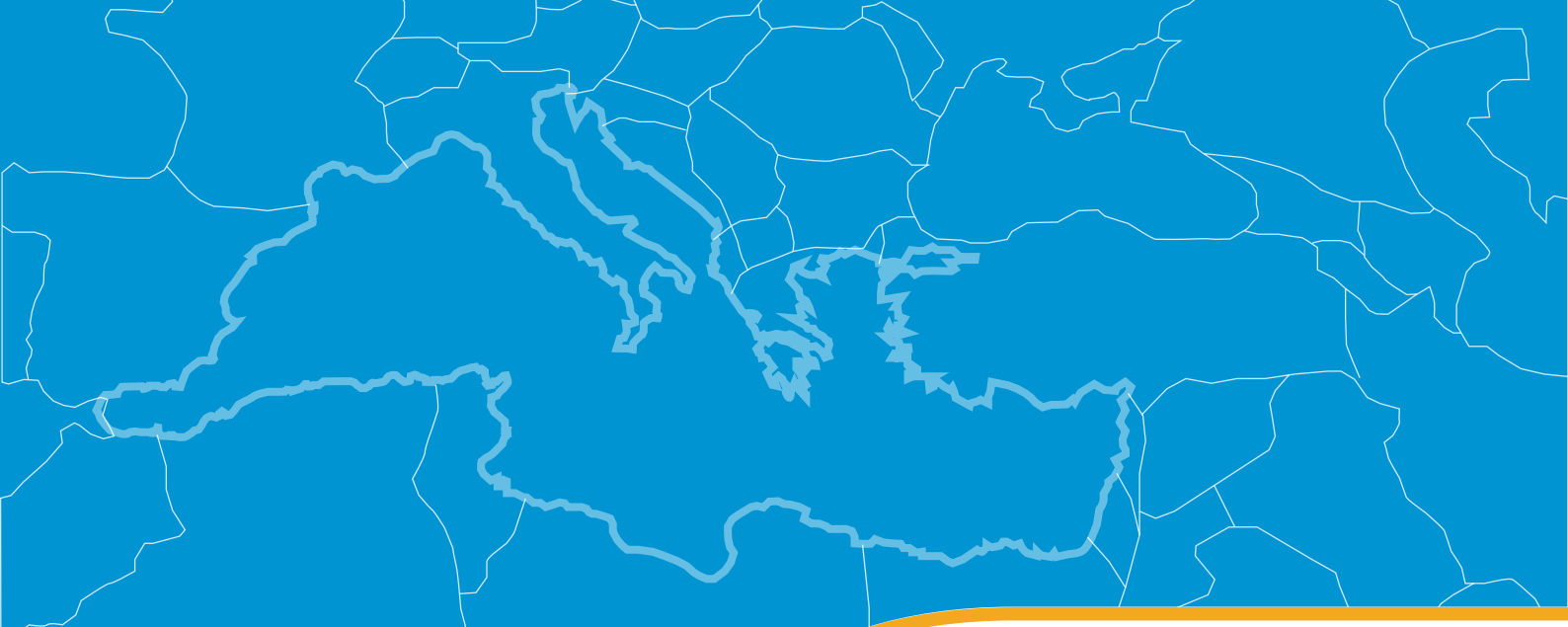

SNTool MED

Sustainable Neighbourhood Tool

Integrated tool and assessment methodology for sustainable neighbourhoods in MED cities

Version : 2023-A

ENI CBCMED

Project Funded by the EUROPEAN UNION

Sustainable MED Cities

Sustainable MED Cities - Integrated Tools and Methodologies for Sustainable Mediterranean Cities, is a capitalization project whose main objective is to enhance the capacity of public administration in delivering, implementing and monitoring efficient measures, plans and strategies to improve the sustainability of cities, neighbourhoods and buildings.

This project received funding from the European Union's ENI CBC MED Programme under Grant Contract C_B.4.3_0063.

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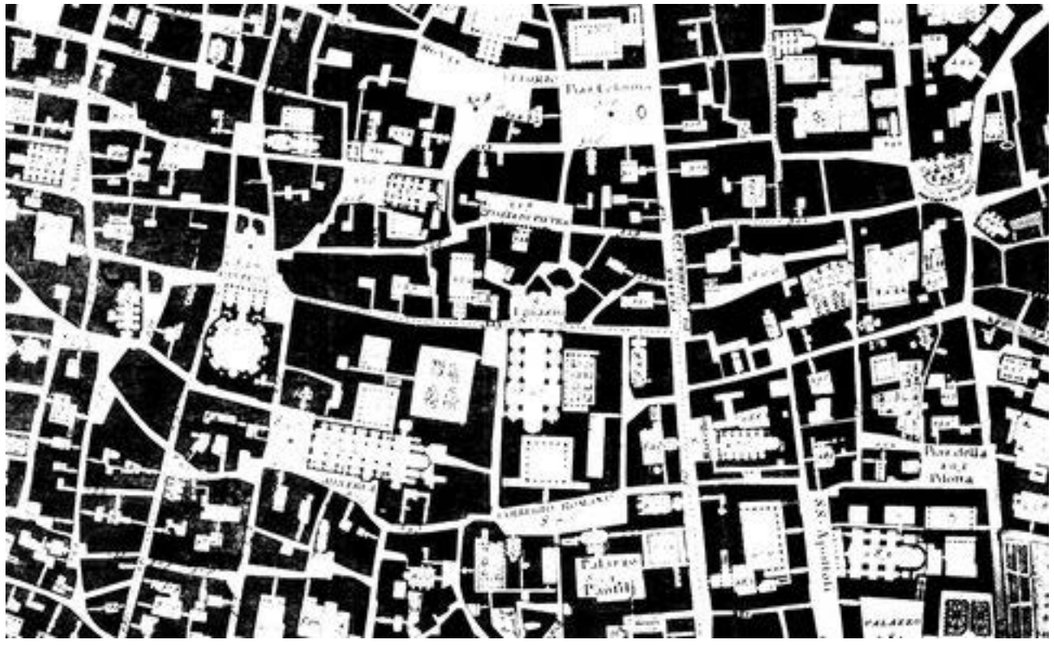


Introduction

SNTool MED is an assessment system for measuring the sustainability of neighbourhoods and small urban areas. It is a tool useful to support decision making processes for the development, implementation and monitoring of urban plans and action plans for more sustainable cities. SNTool can be contextualized and adapted to any Mediterranean region. SNTool is based on a transnational common methodology, the SBE Method.

SBE Method has been developed by iiSBE (international initiative for a Sustainable Built Environment) through the Green Building Challenge (GBC), an international research initiative launched in 1996. Over time, more than 25 countries from all the continents contributed to the development of SBE Method and the test of the assessment tools based it.

SBE Method implements the “think globally, act locally” concept, acting as a common “language” for assessing the sustainability of the built environment. An assessment tool based on the SBE Method, such as SNTool, can be adapted to any context reflecting local priorities and peculiarities. The use of SNTool allows to evaluate, compare and aggregate the results of sustainability measures deployed in different cities (act locally) and, at the same time, to evaluate the progress towards the global sustainability targets (think globally), avoiding the uncertainty and confusion generated using different assessment tools and methodologies. Any city can develop its own version of SNTool that will provide sustainability assessment results comparable and aggregable with the ones of other Mediterranean cities.

The first version of SNTool has been developed through the Interreg MED project “CESBA MED: Sustainable Cities”, leaded by the City of Torino with the scientific coordination of iiSBE Italia R&D. The other partners of the project were: Government of Catalonia, National Observatory of Athens, AURA-EE, EnvirobatBDM, City of Udine, City of Sant Cugat del Vallés, University of Malta, Energy Institute Hrvoje Požar, CESBA.
In the Sustainable MED Cities project, SNTool has been further upgraded and upscaled to be applicable to the whole Mediterranean region, taking in account the specific issues of the South and East shores, with the contribution of Greater Irbid Municipality, Municipality of Sousse, Municipality of Moukhtara, UNEP/MAP and MedCities.

This publication illustrates the SBE Method, how to contextualise SNTool to a specific city, and how to carry out a sustainability assessment using it. The use of the MED Passport and KPIs for comparing the sustainability of Mediterranean neighbourhoods is also explained.

SNTool MED is freely available to any municipality in the Mediterranean willing to develop its own sustainability assessment tool at neighbourhood scale. The use of SNTool contributes to the achievement of the objectives of the Mediterranean Strategy for Sustainable Development, raising the capacity to act of municipalities.

Andrea Moro

WP3 Coordinator
iiSBE Italia R&D

1. SBE Method

Sustainable Built Environment Method

Definition:

SBE Method is a multi-criteria analysis method for assessing the sustainability of the built environment.

Starting from a set of assessment criteria, SBE Method provides a final concise score about a neighbourhood's overall sustainability.

Main elements:

1. A set of assessment criteria.
2. A set of indicators, which allow to quantify the neighbourhood's performances with respect to each criterion.
3. A normalization method.
4. An aggregation method.

1.1 Hierarchic levels

The multicriteria analysis method is structured in four hierarchic levels:

1. Issues
2. Categories
3. Criteria
4. Indicators

Issues

1

Describe general themes, recognized as relevant for assessing the sustainability of a neighbourhood. For instance, the issues of SNTool are:

- A - Use of land and biodiversity
- B - Energy
- C - Water
- D - Solid Waste
- E Environmental quality
- F - Transportation and mobility
- G - Social Aspects
- H - Economy
- I - Climate Change: mitigation and adaptation
- J - Governance

Categories

2

Concern particular aspects of issues. For instance, in the SNTool, the issue A-Use of land and biodiversity contains 3 categories: A1-Use of land, A2- Green urban areas and A3- Biodiversity and ecosystems.

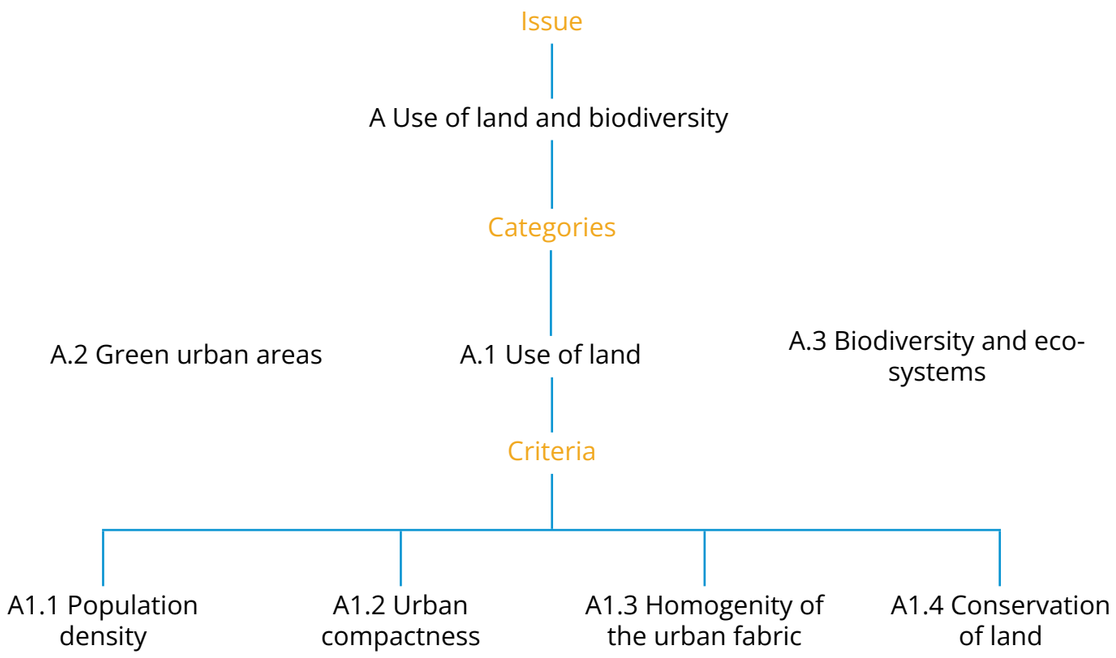
- A.1 Use of land
- A.2 Green urban areas
- A.3 Biodiversity and ecosystems
- B.1 Energy infrastructure
- B.2 Energy consumptions
- B.3 Renewable energy
- C.1 Water infrastructure
- C.2 Water consumption
- C.3 Effluents management
- D.1 Solid waste collection infrastructure
- D.2 Solid wate management
- E.1 Air quality
- E.2 Noise
- E.3 EMF expossure
- E.4 Environmental impacts
- F.1 Performance of mobility service
- F.2 Green mobility
- F.3 Safety in mobility
- F.4 Urban morphology and transportation
- G.1 Accesibility
- G.2 Housing
- G.3 Availability of public and private facilities and services
- G.4 Education
- G.5 Social inclusion
- G.6 Safety
- G.7 Helath
- G.8 Food security
- G.9 Cultural Heritage
- G.10 Perceptual
- H.1 Economic Performance
- H.2 Employment
- H.3 Innovation
- H.4 ICT infrastructure
- I.1 Climate change mitigation
- I.2 Adaptation to the climate action: heatwaves and increase of temperature
- I.3 Adaptation to the climatic action: pluvial flood
- I.4 Adaptation to the climatic action:fluvial and coastal flood
- I.5 Adaptation to the climatic action: drought
- I.6 Adaptation to the climatic hazard: wildfire
- I.7 Adapatation to the climatic hazard: Wind
- J.1 Urban planning
- J.2 Management and community involvement
- J.3 Public buildings cooperation

Criteria

3

They represent the basic assessment entries used to evaluate the sustainability of the neighbourhood.

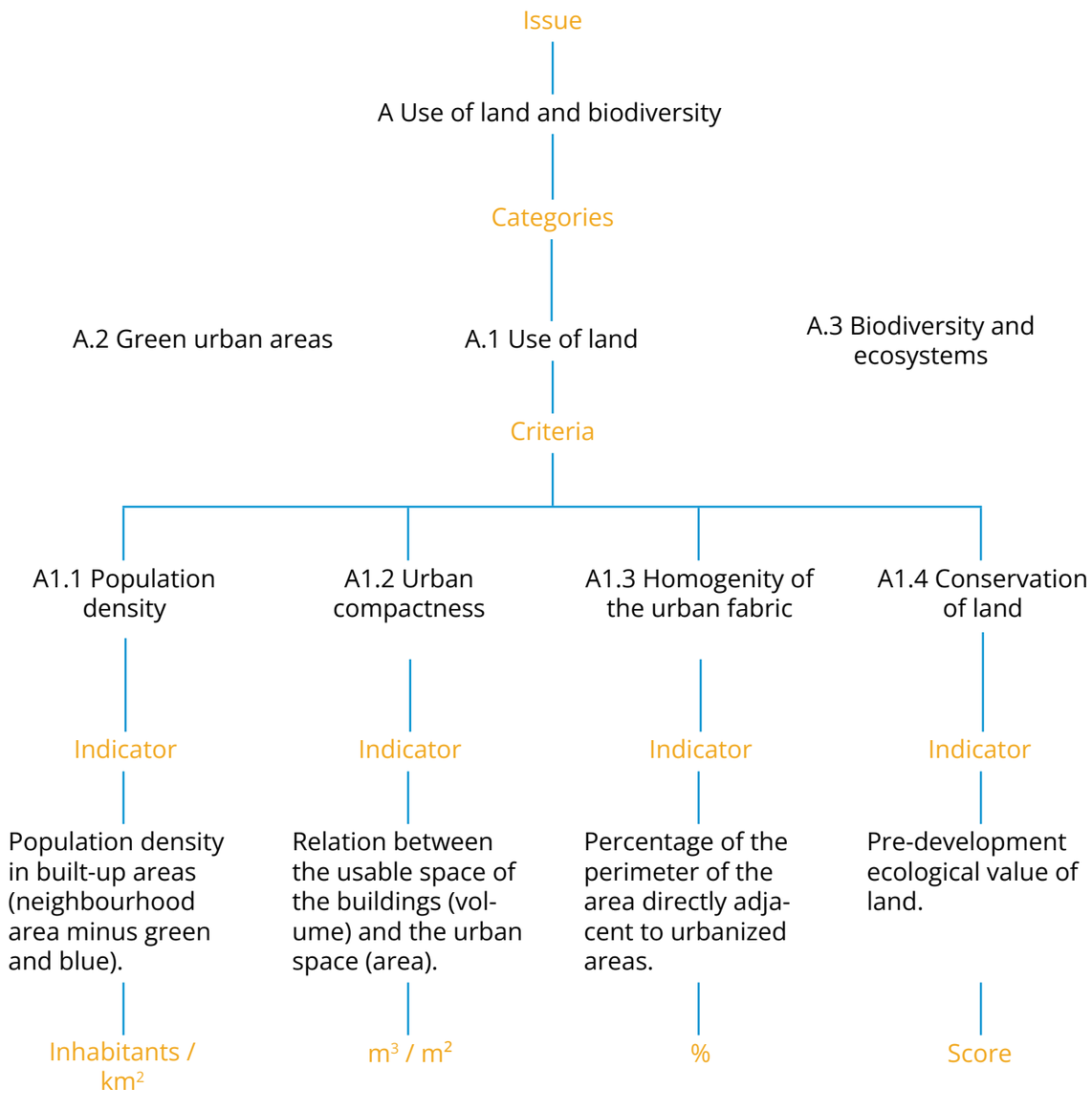
Example:



Indicators

Each criterion is associated to an indicator. They are physical quantities or qualitative scenarios that allow to assess the performance of the neighbourhood with respect to the criteria. Quantitative indicators have a unit of measure.

Example:



1.2 Assessment process

Definition and objective:

The main goal of the SBEMethod is to provide a final concise score, which summarizes the overall performance of the neighbourhood with respect to all criteria.

The assessment procedure is articulated in 3 main steps:

1. Characterization

Calculation/evaluation of the indicators' value.

Input
Experimental data
Design data
Output
Indicators' values and selected escenarios

2. Normalisation

Assignement of a score to the indicators' value.

Input
Indicators' values and selected escenarios
Output
Normalized scores

3 Aggregation

Weighted sum of criteria's scores to calculate the score of categories, issues.

Input
Normalised scores
Output
Final concise score

Step 1: Characterization

In the first stage of the assessment process, the values of all the quantitative indicators in SNTool are calculated.

For each criterion, SNTool provides the description of an “Assessment Method” that specifies the calculation procedure.

For the qualitative indicators, the performance of the neighbourhood is assessed thorough the selection of a reference scenario.

Example:

Code	Criterion	Indicator	Unit of measurement	Value
A1.3	Homogeneity of the urban fabric.	Percentage of the perimeter of the area directly adjacent to urbanized areas	%	78
B2.2	Total final thermal energy consumption for building operations.	Aggregated annual final thermal energy consumption of residential buildings per aggregated internal useful floor area.	kWh/m²/yr	180
C3.2	Public wastewater that is disposed or treated.	Percent of public wastewater that is disposed or treated.	%	78
D1.1	Availability of solid waste collection.	Percentage of buildings with regular solid waste collection.	%	70
E2.1	Ambient daytime noise conditions.	Percentage of building area over noise limit.	%	23
F1.1	Performance of the public transport system.	Percentage of inhabitants that are within 400 meters walking distance of at least one public transportation service stop.	%	80
G1.3	Barrier-free accessibility in local outdoor public areas.	Adequacy of barrier-free accessible public outdoor areas compared to the total public area.	%	47
H4.2	Wireless Broadband Coverage.	Percentage of the neighborhood area served by wireless broadband (3G, 4G, 5G).	%	56
I2.3	Green roofs.	Aggregate area of building roofs covered with vegetated material.	%	1
J1.1	Community involvement in urban planning activities	Percentage of residents active in public urban planning	Level	3

Step 2: Normalisation

In the second stage of the assessment process, a performance score is associated to the value or scenario of each indicator. This process is named “normalisation”. The indicators are normalised in the interval (-1,+5), where -1 corresponds to a negative performance and +5 to an excellent performance. The better the performance, the higher the normalised score.
The values of quantitative indicators are normalised through linear functions of two kinds: H.I.B. (High Is Better) and L.I.B. (Low is Better). Qualitative indicators are normalised using discrete values corresponding to the reference scenarios.

For each indicator, the normalisation function depends on two parameters: the thresholds assigned to score 0 and 5. These parameters are named “benchmarks” and they define the value or scenario of the indicator associated to the “minimum acceptable performance” (score zero) and to the “excellent and ideal performance” (score five).

Scoring scale:

-1	The score corresponds to a value of the indicator that is under the minimum acceptable performance.
0	The score corresponds to a value of the indicator that represents the minimum acceptable performance. It is usually defined on the base of regulations and standards.
1	The score corresponds to a value of the indicator that represents a minimum increase of performance with regards to the minimum acceptable performance.
2	The score corresponds to a value of the indicator that represents a substantial increase of performance with to the minimum acceptable performance.
3	The score corresponds to a value of the indicator that represents a best practice.
4	The score corresponds to a value of the indicator that represents an improvement towards the best practice level.
5	The score corresponds to a value of the indicator that represents an excellent and ideal performance.

Normalisation H.I.B. Criteria (Higher Is Better)

All criteria such that the higher the numerical value of the corresponding indicator, the higher the performance level.

Since the normalized score must fulfil the requirement “the better the performance, the higher the normalized score”, normalisation functions associated with H.I.B. criteria must be increasing functions.

The normalised score is -1 if the value of the indicator is lower than the benchmark corresponding to score 0.

The normalised score is 5 if the value of the indicator is equal of higher than the benchmark corresponding to score 5.

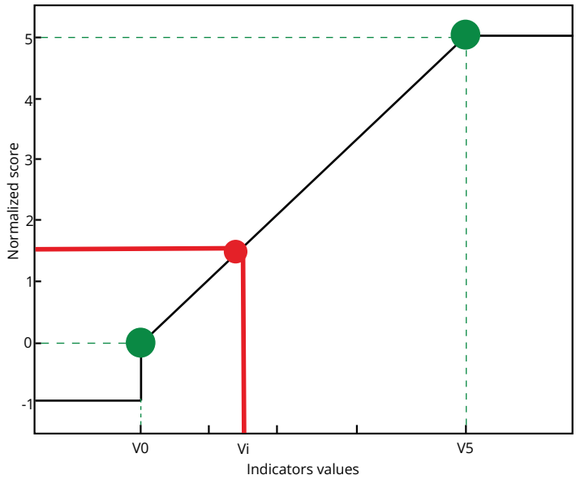
In the other cases, the value of the indicator is normalised through an interpolation.

