



Life CLIVUT

Climate Value of Urban Trees

LIFE18 GIC/IT/001217

ACTION D MONITORING OF THE IMPACTS OF THE PROJECT ACTIONS:

D1 Urban Climate Green Asset Strategy monitoring protocol

D2 Socio Economic assessment monitoring protocol

August 2020



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TITLE	ACTION D MONITORING OF THE IMPACTS OF THE PROJECT ACTIONS
ACTION/TASK RELATED	D.1 LCA of Environmental and Climate of the Urban Climate Green Assets Strategy
ACTION/TASK RELATED	D2 Monitoring of Socio-Economic Impact
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Introduction

Climate change has been identified as one of the main threats to humanity and to the long-term persistence of the living world in general (IPCC 2007).

The LIFE CLIVUT General Objective is to develop and implement the Urban Climate Green Asset Strategy in medium-size Mediterranean cities based on the shared planning and management of the urban green and natural spaces by urban planners and citizens.

The Strategy, designed according with an ecosystem-based approaches, will maximize urban green asset climate mitigation potential and deliver biodiversity and nature conservation benefits improving human safety, health and wellbeing.

Action D “MONITORING OF THE IMPACTS OF THE PROJECT ACTIONS” is divided in 2 sub actions:

- D1 LCA of Environmental and Climate of the Urban Climate Green Assets Strategy
- D2 Monitoring of Socio-Economic Impact

It is specifically designed to measure the effectiveness of the project actions, as compared to the initial situation, the objectives and expected results.



Monitoring Process during Life Clivut project

The monitoring activity will be realized mainly in three times during the project implementation through the collection and elaboration of quantitative or qualitative information related to the project progress in each Municipality.

The first one at the beginning of the implementation phase, end of 2020 – a second one from October 2021 to December 2021 - and a third one at the end of the project that corresponds to the beginning of 2023.

Table 1: Timing for data collection of the quantitative data

	Timing
First Monitoring Activity (Defining the Baseline)	From November 2020 to end of February 2021 after the approval of the Monitoring Protocol (December 2020)
Mid-term monitoring activities	October 2021 to December 2021
Third Monitoring Activity (Including the Impact Assessment of the measures included in the Green Asset Strategic Plan)	At the end of the project (end of 2022 and beginning of 2023).

For specific Actions the monitoring will regard qualitative data focused on the monitoring and assessment of the increase of awareness and Knowledge of the different targets of the project: citizens, Public Administration and Planners, Students, Entrepreneurs. It will be carried on through enquires to the different participants. Therefore the data collections will be implemented in two times at the beginning and at the end of related actions/sub-actions.



ACTION D1: LCA of Environmental and Climate of the Urban Climate Green Assets Strategy

Quantitative Indicators

The indicators chosen for the quantitative monitoring of the effects of the project with respect to climate change mitigation objectives are described below.

Please note that the indicators refer to the impact of the project on the urban context.

1. Green areas in pilot municipality

The objective of Life Clivut is to calculate and disseminate the benefits that trees in urban areas bring for the reduction of the Causes (Impact) of Climate Change (CO2 emissions, PM10,) and the mitigation of their effects on the well-being of citizens (increase of the Temperature in the city better known as Heat Island, lung diseases etc).

In each pilot city data from the green areas and trees (public and private) will be collected . The monitoring will be carried out through the official statistical sources, the surveys of existing data within the Municipal Administrations of the pilot cities and also through the direct census of trees (Action A3 by the Project partners, C2 with the Citizens, and C3 with the students).

The "climatic" services of the trees present in each pilot city will be estimated through the algorithms developed in action A4 and present in the Web App created in the project and available at www.lifeclivut.treedb.eu.

CRITERIA	INDICATOR	DATA TYPOLOGY	PERIOD			SOURCES	
			Baseline	years of project	End Project	BASELINE	END PROJECT
PUBLIC AND PRIVATE GREEN AREAS	Public Green Areas	HA	2019	2020-2022	2023	EUROSTAT/ Municipality	EUROSTAT/ Municipality
	Private green Areas	Ha	2019		2023	MUNICIPALITY land use data /estimation from satellite photos	MUNICIPALITY land use data /estimation
	Trees in public areas	Number and species	2019		2023	Municipality	Municipality /Life Clivut Platform
	Trees in private areas	Numbers	2019		2023	MUNICIPALITY land use data /estimation from satellite or aerial photos	Estimation from satellite or aerial Photo



