHMARK	RATIONALE
A1.2	*Relation between the usable space of the buildings (volume) and the net developable area (area).*	m^3/ha	*0: 60,000* *5: 30,000*	*Based on the Hellenic New Building Regulation the ratio of the usable space of the buildings (volume) to the net developable area (area) ranges between 6 and 3 m^3/m^2. [Νόμος 4447/2016: Χωρικός σχεδιασμός - Βιώσιμη ανάπτυξη και άλλες διατάξεις].*
A1.4	*The ratio of total residential population relative to the total land area for all developed residential blocks within the local area.*	*pp/ha*	*0: 600* *5: 100*	*Values between 100-600 persons / ha are typical for most urban and semi-urban areas [ΦΕΚ 285_2004_ΠΟΛΕΟΔΟΜΙΚΑ ΣΤΑΘΕΡΟΤΥΠΑ]*

A1.5	*The ratio of typical building heights compared to the distance between building facades on the other side of the street*	-	*0: 0.1* *5: 0.5*	
		In order to have efficient solar exposure during winter in urban areas for the location of Attica, a typical value for the ratio of building heights compared to the distance between building facades on the other side of the street is 0.5		
A1.7	*Undeveloped land considered to be of value for ecological or agricultural purposes*	*%*	*0: 10* *5: 20*	
		Indicative empirical values.		

B- ECONOMY				
CRITERION	INDICATOR	UNIT	BENCHMARK	RATIONALE
B2.3	*Average unemployment rate, over a 5-year period*	%	*0: 10* *5: 5*	*Score 0 corresponds to statistical data for Attica for the years before 2008.*
B2.4	Ratio of vacancies in commercial buildings (offices, shops), over a 5-year period.	*%*	*0:25* *5: 5*	*Score 0 corresponds to statistical data for Attica for the years before 2008.*
B2.5	Ratio of households suffering from energy poverty	*%*	*0:10* *5: 5*	*Score 0 corresponds to statistical data for Attica for the years before 2008.*
B3.3.	Annual energy costs of public office/educational buildings	*Euro/m²*	*0: 17.7* *5:4.1*	
		Score 0 corresponds to the energy cost for the thermal and electrical energy consumption of the public office/ educationals building of the dominant energy class (as estimated in C1.3 and C1.6), while Score 5 to the energy cost for consumptions of energy class A+. It is assumed that thermal energy is covered by fuel oil. An increase of 20% is considered in order to take into account energy cost for equipment and installations. **COMMENT: All uses are taken into account, including equipment and installations (unlike energy related indicators). Usefull area with internal dimensions is used.**		

C- ENERGY				
CRITERION	INDICATOR	UNIT	BENCHMARK	RATIONALE
C1.1	*Urban thermal energy consumption of building operations*	*kWh/m2*	*0: 314.0 (323.2)* *5: 21.1 (16.1)*	*Very difficult to get metered data, especially for residential and privately owned non-residential buildings.* *Use of statistical / calculated data.*

		Thermal energy consumption for all building uses, was defined as the weighted average for different building uses. The breakdown of whole buildings per building use in Attica Prefecture was defined using data from the Hellenic Statistical Authority (HSA). Due to lack of significant sample for the Municipality of Fylis, the weighted average was not used for the local benchmarking. *The average thermal consumption for whole buildings per building use and energy class in Attica Prefecture (Municipality of Fylis) was defined using data from the Energy Performance Certificates (EPC) electronic repository (buildingcert). For this reason, calculated data for thermal consumption for space heating (SH) and Domestic Hot Water (DHW) from a single fuel (fuel oil, natural gas or biomass), were used, and also adapted for external (TEEKENAK) to internal (CESBAMED) dimensions.* *For each building use, score 0 corresponds to the consumption of the dominant energy class, while score 5 to the consumption of energy class A+ (33% of class B).*		
C1.3	*Urban thermal energy consumption of public office/educational building operations*	*kWh/m2*	*0: 68.1 (62.3)* *5: 11.5 (10.5)*	*Very difficult to get metered data.* *Use of statistical / calculated data.*
		No weighted average for building uses. Averages from EPC for office/ educational building uses, similar to C1.1.		
C1.4	*Urban electrical energy consumption of building operations*	*kWh/m2*	*0: 64.2 (67.6)* *5: 7.9 (10.8)*	*Very difficult to get metered data, especially for residential and privately owned non-residential buildings.* *Use of statistical / calculated data.*
		Similar to C1.1 with the exception that all end uses (space heating, space cooling and domestic hot water) were taken into account.		
C1.6	*Urban electrical energy consumption of public office/ educational building operations*	*kWh/m2*	*0: 90.1 (100.5)* *5: 24.1 (32.6)*	*Very difficult to get metered data.* *Use of statistical / calculated data.*
		No weighted average for building uses. Averages from EPC for office/ educational building uses, similar to C1.4.		
C1.7	*Annual total primary energy consumption per internal useful floor area*	*kWh/m2*	*0: 461.9 (528.2)* *5: 38.2 (41.9)*	*Very difficult to get metered data, especially for residential and privately owned non-residential buildings.* *Use of statistical / calculated data.*
		Similar to C1.1, with the exception that all end uses (space heating, space cooling and domestic hot water) were taken into account.		
C1.9	*Annual total primary energy consumption per internal useful floor area of public office/ educational buildings*	*kWh/m2*	*0: 286.4 (346.9)* *5: 74.5 (94.4)*	*Very difficult to get metered data.* *Use of statistical / calculated data.*

<table>
<tr><td></td><td></td><td colspan="3">Similar to C1.3, with the exception that all end uses (space heating, space cooling and domestic hot water) were taken into account.</td></tr>
<tr><td rowspan="2">C1.20</td><td rowspan="2">Annual electrical consumption by outdoor public lighting systems</td><td rowspan="2">kWh/m2</td><td>0: 0.72
5: 0.50</td><td>For calculated data.</td></tr>
<tr><td colspan="2">From discussions with a member of Local Committee, expert on lighting, Score 0 the consumption for a typical public lighting planning for neighborhoods during 1990. Score 5¨about 30% decrease for new led lighting fixtures</td></tr>
<tr><td rowspan="2">C2.1</td><td rowspan="2">Ratio of on-site renewable thermal energy consumption to the total thermal energy consumptions of all buildings</td><td rowspan="2">%</td><td>0: 4
5: 14</td><td>Very difficult to get metered data.
Use of statistical/ estimated/ calculated data.</td></tr>
<tr><td colspan="2"><u>Score 0</u> corresponds to 50% of the buildings covering 60% of their DHW energy consumption from on-site renewable energy sources.
<u>Score 5</u> corresponds to 100% of the buildings covering 100% of their DHW energy consumption from on-site renewable energy sources.
The average ratio of the DHW energy consumption to the thermal energy consumption for whole buildings in Attica Prefecture was defined using calculated data from the Energy Performance Certificates (EPC) electronic repository (buildingcert). (Buildings with fuel oil, natural gas or biomass for space heating and electricity, fuel oil, natural gas or biomass for DHW).</td></tr>
<tr><td rowspan="2">C2.7</td><td rowspan="2">Ratio of on-site renewable electrical energy consumption to the total electrical energy consumption of all buildings</td><td rowspan="2">%</td><td>0: 1
5: 47</td><td>Very difficult to get metered data.
Use of statistical/ estimated data.</td></tr>
<tr><td colspan="2">The breakdown of whole buildings in residential and non-residential in Attica Prefecture was defined using data from the Hellenic Statistical Authority (HAS) (the breakdown is almost similar for the Municipality of Fylis).
<u>Score 0</u> corresponds to 5% of the residential buildings covering 25% of their electrical energy consumption from on-site renewable energy sources,
<u>Score 5</u> corresponds to 50% of the residential and 20% of the non-residential buildings covering 100% of their electrical energy consumption from on-site renewable energy sources.</td></tr>
<tr><td rowspan="2">C2.8</td><td rowspan="2">Ratio of on-site renewable electrical energy consumption to the total electrical energy consumption of public office/ educational building</td><td rowspan="2">%</td><td>0: 0
5: 20</td><td>Very difficult to get metered data.
Use of statistical/ estimated data</td></tr>
<tr><td colspan="2"><u>Score 0</u> corresponds to 0% of the public office/ educational buildings covering a part of their electrical energy consumption from on-site renewable energy sources,
<u>Score 5</u> corresponds to 20% of the public office/ educational buildings covering 100% of their electrical energy consumption from on-site renewable energy sources.</td></tr>
</table>

C2.13	*Ratio of residential buildings with renewable systems for thermal energy production*	*%*	*0: 38* *5: 100*	*Score 0 corresponds to the average number of households with solar collectors (data from the Hellenic Statistical Authority)*

D- ATMOSPHERIC EMISSIONS				
CRITERION	INDICATOR	UNIT	BENCHMARK	RATIONALE
D1.2	*CO2 equivalent emissions per useful internal floor area per year*	*kg CO2 eq./m2/yr*	*0: 46* *5: 5*	
		Score 0 corresponds to CO2 equivalent emissions for the thermal and electrical energy consumption of the buildings of the dominant energy class *Score 5 corresponds to the CO2 equivalent emissions for consumptions of energy class A+ (as estimated in C1.1 and C1.4). It is assumed that thermal energy is covered by fuel oil.*		

E- NON-RENEWABLE RESOURCES				
CRITERION	INDICATOR	UNIT	BENCHMARK	RATIONALE
E1.6	*Water consumption per inhabitant in residential buildings (annually)*	*m^3 / occupant*	*0: 62.1* *5: 18.6*	Use of statistical/ estimated data
			Score 0 corresponds to the average water consumption of a typical household in Attica Prefecture, based on statistical data from ELSTAT. *Score 5 corresponds to a reduction up to 70% of the typical consumption, based on a published article.*	
E1.7	*Water consumption per m^2 in public office/educational buildings (annually)*	*m^3 / m^2*	*0: 0.65* *5: 0.33*	
		Score 0 corresponds to the weighted average of the water consumption for school and educational buildings, based on their surface. *Score 5 corresponds to a reduction up to 50%, based on discussions with National Local Committee Members.*		
E1.8	*Water consumption in public spaces*	*m^3 / m^2 watered surface*	*0: 0.73* *5: 0.51*	
		Score 0 corresponds to the weighted average of the water consumption for school and educational buildings, based on their surface. *Score 5 corresponds to a reduction up to 30%, based on discussions with National Local Committee Members.*		
E2.1	*Ratio of residents located within a walking distance of 100 m from*	*%*	*0: 60*	*Based on discussions with National Local Committee*

	solid waste and recycling collection point.		*5: 100*	*Members*

F- ENVIRONMENT				
CRITERION	INDICATOR	UNIT	BENCHMARK	RATIONALE
F1.3	*Percentage of water flowing through the ground*	*%*	*0: 15*	*Based on discussions with National Local Committee Members*
			5: 80	
F1.10	*Ratio of cut-off public lighting fixtures*	%	*0: 10*	*Based on discussions with National Local Committee Members*
			5: 100	
F2.3	*Number of days exceeding the daily limits for PM10 in a year*	days	*0: 35*	*Score 0 based on European Air quality Standards*
			5: 0	
F2.6	*Number of days exceeding the daily limits for ozone in a year*	days	*0: 25*	*Score 0 European Air quality Standards*
			5: 0	
F3.3	*Ratio of green spaces to the total area*	%	*0: 5*	Based on discussions with National Local Committee Members
			5: 30	
F3.5	*Flood protection*	*Text*	*0:*	*There is an implemented flood protection plan, but it hasn't been tested yet*
			5:	*There is an implemented flood protection plan, it has been successfully tested*
F3.11	*Emergency response plan*	*Text*	*0:*	*There is an emergency response plan on a local level. No operational exercises*
			5:	*There is an emergency response plan on a local level. Scheduled operational exercises*

G- SOCIAL ASPECTS				
CRITERION	INDICATOR	UNIT	BENCHMARK	RATIONALE
G1.1	*Percent of key public, buildings that are accessible for use by physically disabled persons*	%	*0: 50*	*Based on discussions with National Local Committee Members*
			5: 100	
G1.2	*Sidewalks and other pedestrian ways that are accessible for use by physically disabled persons*	*Text*	*0:*	*Sidewalks and pedestrian ways of the main network, accessible by physically disabled persons*

			5:	*All sidewalks and pedestrian ways accessible by physically disabled persons. Traffic lights with sound in all main roads.*
G2.1	*Percent of inhabitants that are within 400 meters walking distance of at least one public transportation stop*	%	*0: 50*	*Based on discussions with National Local Committee Members*
			5: 100	
G2.3	*Availability of smart services*	*Text*	*0:*	*Automated bicycle rental system*
			5:	*Free charging station for electric or plug-in hybrid vehicle*
G2.4	*Total walkway meters of dedicated pedestrian paths and meters of bicycle path per 100 inhabitants*	*m/100 inhabitants*	*0:2*	*Based on statistical data for Attica Prefecture (https://www.smu.gr/greece_cycle_map/)*
			5: 20	*Based on data from Municipality of Trikala, which is considered as good example*
G4.2	*Percentage of inhabitants within 800m walking distance of at least 3 key services*	%	*0: 50*	*Based on discussions with National Local Committee Members*
			5: 90	
G4.3	*Percent of inhabitants within 700m walking distance from at least one public school*	%	*0: 70*	*Based on discussions with National Local Committee Members*
			5: 100	
G4.6	*Percent of inhabitants located within a distance of 1000 m from at least one public leisure facility*	%	*0: 50*	*Based on discussions with National Local Committee Members*
			5: 100	
G6.3	*Level of involvement of users in urban planning.*	*Text*	*0:*	*Degree of tokenism. Providing inhabitants and users mainly with the information about the urban project*
			5:	*Degree of citizens power at all stages of the project*
G8.3	*Perceived safety of public places and pedestrian routes*	*Text*	*0:*	*Adequate safety only during daytime.*
			5:	*Very high safety during daytime and night*
G8.5	*Health and safety risks from overhead electric distribution system*	*Text*	*0:*	Overhead high power cables at least 100m from the buildings or/and overhead MV power cables with voltage transformers close to the buildings
			5:	No overhead electric distribution system

e. SNTool Criteria Specifications

In this section for each selected criterion the presentation includes:

- *Information source: The source of the data/information that can 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 that can be 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.*

➢ The presentation that follows describes in details the relevant values that have been calculated for the Hellenic Training Phase in Municipality of Fylis

➢ Relevant information are also provided in the Training Material

A- BUILT URBAN SYSTEMS			
CRITERION	INDICATOR	SPECIFICATIONS	
A1.2	*Urban compactness*	*Information source*	*Measured data, studies*
		Assessment method	*CESBAMED calculation steps:* *1. Calculate the aggregate gross volume of all buildings in the local area, m^3.* *2. Calculate the net developable area by subtracting the surface area used for parks, streets, parking and pedestrian areas from the gross surface area of the local area, ha.* *3. Determine the ratio of the aggregate volume of buildings to the net local developable area, m^3/ha.* *NOA pilot steps/comments:* *Define the number of buildings included in the selected area. Define the land area covered by buildings. Define the number of floors for each building. Assuming typical floor height about 3.5 m, calculate the volume of each building above ground. Calculate the ratio of the total volume of the buildings above ground to the land area covered by buildings (27909 m3/ha)*
		Standard	*Insert text here*
A1.4	*Residential density*	*Information source*	*Measured data, studies, statistical data*
		Assessment method	*CESBAMED calculation steps:* *1. Identify ground surface area of properties being used for residential purposes,m^2.* *2. Identify the total residential population for the relevant residential buildings.* *3. Calculate the residential density.* *NOA pilot steps/comments:*

			From an on-site audit in the testing area, the number of residential buildings, the land area covered by residential buildings, as well as the number of households were defined. According to ELSTAT, the typical number of persons in the average household of West Region of Attica Prefecture, is 3. The total number of residents in the selected area was calculated. The ratio of the number of residents to the land area covered by residential buildings was calculated. (151 residents/ha)
		Standard	*Insert text here*
A1.5	***Urban street canyons (H/W aspect ratio)***	***Information source***	***Measured data, estimations***
		Assessment method	*CESBAMED calculation steps:* *Calculate the ratio of typical building heights compared to the distance between building facades on opposite sides of the street* *NOA pilot steps/comments:* *From an on-site audit in the testing area, the width of the roads, as well as the number of floors for all buildings were defined. Define the typical road width (8m). For these roads define the number of floors of the typical building (2). Assuming typical floor height about 3.5 m, calculate the ratio height to width (0.9)*
		Standard	*Insert text here*
A1.7	*Conservation of Land **	***Information source***	***Measured data, studies***
		Assessment method	*CESBAMED calculation steps:* *1. Determine the gross surface area of the neighbourhood* *2. Determine the aggregate surface area of land that is considered by authorities to be of ecological and agricultural value* *3. Subtract the aggregate undeveloped area from the gross surface area of the urban area, which should equal to the total area developed for buildings, streets, vehicle parking and other infrastructures* *NOA pilot steps/comments:* *From maps of the area, the land that is considered as ecological and agricultural was defined. (0%)*
		Standard	*Insert text here*

B- ECONOMY			
CRITERION	INDICATOR	SPECIFICATIONS	
B2.3	*Unemployment rate*	*Information source*	*Statistical data*
		Assessment method	*CESBAMED calculation steps:* *Define the number of unemployed persons within the area. Calculate the ratio of unemployed to the total persons living in the area* *NOA pilot steps/comments:* *From the corresponding department of the Municipality, the average unemployment rate was not officially reported, but estimated. (22%)*
		Standard	
B2.4	*Economic viability of commercial occupancies*	*Information source*	*Measured data*
		Assessment method	*CESBAMED calculation steps:* *Define the number of commercial occupancies within the selected area. Define the number of empty commercial occupancies. Calculate the ratio empty to total commercial occupancies* *NOA pilot steps/comments:* *From an on-site audit in the testing area, the number of number of commercial occupancies as well as the number of empty commercial occupancies were defined (29%)*
		Standard	*Insert text here*
B2.5	*Energy poverty of households*	*Information source*	*Estimated – Statistical data*
		Assessment method	*CESBAMED calculation steps:* *1. Define the number of households in the area.* *2. Define the number of households claiming inability to keep home adequately warm during winter* *3. Calculate the ratio of households claiming inability to keep home adequately warm to the total number of households (x100).* *NOA pilot steps/comments:* *From the Hellenic Statistical Authority (HSA) the average percentage of households with inadequate heating during winter period was defined on a national basis. (26%)*
		Standard	*Insert text here*
B3.3	*Use stage energy cost for public office/educational buildings **	*Information source*	*Estimated -Statistical data*
		Assessment method	*CESBAMED calculation steps:* Sum of the running energy costs of each public

			building in the area up to an aggregated running costs energy value. The total cost must be normalized per the total indoor useful area of public buildings *NOA pilot steps/comments:* *From an energy study carried out for the Municipal Unit of Ano Liosia, based on the national calculation method for the energy efficiency of buildings,, data for the operational cost for the municipal office/educational buildings within the pilot area were available. An increase of 20% was taken into account in order to take into account other electrical consumptions not considered in the national method (20.4 Euro/m²)* **COMMENT**: **All uses are taken into account, including equipment and installations (unlike energy related indicators). Usefull area with internal dimensions is used.**
		Standard	*Insert text here*

C- ENERGY			
CRITERION	INDICATOR	SPECIFICATIONS	
C1.1	*Total final thermal energy consumption for building operations **	*Information source*	*Calculated – Monitored data. For the evaluation of the actual performance of the urban area it is preferable to use metered data. If metered data aren't available, estimated data should be used.*
		Assessment method	*CESBAMED calculation steps:* *The following energy uses are considered: heating, cooling, domestic hot water.* *<u>Use of calculated data</u>:* *1. Calculate the annual total final thermal energy consumption,for each building in the local area, kWh* *2. Calculate the aggregated annual total final thermal energy consumption for all buildings* *3. Calculate: Aggregated annual total final thermal energy consumption / Total internal area of all buildings* *Calculations are based on EN 13790 using the quasi-steady state monthly method* *<u>Use of monitored/ metered data</u>:* *1. Data collection of the monitored annual total final thermal energy consumption, for each building in the local area, kWh. The consumption data have to be estimated taking the average over 3 years period* *2. Calculate the aggregated annual total final thermal energy consumption for all buildings* *3. Calculate: Aggregated annual total final*

			thermal energy consumption / Total internal area of all buildings *Note: Cooling and lighting are included in order to consider the potential use of, for example, CHP or trigeneration for generating electricity that may then be used for lighting and heat for sorption cooling.* *NOA pilot steps/comments:* From calculated - statistical data. The average thermal consumption for buildings within the testing area was defined based on the average thermal consumption for residential and non residential buildings in Attica Prefecture using data for whole buildings from the Energy Performance Certificates (EPC) electronic repository (buildingcert), as well as calculated data for the public offce/educational buildings from an energy study carried out for the Municipal Unit of Ano Liosia. From EPC database, calculated data for thermal consumption for space heating (SH) and Domestic Hot Water (DHW) from a single fuel (fuel oil, natural gas or biomass), were used, and also adapted for external (TEEKENAK) to internal (CESBAMED) dimensions. From an on-site audit in the testing area, the total floor area of all buildings as well as of residential buildings (internal dimensions) were estimated. (155.4 kWh/m^2)
		Standard	*EN ISO 13790 (Energy performance of buildings. Calculation of energy use for space heating and cooling)* *ec.europa.eu/energy/en/topics/energy-efficiency/buildings* *https://www.iea.org/publications/freepublications/.../buildings_certification.pdf* *www.theicct.org/sites/default/files/.../ICCTupdate_EU95gram_jan2014.pdf*
C1.3	*Total final thermal energy consumption for public office/educational building operations*	*Information source*	*Calculated – Monitored data. For the evaluation of the actual performance of the urban area it is preferable to use metered data. If metered data aren't available, estimated data should be used.*
		Assessment method	*CESBAMED calculation steps:* *The following energy uses are considered: heating, cooling, domestic hot water.* *<u>Use of calculated data</u>:* *1. Calculate the annual total final thermal energy consumption for each public building in the local area, kWh* *2. Calculate the aggregated annual total final thermal energy consumption for all public buildings* *3. Calculate: Aggregated annual total final thermal energy consumption / Total internal area of all public buildings*

			Calculations are based on EN 13790 using the quasi-steady state monthly method *<u>Use of monitored/ metered data</u>:* *1. Data collection of the monitored annual total final thermal energy consumption for each public building in the local area, kWh. The consumption data have to be estimated taking the average over 3 years period* *2. Calculate the aggregated annual total final thermal energy consumption for all public buildings* *3. Calculate: Aggregated annual total final thermal energy consumption / Total internal area of all public buildings* *Note: Cooling and lighting are included in order to consider the potential use of, for example, CHP or trigeneration for generating electricity that may then be used for lighting and heat for sorption cooling.* *NOA pilot steps/comments:* *From calculated data. From an energy study carried out for the Municipal Unit of Ano Liosia, data for thermal consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions. Calculate the ratio of total thermal energy consumption to the total internal area for all public buildings in the area with thermal energy consumption. (73.6 kWh/m²)*
		Standard	*EN ISO 13790 (Energy performance of buildings. Calculation of energy use for space heating and cooling)* *ec.europa.eu/energy/en/topics/energy-efficiency/buildings* *https://www.iea.org/publications/freepublications/.../buildings_certification.pdf* *www.theicct.org/sites/default/files/.../ICCTupdate_EU95gram_jan2014.pdf*
		Information source	*Calculated – Monitored data. For the evaluation of the actual performance of the urban area it is preferable to use metered data. If metered data aren't available, estimated data should be used.*
C1.4	*Total final electric energy consumption for building operations **	*Assessment method*	*CESBAMED calculation steps:* *The following energy uses are considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting* *<u>Use of calculated data</u>:* *1. For each building in the local area, calculate the annual final electric energy consumption in kilowatt hours, kWh.* *2. Sum the annual final electric energy consumption of each building.* *3. Sum the internal useful area of each building in the area, m2.* *4. Calculate the indicator's value as: aggregated*

			annual total final electric energy consumption/ aggregated internal useful area, kWh/m2 *Calculations are based on EN 13790 using the quasi-steady state monthly method* *<u>Use of monitored/ metered data</u>:* *1. For each building in the local area, collect the metered annual final electric energy consumption, kWh* *2. Sum the annual final electric energy consumption of each building* *3. Sum the internal useful area of each building in the area, m2.* *4. Calculate the indicator's value as: aggregated annual total final electric energy consumption/ aggregated internal useful area, kWh/m2* *The metered energy consumption is suitable for the indicator's calculation only if the building has been in use for 3-years* *NOA pilot steps/comments:* *From calculated - statistical data. The average electric energy consumption for buildings within the testing area was defined based on the average electric energy consumption for residential and non residential buildings in Attica Prefecture using data for whole buildings from the Energy Performance Certificates (EPC) electronic repository (buildingcert), as well as calculated data for the public offce/educational buildings from an energy study carried out for the Municipal Unit of Ano Liosia, and also adapted for external (TEEKENAK) to internal (CESBAMED) dimensions. From an on-site audit in the testing area, the total floor area of all buildings as well as of residential buildings (internal dimensions) were estimated. (77.7 kWh/m^2)*
		Standard	*EN ISO 13790 (Energy performance of buildings. Calculation of energy use for space heating and cooling)*
C1.6	*Total final electric energy consumption for public office/educational building operations*	*Information source*	*Calculated – Monitored data. For the evaluation of the actual performance of the urban area it is preferable to use metered data. If metered data aren't available, estimated data should be used.*
		Assessment method	*CESBAMED calculation steps:* *The following energy uses are considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting.* *<u>Use of calculated data</u>:* *1. For each public building in the local area, calculate the annual final electric energy consumption, kWh* *2. Sum the annual final electric energy consumption of each public building* *3. Sum the internal useful area of each public building in the area, m2*