Base representation:

V0 = value of the indicator for benchmark zero

V5 = value of the indicator for benchmark five

Vi = value of the indicator

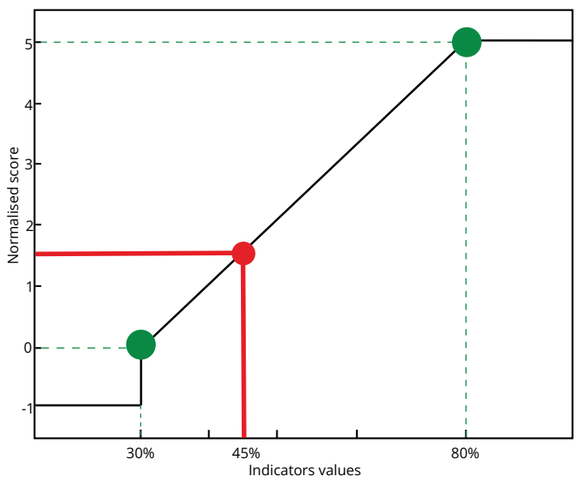


Example:

Criterion:
B3.7 - Share of renewable energy on-site, relative to total primary energy consumption for building operations.

Indicator:
Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption.

Value of the indicator: 45%
Normalised score: 1,5



Normalisation L.I.B. Criteria (Lower Is Better)

All criteria such that the lower the numerical value of the corresponding indicator, the higher the performance level. Normalisation functions associated with L.I.B. criteria must be decreasing functions.

The normalised score is 5 if the value of the indicator is equal or lower than the benchmark corresponding to score 5.

The normalised score is -1 if the value of the indicator is higher than the benchmark corresponding to score 0.

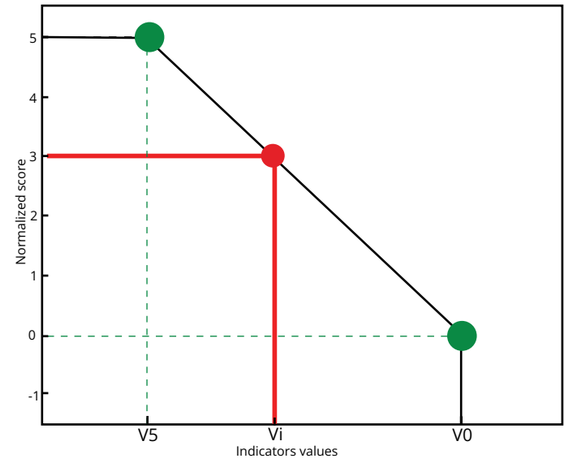
In the other cases, the value of the indicator is normalised through an interpolation.

Base representation:

V0 = value of the indicator for benchmark zero

V5 = value of the indicator for benchmark five

Vi = value of the indicator

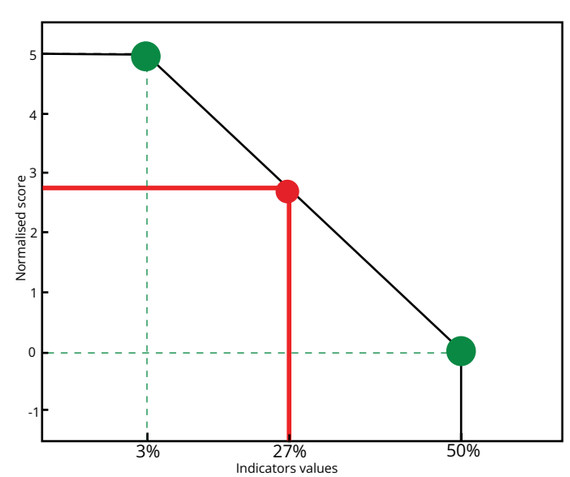


Example:

Criterion:
I1.2 - Greenhouse gas emissions from residential buildings

Indicator:
Total amount of greenhouse gases in Kg (equivalent carbon dioxide units) generated over a calendar year per aggregated indoor useful floor area

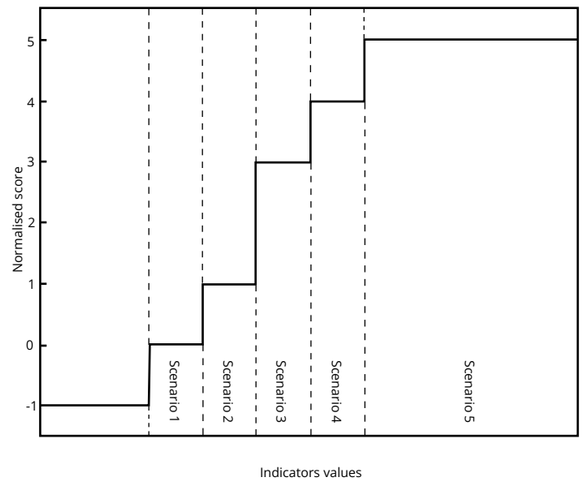
Value of the indicator: 27 Kg CO2 eq / m^2
Normalised score: 2,7



Normalisation qualitative criteria

All criteria such that the normalised score can only attain discrete values in the normalisation interval, each of them corresponding to a reference scenario defined by the corresponding indicator.

The normalised score is computed by comparing the neighbourhood's performance with reference scenarios which are defined by the indicator associated with the criterion.

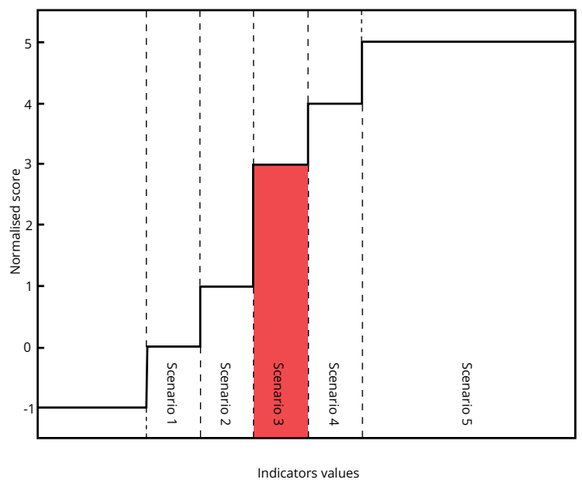


Example:

Criterion:
Management & Community Involvement

Normalisation of the indicator's value: 3

corresponding to the scenario "Degrees of citizen power: Partnership,
delegated power and citizen power in one phase, like diagnosis or after delivery"



Step 3: Aggregation

In the third step the normalised scores of criteria are aggregated to calculate the overall sustainability score of the neighbourhood.

The aggregation takes place in 3 phases:

3.1 Aggregation through criteria: the scores of the criteria in the same category are aggregated to calculate the score of each category.

3.2 Aggregation though categories: the scores of the categories in the same issue are aggregated to calculate the score of each issue.

3.3 Aggregation through issues: the scores of the issues are aggregated to calculate the overall sustainability score of the neighbourhood.

In what follows are used the symbols:

a. Xi the i-th issue. The issues in SNTool are 10, consequently i=1,10. NI is the number of the issues included in SNTool

b. $C_{i,j}$ the j-th category of the issue X_i, j=1, ……., $N_c^{(i)}$, where $N_c^{(i)}$ is the number of the categories in the i-th issue

c. $c_{i,j,k}$ is the k-th criterion of the j-th category in the i-th issue, k=1,…… $N_c^{(I,j)}$, where $N_c^{(I,j)}$ is the number of the criteria in the category $C_{i,j}$

Through criteria

The main goal of aggregation through criteria is to provide a single normalised score for each category. This is computed for each category aggregating the normalised score of all criteria included in that category.

Aggregation is performed by linear aggregation of scores through weights. These quantify the relative weight of each criterion in percentage with respect to all criteria in the same category.

$$S_{i,j} = \sum_{k=1}^{N_c^{(i,j)}} w_{i,j,k}\, Si,j,k$$

$\omega_{i,j,k}$: the weight of the criterion ci,j,k in the category $C_{i,j}$
$s_{i,j,k}$: the score of the criterion ci,j,k in the category $C_{i,j}$
$S_{i,j}$: the score of resulting from the aggregation of criteria's scores included in the category $C_{i,j}$.

Example

Calculation of the score for the SNTool category A1 **Use of land:**

Code	Criteria	Score	Weight
A1.1	Population density	3,1	24%
A1.2	Urban Compactness	2,2	34%
A1.3	Homogenity in the urban fabric	1,3	16%
A1.4	Conservation of land	0,5	26%

Calculation of the category's score as weighted sum:

Code	Criteria	Score X Weight	Weighted Score
A1.1	Population density	3,1*0,24	0,7
A1.2	Urban Compactness	2,2*0,34	0,8
A1.3	Homogenity in the urban fabric	1,3*0,16	0,2
A1.4	Conservation of land	0,5*0,26	0,1
		Score of the category	1,8

Through categories

The scores of categories are aggregated to calculate the score of each issue (A,B,C,D,E,F,G,H,I,J). The calculation consists in a linear aggregation of the scores of the categories included in that issue.

$w_{i,j}$: the weight of each category included in issue Xi;
$S_{i,j}$: the score of each category included in issue Xi;
S_i: the score resulting from the aggregation of the categorie's scores included in issue Xi.

$$S_i = \sum_{j=1}^{N_c^{(i,)}} w_{i,j}\, Si,j$$

Example:

Calculation of the score for the SNTool issue A **Use of land and biodiversity:**

Code	Category	Score	Weight
A1	Use of land	1,6	30%
A2	Green urban areas	2,6	30%
A3	Biodiversity and ecosystems	2,2	40%

Calculation of the issue's score as weighted sum:

Code	Category	Score X Weight	Weighted Score
A1	Use of land	1,6*0,3	0,5
A2	Green urban areas	2,6*0,3	0,8
A3	Biodiversity and ecosystems	2,2*0,4	0,9
	Total score of the issue		2,2

Through issues

The scores of issues are aggregated to calculate the overall sustainability score of the neighbourhood.). The calculation consists in a linear aggregation of the scores of the issues include in SNTool.

W_i = the weight of each issue included in SNTool

S_i = the score of each issue included in SNTool

$$\sum = \sum_{i=1}^{N_A} w_{i,si}$$

Example:

Calculation of the overall sustainability score for a **neighbourhood:**

Code	Issue	Score	Weight
A	Use of land and biodiversity	2,2	8%
B	Energy	1,9	13%
C	Water	2,3	10%

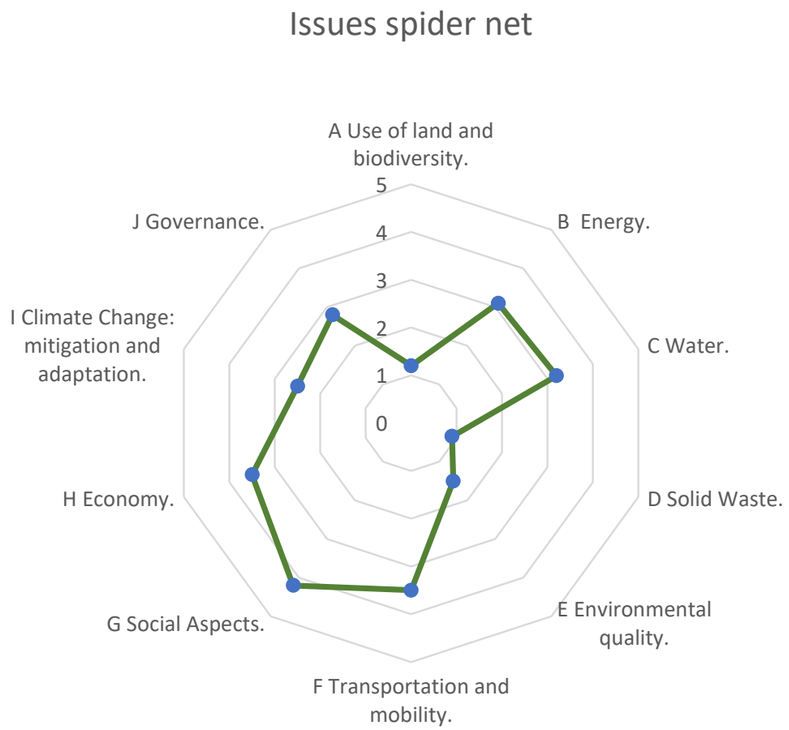
Calculation of the neighbourhood's overall score as a weighted sum:

Code	Issue	Score X Weight	Weighted Score
A	Use of land and biodiversity	2,2*0,08	0,2
B	Energy	1,9*1,3	0,2
C	Water	2,3*0,1	0,2
	Sustainability score		0,6

Assessment`s results

Spider chart:

Easy-to-read representation of the 10 issues score on a scale from 0 (minimum acceptable performance) to 5 (best performance).



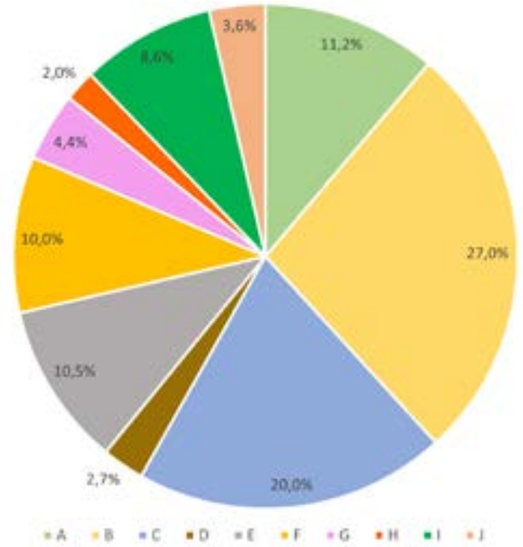
Number of active indicators:

Total number of indicators available in SNTool and number of indicators selected (including KPI- key performance indicators) in the assessment.

The number available criteria is:	92	The number active criteria is:	91

Pie chart:

Percentual contribution weight of each issue to the overall score.



Final score:

Detail of the scores and weights for the 10 issues and overall score.

Issue	Score	Weight	Weighted scores
A Use of land and biodiversity.	1,2	11,2%	0,13
B Energy	3,1	27,0%	0,83
C Water	3,2	20,0%	0,64
D Solid Waste.	0,9	2,7%	0,02
E Environmental quality.	1,5	10,5%	0,45
F Transportation and mobility.	3,5	10,0%	0,15
G Social Aspects.	4,2	4,4%	0,18
H Economy.	3,5	2,0%	0,07
I Climate Change: mitigation and adaptation.	2,5	8,6%	0,21
J Governance.	2,8	3,6%	0,10
		100% Total weight	2,78/5 Total score

Description of the KPIs:

Value of the Key Performance Indicators for the SMC Passport, the reporting document to compare the sustainability of Mediterranean neighbourhoods

Example:

	KPIs neighbourhood scale	Value	Unit of measurement
B2.1	Total final thermal energy consumption for building operations	45	kWh/m^2/yr
B2.4	Total final electrical energy consumption for building operations	8	kWh/m^2/yr
B2.7	Total primary energy demand for building operations	60	kWh/m^2/yr
B3.1	Share of renewable energy on-site in total final thermal energy consumption for building operations	30%	percentage
B3.4	Share of renewable energy on-site in total final electrical energy consumption	72%	percentage
B3.7	Share of renewable energy on-site in total primary energy consumption for building operations	72%	percentage
C2.3	Consumption of potable water in residential buildings	120	L /occupant/yr
D2.2	Access to solid waste and recycling collection points	88%	percentage
E1.2	Particulate matter (PM10) concentration	22	days/yr
F1.1	Performance of the public transport system	88%	percentage
F2.3	Bicycle network	15	m/inhabitant
G3.1	Availability and proximity of key services	75%	percentage
I1.1	Greenhouse gas emissions	5	t $CO_{2\ eq}$./inhabitant/yr
I3.3	Permeability of land	22%	percentage

2. Contextualization

Definition:

SNTool is a generic multicriteria sustainability assessment.

Users need to adapt it to local conditions.

The result of the contextualisation process is a local version of SNTool, ready to be used for assessing the sustainability at neighbourhood scale.

Objectives:

Develop a contextualised version of SNTool to take in account local priorities, history, climatic conditions, socio-economic conditions, and advancement state in relation to sustainability issues.

The contextualisation process takes place in 3 steps:

1. Selection of criteria
2. Benchmarking
3. Weighting

2.1 Selection of the active criteria

Definition:

In the first step of the contextualisation process, users shall select the criteria that will compose the local version of SNTool.

Criteria are selected from the whole list of the Generic Framework. There isn't a fixed number of criteria to be selected.

Only a core set of criteria, the Key Performance Indicators (KPIs) are mandatory for all. They represent the core criteria linked to the transnational global sustainability goals.

Objectives:

The rationale behind the selection could depend on regional policies, targets, specific characteristics of the territory (e.g. touristic area, agricultural area, etc....). The selection of criteria can be documented and justified, using the following tables.

The selection of the active criteria can be documented and justified, using the following tables.

Generic table to report the criteria selection

Name of the issue

AX	Name of the category	Justification
AX.X	Name of the criterion	Text

Example selection of active criterias:

A. Use of land and biodiversity

A1	Use of land	Justification
A1.2	Urban compactness	Soil consumption is a policy priority set by the Municipality

B. Energy

B2	Energy infrastructure	Justification
B2.1	Total final thermal energy consumption for building operations	Achievement of the objectives set by the Covenant of Mayors

D. Solid waste

D1	Solid waste collection infrastructure	Justification
D1.1	Availability of solid waste collection	Support to waste management policies; consistency with the regional waste management plan.

G. Social aspects

G3	Availability of public and private facilities and services	Justification
G3.2	Availability and proximity of a public primary school	Support to sustainable mobility policies consistency with the draft revision of the general regulation plan (P.R.G.) of the City

H. Economy

H1	Economic performance	Justification
H1.1	Average annual per-capita income of residents	Support to social and welfare policies

I. Climate change: mitigation and adaptation

I1	Greenhouse gas emissions	Justification
I1.1	Total amount of greenhouse gases (equivalent carbon dioxide units) generated from building operations over a calendar year per inhabitant	Achievement of the objectives set by the Covenant of Mayors/ EU targets

2.2 Benchmarking

Definition:

Consists in the definition of the scoring scale for each selected criterion.

The value of benchmarks assigned to the different criteria for score zero (minimum acceptable performance) and for score 5 (excellent and ideal performance). The value of indicators corresponding to score zero is usually depends on regulations, standards or a typical performance in the region. Score 3 represents a best practice performance.

Objectives:

Set the benchmarks for each criteria following the priority order:

1. National, regional laws
2. National, regional, municipal regulations
3. Technical standards (national or international9
4. Statistical data
5. Scientific literature
6. Local reference values
7. Simulations

The selection of benchmarks can be documented and justified, using the following tables.

Generic table to report the benchmarks assignment

Name of the issue

Criteria	Indicator	Unit of measurment	Benchmark	Rationale	sources
AX.X	Text	Text	0 (min): number 5 (max): number	Text	Text

Example benchmarking

A. Use of land and biodiversity

Use of land	A1.2	Unit of measurment	Benchmark	Rationale
A1	Urban compactness	m3/m2	0 (min): 14 5 (max): 18	Technical evaluation of municipal offices

B. Energy

Energy infrastructure	B2.1	Unit of measurment	Benchmark	Rationale
B2	Total final thermal energy consumption for building operations	kWh/m2 year	0 (min): 70 5 (max): 30	Values from TABULA project (EU funded research project)

D. Solid waste

Solid waste collection infrastructure	D1.1	Unit of measurment	Benchmark	Rationale
D1	Availability of solid waste collection	%	0 (min): 75 5 (max): 98	Represents a minimum standard on average in the whole city (city center, peripherical areas, ...)

G. Social aspects

Availability of public and private facilities and services	G3.2	Unit of measurment	Benchmark	Rationale
G3	Availability and proximity of a public primary school	%	0 (min): 30 5 (max): 60	Based on national regulation (DM 75/75, evaluated with municipal offices)

H. Economy

Economic performance	H1.1	Unit of measurment	Benchmark	Rationale
H1	Average annual per-capita income of residents	%	0 (min): 80 5 (max): 90	Based on technical report (Rapporto Rota)

I. Climate change: mitigation and adaptation

Greenhouse gas emissions	I1.1	Unit of measurment	Benchmark	Rationale
I1	Total amount of green-house gases (equivalent carbon dioxide units) generated from building operations over a calendar year per inhabitant	kgCO2/ 1000m2	0 (min): 22,5 5 (max): 0	Technical evaluation

2.3 Weighting

Definition:

Consists in setting the weights at criterion, category and issue level through the assignment of priorities.

Priorites are set in relation to local policies and sustainability goals. The priority of criteria, categories and issues are context dependent.

The weighting process takes place in 3 steps:

1. Assignment of priority values to issues and weights calculation.

2. Assignment of priority values to categories and weights calculation.

3. Assignment of impact factors to criteria and weights calculation.

Weighting of issues

To set the weight s at issue level, it is necessary to define a priority factor for each of them.

The priority factor indicates the relevance of the issue in relation to the context.

A value of 1 means a low priority, a level 5 represents the higher priority.

When all the priority factors have been set, it is possible to calculate the weight of each issue as:

$$W_i = \sum_{i=1}^{\frac{Pi}{N}} Pi \times 100$$

Where:
wi = weight of the issue Ai
Pi = priority level of the Ai issue

Example:

Issue	Priority factor (1 to 5)	Formula	Weight
A.Use of land and biodiversity	3	W=(3/26)*100	11,6%
B.Energy	3	W=(3/26)*100	11,6%
D.Water	2	W=(2/26)*100	7,6%
D.Solid Waste	2	W=(2/26)*100	7,6%
E. Environmental quality	3	W=(3/26)*100	11,6%
F Transportation and mobility	4	W=(4/26)*100	15,3%
G.Social aspects	3	W=(3/26)*100	11,5%
H.Economy	1	W=(1/26)*100	3,8%
I.Climate change	3	W=(3/26)*100	11,6%
J Governance	2	W=(2/26)*100	7,6%
			100%

Weighting of categories:

To set the weight for category level, it is necessary to define a priority factor for each of them.

The priority factor indicates the relevance of the issue in relation to the context.

A value of 1 means a low priority, a level 5 represents the higher priority.

When all the priority factors have been set, it is possible to calculate the weight of each category as:

$$W_{i,j} = \frac{Lj}{\sum_{j=1}^{N_c^{(i)}} Lj} \times 100$$

Where:
Wi,j= weight of category Cj,k included in issue Ai
Lj = priority factor of category Cj,k included in issue

Example:

Category: Social aspects

Category	Priority factor(PF)	Formula	Weight
G1. Accesibility	3	W=(3/35)*100	8,5%
G2. Housing	4	W=(4/35)*100	11,4%
G3. Availability of public and private facilities and services	4	W=(4/35)*100	11,4%
G4. Education	2	W=(2/35)*100	5,7%
G5. Social inclusion	4	W=(4/35)*100	11,4%
G6. Safety	5	W=(5/35)*100	14,2%
G7. Health	5	W=(5/35)*100	14,2%
G8. Food and security	3	W=(3/35)*100	8,5%
G9. Cultural and heritage	3	W=(3/35)*100	8,5%
G10. Perceptual	2	W=(2/35)*100	5,7%
			100%

Weighting of criteria

To weight the criteria is necessary to assign an impact level to each assessment criterion.