Trees planted in public areas funded by the project	Numbers and species		2020-2022	2023		Municipality /Life Clivut Platform
Trees planted in public areas (other funds)	Numbers and species		2020-2022	2023		Municipality/Life Clivut Platform
Trees planted in private areas funded by the project	Numbers and species		2020-2022	2023		Life Clivut Platform
Trees planted in private areas (other funds)	Numbers and species		2020-2022	2023		
Trees substituted in public areas	Numbers and species	2019	2020-2022	2023	Municipality	Municipality/ Life Clivut Platform
Trees substituted in private areas (authorized by Municipality)	Numbers and species	2019	2020-2022	2023	Municipality	Municipality/ Life Clivut Platform
/Trees substituted in private areas (others)	Numbers and species		2020-2022	2023		Life Clivut Platform
Area covered by new and substituted trees	ha influenced by trees mitigation action			2023		Life Clivut Platform

2. CO2 capture and storage (sequestration)

Life Clivut support the 4 pilot Municipalities to design and adopt climate mitigation strategies and plan through the management of Urban Trees.

The CO2 reduction due to the increase / replacement of trees, both in the Pilot Cities and in the transfer cities, will be monitored using the data from the monitoring activities regarding the Green Areas referred to in the previous point.

- Estimates of CO2 capture will be made using the algorithms developed in action A4 and present on the www.lifeclivut.tredb.eu, platform based on the following tracking data: number of public trees present at the start of the base line project (survey at the municipality and estimate through the data produced by the A2 Action census in the 10 pilot areas);



- New planting of trees during the project both funded directly by the project and from other sources of public and private funding (survey of the Administrations and activities with citizens):
- Replacement of both public and private trees with species recommended by the Strategic Plan (survey by the Municipal Administrations and activities with citizens).

For each of these indicators, will be calculated the annual CO2 sequestration capacity and storage during their useful life of the detected trees.

CRITERIA	INDICATOR	DATA TYPOLOGY	PERIOD			SOURCES		METHODOLOGY
			BASELINE	YEARS OF PROJECT	END PROJECT	BASELINE	END PROJECT	
Carbon capture and storage	Carbon captured and stored by trees in public areas	tons/years	2019	2020-2022	2023	Estimation on trees data from Municipality	Life Clivut Platform	Calculated by the platform
	Carbon captured and stored by private trees registered in the LIFE CLIVUT Platform	tons/years		2020-2022	2023			
Increase in Carbon capture and storage	Carbon captured and stored by new planted trees (in public and private areas)	tons/years		2020-2022	2023			
	Carbon captured and stored by substituted trees (in public and private areas)	tons/years		2020-2022	2023			

The calculation will allow the construction of the following indicators for CO2 capture:

- 1) CO2 reduction due to the planting of new trees in the 4 pilot cities;
- 2) CO2 reduction due to the replacement of existing trees with more performing species from a climatic point of view in the 4 pilot cities;



- 3) CO₂ reduction due to the planting of new trees for the transfer of project actions to other cities;
- 4) CO₂ reduction due to the replacement of existing trees with more performing species from the climate point of view for the transfer of project actions to other cities.

Carbon captured by trees in public areas	End 2020	End 2021	End project
	Ton/years		
Pilot Municipalities	Estimated using the 10 pilot census areas		
Transfer Municipalities	N.A		

Carbon captured by trees in private areas	End 2020	End 2021	End project
	Ton/years		
Pilot Municipalities	Estimated using the 10 pilot census areas		
Transfer Municipalities	N.A		

3. Air Quality

For air quality, the main indicators that are monitored at European level will be detected in the 4 Pilot Cities, shown in the following table:

CRITERIA	INDICATOR	DATA TYPOLOGY	PERIOD			SOURCES		METHODOLOGY
			BASELINE	YEARS OF PROJECT	END PROJECT	BASELINE	END PROJECT	
Air	CO ₂	per month/	2019	2020-	2023	Regional	Regional	Data from



quality	NOX	media per years		2022		Agency for Environment	Agency for Environment	monitoring stations in the Municipality
	PM 10							
	SO2							

4. PM10 Sequestration

The data relating to the presence of trees in public and private areas, new plants and replacements will allow to calculate the quantity of Pm10 captured.

For the calculation of the captured quantities, the algorithms present in the Life Clivut platform will be used and based on the presence of PM10 in the atmosphere and the climatic conditions that are detected by the air quality monitoring systems and the weather shelters in the cities.