			4. Calculate the indicator's value as: aggregated annual total final electric energy consumption/ aggregated internal useful area, kWh/m2 *Calculations are based on EN 13790 using the quasi-steady state monthly method* *<u>Use of monitored/ metered data</u>:* *1. For each public building in the local area, collect the metered annual final electric energy consumption, kWh/year* *2. Sum the annual final electric energy consumption of each public building* *3. Sum the internal useful area of each public building in the area, m2* *4. Calculate the indicator's value as: aggregated annual total final electric energy consumption/ aggregated internal useful area, kWh/m2* *The metered energy consumption is suitable for the indicator's calculation only if the building has been in use for 3-years* *NOA pilot steps/comments:* *From calculated data. From an energy study carried out for the Municipal Unit of Ano Liosia, data for electric energy consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions. Calculate the ratio of total electric energy energy consumption to the total internal area for all public buildings in the area with electric energy consumption. (145.1 kWh/m^2)*
		Standard	*Insert text here*
		Information source	*Calculated data..*
C1.7	*Total primary energy demand for building operations **	*Assessment method*	*CESBAMED calculation steps:* *The following energy uses are considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting.* *1. For each building in the local area, calculate the annual final (thermal and electric) energy consumption per energy carrier, kWh* *3. Sum the annual final energy consumption of each building* *per energy carrier* *4. Using the national conversion factors, convert the aggregated annual final energy consumption per energy carrier in annual primary energy consumption, kWh* *5. Sum the annual primary energy consumption* *6. Sum the internal useful area of each building in the area, m2* *7. Calculate the indicator's value as: aggregated annual total primary energy consumption /*

			aggregated internal useful area, kWh/m2 *Calculations are based on EN 13790 using the quasi-steady state monthly method.* *NOA pilot steps/comments:* *From calculated - statistical data. Based on the Total final thermal energy consumption for building operations (C.1.1) and the Total final electrical energy consumption for building operations (C1.4) that have been calculated. Taking into account the conversion factors for fuel oil and electricity the total primary enerrgy consumption was calculated (396.3 kWh/m²)*
		Standard	*EN ISO 13790 (Energy performance of buildings. Calculation of energy use for space heating and cooling)*
C1.9	*Total primary energy demand for public office/educational building operations*	*Information source*	*Estimated data*
		Assessment method	*CESBAMED calculation steps:* *The following energy uses are considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting.* *1. For each public building in the local area, calculate the annual final (thermal and electric) energy consumption per energy carrier, kWh* *3. Sum the annual final energy consumption of each public building per energy carrier* *4. Using the national conversion factors, convert the aggregated annual final energy consumption per energy carrier in annual primary energy consumption, kWh* *5. Sum the annual primary energy consumption* *6. Sum the internal useful area of each public building in the area, m2* *7. Calculate the indicator's value as: aggregated annual total primary energy consumption / aggregated internal useful area, kWh/m2* *Calculations are based on EN 13790 using the quasi-steady state monthly method.* *NOA pilot steps/comments:* *From calculated data. Based on the Total final thermal energy consumption for public office/educational building operations (C.1.3) and the Total final electrical energy consumption for public office/educational building operations (C1.6) that have been calculated. Taking into account the conversion factors for fuel oil and electricity the total primary enerrgy consumption for public office/educational building was calculated (501.8 kWh/m²)*
		Standard	*EN ISO 13790 (Energy performance of buildings. Calculation of energy use for space heating and cooling)*

		Information source	*Calculated - Metered data*
C1.20	*Energy consumption of public lighting*	*Assessment method*	*CESBAMED calculation steps:* *1. Calculate the total annual energy consumption for public lighting in the area, kWh* *2. Calculate the ratio of total energy consumption for public lighting to the total gross surface of the area, kWh/m²* *NOA pilot steps/comments:* *From calculated data. From an energy study carried out for the Municipal Unit of Ano Liosia, data for the installed power of the lighting fixtures for public lighting within testing area were available. Based on the energy study, public lighting is turned on for 11 hours per day for 365 days per year. Calculate the ratio of total energy consumption for public lighting to the total gross surface of the area. (0.57 kWh/m²)*
		Standard	*Insert text here*
C2.1	*Share of renewable energy on-site, on total final thermal energy consumptions for buildings operation **	*Information source*	*Calculated – Monitored data. For the evaluation of the actual performance of the urban area it is preferable to use metered data. If metered data aren't available, estimated data should be used.*
		Assessment method	*CESBAMED calculation steps:* *The following energy uses are considered: heating, cooling, domestic hot water.* *<u>Use of estimated data</u>:* *1. For each building in the local area, calculate the annual final thermal energy consumption, kWh* *2. Sum the annual final thermal energy consumption of each building* *3. For each building in the local area, calculate the annual final thermal energy consumption from on-site renewable energy sources, kWh* *4. Sum the annual final thermal energy consumption from on-site renewable sources of each building* *6. Calculate the indicator as: annual total final thermal energy consumption from on-site renewable sources / annual total final thermal energy consumption.* *Calculations are based on EN 13790 using the quasi-steady state monthly method.* *<u>Use of metered data</u>:* *1. For each building in the local area, collect the metered annual final thermal energy consumption, kWh* *2. Sum the annual final thermal energy consumption of each building* *3. For each building in the local area, collect the monitored annual final thermal energy*

consumption from on-site renewable sources, kWh
4. Sum the annual final thermal energy consumption from on-site renewable sources of each
building
5. Calculate the indicator as: annual total thermal energy generation from on-site renewable
energy sources / annual total final thermal energy consumption.
The metered energy consumption is suitable for the indicator's calculation only if the building has been in use for 3-years

NOA pilot steps/comments:
From calculated - statistical – estimated data. From an on-site audit in the testing area, the total number of households and the number of solar collectors were defined. Assuming that each solar collector corresponds to one household, the percentage of households with solar collectors was defined. The total floor area of all buildings as well as of households with solar collectors (internal dimensions) was estimated. The average thermal consumption for domestic hot water in residential buildings within the testing area, was defined based on the average thermal consumption for buildings in Attica Prefecture, using data for whole buildings from the Energy Performance Certificates electronic repository (buildingcert). Assuming that households with solar collector cover 60% of their energy consumption for domestic hot water (according to KENAK), the total thermal energy consumption from on-site renewable energy sources was defined as the 60% of the product of the average thermal energy consumption for DHW with the total floor area of households with solar collectors in the area. The thermal consumption for all buildings within testing area, was defined as the product of the average thermal energy consumption (from C1.1) with the total floor area of all buildings in the area. The ratio of the total thermal energy consumption from on-site renewable energy sources to the total thermal consumption for all buildings was calculated (3.4%)
COMMENT: If the denominators was not defined by the average thermal energy then it should be calculated as the thermal consumption (non renewable) plus the total thermal energy consumption from on-site renewable energy sources

		Standard	*EN 13790 (Energy performance of buildings. Calculation of energy use for space heating and cooling)* *2013/114/EU: Commission Decision of 1 March 2013.*
		Information source	*Calculated – Monitored data. For the evaluation of the actual performance of the urban area it is preferable to use metered data. If metered data aren't available, estimated data should be used.*
C2.4	*Share of renewable energy on-site, on total primary energy consumptions for buildings operation.*	*Assessment method*	*CESBAMED calculation steps:* *The following energy uses are considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting* *1. For each building in the local area, calculate or collect the metered annual final (thermal and electric) energy consumption, kWh* *2. Sum the annual final energy consumption of each building up to an aggregated annual final energy consumption per energy carrier* *3. For each building in the local area, calculate the annual final thermal energy consumption from on-site renewable energy sources, kWh* *4. Using the national conversion factors, convert the aggregated annual final energy consumption per energy carrier in annual primary energy consumption per energy carrier, kWh.* *5. Sum the annual primary energy consumption per energy carrier up to an aggregated annual total primary energy consumption, kWh.* *6. For each building in the local area, calculate the annual final (thermal and electric) energy consumption per on-site renewable energy source (P.V, solar thermal panels), kWh* *7. Sum the annual final energy consumption from on-site renewable energy sources of each building up to an aggregated annual final energy consumption per on-site renewable energy source, kWh.* *8. Using the national conversion factors, convert the aggregated annual final energy consumption per on-site renewable energy source in annual primary energy consumption per on-site renewable energy source, kWh. Estimate the total primary energy from RES for each energy carrier displaced, e.g. electricity from PVs that displaces electricity from the grid or thermal energy from solar collectors that displaces the use of heating oil* *9. Sum the annual primary energy consumption per on-site renewable energy source up to an aggregated annual total primary energy consumption from on-site renewable energy sources (kWh/year).* *10. Calculate the indicator's value as: aggregated total annual primary energy consumption from on-site renewable energy sources / aggregated total annual primary*

			energy consumption. *The metered energy consumption is suitable for the indicator's calculation only if the building has been in use for 3-years.* *NOA pilot steps/comments:* *From calculated - statistical – estimated data. The average thermal energy consumption from on-site renewable energy sources was defined in C2.1. From the Energy Performance Certificates for Attica Prefecture, the breakdown of fuelas used in domestic hot water was defined and the corrsponding percentages were used to define the breakdown of the fuels replaced by energy from sollar collectos. The total electric energy production from PV panels was defined in C2.7. Taking into account the conversion factors for fuel oil and electricity the total primary enerrgy from on site RES was calculated. the total primary energy for all buildings was defined in C1.7. The ratio of the total primary enerrgy from on site RES, to the total primary energy consumptions for buildings was calculated. (5.0%)* ***COMMENT: If the denominators was not defined by the average primary energy then it should be calculated as the total primary energy consumption (non renewable), plus the total primary enerrgy from on site RES***
		Standard	*EN 13790 (Energy performance of buildings. Calculation of energy use for space heating and cooling)* *2013/114/EU: Commission Decision of 1 March 2013.*
C2.6	*Share of renewable energy on-site, on total primary energy consumptions for public ofice/ educational buildings operation.*	*Information source*	*Calculated – Monitored data. For the evaluation of the actual performance of the urban area it is preferable to use metered data. If metered data aren't available, estimated data should be used.*
		Assessment method	*CESBAMED calculation steps:* *The following energy uses are considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting* *1. For each public ofice/ educational building in the local area, calculate or collect the metered annual final (thermal and electric) energy consumption, kWh* *2. Sum the annual final energy consumption of each building up to an aggregated annual final energy consumption per energy carrier* *3. For each building in the local area, calculate the annual final thermal energy consumption from on-site renewable energy sources, kWh* *4. Using the national conversion factors, convert the aggregated annual final energy consumption per energy carrier in annual primary energy consumption per energy carrier, kWh.* *5. Sum the annual primary energy consumption*

			per energy carrier up to an aggregated annual total primary energy consumption, kWh. *6. For each building in the local area, calculate the annual final (thermal and electric) energy consumption per on-site renewable energy source (P.V, solar thermal panels), kWh* *7. Sum the annual final energy consumption from on-site renewable energy sources of each building up to an aggregated annual final energy consumption per on-site renewable energy source, kWh.* *8. Using the national conversion factors, convert the aggregated annual final energy consumption per on-site renewable energy source in annual primary energy consumption per on-site renewable energy source, kWh. Estimate the total primary energy from RES for each energy carrier displaced, e.g. electricity from PVs that displaces electricity from the grid or thermal energy from solar collectors that displaces the use of heating oil* *9. Sum the annual primary energy consumption per on-site renewable energy source up to an aggregated annual total primary energy consumption from on-site renewable energy sources (kWh/year).* *10. Calculate the indicator's value as: aggregated total annual primary energy consumption from on-site renewable energy sources / aggregated total annual primary energy consumption.* *The metered energy consumption is suitable for the indicator's calculation only if the building has been in use for 3-years.* *NOA pilot steps/comments:* *From calculated - statistical – estimated data. From an on-site audit in the testing area, the number of solar collectors and PV panels on public office/educational buildings were defined. (0%)*
		Standard	*EN 13790 (Energy performance of buildings. Calculation of energy use for space heating and cooling)* *2013/114/EU: Commission Decision of 1 March 2013.*
C2.7	*Share of renewable energy on-site, on final electric energy consumptions **	*Information source*	*Metered or estimated data* *For the evaluation of the actual performance of the urban area it is preferable to use metered data. If metered data aren't available, estimated data shall be used*
		Assessment method	*CESBAMED calculation steps:* *The following energy uses are considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting.* *Use of estimated data:*

		1. For each building in the local area, calculate the annual final electric energy consumption, kWh *2. Sum the annual final electric energy consumption of each building* *3. For each building in the local area, calculate the annual final electric energy consumption from on-site renewable energy sources, kWh* *4. Sum the annual final electric energy consumption from on-site renewable sources of each building* *5. Calculate the indicator as: annual total final electric energy consumption from on-site renewable sources / annual total final electric energy consumption. Calculations are based on EN 13790 using the quasi-steady state monthly method* *<u>Use of metered data:</u>* *1. For each building in the local area, collect the metered annual final electric energy consumption, kWh* *2. Sum the annual final electric energy consumption of each building.* *3. For each building in the local area, collect the monitored annual final electric energy consumption from on-site renewable sources, kWh* *4 Sum the annual final electric energy consumption from on-site renewable sources of each* *building* *5. Calculate the indicator as: annual total electric energy generation from on-site renewable energy sources / annual total final electric energy consumption.* *The metered energy consumption is suitable for the indicator's calculation only if the building has been in use for 3-years* *NOA pilot steps/comments:* *From calculated – estimated - statistical data. From an on-site audit in the testing area, the number of photovoltaic panels were defined. Additionally, the total floor area of all buildings (internal dimensions) was estimated. From an energy study carried out in the area, each PV panel produces about 1030kWh as an average.It was assumed that all the produced energy was consumed from the buildings.* *The total electric energy consumption of the buildings was defined as the product of the average electric energy consumption (from C1.4) with the total floor area of all buildings in the area. The share of renewable energy on-site on final electric energy consumption was calculated as the ratio of total electric energy production from PV panels consumped within*

			the buildings to the total electric energy consumption.(2.4%) ***COMMENT: If the denominators was not defined by the average electric energy then it should be calculated as the electric energy (non renewable) plus the total electric energy production from PV***
C2.8	*Share of renewable energy on-site, on final electric energy consumption for public office/educational buildings operation*	*Standard*	*EN 13790 (Energy performance of buildings. Calculation of energy use for space heating and cooling)* *2013/114/EU: Commission Decision of 1 March 2013.*
		Information source	*Metered or estimated data* *For the evaluation of the actual performance of the urban area it is preferable to use metered data. If metered data aren't available, estimated data shall be used*
		Assessment method	*CESBAMED calculation steps:* *The following energy uses are considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting.* *<u>Use of estimated data:</u>* *1. For each public building in the local area, calculate the annual final electric energy consumption, kWh* *2. Sum the annual final electric energy consumption of each public building* *3. For each public building in the local area, calculate the annual final electric energy consumption from on-site renewable energy sources, kWh* *4. Sum the annual final electric energy consumption from on-site renewable sources of each public building* *5. Calculate the indicator as: annual total final electric energy consumption from on-site renewable sources / annual total final electric energy consumption. Calculations are based on EN 13790 using the quasi-steady state monthly method* *<u>Use of metered data:</u>* *1. For each public building in the local area, collect the metered annual final electric energy consumption, kWh* *2. Sum the annual final electric energy consumption of each public building.* *3. For each public building in the local area, collect the monitored annual final electric energy consumption from on-site renewable sources, kWh* *4 Sum the annual final electric energy consumption from on-site renewable sources of each public building* *5. Calculate the indicator as: annual total electric energy generation from on-site renewable*

			energy sources / annual total final electric energy consumption. *The metered energy consumption is suitable for the indicator's calculation only if the building has been in use for 3-years* *NOA pilot steps/comments:* *From calculated - statistical – estimated data. From an on-site audit in the testing area, the number of solar collectors and PV panels on public office/educational buildings were defined. (0%)*
		Standard	*EN 13790 (Energy performance of buildings. Calculation of energy use for space heating and cooling)* *2013/114/EU: Commission Decision of 1 March 2013.*
C2.13	*Use of RES for thermal energy production in residential buildings*	*Information source*	Metered data
		Assessment method	*CESBAMED calculation steps:* *Define the number of households with solar collectors. Calculate the ratio of households with solar collectors to the total number of households.* *NOA pilot steps/comments:* *From metered - estimated data. From an on-site audit in the testing area, the total number of households and the number of solar collectors were defined. Assuming that each solar collector corresponds to one household, the ratio of households with solar collectors to the total number of households was defined.(65%)*
		Standard	

D- ATMOSPHERIC EMISSIONS

CRITERION	INDICATOR	SPECIFICATIONS	
D1.2	*Total GHG Emissions from primary energy used in building operations **	*Information source*	*Estimated data*
		Assessment method	*CESBAMED calculation steps:* *1. For each building in the area calculate the emissions of CO2 eq. with the following formula:* $E = [\sum(Q_{fuel,i} \times LHV_i \times k_{em,i}) + (Q_{el} \times k_{em,el}) + (Q_{dh} \times k_{em,dh})]$ *Qfuel,I = annual quantity of i-th fuel (m3 or Kg)* *Qel = annual quantity of electric energy from the grid (kWh)* *Qdh = annual quantity of energy from district heating/cooling (kWh)* *LHVi = lower heating value of the i-th fuel (kWh/m3 or kWh/Kg)*

			Kem,i = CO2 eq. emission factor of the i-th fuel (Kg CO2/kWh) *Kem,i = CO2 eq. emission factor of the electric energy from the grid (Kg CO2/kWh)* *Kem,i = CO2 eq. emission factor of energy from district heating/cooling (Kg CO2/kWh)* *2. Calculate the aggregated annual total CO2 equivalent emissions from all buildings / total useful internal floor area of all buildings* *NOA pilot steps/comments:* *From calculated - statistical – estimated data. From an on-site audit in the testing area, the total floor area of all buildings (internal dimensions) was estimated. Using data for whole buildings from the Energy Performance Certificates electronic repository for the Municipal Unit of Ano Liossia, the average thermal consumption and the average electric energy consumption for buildings were defined. Thermal energy is only from fuel oil. Based on the national conversion factors to COeq (20704.1 kg/GWh for fuel oil and 61123.9 kg/GWh for electricity), total CO2 equivalent emissions from all buildings to total useful internal floor area of all buildings was calculated (10.9 kg/m^2)*
		Standard	*EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)*

E- NON-RENEWABLE RESOURCES

CRITERION	INDICATOR	SPECIFICATIONS	
E1.6	*Consumption of potable water for residential population **	*Information source*	*Metered data. The use of estimated data is preferable for scenarios' evaluation or if metered data is not available.*
		Assessment method	*CESBAMED calculation steps:* *The following water uses are considered: drinking water; water for sanitation; domestic hot water;* *water for cleaning, water for washing machine, water for dishwasher* *1. For each residential building, collect the monitored annual potable water consumptions for building operation. The consumption data must be estimated taking the average over 3 years period, m^3.* *2. Sum the annual potable water consumption of each building up to an aggregated annual total potable water consumption, m^3/year.* *3. Estimate the number of residential buildings' occupants.*

			4. Calculate the indicator's value as: aggregated annual total potable water consumption / number of occupants. *NOA pilot steps/comments:* *From calculated - statistical – estimated data. From an on-site audit in the testing area, the number of households was defined. According to ELSTAT, the typical number of persons in the average household of West Region of Attica Perfecture, is 3. From statistica ldata (http://eekp.gr/wp-content/uploads/2013/09/arxeio12.2.pdf) the daily water consumption per (3-persons) household is 0.489m3. The ratio of the annual water consumption for the households of the testing area to the residents was calculated. (59.5 m^3/occupant)*
		Standard	
E1.7	*Consumption of potable water for public office/ educational building systems **	*Information source*	*Metered data. The use of estimated data is preferable for scenarios' evaluation or if metered data is not available.*
		Assessment method	*CESBAMED calculation steps:* *The following water uses are considered: drinking water; water for sanitation; domestic hot water;* *water for cleaning, water for washing machine, water for dishwasher* *1. For each public office/ educational building, collect the monitored annual water consumptions for building operation, m^3. The consumption data must be estimated taking the average over 3 years period* *2. Sum the annual water consumption of each building up to an aggregated annual total water consumption* *3) Estimate the total useful internal floor area of all buildings.* *4) Calculate the indicator's value as: aggregated annual total water consumption / total useful internal floor area of all buildings.* *NOA pilot steps/comments:* *Metered data not available for the public buildings of the Municipality. From the corresponding department of the Municipality, the annual water consumption was not officially reported, but estimated. From an energy study carried out for the Municipal Unit of Ano Liosia, the total internal surface of all publicbuildings was available. The ratio of annual total water consumption to the* ***total useful internal floor area*** *of all buildings was calculated (0.65 m^3/m^2)* ***COMMENT: The units should be m^3/person***

		Standard	
E1.8	*Consumption of potable water in public spaces*	*Information source*	*Estimated or metered data.*
		Assessment method	*CESBAMED calculation steps:* *1. Calculate the annual water consumption of potable water in public spaces (for cleaning / watering purposes)* *2. Calculate the total cleaned / watered area.* *3. Calculate the ratio of annual water consumption to the cleaned / watered area.* *NOA pilot steps/comments:* *Metered data not available for the public buildings of the Municipality. From the corresponding department of the Municipality, the annual water consumption was not officially reported, but estimated (0.99 m^3/m^2)*
		Standard	
E2.1	*Percentage of buildings close to recycling collection points*	*Information source*	*Calculated data*
		Assessment method	*CESBAMED calculation steps:* *1. Identify the location of ecological areas or individual recycling bins in the area* *2. Calculate the radius between these nodes and the entrance of the buildings.* *3. Calculate the percentage of the buildings located more than 100 meters from the recycling points.* *NOA pilot steps/comments:* *From calculated - statistical – estimated data. From an on-site audit in the testing area, the number of buildings, the total number of recycling bins as well as their location were defined. The percentage of buildings within a 100m distance from recycling bins was calculated. (65%)*
		Standard	

F- ENVIRONMENT			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
F1.3	*Recharge of groundwater through permeable paving or landscaping **	*Information source*	*Thematic map – Geographic Information System. Estimated data*
		Assessment method	*CESBAMED calculation steps:* *1. Calculate the size of the urban area, m^2* *2. Calculate the size of the surfaces with a*

			different paving or occupied by constructions in the urban area (i.e. green areas, asphalt paving, surfaces occupied by buildings, etc.) *3. Calculate the real permeability of soil considering the permeability coefficient of each surface.* *Sa,per = Σ Sa,ι × αi* *Sa,i = i-th surface in the area, m2* *αi = permeability coefficient of the i-th surface (Reference permeability coefficients: Grass = 1, Gravel = 0.9, Sand = 0.9, Plastic gratings filled with land/grass = 0.8, Concrete gratings leaning on the grass = 0.6, Concrete gratings leaning on gravel = 0.6, Interlocking elements leaning on sand/ gravel = 0.3, Interlocking elements leaning on concrete pavement = 0, Continuous pavements leaning on concrete = 0, Asphalt = 0)* *4. Calculate the indicator's value as the ratio of the real permeability of soil to the size of the urban area.* *NOA pilot steps/comments:* *From calculated - estimated data. From an on-site audit in the testing area, the size of the surfaces with a different paving or occupied by constructions was defined. The real permeability of the area was calculated, using the default values for the permeability coefficient of various surfaces. The ratio of the real permeability to the total area was calculated. (31%)*
		Standard	
F1.10	*Ratio of cut-off lighting fixtures for public lighting*	*Information source*	*Calculated data*
		Assessment method	*CESBAMED calculation steps:* *1. Define the number of cut-off lighting fixtures for public lighting in the area* *2. Define the total number of lighting fixtures for public lighting in the area* *3. Calculate the ratio of the number of cut-off lighting fixtures to the total number of lighting fixtures for public lighting* *NOA pilot steps/comments:* *From calculated data. From the corresponding department of the Municipality, the ratio was defined (70%)*
		Standard	
F2.3	*Ambient air quality with respect to particulates <10 mu (PM10) over a one year period **	*Information source*	*Metered - Estimated data*
		Assessment method	*CESBAMED calculation steps:* *1. Daily test air samples in accordance with national or regional procedures over a period of*

			one year. *2. Evaluate the number of days exceeding the daily limits in a year.* *NOA pilot steps/comments:* *From metered data. From an Aerosols Monitoring Station located in the Municipal Union of Ano Liossia, data for hourly PM10 concentrations for one year were obtained. Daily averages were calculated. The number of days within a year that the daily averages exceed the limit of 50 μg/m^3 was defined, extracting the days with dust events. (38)*
		Standard	
F2.6	*Ambient air quality - ozone*	*Information source*	*Metered - Estimated data*
		Assessment method	*CESBAMED calculation steps:* *1. Hourly data for O3, either from a nearby monitoring station or from test air samples in accordance with national or regional procedures, over a period of one year.* *2. Calculate daily rolling 8-hour averages* *2. Calculate the number of days exceeding even once the daily limit (120μ/m3) in a year.* *NOA pilot steps/comments:* *From metered data. From an Aerosols Monitoring Station located in the Municipal Union of Ano Liossia, data for hourly O_3 concentrations for one year were obtained. Daily rolling 8-hour averages were calculated. The number of days within a year that even once the daily rolling averages exceed the limit of 120 μg/m^3 was defined. (37)*
		Standard	
F3.3	*Green zones & recreation areas density*	*Information source*	*Metered or Estimated data*
		Assessment method	*CESBAMED calculation steps:* *Calculate the ratio Green zones & Recreation areas (m^2) to Urban area (m^2)* *NOA pilot steps/comments:* *From metered data. From an on-site audit in the testing area, the total area and the area of green zones and reacreation zones were defined. (3.2%)*
		Standard	
F3.5	*Flood protection*	*Information source*	*Documantation data*