The weighting of criteria takes place in 2 steps.
Firstly, users assign an impact level (Pk) to each criterion.
The impact level is defined as

Step 1: Calculated Pk
The impact level is defined as: $P_k = I_k * E_k * D_k * A_k$

I= Intensity of the potential Effect (1-3)
E= Extent of potential effect (1-5)
D= Duration of potential effect (1-5)
A= Adjustment factor in relation to local priorities (1-3)

Impact of the potential effect (Ik)

It can get from 1 to 3 points depending on the intensity of the extent of an effect. The impact is considered very relevant for all the energy criteria whose effect is very strong on the territory, but also economical and air quality criteria may have a big impact in that sense.

Impact of potential effect	
Minimum	1
Moderation	2
High	3

Extent of potential effect (Ek)

It can get from 1 to 5 points; this factor examines the extent of the effect of the criterion, for example, the road connectivity is an aspect that could strongly affect the larger scale in terms of extent and also the pollutant emissions whose effect is perceived on a large scale.

Extent of potential effect	
Block	1
Neighborhood	2
Cluster	3
Urban/Region	4
Global	5

Duration of potential effect (Dk)

It can get from 1 to 5 points; it measures the durability of the effect evaluated by the criterion. Land consumption criterion confirms that an urbanized soil will remain as it is over time, also other aspects related to the urban planning have a strongly duration impact like for example, green areas provision, street connections, pedestrian areas, etc.

Duration of potential effect	
1 - 3 years	1
3 - 10 Years	2
10- 30 Years	3
30- 75 years	4
>75 years	5

A = Adjustment factor in relation to local priorities (1-3) (Ak)

It can get from 1 to 3 points; it is a factor that can be used if there is the need to adjust the priority factor of the criterion in relation to specific local priorities. Maybe in a region a particular sustainability issue has a dramatic importance in relation to other issues. In this case the adjustment factor can be used to take in account the local context.

Step 2: the weight of each criterion in its category is calculated as:

$$W_{i,j} = \frac{Pk}{\sum_{k=1}^{N_c^{(i.j)}} Pk}$$

$\omega_{i,j,k}$: weight of the criterion $c_{i,j,k}$ included in the category $C_{i,j}$
P_k = impact level of the criterion $c_{i,j,k}$ included in the category Ci

Example step 1: Impact level assignment

F3. Safety in mobility

Criterion	Impact (Pk)	Intensity (Ik)	Extent (Ek)	Duration (Dk)	Adjustment (Ak)
F3.1 Pedestrian infrastructure	12	2	3	2	1
F3.2 Availability of sidewalks	12	2	3	2	1
F3.3 Safety of bicycle lines	12	2	3	2	1
F3.4 Traffic fatalities	60	3	5	4	1

Example step 2: Weights assignment in the category F3

Criterion	Formula	Weight
F3.1 Pedestrian infrastructure	(12/96)*100	12,5%
F3.2 Availability of sidewalks	(12/96)*100	12,5%
F3.3 Safety of bicycle lines	(12/96)*100	12,5%
F3.4 Traffic fatalities	(60/96)*100	62,5%
		100%

3.Sustainable Neighbourhood Tool

Defintion:

Complete list of the criteria which make up the Sustainable MED Cities SNTool are described below. The table also includes for each criterion, the information related to the name of the indicator and the unit of measure.

Main elements:

10 Issues
43 Categories
134 Criteria

SNTool criteria list

A Use of land and biodiversity

A1 Use of land

CODE	CRITERION	INDICATOR	UNIT
A1.1	Population density	Population density in built-up areas (neighbourhood area minus green and blue)	Inhabitants / km²
A1.2	Urban compactness	Relation between the usable space of the buildings (volume) and the urban space (area)	m³ / m²
A1.3	Homogeneity of the urban fabric	Percentage of the perimeter of the area directly adjacent to urbanized areas	%
A1.4	Conservation of land	Pre-development ecological value of land	Score

A2 Green urban areas

CODE	CRITERION	INDICATOR	UNIT
A2.1	Availability of green urban areas	Proportion of all vegetated areas within the neighborhood boundaries in relation to the total area	%
A2.2	Green areas in relation to the neighborhood population	Total area of green in the neighborhood divided by neighborhood's total population	m²/inhabitant
A2.3	Green Area Accessibility	Percentage of inhabitants with accessibility to green areas	%
A2.4	Green zones density	Density of green spaces within the area	%
A2.5	Green zones and ecosystemic services	Share of natural green areas on total green areas	%

A3 Biodiversity and ecosystems

CODE	CRITERION	INDICATOR	UNIT
A3.1	Connectivity measures for natural areas	Share of natural areas that are connected	%
A3.2	Biodiversity in green zones	Number of plants on number of vegetal species	%

B Energy

B1 Energy infrastructure

CODE	CRITERION	INDICATOR	UNIT
B1.1	Access to electrical service	Percentage of households with authorized access to electricity	%

B2 Energy infrastructure

CODE	CRITERION	INDICATOR	UNIT
B2.1	Total final thermal energy consumption for building operations	Aggregated annual total final thermal energy consumption per aggregated indoor useful floor area	kWh/m²/yr
B2.2	Total final thermal energy consumption for residential building operations	Aggregated annual final thermal energy consumption of residential buildings per aggregated internal useful floor area	kWh/m²/yr
B2.3	Total final thermal energy consumption for public office/ educational building operations	Aggregated annual final thermal energy consumption of public office and educational buildings per aggregated internal useful floor area	kWh/m²/yr
B2.4	Total final electrical energy consumption for building operations	Aggregated annual total final electric energy consumption per aggregated internal useful floor area	kWh/m²/yr
B2.5	Total final electrical energy consumption for residential building operations	Aggregated annual final electrical energy consumption of residential buildings per aggregated indoor useful floor area	kWh/m²/yr

B2.6	Total final electric energy consumption for public office/ educational building operations	Aggregated annual final electric energy consumption of public office and educational buildings per aggregated internal useful floor area	kWh/m²/yr
B2.7	Total primary energy demand for building operations	Aggregated annual total primary energy consumption per aggregated indoor useful floor area	kWh/m²/yr
B2.8	Total primary energy demand for residential building operations	Ratio of average total primary energy consumption of residential buildings to the local minimum value	%
B2.9	Total primary energy demand for public office/educational building operations	Ratio of average total primary energy consumption of public office/ educational buildings to the local minimum value	%
B2.10	Energy consumption of public lighting	Total electricity consumption of public street lighting divided by the total distance of streets where street lights are present	kWh/km/ yr

B3 Renewable Energy

CODE	CRITERION	INDICATOR	UNIT
B3.1	Share of renewable energy on-site, relative to total final thermal energy consumption for building operations	Total consumption of final thermal energy generated from renewable sources on-site divided by total final thermal energy consumption	%
B3.2	Share of renewable energy on-site, relative to total final thermal energy consumption for residential building operations	Total consumption of final thermal energy generated from renewable sources on-site divided by total final thermal energy consumption of residential buildings	%
B3.3	Share of renewable energy on- site, relative to total final thermal energy consumption for public office/educational building operations	Total consumption of final thermal energy generated from renewable sources on-site divided by total final thermal energy consumption of public office/educational buildings	%
B3.4	Share of renewable energy on-site, relative to final electric energy consumption	Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption	%
B3.5	Share of renewable energy on-site, relative to total final electric energy consumption for residential building operations	Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption of residential buildings	%
B3.6	Share of renewable energy on-site, on final electric energy consumptions for public office/educational building operations	Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption of public office/educational buildings	%
B3.7	Share of renewable energy on-site, relative to total primary energy consumption for building operations	Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption	%
B3.8	Share of renewable energy on-site, relative to total primary energy consumption for residential building operations	Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption of residential buildings	%
B3.9	Share of renewable energy on-site, on total primary energy consumptions for public office/ educational building operations	Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption of public office/ educational buildings	%

C Water

C1 Water infrastructure

CODE	CRITERION	INDICATOR	UNIT
C1.1	Availability of a public municipal water supply	Percentage of the buildings within the neighborhood that are served by a municipal water supply	%
C1.2	Availability of wastewater treatment system	Percentage of buildings within the neighbourhood that are served by wastewater collection	%

C2 Water Consumption

CODE	CRITERION	INDICATOR	UNIT
C2.1	Total water consumption	Total amount of the neighborhood's water consumption in litres per day divided by the total neighborhood population	l/day/occupant
C2.2	Efficiency in water use	Volume of water supplied minus the volume of utilized water divided by the total volume of water supplied	%
C2.3	Consumption of potable water in residential buildings	Annual potable water consumption per occupant	L/occupant/yr
C2.4	Consumption of potable water in public offices	Annual potable water consumption per occupant	L/occupant/yr

C2.5	Consumption of potable water in educational buildings	Annual potable water consumption per occupant	L/occupant/yr
C2.6	Re-use of rainwater in residential buildings	Share of rainwater collected from roofs of residential buildings for reuse	%
C2.7	Consumption of potable water in public green spaces	Potable water used for irrigation purposes in public green spaces	m^3/m^2
C2.8	Solar powered water desalinisation	Percentage of water acceptable for human consumption or agriculture from solar desalination	%

C3 Effluents management

CODE	CRITERION	INDICATOR	UNIT
C3.1	Water treatment	Total volume of wastewater collected for at least secondary treatment in centralized wastewater treatment facilities divided by the total volume of wastewater produced in the neighborhood	%
C3.2	Public wastewater (from outdoor areas) that is disposed or treated	Percent of public wastewater that is disposed or treated	%
C3.3	Solar powered water desalinisation	Percentage of households with access to basic sanitation facilities	%

D Solid Waste

D1 Solid waste collection infrastructure

CODE	CRITERION	INDICATOR	UNIT
D1.1	Availability of solid waste collection	Percentage of buildings with regular solid waste collection	%

D1 Solid waste collection infrastructure

CODE	CRITERION	INDICATOR	UNIT
D2.1	Access to solid waste and recycling collection points	Proximity of the resident population to the solid waste and recycling collection point	%
D2.2	Access to solid waste and recycling collection points	Percentage of inhabitants with access to solid waste and recycling collection points within 400 meters walking distance	%

E Environmental quality

E1 Air quality

CODE	CRITERION	INDICATOR	UNIT
E1.1	Fine particulate matter (PM2.5) concentration	Number of days within a year that PM2.5 concentration exceeds the daily limit	days / yr
E1.2	Particulate matter (PM10) concentration	Number of days within a year that PM10 concentration exceeds the daily limit	days / yr
E1.3	Nitrogen Dioxide concentration (NO2)	Number of days within a year that NO2 concentration exceeds the daily limit	µg/m^3
E1.4	Sulfur Dioxide concentration (SO2)	Number of days within a year that SO2 concentration exceeds the daily limit	µg/m^3
E1.5	Ozone concentration (O3)	Number of days within a year that O3 concentration exceeds the daily limit	µg/m^3

E2 Noise

CODE	CRITERION	INDICATOR	UNIT
E2.1	Ambient daytime noise conditions	Percentage of building area over noise limit	%
E2.2	Ambient night-time noise conditions	Percentage of building area over noise limit	%

E3 EMF exposure

CODE	CRITERION	INDICATOR	UNIT
E3.1	Exposure to high frequency electromagnetic fields	Percentage of mobile network antenna sites in compliance with EMF exposure guidelines	%
E3.2	Percentage of buildings exposed to ELF magnetic field	Percentage of buildings in the area located not respecting the safety distance from high voltage lines	%

E4 Environmental impacts

CODE	CRITERION	INDICATOR	UNIT
E4.1	Degree of atmospheric light pollution caused by exterior public lighting systems	Percentage of lighting fixtures with upward luminous emission coefficient equal to 0%	%

F Transportation and mobility

F1 Performance and mobility services

CODE	CRITERION	INDICATOR	UNIT
F1.1	Performance of the public transport system	Percentage of inhabitants that are within 400 meters walking distance of at least one public transportation service stop	%
F1.2	Walking distance to public transport for area workers and students	Percent of workers and students who can reach a public transport stop within a 400 meters distance	%

F2 Green mobility

CODE	CRITERION	INDICATOR	UNIT
F2.1	Shared vehicles	Number of shared vehicles per 1.000 inhabitants	n/1.000 inhabitants
F2.2	Electric-vehicle infrastructure (charging stations)	Electric vehicle charging stations per inhabitant	n/inhabitant
F2.3	Bicycle network	Total length of bicycle paths in the neighborhood per inhabitant	n/inhabitant
F2.4	Shared bicycles	Number of shared bicycles per 1.000 inhabitants	n/1.000 inhabitants
F2.5	Availability of bicycle parking facilities	Bicycle parking spaces per inhabitant	n/inhabitant

F3 Safety in mobility

CODE	CRITERION	INDICATOR	UNIT
F3.1	Pedestrian infrastructure	Percentage of the neighborhood designated as a pedestrian/car free zone	%
F3.2	Availability of sidewalks	Percentage of roads' length that has dedicated sidewalks	%
F3.3	Safety of bicycle lines	Percentage of bicycle paths physically separated from traffic roads	%
F3.4	Traffic fatalities	Traffic fatalities per 1.000 inhabitants	n/1.000 inhabitants

F4 Safety in mobility

CODE	CRITERION	INDICATOR	UNIT
F3.1	Cyclomatic complexity of the street network	Cyclomatic number	number
F3.2	Connectivity of the street network	Number of intersections related to the overall surface area	number/km^2

G Social Aspects

G1 Accessibility (disabled persons)

CODE	CRITERION	INDICATOR	UNIT
G1.1	Public buildings that are accessible for use by physically disabled persons	Percent of key 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	Percent of sidewalks and other pedestrian ways that are accessible for use by physically disabled persons	%
G1.3	Barrier-free accessibility in local outdoor public areas	Adequacy of barrier-free accessible public outdoor areas compared to the total public area	%

G2 Housing

CODE	CRITERION	INDICATOR	UNIT
G2.1	Affordability of housing property	Housing properties in the local area that are financially accessible to the lowest quintile of area population	%
G2.2	Affordability of housing rental	Percentage of the average salary of the lowest quintile of the population used for rental payments	%
G2.3	Vacant residential units in the neighborhood	Percentage of vacant residential units	%
G2.4	Informal settlements	Percentage of inhabitants living in slums, informal settlements or inadequate housing	%

G3 Availability of public and private facilities and services

CODE	CRITERION	INDICATOR	UNIT
G3.1	Availability and proximity of key services	Percentage of inhabitants that are within 800 meters walking distance of at least 3 key services	%
G3.2	Availability and proximity of a public primary school	Percentage of population near a public primary school	%
G3.3	Availability and proximity of a public secondary school	Percentage of population near a public secondary school	%
G3.4	Availability and proximity of childrens' play facilities	Percentage of population near a childrens' play facilities	%
G3.5	Open space for public use	Average share of the built-up area of the neighborhood that is open space for public use	%

G4 Education

CODE	CRITERION	INDICATOR	UNIT
G4.1	Primary enrollment rate	Net primary enrollment rate	%
G4.2	Rate of female scholarship	Ratio of female to male mean years of education received of population age 25+	%
G4.3	Secondary school enrollment	Lower secondary completion rate	%
G4.4	Tertiary education	Population age 25-34 with tertiary educational attainment	%

G5 Social inclusion

CODE	CRITERION	INDICATOR	UNIT
G5.1	Energy poverty of households	Percentage of households unable to afford the most basic levels of energy (more than 10% of the income spent on energy bills)	%
G5.2	Population at risk of poverty or exclusion	hare of persons with an equivalised disposable income below 60 % of the national median income	%

G6 Safety

CODE	CRITERION	INDICATOR	UNIT
G6.1	Police service	Number of police officers per 1.000 inhabitants	n/1.000 inhabitants
G6.1	Fire service	Number of firefighters per 1.000 inhabitants	n/1.000 inhabitants
G6.1	Population living in disaster prone areas	Percentage of inhabitants living in a zone subject to natural hazards	%

G7 Health

CODE	CRITERION	INDICATOR	UNIT
G7.1	In-Patient Hospital Beds	Number of in-patient public hospital beds per 1.000 inhabitants	n/1.000 inhabitants

G8 Food security

CODE	CRITERION	INDICATOR	UNIT
G8.1	Urban agricultural land	Area of urban agricultural land on total neighborhood area	%

G9 Culture and Heritage

CODE	CRITERION	INDICATOR	UNIT
G9.1	Compatibility of urban design with local cultural values	Compatibility with local area traditional values of street layouts and the character of urban spaces	Score
G9.2	Compatibility of public open space with local cultural values	Compatibility with local area traditional values of local public open spaces, including major uses, dimensions and adjacent uses	Score

G10 Perceptual

CODE	CRITERION	INDICATOR	UNIT
G10.1	Perceived safety of public areas for pedestrians	Perceived safety of public places and pedestrian routes, as determined by a sample of pedestrians	Score
G10.2	Impact of commercial signage on the visual environment	Visual impact of exterior commercial signage	Score
G10.3	Impact of overhead electric distribution system	Visual impact of above-grade electrical distribution systems	Score

H Economy

H1 Economic performance

CODE	CRITERION	INDICATOR	UNIT
H1.1	Average annual per-capita income of residents	Percentage of average per-capita income	%

H2 Employment

CODE	CRITERION	INDICATOR	UNIT
H2.1	Unemployment rate	Percentage of working age adults unemployed or actively looking for work	%
H2.2	Youth unemployment rate	Percentage of unemployed youth	%

H3 Innovation

CODE	CRITERION	INDICATOR	UNIT
H3.1	New business registration rate	Proportion of business registrations per 10.000 inhabitants aged 16 and above	n

H4 ICT infrastructure

CODE	CRITERION	INDICATOR	UNIT
H4.1	Fixed Broadband Subscriptions	Percentage of households with fixed (wired) broadband	%
H4.2	Wireless Broadband Coverage	Percentage of the neighborhood area served by wireless broadband (3G, 4G, 5G)	%
H4.3	Availability of WIFI in Public Areas	Number of public WIFI hotspots in the neighborhood per 1000 inhabitants	n/1.000 inhabitants
H4.4	Mobile phone subscriptions	Total number of mobile phone subscriptions in the area divided by one 1000th of the area's total population	n/1.000 inhabitants

I Climate Change: mitigation and adaptation

I1 Climate change mitigation

CODE	CRITERION	INDICATOR	UNIT
I1.1	Greenhouse gas emissions	Total amount of greenhouse gases (equivalent carbon dioxide units) generated from building operations over a calendar year per inhabitant	t CO_2 eq. / inhabitant/yr
I1.2	Greenhouse gas emissions from residential buildings	Total amount of greenhouse gases in Kg (equivalent carbon dioxide units) generated over a calendar year per aggregated indoor useful floor area	Kg CO^2 eq / m^2
I1.3	Embodied carbon for construction and renovation of infrastructures	Aggregated total embodied carbon per aggregated linear area	kg CO_2 eq / m^2
I1.4	Embodied carbon for construction/ renovation of residential buildings	Aggregated total embodied carbon per aggregated indoor useful floor area	kg CO_2 eq / m^2
I1.5	Embodied carbon for construction/ renovation of public offices/educational buildings	Aggregated total embodied carbon per aggregated indoor useful floor area	kg CO_2 eq / m^2
I1.6	CO2 sequestration	Potential CO2 sequestraion in the neighborhood per hectare	kg CO_2 eq / m^2

I2 Adaptation to the climatic action: heatwaves and increase of temperature

CODE	CRITERION	INDICATOR	UNIT
I2.1	Albedo	Mean Solar Reflectance Index of paved surfaces and roofs in the neighborhood	SRI
I2.2	Use of vegetation to provide ambient outdoor cooling	Leaf Area Index: ratio of total vegetated surface area (on ground and on roofs, and including trees), divided by total site area	Index
I2.3	Green roofs	Aggregate area of building roofs covered with vegetated material	%

I3 Adaptation to the climatic action: pluvial flood

CODE	CRITERION	INDICATOR	UNIT
I3.1	Stormwater retention capacity on site by buildings	Share of the attenuation storage capacity by buildings in relation to the optimal volume	%
I3.2	Sustainable Urban Drainage	Share of the optimal capacity of sustainable urban drainage systems	%
I3.3	Permeability of land	Percentage of weighted ground permeability	%

I4 Adaptation to the climatic action: fluvial and coastal flood

CODE	CRITERION	INDICATOR	UNIT
I4.1	Flood risk	Percentage of population exposed to flood risk	%
I4.2	Protection of vulnerable zones	Share of land in vulnerable areas protected by flooding barriers	%
I4.3	Protection of buildings from flooding	Share of buildings with elevated ground floor in vulnerable sites	%

I5 Adaptation to the climatic action: drought

CODE	CRITERION	INDICATOR	UNIT
I5.1	Rainwater collection and storage from buildings for non-potable uses	Share of buildings in the neighborhood with a rainwater collection system	%
I5.2	Rainwater collection and storage from outdoor areas	Share of rainwater collected from paved (not permeable) surfaces in the neighborhood (excluding buildings' roofs and plots)	%

I5.3	Greywater collection in buildings for non-potable uses	Share of buildings in the neighborhood with a greywater collection system	%
I5.4	Local vegetation	Share of landscape (green areas) plated with local vegetation	%

I6 Adaptation to the climatic action: pluvial flood

CODE	CRITERION	INDICATOR	UNIT
I6.1	Wildfire risk	Percentage of population exposed to wildfire risk	%
I6.2	Fire protection	Share of wildfire vulnerable areas protected by fire barriers	%
I6.3	Fireproof ground	Share of ground cover materials (excluding buildings' plots) in vulnerable areas that are fire resistant	%

I7 Climatic hazard: wind

CODE	CRITERION	INDICATOR	UNIT
I7.1	Windproof urban form	Strategies to minimise the impact of wind	Score

J Governance

J1 Urban Planning

CODE	CRITERION	INDICATOR	UNIT
J1.1	Community involvement in urban planning activities	Percentage of residents active in public urban planning	Level

J2 Management and community involvement

CODE	CRITERION	INDICATOR	UNIT
J2.1	Involvement of residents in community affairs	Percentage of resident population above 16 years having an involvement in community affairs	%

J3 Management and community involvement

CODE	CRITERION	INDICATOR	UNIT
J3.1	Public buildings sustainability	Percentage of population exposed to wildfire risk	%
J3.2	Operating energy costs for public buildings	Aggregated annual operating energy cost per aggregated indoor useful floor area	€/m²/yr
J3.3	Energy consumption of public buildings	Total end use of energy in public buildings within a neighborhood divided by total indoor useful area of these buildings	kWh/m²

A.Use of Land & Biodiversity

Description of the Information

A: Issue.

Ax: Category.

- **A1: Urban Structure and Form.**
- **A2: Green Urban Areas.**
- **A3: Biodiversity and Ecosystems.**

Ax.x: Criterion.