For each pilot city will be detected:

1. List of environmental control stations:
 - name
 - coordinate x
 - coordinate y
 - The system searches for the station nearer to the tree position.

2. For each station and for each month:
 - station name
 - year
 - month
 - wind = monthly mean wind speed (m/s)
 - rain = days of the month - rainy days (number)
 - pm10 = monthly mean (g/m³)

This will allow to evaluate the indicator as per the following table:

CRITERIA	INDICATOR	DATA TYPOLOGY	PERIOD			SOURCES		METHODOLOGY
			BASELINE	YEARS OF PROJECT	END PROJECT	BASELINE	END PROJECT	
Pm10 Sequestration	Pm10 Captured by trees in public areas	mg per years and per month	2019	2020-2022	2023	Estimation on trees data from Municipality	Life Clivut Platform	Calculated by the platform



	Pm10 Capture by trees registered in the Life Clivut Platform	mg per years and per month		2020-2022	2023	Estimation on trees registred		
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5. Reduction of electricity consumption

Trees have an important reducing effect on temperature in the City, which is normally 3-5 °C degrees higher than in the surrounding rural areas (Urban Heat Island).

The contribution of the project to the temperature reduction of the pilot cities will be estimated according to the different methods:

a) Estimation of the evapotranspiration of new trees planted or replaced and transformation. Data from the weather stations in the 4 Pilot Cities will be used to estimate the trees evapotranspiration.

CRITERIA	INDICATOR	DATA TYPOLOGY	PERIOD			SOURCES		METHODOLOGY
			BASELINE	YEARS OF PROJECT	END PROJECT	BASELINE	END PROJECT	
Electricity consumption reduction	Reduction on electricity due to evapotranspiration of new planted trees	Min & Max Daily Temp		2020-2022	2023	Municipality Weather Municipality	Calculated by the platform	

b) temperature monitoring inside buildings of representative types of those present in pilot cities in environments where the external walls are shaded by trees.

In each pilot city, 3-4 types of representative buildings will be identified. The types will be differentiated on the basis of construction materials and their energy classification. Sample buildings will be chosen based on the presence of areas on the same wall that are shaded by trees and areas completely exposed to radiation.

In the rooms behind the façade, from June onwards, temperature and humidity meters will be placed to detect the temperature at different times of the day. The temperature in the rooms shaded by trees and in those exposed to direct solar radiation will be compared. Finally, the estimate of the electricity required



will be carried out and both rooms will be brought to a temperature of 20-21 ° C through air conditioning equipment.¹

6. Biodiversity

Another important indicator will be the Biodiversity, its monitoring will help us to control and counter the spread of invasive and harmful plant species for the ecosystem.

The indicators identified concern these species: *Amorpha fruticosa*, *Catalpa bignonioides*, *Ailanthus altissima*.

CRITERIA	INDICATOR	DATA TYPOLOGY	PERIOD			SOURCES		METHODOLOGY
			BASELINE	YEARS OF PROJECT	END PROJECT	BASELINE	END PROJECT	
Biodiversity	Number of alien species	number per ha per single specie	2019	2020-2022	2023	Municipality	Life Platform Clivut	From the Public trees census/substitution/other sources (life projects etc)

Monitoring of the effects of the CLIVUT Green Asset Strategy

Life CLIVUT will design an **Urban Climate Green Assets Strategy** for the green areas of the Pilot Cities to optimize their climatic and environmental performance, and also identify new incentives for offsetting emissions through trees. Only the Municipality of Bologna (of the four pilot Municipality) has developed an Urban Plan for green areas including climatic aspects. Within the project, the plan will be up-dated with new data and actions.

7. Area affected by climate change covered by the Urban Climate Green Assets Strategy

The Urban Climate Green Assets Strategy is designed for all the administrative surfaces of the 4 pilot cities and those where the project results will be transferred. Therefore all the Area of the Municipality is considered as the impact area of the project.