		Assessment method	*CESBAMED calculation steps:* *Evaluation of the existance of a flood protection plan, the implementation and the testing* *NOA pilot steps/comments:* *From the civil protection department of the Municipality. There is an implemented flood protection plan, but it hasn't been tested yet*
		Standard	
F3.11	*Emergency response plan*	*Information source*	*Documantation*
		Assessment method	*CESBAMED calculation steps:* *Evaluation of the existance of an emergency response plan, the implementation and the testing* *NOA pilot steps/comments:* *From the civil protection department of the Municipality. There is an emergency response plan on a local level. No operational exercises*
		Standard	

G- SOCIAL ASPECTS			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
G1.1	*Public office/ educational buildings that are accessible for use by physically disabled persons*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps:* *1.Define the number of public office/ educational buildings with full accessibility of exterior parking and pedestrian access areas, considering all major disability types.* *2. Calculate the percent of public buildings that may be considered accessible by physically disabled persons.* *NOA pilot steps/comments:* *From the corresponding department of the Municipality, the percent of public office/ educational buildings that may be considered accessible by physically disabled persons, was defined. (30%)*
		Standard	
G1.2	*Sidewalks and other pedestrian paths that are accessible for use by physically disabled*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps:* *Evaluation of the extend to which the sidewalks*

	persons		*and pedestrian ways of the main and the secondary network are accessible by physically disabled persons* *NOA pilot steps/comments:* *From an on-site audit in the testing area. Sidewalks and pedestrian ways of the main network are not accessible by physically disabled persons.*
		Standard	
G2.1	*Performance of the public transport **	*Information source*	*Estimated data*
		Assessment method	*CESBAMED calculation steps:* *For the calculation of the indicator only residents (and not working people in the area) are considered* *Percentage of inhabitants that are within 400 meters walking distance of at least one public transportation* *service stop* *To be considered valid for the calculation, a stop must have a daily total service frequency of at least 20 trips.* *NOA pilot steps/comments:* *From metered data. From a study carried out by the Municipality for the public transport, the number and location of public transport stops was defined. (100%)*
		Standard	*Global Platform for Sustainable Cities – Urban Sustainability Framework*
G2.3	*Smart services*	*Information source*	*Estimated data*
		Assessment method	*CESBAMED calculation steps:* *Evaluation of the presence of smart services* *NOA pilot steps/comments:* *From the corresponding department of the Municipality, there is free wifi network in some public spaces.*
		Standard	
G2.4	*Quality of pedestrian and bicycle network **	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps:* *1. Estimation of the number of inhabitants in the area* *2. Calculation of the walkway meters of dedicated pedestrian paths in the area (A)* *3. Calculation of the meters of bicycle paths in the area (B)*

			4. Calculation of the meters of shared spaces (C) *5. Calculation of the indictor's value as (A+B+C)/(100 inhabitants)* *Bicycle paths and pedestrian paths have to be safe and physically separated to traffic roads to be considered in the calculation. A walkway adjacent to a traffic road is not acceptable. A "shared space" is an urban design approach that minimizes the segregation between modes of road user (car, pedestrian, bicycle, etc.)* *NOA pilot steps/comments:* *From metered data. From an on-site audit in the testing area, the total length of dedicated pedestrian and bicycle paths and "shared space" per 100 inhabitants. was defined.(188.8 m/100 inhabitants)* ***COMMENT: This indicator is biased, especially when the area is underpopulated, the calculated value is high even with small pedestrian and bicycle networks. Maybe the unit should be the length of pedestrian and bicycle paths and shared areas to the total street length of teh area. An other issue that should be taken into account, is the connectivity of these paths, i.e. bicycle paths are connected with bicycle paths from suurounding areas, or are circular.***
		Standard	
		Information source	*Metered data*
G4.2	*Availability and proximity of key services **	*Assessment method*	*CESBAMED calculation steps:* *1. Identify locations of key services in the local area.* *2. Calculate the percentage of the inhabitants that are within 800 meters walking distance from at least 3 key services coming from the nine categories below.* *Key services are:* *1. Education (schools, kindergartens, education centers, etc.)* *2. Health center (hospitals, medical ward, medical center, etc.)* *3. Law enforcement areas (police station, etc.)* *4. Sport facilities* *5. Food shops* *6. Bank* *7. Post office* *8. Pharmacy* *9. Shopping center* *Consider only one key service from each of the nine categories.*

			Private services can be considered. *NOA pilot steps/comments:* *From metered data. From an on-site audit in the testing area, the location of key services and the number of housdeholds were defined. According to ELSTAT, the typical number of persons in the average household of West Region of Attica Perfecture, is 3. The total number of residents in the selected area was estimated. The percentage of the inhabitants that are within 800 meters walking distance from at least 3 key services was calculated (100%)* ***COMMENT: Key services are not of equal importance. The categories should be regrouped, into 4: Education, Health center, Law enforcement areas, Other***
		Standard	*Global Platform for Sustainable Cities – Urban Sustainability Framework*
G4.3	*Availability and proximity of public schools*	*Information source*	*Metered - Estimated data*
		Assessment method	*CESBAMED calculation steps:* *1. Identify the public schools.* *2. Calculate the radius between the buildings and the schools* *3. Calculate the percentage of* inhabitants that are within a radius of 700 meters from at least one public school *NOA pilot steps/comments:* *From metered and estimated data. From an on-site audit in the testing area, the location of public schools and the number of housdeholds were defined. According to ELSTAT, the typical number of persons in the average household of West Region of Attica Perfecture, is 3. The total number of residents in the selected area was estimated. The percentage of inhabitants that are within a radius of 700 meters from at least one public school was calculated (100%)*
		Standard	
G4.6	*Availability and proximity of public leisure facilities*	*Information source*	*Metered - Estimated data*
		Assessment method	*CESBAMED calculation steps:* *1. Identify the facilities for leisure in the area, distinguishing in sports and cultural structures.* *2. Calculate the radius between the buildings and these nodes* *3. Calculate the percentage* of inhabitants that are within a radius of 1000 meters from at least one public sports and one cultural facility *NOA pilot steps/comments:*

			From metered and estimated data. From an on-site audit in the testing area, the location of public schools and the number of housdeholds were defined. According to ELSTAT, the typical number of persons in the average household of West Region of Attica Perfecture, is 3. The total number of residents in the selected area was calculated. (100%)
		Standard	
G6.3	*Community involvement in urban planning activities **	*Information source*	*Process documentation*
		Assessment method	*CESBAMED calculation steps:* *Level of involvement of users in urban planning* *NOA pilot steps/comments:* *Not available for existing neighborhoods*
		Standard	*Arnstein S., 1969, "A Ladder Of Citizen Participation", Journal of the American Institute of Planners 35 (4), p. 216-24.* *Chelzen Hélène and Jégou Anne, « À la recherche de l'habitant dans les dispositifs participatifs deprojets urbains durables en région parisienne : les éclairages de l'observation participante »,Développement durable et territoires [En ligne], Vol. 6, n°2 | Septembre 2015, mis en ligne le 30 septembre 2015.* *Quartiers Durables Méditerranéens (Sustainable Mediterranean Neighbourhood) , an approach towards sustainable Mediterranean neighbourhoods in the Provence-Alpes-Côté d'Azur Region, envirobatBDM.*
G8.3	*Perceived safety of public areas for pedestrians*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps:* *Perceived safety of public areas during daytime and nighttime* *NOA pilot steps/comments:* *From metered data. From a study carried out by the Municipality.*
		Standard	
☑ *G8.5*	*Impact of overhead electric distribution system*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps:* *Distance of overhead electric distribution system from buildings.* *NOA pilot steps/comments:* *From metered data. From a study carried out by the Municipality. (Overhead high power cables over 100m from the buildings)*
		Standard	

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	5.00
A1.4 Residential density	4.50
A1.5 Urban street canyons (H/W aspect ratio)	1.20
A1.7 Conservation of Land *	-1.00
B – ECONOMY	
B2 – Economic activity	
B2.3 Unemployment rate	-1.00
B2.4 Economic viability of commercial occupancies	-1.00
B2.5 Energy poverty of households	-1.00
B3 – Cost and Investment	
B3.3 Use stage energy cost for public office/educational buildings	-1.00
C – ENERGY	
C1 – Non-renewable energy	
C1.1 Total final thermal energy consumption for building operations	2.70
C1.3 Total final thermal energy consumption for public office/educational building operations	-1.00
C1.4 Total final electric energy consumption for building operations	-1.00
C1.6 Total final electric energy consumption for public office/educational building operations	-1.00
C1.7 Total primary energy demand for building operations	0.80
C1.9 Total primary energy demand for public office/educational building operations	-1.00
C1.20 Energy consumption of public lighting	3.40
C2 – Renewable and Decarbonized energy	
C2.1 Share of renewable energy on-site, on total final thermal energy consumptions for buildings operation	-1.00
C2.4 Share of renewable energy on-site, on total primary energy consumptions for buildings operation	-1.00
C2.6 Share of renewable energy on-site, on total primary energy consumptions for public office/educational buildings operation	-1.00
C2.7 Share of renewable energy on-site, on final electric energy consumptions	0.20
C2.8 Share of renewable energy on-site, on final electric energy consumptions for public office/educational buildings operation	-1.00
C2.13 Use of RES for thermal energy production in residential buildings	2.20
D – ATMOSPHERIC EMISSIONS	
D1 – Atmospheric emissions	
D1.2 – Total GHG Emissions from primary energy used in building operations	4.30
E – NON RENEWABLE SOURCES	
E1 – Potable water, stormwater and greywater	
E1.6 Consumption of potable water for residential population	0.30
E1.7 Consumption of potable water for public office/educational building systems	0.65
E1.8 Consumption of potable water in public spaces	-1.0
E2 – Solid and Liquid Wastes	

E2.1 Solid waste and recycling collection points	0.60
F – ENVIRONMENT	
F1 – Environmental impacts	
F1.3 Recharge of groundwater through permeable paving or landscaping	1.20
F1.10 Light pollution caused by exterior public lighting systems	3.30
F2 – Outdoor environmental quality	
F2.3 Ambient air quality with respect to particulates <10 mu (PM10) over a one year period	-1.00
F2.6 Ambient air quality - ozone	-1.00
F3 – Ecosystems and landscapes	
F3.3 Green zones & recreation areas density	-1.00
F3.5 Flood protection	0.00
F3.11 Emergency response plan	0.00
G – SOCIAL ASPECTS	
G1 – Safety and Accessibility	
G1.1 Public buildings that are accessible for use by physically disabled persons	-1.00
G1.2 Sidewalks and other pedestrian paths that are accessible for use by physically disabled persons	-1.00
G2 – Traffic and Mobility Services	
G2.1 Performance of the public transport	5.00
G2.3 Smart services	-1.00
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
G4.3 Availability and proximity of public schools	5.00
G4.6 Availability and proximity of public leisure facilities	5.00
G6 – Management and community involvement	
G6.3 Community involvement in urban planning activities	-
G8 – Perceptual	
G8.3 Perceived safety of public areas for pedestrians	0.00
G8.5 Impact of overhead electric distribution system	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	20.40
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	155.40
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	77.70
C.1.7 Total primary energy demand for building operations	Aggregated annual total primary energy consumption per aggregated indoor useful floor area	kWh/m2/year	396.30
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	%	3.40
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	%	2.40
D.1.2 Total GHG Emissions from primary energy used in building operations	CO2 equivalent emissions per useful internal floor area per year	kg CO_2 eq./m2/yr	10.90
E.1.6 Consumption of potable water for residential population	Annual potable water consumption per occupant	m^3 per occupant*yr	59.50
E.1.7 Consumption of potable water for non-residential building systems	Annual water consumption per occupant	m^3 /m^2	0.65
F.1.3 Recharge of groundwater through permeable paving or landscaping	Area of permeable surfaces on total neighborhood area	%	31.00
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	38.00
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	%	100.00
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	188.80
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.	%	100.00
G.6.3 Community involvement in urban planning activities	Level of involvement of users in urban planning	Level (score)	-

c. SWOT analysis

The SWOT analysis is presented in the following table

STRENGTHS	WEAKNESSES
- Location - Diversity (Land, Water) - Landscape - Ecological indicators - Human resource - International co-operations - Health, educational, transportation services - Economic growth - Improvement of life quality - Touristic – Industrial infrastructures - High RES potential, natural gas network - Support for vulnerable citizens - Political commitment (vision) for self-efficiency in energy, promotion of RES, environmental awareness)	- Slow urbanization - Lack of natural resources - Limited economic resources - Limited infrastructure networks (public wastewater treatment, sewer system) - Spatial planning, Areas outside town plan - Limited infrastructures for protection against - extreme weather conditions - Limited infrastructures for environmental protection - Unemployment - Safety of public places - Inadequate public lighting - Limited network of bicycle paths and pedestrian paths
OPPORTUNITIES	**THREATS**
- Reduce energy cost and finance other resources - Support from central, regional administration - Private investments - New jobs - Improve Municipality's image - Attract new citizens - Protection and enhancement of cultural heritage	- Climate change - Geomorphological characteristics contribution to extreme weather condition - Waste management - Degradation of natural and cultural heritage - More strict laws and regulations

4. STRATEGIC DEFINITION

a. Performance targets

The overall Environmental, Social and Economic targets.

Environmental targets	*Efforts towards sustainable development by improving the municipality's energy and carbon footprint, implementing various initiatives on energy conservation, exploitation of renewables, completing the main natural gas network, the use of LED in all municipal buildings and street lighting, establishing the first energy community for generating electricity using a PV (8MW) and wind park (9MW) at a regenerated area. Self-efficiency in water for the whole Municipality.*
Social targets	*Efforts to improve and facilitate the citizens' life and change Municipality's image to become more attractive and a place where people want to live in. Free municipal transportation system with two circular lines, connecting the different parts of the Municipality. Free Wi-Fi in public spaces. Extension of the bicycle and pedestrian paths. Reconstruction and maintenance of squares, Improve the safety in the Municipality. Involve citizens in urban planning activities.*
Economy targets	*Eliminate* running energy cost for public buildings and *public lighting.* Reduce *unemployment rate and energy poverty of households.*

Target values for each criterion in the SNTool reflecting the overall targets.

A – BUILT URBAN SYSTEMS			
A1 – Urban Structure and Form			
A1.2 Urban compactness		Actual value	*27909.00*
Relation between the usable space of the buildings (volume) and the urban space (area).	m^3 / ha	Target value	*27909.00*
A1.4 Residential density		Actual value	*151.00*
The ratio of total residential population relative to the total land area for all developed residential blocks within the local area.		Target value	*151.00*
A1.5 Urban street canyons (H/W aspect ratio)		Actual value	*0.90*
The ratio of typical building heights compared to the distance between building facades on the other side of the street.		Target value	*0.90*
A1.7 Conservation of Land		Actual value	*0.00*
Undeveloped land considered to be of value for ecological or agricultural purposes.		Target value	*0.00*
B – ECONOMY			
B2 – Economic activity			
B2.3 Unemployment rate		Actual value	*22.00*
Average unemployment rate	%	Target value	*22.00*
B2.4 Economic viability of commercial occupancies		Actual value	*29.00*
Rate of business failures of commercial occupancies in the local relative to the total urban area, over a 5-year period.	%	Target value	*29.00*
B2.5 Energy poverty of households		Actual value	*26.00*
Percent of households with inadequate heating	%	Target value	*10.00*

B3 – Cost and Investment			
B3.3 Use stage energy cost for public office/educational buildings		Actual value	*17.00*
Annual running energy cost for public office/educational buildings	Euro /m²	Target value	*0.00*
C – ENERGY			
C1 – Non-renewable energy			
C1.1 Total final thermal energy consumption for building operations		Actual value	*155.40*
Total final thermal energy consumption for all buildings	kWh/m²	Target value	*132.00*
C1.3 Total final thermal energy consumption for public office/educational building operations		Actual value	*73.60*
Total final thermal energy consumption for all public office/educational buildings	kWh/m²	Target value	*0.00*
C1.4 Total final electric energy consumption for building operations		Actual value	*77.70*
Total final electric energy consumption for all buildings	kWh/m²	Target value	*0.00*
C1.6 Total final electric energy consumption for public office/educational building operations		Actual value	*145.10*
Total final electric energy consumption for all public office/educational buildings	kWh/m²	Target value	*0.00*
C1.7 Total primary energy demand for building operations		Actual value	*396.30*
Total primary energy demand for all buildings	kWh/m²	Target value	*139.00*
C1.9 Total primary energy demand for public office/educational building operations		Actual value	*501.80*
Total primary energy demand for all public office/educational buildings	kWh/m²	Target value	*0.00*
C1.20 Energy consumption of public lighting		Actual value	*0.57*
Annual electrical consumption by outdoor public lighting systems	kWh/m²	Target value	*0.00*
C2 – Renewable and Decarbonized energy			
C2.1 Share of renewable energy on-site, on total final thermal energy consumptions for buildings operation		Actual value	*3.40*
Ratio of on-site renewable energy consumption to the total final thermal energy consumption of all buildings	%	Target value	*3.30*
C2.4 Share of renewable energy on-site, on total primary energy consumptions for buildings operation		Actual value	*5.00*
Ratio of on-site renewable energy consumption to the total primary energy consumption of all buildings	%	Target value	*100.00*
C2.6 Share of renewable energy on-site, on total primary energy consumptions for public office/educational buildings operation		Actual value	*0.00*
Ratio of on-site renewable energy consumption to the total primary energy consumption of all public office/educational buildings	%	Target value	*100.00*
C2.7 Share of renewable energy on-site, on final electric energy consumptions		Actual value	*2.40*
Ratio of on-site renewable energy consumption to the total final electric energy consumption of all buildings	%	Target value	*100.00*
C2.8 Share of renewable energy on-site, on final electric energy consumptions for public office/educational buildings operation		Actual value	*0.00*
Ratio of on-site renewable energy consumption to the total final electric energy consumption of all public office/educational buildings	%	Target value	*100.00*
C2.13 Use of RES for thermal energy production in residential buildings		Actual value	*65.00*
Percent of households using RES for thermal energy production	%	Target value	*65.00*
D – ATMOSPHERIC EMISSIONS			
D1 – Atmospheric emissions			
D1.2 – Total GHG Emissions from primary energy used in building operations		Actual value	*10.90*

Total GHG Emissions from energy consumption in all buildings	kg CO_2 eq/m^2	Target value	*2.10*
E – NON RENEWABLE SOURCES			
E1 – Potable water, stormwater and greywater			
E1.6 Consumption of potable water for residential population		Actual value	*59.50*
Total water consumption in residential buildings.	m^3/occupant	Target value	*59.50*
E1.7 Consumption of potable water for public office/educational building systems		Actual value	*0.65*
Total water consumption in public office/educational buildings	m^3 /m^2	Target value	*0.33*
E1.8 Consumption of potable water in public spaces		Actual value	
Total potable water consumption used for cleaning and watering purposes in public spaces	m^3 / m^2 watered surface	Target value	*0.51*
E2 – Solid and Liquid Wastes			
E2.1 Solid waste and recycling collection points		Actual value	*65.00*
Percent of buildings in a radius less than 100m from solid waste and recycling collection points.	%	Target value	*100.00*
F – ENVIRONMENT			
F1 – Environmental impacts			
F1.3 Recharge of groundwater through permeable paving or landscaping		Actual value	*31.00*
Percentage of water flowing through the ground.	%	Target value	*31.00*
F1.10 Light pollution caused by exterior public lighting systems		Actual value	*70.00*
Ratio of cut-off lighting fixtures for public lighting	%	Target value	*70.00*
F2 – Outdoor environmental quality			
F2.3 Ambient air quality with respect to particulates <10 mu (PM10) over a one year period		Actual value	*38.00*
Number of days exceeding the daily limits in a year.	days / yr	Target value	*38.00*
F2.6 Ambient air quality - ozone		Actual value	*37.00*
Number of days exceeding the daily limits in a year.	days / yr	Target value	*37.00*
F3 – Ecosystems and landscapes			
F3.3 Green zones & recreation areas density		Actual value	*3.20*
Ratio of Green zones & recreation areas' surface to the total surface	%	Target value	*3.20*
F3.5 Flood protection		Actual value	*-1.00*
Flood protection plan	Qualitative parameter	Target value	*0.00*
F3.11 Emergency response plan		Actual value	*0.00*
Emergency response plan	Qualitative parameter	Target value	*0.00*
G – SOCIAL ASPECTS			
G1 – Safety and Accessibility			
G1.1 Public buildings that are accessible for use by physically disabled persons		Actual value	*30.00*
Percent of public office/educational buildings that are accessible by physically disabled persons.	%	Target value	*30.00*
G1.2 Sidewalks and other pedestrian paths that are accessible for use by physically disabled persons		Actual value	*-1.00*
Accessibility of sidewalks and other pedestrian paths as well as outdoor parking to physically disabled persons	Qualitative parameter	Target value	*-1.00*
G2 – Traffic and Mobility Services			
G2.1 Performance of the public transport		Actual value	*100.00*
Percent of inhabitants that are within 400 meters walking distance of at least one public transportation service stop.	%	Target value	*100.00*
G2.3 Smart services		Actual value	*-1.00*
Availability of smart services	Qualitative	Target value	*-1.00*

	parameter		
G2.4 Quality of pedestrian and bicycle network		Actual value	*188.80*
Total walkway meters of dedicated pedestrian paths and meters of bicycle path and “shared space” per 100 inhabitants	m/100 inhabitants	Target value	*188.80*
G4 – Public and private facilities and services			
G4.2 Availability and proximity of key services		Actual value	*100.00*
Percent of inhabitants that are within 800 meters walking distance from at least 3 key services.	%	Target value	*100.00*
G4.3 Availability and proximity of public schools		Actual value	*100.00*
Percent of inhabitants that are within a radius of 700 meters from at least one public school	%	Target value	*100.00*
G4.6 Availability and proximity of public leisure facilities		Actual value	*100.00*
Percent of inhabitants that are within a radius of 1000 meters from at least one public sports and one cultural facility	%	Target value	*100.00*
G6 – Management and community involvement			
G6.3 Community involvement in urban planning activities		Actual value	-
Level of involvement of users in urban planning	Qualitative parameter	Target value	*3.00*
G8 – Perceptual			
G8.3 Perceived safety of public areas for pedestrians		Actual value	*0.00*
Perceived safety of inhabitants in public places during daytime and nighttime	Qualitative parameter	Target value	*0.00*
G8.5 Impact of overhead electric distribution system		Actual value	*3.00*
Health and safety risks from overhead electric distribution system	Qualitative parameter	Target value	*3.00*

b. Constraints and restrictions

CONSTRAINTS / RESTRICTIONS	
Legal constraints	*New buildings and buildings under major renovation should comply with Hellenic regulation on the energy performance in the building sector (KENAK)*
Technical constraints	*Non existing local network of natural gas until recently. It is not known how soon the local network will develop in the neighborhoods. Not sufficient public free areas for the installation of an energy park, so this energy park (PV and wind power) will be installed in a nearby area.*
Financial constraints	*Availability of funds*
Environmental condition constraints	*High levels of atmospheric pollution, due to high heavy transport traffic.*
Stakeholder based restrictions	*Availability of funds*
Other relevant constraints	