Intent: Description of the objective of the criterion.

Indicator: Name of the indicator to be calculated.

Unit of Measure: Measuring unit of each indicator.

Standard: The calculation standard for the criterion.

References: The acquiring source of information.

A1 Urban Structure

A1.1 Population Density

Intent: To evaluate the increase of the proximity between residents and local goods and services.

Indicator	Unit of Measure
Population density in built-up areas. (neighborhood area minus green and blue).	Inhabitants / km^2

Assessment Methodology:

1. Calculate the total neighborhood population.
(A) - numerator
2. Calculate the total area of the neighborhood (neighborhood area minus green and blue) .
(B) - denominator
3. Calculate the value of the indicator as A/B.
The result shall be expressed as number of persons per square kilometer.

Standard: -

Reference: 1.CESBA MED Project
2 SNTool Assessment System.

A1 Urban Structure

A1.2 Urban Compactness

Intent: To maximize efficiency in the use of land used for buildings.

Indicator	Unit of Measure
Relation between the usable space of the buildings (volume) and the urban space (area).	m^3 / m^2

Assessment Methodology:

1. Calculate the aggregate gross volume of all buildings in the local area, in m^3
2. Calculate the net developable area by stubtracting the surface area used for parks, streets, parking and, pedestrian areas from the gross surface area of the locality.
3. Determine the ratio of the aggregate volume of the buildings to the net local developable area, expressed as m^3/ha.

Standard: -

Reference: 1.CESBA MED Project
2 SNTool Assessment System

A1 Urban Structure

A1.3 Homogeneity of the Urban Fabric

Intent: To identify voids in the urban fabric and at the same time to contain the peripheral expansion.

Indicator	Unit of Measure
Percentage of the perimeter of the area directly adjacent to urbanized areas.	%

Assessment Methodology:

1. Quantify the total length of the perimeter of the area anayzed (A).
2. Evaluate by quantifying, the linear meters of urban fabric adjacent to the urbanized areas (B).
3. Calculate the percentage ratio between the length of the urban fabric perimeter adjacent to the urbanized areas and the overall length of the perimeter of the area: (B/A)* 100.

Standard: -

Reference: 1.CESBA MED Project
2 SNTool Assessment System.

A1 Urban Structure

A1. 4 Conservation of Land

Intent: To determine the proportion of land, considered to be of value for ecological or agricultural purposes, that r emains undeveloped.

Indicator	Unit of Measure
Pre-developed ecological value of land.	Score

Assessment Methodology:

1. Determine the area of the neighborhood.
2. Determine the area of the undeveloped land that is considered by authorities to be of ecological and agricultural value.
3. Calculate the ratio between the undeveloped area and the total area of the neighborhood.

-Only areas with recognized ecological or agricultural value, also in case of reconverted areas, must be taken into account.
-The areas of the neighborhood is the area included within the perimeter selection.
-Parks and squares are not considered undeveloped land.
-Definition of agricultural value: an area that is intended for agricultural objectives (food, forage, etc.).
-Definition of ecological value: an area that provides support to native life forms, making up natural ecosystems.

Standard: -

Reference: 1.CESBA MED Project
2 SNTool Assessment System.

A2 Green Urban Areas

A2.2 Green Areas in Relation to the Neighborhood Population

Intent: To improve the urban environment helping regulate air quality and climate, recharging groundwater supplies and protecting lakes and streams from polluted runoff.

Indicator	Unit of Measure
Total green area in the neighborhood by total population.	m^2/inhabitant

Assessment Methodology:

1. Calculate the total of green areas in the neighborhood (m^2).
(A)- Numerator
2. Calculate the neighborhood's total population.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B (m^2/inhabitants)

Standard: -

Reference: IEFCA 2019 Edition-Calculation Guideline.

A2 Green Urban Areas

A2.1 Availability of Green Urban Areas

Intent: To improve the permeability of the area and to benefit from the availability of green spaces (capturing pollutants, reducing the "heat island" effect, providing recreational spaces, etc.).

Indicator	Unit of Measure
Proportion of all vegetated areas within the neighborhood in relation to the total area.	%

Assessment Methodology:

1. Calculate the amount of vegetated areas (in hectares) in the neighborhood.
(A) - numerator
2. Calculate the total area of the neighborhood .
(B)- denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: 1.CESBA MED Project
2 SNTool Assessment System.

A2 Green Urban Areas

A2.3 Green Area Accessibility

Intent: To work towards a higher quality of life for the neighborhood's inhabitants and to reduce the negative effects of the urbanization process.

Indicator	Unit of Measure
Percentage of inhabitants with accessibility to green areas.	%

Assessment Methodology:

1. Calculate the number of inhabitants living within 300 meter distance of a publicly accessible green space of at least 0.5 ha.
(A) - numerator
2. Calculate the neighborhood's total population.
(B)- denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

A. Use of Land and Biodiversity

SN Tool

A2 Green Urban Areas

A2.4 Green Zones Density

Intent: To measure the existing green zones a s added value for the quality of life in the inhabitants.

Indicator	Unit of Measure
Density of green spaces within the neighborhood's area	%

Assessment Methodology:

1. Calculate the total green area in the neighborhood (m²).
(A) - numerator
2. Calculate the total area of the neighborhood .
(B)- denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard:
-

Reference:
1.CESBA MED Project
2 SNTool Assessment System.

A. Use of Land and Biodiversity

SN Tool

A2 Green Urban Areas

A2. 5 Green Zones and Ecosystem Services

Intent: To improve the benefits from the green zones availability (capturing pollutants, reducing the " heat island" effect, providing recreational spaces, etc.).

Indicator	Unit of Measure
Share of natural green areas on total green areas.	%

Assessment Methodology:

1. Calculate the amount of natural green areas (in hectares) in the neighborhood.
(A)- Numerator
2. Calculate the total green area of the neighborhood.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard:
--

Reference:

A. Use of Land and Biodiversity

SN Tool

A3 Biodiversity and Ecosystems

A3.1 Connectivity Measures for Natural Areas

Intent: To maximize the connectivity measures for natural areas.

Indicator	Unit of Measure
Share of connected natural areas.	%

Assessment Methodology:

1. Calculate the total amount of connected natural areas (in hectares) in the neighborhood.
(A)- Numerator
2. Calculate the total amount of natural area in the neighborhood.
(B)-Denominator
3. Calculate the value of the indicator as.
A/B (%)
Note: Connected areas are the ones located at less than 100 meters from each other.

Standard:
-

Reference:
Reference Framework for Sustainable Cities - RFSC.

A. Use of Land and Biodiversity

SN Tool

A3 Biodiversity and Ecosystems

A3.2 Biodiversity in green zones

Intent: To protect and maintain biodiversity.

Indicator	Unit of Measure
Number of plants by number of vegetal species.	%

Assessment Methodology:

1. Calculate the number of plants in the neighborhood.
(A) - numerator
2. Calculate the number of vegetable species in the neighborhood.
(B)- denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard:
-

Reference:
Reference Framework for Sustainable Cities - RFSC.

B. Energy

Description of the Information

B: Issue

Bx: Category

B1: Energy Infrastructure
B2: Energy Consumption
B3: Renewable Energy

Bx.x: Criterion

Intent: Description of the objective of the criterion

Indicator: Name of the indicator to be calculated

Unit of Measure: Measuring unit of each indicator

Standard: The calculation standard for the criterion

References: The acquiring source of information

★ Key Performance Indicator

B1 Energy Insfrastructure

B1.1 Access to Electrical Service

Intent: To evaluate the electrical services as a contributing indicator of sustainability, resilience and economic productivity

Indicator	Unit of Measure
Percentage of household with authorized access to electricity	%

Assessment Methodology:

1. Calculate the number of people in the neighborhood with authorized electrical services
(A) - numerator
2. Calculate the total population of the neighborhood
(B) - denominator
3. Calculate the value of the indicator as
=A/B

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities - Indicators for City Services and Quality of Life

B2 Energy Consumption

B2.3 Total Final Thermal Energy Consumption for Public Office/ Educational Building Operations

Intent: To estimate the urban thermal energy consumption per gross area for public office/educational building operations

Indicator	Unit of Measure
Urban thermal energy Consumption per gross area for public office/ educational building operations	kWh/m²/yr

Assessment Methodology:

1. Calculate the annual total final thermal energy consumption of non-renewable energy for building operations (Heating, Cooling, Domestic Hot Water and Lighting), in kWh, for each public office/ educational building in the neighborhood.
2. Calculate the aggregated annual total final thermal energy consumption for all public office/educational buildings.
3. Calculate the indicator as:

Aggregated annual total final thermal energy consumption/ Total gross area of all public office/educational buildings

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

B2 Energy Consumption

★B2.4 Total Final Electrical Energy Consumption for Building Operations

Intent: To estimate urban electric energy consumption for building operations

Indicator	Unit of Measure
Aggregated annual total final electric energy consumption per aggregated internal useful floor area.	kWh/m²/yr

Assessment Methodology:

To perform the calculation, it is possible to use:

Metered Data 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. Estimated data shall be used for evaluating alternative scenarios in planning and decision-making processes. In reporting the indicator's value, the data source must be indicated.

Note: See anex for further details on the calculation steps.

Standard: EN 13790

Reference: CESBA MED Project - SNTool Assessment System

B2 Energy Consumption

★B2.1 Total Final Thermal Energy Consumption for Building Operations

Intent: To estimate urban thermal energy consumption for building operations.

Indicator	Unit of Measure
Aggregated annual total final thermal energy consumption per aggregated indoor useful floor area	kWh/m²/yr

Assessment Methodology:

To perform the calculation, it is possible to use:

Metered Data 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. Estimated data shall be used for evaluating alternative scenarios in planning and decision-making processes. In reporting the indicator's value, the data source must be indicated.

Note: See anex for further details on the calculation steps.

Standard: EN 13790

Reference: CESBA MED Project - SNTool Assessment System

B2 Energy Consumption

B2.2 Total Final Thermal Energy Consumption for Residential Building Operations

Intent: To estimate urban thermal energy consumption per gross area of all residential buildings.

Indicator	Unit of Measure
Urban thermal energy consumption per gross area of all residential buildings	kWh/m²/yr

Assessment Methodology:

1. Calculate the annual total final thermal energy consumption of non-renewable energy for the building operations (Heating, Cooling, Domestic Hot Water and Lighting), in kWh, for each residential buildings in the neighborhood.
2. Calculate the aggregated annual total final thermal energy consumption for all residential buildings.
3. Calculate the indicator:

Aggregated annual total final thermal energy consumption / Total gross area of all residential buildings.

Standard: -

Reference: CESBA MED Project - SNTool Assessment Sytem

B2 Energy Consumption

B2.5 Total Electrical Energy Consumption for Residential Building Operations

Intent: To estimate urban electrical energy consumption per gross area for residential building operations

Indicator	Unit of Measure
Urban electrical energy consumption of residential buildings	kWh/m²/yr

Assessment Methodology:

1. Calculate the annual total final electrical energy consumption of non-renewable energy for building operations (Heating, Cooling, Domestic Hot Water and, Lighting), in kWh, for each residential building in the neighborhoood.
2. Calculate the aggregated annual total final electrical energy consumption for all residential buildings.
3. Calculate the indicator:

Aggregated Total Annual Final Electrical Energy Consumption / Total Gross Area of All Residential Buildings

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

B2 Energy Consumption

B2.6 Total Electrical Energy Consumption for Public Office/Educational Building Operations

Intent: To estimate urban electrical energy consumption per gross area for public office/educational building operations

Indicator	Unit of Measure
Urban electrical energy consumption of public office/educational buildings	kWh/m²/yr

Assessment Methodology:

1. Calculate the annual total final electrical energy consumption of non-renewable energy for building operations (Heating, Cooling, Domestic Hot Water and, Lighting), in kWh, for each public office/educational building in the neighborhoood.
2. Calculate the aggregated annual total final electrical energy consumption for all public office/educational buildings.
3. Calculate the indicator:

Aggregated Total Annual Final Electrical Energy Consumption / Total Gross Area of All public/educational buildings

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B2 Energy Consumption

★ B2.7 Total Primary Energy Demand for Residential Building Operations

Intent: To reduce the need of energy for residential building operations

Indicator	Unit of Measure
Aggregated annual total primary energy consumption per aggregated indoor useful floor area	kWh/m²/yr

Assessment Methodology:

Calculate the indicator as:

Aggregated annual total primary energy consumption/ aggregated indoor useful area (kWh/m²/year).

Note: For further explanation of the KPI go to anex.

Standard: EN 13790

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B2 Energy Consumption

B2.8 Total Primary Energy Demand for Residential Building Operations

Intent: To reduce the need of energy for residential building operations

Indicator	Unit of Measure
Ratio of average total primary energy consumption of residential buildings to the local minimum value.	%

Assessment Methodology:

1. Calculate the annual total primary energy consumption of non-renewable energy for building operations(Heating, Cooling, Domestic Hot Water and Lighting), in kWh/m² of gross area for each residential building in the local area.
2. Calculate the neighborhood's residential total primary energy consumption as the weighted mean value of total primary energy consumption over the floor surfaces of all residential buildings in the area.
3. Calculate the indicator as:

(Neighborhood Residential Total Primary Energy Consumption/Local Minimum Value)*100

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B2 Energy Consumption

B2.9 Total Primary Energy Demand for Public Office/Educational Building Operations

Intent: To reduce the need of energy for public office/ educational building operations

Indicator	Unit of Measure
Ratio of average of total primary energy consumption of public office/educational buildings to the local minimum value	%

Assessment Methodology:

1. Calculate the annual total primary energy consumption of non-renewable energy for building operations (Heating, Cooling, Domestic Hot Water and Lighting),in kWh/m² of gross area for each public office/educational buildings in the local area.
2. Calculate the neighborhood's public office/educational buildings total primary energy consumption as the weighted mean value of total primary energy.
3. Calculate the indicator:

Neighborhood's public office-educational buildings total primary energy consumption / Local minimum value * 100

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B2 Energy Consumption

B2.10 Energy Consumption of Public Lighting

Intent: To improve the efficiency of street lighting for cost-effective steps and energy efficiency

Indicator	Unit of Measure
Total electricity consumption of public street lighting by total distance of streets where streetlights are present	kWh/Km/yr

Assessment Methodology:

1. Calculate the total electricity consumption of public street lighting for cost-effective steps and energy efficiency.
(A)-Numerator
2. Calculate the length of streets where streetlights are present in the neighborhood.
(B)-Denominator
3. Calculate the indicator:
A/B

Standard: -

Reference: ISO 3710: Sustainable Cities and Communities- Indicators for City Services and Quality of Life.

B. Energy — SN Tool

B3 Renewable Energy

★ B3.1 Share of Renewable Energy On-Site, Relative to Final Thermal Energy Consumption for Building Operations

Intent: To incentive the consumption and production of renewable energy

Indicator	Unit of Measure
Total consumption of final thermal energy generated from renewable sources on-site by total final thermal energy consumption	%

Assessment Methodology:

To perform the calculation, it is possible to use:

Metered Data 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. Estimated data shall be used for evaluating alternative scenarios in planning and decision-making processes. In reporting the indicator's value, the data source must be indicated.

Note: See anex for further details on the calculation steps.

Standard: EN 13790

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B3 Renewable Energy

B3.2 Share of Renewable Energy On-Site, Relative to Total Final Energy Consumption for Residential Building Operations

Intent: To incentive the consumption and production of renewable energy

Indicator	Unit of Measure
Total consumption of final thermal energy generated from renewable sources on-site divided by the total final thermal energy consumption of residential buildings	%

Assessment Methodology:

1.Calculate the annual total primary energy consumption of non-renewable energy for building operations(Heating,Cooling, Domestic Hot Water and Lighting), in kWh/m, of gross area for each residential building in the neigborhood including renewables, if applicable, in the existing condition.
2.Calculate the aggregated annual total final energy consumption for all residential buildings.
3.Calculate the annual total primary energy consumption of non-renewable energy for building operations(Heating,Cooling, Domestic Hot Water and Lighting), in kWh/m, of gross area for each residential building in the neigborhood without the installed renewables, if applicable.
4.Calculate the aggregated annual total final energy consumption without the renewables for all residential buildings.
5.Calculate the indicator:
Aggregated annual total final energy consumption/ Aggregated annual total fiinal energy consumption without the renewables

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B3 Renewable Energy

B3.3 Share of Renewable Energy On-Site, Relative to the Total Final Thermal Energy Consumption for Public Office/ Educational Building Operations

Intent: To incentive the consumption and / production of renewable energy

Indicator	Unit of Measure
Total consumption of final thermal energy generated from renewables sources on-site by the total final thermal energy consumption of public office/ educational buildings	%

Assessment Methodology:

1. Calculate the annual total final energy consumption of non-renewable energy for building operations (Heating, Cooling, Domestic Hot Water and Lighting),in kWh/m² of gross area for each public office/educational buildings in the neighborhood, including renewables, if applicable, in the existing conditions.
2. Calculate the aggregated annual total final energy consumption for all public office/educational buildings.
3. Calculate the annual total final energy consumption for building operations (heating, cooling, domestic hot water and lighting), in kWh, for each public office/educational buildings in the local area without the installed renewables, if applicable.
4. Calculate the aggregated annual total final energy consumption without the renewables for all public office/ educational buildings.
5. Calculate the ratio:
Aggregated annual total final energy consumption / Aggregated annual total final energy consumption without the renewables.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B3 Renewable Energy

★ B3.4 Share of renewable energy on-site, relative to final electric energy consumption

Intent: To incentive the consumption and production of renewable energy

Indicator	Unit of Measure
Total consumption of final electrical energy generated from renewable sources on-site by total final thermal energy consumption	%

Assessment Methodology:

To perform the calculation, it is possible to use:

Metered Data 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. Estimated data shall be used for evaluating alternative scenarios in planning and decision-making processes. In reporting the indicator's value, the data source must be indicated.

Note: See anex for further details on the calculation steps.

Standard: EN 13790

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B3 Renewable Energy

B3.5 Share of Renewable Energy On-Site, Relative to Total Final Electrical Energy Consumption for Residential Buildings Operations

Intent: To reduce the need of energy for residential building operations

Indicator	Unit of Measure
Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption of residential buildings	%

Assessment Methodology:

1. Calculate the annual total final electric energy consumption for building operations (heating, cooling, domestic hot water and lighting), in kWh, for each residential building in the local area including renewables, if applicable, in the existing condition.
2. Calculate the aggregated annual total primary energy consumption for residential buildings.
3. Calculate the annual total final electric energy consumption for building operations (heating, cooling, domestic hot water and lighting), in kWh, for each residential building in the local area without the installed renewables, if applicable.
4. Calculate the aggregated annual total final electric energy consumption without the renewables for residential buildings.
5. Calculate the ratio:

Aggregated annual total final electric energy consumption / Aggregated annual total final electric energy consumption without the renewables.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B3 Renewable Energy

B3.6 Share of Renewable Energy On-Site,Relative to Total Final Electrical Energy Consumption for Public Office/Educational Buildings Operation

Intent: To incentive the consumption and production of renewable energy

Indicator	Unit of Measure
Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption of public office/educational buildings	%

Assessment Methodology:

1. Calculate the annual total final electric energy consumption for building operations (heating, cooling, domestic hot water and lighting), in kWh, for each public office/educational building in the local area including renewables, if applicable, in the existing condition.
2. Calculate the aggregated annual total primary energy consumption for public office/educational buildings.
3. Calculate the annual total final electric energy consumption for building operations (heating, cooling, domestic hot water and lighting), in kWh, for each public office/educational building in the local area without the installed renewables, if applicable.
4. Calculate the aggregated annual total final electric energy consumption without the renewables for public office/ educational buildings.
5. Calculate the ratio:

Aggregated annual total final electric energy consumption / Aggregated annual total final electric energy consumption without the renewables.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B3 Renewable Energy

B3.9 Share of Renewable Energy On-Site, On Total Primary Energy Consumptions for Public Office/Educational Building Operations

Intent: To incentive the consumption and production of renewable energy

Indicator	Unit of Measure
Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption of public office/ educational buildings	%

Assessment Methodology:

1. Calculate the annual total final electric energy consumption for building operations (heating, cooling, domestic hot water and lighting), in kWh, for each public office/educational building in the local area including renewables, if applicable, in the existing condition.
2. Calculate the aggregated annual total primary energy consumption for residential buildings.
3. Calculate the annual total final electric energy consumption for building operations (heating, cooling, domestic hot water and lighting), in kWh, for each public office/educational building in the local area without the installed renewables, if applicable.
4. Calculate the aggregated annual total final electric energy consumption without the renewables for public office/ educational buildings.
5. Calculate the ratio:

Aggregated annual total final electric energy consumption / Aggregated annual total final electric energy consumption without the renewables.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B3 Renewable Energy

★B3.7 Share of Renwable Energy On-Site, Relative to Total Primary Energy Consumption for Buildings Operations

Intent: To incentive the consumption and production of renewable energy

Indicator	Unit of Measure
Total consumption of primary energy generated from renewable sources on-site divided by the total primary energy consumption	%

Assessment Methodology:

Calculate the indicator as:

Aggregated total annual primary energy consumption from on-site renewable energy sources/ Aggregated total annual primary energy consumption

Note: For further information on the calculation process go to anex

Standard: EN 13790

Reference: CESBA MED Project - SNTool Assessment System

B. Energy — SN Tool

B3 Renewable Energy

B3.8 Share of Renewable Energy On-Site, Relative to the Total Primary Energy Consumption for Residential Buildings Operations

Intent: To incentive the consumption and production of renewable energy

Indicator	Unit of Measure
Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption of residential buildings	%

Assessment Methodology:

1. Calculate the annual total primary energy consumption for building operations (heating, cooling, domestic hot water and lighting), in kWh, for each residential building in the local area including renewables, if applicable, in the existing condition.
2. Calculate the aggregated annual total primary energy consumption for residential buildings.
3. Calculate the annual total primary energy consumption for building operations (heating, cooling, domestic hot water and lighting), in kWh, for each residential building in the local area without the installed renewables, if applicable.
4. Calculate the aggregated annual total primary energy consumption without the renewables for residential buildings.
5. Calculate the ratio:

Aggregated annual total primary energy consumption / Aggregated annual total primary energy consumption without the renewables.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

C. Water

Description of the Information

C: Issue

Cx: Category

C1: Water Infrastructure
C2: Water Consumption
C3: Effluents Management

Cx.x: Criterion

Intent: Description of the objective of the criterion

Indicator: Name of the indicator to be calculated

Unit of Measure: Measuring unit of each indicator

Standard: The calculation standard for the criterion

References: The acquiring source of information

★ Key Performance Indicator

C. Water — SN Tool

C1 Water Infrastructure

C1. 1 Availability of a Public Municipal Water Supply

Intent: To evaluate the neighborhood's health and quality of life

Indicator	Unit of Measure
Number of people within the neighborhood who are served by a municipal water supply divided by the neighborhood's population.	%

Assessment Methodology:

1. Calculate the number of people within the neighborhood who are served by a municipal water supply.
(A) - numerator
2. Calculate the total population of the neighborhood.
(B) - denominator
3. Calculate the value of the indicator as:
=A/B (%)

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities - Indicators for City Services and Quality of Life

C. Water — SN Tool

C2 Water Consumption

C2. 2 Efficiency in Water Use

Intent: To make an efficient use of water resources.