CRITERIA	INDICATOR	DATA TYPOLOGY	PERIOD			SOURCES		METHODOLOGY
			BASELINE	YEARS OF	END PROJECT	BASELINE	END PROJECT	



				PROJECT				
Dimensional impact of the project (Area affected by the project)	Area of Pilot Cities	Ha	2019	2020-2022	2023	Municipality	Statistical Administrative data	
	Area of transfer Cities							

8. Total human population to benefit from the project

The values reported below are referred to the population of the municipalities that will adopt the Strategic Plan, plus the municipalities where the project will be transferred and replicated during the project, and where one or more actions of the project will be implemented (i.e. Trees census b the Life Clivut Platform. Capacity Building actions etc)

CRITERIA	INDICATOR	DATA TYPOLOGY	PERIOD			SOURCES		METHODOLOGY
			BASELINE	YEARS OF PROJECT	END PROJECT	BASELINE	END PROJECT	
Total Human population to benefit from the project	Resident population in the Pilot Cities	Number of citizens	2019	2020-2022	2023	Municipality	Population census data	
	Resident population in transfer Cities							
	Resident population in Cities where are implemented LC actions							

9. Population directly affected from the project actions in climate terms.

The project provides the plantation of new trees and replacement of existing ones. This will lead to an improvement in the air quality and comfort of the resident population near the area of new plantation. We



chosed to consider a range of 500 m from the site of the new plants equal to the possibility of reaching the plant areas in 10 minutes on foot (see 2020-2030 ONU sustainability objectives).

CRITERIA	INDICATOR	DATA TYPOLOGY	PERIOD			SOURCES		METHODOLOGY
			BASELINE	YEARS OF PROJECT	END PROJECT	BASELINE	END PROJECT	
Citizen Benefits	Resident population in the neighbourhoods where plants are planted / replaced in Pilot Cities	Number of Citizens living within 500 meters from the new plantations in public and private areas financed by the project		2020-2022	2023	Municipality census	Municipality census	Estimation from population census data
	Resident population in the neighbourhoods where plants are planted / replaced in Transfer Cities			2020-2022	2023	Municipality census	Municipality census	

In order to make the effects of the benefits on the population more explicit, will also be collected statistical data relating to the incidence of diseases caused by air pollution and urban heat island on the population.



IMPACT OF PILOT ACTIONS CONTAINED IN THE URBAN GREEN ASSET STRATEGY

The evaluation of the environmental impact of mitigation pilot actions and incentives contained urban green asset strategy will be carried on using the LCA methodology.

A benchmarking methodology will be used to evaluate the environmental effects in the absence and in the presence of such actions on the pilot cities.

The scheme of the assessment of the impact of each action is reported in the following table:

	LCA (CO2 Emission and equivalent)		Sources of Data	
	BASELINE	PROJECT RESULTS	BASELINE	PROJECT RESULTS
ACTION C1	Actual urban forest management practices (species, pruning, location)	New practices included/recommended in the Strategic Plan	Actual municipality regulation for green infrastructure management/ City Administration	Urban Climate Green Assets Strategy
ACTION C2	Actual choice of citizens for private gardens	New practices included/recommended in the Strategic Plan for private gardens	Interviews with nurseries and professionals and census data	Urban Climate Green Assets Strategy
ACTION C3	Actual green infrastructure in the school/University participating in the project	New practices included/recommended in the Strategic Plan	Data collection in the schools / university	Urban Climate Green Assets Strategy
ACTION C4	4 main business sectors (industry, tourism, retail, transport)	Incentives included in the strategic Plan for the sectors	Emission Literature and Case studies of Companies participating to the actions and main City events	Urban Climate Green Assets Strategy

Improvements in green governance tools in pilot cities

Changes in governance will be detected, including green management techniques through a monitoring of the methods currently used and recommended for the management of trees in green areas, contained in official documents of the administrations (green regulation, green plan, recommended species, etc.).

The base line will be detected through the reconnaissance of the green regulations of the criteria currently adopted in the direct and indirect management of green areas and trees by the pilot municipalities. Any

Changes will be monitored during the project induced by the drafting of a strategic plan.



	Green public areas	Green private areas open to public	Others Green private areas	Green public areas	Green private areas open to public	Others Green private areas
ISSUES	Present	Not present	Brief description of contents with particular reference to the climatic role of trees	Present	Not present	Brief description of contents with particular reference to the climatic role of trees
References to the role of trees in climate change						
Management of green areas by city associations						
Private sponsorship of green areas / tree plantings						
Incentives for the creation of private green areas and green roofs (green roofs etc.)						
Use of green areas for events						
Monitoring of the use of green areas						
urban gardens						
Historic Green						
Equipped green areas						
Classification of trees						
Monumental trees						
Tree protection criteria						
criteria for pruning						

criteria for substitution						
Criteria for care and maintenance of public areas						
Criteria for care and maintenance of private areas						
Trees balance						
Forecast of new plants						
criteria for Public green design						
criteria for Design private green						



areas						
Forbidden trees						
Recommended trees and related criteria						
calculation of the economic value of trees						



Action D2: Monitoring of Socio Economic Impact

The socio-economic impact on citizens will be estimated in relation of direct and indirect actions in which they take parts.