5. DECISION MAKING

a. Description of scenarios

NAME OF SCENARIO	DESCRIPTION
1.	- PV panels 195 PV panels (total surface 318m^2) will be installed in public buildings combined with central HPs for heating and cooling (29 HPs). - Natural gas All buildings will be connected to the natural gas network - Lighting Replace all lighting fixtures in public spaces (about 285) with LED lighting fixtures - Recycle bins More recycle bins in order to cover all the areas of the Municipality - Municipal transportation Two lines of municipal transportation within the Municipality - Improve safety
2.	Self-efficiency in electric energy for the whole Municipality - PV park (in a near-by area) in order to cover a. all energy needs of the public buildings and public spaces b. all electricity needs of all other buildings - Natural gas All buildings will be connected to the natural gas network - Lighting Replace all lighting fixtures in public spaces (about 285) with LED lighting fixtures - Recycle bins More recycle bins in order to cover all the areas of the Municipality - Municipal transportation Two lines of municipal transportation within the Municipality - Improve safety - Involve citizens in urban planning activities.

b. Scenarios raking

i. Performance Scores

Issues	Current state	Scenario 1	Scenario 2
TOTAL SCORE	**1.37**	**2.45**	**3.19**
A – Built Urban Systems	3.09	3.09	3.09
B – Economy	-1.51	-0.20	0.24
C – Energy	0.15	2.21	4.08
D – Atmospheric	4.31	4.85	5.00
E – Non-renewable sources	0.27	1.92	1.92
F - Environment	0.01	0.01	0.01
G – Social aspects	3.21	3.55	3.89

ii. Key Performance Indicators

SCENARIO 1			
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	1.92
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	132.00
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	72.10
C.1.7 Total primary energy demand for building operations	Aggregated annual total primary energy consumption per aggregated indoor useful floor area	kWh/m2/year	341.40
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	%	4.00
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	%	6.00
D.1.2 Total GHG Emissions from primary energy used in building operations	CO2 equivalent emissions per useful internal floor area per year	kg CO_2 eq./m2/year	6.50
E.1.6 Consumption of potable water for residential population	Annual potable water consumption per occupant	m^3 per occupant*year	59.50
E.1.7 Consumption of potable water for non-residential building systems	Annual water consumption per occupant	m^3 /m^2	0.65
F.1.3 Recharge of groundwater through permeable paving or landscaping	Area of permeable surfaces on total neighborhood area	%	31.00
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	38.00
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	%	100.00
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	188.80
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.	%	100.00
G.6.3 Community involvement in urban planning activities	Level of involvement of users in urban planning	Level (score)	-

SCENARIO 2			
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	0.00
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	132.00
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	00.00
C.1.7 Total primary energy demand for building operations	Aggregated annual total primary energy consumption per aggregated indoor useful floor area	kWh/m2/year	139.00
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	%	4.00
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	%	100.00
D.1.2 Total GHG Emissions from primary energy used in building operations	CO2 equivalent emissions per useful internal floor area per year	kg CO_2 eq./m2/year	2.10
E.1.6 Consumption of potable water for residential population	Annual potable water consumption per occupant	m^3 per occupant*year	59.50
E.1.7 Consumption of potable water for non-residential building systems	Annual water consumption per occupant	m^3 /m^2	0.65
F.1.3 Recharge of groundwater through permeable paving or landscaping	Area of permeable surfaces on total neighborhood area	%	31.00
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	38.00
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	%	100.00
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	188.80
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.	%	100.00
G.6.3 Community involvement in urban planning activities	Level of involvement of users in urban planning	Level (score)	3.0

iii. Financing mechanisms evaluation

Scenario 1	Municipality's own funds, National and EU financing programs
Scenario 2	Municipality's own funds, Funding from Attika Prefecture, National and EU financing programs, Energy community

6. RETROFIT CONCEPT

SELECTED SCENARIO	DESCRIPTION
1	The two proposed scenarios are not alternative, but they are progressive. Scenario1 is the short-term scenario and Scenario2 is the more ambitious and the long-term one. The selected scenario is Scenario1, which can be promptly implemented.

KEY ELEMENTS OF THE CONCEPT

Retrofits Strategies	Energy : Install PV panels in public buildings combined with central HPs for heating and cooling. Fully developed local natural gas network. Public lighting with LED
	Recycle: Increase the number of recycle bins
	Transport: Two lines of municipal transportation within the Municipality
Performance improvement	Reduced energy consumption and CO_2 emissions. Increased recycling.
	Improved citizens' transportation, reduced car traffic.
	Reduce energy poverty and energy cost of buildings. Reduced car fuel cost
Financial mechanism	Municipality's own funds, National and EU financing programs

BUILDING SCALE ASSESSMENT – BUILDING 1

1. INITIATION

General information on the selected building	
Town Hall	
Address	*Platia Iroon, Fili 133 41*
Building use	*Office Building*
Owner	*Municipality of Fylis*
Year of construction	*1990*
Building method	*Concrete structure with bricks. Double-pane windows with aluminum frame without thermal break. Concrete flat roof. The long axis of the building is along the N-S axis.*
Number of levels above earth	*2*
Number of levels underground	*1*
Heating system	*Central Oil Boiler (200kW)*
Cooling system	*Thirty Split Heat Pumps (102kW)*
DHW system	-
Ventilation system	*No ventilation system*
Lighting system	*A total of 543 fluorescent lamps, 308 halogen spotlights and 12 incandescent lamps. A total of 34 halogen headlamps for exterior lighting.*
Average U value	*Walls: 2.56 W/m^{2}K / Roof: 3.05 W/m^{2}K / Floor: 0.95 W/m^{2}K / Windows: 4.1 W/m^{2}K*
Number of employees	*130*
Hours of occupation per year	*2600*

2. PREPARATION

a. SBTool structure

In this section the structure of the Hellenic SBTool (HE-Attica-SBTool) is described.

Following the concept and procedure used in the Hellenic SNTool, there was a screening of the initial GF-B 153 available indicators, resulting to 33.

The list of the criteria selected from the CESBA MED Generic Framework ay Building scale and included in the He-SBTool is presented in the following Table (KPIs are marked with an *, new or modified criteria are marked with ✍).

A – SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE	
A1	**Site Regeneration and Development**
A1.13	*Provision and quality of walkways for pedestrian use.*
A3	**Project Infrastructure and Services**
A3.12	*Public/ Municipal transportation* ✍
A3.13	*Provision of on-site parking facilities for private vehicles.* ✍
A3.16	*Exterior lighting.* ✍

B – ENERGY AND RESOURCES CONSUMPTION	
B1	**Energy**
B1.1	*Primary energy demand* *
B1.2	*Delivered thermal energy demand* *
B1.3	*Delivered electric energy demand* *
B1.5	*Energy from renewable sources in total thermal energy consumption* *
B1.6	*Energy from renewable sources in total electrical energy consumption* *
B1.8	*Final total energy for all building operations*
B1.11	*Embodied energy (Not for Use phase)* *
B2	**Electrical peak demand**
B2.1	*Electrical peak demand for building operations*
B3	**Use of Materials**
B3.5	*Recycled materials (Not for Use phase)* *
B4	**Use of potable water, stormwater and greywater**
B4.5	*Water consumption for indoor uses* *

C- ENVIRONMENTAL LOADINGS	
C1	**Greenhouse Gas Emissions**
C1.3	*Greenhouse Gas Emissions from building's operations* *
C3	**Solid and Liquid Wastes**
C3.1	*Construction and demolition waste (Not for Use phase)* *
C3.2	*Solid waste from building operations* *

D- INDOOR ENVIRONMENTAL QUALITY	
D1	**Indoor Air Quality and Ventilation**
D1.4	*TVOC concentration in indoor air (Not for Use phase) **
D1.10	*Ventilation rate **
D2	**Air Temperature and Relative Humidity**
D2.2	*Thermal comfort index **

E- SERVICE QUALITY	
E1	**Safety and Security**
E1.2	*Risk to occupants and facilities from fire*
E1.3	*Risk to occupants and facilities from flooding*
E1.4	*Risk to occupants and facilities from earthquake*
E2	**Functionality and efficiency**
E2.5	*Elevators*
E3	**Controllability**
E3.1	*Building Management System (BMS)*
E3.2	*Building Energy Management System (BEMS)*
E3.3	*Control of lighting systems*
E3.4	*Local control of heating/cooling systems*
E4	**Flexibility and Adaptability**
E4.5	*Adaptability to future changes in type of energy supply*
E5	**Optimization and Maintenance of Operating Performance**
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**
F1.4	*Use stage energy cost **
F1.5	*Use stage water cost **

b. SBTool criteria selection rationale

In this section the reason / motivation of the selection of the criteria that have been included in the HE-SBTool is described.

A - SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE		
	CRITERION	**REASON/MOTIVATION**
A1.13	*Provision and quality of walkways for pedestrian use.*	*Facilitate the occupants*
A3.12	*Public/ Municipal transportation*	*Facilitate the occupants*
A3.13	*Provision of on-site parking facilities for private vehicles*	*Facilitate the occupants*
A3.16	*Exterior lighting.*	*Important for occupants' safety*

B – ENERGY AND RESOURCES CONSUMPTION		
	CRITERION	**REASON/MOTIVATION**
B1.1	*Primary energy demand **	*KPI*
B1.2	*Delivered thermal energy demand **	*KPI*
B1.3	*Delivered electric energy demand **	*KPI*
B1.5	*Energy from renewable sources in total thermal energy consumption **	*KPI*
B1.6	*Energy from renewable sources in total electrical energy consumption **	*KPI*
B1.8	*Final total energy for all building operations*	*Interesting and can be calculated*
B1.11	*Embodied energy (Not for Use phase) **	*KPI*
B2.1	*Electrical peak demand for building operations **	*KPI*
B3.5	*Recycled materials (Not for Use phase) **	*KPI*
B4.5	*Water consumption for indoor uses **	*KPI*

C- ENVIRONMENTAL LOADINGS		
	CRITERION	**REASON/MOTIVATION**
C1.3	*Greenhouse Gas Emissions from building's operations **	*KPI*
C3.1	*Construction and demolition waste (Not for Use phase) **	*KPI*
C3.2	*Solid waste from building operations **	*KPI*

D- INDOOR ENVIRONMENTAL QUALITY		
	CRITERION	**REASON/MOTIVATION**
D1.4	*TVOC concentration in indoor air (Not for Use phase) **	*KPI*
D1.10	*Ventilation rate **	*KPI*
D2.2	*Thermal comfort index **	*KPI*

E- SERVICE QUALITY		
	CRITERION	**REASON/MOTIVATION**
E1.2	*Risk to occupants and facilities from fire*	*Important for occupants' safety*
E1.3	*Risk to occupants and facilities from flooding*	*Important for occupants' safety*
E1.4	*Risk to occupants and facilities from earthquake*	*Important for occupants' safety*
E2.5	*Elevators*	*Interesting and can be calculated*
E3.1	*Building Management System (BMS)*	*Important for building's energy consumption*
E3.2	*Building Energy Management System (BEMS)*	*Important for building's energy consumption*
E3.3	*Control of lighting systems*	*Important for building's energy consumption*
E3.4	*Local control of heating/cooling systems*	*Important for building's energy consumption*
E4.5	*Adaptability to future changes in type of energy supply*	*Interesting and can be calculated*
E5.6	*Retention of as-built documentation.*	*Useful*

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

G- COST AND ECONOMIC ASPECTS		
	CRITERION	**REASON/MOTIVATION**
G1.4	*Use stage energy cost **	*KPI*
G1.5	*Use stage water cost **	*KPI*

c. SBTool weights rationale

In this section the motivation for the value of weights assigned to issues, categories and criteria is presented.

ISSUE	WEIGHT (1 to 3)	MOTIVATION
A - SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE		
B – ENERGY AND RESOURCES CONSUMPTION	3	
C- ENVIRONMENTAL LOADINGS	3	
D- INDOOR ENVIRONMENTAL QUALITY	2	
E- SERVICE QUALITY		
F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS		
G- COST AND ECONOMIC ASPECTS	1	

* Issue weighting is from the "CESBA KPIs SBTool v1.0" tool

COMMENT: We do not have weighting factors for issues (issues are replaced by primary issue or system, which is factor D). Additionally, reporting of factor A is missing.

Primary issue or system directly affected	WEIGHT (1 to 5)	MOTIVATION
COST AND ECONOMICS	1	
FUNCTIONALITY AND SERVICABILITY	1	
WELL-BEING AND PRODUCTIVITY OF OCCUPANTS	2	
SOCIAL AND CULTURAL ISSUES	2	
LAND RESOURCES	3	
NON-RENEWABLE MATERIAL RESOURCES	3	
NON-RENEWABLE WATER	3	

RESOURCES	
HEALTH, SAFETY AND SECURITY OF INDIVIDUALS	3
RENEWABLE ENERGY RESOURCES	4
NON-RENEWABLE ENERGY RESOURCES	4
GLOBAL CLIMATE	5

CATEGORIES	WEIGHT (%)
A1- Site regeneration and Development	1.3
A3- Project Infrastructure and Services	5.2
TOTAL	6.5
B1- Energy	22.0
B2- Electrical peak demand	5.1
B3- Use of materials	-
B4 – Use of water, stormwater and greywater	1.4
TOTAL	28.5
C1- Greenhouse gas emissions	26.5
C3- Solid and liquid waste	10.1
TOTAL	36.6
D1- Indoor air quality and ventilation	-
D2- Thermal comfort	0.5
TOTAL	0.5
E1- Safety and Security	3.6
E2- Functionality and efficiency	0.2
E3- Controllability	3.8
E4– Flexibility and adaptability	5.1
E5- Optimization and maintenance of operating performance	0.0
TOTAL	12.6
F1- Social aspects	4.3
TOTAL	4.3
G1- Cost	11.0
TOTAL	11.0

CRITERIA WEIGHTS

SBTool file A – WeightA-G

The pre-assigned values of weighting factors in the CESBA MED GF-U have been reviewed and some of them were accepted and some were modified.
The L.F. weighting factors were reviewed with experts from Municipality of Fylis.

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**
A1.13	*Provision and quality of*	*1.26*	*3*	*2*	*1*	*4*	*Pedestrian and bicycle paths are important*

	walkways for pedestrian use.						*for future plans*

A3 Project Infrastructure and Services

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
A3.12	*Public/ Municipal transportation*	*2.83*	*3*	*3*	*1*	*4*	*Municipal transportation system is important for future plans*
A3.13	*Provision of on-site parking facilities for private vehicles*	*0.47*	*1*	*3*	*1*	*2*	*Parking is less important*
A3.16	*Exterior lighting.*	*1.89*	*1*	*3*	*3*	*4*	*Exterior lighting is important for security reasons*
TOTAL		**6.4**					

B - ENERGY AND RESOURCES CONSUMPTION

B1 Energy

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
B1.1	*Primary energy demand*	*3.77*	*3*	*3*	*4*	*4*	*Energy consumption is an important issue*
B1.2	*Delivered thermal energy demand*	*3.77*	*3*	*3*	*4*	*4*	*Energy consumption is an important issue*
B1.3	*Delivered electric energy demand*	*3.77*	*3*	*3*	*4*	*4*	*Energy consumption is an important issue*
B1.5	*Energy from renewable sources in total thermal energy consumption*	*0.94*	*3*	*3*	*4*	*1*	*Energy consumption is an important issue*
B1.6	*Energy from renewable sources in total electrical energy consumption*	*4.72*	*3*	*3*	*4*	*5*	*Installation of PV are of extremely importance for the Municipality strategic plan*
B1.8	*Final total energy for all building operations*	*3.77*	*3*	*3*	*4*	*4*	*Energy consumption is an important issue*
B1.11	*Embodied energy*	*1.05*	*5*	*1*	*4*	*1*	*Not so important for now*

B2 Electrical peak demand

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
B2.1	*Electrical peak demand for building operations*	*5.03*	*2*	*3*	*4*	*2*	*Not so important for now*

B3 Use of Materials

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
B3.5	*Recycled materials (Not for Use phase)*	-	*4*	*2*	*3*	*2*	Not very common practice

B4 Use of potable water, stormwater and greywater

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
B4.5	*Water consumption for indoor uses*	*1.42*	*3*	*2*	*3*	*3*	
TOTAL		**28.2**					

C- ENVIRONMENTAL LOADINGS

C1 Greenhouse Gas Emissions							
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
C1.3	*Greenhouse Gas Emissions from building's operations*	*26.21*	*5*	*2*	*5*	*4*	*Reduction of CO2 is an important issue*
C3 Solid and Liquid Wastes							
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
C3.1	*Construction and demolition waste (Not for Use phase)*	*-*	*4*	*2*	*3*	*3*	
C3.2	*Solid waste from building operations*	*10.01*	*4*	*2*	*3*	*4*	*Recycling is an important issue*
TOTAL		**36.3**					

D- INDOOR ENVIRONMENTAL QUALITY							
D1 Indoor Air Quality and Ventilation							
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
D1.4	*TVOC concentration in indoor air (Not for Use phase)*	*-*	*1*	*3*	*3*	*3*	
D1.10	*Ventilation rate*	*0.94*	*2*	*3*	*2*	*3*	
D2 Air Temperature and Relative Humidity							
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
D2.2	*Thermal comfort index*	*0.47*	*1*	*3*	*2*	*3*	
TOTAL		**1.4**					

E- SERVICE QUALITY							
E1 Safety and Security							
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
E1.2	*Risk to occupants and facilities from fire*	*1.42*	*1*	*3*	*3*	*3*	
E1.3	*Risk to occupants and facilities from flooding*	*1.42*	*1*	*3*	*3*	*3*	
E1.4	*Risk to occupants and facilities from earthquake*	*0.71*	*1*	*3*	*3*	*3*	
E2 Functionality and efficiency							
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
E2.5	*Elevators*	*0.21*	*1*	*2*	*1*	*4*	
E3 Controllability							
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
E3.1	*Building Management System (BMS)*	*0.16*	*2*	*1*	*1*	*3*	

E3.2	*Building Energy Management System (BEMS)*	*1.68*	*2*	*2*	*4*	*4*	
E3.3	*Control of lighting systems*	*1.26*	*2*	*2*	*4*	*3*	
E3.4	*Local control of heating/cooling systems*	*0.63*	*2*	*2*	*2*	*3*	
E4	**Flexibility and Adaptability**						
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
E4.5	*Adaptability to future changes in type of energy supply*	*5.03*	*3*	*2*	*4*	*4*	*Turning to PV systems is in future plans*
E5	**Optimization and Maintenance of Operating Performance**						
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
E5.6	*Retention of as-built documentation*	*0.03*	*1*	*1*	*1*	*1*	*Of no importance for now*
TOTAL		**12.5**					

F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS							
F1	**Social Aspects**						
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
F1.1	*Universal access on site and within the building*	*4.25*	*3*	*3*	*3*	*3*	
TOTAL		**4.2**					

G- COST AND ECONOMIC ASPECTS							
G1	**Cost**						
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
G1.4	*Use stage energy cost*	*2.36*	*3*	*3*	*1*	*5*	*Reduction of energy cost is very important*
G1.5	*Use stage water cost*	*8.49*	*3*	*3*	*3*	*3*	
TOTAL		**10.8**					

d. SBTool benchmarks rationale

In this section the motivation of the value of benchmarks assigned to the different criteria for score 0 (minimum acceptable performance) and for score 5 (excellent and ideal performance) is described. In order to set the benchmark values, we have integrated national/ local policies, guidelines, statistics and good practice.

A- SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
A1.13	*Existence and usability of bicycle and pedestrian paths around the building*	*text*	*0:*	*Short network of pedestrian or bicycle paths or shared areas*

				near the building
			5:	*Large network of pedestrian or bicycle paths or shared areas near the building leading to public transport stops, schools or public spaces*
A3.12	*Public/ Municipal transportation*	*text*	*0:*	*One stop of public/municipal transportation within 400m from the building, with travel frequency up to 15 minutes.*
			5:	*At least two stops of public/municipal transportation (covering different directions) within 400m from the building, with travel frequency up to 10 minutes.*
A3.13	*Provision of on-site parking facilities for private vehicles*	*Spaces/60m²*	*0: 1*	*ΦΕΚ 76/ΜΑΡΤΙΟΣ 2004*
			5: 1.3	*Based on discussions with National Local Committee Members*
A3.16	*Exterior lighting.*	*text*	*0:*	*Adequate exterior and public lighting around the building with old lighting fixtures, no visual discomfort*
			5:	*Adequate exterior and public lighting around the building with new lighting fixtures, no visual discomfort*

B- ENERGY AND RESOURCES CONSUMPTION

CRITERION	INDICATOR	UNIT	BENCHMARK	DERIVATIONS
B1.1	*Primary energy demand **	*kWh/m²*	*0: 310.6*	*Very difficult to get metered data, especially for residential and privately owned non-residential buildings. Use of statistical / calculated data.*
			5: 87.6	
		Score 0 corresponds to the consumption of the dominant energy class, while Score 5 to energy class A+ (33% of class B). Primary energy consumption per building use for the dominant energy class and class B, were defined using data from the Energy Performance Certificates (EPC) electronic repository (buildingcert), for whole buildings in Attica Prefecture, adapted for external (TEEKENAK) to internal (CESBAMED) dimensions. All end uses (space heating, space cooling, domestic hot water, ventilation, lighting and auxiliaries) were taken into account.		
B1.2	*Delivered thermal energy demand **	*kWh/m²*	*0: 69.1*	*Very difficult to get metered data, especially for residential and privately owned non-residential buildings.*
			5: 11.5	

				Use of statistical / calculated data. *Score 0 corresponds to the consumption of the dominant energy class, while Score 5 to energy class A+ (33% of class B).* *Thermal energy consumption per building use for the dominant energy class and class B, were defined using data from the Energy Performance Certificates (EPC) electronic repository (buildingcert), for whole buildings in Attica Prefecture, adapted for external (TEEKENAK) to internal (CESBAMED) dimensions.* *All end uses (space heating, space cooling and domestic hot water) were taken into account.*
B1.3	*Delivered electric energy demand **	*kWh/m²*	*0: 99.4* *5: 29.1*	*Very difficult to get metered data, especially for residential and privately owned non-residential buildings.* *Use of statistical / calculated data.* *Score 0 corresponds to the consumption of the dominant energy class, while Score 5 to energy class A+ (33% of class B).* *Electricity consumption per building use for the dominant energy class and class B, were defined using data from the Energy Performance Certificates (EPC) electronic repository (buildingcert), for whole buildings in Attica Prefecture, adapted for external (TEEKENAK) to internal (CESBAMED) dimensions.* *All end uses (space heating, space cooling, domestic hot water, ventilation, lighting and auxiliaries) were taken into account.*
B1.5	*Energy from renewable sources in total thermal energy consumption **	*%*	*0: 16* *5: 80*	*Building use solar collectors for pre-heating* *Building use solar collectors for pre-heating and partial coverage of heating loads*
B1.6	*Energy from renewable sources in total electrical energy consumption **	*%*	*0: 20* *5: 100*	*Very difficult to get metered data.* *Use of statistical/ estimated data*
B1.8	*Final total energy for all building operations*	*kWh/m²*	*0: 168.5* *5: 40.6*	*Based on B1.2 and B1.3*
B1.11	*Embodied energy (Not for Use phase) **	*MJ/m²*	*0: 6230* *5: 3000*	*Based on discussions with National Local Committee Members*
B2.1	*Electrical peak demand for building operations **	*W/m²*	*0: 225.3* *5: 9*	*From typical installed power for heating, cooling, mechanical ventilation, lighting, and equipment for office buildings* *For nzeb buildings*
B3.5	*Weight of recycled materials on total weight of materials (Not for Use phase) **	*%*	*0: 3* *5: 40*	*Based on discussions with National Local Committee Members and common practice in Greece*

			0: 6.0	From typical values for offices
B4.5	Potable water consumption per occupant per year*	m^3/occupant	5: 1.5	Based on discussions with National Local Committee, consumption can be reduced to 75%

C- ENVIRONMENTAL LOADINGS				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
C1.3	CO2 equivalent emissions per internal useful floor area per year *	kg CO2 eq/m^2/yr	0: 7.5 5: 2.0	Based on thermal and electricity consumption benchmarking as estimated in B1.2 and B1.3. It is assumed that thermal energy is covered by fuel oil. Score 0 corresponds to CO2 equivalent emissions for the thermal and electrical energy consumption of the buildings of the dominant energy class Score 5 corresponds to the CO2 equivalent emissions for consumptions of energy class A+.
C3.1	Weight of waste and materials generated per 1 m2 of useful floor area demolished or constructed (Not for Use phase) *	kg/m^2/life cycle stage	0: 120 5: 36	As an assumption of 8 m^3/100 m^2 X 1500 kg/m^3 70% x120kg/m^2 =1.8 kg/m^2 reuse, recycling and recovery of CDW should be reduced by 70% at 2020
C3.2	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 *	%	0: 57 5: 100	Based on discussions with National Local Committee Members and common practice