Indicator	Unit of Measure
Volume of water supplied minus the volume of utilized water divided by the total volume of water supplied	%

Assessment Methodology:

1. Calculate the total volume of water supplied in the neighborhood.
(A) - numerator
2. Calculate the volume of utilized water.
(B) - denominator
3. Calculate the value of the indicator as:
=A/B (%)

Standard: -

Reference: IEFCA 2019 Edition-Calculation Guideline

C. Water — SN Tool

C2 Water Consumption

★C2. 3 Consumption of Potable Water in Residential Buildings

Intent: To make an efficient use of water resources.

Indicator	Unit of Measure
Annual potable water consumption per occupant	L/occupant/year

Assessment Methodology:

The potable water consumption is calculated based on metered data for water consuming appliances and sanitary fittings in the buildings.
The scope of the criterion includes the use of potable water for:
-Drinking water;
-Water for sanitation;
-Domestic hot water;
-Water for the washing machine;
-Water for the dishwasher;
-Water for cleaning.

Note: For further information on the calculation steps go to the KPIs Anex.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

C. Water — SN Tool

C1 Water Infrastructure

C1. 2 Availability of Wastewater Treatment System

Intent: To evaluate the neighborhood's health, cleaniliness and quality of life

Indicator	Unit of Measure
Number of people within the neighborhood who are served by a wastewater collection divided by the neighborhood's population.	%

Assessment Methodology:

1. Calculate the number of people within the neighborhood who are served by a wastewater collection.
(A) - numerator
2. Calculate the total population of the neighborhood.
(B) - denominator
3. Calculate the value of the indicator as:
=A/B (%)

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities - Indicators for City Services and Quality of Life

C. Water — SN Tool

C2 Water Consumption

C2. 1 Total Water Consumption

Intent: To evaluate the water resources in the neighborhood.

Indicator	Unit of Measure
Total amoun of the neighborhood's water consumption in litres per day divided by the total neighborhood's population	L/day/occupant

Assessment Methodology:

1. Calculate the total amount of the neighborhood's water consumption in litres per day.
(A) - numerator
2. Calculate the total population of the neighborhood.
(B) - denominator
3. Calculate the value of the indicator as:
=A/B

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities - Indicators for City Services and Quality of Life

C. Water — SN Tool

C2 Water Consumption

C2. 4 Consumption of Potable Water in Public Offices

Intent: To make an efficient use of water resources

Indicator	Unit of Measure
Annual potable water consumption per occupant	L/occupant/year

Assessment Methodology:

1. For each public office building, collect the monitored annual potable water consumptions for building operations. The consumption data must be estimated taking the average over a 3 year period (litres).
2. Sum the annual potable water consumption of each office building up to an aggregated annual total potable water consumption (litres/year).
3. Estimate the number of occupants in the public office buildings.
4.Calculate the indicator as:

Aggregated annual total potable water consumption / Number of occupants

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

C. Water — SN Tool

C2 Water Consumption

C2. 5 Consumption of Potable Water in Educational Buildings

Intent: To make an efficient use of water resources.

Indicator	Unit of Measure
Annual potable water consumption per occupant	L/occupant/year

Assessment Methodology:

1. For each educational building, collect the monitored annual potable water consumption for building operation. The consumption data must be estimated taking the average over a 3 year period (litres).
2. Sum the annual potable water consumption of each educational building up to an aggregated annual total potable water consumption (litres/year).
3. Estimate the number of occupants in the educational buildings.
4.Calculate the indicator as:
Aggregated annual total potable water consumption/ Number of occupants

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

C. Water | SN Tool

C2 Water Consumption

C2. 6 Re-Usage of Rainwater in Residential Buildings

Intent: To assess the collection of rainwater from roofs in residential buildings

Indicator	Unit of Measure
Share of rainwater collected from roofs of residential buildings for reutilization	%

Assessment Methodology:

1. Calculate the volume of rainwater collected in the neighborhood.

(A) - Numerator

2. Calculate the volume of greywater used for toilets and irrigation in residential buildings in the neighborhood.

(B) - Denominator

3. Calculate the value of the indicator as:

A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

C. Water | SN Tool

C2 Water Consumption

C2. 7 Consumption of Potable Water in Public Green Spaces

Intent: To reduce the consumption of potable water

Indicator	Unit of Measure
Potable water used for irrigation purposes in public green spaces	m^3/m^2

Assessment Methodology:

1. Calculate the estimated consumption of potable water used for irrigation purposes in public green spaces in the neighborhood (m^3).

(A) - Numerator

2. Set the reference surface for the estimation of consumption as 1000 m .

(B) - Denominator

3. Calculate the value of the indicator as:

A/B (m^3/m^2)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

C. Water | SN Tool

C2 Water Consumption

C2. 8 Solar-Powered Water Desalinization

Intent: To alleviate water stress, maximize the use of solar energy to reduce production cost for removing salts from brackish or saline water in order to render it acceptable for human consumption and/or agriculture.

Indicator	Unit of Measure
Percentage of water acceptable for human consumption or agriculture from solar-desalinization	%

Assessment Methodology:

To perform the calculation, it is possible to use metered or estimated data for producing fresh water from direct (thermal) or indirect (electrical) solar-desalination systems.

1.Calculate the annual water production from all solar-desalinization facilities (m^3/year) serving the city (A).
2.Calculate the annual total water consumption (m^3/year) of the city (B).
3.Calculate the value of the indicator as a percentage ratio of the average annual water production divided by the annual total water consumption (%) as:

A/B

Standard: -

Reference:
-WHO/HSE/WSH/11.03 Safe Drinking Water from Desalinization,2011.
-Directive (EU) 2020/2184
-EurEau 2021. Europe's Water in Figures

C. Water | SN Tool

C3 Effluents Management

C3. 1 Water Treatment

Intent: To reduce the incidence of a variety of waterborne diseases.

Indicator	Unit of Measure
Total volume of wastewater collected for at least secondary treatment in centralized wastewater treatment facilities, divided by the total volume of wastewater produced in the neighborhoood	%

Assessment Methodology:

1. Calculate the total volume of wastewater collected for at least secondary treatments in centralized wastewater treatment facilities.

(A)-Numerator

2. Calculate the total volume of wastewater produced in the neighborhood.

(B)-Denominator

4.Calculate the indicator as:

A/B (%)

Standard: -

Reference: UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

C. Water | SN Tool

C3 Effluents Management

C3. 2 Public Wastewater (from Outdoor Areas) that is Disposed or Treated

Intent: To reduce the incidence of a variety of waterborne diseases.

Indicator	Unit of Measure
Percentage of public wastewater that is disposed or treated	%

Assessment Methodology:

1.Calculate the total volume of public wastewater from outdoor areas disposed or treated in the neighborhood.

(A)-Numerator

2.Calculate the total volume of public wastewater produced from outdoor areas in the neighborhood.

(B)-Denominator

3.Calculate the indicator:

A/B (%)

Standard: -

Reference: UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

C. Water | SN Tool

C3 Effluents Management

C3. 3 Household Sanitation

Intent: To maintain basic hygiene levels in households.

Indicator	Unit of Measure
Percentage of households with access to basic sanitation facilities	%

Assessment Methodology:

1. Calculate the total number of neighborhood households with access to basic sanitation and facilities.

(A)-Numerator

2.Calculate the total number of neighborhood households.

(B)-Denominator

3.Calculate the indicator as:

A/B (%)

Standard: -

Reference: UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

D.Solid Waste

Description of the Information

D: Issue

Dx: Category

D1: Solid Waste Collection Infrastructure
D2: Solid Waste Management

Dx.x: Criterion

Intent: Description of the objective of the criterion

Indicator: Name of the indicator to be calculated

Unit of Measure: Measuring unit of each indicator

Standard: The calculation standard for the criterion

References: The acquiring source of information

★ Key Performance Indicator

D. Solid Waste — SN Tool

D1 Solid Waste Collection Infrastructure

D1.1 Availability of Solid Waste Collection

Intent: To evaluate the neighborhood's health and quality of life.

Indicator	Unit of Measure
Percentage of the population with regular solid waste collection.	%

Assessment Methodology:

1. Calculate the number of households in the neighborhood that are served by solid waste collection.
(A) - numerator

2. Calculate the total number of households in the neighborhood.
(B) - denominator

3. Calculate the value of the indicator as:
=A/B (%)

Standard: -

Reference: UNECE-Collection Methodologies for Key Performance Indicators for Smart Sustainable Cities.

D. Solid Waste — SN Tool

D2 Solid Waste Management

D2. 1 Access to Solid Waste and Recycling Collection Points

Intent: To assess the proportion of potential residential households and non-residential users with access to nearby collection points for solid waste and recycling.

Indicator	Unit of Measure
Proximity of the resident population to the solid waste and recycling collection points	%

Assessment Methodology:

1. Identify the ecological areas or individual bins for differentiated collection of waste present in the neighborhood.

2. Calculate the actual distance on foot between these nodes and the accesses of the buildings.

3. Calculate the percentage of the population that is located more than 50 meters from the waste collection points, compared to the main entrances of the buildings.

Standard: -

Reference: CESBA MED Project-SNTool Assessment System.

D. Solid Waste — SN Tool

D2 Solid Waste Management

D2.2 Access to Solid Waste and Recycling Collection Points

Intent: To improve separate collection disposal, avoiding to burn waste.

Indicator	Unit of Measure
Percentage inhabitants with access to solid waste and recycling collection points within 400 meters of walking distance.	%

Assessment Methodology:

1. Calculate the share of inhabitants living with 400 meters distance to the solid waste and recylcing collection points in the neighborhood.
(A) - numerator

2. Calculate the total population of the neighborhood.
(B) - denominator

3. Calculate the value of the indicator as:
=A/B (%)

Standard: -

Reference: UNECE-Collection Methodologies for Key Performance Indicators for Smart Sustainable Cities.

E. Environmental Quality

Description of the Information

E: Issue

Ex: Category

- **E1: Air Quality**
- **E2: Noise**
- **E3: EMF Exposure**
- **E4: Environmental Impacts**

Ex.x : Criterion

Intent: Description of the objective of the criterion

Indicator: Name of the indicator to be calculated

Unit of Measure: Measuring unit of each indicator

Standard: The calculation standard for the criterion

References: The acquiring source of information

★ Key Performance Indicator

E. Environmental Quality — SN Tool

E1 Air Quality

E1. 1 Fine Particulate Matter ($PM_{2.5}$) Concentration

Intent: To evaluate the quality of the air through the exceeded daily limits of pollutants.

Indicator	Unit of Measure
Number of days within a year that $PM_{2.5}$ concentration exceeds the daily limit.	%

Assessment Methodology:

1. Select the number of days per year with a bad air quality according to the following criteria:

- SO2: Number of days with more than 125 $\mu g/m^3$
- CO: Number of days with more than 10 mg/m^3
- NOx: Number of days with more than 50 $\mu g/m^3$
- O3: Number of days with more than 120 $\mu g/m^3$
- PM10: Number of days with more than 50 $\mu g/m^3$

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

E. Environmental Quality — SN Tool

E1 Air Quality

E1. 4 Sulfur Dioxide Concentration (SO_2)

Intent: To evaluate the quality of the air through the exceeded daily limits of pollutants (SO_2).

Indicator	Unit of Measure
Number of days within a year that SO_2 concentration exceeds the daily limit.	$\mu g/m^3$

Assessment Methodology:

1. Calculate the mass of pollutants collected SO_2 (μg).
(A)-Numerator

2. Calculate the volume of air sampled in standard cubic meters ($\mu g/m^3$).
(B)-Denominator

3. The result shall be expressed as the concentration of SO_2 in micrograms per standard cubic meter.
$\mu g/m^3$

Standard: -

Reference: UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

E. Environmental Quality — SN Tool

E1 Air Quality

E1. 5 Ozone Concentration (O_3)

Intent: To evaluate the quality of the air through the exceeded daily limits of pollutants (O_3).

Indicator	Unit of Measure
Number of days within a year that O_3 concentration exceeds the daily limit.	$\mu g/m^3$

Assessment Methodology:

1. Calculate the mass of pollutants collected O_3 (μg).
(A)-Numerator

2. Calculate the volume of air sampled in standard cubic meters ($\mu g/m^3$).
(B)-Denominator

3. The results shall be expressed as the concentration of O_3 in micrograms per standard cubic meter.
($\mu g/m^3$)

Standard: -

Reference: UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

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E. Environmental Quality — SN Tool

E1 Air Quality

★E1. 2 Particulate Matter (PM_{10}) Concentration

Intent: To assess the long-term ambient air quality with respect to particulates <10mu (PM_{10}) in the neighborhood.

Indicator	Unit of Measure
Number of days within a year that PM_{10} concentration exceeds the daily limit.	Days/Year

Assessment Methodology:

1. Daily test air samples in accordance with national or regional procedures over a period time of one year.

2. Evaluate the number of days exceeding the daily limits in a year.

Note: For further information on the calculation steps go to the KPIs Anex.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

E. Environmental Quality — SN Tool

E1 Air Quality

E1.3 Nitrogen Dioxide Concentration (NO_2)

Intent: To evaluate the quality of the air through the exceeded daily limits of pollutants (NO_2).

Indicator	Unit of Measure
Number of days within a year that NO_2 concentration exceeds the daily limit.	$\mu g/m^3$

Assessment Methodology:

1. Calculate the mass of pollutant collected NO_2 (μg).
(A)-Numerator

2. Calculate the volume of air sampled in standard cubic meters $\mu g/m^3$.
(B)-Denominator

3. The result shall be expressed as the concentration of NO_2 in micrograms per standard cubic meters.
$\mu g/m^3$

Standard: -

Reference: UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

E. Environmental Quality — SN Tool

E2 Noise

E2. 1 Ambient Daytime Noise Conditions

Intent: To promote acoustic comfort, for a healthy and safe environment

Indicator	Unit of Measure
Percentage of building area over noise limit.	%

Assessment Methodology:

1. Calculate the number of people living in the neighborhood with excessive ambient daytime noise levels.
(A)-Numerator

2. Calculate the total number of people living in the neighborhood.
(B)- Denominator

3. Calculate the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

E. Environmental Quality — SN Tool

E2 Noise

E2. 2 Ambient Night-Time Noise Conditions

Intent: To promote acoustic comfort, for a healthy and safe environment.

Indicator	Unit of Measure
Percentage of building area over noise limit	%

Assessment Methodology:

Estimated percentage of total residential population in the neighborhood that is exposed to ambient noise exceeding 40dBA during periods from 22:00 to 7:00.

1. Calculate the number of people living in the neighborhood that is exposed to ambient noise exceeding 40dBA during periods from 22:00 to 7:00.
(A)- Numerator

2. Calculate the total number of people living in that neighborhood.
(B)-Denominator

3. Calculate the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

E. Environmental Quality

SN Tool

E3 EMF Exposure

E3. 1 Exposure to High Frequency Electromagnetic Fields

Intent: To evaluate the exposure to high frequency electromagnetic fields.

Indicator	Unit of Measure
Percentage of mobile network antenna sites in compliance with EMF exposure	%

Assessment Methodology:

1. Calculate the number of mobile network antenna sites in compliance with EMF exposure.
(A)-Numerator
2. Calculate the total number of mobile network antenna sites in the neighborhood.
(B)-Denominator
3. Calculate the indicator as:
A/B (%)

Standard:
-

Reference:
UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

E. Environmental Quality

SN Tool

E3 Air Quality

E3. 2 Exposure to High Frequency Electromagnetic Fields

Intent: To assess the quantity of buildings exposed to ELF magnetic fields.

Indicator	Unit of Measure
Percentage of buildings in the neighborhood, located not respecting the safety distance from high voltage lines.	%

Assessment Methodology:

1. Calculate the number of buildings located in the neighborhood not respecting the safety distance from high voltage lines.
(A)-Numerator
2. Calculate the total number of buildings in the neighborhood.
(B)-Denominator
3. Calculate the value of the indicator:
A/B (%)

Standard:
-

Reference:
UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

E. Environmental Quality

SN Tool

E4 Environmental Impacts

E4. 1 Degree of Atmospheric Light Pollution Caused by the Exterior Public Lighting Systems

Intent: To reduce light pollution.

Indicator	Unit of Measure
Percentage of lighting fixtures with upward luminous emission coefficient equal to 0%	%

Assessment Methodology:

1. Calculate the number of lighting fixtures installed in the neighborhood with upward luminous emission coefficient equal to 0%.
(A)-Numerator
2. Calculate the total number of lighting fixtures installed in the neighborhood.
(B)- Denominator
3. Calculate the indicator as:
A/B (%)

Standard:
-

Reference:
CESBA MED Project - SNTool Assessment System.

F. Transportation & Mobility

Description of the Information

F: Issue

Fx : Category

- **F1: Performance of Mobility Services**
- **F2: Green Mobilit y**
- **F3: Safety in Mobility**
- **F4: Urban Morphology & Transportation**

Fx.x : Criterion

Intent: Description of the objective of the criterion

Indicator: Name of the indicator to be calculated

Unit of Measure: Measuring unit of each indicator

Standard: The calculation standard for the criterion

References: The acquiring source of information

★ Key Performance Indicator

F. Transportation & Mobility — SN Tool

F1 Performance of Mobility Services

★F1. 1 Performance of the Public Transport System

Intent: To determine the performance of the public transportation system.

Indicator	Unit of Measure
Percentage of inhabitants that are within 400 meters walking distance of at lesat one public transportation service stop.	%

Assessment Methodology:

1. Locate the public/municipal transport stops with daily total service frequency of at least 20trips, that serve the neighborhood.
2.Locate all the residential buildings in the neighborhood with a walking distance from their entrance to at least one of the located stops up to 400 meters.
3. Calculate the occupants of the selected buildings.
4.Calculate the total population of the neighborhood.
5.Calculate the indicator's value as the percentage of the occupants of the selected buildings to the total popula-tion of the neighborhoood.

Note: For further information on the calculation steps go to the KPIs Anex.

Standard: Global Platform for Sustainable Cities - Urban Sustainability Frame

Reference: CESBA MED Project - SNTool Assessment System.

F. Transportation & Mobility — SN Tool

F2 Green Mobility

F2. 2 Electric-Vehicle Infrastructure (Charging Station)

Intent: To promote the use of electric vehicles.

Indicator	Unit of Measure
Electric vehicle's charging stations per inhabitant	N/Inhabitants

Assessment Methodology:

1. Calculate the number of charging stations for electric vehicles.
(A)- Numerator
2. Calculate the neighborhood's population.
(B)-Denominator
3. Calculate the indicator as:
A/B

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

F. Transportation & Mobility — SN Tool

F2 Green Mobility

★F2. 3 Bicycle Network

Intent: To emphazise the use of bicycles as a method to reduce traffic congestion and pollution.

Indicator	Unit of Measure
Total length of bicycle paths in the neighborhood per inhabitant.	m/inhabitants

Assessment Methodology:

1. Calculate the total length of bicycle paths/lanes in the neighborhood.
(A)- Numerator
2. Estimate/calculate the total number of inhabitants in the neighborhood.
(B)-Denominator
3. Calculate the indicator as:
A/B

Standard: -

Reference: UNECE.Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

F. Transportation & Mobility — SN Tool

F1 Performance of Mobility Services

F1. 2 Walking Distance to Public Transport for Area Workers and Students

Intent: To determine the performance of the public transportation system.

Indicator	Unit of Measure
Percentage of workers and students that are within 400 meters walking distance of at least one public transportation service.	%

Assessment Methodology:

1. Calculate the percentage of workers and students in the area that are within 400 meters walking distance of at least one public transportation service stop (bus, tram, metro)

Note: To be considered valid for the calculation, a stop must have a daily total service frequency of at least 20 trips.

For the calculation of the indicator are considered only students and working people in the neighborhood.

Standard: Global Platform for Sustainable Cities - Urban Sustainability Frame

Reference: CESBA MED Project - SNTool Assessment System.

F. Transportation & Mobility — SN Tool

F2 Green Mobility

F2. 1 Shared Vehicles

Intent: To promote an alternative form of transportation.

Indicator	Unit of Measure
Number of shared vehicles per 1.000 inhabitants.	N/1000 Inhabitants

Assessment Methodology:

1. Calculate the number of shared vehicles.
(A)- Numerator
2. Calculate the one 1.000 of the neighborhood's population.
(B)-Denominator
3. Calculate the indicator as:
A/B

Standard: -

Reference: UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

F. Transportation & Mobility — SN Tool

F2 Green Mobility

F2. 4 Shared Vehicles

Intent: To emphazise the use of bicycles as a method to reduce traffic congestion and pollution.

Indicator	Unit of Measure
Number of shared bicycles per 1.000 inhabitants.	N/1000 Inhabitants

Assessment Methodology:

1. Calculate the number of shared bicycles available.
(A)- Numerator
2. Calculate the one 1.000 of the neighborhood's population.
(B)-Denominator
3. Calculate the indicator as:
A/B

Standard: -

Reference: UNECE.Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

F. Transportation & Mobility — SN Tool

F2 Green Mobility

F2. 5 Availability of Bicycle Parking Facilities

Intent: To promote cycling as an alternative to vehicle use by providing a safe and efficient mobility network.

Indicator	Unit of Measure
Bicycle parking spaces per inhabitant	N/Inhabitants

Assessment Methodology:

1. Calculate the number of bicycles parking available in the neighborhood.
(A)- Numerator
2. Calculate the neighborhood's population.
(B)-Denominator
3. Calculate the indicator as:
A/B

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

F. Transportation & Mobility

SN Tool

F3 Safety in Mobility

F3. 1 Pedestrian Infrastructure

Intent: To improve the neighborhood in terms of liveability and safety for pedestrians.

Indicator	Unit of Measure
Percentage of the neighborhood's area designated as a pedestrian/car free zone	%

Assessment Methodology:

1. Calculate the total area of pedestrian/car free zones.
(A)- Numerator
2. Calculate the total area of the neighborhood.
(B)-Denominator
3. Calculate the indicator as:
A/B

Standard: -

Reference: UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

F. Transportation & Mobility

SN Tool

F3 Safety in Mobility

F3. 2 Availability of Sidewalks

Intent: To promote road connectivity, as a key element of spatial accessibility.

Indicator	Unit of Measure
Percentage of road's length that has dedicated sidewalks.	%

Assessment Methodology:

1. Calculate the roads length that has dedicated sidewalks.
(A)- Numerator
2. Calculate the total length of the roads in the neighborhood
(B)-Denominator
3. Calculate the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

F. Transportation & Mobility

SN Tool

F3 Safety in Mobility

F3. 3 Safety of bicycle lines

Intent: To promote the use of the bicycle as an alternative vehicle from the private car.