Direct effects deriving from the behaviour change due to the participation in the action C1, C2, C3 and C4 (as energy saving), increase utilization of green areas and related knowledge.

Indirect effect deriving from the implementation of the Urban Climate Green Asset Strategic Plans by the Municipality, the owners of private green spaces and the entrepreneurs. (see indicators 8 and 9 of previous paragraph).

Indicator of direct social effects of the project actions (and the related methodology)

The measuring and updating the changes in attitudes and practices of the target audiences will be carried out through follow-up activities with the participants in the various actions and through surveys to citizens with both online and face-to-face questionnaires.

a) follow-up activities with the participants for action C1 C2, C3 AND C4:

- questionnaire for citizens, stakeholders and students in University have been prepared and is available at https://docs.google.com/forms/d/e/1FAIpQLSeNsujOJOLD71qfgkKWKKT9OF4MNKEgfX2ojoua-q9OyPSBmw/viewform?usp=sf_link
- questionnaires for students of schools have been prepared and are available at <https://forms.gle/WVG5zEyWRN7v6uG89>

b) surveys to citizens (random sample)

- a short questionnaire for citizens will be prepared starting from the one prepared for citizens participating in Action C2 https://docs.google.com/forms/d/e/1FAIpQLSeNsujOJOLD71qfgkKWKKT9OF4MNKEgfX2ojoua-q9OyPSBmw/viewform?usp=sf_link

The questionnaire will be administered to a random sample of 200 citizens in each pilot city in spring 2021 and at the end of 2022. The results will be elaborated in a comparative study.



Criteria	Indicator	2020	2021	2022	2023	Methodology
Citizen Awareness raising	% of Citizens Knowledge and awareness on Climate Change and Urban Trees		First administration / baseline	Second administration	Elaboration	Questionnaire random sample of Citizens in each Pilot City
Persons who may have been influenced via dissemination or awareness raising project-actions	Number of participants in the Capacity Building Action Study Group C1	X	X		X	Attendance register
	Number of student (per level) participating in A C3		X	X	X	Attendance register
	Number of Citizens Associations (and number of associated) participating in A C2	X	X	X	X	Municipality and direct investigation
	Number of Citizens participating to events /Forum of action C1			X	X	Attendance register Data from the website
	Number of Entrepreneurial Associations (and entrepreneurs associated) participating in the workshop of Action C4		X		X	Attendance register
	Number of entrepreneurs Contacted during the project for the emission calculation and compensation)				X	X
Persons whose lives were directly, positively impacted by MAIN envir. actions of project -	Change in Knowledge and behaviour of participant in the project		administration to students/ administration to entrepreneurs	administration to students		questionnaire for students Questionnaire for entrepreneurs



Others indicators of social impact (from LIFE Key Project Indicators)

01 – Implication of NGO including interventions supporting EU environmental (NGO) e stakeholders

This indicator estimates the representatives of citizens' or trade associations involved in the project and in the actions aimed to increase the knowledge of the importance of trees in the urban environment for the reduction of greenhouse gas emissions and their effect on the heat island. (Actions C2 and C4)

Associations	2020	2021-2022	2023
No. of, national ,regional and municipal associations participating in the project (in actions or networking)			

02 - Implication of NGO including interventions supporting EU environmental and/or climate change policies and of other stakeholders [local authorities]

This indicator estimates the number of regional and municipal political and technical representatives with increased knowledge on the importance of urban trees for the mitigation of Climate Change effects on Cities (action C.1 as a whole).

Local authorities	2020	2021-2022	2023
No. of regional and municipal political and technical representatives with increased knowledge on the importance of trees for climate mitigation			

03 - Implication of NGO including interventions supporting EU environmental and/or climate change policies and of other stakeholders [professionals]

This indicator estimates the number of professionals (urban planners, agronomist etc.) contacted/ involved in the project representatives with increased knowledge on the importance of the climate adaptation process involved in region (all actions).



Professionals	2020	2021-2022	2023
No. of professionals al associations participating in the project (in actions or networking) with increased knowledge on the importance of trees for climate mitigation			

04 - Information and awareness - General public reached and/ or made aware – website [total/reach/awareness-raising]

The ISG was the partner responsible for the realization of the website project, that can be found at the following web address: <http://www.lifeclivut.eu/>.