D- INDOOR ENVIRONMENTAL QUALITY				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
D1.4	TVOC concentration in indoor air (Not for Use phase) *	µg/ m^3	0: 1000 5: 200	From punished material
D1.10	Ventilation rate *	l/s/m^2	0: 0.29 5: 0.83	Common practice in NR buildings for fresh air Based on National guidelines for fresh air for office buildings
D2.2	Thermal comfort index *	%	0: 25 5: 5	Based on discussions with National Local Committee Members

E- SERVICE QUALITY				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**

E1.2	*Risk to occupants and facilities from fire*	*text*	*0:*	*The building fulfils the requirements for fire protection. Basic training of the occupants*
			5:	*The building fulfils the requirements for fire protection. Periodical training of the occupants and fire drills. System connected to a BMS.*
E1.3	*Risk to occupants and facilities from flooding*	*text*	*0:*	*Area facing flooding problems (during the last 100years), building partially equipped, OR building in an area with no flooding problems (during the last 100years).*
			5:	*Area facing flooding problems (during the last 100years), building fully equipped, which faced flooding incident successfully*
E1.4	*Risk to occupants and facilities from earthquake*	*text*	*0:*	*Building has passed successfully, a pre-earthquake inspection.*
			5:	*Building has passed successfully, a pre-earthquake inspection and fully complies with National Regulations. Periodical training of the occupants*
E2.5	*Elevators*	*text*	*0:*	*Certified elevators, with regular maintenance but don't comply with regulations for disabled persons. Maximum waiting time about 45 sec.*
			5:	*Certified elevators, with regular maintenance, complied with updated standards EN81.20, and with disabled persons' requirements. Maximum waiting time about 25 sec. System connected to a BMS.*
E3.1	*Building Management System (BMS)*	*text*	*0:*	*The building is equipped with a BMS, but it doesn't provide monitoring of system operations, or diagnostic reporting.*
			5:	*The building is equipped with a BMS, capable of ensuring that building technical systems operate at peak efficiency during all operating conditions, and the system provides full monitoring of system operations, as well as diagnostic reporting.*

E3.2	*Building Energy Management System (BEMS)*	*text*	*0:* *5:*	*Central control system for heating, cooling and ventilation, on building level* *Central control system for heating, cooling, ventilation and lighting on zone level*
E3.3	*Control of lighting systems*	*text*	*0:* *5:*	*Automatic control of lighting turning on and off per building part.* *Automatic control of lighting turning on and off per zone. Daylight and occupancy sensors in all zones. System connected to a BEMS or BMS.*
E3.4	*Local control of heating/cooling systems*	*text*	*0:* *5:*	*Thermostatic control of terminal units or/and central heating system with timer* *Automatic local control of terminal units per room. Thermostatic control per room for central heating systems.*
E4.5	*Ease in installing heating or cooling equipment that require a different fuel/ energy carrier, or photovoltaic systems.*	*text*	*0:* *5:*	*Adapting the building to a new fuel source will be possible with a moderate level of renovations, but installing photovoltaics will require major renovations.* *Adapting the building to a new fuel source or installing photovoltaics will require only minor adjustments to architectural, HVAC or electrical systems.*
E5.6	*Retention of as-built documentation*	*text*	*0:* *5:*	*A full set of systems manuals and complete as-built drawings will be been provided. There will be a partial recording, reporting and documentation protocol for maintenance, but somewhat inconsistent with the size and complexity of the building.* *A full set of operations and maintenance documentation, including a full set of systems manuals, complete as-built drawings and an operations and maintenance guide will be provided in both hard-copy and electronic forms.*

F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
F1.1	*Ease of access and use of facilities for*	*text*	*0:*	*All key facilities, including*

	persons with mobility or perceptual disabilities.		*outdoor facilities, entry points and hallways, are accessible to wheelchair users and visually impaired persons*
		5:	*All key facilities, including outdoor facilities, entry points and hallways, are accessible to wheelchair users and visually impaired persons.*

G- COST AND ECONOMIC ASPECTS				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
G1.4	*Annual energy cost per usable floor area **	*€/m2*	*0: 18.9* *5: 4.7*	*From benchmarking of B1.2 and B1.3, taking an average fuel and electricity cost. (taking +20% of total for taking into account energy cost for equipment and other installations)*
G1.5	*Annual water cost per usable floor area **	*€/m2*	*0: 0.59* *5: 0.15*	*From benchmarking of B4.5, taking into account 10 occupants/100m2 and an average of water cost.*

e. SBTool Criteria Specifications

In this section for each selected criterion the presentation includes:

- *Information source: The source of the data/information that can 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 that can be used to verify the value of indicators.*
- *Standards: technical documents taken as reference for the assessment method.*

➢ The presentation that follows describes in details the relevant values that have been calculated for the Hellenic Training Phase in Town Hall of Municipality of Fylis

➢ Relevant information are also provided in the Training Material

A- SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
A1.13	Existence and usability of bicycle and pedestrian paths around the building	*Information source*	*Qualitative indicator - Estimations*
		Assessment method	*CESBAMED calculation steps* Estimate the existence and usability of bicycle and pedestrian paths around the building *NOA pilot steps/comments:* From area plots and from the on-site audit, three of the building's facades are facing

			“shared paths”, connected to a larger network of “shared areas”
		Standard	
A3.12	Existence and effectiveness of public/municipal transportation near the building	*Information source*	*Qualitative indicator – Estimations – Metered data*
		Assessment method	*CESBAMED calculation steps* Estimate the existence and effectiveness of public/municipal transportation within 400m from the building *NOA pilot steps/comments:* *From metered data. From a study carried out by the Municipality for the public transport, the number and location of public transport stops was defined. (1 stop of a certain transportation line within 400m)*
		Standard	
A3.13	*Ratio of exterior and interior parking spaces to the total usable area of non-residential occupancies (spaces/60 m2)*	*Information source*	*Metered data - Estimations*
		Assessment method	*CESBAMED calculation steps* *1. Calculate the total usable area of non-residential occupancies* *2. Calculate the total parking spaces (exterior and interior)* *3. Calculate the ratio of total parking spaces per 60m² total usable area* *NOA pilot steps/comments:* *From metered data.from bluilding plots, the usable area was defined. From the on-site audit the number of total parking spaces was defined. (0.73)*
		Standard	*ΦΕΚ 76/ΜΑΡΤΙΟΣ 2004*
A3.16	*Efficiency and adequacy of the exterior lighting and the public lighting around the building*	*Information source*	*Qualitative indicator – Estimations – Metered data*
		Assessment method	*CESBAMED calculation steps* *Estimation of the efficiency and adequacy of the exterior lighting and the public lighting around the building* *NOA pilot steps/comments:* From the on-site audit the number and type of exterior and public lighting was defined. (Adequate exterior and public lighting around the building, with old lighting fixtures, no visual discomfort)
		Standard	

B- ENERGY AND RESOURCES CONSUMPTION			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
B1.1	*Primary energy demand **	*Information source*	*Metered data – Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *National calculation methods used to meet performance requirements or to complete Energy Performance Certificates (EPCs), aligned with the EN standards series, can be used. In-built lighting may not be specifically covered in all national or regional calculation methods. As a result, either the omission from the calculations, or a separate calculation method if used, shall be noted in the reporting. The reference unit is one square meter of useful internal floor area (Level(s) Part 3 – 1.3.1).* *NOA pilot steps/comments:* *From calculated data based on National calculation merthod for the energy performance of building and the issuing of Energy Performance Certificates (semi-steady, monthly method). From an energy study carried out for the Municipal Unit of Ano Liosia, data for primary energy consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions.(442.4 kWh/m^2)* ***Comment: Lighting is taken into account. Hot water is not taken into account for office buildings***
		Standard	*EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *EN ISO 13790 (Energy performance of buildings)* *EN 15193 (Energy performance of buildings — Energy requirements for lighting)*
B1.2	*Delivered thermal energy demand **	*Information source*	*Metered data – Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *Energy uses taken into account: heating, cooling, ventilation, domestic hot water* *National calculation methods used to meet performance requirements or to complete Energy Performance Certificates (EPCs), aligned with the EN standards series, can be used. The reference unit is one square meter of useful internal floor area (Level(s)*

			Part 3 – 1.3.1). *In case of existing buildings, the delivered thermal energy should be evaluated using data from metering.* *The metered delivered thermal energy demand (i.e. fuel consumption data) has to be calculated taking the average value over 3 years period.* *NOA pilot steps/comments:* *From calculated data based on National calculation merthod for the energy performance of building and the issuing of Energy Performance Certificates (semi-steady, monthly method). From an energy study carried out for the Municipal Unit of Ano Liosia, data for thermal energy consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions.(100.1 kWh/m^2)* ***Comment: Hot water is not taken into account for office buildings***
		Standard	*EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *EN ISO 13790 (Energy performance of buildings)* *EN 15193 (Energy performance of buildings — Energy requirements for lighting)*
		Information source	*Metered data – Calculated data - Estimations*
B1.3	*Delivered electric energy demand* *	*Assessment method*	*CESBAMED calculation steps* *National calculation methods used to meet performance requirements or to complete Energy Performance Certificates (EPCs), aligned with the EN standards series, can be used. The reference unit is one square meter of useful internal floor area (Level(s) Part 3 – 1.3.1).* *In case of existing buildings, the delivered electrical energy should be evaluated using data from metering. The metered delivered electric energy demand (i.e. electricity consumption data) has to be calculated taking the average value over 3 years period bills.* *NOA pilot steps/comments:* *From calculated data based on National calculation merthod for the energy performance of building and the issuing of Energy Performance Certificates (semi-steady, monthly method). From an energy study carried out for the Municipal Unit of Ano Liosia, data for electric energy*

			consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions (114.6 kWh/m²) ***Comment: Lighting is taken into account. Hot water is not taken into account for office buildings***
		Standard	*EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *EN ISO 13790 (Energy performance of buildings)* *EN 15193 (Energy performance of buildings — Energy requirements for lighting)*
B1.5	*Energy from renewable sources in total thermal energy consumption ****	*Information source*	*Metered data – Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *Share of renewable energy in final thermal energy consumption of the building. In case of existing buildings, it should be evaluated by energy metering* *NOA pilot steps/comments:* *From an on site audit there were no renewable sources for thermal energy installed on the building (0%)*
		Standard	*Level(s) Part 1-2 – Beta version* *EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *2013/114/EU: Commission Decision of 1 March 2013.* *Directive 2009/28/EC (RES Directive)*
B1.6	*Energy from renewable sources in total electrical energy consumption **	*Information source*	*Metered data – Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *Share of renewable energy in final electric energy consumption. In case of existing buildings, it should be evaluated by energy metering* *NOA pilot steps/comments:* *From an on site audit there were no renewable sources for electric energy installed on the building (0%)*
		Standard	*Level(s) Part 1-2 – Beta version* *EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *2013/114/EU: Commission Decision of 1 March 2013.* *Directive 2009/28/EC (RES Directive)*
B1.8	*Final total energy for all building operations*	*Information source*	*Metered data – Calculated data - Estimations*
		Assessment	*CESBAMED calculation steps*

		method	*During early design stages a screening tool may be used, but in later stages an hour-by-hour simulation program should be used* *NOA pilot steps/comments:* *From calculated data based on National calculation merthod for the energy performance of building and the issuing of Energy Performance Certificates (semi-steady, monthly method). From an energy study carried out for the Municipal Unit of Ano Liosia, data for final energy consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions (214.7 kWh/m^2)* ***Comment: Lighting is taken into account. Hot water is not taken into account for office buildings***
		Standard	*EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *EN ISO 13790 (Energy performance of buildings)* *EN 15193 (Energy performance of buildings — Energy requirements for lighting)*
B1.11	*Embodied energy (Not for Use phase) **	*Information source*	*Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *The following steps should be followed in order to compile the BoM:* *- Compile the Bill of Quantities: A BoQ is compiled which comprises the building elements accounting for at least 99% of the mass of the building.* *- Identify the basic composition of each building element. A breakdown of its constituent materials has to be carried out. The mass of each constituent material has to be estimated;* *- Aggregation by material: The mass for each constituent material should thereafter be aggregated to obtain the total mass for each type of material.* *Once the BoM has been compiled, it is possible to calculate the indicator associating to each constituent material the relative embodied primary non-renewable energy by multiplying the specific mass (i.e. kg) with its corresponding embodied energy coefficient (i.e. MJ/kg). The total value of embodied primary non-renewable energy is finally normalized by the gross area of the building* *NOA pilot steps/comments:*

			Not for Use phase
		Standard	*EN 15978 "Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method".* *ISO 14040/44* *EN 15804 (Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products)*
B2.1	*Electrical peak demand for building operations*	*Information source*	*Metered data – Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *Review of contract documentation and sample equipment specifications by an ouside electrical engineer.* *NOA pilot steps/comments:* *From an on site audit, the installed power of heating, cooling and lighting systmes was defined. For equipment, typical values for office, taken from National Guidelines. An increasement of about 15% to include other systmes (i.e. elevators, circulators, pumps). (434.7 W/m²)* **COMMENT**: **Usefull area with internal dimensions is used.**
		Standard	
B3.5	*Recycled materials (Not for Use phase) **	*Information source*	*Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *- Compile the Bill of Quantities: A BoQ is compiled which comprises the building elements accounting for at least 99% of the mass of the building.* *- Identify the basic composition of each building element. A breakdown of its constituent materials has to elaborated. The mass of each constituent material has to be estimated;* *- Aggregation by material: the mass of all constituent material should thereafter be aggregated to obtain the total mass of materials used in the building (A);* *- Identify the recycled content of each constituent material (in mass);* *- Aggregation by material: the recycled mass of all constituent materials should thereafter be aggregated to obtain the total recycled mass of materials (B) used in the building;* *- The indicator's value is calculated as B/A (total mass of recycled materials on the total mass of materials).*

			NOA pilot steps/comments: ***Not for Use phase***
		Standard	*EN ISO 14021 (Environmental labels and declarations - Self-declared environmental claims - Type II environmental labelling)*
B4.5	*Water consumption for indoor uses **	*Information source*	*Metered data – Estimations*
		Assessment method	*CESBAMED calculation steps* *Includes the use of potable water for: drinking water; water for sanitation; water for cleaning; water for washing machine; water for dishwasher; domestic hot water. The user must include in the calculation the sanitary devices/fittings (i.e. toilets, taps and showers) and water using appliances (i.e dishwashers and washing machines). Consumption rates for different sanitary devices and fittings are determined through specific data from suppliers. The specific usage factors have to be established. The number of days that the building is expected to be occupied per year has to be defined by the user. See KPIs Card document for the principle of the per occupant potable water consumption calculation.* *In case of existing buildings, the potable area water consumptions should be evaluated using data from metering. The metered consumptions have to be estimated taking the average value over 3 years period bills.* *NOA pilot steps/comments:* *Metered data not available for the public buildings of the Municipality. From the corresponding department of the Municipality, the annual water consumption was not officially reported, but estimated. From an energy study carried out for the Municipal Unit of Ano Liosia, the number of employyes was defined. The ratio of annual total water consumption to the number of employees was calculated (6 m^3/person)*
		Standard	*Level(s) Part 1-2 – Beta version.* *EN 15978 (Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method)*

C- ENVIRONMENTAL LOADINGS			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
		Information source	*Metered data – Calculated data - Estimations*
C1.3	*Greenhouse Gas Emissions from building's operations **	*Assessment method*	*CESBAMED calculation steps* *1. For each building in the area calculate the emissions of CO2 eq. with the following formula:* $E = \left[\sum \left(Q_{fuel,i} \times LHV_i \times k_{em,i}\right) + \left(Q_{el} \times k_{em,el}\right) + \left(Q_{dh} \times k_{em,dh}\right)\right]$ *Qfuel,I = annual quantity of i-th fuel (m3 or Kg)* *Qel = annual quantity of electric energy from the grid (kWh)* *Qdh = annual quantity of energy from district heating/cooling (kWh)* *LHVi = lower heating value of the i-th fuel (kWh/m3 or kWh/Kg)* *Kem,i = CO2 eq. emission factor of the i-th fuel (Kg CO2/kWh)* *Kem,i = CO2 eq. emission factor of the electric energy from the grid (Kg CO2/kWh)* *Kem,i = CO2 eq. emission factor of energy from district heating/cooling (Kg CO2/kWh)* *2. Calculate the aggregated annual total CO2 equivalent emissions from all buildings / total useful internal floor area of all buildings* *NOA pilot steps/comments:* *From calculated data based on National calculation merthod for the energy performance of building and the issuing of Energy Performance Certificates (semi-steady, monthly method). From an energy study carried out for the Municipal Unit of Ano Liosia using the national method, data for thermal and electrical energy consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions. Using the national conversion factors to COeq (20704.1 kg/GWh for fuel oil and 61123.9 kg/GWh for electricity), total CO2 equivalent emissions to total useful internal floor area of the building (9.1 kg/m^2)*
		Standard	*EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings).* *Level(s) Part 1-2 – Beta version*
C3.1	*Construction and demolition waste (Not for Use phase) **	*Information source*	*Metered data –Estimations*
		Assessment	*CESBAMED calculation steps*

		method	*<u>Design stage (based on estimations)</u>* *Estimations of waste based on surveys of existing buildings that will undergo major renovation or where the structure will be reused (life cycle stage B5).* *Estimations based on scenarios for deconstruction and demolition of the building at a future point in time beyond the end of its service life (life cycle stages C1/3, D).* *<u>Construction stage (based on data recorded from the site)</u>* *Data from deconstruction and demolition of (a) building(s) in order to clear a site for a new building construction (as part of a previous life cycle).* *Data from the part deconstruction of (a) building(s) in order to prepare useful parts for in-situ reuse. Data from construction on site of a new building and/or the prefabrication/construction of parts and elements off site (life cycle stages A3/5).* *Data from preparation of a building in order to facilitate a major renovation.* *<u>Completion stage (based on estimations supported by as-built drawings)</u>* *Estimations based on scenarios for deconstruction and demolition of the building at a future point in time beyond the end of its service life (life cycle stages C1/3, D).* *NOA pilot steps/comments:* ***Not for Use phase***
		Standard	*Level(s) Part 1-2 – Beta version*
C3.2	*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 **	*Information source*	*Metered data – Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *The seven reference categories of solid waste are: Paper, Plastic, Metal, Glass, Wet waste, Textiles, Special hazardous waste.* *1. Identify the availability and position of bins and containers for each of the seven solid waste categories.* *2. Calculate the walking distance (m) from the building's main entrance to each identified bin or container.* *3. Evaluate how many of the 7 categories of solid waste is possible to collect within a*

			100 m walking distance from the building's entrance (A). *4. Calculate the value of the indicator as : A/7* *NOA pilot steps/comments:* *From calculated data. From an on-site audit in the testing area, the number and the type of collectable solid waste categories within a 100 m distance was defined. In this case there were single bins used to collect different types of waste that will be later separated at the waste facility. (57%)*
		Standard	

D- INDOOR ENVIRONMENTAL QUALITY			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
D1.4	*TVOC concentration in indoor air (Not for Use phase) **	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *<u>Post completion phase</u>* *Testing shall be carried out for a minimum of 10% of the apartments and be representative of any significant variations in the house or apartment typologies, configurations and materials. Samples shall be taken in the living room and the smallest bedroom of each property* *NOA pilot steps/comments:* ***Not for Use phase*** ***COMMENT: TVOC concentrations have been in the past used as an indicator of the ability of combined VOC exposures to produce adverse health effects. This approach is no longer supported (e.g. ASHRAE), because the irritant potential and toxicity of individual VOCs vary widely, and measured concentrations are highly dependent on the sampling and analytical methods used. The available data do not allow establishing of thresholds for TVOC (ECA-IAQ European Collaborative Action, JRC)***
		Standard	*CEN/TS 16516 (Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air).* *EN 15251 (Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment,*

			lighting and acoustics). *Level(s) Part 1-2 – Beta version*
D1.10	*Ventilation rate **	*Information source*	*Metered data – Calculated data*
		Assessment method	*CESBAMED calculation steps* *<u>ONLY for ventilated buildings</u>* *The ventilation rate (l/s/m2) must be calculated in all the main rooms, excluding circulation spaces and service rooms (i.e. toilets).* *The indicator must be calculated as weighted sum all the calculated ventilation rates.* *NOA pilot steps/comments:* *Building not mechanically ventilated.*
		Standard	*EN 16798-7 (Energy performance of buildings - Ventilation for buildings - Part 7: Calculation methods for the determination of air flow rates in buildings including infiltration)*
D2.2	*Predicted Percentage Dissatisfied (PPD) **	*Information source*	*Metered data – Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *<u>Design stage (mechanically conditioned)</u>* *For all main occupied room:* *1. Estimate PMV* *2. Calculate PPD* *NOA pilot steps/comments:* *From short ohn site occupant survey.* *From on site audit there were some spaces with no heating system and there was difficulty in controlling internal conditions and natural ventilation. (18%)*
		Standard	*EN ISO 7730 – Ergonomics of the thermal environment – Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria.* *EN 16798-1:2017 - Energy performance of buildings - Part 1: Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics - Module M1-6 (revision of EN 15251). Brussels: European Committee for Standardization.* *Level(s) Part 1-2 – Beta version. Brussels: European Commission*

E- SERVICE QUALITY			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
E1.2	*Risk to occupants and facilities from fire*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Estimate the level of compliance with the requirements for fire protection as well as of the occupnats training* *NOA pilot steps/comments:* *From and on site audit and information from the corresponding department. (The building fulfils the requirements for fire protection. Basic training of the occupants)*
		Standard	*Insert text here*
E1.3	*Risk to occupants and facilities from flooding*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Estimate the area's flooding risk as well as the building equipment.* *NOA pilot steps/comments:* *From an on site audit and information from the corresponding department. (*Area often facing floodings, building properly equipped)
		Standard	
E1.4	*Risk to occupants and facilities from earthquake*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Evaluate the building's anti-earthquaqe protection.* *NOA pilot steps/comments:* *From an on site audit and information from the corresponding department. (Building has passed successfully, a pre-erthquaqe inspection. Basic training of the occupants)*
		Standard	
E2.5	*Elevators*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Assess the service quality and functional efficiency of elevators within a building, as well as their compliance with the existing regulations.* *NOA pilot steps/comments:*

			From an on site audit and information from the corresponding department. (The elevator is certified, but it is too small)
		Standard	
E3.1	*Building Management System (BMS)*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Visual inspection and review of specifications.* *NOA pilot steps/comments:* *From an on site audit and information from the corresponding department. (The building has no BMS)*
		Standard	
E3.2	*Building Energy Management System (BEMS)*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Visual inspection and review of specifications.* *NOA pilot steps/comments:* *From an on site audit and information from the corresponding department. (Building is equipped with a compensation system)*
		Standard	
E3.3	*Control of lighting systems*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Visual inspection and review of specifications for lighting control zones, control types and locations* *NOA pilot steps/comments:* *From an on site audit and information from the corresponding department. (The building has no lighting control system)*
		Standard	
E3.4	*Local control of heating/cooling systems*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Type of mechanical and electrical equipment accessible by occupants, and the extent to which local systems can be operated and modulated by occupants.* *NOA pilot steps/comments:*

			From an on site audit and information from the corresponding department. (Thermostatic control of terminal units)
		Standard	
E4.5	*Adaptability to future changes in type of energy supply*	*Information source*	*Estimations*
		Assessment method	*CESBAMED calculation steps* *Evaluate the ease or difficulty in installing heating or cooling equipment that require a different fuel, or to install photovoltaic systems.* *NOA pilot steps/comments:* *From an on site audit and information from the corresponding department. (Adapting the building to a new fuel source or installing photovoltaics will require only a minor level of renovations).*
		Standard	
E5.6	*Retention of as-built documentation*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Evaluate the availability of architectural, mechanical and electrical drawings, and equipment manuals.* *NOA pilot steps/comments:* *From an on site audit and information from the corresponding department.* (*Building drawing, operation and maintenance manuals exist but are deficient)*
		Standard	

F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
F1.1	*Universal access on site and within the building*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Assess the ease of access and use of facilities for persons with mobility or perceptual disabilities.* *NOA pilot steps/comments:* *From an on site audit. (Outdoor facilities, entry points and ground-floor hallways, are accessible to wheelchair users and visually*

			impaired persons)
		Standard	

G- COST AND ECONOMIC ASPECTS			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
G1.4	*Energy annual cost per usable floor area **	*Information source*	*Metered data – Estimations*
		Assessment method	*CESBAMED calculation steps* *In case of existing buildings, the total annual cost of actual thermal and electrical energy use from energy bills should be calculated taking the average energy cost over 3 years period.* *NOA pilot steps/comments:* *Metered data not available for the public buildings of the Municipality. From the corresponding department of the Municipality, the annual water consumption was not officially reported, but estimated. From the architectural plans, the total internal surface of the building was defined. (23.8 €/m²)* **COMMENT: All uses are taken into account, including equipment and installations (unlike energy related indicators). Usefull area with internal dimensions is used.**
		Standard	*Level(s) Part 1-2 – Beta version*
G1.5	*Water annual cost per usable floor area **	*Information source*	*Metered data – Estimations*
		Assessment method	*CESBAMED calculation steps* *In case of existing buildings, the total annual cost of water use from water bills should be calculated taking the average water cost over 3 years period.* *NOA pilot steps/comments:* *(0.37 €/m²)* **COMMENT: Gross area with internal dimensions is used.**
		Standard	*Level(s) Part 1-2 – Beta version*