Indicator	Unit of Measure
Percentage of bicycle paths physically separated from traffic roads.	%

Assessment Methodology:

1. Calculate the length of the bicycle paths physically separated from traffic roads.
(A)- Numerator
2. Calculate the total length of bicycle paths in the neighborhood.
(B)-Denominator
3. Calculate the indicator as:
A/B(%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

F. Transportation & Mobility

SN Tool

F3 Safety in Mobility

F3.4 Traffic Fatalities

Intent: To assess road safety

Indicator	Unit of Measure
Traffic fatalities per 1.000 inhabitants	N/1.000 Inhabitants

Assessment Methodology:

1. Calculate the number of traffic fatalities.
(A)- Numerator
2. Calculate one 1.000 inhabitants of the neighborhood's population.
(B)-Denominator
3. Calculate the indicator as:
A/B(%)

Standard: -

Reference: UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

F. Transportation & Mobility

SN Tool

F4 Urban Morphology & Transportation

F4. 1 Cyclomatic Complexity of the Street Network

Intent: To assess road connectivity as a key element of spatial accessibility.

Indicator	Unit of Measure
Cyclomatic Number	Number

Assessment Methodology:

To assess this indicator, it is necesarry to add up all the road links and subtratc the number of intersections.
Links-Nodes+1
For the calculation of the performance indicator proceed as follows:
1. Locate in the neighborhood the intersections (nodes N), and quantify them.
2. Find in the neighborhood segments between successive intersections, quantify them (sides L).
3. Apply the formula: L-N+1

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

F. Transportation & Mobility

SN Tool

F4 Urban Morphology & Transportation

F4. 2 Connectivity of the Street Network

Intent: To determine the connectivity of the local street network.

Indicator	Unit of Measure
Number of intersections related to the overall surface area.	Number/Km^2

Assessment Methodology:

1. Calculate the number of streets intersections in the neighborhood.
(A)- Numerator
2. Calculate the area of the neighborhood in Km^2.
(B)-Denominator
3. Calculate the indicator as:
A/B

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

G.Social Aspects

Description of the Information

G: Issue

Gx : Category

G1: Accessibility (Disabled People)
G2: Housing
G3: Availability of Public, Private Facilities & Services
G4: Education
G5: Social Inclusion
G6: Safety
G7: Health
G8: Food Security
G9: Culture & Heritage
G10: Perceptual

Gx.x : Criterion

Intent: Description of the objective of the criterion

Indicator: Name of the indicator to be calculated

Unit of Measure: Measuring unit of each indicator

Standard: The calculation standard for the criterion

References: The acquiring source of information

★ Key Performance Indicator

G. Social Aspects — SN Tool

G1 Accessibility (Disabled People)

G1.1 Public Buildings that are Accessible for Use by Physically Disabled People

Intent: To assess the ability of residents, workers or visitors with physical disabilities to be able to have physical access to key buildings.

Indicator	Unit of Measure
Percentage of public buildings that are accessible for use by physically disabled people.	%

Assessment Methodology:

1. Identify what may be referred to as "key" public, commercial and residential buildings.

2. Assess the accessibility of exterior parking and pedestrian access areas, considering all major disability types.

3. Establish the percentage of key buildings that may be considered accessible.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

G. Social Aspects — SN Tool

G1 Accessibility (Disabled People)

G1.2 Sidewalks & Other Pedestrian Paths that are Accessible for Use by Physically Disabled People

Intent: To assess the ability of residents, workers or visitors with physical disabilities to be able to make use of public outdoor facilities in the neighborhood.

Indicator	Unit of Measure
Percentage of sidewalks and other pedestrian ways that are accessible for use by physically disabled people	%

Assessment Methodology:

1. Identify key pedestrian paths or other public routes that may be frequently used by people with physical disabilities.

2. Assess the accessibility of exterior parking and pedestrian access areas, considering all major disability types.

3. Establish the percentage of public pedestrian routes that may be considered accessible.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

G. Social Aspects — SN Tool

G1 Accessibility (Disabled People)

G1.3 Barrier-Free Accessibility in Local Outdoor Public Areas

Intent: To evaluate the accessibility of various urban resources using spatial data analysis.

Indicator	Unit of Measure
Percentage of accessible public outdoor areas that are barrier-free compared to the total public area.	%

Assessment Methodology:

1. Identify key outdoor public facilities that may be frequently used by people with physical disabilities.

2. Assess the accessibility of pedestrians routes, considering all major disability types.

3. Establish the percentage of public outdoor facilities that may be considered accessible.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

G. Social Aspects — SN Tool

G2 Housing

G2.1 Affordability of Housing Property

Intent: To assess the affordability of housing property in the neighborhood.

Indicator	Unit of Measure
Housing properties in the neighborhood that are financially accessible to the lowest quintile of area population.	%

Assessment Methodology:

1. Calculate the number of housing properties in the neighborhood that are financially accessible to the lowest quintile of area population.
(A)-Numerator

2. Calculate the total number of housing properties in the neighborhood.
(B)-Denominator

3. Calculate the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

G. Social Aspects — SN Tool

G2 Housing

G2.2 Affordability of Housing Rental

Intent: To assess the affordability of housing rental property for low-income residents in the neighborhood.

Indicator	Unit of Measure
Percentage of the average salary of the lowest quintile of the population used for rental payments.	%

Assessment Methodology:

1. Calculate the number of housing rental property in the neighborhood that are financially accessible to low-income residents.
(A)-Numerator

2. Calculate the total number of housing rental property in the neighborhood.
(B)-Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

G. Social Aspects — SN Tool

G2 Housing

G2.3 Vacant Residential Units in the Neighborhood

Intent: To understand the current and future housing needs in the neighborhood.

Indicator	Unit of Measure
Percentage of vacant residential units.	%

Assessment Methodology:

1. Calculate the number of unoccupied dwellings.
(A)-Numerator

2. Calculate the total number of dwellings in the neighborhood.
(B)-Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities- Indicators for City Services and Quality of Life.

G. Social Aspects — SN Tool

G2 Housing

G2.4 Informal Settlements

Intent: To evaluate the extent of the challenges for the reporting neighborhood in meeting the shelter needs and demands.

Indicator	Unit of Measure
Percentage of inhabitants living in slums, informal settlements or inadequate housing.	%

Assessment Methodology:

1. Calculate the area of informal settlements within the neighborhood boundary (in square kilometers).
(A)-Numerator

2. Calculate the neighborhood area in square kilometers.
(B)-Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities- Indicators for City Services and Quality of Life.

G. Social Aspects

SN Tool

G3 Availability of Public,Private Facilities & Services

★G3.1 Availability and Proximity of Key Services

Intent: To determine the accessibility and proximity of key services for local residents (e.g. schools, sport facilities, supermarkets, community buildings, etc.)

Indicator	Unit of Measure
Percentage of inhabitants that are within a 800 meters walking-distance of at least 3 key services.	%

Assessment Methodology:

1. Identify the location of the key services in the local area.

2. Calculate the percentage of the inhabitants that are within a 800 meters walking-distance from at least 3 key services.

Note: For further information on the calculation steps go to the KPI Anex.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

G. Social Aspects

SN Tool

G3 Availability of Public,Private Facilities & Services

G3.2 Availability and Proximity of a Public Primary School

Intent: To evaluate the percentage of the population near a primary school.

Indicator	Unit of Measure
Percentage of the population living within a 300 meter distance to a public primary school	%

Assessment Methodology:

1. Locate all the primary schools present in the neighborhood.
2. Calculate a 300 meter buffer zone for each primary school located in the neighborhood.
3.Calculate the number of buildings contained in each buffer zone.
4.Calculate the indicator as:
Total number of buildings located near a primary school (300m) / Total number of buildings in the neighborhood.

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities- Indicators for City Services and Quality of Life.

G. Social Aspects

SN Tool

G3 Availability of Public, Private Facilities & Services

G3.3 Availability and Proximity to a Public Secondary School

Intent: To evaluate the percentage of the population near a secondary school.

Indicator	Unit of Measure
Percentage of the population living within a 500m distance to a public secondary school	%

Assessment Methodology:

1. Locate all the secondary schools present in the neighborhood.
2. Calculate a 500 meter buffer zone for each primary school located in the neighborhood.
3.Calculate the number of buildings contained in each buffer zone.
4.Calculate the indicator as:
Total number of buildings located near a secondary school (500m) / Total number of buildings in the neighborhood.

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities- Indicators for City Services and Quality of Life.

G. Social Aspects

SN Tool

G3 Availability of Public, Private Facilities & Services

G3.4 Availability & Proximity to Children's Play Facilities

Intent: To evaluate the percentage of the population near children's play facilities.

Indicator	Unit of Measure
Percentage of the population near a children's play facility.	%

Assessment Methodology:

1. 1. Locate all the children's play facilities present in the neighborhood.
2. Calculate a 300 meter buffer zone for each primary school located in the neighborhood.
3.Calculate the number of buildings contained in each buffer zone.
4.Calculate the indicator as:
Total number of buildings located near a children's play facility (300m) / Total number of buildings in the

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities- Indicators for City Services and Quality of Life.

G. Social Aspects

SN Tool

G3 Availability of Public,Private Facilities & Services

G3.5 Outdoor Public Spaces

Intent: To ensure that public open space compatible with local cultural value is provided in large projects.

Indicator	Unit of Measure
Average share of the built-up area of the neighborhood that is open space for public use.	%

Assessment Methodology:

1. Calculate the share of the built-up area of the neigborhood that is open space for public use.
(A)-Numerator

2. Calculate the total area of the neighborhood.
(B)-Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

G. Social Aspects

SN Tool

G4 Education

G4.1 Primary school Enrolment Rate

Intent: To expand and transform the educational systems of countries achieving universal standards o f learning outcomes, reducing inequalities.

Indicator	Unit of Measure
Net enrolment rate to primary school.	%

Assessment Methodology:

1. Calculate the net enrolment rate to primary school of people in the neighborhood.
(A)-Numerator
2. Calculate the total population in the neighborhood.
(B)-Denominator
3.Calculate the indicator as:
A/B(%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

G. Social Aspects

SN Tool

G4 Education

G4.2 Rate of Female Scholarship

Intent: To monitor woman's rights

Indicator	Unit of Measure
Ratio of female to male mean years of education received og population age 25+	%

Assessment Methodology:

1. Calculate the number of female's average years of education received of population age 25+ in the neighborhood.
(A)-Numerator
2. Calculate the number of male's average years of education received of population age 25+ in the neighborhood.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B(%)

Standard: -

Reference: Sustainable Development in the Mediterranean Report.

G. Social Aspects

SN Tool

G4 Education

G4.3 Secondary School Enrolment Rate

Intent: To expand and transform the educational systems of countries achieving universal standards o f learning outcomes, reducing inequalities.

Indicator	Unit of Measure
Net enrolment rate to secondary school	%

Assessment Methodology:

1. Calculate the net enrolment rate to secondary school of people in the neighborhood.
(A)-Numerator
2. Calculate the total population in the neighborhood.
(B)-Denominator
3.Calculate the indicator as:
A/B(%)

Standard: -

Reference: Sustainable Development in the Mediterranean Report.

G4 Education

G4.4 Tertiary Education

Intent: To expand and transform the educational systems of countries achieving universal standards of learning outcomes, reducing inequalities.

Indicator	Unit of Measure
Population from ages 25 to 34 with tertiary educational attainment.	%

Assessment Methodology:

1. Calculate the number of the population from ages 25 to 34 with a tertiary educational attainment in the neighborhood.
(A)-Numerator

2. Calculate the total population from ages 25 to 34 in the neighborhood.
(B)-Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: Sustainable Development in the Mediterranean Report.

G5 Social Inclusion

G5.1 Energy Poverty of Households

Intent: To assess poverty risk.

Indicator	Unit of Measure
Percentage of households unable to afford the most basic levels of energy (more than 10% of the income spent on energy bills)	%

Assessment Methodology:

1. Calculate the number of households unable to afford the most basic levels of energy (more than 10% of the income spent on energy bills)
(A)-Numerator

2. Calculate the total number of households in the neighborhood.
(B)-Denominator

3. Calculate the indicator as:
A/B(%)

Standard:

Reference:

G5 Social Inclusion

G5.2 Population at Risk of Poverty or Exclusion

Intent: To assess poverty risk.

Indicator	Unit of Measure
Share of people with an equivalized disposable income below 60% of the national median income.	%

Assessment Methodology:

1. Calculate the number of people with an equivalized disposable income below 60% of the national median income.
(A)-Numerator

2. Calculate the total number of people in the neighborhood.
(B)-Denominator

3. Calculate the indicator as:
A/B(%)

Standard: -

Reference: Sustainable Development in the Mediterranean Report.

G6 Safety

G6.1 Police Service

Intent: To assess the overall crime prevention in place in the neighborhood.

Indicator	Unit of Measure
Number of police officers per 1.000 inhabitants.	N/1.000 Inhabitants

Assessment Methodology:

1. Calculate the number of permanent full-time (or FTE) sworn-in police officers.
(A)-Numerator

2. Calculate one 1.000 of the neighborhood's total population.
(B)-Denominator

3. Calculate the indicator as:
A/B

Standard: -

Reference: ISO 37120: Sustainable cities and communities-Indicators for city services and quality of life.

G6 Safety

G6.2 Fire Service

Intent: To assess the overall fire security/prevention in place in the neighborhood.

Indicator	Unit of Measure
Number of firefigthers per 1.000 inhabitants	N/1.000 Inhabitants

Assessment Methodology:

1. Calculate number of permanent full-time or (FTE) sworn-in firefigthers in the neighborhood.
(A)-Numerator

2. Calculate one 1.000 of the neighborhood's total population.
(B)-Denominator

3. Calculate the value of the indicator as:
A/B

Standard: -

Reference: Sustainable Development in the Mediterranean Report.

G6 Safety

G6.3 Population Living in Disaster Prone Areas

Intent: To assess populations living in areas subject to significant risk of death or damage caused by prominent hazards; cyclones, drought, floods, earthquakes, volcanoes and landslides.

Indicator	Unit of Measure
Percentage of inhabitants living in a zone subject to natural hazards.	%

Assessment Methodology:

1. Calculate the total number of neighborhood inhabitants living in areas subject to significant risk of death or damage caused by prominent hazards.
(A)-Numerator

2. Calculate the total number of the neighborhood's population.
(B)-Denominator

3. Calculate the indicator as:
A/B(%)

Standard: -

Reference: UNECE - Collection Methodology for Key Performance Indicators for Sustainable Smart Cities.

G7 Health

G7.1 In-Patient Hospital Beds

Intent: To monitor the level of a health service delivery.

Indicator	Unit of Measure
Number of in-patient public hospital beds per 1.000 inhabitants	N/1.000 Inhabitants

Assessment Methodology:

1. Calculate the total number of in-patient hospital beds (public and private)
(A)-Numerator

2. Calculate one 1.000 of the neighborhood's population.
(B)-Denominator

3. Calculate the indicator as:
A/B

Standard: -

Reference: UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

G8 Food Security

G8.1 Urban Agricultural Land

Intent: To promote inclusion of areas devoted to urban agriculture and also plans of new urban development projects with the goal of producing food through reutilization of urban resources.

Indicator	Unit of Measure
Area for urban agricultural land on the total neighborhood area.	%

Assessment Methodology:

1. Calculate the total designated urban agricultural area used for food production located within neighborhood boundaries.
(A)-Numerator

2. Calculate the total extension of the neighborhood area.
(B)-Denominator

3. Calculate the indicator as:
A/B(%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

G. Social Aspects

SN Tool

G9 Culture and Heritage

G9.1 Compatibility of Urban Design with Local Cultural Values

Intent: To ensure that the urban design and architecture of buildings is compatible with local cultural values.

Indicator	Unit of Measure
Compatibility between the traditional values of street values in the neighborhood and the character of urban spaces.	Score

Assessment Methodology:

Subjective qualitative assessment by an experienced third-party design professional and/or sociologist.

Standard:

-

Reference:

CESBA MED Project - SNTool Assessment System.

G. Social Aspects

SN Tool

G9 Culture and Heritage

G9.2 Compatibility of Public Open Space with Local Cultural Values

Intent: To ensure that public open space compatible with local cultural values is provided in large projects.

Indicator	Unit of Measure
Compatibility with local area traditional values of local public open spaces, including major uses, dimensions and adjacent uses.	Score

Assessment Methodology:

Subjective qualitative assessment by an experienced third -party design professional and/or sociologist.

Standard:

-

Reference:

CESBA MED Project - SNTool Assessment System.

G. Social Aspects

SN Tool

G10 Perceptual

G10. 1 Perceived Safety of Public Areas for Pedestrians

Intent: To improve safety of public places and pedestrian routes.

Indicator	Unit of Measure
Perceived safety of public places and pedestrian routes, as determined by a sample of pedestrians.	Score

Assessment Methodology:

Evaluate the perceived safety of public places and pedestrian routes, as determined by a sample of residents.

Standard:

-

Reference:

CESBA MED Project - SNTool Assessment System

G. Social Aspects

SN Tool

G10 Perceptual

G10. 2 Impact of Commercial Signage on the Visual Environment

Intent: To avoid visual environment obstruction through the integration of commercial signage.

Indicator	Unit of Measure
Visual Impact of exterior commercial signage.	Score

Assessment Methodology:

Aggregate visual impact of exterior commercial signage, based on degree of integration with building exterior, diversity in signage dimensions and illumination; as determined by a sample of the local area population.

Standard:

-

Reference:

CESBA MED Project - SNTool Assessment System.

G. Social Aspects

SN Tool

G10 Perceptual

G10.3 Impact of Overhead Electric Distribution System

Intent: To avoid visual environment obstruction caused by overhead electric distribution system.

Indicator	Unit of Measure
Visual impact of above-grade electrical distribution systems	Score

Assessment Methodology:

Aggregate visual impact of above-grade electrical distribution systems, based on degree of visual clutter; as determined by a sample of the local area population.

Standard:

-

Reference:

CESBA MED Project - SNTool Assessment System

H.Economy

Description of the Information

H: Issue

Hx: Category

- H1: Economic Performanc e
- H2: Employment
- H3: Innovatio n
- H4: ICT Infrastructure

Hx.x: Criterion

Intent: Description of the objective of the criterion

Indicator: Name of the indicator to be calculated

Unit of Measure: Measuring unit of each indicator

Standard: The calculation standard for the criterion

References: The acquiring source of information

★ Key Performance Indicator

H. Economy | SN Tool

H1 Economic Performance

H1.1 Average Annual Per-Capita Income of Residents

Intent: To evaluate the economic well-being.

Indicator	Unit of Measure
Percentage of average per-capita income.	%

Assessment Methodology:

1. Calculate the income per-capita of residents in the neighborhood.
(A) - Numerator
2. Calculate the income per-capita income of the whole urban region.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B(%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

H. Economy | SN Tool

H3 Innovation

H3.1 New Business Registration Rate

Intent: To assess the neigborhood's level of economic activity and economic performance.

Indicator	Unit of Measure
Proportion of business registrations per 10.000 inhabitants aged 16 and above.	N/10.000 Inhabitants

Assessment Methodology:

1. Calculate the total number of new businessess registrations per 10.000 inhabitants aged 16 and above.
(A) - Numerator
2. Calculate one 10.000th of the neighborhood's total population.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities- Indicators for City Services and Quality of Life.

H. Economy | SN Tool

H4 ICT Infrastructure

H4.1 Fixed Broadband Subscriptions

Intent: To assess the access to information and technology connectivity.

Indicator	Unit of Measure
Percentage of households with fixed (wired) broadband.	%

Assessment Methodology:

1. Calculate the number of fixed broadband subscriptions in the neighborhood.
(A) - Numerator
2. Calculate the total number of households in the neighborhood.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B(%)

Standard: -

Reference: UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

H. Economy | SN Tool

H2 Employment

H2.1 Unemployment Rate

Intent: To assess the labour market status, the economy development and citizens' quality of life.

Indicator	Unit of Measure
Percentage of working age adults unemployed or actively working for work.	%

Assessment Methodology:

1. Calculate the number of working age adults unemployed or actively looking for work in the neighborhood.
(A) - Numerator
2. Calculate the number of working age people in the neighborhood.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B(%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

H. Economy | SN Tool

H2 Unemployment

H2.2 Youth unemployment rate

Intent: To quantify and analyze the current labor market trends and challenges of young people.

Indicator	Unit of Measure
Percentage of unemployed youth.	%

Assessment Methodology:

1. Calculate the total number of a neighborhood's unemployed youth.
(A) - Numerator
2. Calculate the neighborhood's total youth labor force.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B(%)

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities - Indicators for City Services and Quality of Life.

H. Economy | SN Tool

H4 ICT Infrastructure

H4.2 Wireless Broadband Coverage

Intent: To assess the access to information and technology connectivity

Indicator	Unit of Measure
Percentage of the neighborhood served by wireless broadband (3G,4G,5G)	%

Assessment Methodology:

1. Calculate the area of the neighborhood covered by mobile services (km^2).
(A) - Numerator
2. Calculate the total area of the neighborhood (Km^2).
(B)-Denominator
3. Calculate the value of the indicator as:
A/B(%)
Note: Each service should be reported on separately (3G, and, 4G)

Standard: -

Reference: UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

---

H. Economy | SN Tool

H4 ICT Infrastructure

H4.3 Availability of WIFI in Public Areas

Intent: To increase access to internet at little or no cost.

Indicator	Unit of Measure
Number of public WIFI hotspots in the neighborhood per 1.000 inhabitants.	n/1000 inhabitants

Assessment Methodology:

1. Calculate the total number of WIFI hotspots provided by the neighborhood's administration.
(A) - Numerator
2. Calculate one 1.000th of the neighborhood's total population.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B(%)

Standard: -

Reference: UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

H4 ICT Infrastructure

H4.4 Mobile Phone Subscriptions

Intent: To evaluate the levels of communication technology, information, communication technology and innovation.

Indicator	Unit of Measure
Total number of mobile phones subscriptions in the area per 1.000 inhabitants in the neighborhood.	n/1000 inhabitants

Assessment Methodology:

1. Calculate the total number of mobile phone connections in the neighborhood.
(A) - Numerator
2. Calculate one 1.000th of the neighborhood's total population
(B)-Denominator
3. Calculate the value of the indicator as:
A/B(%)

Standard:
-

Reference:
ISO 37120: Sustainable Cities and Communities - Indicators for City Services and Quality of Life.