In the web site the contents of the site have been provided by the various partners, and ISG is responsible of monitoring inflow and download of data.

The project website will be monitored to assess the presence of visitors throughout the duration of the project and website statistics will be collected and used as indicator.

	2020	2021	2022	End project
Website- n° of visit of individuals (Total)				
Website- n° of visit of individuals reached				
Website- n° of regularly visiting by individuals				

05 - Information and awareness - General public reached and/ or made aware - other tools for reaching/raising awareness of the general public [-Leaflet Twitter- Instagram – YouTube pages fans]

This indicator regards the other tools used to raise awareness about climate change and to reach general public used as distribution of leaflets, a Facebook page of the Project Life Clivut, Twitter and Instagram to reach a wider public, and the Youtube channel.



	2020	2021	2022	End project
Other tools for reaching/raising awareness of the general public- n°of leaflets				
Other tools for reaching/raising awareness of the general public- n°of project Facebook page followers				
Other tools for reaching/raising awareness of the general public- n°of visit of twitter,				
Other tools for reaching/raising awareness of the general public- n°of visit of Instagram				
Other tools for reaching/raising awareness of the general public- n°of visit of Youtube Channel				

06 – Capacity Building - Conference/Final conference

As networking activity, throughout the project, all the partner organized a series of conference to create a wider audience for Life Clivut and raise awareness about climate change. This indicator estimates the number of participants to the conferences in the municipalities partner of the project.

	2020	2021-2022	2023
Networking and other professional training or education - Press Conference - N° of individuals reached			
Networking and other professional training or education - Final Conference - N° of individuals reached			



Economic Impact

The indicators for the assessment of the economic impact are summarized in the following table:

INDICATORS	BASELINE	PROJECT RESULTS	Sources of Data	
Managerial cost of green area	Actual Pilot Municipality expenditure for green infrastructure management	Pilot municipality expenditure for green infrastructure management	Pilot Municipality Budget	
Cost of New investment on public and private urban green areas	Cost of new trees plantation		Pilot Municipality	Interview to project targets and nurseries
New jobs place created		Estimation of job activated by new plantation and their management	Literature and direct interviews to gardeners and municipality	
Energy cost of the public and private building presence in the area of the new plantation		Data from the census of new trees plantation (see Action D1)	actual energy cost in sample building (construction typology)	Energy cost of the sampling building with trees
Carbon credit deriving from the implementation		see action D1	International carbon Market	
Economic value of the compensation measures included/recommended by the Strategic Plan (in carbon credit)		see action C4 and D1	Case studies	

Other economic indicators *(from LIFE Key Project Indicators)*

Jobs - Full Time Equivalents

A full-time equivalent is a unit to measure new employed persons in a way that makes them comparable although they may work a different number of hours per week. Throughout the Life Clivut , It has been indisputable that municipalities need additional personnel to conduct project's activities and to carry on those activity after the project end. This kind of project therefore brought a really added value to the partners, making possible to hire professionals who, at the same time, have gained experience on the climate change topic on a local level. After the end of the project we expect new job creation due to the implementation of actions contained in the Green. In this indicator we estimate the number of jobs activated during the project and after its end.

FTE	2020	2021-2022	End project
Number of FTE directly activated during the project			



Number of FTE activated by the action of the project (due to the new trees plantations/substitutions and their maintenance after the project)			
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Economic Growth - Running costs during the project

This indicator is deeply connected with the previous one, because one of the main cost for partners of this project has been additional staff, necessary to carry on project's activities supporting the permanent staff.

	Mid term	2022	End project
Running cost/operating costs during the project			

Economic Growth – Capital Expenditure expected in case of continuation

This indicator is deeply connected with the previous ones, because one of the main capital expenditure consist in the plantation /substitution of trees. The indicator will be estimate for the continuation of the project / transfer in other Cities.