2. 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		
Ax – Category name		
A1.13	*Provision and quality of walkways for pedestrian use.*	*3.0*
A3.12	*Public/ Municipal transportation*	*0.0*
A3.13	*Provision of on-site parking facilities for private vehicles*	*-1.0*
A3.16	*Exterior lighting.*	*0.0*
B – ENERGY AND RESOURCES CONSUMPTION		
Bx – Category name		
B1.1	*Primary energy demand **	*-1.0*
B1.2	*Delivered thermal energy demand **	*-1.0*
B1.3	*Delivered electric energy demand **	*-1.0*
B1.5	*Energy from renewable sources in total thermal energy consumption **	*-1.0*
B1.6	*Energy from renewable sources in total electrical energy consumption **	*-1.0*
B1.8	*Final total energy for all building operations*	*-1.0*
B1.11	*Embodied energy (Not for Use phase) **	
B2.1	*Electrical peak demand for building operations **	*-1.0*
B3.5	*Recycled materials (Not for Use phase) **	
B4.5	*Water consumption for indoor uses **	*0.0*
C- ENVIRONMENTAL LOADINGS		
Cx – Category name		
C1.3	*Greenhouse Gas Emissions from building's operations **	*-1.0*
C3.1	*Construction and demolition waste (Not for Use phase) **	
C3.2	*Solid waste from building operations **	*0.0*
D- INDOOR ENVIRONMENTAL QU		
Dx – Category name		
D1.4	*TVOC concentration in indoor air (Not for Use phase) **	
D1.10	*Ventilation rate **	-
D2.2	*Thermal comfort index **	*1.8*
E- SERVICE QUALITY		
Ex – Category name		
E1.2	*Risk to occupants and facilities from fire*	*0.0*
E1.3	*Risk to occupants and facilities from flooding*	*3.0*
E1.4	*Risk to occupants and facilities from earthquake*	*3.0*
E2.5	*Elevators*	*0.0*
E3.1	*Building Management System (BMS)*	*-1.0*
E3.2	*Building Energy Management System (BEMS)*	*0.0*
E3.3	*Control of lighting systems*	*-1.0*
E3.4	*Local control of heating/cooling systems*	*0.0*
E4.5	*Adaptability to future changes in type of energy supply*	*3.0*
E5.6	*Retention of as-built documentation.*	*-1.0*
F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS		
F1 – Κοινωνικές Πτυχές		

F1.1	*Universal access on site and within the building.*	*-1.0*
G- COST AND ECONOMIC ASPECTS		
G1 – Cost		
G1.4	*Use stage energy cost **	*-1.0*
G1.5	*Use stage water cost **	2.5

COMMENTS:

- **All scores below 0 should be -1.**
- **A3.13 *Provision of on-site parking facilities for private vehicles. In file B, input only for residential building***

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/m2/yr	442.4
B.1.2 Delivered thermal energy demand	Delivered thermal energy demand per internal useful floor area per year	kWh/m2/yr	100.1
B.1.3 Delivered electric energy demand	Delivered electric energy demand per internal useful floor area per year	kWh/m2/yr	114.6
B.1.5 Energy from renewable sources in total final thermal energy consumption	Share of renewable energy in final thermal energy consumptions	%	0.0
B.1.6 Energy from renewable sources in total final electric energy consumption	Share of renewable energy in final electric energy consumption	%	0.0
B.1.11 Embodied non-renewable primary energy	Embodied primary non-renewable energy	MJ/m^2	-
B.3.5 Recycled materials	Weight of recycled materials on total weight of materials	%	-
B.4.5 Potable water consumption for indoor uses	Potable water consumption per occupant per year	m^3/occupant/year	6.0
C.1.3 Global Warming potential	CO_2 equivalent emissions per internal useful floor area per year	kg CO_2 eq./m^2/yr	9.1
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	-

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	%	57.0
D.1.4 TVOC concentration in indoor air	TVOC concentration in indoor air	µg/ m^3	-
D.1.10 Ventilation rate	Ventilation rate normalized per useful floor area	l/s/m2	-
D.2.2 Thermal comfort index	Predicted Percentage Dissatisfied (PPD)	%	18.0
G.1.4 Use stage energy cost	Energy annual cost per usable floor area	€/m2/yr	23.8
G.1.5 Use stage water cost	Water annual cost per usable floor area	€/m2/yr	0.37

c. Actual performance analysis

WEAKNESSES ASPECTS	*Old building with no insulation. Inefficient heating system. No mechanical ventilation. Old lighting system. No automatic controls in heating, lighting. Large unused spaces in the basement.*
STRENGHT ASPECTS	*Aesthetics. Central location and easy accessibility. Spacious and green surrounding area (in front of a square). Three of the building's facades are facing "shared paths", connected to a larger network of "shared areas. Large flat roof, for installation of PV*
POTENTIAL FOR PERFORMANCE IMPROVEMENT	*Improve energy consumption and CO2 emissions of the building. Improve thermal comfort and indoor air quality. Reduce energy cost.*

3. STRATEGIC DEFINITION

a. Performance targets

A - SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE			
A1 – Site Regeneration and Development			
A1.13 Provision and quality of walkways for pedestrian use.		Actual value	3.0
Existence and usability of bicycle and pedestrian paths around the building	text	Target value	3.0
A3 – Project Infrastructure and Services			
A3.12 Public/ Municipal transportation		Actual value	0.0
Existence and effectiveness of public/municipal transportation near the building	text	Target value	
A3.13 Provision of on-site parking facilities for private vehicles		Actual value	-1.0
Ratio of exterior and interior parking spaces to the total usable area of non-residential occupancies	spaces/60 m^2	Target value	
A3.16 *Exterior lighting*		Actual value	0.0
Efficiency and adequacy of the exterior lighting and the public lighting around the building	text	Target value	5.0
B – ENERGY AND RESOURCES CONSUMPTION			
B1 – Energy			
B1.1 – Primary energy demand		Actual value	-1.0
Primary energy demand	kWh/m^2	Target value	5.0
B1.2 – Delivered thermal energy demand		Actual value	-1.0
Delivered thermal energy demand	kWh/m^2	Target value	
B1.3 – Delivered electric energy demand		Actual value	-1.0
Delivered electric energy demand	kWh/m^2	Target value	5.0
B1.5 – Energy from renewable sources in total thermal energy consumption		Actual value	-1.0
Energy from renewable sources in total thermal energy consumption	%	Target value	-1.0
B1.6 – Energy from renewable sources in total electrical energy consumption		Actual value	-1.0
Energy from renewable sources in total electrical energy consumption	%	Target value	5.0
B1.8 – Final total energy for all building operations		Actual value	-1.0
Final total energy for all building operations	kWh/m^2	Target value	
B2 – Electrical peak demand			
B2.1 – *Electrical peak demand for building operations*		Actual value	-1.0
Average of peak monthly electrical demand for one year	W/m^2	Target value	
B4 – Use of potable water, stormwater and greywater			
B4.5 – Water consumption for indoor uses		Actual value	0.0
Water consumption for indoor uses	m^3/person	Target value	0.0
C- ENVIRONMENTAL LOADINGS			
C1 – Greenhouse Gas Emissions			
C1.3 – Greenhouse Gas Emissions from building's operations		Actual value	-1.0
Greenhouse Gas Emissions from building's operations	kg CO2eq/m^2	Target value	
C3 – Solid and Liquid Wastes			
C3.2 – *Solid waste from building operations*		Actual value	0.0
Ratio of the number of collectable solid waste	%	Target value	3.0

categories within a 100 m distance from the building's entrance to the reference solid waste categories			
D- INDOOR ENVIRONMENTAL QUALITY			
D2 – Air Temperature and Relative Humidity			
D2.2 – Thermal comfort index		Actual value	1.8
Predicted Percentage Dissatisfied (PPD)	%	Target value	5.0
E- SERVICE QUALITY			
E1 – Safety and Security			
E1.2 – Risk to occupants and facilities from fire		Actual value	0.0
Risk to occupants and facilities from fire	text	Target value	0.0
E1.3 – Risk to occupants and facilities from flooding		Actual value	3.0
Risk to occupants and facilities from flooding	text	Target value	3.0
E1.4 – Risk to occupants and facilities from earthquake		Actual value	3.0
Risk to occupants and facilities from earthquake	text	Target value	3.0
E2 – Functionality and efficiency			
E2.5 – Elevators		Actual value	0.0
Elevators	text	Target value	0.0
E3 – Controllability			
E3.1 – Building Management System (BMS)		Actual value	-1.0
Building Management System	text	Target value	3.0
E3.2 – Building Energy Management System (BEMS)		Actual value	0.0
Building Energy Management System	text	Target value	0.0
E3.3 – Control of lighting systems		Actual value	-1.0
Control of lighting systems	text	Target value	-1.0
E3.4 – Local control of heating/cooling systems		Actual value	0.0
Local control of heating/cooling systems	text	Target value	0.0
E4 – Flexibility and Adaptability			
E4.5 – Adaptability to future changes in type of energy supply		Actual value	3.0
Adaptability to future changes in type of energy supply	text	Target value	3.0
E5 – Optimization and Maintenance of Operating Performance			
E5.6 – Retention of as-built documentation		Actual value	-1.0
The scope and quality of design documentation retained for use by building operators, according to design documentation.	text	Target value	0.0
F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS			
F1 – Social Aspects			
F1.1 – Universal access on site and within the building		Actual value	-1.0
The scope and quality of design measures planned to facilitate access and use of building facilities by persons with disabilities.	text	Target value	0.0
G- COST AND ECONOMIC ASPECTS			
G1 – Cost			
G1.4 – Use stage energy cost		Actual value	-1.0
Energy annual cost per usable floor area	€/m^2	Target value	5.0
G1.5 – Use stage water cost		Actual value	2.5
Water annual cost per usable floor area	€/m^2	Target value	2.5

b. Constraints and restrictions

CONSTRAINTS / RESTRICTIONS	
Legal constraints	*Buildings under major renovation should comply with Hellenic regulation on the energy performance in the building sector (KENAK)*
Technical constraints	
Financial constraints	*Budget constraints*
Environmental condition constraints	
Stakeholder based restrictions	
Other relevant constraints	

c. Potential strategies at building scale

Synergy zones	
Energetic synergies	*Electricity surplus can be used to cover municipal lighting of the main square in front of the building and electricity of the nearby buildings.*
Water synergies	*Collected rainwater can be used to water the main square in front of the building.*
Waste synergies	
Mobility synergies	
Other synergies	

4. DECISION MAKING

a. Description of scenarios

SCENARIO A	DESCRIPTION
1.	Installation of 90 PV panels, with total surface 146.7 m^2 and efficiency 19%
2.	Installation of 9 Heat Pumps (35kW each) for heating and cooling. Installation of fan coils. Insulation of all distribution networks.
3.	Replacement of all lamps with new LED
4.	Installation of a BMS system.
5.	Installation of a lighting control system
6.	Installation of local control systems for heating/cooling terminal units

SCENARIO B	DESCRIPTION
1.	Installation of 90 PV panels, with total surface 146.7 m^2 and efficiency 19%. Remaining needs will be covered by the PV park in a nearby area.
2.	Installation of 9 Heat Pumps (35kW each) for heating and cooling. Installation of fan coils. Insulation of all distribution networks.
3.	Replacement of all lamps with new LED
4.	Installation of a BMS system
5.	Installation of a lighting control system
6.	Installation of local control systems for heating/cooling terminal units
7.	Increased number of recycle bins, covering more categories
8.	Municipal transportation

b. Scenarios raking

For the evaluation of the two scenarios the short version of the SBTool was used, since the SBTool was not updated.

i. Performance Scores

Issues	Current state	Scenario A	Scenario B
TOTAL SCORE	**-0.4**	**2.6**	**2.7**
A – Site regeneration			
B – Energy and Resources C.	-0.8	2.8	3.0
C – Environmental Loadings	-0.8	4.7	4.7
D – Indoor Env. Quality	1.8	3.8	5.0
E – Service Quality			
F – Social Aspects			
G – Cost and Economic Asp.	0.8	3.8	3.8

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/m2/yr	60.30
B.1.2 Delivered thermal energy demand	Delivered thermal energy demand per internal useful floor area per year	kWh/m2/yr	0.00
B.1.3 Delivered electric energy demand	Delivered electric energy demand per internal useful floor area per year	kWh/m2/yr	20.80
B.1.5 Energy from renewable sources in total final thermal energy consumption	Share of renewable energy in final thermal energy consumptions	%	0.00
B.1.6 Energy from renewable sources in total final electric energy consumption	Share of renewable energy in final electric energy consumption	%	79.00
B.1.11 Embodied non-renewable primary energy	Embodied primary non-renewable energy	MJ/m^2	-
B.3.5 Recycled materials	Weight of recycled materials on total weight of materials	%	-
B.4.5 Potable water consumption for indoor uses	Potable water consumption per occupant per year	m^3/occupant/year	6.00
C.1.3 Global Warming potential	CO_2 equivalent emissions per internal useful floor area per year	kg CO_2 eq./m^2/yr	1.30
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	-
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	%	57.00
D.1.4 TVOC concentration in indoor air	TVOC concentration in indoor air	µg/ m^3	-
D.1.10 Ventilation rate	Ventilation rate normalized per useful floor area	l/s/m2	-

D.2.2 Thermal comfort index	Predicted Percentage Dissatisfied (PPD)	%	10.00
G.1.4 Use stage energy cost	Energy annual cost per usable floor area	€/m2/yr	2.50
G.1.5 Use stage water cost	Water annual cost per usable floor area	€/m2/yr	0.37

SCENARIO B			
KPI	**Indicator**	**Unit of measure**	**Value**
B.1.1 Primary energy demand	Primary energy demand per internal useful floor area per year	kWh/m2/yr	0.00
B.1.2 Delivered thermal energy demand	Delivered thermal energy demand per internal useful floor area per year	kWh/m2/yr	0.00
B.1.3 Delivered electric energy demand	Delivered electric energy demand per internal useful floor area per year	kWh/m2/yr	0.00
B.1.5 Energy from renewable sources in total final thermal energy consumption	Share of renewable energy in final thermal energy consumptions	%	0.00
B.1.6 Energy from renewable sources in total final electric energy consumption	Share of renewable energy in final electric energy consumption	%	0.00
B.1.11 Embodied non-renewable primary energy	Embodied primary non-renewable energy	MJ/m^2	-
B.3.5 Recycled materials	Weight of recycled materials on total weight of materials	%	-
B.4.5 Potable water consumption for indoor uses	Potable water consumption per occupant per year	m^3/occupant/year	6.00
C.1.3 Global Warming potential	CO_2 equivalent emissions per internal useful floor area per year	kg CO_2 eq./m^2/yr	0.00
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	-
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	%	86.00
D.1.4 TVOC concentration in indoor air	TVOC concentration in indoor air	µg/ m^3	-
D.1.10 Ventilation rate	Ventilation rate normalized per useful floor area	l/s/m2	-
D.2.2 Thermal comfort index	Predicted Percentage Dissatisfied (PPD)	%	5.00
G.1.4 Use stage energy cost	Energy annual cost per usable floor area	€/m2/yr	0.00
G.1.5 Use stage water cost	Water annual cost per usable floor area	€/m2/yr	0.37

iii. Financing mechanisms evaluation

Scenario A	Municipality's own funds, National and EU financing programs
Scenario B	Municipality's own funds, Attika Prefecture funding, National and EU financing programs

iv. Synergies at building level

Scenario A	*Electricity surplus can be used to cover municipal lighting of the main square in front of the building and of the nearby buildings.*
Scenario B	*Electricity surplus can be used to cover municipal lighting of the main square in front of the building and of the nearby buildings.*

5. RETROFIT CONCEPT

SELECTED SCENARIO	DESCRIPTION
A.	The two proposed scenarios are not alternative, but they are progressive. ScenarioA is the short-term scenario and ScenarioB is the long-term. The selected scenario is ScenarioA, which can be promptly implemented.

KEY ELEMENTS OF THE CONCEPT

Retrofits Strategies	Installation of PV panels. New heating system with HP
	Replacement of all lamps
	Installation of BMS system.
Performance improvement	Environment: Improved energy consumption and CO2 emissions
	Society: Improved thermal comfort and indoor air quality.
	Economy: Reduced energy cost
Financial mechanism	Municipality's own funds

BUILDING SCALE ASSESSMENT – BUILDING 2

1. INITIATION

General information on the selected building	
School Building	
Address	*Eggonopoulou & Partheni, Ano Liossia, Fyli*
Building use	*School*
Owner	*(Enter text)*
Year of construction	*(Number)*
Building method	*Concrete structure with bricks. Double-pane windows with aluminum frame without thermal break. Concrete flat roof. The long axis of the building is along the E-W axis.*
Number of levels above earth	*2*
Number of levels underground	*0*
Heating system	*Central Oil Boiler (300kW)*
Cooling system	*Three Split Heat Pumps (13.2kW)*
DHW system	*-*
Ventilation system	*No ventilation system*
Lighting system	*A total of 440 fluorescent lamps and 90 incandescent lamps. A total of 2 halogen headlamps for exterior lighting.*
Average U value	*Walls: 2.56 W/m^{2}K / Roof: 3.05 W/m^{2}K / Floor: 0.95 W/m^{2}K / Windows: 4.1 W/m^{2}K*
Number of occupants	
Hours of occupation per year	*1560*

2. PREPARATION

a. SBTool structure

In this section the structure of the Hellenic SBTool (HE-Attica-SBTool) is described.

Following the concept and procedure used in the Hellenic SNTool, there was a screening of the initial GF-B 153 available indicators, resulting to 28.

The list of the criteria selected from the CESBA MED Generic Framework ay Building scale and included in the He-SBTool is presented in the following Table (KPIs are marked with an *, new or modified criteria are marked with ✍).

A – SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE	
A1	**Site Regeneration and Development**
A1.13	*Provision and quality of walkways for pedestrian use.*
A3	**Project Infrastructure and Services**
A3.12	*Public/ Municipal transportation* ✍
A3.13	*Provision of on-site parking facilities for private vehicles.* ✍
A3.16	*Exterior lighting.* ✍

B – ENERGY AND RESOURCES CONSUMPTION	
B1	**Energy**
B1.1	*Primary energy demand *
B1.2	*Delivered thermal energy demand *
B1.3	*Delivered electric energy demand *
B1.5	*Energy from renewable sources in total thermal energy consumption *
B1.6	*Energy from renewable sources in total electrical energy consumption *
B1.8	*Final total energy for all building operations*
B1.11	*Embodied energy *
B2	**Electrical peak demand**
B2.1	*Electrical peak demand for building operations*
B3	**Use of Materials**
B3.5	*Recycled materials (Not for Use phase) *
B4	**Use of potable water, stormwater and greywater**
B4.5	*Water consumption for indoor uses *

C- ENVIRONMENTAL LOADINGS	
C1	**Greenhouse Gas Emissions**
C1.3	*Greenhouse Gas Emissions from building's operations *
C3	**Solid and Liquid Wastes**
C3.1	*Construction and demolition waste (Not for Use phase) *
C3.2	*Solid waste from building operations *

D- INDOOR ENVIRONMENTAL QUALITY	
D1	**Indoor Air Quality and Ventilation**

D1.4	*TVOC concentration in indoor air (Not for Use phase) **
D1.10	*Ventilation rate **
D2	**Air Temperature and Relative Humidity**
D2.2	*Thermal comfort index **

E- SERVICE QUALITY	
E1	**Safety and Security**
E1.2	*Risk to occupants and facilities from fire*
E1.4	*Risk to occupants and facilities from earthquake*
E2	**Functionality and efficiency**
E2.5	*Elevators*
E3	**Controllability**
E3.2	*Building Energy Management System (BEMS)*
E4	**Flexibility and Adaptability**
E4.5	*Adaptability to future changes in type of energy supply*

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**
F1.4	*Use stage energy cost **
F1.5	*Use stage water cost **

b. SBTool criteria selection rationale

In this section the reason / motivation of the selection of the criteria that have been included in the HE-SBTool is described.

A - SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE		
	CRITERION	**REASON/MOTIVATION**
A1.13	*Provision and quality of walkways for pedestrian use.*	*Facilitate the occupants*
A3.12	*Public/ Municipal transportation*	*Facilitate the occupants*
A3.13	*Provision of on-site parking facilities for private vehicles*	*Facilitate the occupants*
A3.16	*Exterior lighting.*	*Important for occupants' safety*

B – ENERGY AND RESOURCES CONSUMPTION		
	CRITERION	**REASON/MOTIVATION**
B1.1	*Primary energy demand **	*KPI*
B1.2	*Delivered thermal energy demand **	*KPI*
B1.3	*Delivered electric energy demand **	*KPI*

B1.5	*Energy from renewable sources in total thermal energy consumption **	*KPI*
B1.6	*Energy from renewable sources in total electrical energy consumption **	*KPI*
B1.8	*Final total energy for all building operations*	*Interesting and can be calculated*
B1.11	*Embodied energy (Not for Use phase) **	*KPI*
B2.1	*Electrical peak demand for building operations **	*KPI*
B3.5	*Recycled materials (Not for Use phase) **	*KPI*
B4.5	*Water consumption for indoor uses **	*KPI*

C- ENVIRONMENTAL LOADINGS

	CRITERION	REASON/MOTIVATION
C1.3	*Greenhouse Gas Emissions from building's operations **	*KPI*
C3.1	*Construction and demolition waste (Not for Use phase) **	*KPI*
C3.2	*Solid waste from building operations **	*KPI*

D- INDOOR ENVIRONMENTAL QUALITY

	CRITERION	REASON/MOTIVATION
D1.4	*TVOC concentration in indoor air (Not for Use phase) **	*KPI*
D1.10	*Ventilation rate **	*KPI*
D2.2	*Thermal comfort index **	*KPI*

E- SERVICE QUALITY

	CRITERION	REASON/MOTIVATION
E1.2	*Risk to occupants and facilities from fire*	*Important for occupants' safety*
E1.4	*Risk to occupants and facilities from earthquake*	*Important for occupants' safety*
E2.5	*Elevators*	*Interesting and can be calculated*
E3.2	*Building Energy Management System (BEMS)*	*Important for building's energy consumption*
E4.5	*Adaptability to future changes in type of energy supply*	*Interesting and can be calculated*

F- SOCIAL, CULTURAL AND PERCEPTUAL ASPECTS

	CRITERION	REASON/MOTIVATION
F1.1	*Universal access on site and within the building.*	*Important*

G- COST AND ECONOMIC ASPECTS

	CRITERION	REASON/MOTIVATION
G1.4	*Use stage energy cost **	*KPI*
G1.5	*Use stage water cost **	*KPI*

c. SBTool weights rationale

In this section the motivation for the value of weights assigned to issues, categories and criteria is presented.

ISSUE	WEIGHT (1 to 3)	MOTIVATION
A - SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE		
B – ENERGY AND RESOURCES CONSUMPTION	3	
C- ENVIRONMENTAL LOADINGS	3	
D- INDOOR ENVIRONMENTAL QUALITY	2	
E- SERVICE QUALITY		
F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS		
G- COST AND ECONOMIC ASPECTS	1	

* Issue weighting is from the "CESBA KPIs SBTool v1.0" tool

COMMENT: We do not have weighting factors for issues (issues are replaced by primary issue or system, which is factor D). Additionally, reporting of factor A is missing.

Primary issue or system directly affected	WEIGHT (1 to 5)	MOTIVATION
COST AND ECONOMICS	1	
FUNCTIONALITY AND SERVICABILITY	1	
WELL-BEING AND PRODUCTIVITY OF OCCUPANTS	2	
SOCIAL AND CULTURAL ISSUES	2	
LAND RESOURCES	3	
NON-RENEWABLE MATERIAL RESOURCES	3	
NON-RENEWABLE WATER RESOURCES	3	
HEALTH, SAFETY AND SECURITY OF INDIVIDUALS	3	
RENEWABLE ENERGY RESOURCES	4	
NON-RENEWABLE ENERGY RESOURCES	4	
GLOBAL CLIMATE	5	

CATEGORIES	WEIGHT (%)
A1- Site regeneration and Development	0.7
A3- Project Infrastructure and Services	2.9
TOTAL	3.5
B1- Energy	57.1
B2- Electrical peak demand	2.8
B3- Use of materials	-

B4 – Use of water, stormwater and greywater	3.1
TOTAL	63.0
C1- Greenhouse gas emissions	14.4
C3- Solid and liquid waste	5.5
TOTAL	20.0
D1- Indoor air quality and ventilation	-
D2- Thermal comfort	0.3
TOTAL	0.3
E1- Safety and Security	1.2
E2- Functionality and efficiency	0.1
E3- Controllability	0.9
E4– Flexibility and adaptability	2.8
TOTAL	5.0
F1- Social aspects	2.3
TOTAL	2.3
G1- Cost	6.0
TOTAL	6.0

CRITERIA WEIGHTS

SBTool file A – WeightA-G

The pre-assigned values of weighting factors in the CESBA MED GF-U have been reviewed and some of them were accepted and some were modified.
The L.F. weighting factors were reviewed with experts from Municipality of Fylis.