I. Climate Change: Mitigation & Adaptation

Description of the Information

I: Issue

Ix: Category

I1: Climate Change Mitigatio n
I2: Adaptation of the Climatic Action: Heatwaves & Increase of Temperatures
I3: Adaptation of the Climatic Action: Pluvial Flood
I4: Adaptation to the Climatic Action: Fluvial & Coastal Flood
I5: Adaptation to the Climatic Action: Drought
I6: Adaptation to the Climatic Action: Wildfire
I7: Climatic Hazard: Win d

Hx.x: Criterion

Intent: Description of the objective of the criterion

Indicator: Name of the indicator to be calculated

Unit of Measure: Measuring unit of each indicator

Standard: The calculation standard for the criterion

References: The acquiring source of information

★ Key Performance Indicator

I. Climate Change: Mitigation & Adaptation — SN Tool

I1 Climate Change Mitigation

★I1.1 Green House Gas Emissions

Intent: To assess the adverse contribution the neighborhood is making to climate change.

Indicator	Unit of Measure
Total amount of greenhouse gases (equivalent to carbon dioxide units) per inhabitant, generated from building operations per year.	t CO_2eq. / inhabitant /yr

Assessment Methodology:

1. Calculate the total amount of greenhouse gases in tonees (equivalent carbon dioxide units) generated over a calendar year by all activities within the neighborhood, including indirect emissions outside neighborhood boundaries.

(A) - Numerator

2. Calculate the total population of the neighborhood.

(B)-Denominator

3. Calculate the value of the indicator as:

A/B

Standard: -

Reference: ISO 37120: Sustainable Cities and Communities-Indicators for City Services and Quality of Life.

I. Climate Change: Mitigation & Adaptation — SN Tool

I1 Climate Change Mitigation

I1.2 Greenhouse gas emissions from residential buildings

Intent: To estimate urban greenhouse emissions from all residential buildings.

Indicator	Unit of Measure
Total amount of greenhouse gases in Kg (equivalent carbon dioxide units) generated over a calendar year per aggregated indoor useful floor area	Kg CO^2 eq / m^2

Assessment Methodology:

A. Calculate the annual total final greenhouse emissions for the building operations in Kg CO^2 eq/m^2, for each residential building.

B. Calculate the aggregated useful floor area for all residential buildings.

C. Calculate the indicator:

A/B

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

I. Climate Change: Mitigation & Adaptation — SN Tool

I1 Climate Change Mitigation

I1.3 Embodied Carbon for Construction and Renovation Infrastructures

Intent: To promote the use of construction materials for infrastructures with a low embodied carbon.

Indicator	Unit of Measure
Aggregated total embodied carbon per aggregated linear area.	kg CO_2 eq / m^2

Assessment Methodology:

1. Identify the basic composition of each infrastructure element. The mass of each constituent material has to be estimated:
2. Aggregate by material: The mass for each constituent material should thereafter be aggregated to obtain the total mass for each type of material.
3. Calculate the embodied carbon of each material by multiplying the specific mass with its corresponding carbon coefficient (national coefficients or international databases) the coefficients are quantified in kilograms of CO_2equivalent ($kgCO_2eq$) per unit mass ($kgCO_2eq$) per unit mass (kg) of the material or sometimes also expressed per unit area of material ($kgCO_2eq/m^2$).
4. Calculate the total linear area of the infrastructures considered.
5. Calculate the indicator's value as:
Total embodied carbon of the building /Total linear area.

Standard: EN 15978

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation — SN Tool

I1 Climate Change Mitigation

I1.4 Embodied Carbon for Construction/ Renovation of Residential Buildings

Intent: To promote the use of construction materials with a low embodied carbon

Indicator	Unit of Measure
Aggregated total embodied carbon per aggregated indoor useful floor area.	kg CO_2 eq / m^2

Assessment Methodology:

1. Identify the basic composition of each building element for all residential building of the neighborhood. The mass of each constituent material has to be estimated:
2. Aggregate by material: The mass for each constituent material should thereafter be aggregated to obtain the total mass for each type of material.
3. Calculate the embodied carbon of each material by multiplying the specific mass with its corresponding carbon coefficient (national coefficients or international databases) the coefficients are quantified in kilograms of CO_2equivalent ($kgCO_2eq$) per unit mass ($kgCO_2eq$) per unit mass (kg) of the material or sometimes also expressed per unit area of material ($kgCO_2eq/m^2$).
4. Calculate the total interal floor area of the residential buildings in the neighborhood.
5. Calculate the indicator's value as:
Total embodied carbon of the building /Total useful internal floor area of residential buildings.

Standard: EN 15978

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation — SN Tool

I1 Climate Change Mitigation

I1.5 Embodied Carbon for Construction/Renovation of Public Offices/Educational Buildings

Intent: To promote the use of construction materials for infrastructures with a low embodied carbon.

Indicator	Unit of Measure
Aggregated total embodied carbon per aggregated linear area.	kg CO_2 eq / m^2

Assessment Methodology:

1. Identify the basic composition of each building element for all office/educational buildings. The mass of each constituent material has to be estimated:
2. Aggregate by material: The mass for each constituent material should thereafter be aggregated to obtain the total mass for each type of material.
3. Calculate the embodied carbon of each material by multiplying the specific mass with its corresponding carbon coefficient (national coefficients or international databases) the coefficients are quantified in kilograms of CO_2equivalent ($kgCO_2eq$) per unit mass ($kgCO_2eq$) per unit mass (kg) of the material or sometimes also expressed per unit area of material ($kgCO_2eq/m^2$).
4. Calculate the total useful internal floor area for all offices/educational buildings of the neighborhood.
5. Calculate the indicator's value as:
Total embodied carbon of the building /Total useful internal floor area of offfices/educational buildings.

Standard: EN 15978

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation — SN Tool

I1 Climate Change Mitigation

I1.6 CO_2 Sequestration

Intent: To promote the CO_2 sequestration in the neighbborhood

Indicator	Unit of Measure
Potential CO_2 sequestration in the neighborhood per hectare.	tepCO_2 /ha

Assessment Methodology:

1. Calculate the amount of CO_2 sequestration in the neighborhood.

(A) - Numerator

2. Calculate the total area of the neighborhood in hectares.

(B)-Denominator

3. Calculate the value of the indicator as:

A/B

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation — SN Tool

I2 Adaptation To The Climatic Action: Heatwaves & Increase of Temperatures

I2.1 Albedo

Intent: To estimate the extent of the Urban Heat Island effect in the neighborhood.

Indicator	Unit of Measure
Mean Solar Reflectance Index of paved surfaces and roofs in the neighborhood	SRI

Assessment Methodology:

1. Identify the boundaries of the area being assessed.
2. Obtain records of local ambient temperatures and wind speeds during summer conditions over a 3-year period.

3. Obtain similar data for the larger urban region.

4. Identify differences between the local and regional UHI effects.

5. Identify factors in configuration of buildings, vegetation, surface albedo and, other local factors that may explain the differences.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation

SN Tool

I2 Adaptation To The Climatic Action: Heatwaves & Increase of Temperatures

I2.2 Use of Vegetation to Provide Ambient Outdoor Cooling

Intent: To assess the role of vegetation on the site and on roofs in cooling ambient conditions through evapotranspiration.

Indicator	Unit of Measure
Leaf Area Index: ratio of total vegetated surface area (on ground and on roofs, and including trees), divided by total site area	Index

Assessment Methodology:

Desk Analysis

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation

SN Tool

I2 Adaptation To The Climatic Action: Heatwaves & Increase of Temperatures

I2.3 Green Roofs

Intent: To determine the aggregated area of green roofs on all buildings relative to the total surface area in the neighborhood.

Indicator	Unit of Measure
Aggregate area of building roofs covered with vegetated material	%

Assessment Methodology:

1. Identify the buildings with green roofs and estimate the aggregate net green roof area.

2. Determine the ratio of the aggregate green roof area to the total surface area in the neighborhood.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation

SN Tool

I3 Adaptation To The Climatic Action: Pluvial Flood

I3.1 Stormwater retention capacity on site by buildings

Intent: To evaluate the level of retention capacity of the buildings.

Indicator	Unit of Measure
Share of the onsite stormwater retention capacity of the buildings	%

Assessment Methodology:

1. Calculate amount of on-site stormwater retention capacity of the buildings.
(A) - Numerator
2. Calculate the optimal retention capacity of the buildings.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard: --

Reference:

I. Climate Change: Mitigation & Adaptation

SN Tool

I3 Adaptation To The Climatic Action: Pluvial Flood

I3.2 Sustainable Urban Drainage

Intent: To ensure urban drainage.

Indicator	Unit of Measure
Share of the optimal capacity of sustainable urban drainage systems.	%

Assessment Methodology:

1. Calculate the share of the optimal capacity of sustainable urban drainage systems.
(A) - Numerator
2. Calculate the optimal capacity of sustainable urban drainage systems.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard: --

Reference:

I. Climate Change: Mitigation & Adaptation

SN Tool

I3 Adaptation To The Climatic Action: Pluvial Flood

★ **I3.3** Permeability of Land

Intent: To improve the permeability of the area

Indicator	Unit of Measure
Percentage of weighted ground permeability	%

Assessment Methodology:

1. Calculate the size (Sa) of the neighborhood area (m^2).

2. Calculate the size of the surfaces with a different paving or occupied by constructions in the neighborhood area.

Note: For further information on the calculation steps go to the KPIs Anex.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation

SN Tool

I4 Adaptation To The Climatic Action: Fluvial & Coastal Flood

I4.1 Flood Risk

Intent: To assess the flood risk of the neighborhood.

Indicator	Unit of Measure
Percentage of the population exposed to flood risk	%

Assessment Methodology:

1. Calculate the number of inhabitants exposed to a flood risk with medium probability in the neighborhood.
(A)-Numerator
2. Calculate the total population of the neighborhood.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: Reference Framework for Sustainable Cities - RFSC

I. Climate Change: Mitigation & Adaptation

SN Tool

I4 Adaptation To The Climatic Action: Fluvial & Coastal Flood

I4.2 Protection of Vulnerable Zones

Intent: To assess vulnerable zones to flood risk.

Indicator	Unit of Measure
Share of land in vulnerable areas protected by flooding barriers.	%

Assessment Methodology:

1. Calculate the amount of land in vulnerable areas protected by flooding barriers.
(A)-Numerator
2. Calculate the total extension of land in the neighborhood.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

I. Climate Change: Mitigation & Adaptation

SN Tool

I4 Adaptation To The Climatic Action: Fluvial & Coastal Flood

I4.3 Protection of Buildings from Flooding

Intent: To assess the flood risk of the neighborhood.

Indicator	Unit of Measure
Share of buildings with elevated ground floor in vulnerable sites.	%

Assessment Methodology:

1. Calculate the number of buildings with elevated ground floor exposed to flood risk in the neighborhood.
(A)-Numerator
2. Calculate the total number of buildings in the neigborhood.
(B)-Denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

I. Climate Change: Mitigation & Adaptation

SN Tool

I5 Adaptation To The Climatic Action: Drought

I5.1 Rainwater Collection and Storage from Buildings for Non-Potable Uses.

Intent: To promote rainwater collection for re-use.

Indicator	Unit of Measure
Share of buildings in the neighborhood with a rainwater collection system.	%

Assessment Methodology:

1. Calculate the number of buildings in the neighborhood with a rainwater collection system.
(A)-Numerator

2. Calculate the total number of buildings in the neighborhood.
(B) - Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation

SN Tool

I5 Adaptation To The Climatic Action: Drought

I5.2 Rainwater Collection and Storage for Outdoor Areas.

Intent: To ensure the optimization of supply, storage and distribution of rainwater.

Indicator	Unit of Measure
Share of rainwater collected from paved (non permeable) surfaces in the neighborhood (excluding buildings' roofs and plots)	%

Assessment Methodology:

1. Calculate the amount of rainwater collected from paved (not permeable) surfaces in the neighborhood (excluding buildings' roofs and plots).
(A)-Numerator

2. Calculate the maximum amount of rainwater collectable from paved (not permeable) surfaces in the neighborhood (excluding buildings' roofs and plots).
(B)-Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

I. Climate Change: Mitigation & Adaptation

SN Tool

I5 Adaptation To The Climatic Action: Drought

I5.3 Greywater Collection in Buildings for Non-Potable Uses

Intent: To reduce potable water consumption.

Indicator	Unit of Measure
Share of buildings in the neighborhood with a greywater collection system	%

Assessment Methodology:

1. Calculate the number of buildings in the neighborhood with a greywater collection system.
(A)-Numerator

2. Calculate the total number of buildings in the neighborhood.
(B)-Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

I. Climate Change: Mitigation & Adaptation

SN Tool

I5 Adaptation To The Climatic Action: Drought

I5.4 Local Vegetation

Intent: To promote the use of local vegetation.

Indicator	Unit of Measure
Share of landscape (green areas) plated with local vegetation.	%

Assessment Methodology:

1. Calculate the extent of green areas planted with local vegetation in the neighborhood.
(A)-Numerator

2. Calculate the total extent of green areas in the neighborhood.
(B)-Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

I. Climate Change: Mitigation & Adaptation

SN Tool

I6 Adaptation To The Climatic Action: Wildfire

I6.1 Wildfire Risk

Intent: To assess the wildfire risk of the neighborhood.

Indicator	Unit of Measure
Percentage of the population exposed to wildfire risk.	%

Assessment Methodology:

1. Calculate the amount of population exposed to wildfire risks in the neighborhood.
(A)-Numerator

2. Calculate the total population of the neighborhood.
(B) - Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation

SN Tool

I6 Adaptation To The Climatic Action: Wildfire

I6.2 Fire Protection

Intent: To assess the level of vulnerable zones to fire risk.

Indicator	Unit of Measure
Share of wildfire vulnerable areas protected by fire barriers.	%

Assessment Methodology:

1. Calculate the amount of wildifre vulnerable areas protected by fire barriers.
(A) - Numerator

2. Calculate the total extension of wildfire vulnerable areas in the neighborhood.
(B) - Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation

SN Tool

I6 Adaptation To The Climatic Action: Wildfire

I6.3 Fire Proof Ground

Intent: To assess the risk exposure to fire.

Indicator	Unit of Measure
Share of ground cover materials (excluding buildings' plots) in vulnerable areas that are fire resistant.	%

Assessment Methodology:

1. Calculate the share of ground cover materials (excluding building's plots) in vulnerable areas that are fire resistant in the neighborhood.
(A) - Numerator

2. Calculate the total extension of ground cover materials (excluding buildings' plots) in vulnerable areas in the neighborhood.
(B) - Denominator

3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System

I. Climate Change: Mitigation & Adaptation

SN Tool

I7 Climatic Hazard: Wind

I7.1 Windproof Urban Form

Intent: To minimize the impact of wind in urban contexts.

Indicator	Unit of Measure
Strategies to minimize the impact of wind.	Score

Assessment Methodology:

Evaluate the strategies adopted in the neighborhood to minimize the impact of wind.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

J. Governance

Description of the Information

J: Issue

Jx : Category

J1: Urban Planning
J2: Management and Community Involvemen t
J3: Public Buildings Operatio n

Jx.x : Criterion

Intent: Description of the objective of the criterion

Indicator: Name of the indicator to be calculated

Unit of Measure: Measuring unit of each indicator

Standard: The calculation standard for the criterion

References: The acquiring source of information

J. Governance — SN Tool

J1 Urban Planning

J1.1 Community Involvement in Urban Planning Activities

Intent: To raise the level of community involvement in planning through the redistribution of power.

Indicator	Unit of Measure
Percentage of residents active in public urban planning.	%

Assessment Methodology:

To characterize the indicator's value:
Use of the Sherry Arnstein ladder on citizen participation. Rate the level of users' involvement on planning.

SCORE - 1 (LEVEL 1) Non-participation or manipulation and therapy (in the Arnstein ladder).
SCORE 0 (LEVEL 2) Degrees of tokenism: Information / Consultation / Placation (in the Arnstein ladder).
SCORE 3 (LEVEL 3) Degrees of citizen power: Partnership, delegated power and citizen power (in t he A rnstein ladder) in one phase, like diagnosis or after delivery.
SCORE 5 (LEVEL 4) Degrees of citizen power: Partnership, delegated power and citizen power (in the Arnstein ladder), at every stages.

Standard: Sherry Arnstein

Reference: CESBA MED Project - SNTool Assessment System.

J. Governance — SN Tool

J2 Management & Community Involvement

J2.1 Involvement of Residents in Community Affairs

Intent: To promote involvement of citizens in community affairs.

Indicator	Unit of Measure
Percentage of residents population above 16 years having an involvement in community affairs.	%

Assessment Methodology:

1. Calculate the amount of resident population above 16 years having an involvement in community affairs.
(A) - Numerator
2. Calculate the total population of the neighborhood above 16 years.
(B) - Denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard: .

Reference: CESBA MED Project - SNTool Assessment System.

J. Governance — SN Tool

J3 Public Buildings Operation

J3.1 Public Buildings Sustainability

Intent: To evaluate the number of buildings with a certifi- cation label.

Indicator	Unit of Measure
Percentage area of the public buildings with recognized sustainability certifications on ongoing operations.	%

Assessment Methodology:

1. Calculate the floor area of public buildings with certification to a recognized standard for ongoing building operations (m^2)
(A) - Numerator
2. Calculate the total floor area of public buildings (m^2)
(B) - Denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard: .

Reference: CESBA MED Project - SNTool Assessment System.

J. Governance — SN Tool

J3 Public Buildings Operation

J3.2 Operating Energy Costs for Public Buildings

Intent: To evaluate the operational amount energy costs for public buildings.

Indicator	Unit of Measure
Aggregated annual operating energy cost per aggregated indoor useful floor area.	$/m2/yr

Assessment Methodology:

1. Identify all the public buildings in the urban area and calculate their useful floor area (m^2).
2. Calculate the aggregated annual operating energy cost of the public buildings identified (€)
3. Calculate the aggregated annual operating energy cost per aggregated indoor useful floor area, per year (€/m /yr)
Note: in case of buildings in use, 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.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

J. Governance — SN Tool

J3 Public Buildings Operation

J3.3 Energy Consumption of Public Buildings

Intent: To evaluate the energy efficiency of public buildings.

Indicator	Unit of Measure
Total end use of energy in public buildings within a neighborhood by the total indoor useful area of the buildings.	kWh/m^2

Assessment Methodology:

1. Calculate the total end use of energy in public buildings withing the neighborhood (Kwh).
(A) - Numerator
2. Calculate the total indoor useful area of these buildings (m^2)
(B) - Denominator
3. Calculate the value of the indicator as:
A/B (%)

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

4.Key performance indicators

Definition:

KPIs are a set of assessment criteria that during the contextualisation process must be included in the local versions of the SNTool MED.

KPIs are linked to the global sustainability goals in the Mediterranean and they are meaningful in any region.

KPIs allows to compare directly the perforamnce of neighbourhoods in different cities.

The value of KPIs is reported in the SMC Passport.

There are 14 key performance indicators :

A. Use of land and biodiversity: 0
B. Energy: 6
C. Water: 1
D. Solid waste: 1
E. Environmental quality: 1
F. Transportation and mobility: 2
G. Social aspects: 1
H. Economy: 0
I. Climate change: mitigation and adaptation: 2
J. Governance: 0

B2 Energy Consumption

★B2.1 Total Final Thermal Energy Consumption for Building Operations

Intent: To estimate urban thermal energy consumption for building operations

Indicator	Unit of Measure
Aggregated annual total final thermal energy consumption per aggregated indoor useful floor area	kWh/m²/yr

Assessment Methodology:

To perform the calculation, it is possible to use metered or estimated data. The source of data must always be clearly declared.

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. Estimated data shall be used for evaluating alternative scenarios in planning and decision-making processes. In reporting the indicator's value, the data source must be indicated.

Use of Estimated Data

1. In the calculation of the final thermal energy consumption, the following energy uses must be considered: Heating, Cooling, Domestic Hot Water.
2. For each building in the local area, calculate the annual final thermal energy consumption in kilowatts hours (kWh/year)
3. Sum the annual final thermal energy consumption of each building up to an aggregated total annual final thermal energy consumption (kWh/year)
4.Sum the indoor useful area of each building in the area up to an aggregated indoor useful area value (m²)
5. Calculate the indicator's value as: aggregated annual total final thermal energy consumption/aggregated indoor useful area (kWh/m²/year)
Note: Calculations are based on EN 13790 using the quasi-steady state monthly method.

Use of Metered Data

1. In the evaluation of the final thermal energy consumption, the following energy uses must be considered: Heating, Cooling, Domestic Hot Water
2. For each building in the local area, collect the metered annual final thermal energy consumption in kilowatt hours (kWh/year)
3. Sum the annual final thermal energy consumption of each building up to an aggregated total annual final thermal energy consumption (kWy/year)
4.Sum the annual final thermal energy consumption of each building up to an aggregated total annual final thermal energy consumption (kWy/year)
5.Calculate the indicator's value as: aggregated annual total final thermal energy consumption/aggregated indoor useful area (kWh/m²/year)
Note: The metered energy consumption is suitable for the indicator's calculation only if the building has been in use for 3-years, in order to ensure that there has been time enough to have building systems reach their normal operating efficiency levels, and also to factor out unusual seasonal variations. This means that the buildings assessed are at least 3 years old.

Standard: EN 13790

Reference: CESBA MED Project - SNTool Assessment System

B2 Energy Consumption

★B2.4 Total Final Electrical Energy Consumption for Building Operations

Intent: To estimate urban electrical energy consumption for building operations.

Indicator	Unit of Measure
Aggregated annual total final electrical energy consumption per aggregated indoor useful floor area.	kWh/m²/yr

Assessment Methodology:

To perform the calculation, it is possible to use metered or estimated data. The source of data must always be clearly declared.

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. Estimated data shall be used for evaluating alternative scenarios in planning and decision-making processes. In reporting the indicator's value, the data source must be indicated.

Use of Estimated Data

1. In the calculation of the final electrical energy consumption, the following energy uses must be considered: heating, cooling, domestic hot water and, lighting.
2. For each building in the local area, calculate the annual final electrical energy consumption in kilowatts hours (kWh/year).
3. Sum the annual final electrical energy consumption of each building up to an aggregated total annual final electrical energy consumption (kWh/year).
4.Sum the indoor useful area of each building in the area up to an aggregated indoor useful area value (m²).
5. Calculate the indicator's value as: aggregated annual total final electrical energy consumption/aggregated indoor useful area (kWh/m²/year).
Note: Calculations are based on EN 13790 using the quasi-steady state monthly method.

Use of Metered Data

1. In the evaluation of the final electrical energy consumption, the following energy uses must be considered: Heating, Cooling, Domestic Hot Water and Lighting.
2. For each building in the local area, collect the metered annual final electrical energy consumption in kilowatt hours (kWh/year)
3. Sum the annual final electrical energy consumption of each building up to an aggregated total annual final electrical energy consumption (kWy/year)
4.Sum the annual final thermal energy consumption of each building up to an aggregated total annual final electrical energy consumption (kWy/year)
5.Calculate the indicator's value as: aggregated annual total final electrical energy consumption/aggregated indoor useful area (kWh/m²/year)
Note: The metered energy consumption is suitable for the indicator's calculation only if the building has been in use for 3-years, in order to ensure that there has been time enough to have building systems reach their normal operating efficiency levels, and also to factor out unusual seasonal variations. This means that the buildings assessed are at least 3 years old.