Annex I – Indicator lists (including LIFE Key Project Indicators)

INDICATORS	DESCRIPTORS	DEFINITION	IMPACT UNIT
URBAN ENVIRONMET			
Mitigation – Green Infrastructure (specific of the Life Clivut Project)			
Green Areas improvement	N OF new tree	Number of trees planted during the project (public and private areas)	number
	N OF new trees	Number of trees substituted during the project (public and private areas)	number
Partial reduction of specific pressures KEI code 1,5			
Partial reduction of specific pressures	Area covered by new/substituted trees	Area covered by mitigation effect of new planted and substituted trees in the cities	Ha
Mitigation – Greenhouse Gas Emission KEI code 8.2			
CO2	/	Amount of CO2 captured by trees planted/substituted during the project	metric tons/year
	/	Amount of CO2 stored by trees planted/substituted during the project	metric tonsr
Mitigation – Electricity reduction due to Temperature reduction by tree (specific of the Life Clivut P)			
Temperature reduction	External Temperature reduction	Temperature reduction by the trees evaporation	Watt/mq
Electricity reduction	Internal building temperature reduction	Temperature reduced inside the building by the trees shadow effect,	Kw/h
Air Quality – Pollutants concentration KEI code 6.2			
– Pollutants concentration	NOX		ppm
	SO2		ppm
	PM10		ppm
Air Quality – PM10 sequestration (specific of the Life Clivut P)			
PM10 sequestration		PM10 captured by new trees	ppm
Biodiversity- KEI code 7.5.1			
Alien species removed		Amorpha fruticosa	N/ha



		Ailanthus altissima Catalpa bignonioides	
Coverage / Range of the environmental / climate change impact (specific of the Life Clivut P)			
Total area to be affected by the project	km ² of total area to be affected by the project	Total area to be affected by the project	km ²
Total human population to be affected by the project	No. of individuals to be affected by the project	Individuals to be affected by the project (No. of individuals
Population directly affected by the project actions in climate terms.		No of individual living within 500 mt from the area of new trees plantation	No. of individuals
Ecosystem KEI code 7.2			
Ecosystem Service Condition	Actual importance of Ecosystem services in Green Regulations	Analysis of actual green areas regulation/plan in Pilot cities	Qualitative
Ecosystem Service Trend	importance of Ecosystem services in Green regulation	Improvement of concern and action regarding Ecosystem Services in Green Area Regulation/Plan	Qualitative

INDICATORS	DESCRIPTORS	DEFINITION	IMPACT UNIT
CITIZEN AWARENESS RAISING			
Citizens awareness KEI code 11.3			
Increase of citizens awareness		Elaboration of questionnaire to a random sample of citizens in pilot cities (two administration)	N of interviews
Persons whose lives were directly, positively impacted by actions of project			
Capacity building actions	Civil Servant Professional Entrepreneurs	Number of persons participating in action C1.1 and in C4	Number N of interviews
Education actions	All level education	Number of students involved in action C3	Number N of interviews



Demonstration actions	Citizens	Number of Association and associate members involved in action C2	Number N of interviews
Governance KEI code 10.2			
Implication of NGO including interventions supporting EU environmental and/or climate change policies and of other stakeholders	No. of NGO involved in the project	Number of NGO and/or other civil society aggregations (e.g. neighborhood committees,...) involved by project partners during the project implementation and participating to the Green Asset strategic Plan definition	No. of NGO and other civil society aggregations
	Local authorities	Regional and municipal political and technical representatives with increased knowledge on the importance of the climate adaptation process at municipal level	No. of regional and municipal political and technical representatives
	Other organizations: A. Agriculture, forestry and fishing C. Manufacturing Q. Human health and social work activities	Other organizations by the NACE codes involved in the Green Asset strategic Plan definition	No. of organizations involved
	Other interventions supporting EU environmental or climate change policies	Municipalities that have used the Life Clivut Platform (not included in the transfer Cities)	No. of municipalities

INDICATORS	DESCRIPTORS	DEFINITION	IMPACT UNIT
Capacity Building KEI code 11,2			
Networking and other professional media	Press conference	Individuals reached by press conferences	No. of individuals reached
	Final Conference	Individuals included in or participated in the final conference of the project	No. of individuals involved
	Publication	Publication on specialized journal	No. of publications/papers



INDICATORS	DESCRIPTORS	DEFINITION	IMPACT UNIT
ECONOMIC IMPACT			
Economic values			
Municipality expenditure for green areas	Increase due to the Green Asset Strategy	Estimated Increase of Municipality expenditure for green areas in pilot cities	EURO
New investments	Cost of investments in green areas	Cost of investment in green areas from fund other than the project during the project	EURO
Carbon Credit	Value of CO2 sequestration	Carbon credit deriving from the implementation of Project actions	EURO/year
Economic value of the compensation measures included/recommended by the Strategic Plan	Case studies	LCA of actions/incentives included in the Green Assets Strategic Plan	EURO