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
A1.13	*Provision and quality of walkways for pedestrian use.*	*0.69*	*3*	*2*	*1*	*4*	*Pedestrian and bicycle paths are important for future plans*

A3 Project Infrastructure and Services

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
A3.12	*Public/ Municipal transportation*	*1.56*	*3*	*3*	*1*	*4*	*Municipal transportation system is important for future plans*
A3.13	*Provision of on-site parking facilities for private vehicles*	*0.26*	*1*	*3*	*1*	*2*	*Parking is less important*
A3.16	*Exterior lighting.*	*1.04*	*1*	*3*	*3*	*4*	*Exterior lighting is important for security reasons*
TOTAL		**3.5**					

B - ENERGY AND RESOURCES CONSUMPTION

B1 Energy

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
B1.1	*Primary energy demand*	*10.38*	*3*	*3*	*4*	*4*	*Energy consumption is an important issue*

B1.2	*Delivered thermal energy demand*	*10.38*	*3*	*3*	*4*	*4*	*Energy consumption is an important issue*
B1.3	*Delivered electric energy demand*	*10.38*	*3*	*3*	*4*	*4*	*Energy consumption is an important issue*
B1.5	*Energy from renewable sources in total thermal energy consumption*	*2.59*	*3*	*3*	*4*	*1*	*Energy consumption is an important issue*
B1.6	*Energy from renewable sources in total electrical energy consumption*	*12.97*	*3*	*3*	*4*	*5*	*Installation of PV are of extremely importance for the Municipality strategic plan*
B1.8	*Final total energy for all building operations*	*10.38*	*3*	*3*	*4*	*4*	*Energy consumption is an important issue*
B1.11	*Embodied energy*	*-*	*5*	*1*	*4*	*1*	*Not so important for now*
B2	**Electrical peak demand**						
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
B2.1	*Electrical peak demand for building operations*	*2.77*	*2*	*3*	*4*	*2*	*Not so important for now*
B3	**Use of Materials**						
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
B3.5	*Recycled materials (Not for Use phase)*	*-*	*4*	*2*	*3*	*2*	Not very common practice
B4	**Use of potable water, stormwater and greywater**						
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
B4.5	*Water consumption for indoor uses*	*3.11*	*3*	*2*	*3*	*3*	
TOTAL		**63.0**					

C- ENVIRONMENTAL LOADINGS							
C1	**Greenhouse Gas Emissions**						
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
C1.3	*Greenhouse Gas Emissions from building's operations*	*14.42*	*5*	*2*	*5*	*4*	*Reduction of CO2 is an important issue*
C3	**Solid and Liquid Wastes**						
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
C3.1	*Construction and demolition waste (Not for Use phase)*	*-*	*4*	*2*	*3*	*3*	
C3.2	*Solid waste from building operations*	*5.54*	*4*	*2*	*3*	*4*	*Recycling is an important issue*
TOTAL		**20.0**					

D- INDOOR ENVIRONMENTAL QUALITY							
D1	**Indoor Air Quality and Ventilation**						
CRITERION		**Weight**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**

		(%)					
D1.4	*TVOC concentration in indoor air (Not for Use phase)*	-	*1*	*3*	*3*	*3*	
D1.10	*Ventilation rate*	-	*2*	*3*	*2*	*3*	

D2 Air Temperature and Relative Humidity

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
D2.2	*Thermal comfort index*	*0.26*	*1*	*3*	*2*	*3*	
TOTAL		**0.3**					

E- SERVICE QUALITY

E1 Safety and Security

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
E1.2	*Risk to occupants and facilities from fire*	*0.78*	*1*	*3*	*3*	*3*	
E1.4	*Risk to occupants and facilities from earthquake*	*0.39*	*1*	*3*	*3*	*3*	

E2 Functionality and efficiency

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
E2.5	*Elevators*	*0.12*	*1*	*2*	*1*	*4*	

E3 Controllability

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
E3.2	*Building Energy Management System (BEMS)*	*0.92*	*2*	*2*	*4*	*4*	

E4 Flexibility and Adaptability

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
E4.5	*Adaptability to future changes in type of energy supply*	*2.77*	*3*	*2*	*4*	*4*	*Turning to PV systems is in future plans*
TOTAL		**5.0**					

F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS

F1 Social Aspects

CRITERION		Weight (%)	B	C	D	L.F.	L.F. REASON/MOTIVATION
F1.1	*Universal access on site and within the building*	*2.34*	*3*	*3*	*3*	*3*	
TOTAL		**2.3**					

G- COST AND ECONOMIC ASPECTS

G1 Cost							
CRITERION		**Weight (%)**	**B**	**C**	**D**	**L.F.**	**L.F. REASON/MOTIVATION**
G1.4	*Use stage energy cost*	*1.30*	*3*	*3*	*1*	*5*	*Reduction of energy cost is very important*
G1.5	*Use stage water cost*	*4.67*	*3*	*3*	*3*	*3*	
TOTAL		**6.0**					

d. SBTool benchmarks rationale

In this section the motivation of the value of benchmarks assigned to the different criteria for score 0 (minimum acceptable performance) and for score 5 (excellent and ideal performance) is described. In order to set the benchmark values, we have integrated national/ local policies, guidelines, statistics and good practice.

A- SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
A1.13	*Provision and quality of walkways for pedestrian use.*	*text*	*0:*	*Short network of pedestrian or bicycle paths or shared areas near the building*
			5:	*Large network of pedestrian or bicycle paths or shared areas near the building leading to public transport stops, schools or public spaces*
A3.12	*Public/ Municipal transportation*	*text*	*0:*	*One stop of public/municipal transportation within 400m from the building, with travel frequency up to 15 minutes.*
			5:	*At least two stops of public/municipal transportation (covering different directions) within 400m from the building, with travel frequency up to 10 minutes.*
A3.13	*Provision of on-site parking facilities for private vehicles*	*Spaces /60m²*	*0: 1*	*ΦΕΚ 76/ΜΑΡΤΙΟΣ 2004*
			5: 1.3	*Based on discussions with National Local Committee Members*
A3.16	*Exterior lighting.*	*text*	*0:*	*Adequate exterior and public lighting around the building with old lighting fixtures, no visual discomfort*
			5:	*Adequate exterior and public lighting around the building with new lighting fixtures, no visual discomfort*

B- ENERGY AND RESOURCES CONSUMPTION				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
B1.1	*Primary energy demand **	*kWh/m²*	*0: 136.7* *5: 30.9*	*Very difficult to get metered data, especially for residential and privately owned non-residential buildings.* *Use of statistical / calculated data.* *Score 0 corresponds to the consumption of the dominant energy class, while Score 5 to energy class A+ (33% of class B).* *Primary energy consumption per building use for the dominant energy class and class B, were defined using data from the Energy Performance Certificates (EPC) electronic repository (buildingcert), for whole buildings in Attica Prefecture, adapted for external (TEEKENAK) to internal (CESBAMED) dimensions.* *All end uses (space heating, space cooling, domestic hot water, ventilation, lighting and auxiliaries) were taken into account.*
B1.2	*Delivered thermal energy demand **	*kWh/m²*	*0: 38.0* *5: 11.5*	*Very difficult to get metered data, especially for residential and privately owned non-residential buildings.* *Use of statistical / calculated data.* *Score 0 corresponds to the consumption of the dominant energy class, while Score 5 to energy class A+ (33% of class B).* *Thermal energy consumption per building use for the dominant energy class and class B, were defined using data from the Energy Performance Certificates (EPC) electronic repository (buildingcert), for whole buildings in Attica Prefecture, adapted for external (TEEKENAK) to internal (CESBAMED) dimensions.* *All end uses (space heating, space cooling and domestic hot water) were taken into account.*
B1.3	*Delivered electric energy demand **	*kWh/m²*	*0: 32.9* *5: 7.8*	*Very difficult to get metered data, especially for residential and privately owned non-residential buildings.* *Use of statistical / calculated data.* *Score 0 corresponds to the consumption of the dominant energy class, while Score 5 to energy class A+ (33% of class B).* *Electricity consumption per building use for the dominant energy class and class B, were defined using data from the Energy Performance Certificates (EPC) electronic repository (buildingcert), for whole buildings in Attica Prefecture, adapted for external (TEEKENAK) to internal (CESBAMED) dimensions.* *All end uses (space heating, space cooling, domestic hot water, ventilation, lighting and auxiliaries) were taken into account.*

B1.5	*Energy from renewable sources in total thermal energy consumption **	*%*	*0: 22* *5: 100*	*Building use solar collectors for pre-heating* *Building use solar collectors for pre-heating and partial coverage of heating loads*
B1.6	*Energy from renewable sources in total electrical energy consumption **	*%*	*0: 20* *5: 100*	*Very difficult to get metered data.* *Use of statistical/ estimated data*
B1.8	*Final total energy for all building operations*	*kWh/m²*	*0: 70.9* *5: 19.3*	*Based on B1.2 and B1.3*
B1.11	*Embodied energy (Not for Use phase) **	*MJ/m²*	*0: 6230* *5: 3000*	*Based on discussions with National Local Committee Members*
B2.1	*Electrical peak demand for building operations **	*W/m²*	*0: 208.5* *5: 9*	*From typical values for heating, cooling, lighting, equipment in schools.* *For nzeb buildings*
B3.5	*Weight of recycled materials on total weight of materials (Not for Use phase) **	*%*	*0: 3* *5: 40*	*Based on discussions with National Local Committee Members and common practice in Greece*
B4.5	*Potable water consumption per occupant per year**	*m³/occupant*	*0: 1.95* *5: 0.5*	*From typical values for offices* *Based on discussions with National Local Committee, consumption can be reduced to 75%*

C- ENVIRONMENTAL LOADINGS				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
C1.3	*CO2 equivalent emissions per internal useful floor area per year **	*kg CO2 eq/m²/yr*	*0: 2.8* *5: 0.7*	*Based on thermal and electricity consumption benchmarking as estimated in B1.2 and B1.3. It is assumed that thermal energy is covered by fuel oil.* *Score 0 corresponds to CO2 equivalent emissions for the thermal and electrical energy consumption of the buildings of the dominant energy class* *Score 5 corresponds to the CO2 equivalent emissions for consumptions of energy class A+.*
C3.1	*Weight of waste and materials generated per 1 m2 of useful floor area demolished or constructed (Not for Use phase) **	*kg/m²/life cycle stage*	*0: value* *5: value*	*Insert your comment here* *Insert your comment here*
C3.2	*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 **	*%*	*0: 57* *5: 100*	*Based on discussions with National Local Committee Members and common practice*

D- INDOOR ENVIRONMENTAL QUALITY				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
D1.4	*TVOC concentration in indoor air (Not for Use phase) **	*µg/ m³*	*0: 1000* *5: 200*	From published material
D1.10	*Ventilation rate **	*l/s/m²*	*0: 1.07* *5: 3.06*	*Common practice in NR buildings for fresh air* *Based on National guidelines for fresh air for school buildings*
D2.2	*Thermal comfort index **	*%*	*0: 25* *5: 5*	*Based on discussions with National Local Committee Members*

E- SERVICE QUALITY				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
E1.2	*Risk to occupants and facilities from fire*	*text*	*0:* *5:*	*The building fulfils the requirements for fire protection. Basic training of the occupants* *The building fulfils the requirements for fire protection. Periodical training of the occupants and fire drills. System connected to a BMS.*
E1.4	*Risk to occupants and facilities from earthquake*	*text*	*0:* *5:*	*Building has passed successfully, a pre-earthquake inspection.* *Building has passed successfully, a pre-earthquake inspection and fully complies with National Regulations. Periodical training of the occupants*
E2.5	*Elevators*	*text*	*0:* *5:*	*Certified elevators, with regular maintenance but don't comply with regulations for disabled persons. Maximum waiting time about 45 sec.* *Certified elevators, with regular maintenance, complied with updated standards EN81.20, and with disabled persons' requirements. Maximum waiting time about 25 sec. System connected to a BMS.*
E3.2	*Building Energy Management System (BEMS)*	*text*	*0:* *5:*	*Central control system for heating, cooling and ventilation, on building level* *Central control system for heating, cooling, ventilation*

				and lighting on zone level

F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
F1.1	*Ease of access and use of facilities for persons with mobility or perceptual disabilities.*	*text*	*0:*	*All key facilities, including outdoor facilities, entry points and hallways, are accessible to wheelchair users and visually impaired persons*
			5:	*All key facilities, including outdoor facilities, entry points and hallways, are accessible to wheelchair users and visually impaired persons.*

G- COST AND ECONOMIC ASPECTS				
CRITERION	**INDICATOR**	**UNIT**	**BENCHMARK**	**DERIVATIONS**
G1.4	*Annual energy cost per usable floor area **	*€/m2*	*0: 7.7*	*From benchmarking of B1.2 and B1.3, taking an average fuel and electricity cost. (taking +20% of total cost for considering energy cost for equipment and other installations)*
			5: 2.1	
G1.5	*Annual water cost per usable floor area **	*€/m2*	*0: 0.96*	*From benchmarking of B4.5, taking into account 50 occupants/100m^2 and an average of water cost.*
			5: 0.24	

e. SBTool Criteria Specifications

In this section for each selected criterion the presentation includes:

- *Information source: The source of the data/information that can 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 that can be used to verify the value of indicators.*
- *Standards: technical documents taken as reference for the assessment method.*

➢ The presentation that follows describes in details the relevant values that have been calculated for the Hellenic Training Phase in Town Hall of Municipality of Fylis

➢ Relevant information are also provided in the Training Material

A- SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE		
CRITERION	**INDICATOR**	**SPECIFICATIONS**

A1.13	Existence and usability of bicycle and pedestrian paths around the building	*Information source*	*Qualitative indicator - Estimations*
		Assessment method	*CESBAMED calculation steps* Estimate the existence and usability of bicycle and pedestrian paths around the building *NOA pilot steps/comments:* From area plots and from the on-site audit, two of the building's facades are facing "shared paths", connected to a small network of "shared areas"
A3.12	Existence and effectiveness of public/municipal transportation near the building	*Standard*	
		Information source	*Qualitative indicator – Estimations – Metered data*
		Assessment method	*CESBAMED calculation steps* Estimate the existence and effectiveness of public/municipal transportation within 400m from the building *NOA pilot steps/comments:* *From metered data. From a study carried out by the Municipality for the public transport, the number and location of public transport stops was defined. (at least 1 stop of a transportation line within 400m)*
A3.13	*Ratio of exterior and interior parking spaces to the total usable area of non-residential occupancies (spaces/60 m2)*	*Standard*	
		Information source	*Metered data - Estimations*
		Assessment method	*CESBAMED calculation steps* *1. Calculate the total usable area of non-residential occupancies* *2. Calculate the total parking spaces (exterior and interior)* *3. Calculate the ratio of total parking spaces per 60m² total usable area* *NOA pilot steps/comments:* *From metered data.from bluilding plots, the usable area was defined. From the on-site audit the number of total parking spaces was defined. (0.49)*
A3.16	*Efficiency and adequacy of the exterior lighting and the public lighting around the building*	*Standard*	*ΦΕΚ 76/ΜΑΡΤΙΟΣ 2004*
		Information source	*Qualitative indicator – Estimations – Metered data*
		Assessment method	*CESBAMED calculation steps* *Estimation of the efficiency and adequacy of the exterior lighting and the public lighting around the building*

			NOA pilot steps/comments: From the on-site audit the number and type of exterior and public lighting was defined. (Adequate exterior and public lighting around the building, with old lighting fixtures, no visual discomfort)
		Standard	

B- ENERGY AND RESOURCES CONSUMPTION			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
B1.1	*Primary energy demand **	*Information source*	*Metered data – Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *National calculation methods used to meet performance requirements or to complete Energy Performance Certificates (EPCs), aligned with the EN standards series, can be used. In-built lighting may not be specifically covered in all national or regional calculation methods. As a result, either the omission from the calculations, or a separate calculation method if used, shall be noted in the reporting. The reference unit is one square meter of useful internal floor area (Level(s) Part 3 – 1.3.1).* *NOA pilot steps/comments:* *From calculated data based on National calculation merthod for the energy performance of building and the issuing of Energy Performance Certificates (semi-steady, monthly method). From an energy study carried out for the Municipal Unit of Ano Liosia, data for primary energy consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions.(556.2 kWh/m^2)* ***Comment: Lighting is taken into account. Hot water is not taken into account for school buildings***
		Standard	*EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *EN ISO 13790 (Energy performance of buildings)* *EN 15193 (Energy performance of buildings — Energy requirements for lighting)*

		Information source	*Metered data – Calculated data - Estimations*
B1.2	*Delivered thermal energy demand* *	*Assessment method*	*CESBAMED calculation steps* *Energy uses taken into account: heating, cooling, ventilation, domestic hot water* *National calculation methods used to meet performance requirements or to complete Energy Performance Certificates (EPCs), aligned with the EN standards series, can be used. The reference unit is one square meter of useful internal floor area (Level(s) Part 3 – 1.3.1).* *In case of existing buildings, the delivered thermal energy should be evaluated using data from metering.* *The metered delivered thermal energy demand (i.e. fuel consumption data) has to be calculated taking the average value over 3 years period.* *NOA pilot steps/comments:* *From calculated data based on National calculation merthod for the energy performance of building and the issuing of Energy Performance Certificates (semi-steady, monthly method). From an energy study carried out for the Municipal Unit of Ano Liosia, data for thermal energy consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions.(67.1 kWh/m^2)* ***Comment: Hot water is not taken into account for school buildings***
		Standard	*EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *EN ISO 13790 (Energy performance of buildings)* *EN 15193 (Energy performance of buildings — Energy requirements for lighting)*
		Information source	*Metered data – Calculated data - Estimations*
B1.3	*Delivered electric energy demand* *	*Assessment method*	*CESBAMED calculation steps* *National calculation methods used to meet performance requirements or to complete Energy Performance Certificates (EPCs), aligned with the EN standards series, can be used. The reference unit is one square meter of useful internal floor area (Level(s) Part 3 – 1.3.1).* *In case of existing buildings, the delivered electrical energy should be evaluated using data from metering. The metered delivered electric energy demand (i.e. electricity consumption data) has to be calculated*

			taking the average value over 3 years period bills. *NOA pilot steps/comments:* *From calculated data based on National calculation merthod for the energy performance of building and the issuing of Energy Performance Certificates (semi-steady, monthly method). From an energy study carried out for the Municipal Unit of Ano Liosia, data for electric energy consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions (166.4 kWh/m^2)* ***Comment: Lighting is taken into account. Hot water is not taken into account for school buildings***
		Standard	*EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *EN ISO 13790 (Energy performance of buildings)* *EN 15193 (Energy performance of buildings — Energy requirements for lighting)*
		Information source	*Metered data – Calculated data - Estimations*
B1.5	*Energy from renewable sources in total thermal energy consumption **	*Assessment method*	*CESBAMED calculation steps* *Share of renewable energy in final thermal energy consumption of the building. In case of existing buildings, it should be evaluated by energy metering* *NOA pilot steps/comments:* *From an on site audit there were no renewable sources for thermal energy installed on the building (0%)*
		Standard	*Level(s) Part 1-2 – Beta version* *EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *2013/114/EU: Commission Decision of 1 March 2013.* *Directive 2009/28/EC (RES Directive)*
		Information source	*Metered data – Calculated data - Estimations*
B1.6	*Energy from renewable sources in total electrical energy consumption **	*Assessment method*	*CESBAMED calculation steps* *Share of renewable energy in final electric energy consumption. In case of existing buildings, it should be evaluated by energy metering* *NOA pilot steps/comments:* *From an on site audit there were no renewable sources for electric energy installed on the building (0%)*

		Standard	*Level(s) Part 1-2 – Beta version* *EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *2013/114/EU: Commission Decision of 1 March 2013.* *Directive 2009/28/EC (RES Directive)*
		Information source	*Metered data – Calculated data - Estimations*
B1.8	*Final total energy for all building operations*	*Assessment method*	*CESBAMED calculation steps* *During early design stages a screening tool may be used, but in later stages an hour-by-hour simulation program should be used* *NOA pilot steps/comments:* *From calculated data based on National calculation merthod for the energy performance of building and the issuing of Energy Performance Certificates (semi-steady, monthly method). From an energy study carried out for the Municipal Unit of Ano Liosia, data for final energy consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions (233.4 kWh/m^2)* ***Comment: Lighting is taken into account. Hot water is not taken into account for school buildings***
		Standard	*EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings)* *EN ISO 13790 (Energy performance of buildings)* *EN 15193 (Energy performance of buildings — Energy requirements for lighting)*
		Information source	*Calculated data - Estimations*
B1.11	*Embodied energy (Not for Use phase) **	*Assessment method*	*CESBAMED calculation steps* *The following steps should be followed in order to compile the BoM:* *- Compile the Bill of Quantities: A BoQ is compiled which comprises the building elements accounting for at least 99% of the mass of the building.* *- Identify the basic composition of each building element. A breakdown of its constituent materials has to be carried out. The mass of each constituent material has to be estimated;* *- Aggregation by material: The mass for each constituent material should thereafter be aggregated to obtain the total mass for each type of material.* *Once the BoM has been compiled, it is possible to calculate the indicator*

			associating to each constituent material the relative embodied primary non-renewable energy by multiplying the specific mass (i.e. kg) with its corresponding embodied energy coefficient (i.e. MJ/kg). The total value of embodied primary non-renewable energy is finally normalized by the gross area of the building *NOA pilot steps/comments:* ***Not for Use phase***
B2.1	*Electrical peak demand for building operations*	*Standard* *Information source* *Assessment method*	*EN 15978 "Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method".* *ISO 14040/44* *EN 15804 (Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products)* *Metered data – Calculated data - Estimations* *CESBAMED calculation steps* *Review of contract documentation and sample equipment specifications by an ouside electrical engineer.* *NOA pilot steps/comments:* *From an on site audit, the installed power of heating, cooling and lighting systmes was defined. For equipment, typical values for office, taken from National Guidelines. An increase of about 15% to include other systmes (i.e. elevators, circulators, pumps). (371.5 W/m²)* **COMMENT**: **Usefull area with internal dimensions is used.**
B3.5	*Recycled materials (Not for Use phase) **	*Standard* *Information source* *Assessment method*	*Calculated data - Estimations* *CESBAMED calculation steps* *- Compile the Bill of Quantities: A BoQ is compiled which comprises the building elements accounting for at least 99% of the mass of the building.* *- Identify the basic composition of each building element. A breakdown of its constituent materials has to elaborated. The mass of each constituent material has to be estimated;* *- Aggregation by material: the mass of all constituent material should thereafter be aggregated to obtain the total mass of materials used in the building (A);*

			- Identify the recycled content of each constituent material (in mass); *- Aggregation by material: the recycled mass of all constituent materials should thereafter be aggregated to obtain the total recycled mass of materials (B) used in the building;* *- The indicator's value is calculated as B/A (total mass of recycled materials on the total mass of materials).* *NOA pilot steps/comments:* ***Not for Use phase***
		Standard	*EN ISO 14021 (Environmental labels and declarations - Self-declared environmental claims - Type II environmental labelling)*
		Information source	*Metered data – Estimations*
B4.5	*Water consumption for indoor uses **	*Assessment method*	*CESBAMED calculation steps* *Includes the use of potable water for: drinking water; water for sanitation; water for cleaning; water for washing machine; water for dishwasher; domestic hot water. The user must include in the calculation the sanitary devices/fittings (i.e. toilets, taps and showers) and water using appliances (i.e dishwashers and washing machines). Consumption rates for different sanitary devices and fittings are determined through specific data from suppliers. The specific usage factors have to be established. The number of days that the building is expected to be occupied per year has to be defined by the user. See KPIs Card document for the principle of the per occupant potable water consumption calculation.* *In case of existing buildings, the potable area water consumptions should be evaluated using data from metering. The metered consumptions have to be estimated taking the average value over 3 years period bills.* *NOA pilot steps/comments:* *Metered data not available for the public buildings of the Municipality. From the corresponding department of the Municipality, the annual water consumption was not officially reported, but estimated. From an energy study carried out for the Municipal Unit of Ano Liosia, the number of employyes was defined. The ratio of annual total water consumption to the number of employees was calculated (1.6 m^3/person)*