Standard: EN 13790

Reference: CESBA MED Project - SNTool Assessment System.

B2 Energy Consumption

★B2.7 Total Primary Energy Demand for Building Operations

Intent: To reduce the need of primary energy for building operations

Indicator	Unit of Measure
Aggregated annual total primary energy consumption per aggregated indoor useful floor area	kWh/m²/yr

Assessment Methodology:

To characterize the indicator's value:

1.In the calculation of the primary energy consumption, the following energy uses must be considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting.

2.For each building in the local area, calculate the annual final (thermal and electric) energy consumption per energy carrier in kilowatt hours (kWh/year)

3.Sum the annual final energy consumption of each building up to an aggregated annual final energy consumption per energy carrier (kWh/year).

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/year).

5.Sum the annual primary energy consumption per energy carrier up to an aggregated annual total primary energy consumption
(kWh/year).

6.Sum the indoor useful area of each building in the area up to an aggregated indoor useful area value (m²).

7.Calculate the indicator's value as:
Aggregated annual total primary energy consumption / Aggregated indoor useful area
(kWh/m² /year).

Note: Calculations are based on EN 13790 using the quasi-steady state monthly method.

Standard: EN 13790

Reference: CESBA MED Project - SNTool Assessment System.

B3 Renewable Energy

★B3.1 Share of Renewable Energy On-Site, Relative to Final Thermal Energy Consumption for Building Operations

Intent: To incentive the consumption and production of renewable energy

Indicator	Unit of Measure
Total consumption of final thermal energy generated from renewable sources on-site by total final thermal energy consumption	%

Assessment Methodology:

To perform the calculation, it is possible to use metered or estimated data. The source of data must always be clearly declared.
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. Estimated data shall be used for evaluating alternative scenarios in planning and decision-making processes. In reporting the indicator's value, the data source must be indicated.

Use of Estimated Data

1. In the calculation of the final thermal energy consumption, the following energy uses must be considered: heating, cooling, domestic hot water.
2. For each building in the local area, calculate the annual final thermal energy consumption in kilowatt hours (kWh/year).
3. Sum the annual final thermal energy consumption of each building up to an aggregated total annual final thermal energy consumption (kWh/year).
4. For each building in the local area, calculate the annual final thermal energy consumption from on-site renewable energy sources in kilowatt hours.
5. Sum the annual final thermal energy consumption from on-site renewable sources of each building up to an aggregated total annual final thermal energy consumption from on-site renewable sources (kWh/year).
6. Calculate the indicator as:
Annual total final thermal energy consumption from on-site renewable sources / Annual total final thermal energy consumption.
Note: Calculations are based on EN 13790 using the quasi-steady state monthly method.

Use of Metered Data

1. In the evaluation of the final thermal energy consumption, the following energy uses must be considered: heating, cooling, domestic hot water.
2. For each building in the local area, collect the metered annual final thermal energy consumption) in kilowatt hours (kWh/year).
3. Sum the annual final thermal energy consumption of each building up to an aggregated total annual final thermal energy consumption (kWh/year).
4. For each building in the local area, collect the monitored annual final thermal energy consumption from on-site renewable sources in kilowatt hours (kWh).
5. Sum the annual final thermal energy consumption from on-site renewable sources of each building up to an aggregated total annual final thermal energy consumption from on-site renewable sources (kWh/year).
6. Calculate the indicator as:
Annual total thermal energy generation from on-site renewable energy sources / Annual total final thermal energy consumption.

Note: The metered energy consumption is suitable for the indicator's calculation only if the building has been in use for 3-years, in order to ensure that there has been time enough to have building systems reach their normal operating efficiency levels, and also to factor out unusual seasonal variations. According to the Renewables Energy Directive (RED 2018),, energy from renewable sources means energy from renewable non-fossil sources, namely wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. Heat pumps enabling the use of aerothermal, geothermal or hydrothermal heat at a useful temperature level need electricity or other auxiliary energy to function. The energy used to drive heat pumps should therefore be deducted from the total usable heat. Only heat pumps for which SPF > 1,15 * 1/η shall be taken into account.

Standard: EN 13790

Reference: CESBA MED Project - SNTool Assessment System.

B3 Renewable Energy

★B3.4 Share of Renewable Energy On-Site, Relative to Final Electric Energy Consumption

Intent: To incentive the consumption and production of renewable energy

Indicator	Unit of Measure
Total consumption of final electric energy generated from renewable sources on-site divided by the total final electric energy consumption	%

Assessment Methodology:

To perform the calculation, it is possible to use metered or estimated data. The source of data must always be clearly declared.
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. Estimated data shall be used for evaluating alternative scenarios in planning and decision-making processes. In reporting the indicator's value, the data source must be indicated. Exported energy is the one delivered by technical systems through the system boundary (urban area) and used outside the system boundary. Exported energy is a benefit beyond the system boundary and it has not to be included in the calculation.

Use of Estimated Data

1.In the calculation of the final electric energy consumption, the following energy uses must be considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting.
2.For each building in the local area, calculate the annual final electric energy consumption in kilowatt hours (kWh/year).
3.Sum the annual final electric energy consumption of each building up to an aggregated total annual final electric energy consumption (kWh/year).
4.For each building in the local area, calculate the annual final electric energy consumption from on-site renewable energy sources in kilowatt hours
5.Sum the annual final electric energy consumption from on-site renewable sources of each building up to an aggregated total annual final electric energy consumption from on-site renewable sources (kWh/year).
6.Calculate the indicator as:

Annual total final electric energy consumption from on-site renewable sources / Annual total final electric energy consumption.

Note: Calculations are based on EN 13790 using the quasi-steady state monthly method.

Use of Metered Data

1.In the evaluation of the final electric energy consumption, the following energy uses must be considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting water.
2.For each building in the local area, collect the metered annual final electric energy consumption) in kilowatt hours (kWh/year).
3.Sum the annual final electric energy consumption of each building up to an aggregated total annual final electric energy consumption (kWh/year).
4.For each building in the local area, collect the monitored annual final electric energy consumption from on-site renewable sources in kilowatt hours (kWh).
5.Sum the annual final electric energy consumption from on-site renewable sources of each building up to an aggregated total annual final electric energy consumption from on-site renewable sources (kWh/year).
6.Calculate the indicator as:

Annual total electric energy generation from on-site renewable energy sources / Annual total final electric energy consumption.

Note: The metered energy consumption is suitable for the indicator's calculation only if the building has been in use for 3-years, in order to ensure that there has been time enough to have building systems reach their normal operating efficiency levels, and also to factor out unusual seasonal variations.
According to the Renewables Energy Directive (RED 2018), energy from renewable sources means energy from renewable non-fossil sources, namely wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.
Heat pumps enabling the use of aerothermal, geothermal or hydrothermal heat at a useful temperature level need electricity or other auxiliary energy to function. The energy used to drive heat pumps should therefore be deducted from the total usable heat. Only heat pumps

Standard: EN 13790
Reference: CESBA MED Project - SNTool Assessment System.

B3 Renewable Energy

★B3.7 Share of Renewable Energy On-Site, Relative to the Total Primary Energy Consumption for Building Operations

Intent: To incentive the consumption and production of renewable energy

Indicator	Unit of Measure
Total consumption of primary energy generated from renewable sources on-site divided by the total final electric energy consumption	%

Assessment Methodology:

1. In the calculation of the primary energy consumption, the following energy uses must be considered: heating, cooling, ventilation, auxiliaries, domestic hot water and lighting.
2. For each building in the local area, calculate the annual final (thermal and electric) energy consumption per energy carrier in kilowatt hours (kWh/year)
3. Sum the annual final energy consumption of each building up to an aggregated annual final energy consumption per energy carrier (kWh/year).
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/year).
5. Sum the annual primary energy consumption per energy carrier up to an aggregated annual total primary energy consumption (kWh/year).
6. For each building in the local area, calculate the annual final (thermal and electric) energy consumption per on-site renewable energy source in kilowatt hours (kWh/year) – i.e. P.V, solar thermal panels, etc.
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/year).
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/year).
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.

Note Calculations are based on EN 13790 using the quasi-steady state monthly method.
Exported energy is the one delivered by technical systems through the system boundary (urban area) and used outside the system boundary. Exported energy is a benefit beyond the system boundary and it has not to be included in the calculation

Standard: EN 13790
Reference: CESBA MED Project - SNTool Assessment System.

C2 Water Consumption

★C2. 3 Consumption of Potable Water in Residential Buildings

Intent: To make an efficient use of water resources.

Indicator	Unit of Measure
Annual potable water consumption per occupant.	L/occupant/yr

Assessment Methodology:

The potable water consumption is calculated based on metered data for water consuming appliances and sanitary fittings in the buildings.

The scope of the criterion includes the use of potable water for:

-Drinking water.
-Water for sanitation.
-Domestic hot water.
-Water for washing machine.
-Water for dishwasher.
-Water for cleaning.

To calculate the indicator:

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 (litres).

2. Sum the annual potable water consumption of each building up to an aggregated annual total potable water consumption (litres/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.

Standard: -

Reference: CESBA MED Project - SNTool Assessment System.

D2 Solid Waste Management

★D2.2 Access to Solid Waste and Recycling Collection Points

Intent: To improve separate collection disposal, avoiding to burn waste.

Indicator	Unit of Measure
Percentage of inhabitants with access to solid waste and recycling collection points within a 400 meters walking distance.	%

Assessment Methodology:

1. Calculate the share of inhabitant living with 400m access to the solid waste and recycling collection points in the neighborhood.

(A) - Numerator

2. Calculate the neighborhood's population.

(B) - Denominator

3. Calculate the value of the indicator as :

A/B (%)

Standard: -

Reference: UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

E. Environmental Quality

SN Tool

E1 Air Quality

★E1. 2 Particulate Matter (PM_{10}) Concentration

Intent: To assess the long-term ambient air quality with respect to particulates <10 mu (PM_{10}) in the neigborhood.

Indicator	Unit of Measure
Number of days within a year that PM_{10} concentration exceed the daily limit	days/yr

Assessment Methodology:

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.

Standard:
-

Reference:
CESBA MED Project - SNTool Assessment System.

F. Transportation and Mobility

SN Tool

F1 Performance of Mobility Services

★F1. 1 Performance of the Public Transport System

Intent: To determine the performance of the public transportation system.

Indicator	Unit of Measure
Percentage of inhabitants that are within a 400 meters walking distance of at least one public transportation service stop.	%

Assessment Methodology:

1. Locate the public/municipal transport stops with daily total service frequency of at least 20 trips, that serve the neighborhood.

2. Locate all the residential buildings in the neighborhood with a walking distance from their entrance to at least one of the located stops up to 400 meters.

3. Calculate the occupants of the selected buildings.

4. Calculate the total population of the neighborhood.

5. Calculate the indicator's value as the percentage of the occupants of the selected buildings to the total population of the neighborhood.

For the calculation of the indicator the following are considered:

- Only residents of the neighborhood and not working people in the area.

- A stop must have a daily total service frequency of at least 20 trips.

Standard:
Global Platform for Sustainable Cities - Urban Sustainability Frame

Reference:
CESBA MED Project - SNTool Assessment System.

F2 Green Mobility

★F2. 3 Bycicle Network

Intent: To emphazise the use of bycicles as a method to reduce traffic congestion and pollution.

Indicator	Unit of Measure
Total length of bicycle paths in the neighborhood per inhabitant.	m/inhabitant

Assessment Methodology:

1. Calculate the total length of bicycle paths/lanes in the neighborhood.

(A) - Numerator.

2. Estimate/Calculate the total number of inhabitants in the neighborhood.

(B) - Denominator.

3. Calculate the value of the indicator as:

A/B

Standard:
-

Reference:
UNECE-Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

G3 Availability of Public, Private Facilities and Services

★G3.1 Bycicle Network

Intent: To determine the accessibility and proximity of key services for local residents (e.g schools. sports facilities, supermarkets, community buildings, etc.)

Indicator	Unit of Measure
Percentage of inhabitants that are within an 800 meters walking distance of at least 3 key services.	%

Assessment Methodology:

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.

Note

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.
10. Culture and leisure.

It is possible to consider only one key service from each of the ten categories.
Private services can be considered.

Standard:
-

Reference:
CESBA MED Project - SNTool Assessment System.

I1 Climate Change Mitigation

★I1.1 Greenhouse Gas Emissions

Intent: To assess the adverse contribution the neighborhood is making to climate change.

Indicator	Unit of Measure
Total amount of greenhouse gases (equivalent carbon dioxide units) generatede from building operations over a calendar year per inhabitant.	t CO_2 eq./ ihbaitant /yr

Assessment Methodology:

1. Calculate the total amount of greenhouse gases in tonees (equivalent carbon dioxide units) generated over a calendar year by all activities within the neighborhood, including indirect emissions outside neighborhood boundaries.

(A) - Numerator

2. Calculate the total population of the neighborhood.

(B)-Denominator

3. Calculate the value of the indicator as:

A/B

Standard:
-

Reference:
ISO 37120: Sustainable Cities and Communities - Indicators for City Services and Quality of Life.

I3 Adaptation to the Climatic Action: Pluvial Flood

★I3.1 Permeability of Land

Intent: To improve the permeability of the area.

Indicator	Unit of Measure
Percentage of the weighted ground permeability.	%

Assessment Methodology:

1. Calculate the size (Sa) of the neighborhood area (m^2)
2. Calculate the size of the surfaces with a different paving or occupied by constructions in the neighborhood area (i.e. green areas, surfaces paved with asphalt, surfaces occupied by buildings, etc.). Include all the surfaces in the neighborhood area so that:

$$Sa = \sum_{i=1}^{n} Sa_1$$

Sa = total surface of the neighborhood area
Sa,i = surface i-th in the neighborhood area (m^2)

- Calculate the real permeability of soil considering the permeability coefficient of each surface.

$$Sa.perm = \sum_{i=1}^{n} (Sai\ x\ ai)$$

Sa,i = i-th surface in the neighborhood area (m^2)
ai= permeability coefficient of the i-th surface

- Calculate the indicator's value as:

$$\frac{Sa\ perm}{Sa}\ x\ 100$$

Note:
• 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 = 0.3
- Interlocking elements leaning on gravel = 0.3
- Interlocking elements leaning on concrete pavement = 0
- Continuous pavements leaning on concrete = 0
- Asphalt = 0

Standard:
-

Reference:
ISO 37120: Sustainable Cities and Communities - Indicators for City Services and Quality of Life.

5.SMC passport

Sustainable MED cities passport

Definition:

The SMC Passport template is a graphical visualisation of the main information concerning the assessment and it includes two different pages.
The first one contains general information as well as maps and significant images, in order to better represent the features of the analysis.
The second page of the Passport contains the list of the Key Performance Indicators, together with their code, criterion, unit of measure and The third page shows the sustainability results achieved by the neighbourhood using the contextualised version of SNTool.

Observation:

The sustainability score produced by SMC rating system is valid only for the specific geographical area, as it reflects the local priorities and construction practice.

In order to be able to compare the sustainability performance between buildings, neighborhoods or cities in the different Mediterranean regions, it is necessary to use indicators expressed in absolute values instead of scores.

Name of the Pilot Neighborhood

Name: .....

Total area (km²): .....

General location: .....

City: .....

MAP

SMC Passport Neighbourhood

Short Description

.....

.....

.....

.....

IMAGE

Demography

Residential population in the area	.....Inhab
Urban residential density	.....Inhab/ha
Population working in the area	.....Persons
Other info	.....

Climate

Annual precipitation	.....mm
Solar irradiance on horizontal	.....kWh/m²y
Winter / summer design temperature	.....ºC
Heating degree days (base 18ºC)	.....HDD

Building Stock

Number of buildings in the area	.....number
Gross area of residential Buildings	.....m²
Gross area office buildings	.....m²
Gross area of retail/ Commercial buildings	.....m²
Total gross area of all buildings	.....m²
Total gross area of buildings constructed before 1975	.....m²
Average building density (total m²/ land surface in m²)	.....number

Use of land and morphology

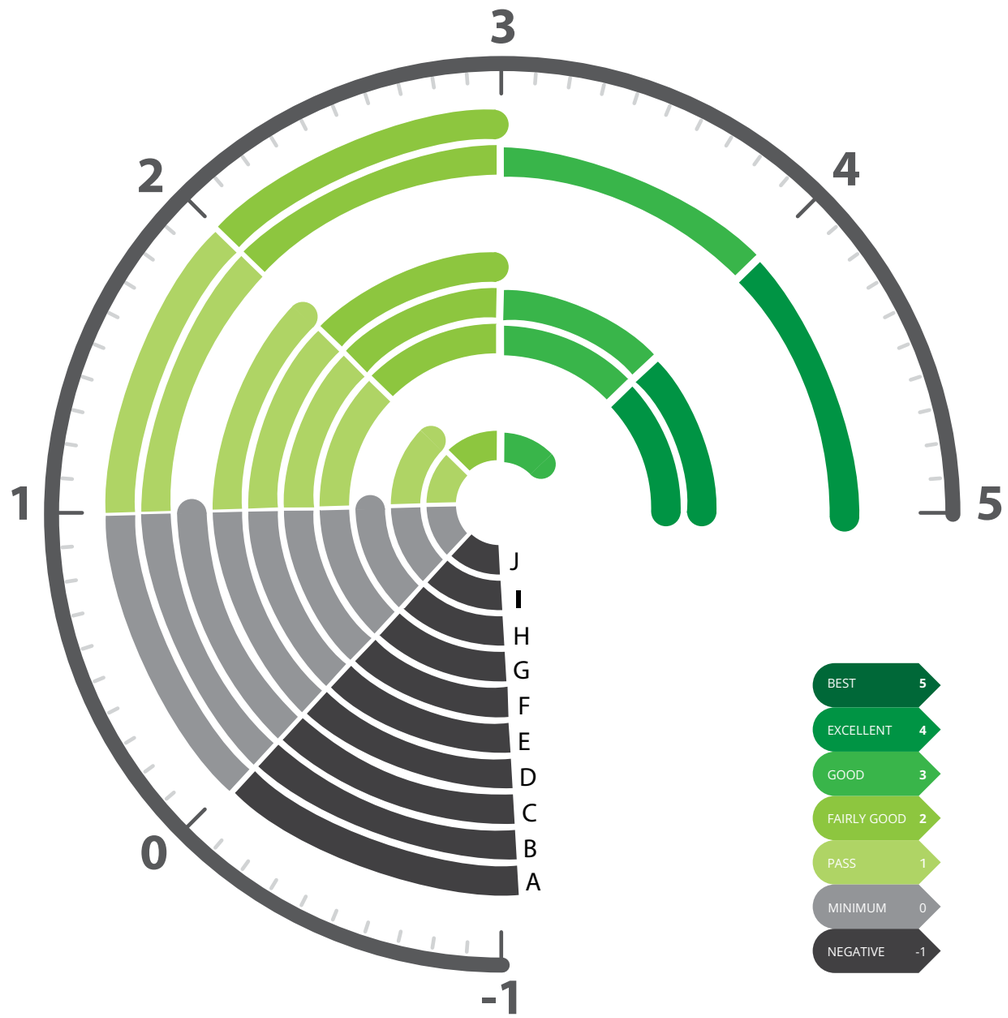
Percentage of consumed land area	.....%
Total lenght of urban streets with sidewalks	.....km
Total lenght of bicycles lanes	.....m
Other relevant info	.....

SMC Key Performance Indicators

Sustainable MED Cities

CODE	CRITERIA	INDICATOR	VALUE	UNIT
B2.1	Total final thermal energy consumption for building operations	Aggregated annual total final thermal energy consumption per aggregated indoor useful floor area	.....	kWh/m²/yr
B2.4	Total final electric energy consumption for building operations	Aggregated annual total final electric energy consumption per aggregated indoor useful floor area	.....	kWh/m²/yr
B2.7	Total primary energy demand for building operations	Aggregated annual total primary energy consumption per aggregated indoor useful floor area	.....	kWh/m²/yr
B3.1	Share of renewable energy on-site, in total final thermal energy consumption for building operations	Annual total thermal energy consumption from on-site renewable energy sources / annual total final thermal energy consumption.	.....	%
B3.4	Share of renewable energy on-site, in final electrical energy consumption for building operations	Annual total electrical energy consumption from on-site renewable energy sources / annual total electrical energy consumption.	.....	%
B3.7	Share of renewable energy on-site in total primary energy consumption for building operations	Annual total consumption of primary energy generated from renewable sources on-site / total primary energy consumption.	.....	%
C2.3	Consumption of potable water in residential buildings	Annual potable water consumption per occupant	.....	L /occupant/yr
D2.2	Access to solid waste and recycling collection points	Percentage of inhabitants with access to solid waste and recycling collection points within 400 meters walking distance.	.....	%
E1.2	Particulate matter (PM10) concentration	Number of days within a year that PM10 concentration exceeds the daily limit.	.....	days/yr
F1.1	Performance of the public transport system	Percentage of inhabitants that are within 400 meters walking distance of at least one public transportation service stop.	.....	%
F2.3	Bicycle network	Length of bicycle paths in the neighborhood per inhabitant.	.....	m/inhabitant
G3.1	Availability and proximity of key services	Percentage of inhabitants that are within 800 meters walking distance of at least 3 key services.	.....	%
I1.1	Greenhouse gas emissions	Total amount of greenhouse gases (equivalent carbon dioxide units) generated from buildings' operation over a calendar year per inhabitant.	.....	t CO_2 eq./ inhabitant/yr
I3.3	Permeability of land	Percentage of weighted ground permeability	.....	%

Visualisation of the sustainability assessment results



FINAL SCORE 3,38

	Score	Weight	
A Use of land and biodiversity	3,1	11,2%	0,34
B Energy	5	27%	1,35
C Water	1,1	20%	0,22
D Solid Waste	2,2	2,7%	0,05
E Environmental quality	3,2	10,5%	0,33
F Transportation and mobility	5	10%	0,5
G Social Aspects	5	4,4%	0,22
H Economy	1,1	2%	0,02
I Climate Change: mitigation and adaptation	2,4	8,6%	0,2
J Governance	4,2	3,6%	0,15
		100%	3,38

Sustainability Assessmet Results

The document summarises the scores achieved in each issue of the assessment system, giving the final score of the sustainability.

Scores are then illustrated using a tachometer with a graduated scale which goes from the -1 (negative performance) to the 5 points (best performance).

The Certificate template is a graphic label which allows, in a visual way, to understand the sustainability performance obtained by the neighbourhood.

6. References

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SNTool MED

Sustainable Neighborhood Tool

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