INDICATORS	DESCRIPTORS	DEFINITION	IMPACT UNIT
Jobs KEI code 13			
Full-time equivalents (FTE)		A full-time equivalent is a unit to measure employed persons in a way that makes them comparable although they may work a different number of hours per week. The unit is obtained by comparing an employee's average number of hours worked to the average number of hours of a full-time worker.	No. of FTE

Economic growth KEI code 14.1 e 14.2.1			
Running cost/ during the project and expected in case of continuation/ replication/ transfer after the project period	Continuation	Running costs/operating costs include all regular eligible costs budgeted in the project's proposal necessary to apply the method/technique/practice during the project (personnel, travelling, external assistance, depreciation; consumables, overheads), without durable goods.	EURO
Capital expenditure expected in case of continuation/replication/transfer after the project period		Capital expenditure expected in case of continuation/replication/transfer after the project period	EURO



Entry into new entities/projects	Continuation	New projects joined by <i>Life Clivut</i> participants	No. new projects
	Replication	New entities that join the <i>Life Clivut Platform</i>	N. new entities

Annex II – Partners responsible and sources of information for each indicator

INDICATORS	PARTNERS RESPONSIBLE	SOURCES OF INFORMATION
Green Areas improvement (trees)	All partners	Municipal data Life Clivut Platform
Partial reduction of specific pressures	All partners	Ha of area interested by the effect of new plantation/trees substitutions
CO ₂	UNIPG	Life Clivut Platform elaboration
Temperature reduction	UNIPG	Life Clivut Platform elaboration
Electricity Reduction	All partners	Direct monitoring
Area potentially affected by climate change covered by adaptation measures	Each municipality involved in the project and Adep	Vulnerability assessments and adaptation plans
Air Pollutants concentration	All partners	Environmental statistic data
PM 10 sequestration	UNIPG	Life Clivut Platform elaboration
Alien species removed	All partners	Municipal data
Total area to be affected by the project	All partners	Municipal data
Total human population to be affected by the project	All partners	Municipal data



INDICATORS	PARTNERS RESPONSIBLE	SOURCES OF INFORMATION
Population directly affected by the project actions in climate terms	All partners	Municipal data
Ecosystem Services Condition	All partners	Municipal data
Ecosystem Services Trend	All partners	Municipal data and data from the Green Asset Strategic Plan
Increase in citizen awareness	All partners	Elaboration of Citizens' questionnaire
Capacity Building actions	All partners	Attendance registers
Education Actions	All partners	Attendance registers
Demonstrations Actions	All partners	Attendance registers
Implication of NGO including interventions supporting EU environmental and/or climate change policies and of other stakeholders: No. of NGO and other civil society aggregations	All partners	All partner on the basis of NGOs involved in the different actions
No. of regional and municipal political and technical representatives	All partners	All partners on the basis of all the technical and political representatives who participated throughout all the project
No. of other organizations involved	All partners	All partner on the basis of organizations involved during the project
Other interventions	UNIPG	All partners on the basis of other Municipalities using the Life Clivut Platform
Website; no. of visit of individuals (total);	ISGH	Website statistics
no. of visit of individuals;		
no. of regularly visiting individuals		
No of leaflet distributed	All partners	PrPrinted leaflet



INDICATORS	PARTNERS RESPONSIBLE	SOURCES OF INFORMATION
No of Facebook Pages Fans	UNIPG	Facebook statistics
No of contacts on others social media (Twitter, Youtube)	UNIPG	Social mediastatistics
Press conference	All partners	Attendance registers
Final Conference	UNIPG	No of Partecipants
Municipality expenditure for Green Areas	All partners	Municipal data
Investment in green areas not funded by the project	All partners	Municipal data
Carbon credit generated during the project by new/substituted trees	UNIPG	Life Clivut Platform elaboration
Economic value of compensation measures proposed in the Green Asset Strategic Plan	UNIPG	LCA and LCc elaboration of Case studies
Full-time equivalents (FTE)	All Partners	Municipal or company data
Running cost/operating costs during the project and expected in case of continuation/ replication/ transfer after the project period	UNIPG	All partners on the basis of their own financial report
Capital expenditure expected in case of continuation	UNIPG	All partners on the basis of their transfer activities
Entry into new entities/projects: No. new projects	All Partners and Municipalities	All partners on the basis of their own financial report
N. new entities		