		Standard	*Level(s) Part 1-2 – Beta version. EN 15978 (Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method)*

C- ENVIRONMENTAL LOADINGS			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
		Information source	*Metered data – Calculated data - Estimations*
C1.3	*Greenhouse Gas Emissions from building's operations **	*Assessment method*	*CESBAMED calculation steps* *1. For each building in the area calculate the emissions of CO2 eq. with the following formula:* $E = \left[\sum (Q_{fuel,i} \times LHV_i \times k_{em,i}) + (Q_{el} \times k_{em,el}) + (Q_{dh} \times k_{em,dh})\right]$ *Qfuel,I = annual quantity of i-th fuel (m3 or Kg)* *Qel = annual quantity of electric energy from the grid (kWh)* *Qdh = annual quantity of energy from district heating/cooling (kWh)* *LHVi = lower heating value of the i-th fuel (kWh/m3 or kWh/Kg)* *Kem,i = CO2 eq. emission factor of the i-th fuel (Kg CO2/kWh)* *Kem,i = CO2 eq. emission factor of the electric energy from the grid (Kg CO2/kWh)* *Kem,i = CO2 eq. emission factor of energy from district heating/cooling (Kg CO2/kWh)* *2. Calculate the aggregated annual total CO2 equivalent emissions from all buildings / total useful internal floor area of all buildings* *NOA pilot steps/comments:* *From calculated data based on National calculation merthod for the energy performance of building and the issuing of Energy Performance Certificates (semi-steady, monthly method). From an energy study carried out for the Municipal Unit of Ano Liosia using the national method, data for thermal and electrical energy consumption and heated area (external dimensions) for the public buildings within testing area were available, and also adapted for external to internal (CESBAMED) dimensions. Using the national conversion factors to COeq (20704.1 kg/GWh for fuel oil and 61123.9 kg/GWh for electricity), total CO2 equivalent emissions to total useful internal floor area*

			of the building (11.6 kg/m2)
		Standard	*EN 15603 (Energy performance of buildings - Overall energy use and definition of energy ratings). Level(s) Part 1-2 – Beta version*
		Information source	*Metered data –Estimations*
C3.1	*Construction and demolition waste (Not for Use phase) **	*Assessment method*	*CESBAMED calculation steps* *<u>Design stage (based on estimations)</u>* *Estimations of waste based on surveys of existing buildings that will undergo major renovation or where the structure will be reused (life cycle stage B5).* *Estimations based on scenarios for deconstruction and demolition of the building at a future point in time beyond the end of its service life (life cycle stages C1/3, D).* *<u>Construction stage (based on data recorded from the site)</u>* *Data from deconstruction and demolition of (a) building(s) in order to clear a site for a new building construction (as part of a previous life cycle).* *Data from the part deconstruction of (a) building(s) in order to prepare useful parts for in-situ reuse. Data from construction on site of a new building and/or the prefabrication/construction of parts and elements off site (life cycle stages A3/5).* *Data from preparation of a building in order to facilitate a major renovation.* *<u>Completion stage (based on estimations supported by as-built drawings)</u>* *Estimations based on scenarios for deconstruction and demolition of the building at a future point in time beyond the end of its service life (life cycle stages C1/3, D).* *NOA pilot steps/comments:* ***Not for Use phase***
C3.2	*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 **	*Standard*	*Level(s) Part 1-2 – Beta version*
		Information source	*Metered data – Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *The seven reference categories of solid waste are: Paper, Plastic, Metal, Glass, Wet waste, Textiles, Special hazardous waste.*

			1. Identify the availability and position of bins and containers for each of the seven solid waste categories. *2. Calculate the walking distance (m) from the building's main entrance to each identified bin or container.* *3. Evaluate how many of the 7 categories of solid waste is possible to collect within a 100 m walking distance from the building's entrance (A).* *4. Calculate the value of the indicator as : A/7* *NOA pilot steps/comments:* *From calculated data. From an on-site audit in the testing area, the number and the type of collectable solid waste categories within a 100 m distance was defined. (57%)*
		Standard	

D- INDOOR ENVIRONMENTAL QUALITY			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
		Information source	*Metered data*
D1.4	*TVOC concentration in indoor air (Not for Use phase) **	*Assessment method*	*CESBAMED calculation steps* *<u>Post completion phase</u>* *Testing shall be carried out for a minimum of 10% of the apartments and be representative of any significant variations in the house or apartment typologies, configurations and materials. Samples shall be taken in the living room and the smallest bedroom of each property* *NOA pilot steps/comments:* ***Not for Use phase*** ***COMMENT: TVOC concentrations have been in the past used as an indicator of the ability of combined VOC exposures to produce adverse health effects. This approach is no longer supported (e.g. ASHRAE), because the irritant potential and toxicity of individual VOCs vary widely, and measured concentrations are highly dependent on the sampling and analytical methods used. The available data do not allow establishing of thresholds for TVOC (ECA-IAQ European Collaborative Action, JRC)***

		Standard	*CEN/TS 16516 (Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air).* *EN 15251 (Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics).* *Level(s) Part 1-2 – Beta version*
		Information source	*Metered data – Calculated data*
D1.10	*Ventilation rate **	*Assessment method*	*CESBAMED calculation steps* *<u>ONLY for ventilated buildings</u>* *The ventilation rate (l/s/m2) must be calculated in all the main rooms, excluding circulation spaces and service rooms (i.e. toilets).* *The indicator must be calculated as weighted sum all the calculated ventilation rates.* *NOA pilot steps/comments:* *Building not mechanically ventilated.*
		Standard	*EN 16798-7 (Energy performance of buildings - Ventilation for buildings - Part 7: Calculation methods for the determination of air flow rates in buildings including infiltration)*
		Information source	*Metered data – Calculated data - Estimations*
		Assessment method	*CESBAMED calculation steps* *<u>Design stage (mechanically conditioned)</u>* *For all main occupied room:* *1. Estimate PMV* *2. Calculate PPD* *NOA pilot steps/comments:* *From short ohn site occupant survey.* *From on site audit there was difficulty in controlling internal conditions. (15%)*
D2.2	*Predicted Percentage Dissatisfied (PPD) **	*Standard*	*EN ISO 7730 – Ergonomics of the thermal environment – Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria.* *EN 16798-1:2017 - Energy performance of buildings - Part 1: Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics - Module M1-6 (revision of EN 15251). Brussels: European Committee for Standardization.*

			Level(s) Part 1-2 – Beta version. Brussels: European Commission

E- SERVICE QUALITY			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
E1.2	*Risk to occupants and facilities from fire*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Estimate the level of compliance with the requirements for fire protection as well as of the occupnats training* *NOA pilot steps/comments:* *From and on site audit and information from the corresponding department. (The building fulfils the requirements for fire protection. Basic training of the occupants)*
		Standard	*Insert text here*
E1.4	*Risk to occupants and facilities from earthquake*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Evaluate the building's anti-earthquaqe protection.* *NOA pilot steps/comments:* *From an on site audit and information from the corresponding department. (Building has passed successfully, a pre-erthquaqe inspection. Basic training of the occupants)*
		Standard	
E2.5	*Vertical or horizontal transportation systems in building*	*Information source*	*Metered data*
		Assessment method	*CESBAMED calculation steps* *Assess the service quality and functional efficiency of elevators within a building, as well as their compliance with the existing regulations.* *NOA pilot steps/comments:* *From an on site audit and information from the corresponding department. (Certified elevator, with monthly maintenance)*
		Standard	
E3.2	*Building Energy Management System (BEMS)*	*Information source*	*Metered data*

		Assessment method	*CESBAMED calculation steps* *Visual inspection and review of specifications.* *NOA pilot steps/comments:* *From an on site audit and information from the corresponding department. No BEMS*
		Standard	
		Information source	*Estimations*
E4.5	*Adaptability to future changes in type of energy supply*	*Assessment method*	*CESBAMED calculation steps* *Evaluate the ease or difficulty in installing heating or cooling equipment that require a different fuel, or to install photovoltaic systems.* *NOA pilot steps/comments:* *From an on site audit and information from the corresponding department. (Adapting the building to a new fuel source or installing photovoltaics will require only a minor level of renovations).*
		Standard	

F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS			
CRITERION	**INDICATOR**	**SPECIFICATIONS**	
		Information source	*Metered data*
F1.1	*Universal access on site and within the building*	*Assessment method*	*CESBAMED calculation steps* *Assess the ease of access and use of facilities for persons with mobility or perceptual disabilities.* *NOA pilot steps/comments:* *From an on site audit. (Outdoor facilities, entry points, ground-floor hallways and elevator, are accessible to wheelchair users and visually impaired persons)*
		Standard	

G- COST AND ECONOMIC ASPECTS		
CRITERION	**INDICATOR**	**SPECIFICATIONS**

		Information source	*Metered data – Estimations*
G1.4	*Energy annual cost per usable floor area **	*Assessment method*	*CESBAMED calculation steps* *In case of existing buildings, the total annual cost of actual thermal and electrical energy use from energy bills should be calculated taking the average energy cost over 3 years period.* *NOA pilot steps/comments:* *Metered data not available for the public buildings of the Municipality. From the energy audit the thermal and electrical energy consumption of the building was calculated based on the national method. From the architectural plans, the total internal surface of the building was defined. (26.9 €/m²)* **COMMENT**: **All uses are taken into account, including equipment and installations (unlike energy related indicators). Usefull area with internal dimensions is used.**
		Standard	*Level(s) Part 1-2 – Beta version*
G1.5	*Water annual cost per usable floor area **	*Information source*	*Metered data – Estimations*
		Assessment method	*CESBAMED calculation steps* *In case of existing buildings, the total annual cost of water use from water bills should be calculated taking the average water cost over 3 years period.* *NOA pilot steps/comments:* *Metered data not available for the public buildings of the Municipality. From the corresponding department of the Municipality, the annual water consumption was not officially reported, but estimated. From the architectural plans, the total internal surface of the building was defined. (0.29 €/m²)* **COMMENT: Gross area with internal dimensions is used.**
		Standard	*Level(s) Part 1-2 – Beta version*

6. DIAGNOSIS

d. 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		
A1.13	*Provision and quality of walkways for pedestrian use.*	*0.0*
A3.12	*Public/ Municipal transportation*	*0.0*
A3.13	*Provision of on-site parking facilities for private vehicles*	*-1.0*
A3.16	*Exterior lighting.*	*0.0*
B – ENERGY AND RESOURCES CONSUMPTION		
B1.1	*Primary energy demand **	*-1.0*
B1.2	*Delivered thermal energy demand **	*-1.0*
B1.3	*Delivered electric energy demand **	*-1.0*
B1.5	*Energy from renewable sources in total thermal energy consumption **	*-1.0*
B1.6	*Energy from renewable sources in total electrical energy consumption **	*-1.0*
B1.8	*Final total energy for all building operations*	*-1.0*
B1.11	*Embodied energy (Not for Use phase) **	
B2.1	*Electrical peak demand for building operations **	*-1.0*
B3.5	*Recycled materials (Not for Use phase) **	
B4.5	*Water consumption for indoor uses **	*1.2*
C- ENVIRONMENTAL LOADINGS		
C1.3	*Greenhouse Gas Emissions from building's operations **	*-1.0*
C3.1	*Construction and demolition waste (Not for Use phase) **	
C3.2	*Solid waste from building operations **	*0.0*
D- INDOOR ENVIRONMENTAL QU		
D1.4	*TVOC concentration in indoor air (Not for Use phase) **	
D1.10	*Ventilation rate **	-
D2.2	*Thermal comfort index **	*2.5*
E- SERVICE QUALITY		
E1.2	*Risk to occupants and facilities from fire*	*0.0*
E1.4	*Risk to occupants and facilities from earthquake*	*3.0*
E2.5	*Elevators*	*3.0*
E3.2	*Building Energy Management System (BEMS)*	*0.0*
E4.5	*Adaptability to future changes in type of energy supply*	*3.0*
F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS		
F1.1	*Universal access on site and within the building.*	*0.0*
G- COST AND ECONOMIC ASPECTS		
G1.4	*Use stage energy cost **	*-1.0*
G1.5	*Use stage water cost **	4.7

COMMENTS:

- **All scores below 0 should be -1.**
- **A3.13 *Provision of on-site parking facilities for private vehicles. In file B, input only for residential building***

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/m2/yr	556.20
B.1.2 Delivered thermal energy demand	Delivered thermal energy demand per internal useful floor area per year	kWh/m2/yr	67.10
B.1.3 Delivered electric energy demand	Delivered electric energy demand per internal useful floor area per year	kWh/m2/yr	166.40
B.1.5 Energy from renewable sources in total final thermal energy consumption	Share of renewable energy in final thermal energy consumptions	%	0.00
B.1.6 Energy from renewable sources in total final electric energy consumption	Share of renewable energy in final electric energy consumption	%	0.00
B.1.11 Embodied non-renewable primary energy	Embodied primary non-renewable energy	MJ/m^2	-
B.3.5 Recycled materials	Weight of recycled materials on total weight of materials	%	-
B.4.5 Potable water consumption for indoor uses	Potable water consumption per occupant per year	m^3/occupant/year	1.6
C.1.3 Global Warming potential	CO_2 equivalent emissions per internal useful floor area per year	kg CO_2 eq./m^2/yr	11.60
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	-
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	%	0.00
D.1.4 TVOC concentration in indoor air	TVOC concentration in indoor air	µg/ m^3	-
D.1.10 Ventilation rate	Ventilation rate normalized per useful floor area	l/s/m2	-
D.2.2 Thermal comfort index	Predicted Percentage Dissatisfied (PPD)	%	15.00
G.1.4 Use stage energy cost	Energy annual cost per usable floor area	€/m2/yr	26.90
G.1.5 Use stage water cost	Water annual cost per usable floor area	€/m2/yr	0.29

c. Actual performance analysis

WEAKNESSES ASPECTS	*Inefficient heating system. Old lighting system. No automatic controls in heating, lighting.*
STRENGHT ASPECTS	*Central location and easy accessibility (at least 1 stop of a transportation line within 400m). Part of a school building complex with spacious and green yard. Bicycle path adjacent to the school block. Shared path adjacent to one façade of the building complex. Large flat roof, for installation of PV.*
POTENTIAL FOR PERFORMANCE IMPROVEMENT	*Improve energy consumption and CO2 emissions of the building. Improve thermal comfort. Reduce energy cost. Extension of the shared paths and bicycle pats. Municipal transportation stop outside the building complex.*

4. STRATEGIC DEFINITION

a. Performance targets

A - SITE REGENERATION AND DEVELOPMENT, URBAN DESIGN AND INFRASTRUCTURE			
A1 – Site Regeneration and Development			
A1.13 Provision and quality of walkways for pedestrian use.		Actual value	0.0
Existence and usability of bicycle and pedestrian paths around the building	text	Target value	1.0
A3 – Project Infrastructure and Services			
A3.12 Public/ Municipal transportation		Actual value	0.0
Existence and effectiveness of public/municipal transportation near the building	text	Target value	1.0
A3.13 Provision of on-site parking facilities for private vehicles		Actual value	-1.0
Ratio of exterior and interior parking spaces to the total usable area of non-residential occupancies	spaces/60 m^2	Target value	-1.0
A3.16 *Exterior lighting*		Actual value	0.0
Efficiency and adequacy of the exterior lighting and the public lighting around the building	text	Target value	5.0
B – ENERGY AND RESOURCES CONSUMPTION			
B1 – Energy			
B1.1 – Primary energy demand		Actual value	-1.0
Primary energy demand	kWh/m^2	Target value	5.0
B1.2 – Delivered thermal energy demand		Actual value	-1.0
Delivered thermal energy demand	kWh/m^2	Target value	5.0
B1.3 – Delivered electric energy demand		Actual value	-1.0
Delivered electric energy demand	kWh/m^2	Target value	5.0
B1.5 – Energy from renewable sources in total thermal energy consumption		Actual value	-1.0
Energy from renewable sources in total thermal energy consumption	%	Target value	-1.0
B1.6 – Energy from renewable sources in total electrical energy consumption		Actual value	-1.0
Energy from renewable sources in total electrical energy consumption	%	Target value	5.0
B1.8 – Final total energy for all building operations		Actual value	-1.0
Final total energy for all building operations	kWh/m^2	Target value	5.0
B2 – Electrical peak demand			
B2.1 – *Electrical peak demand for building operations*		Actual value	-1.0
Average of peak monthly electrical demand for one year	W/m^2	Target value	-1.0
B4 – Use of potable water, stormwater and greywater			
B4.5 – Water consumption for indoor uses		Actual value	1.2
Water consumption for indoor uses	m^3/person	Target value	0.0
C- ENVIRONMENTAL LOADINGS			
C1 – Greenhouse Gas Emissions			
C1.3 – Greenhouse Gas Emissions from building's operations		Actual value	-1.0
Greenhouse Gas Emissions from building's operations	kg CO2eq/m^2	Target value	5.0
C3 – Solid and Liquid Wastes			
C3.2 – *Solid waste from building operations*		Actual value	-1.0
Ratio of the number of collectable solid waste	%	Target value	3.0

categories within a 100 m distance from the building's entrance to the reference solid waste categories			
D- INDOOR ENVIRONMENTAL QUALITY			
D2 – Air Temperature and Relative Humidity			
D2.2 – Thermal comfort index		Actual value	2.5
Predicted Percentage Dissatisfied (PPD)	%	Target value	5.0
E- SERVICE QUALITY			
E1 – Safety and Security			
E1.2 – Risk to occupants and facilities from fire		Actual value	0.0
Risk to occupants and facilities from fire	text	Target value	3.0
E1.4 – Risk to occupants and facilities from earthquake		Actual value	3.0
Risk to occupants and facilities from earthquake	text	Target value	3.0
E2 – Functionality and efficiency			
E2.5 – Elevators		Actual value	3.0
Elevators	text	Target value	0.0
E3 – Controllability			
E3.2 – Building Energy Management System (BEMS)		Actual value	0.0
Building Energy Management System	text	Target value	0.0
E4 – Flexibility and Adaptability			
E4.5 – Adaptability to future changes in type of energy supply		Actual value	3.0
Adaptability to future changes in type of energy supply	text	Target value	3.0
F- SOCIAL CULTURAL AND PERCEPTUAL ASPECTS			
F1 – Social Aspects			
F1.1 – Universal access on site and within the building		Actual value	-1.0
Retention of as-built documentation	text	Target value	0.0
G- COST AND ECONOMIC ASPECTS			
G1 – Cost			
G1.4 – Use stage energy cost		Actual value	-1.0
Energy annual cost per usable floor area	€/m^2	Target value	5.0
G1.5 – Use stage water cost		Actual value	4.7
Water annual cost per usable floor area	€/m^2	Target value	5.0

b. Constraints and restrictions

CONSTRAINTS / RESTRICTIONS	
Legal constraints	*Buildings under major renovation should comply with Hellenic regulation on the energy performance in the building sector (KENAK)*
Technical constraints	*Building use*
Financial constraints	*Budget constraints*
Environmental condition constraints	
Stakeholder based restrictions	
Other relevant constraints	

c. Potential strategies at building scale

Synergy zones	
Energetic synergies	*Since the building is part of a school complex, there is a possibility of large PV installation. Electricity surplus (given the building use) can be used to cover electricity of the nearby buildings*
Water synergies	
Waste synergies	
Mobility synergies	
Other synergies	

5. DECISION MAKING

a. Description of scenarios

SCENARIO A	DESCRIPTION
1.	Installation of 30 PV panels, with total surface 48.9 m^2 and efficiency 19%
2.	Installation of 6 Heat Pumps (35kW each) for heating and cooling. Installation of fan coils. Insulation of all distribution networks.
3.	Replacement of all lamps with new LED

SCENARIO B	DESCRIPTION
1.	Installation of 30 PV panels, with total surface 48.9 m^2 and efficiency 19%. Remaining needs will be covered by the PV park in a nearby area.
2.	Installation of 6 Heat Pumps (35kW each) for heating and cooling. Installation of fan coils. Insulation of all distribution networks.
3.	Replacement of all lamps with new LED
4.	Installation of a central thermal-compensation system for heating
5.	Recycle bins for more categories
6.	Municipal transportation
7.	Extended network of shared area leading to public transportation stops

b. Scenarios raking

For the evaluation of the two scenarios the short version of the SBTool was used, since the SBTool was not updated.

i. Performance Scores

Issues	Current state	Scenario A	Scenario B
TOTAL SCORE	**-0.2**	**1.5**	**2.8**
A – Site regeneration			
B – Energy and Resources C.	-0.6	1.8	3.3
C – Environmental Loadings	-1.0	1.5	4.3
D – Indoor Env. Quality	2.5	4.3	5.0
E – Service Quality			
F – Social Aspects			
G – Cost and Economic Asp.	1.8	4.1	4.8

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/m2/yr	88.50
B.1.2 Delivered thermal energy demand	Delivered thermal energy demand per internal useful floor area per year	kWh/m2/yr	0.00
B.1.3 Delivered electric energy demand	Delivered electric energy demand per internal useful floor area per year	kWh/m2/yr	30.50
B.1.5 Energy from renewable sources in total final thermal energy consumption	Share of renewable energy in final thermal energy consumptions	%	0.00
B.1.6 Energy from renewable sources in total final electric energy consumption	Share of renewable energy in final electric energy consumption	%	54.00
B.1.11 Embodied non-renewable primary energy	Embodied primary non-renewable energy	MJ/m^2	-
B.3.5 Recycled materials	Weight of recycled materials on total weight of materials	%	-
B.4.5 Potable water consumption for indoor uses	Potable water consumption per occupant per year	m^3/occupant/year	1.2
C.1.3 Global Warming potential	CO_2 equivalent emissions per internal useful floor area per year	kg CO_2 eq./m^2/yr	1.90
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	-
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	%	0.00
D.1.4 TVOC concentration in indoor air	TVOC concentration in indoor air	µg/ m^3	-
D.1.10 Ventilation rate	Ventilation rate normalized per useful floor area	l/s/m2	-
D.2.2 Thermal comfort index	Predicted Percentage Dissatisfied (PPD)	%	8.00
G.1.4 Use stage energy cost	Energy annual cost per usable floor area	€/m2/yr	3.70
G.1.5 Use stage water cost	Water annual cost per usable floor area	€/m2/yr	0.29

SCENARIO B			
KPI	**Indicator**	**Unit of measure**	**Value**
B.1.1 Primary energy demand	Primary energy demand per internal useful floor area per year	kWh/m2/yr	0.00
B.1.2 Delivered thermal energy demand	Delivered thermal energy demand per internal useful floor area per year	kWh/m2/yr	0.00
B.1.3 Delivered electric energy demand	Delivered electric energy demand per internal useful floor area per year	kWh/m2/yr	0.00
B.1.5 Energy from renewable sources in total final thermal energy consumption	Share of renewable energy in final thermal energy consumptions	%	0.00
B.1.6 Energy from renewable sources in total final electric energy consumption	Share of renewable energy in final electric energy consumption	%	100.00
B.1.11 Embodied non-renewable primary energy	Embodied primary non-renewable energy	MJ/m^2	-
B.3.5 Recycled materials	Weight of recycled materials on total weight of materials	%	-
B.4.5 Potable water consumption for indoor uses	Potable water consumption per occupant per year	m^3/occupant/year	1.2
C.1.3 Global Warming potential	CO_2 equivalent emissions per internal useful floor area per year	kg CO_2 eq./m^2/yr	0.00
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	-
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	%	71.00
D.1.4 TVOC concentration in indoor air	TVOC concentration in indoor air	µg/ m^3	-
D.1.10 Ventilation rate	Ventilation rate normalized per useful floor area	l/s/m2	-
D.2.2 Thermal comfort index	Predicted Percentage Dissatisfied (PPD)	%	5.00
G.1.4 Use stage energy cost	Energy annual cost per usable floor area	€/m2/yr	0.00
G.1.5 Use stage water cost	Water annual cost per usable floor area	€/m2/yr	0.29

iii. Financing mechanisms evaluation

Scenario A	Municipality's own funds, National and EU financing programs

Scenario B	Municipality's own funds, Attika Prefecture funding, National and EU financing programs

iv. Synergies at building level

Scenario A	*Electricity surplus (given the building use) can be used to cover electricity of the nearby buildings*
Scenario B	*Electricity surplus (given the building use) can be used to cover electricity of the nearby buildings*

6. RETROFIT CONCEPT

SELECTED SCENARIO	DESCRIPTION
A.	The two proposed scenarios are not alternative, but they are progressive. ScenarioA is the short-term scenario and ScenarioB is the long-term. The selected scenario is ScenarioA, which can be promptly implemented.

KEY ELEMENTS OF THE CONCEPT

Retrofits Strategies	Installation of PV panels. New heating system with HP
	Replacement of all lamps
Performance improvement	Environment: Improved energy consumption and CO2 emissions
	Society: Improved thermal comfort
	Economy: Reduced energy cost
Financial mechanism	Municipality's own funds