PROJECT LIFE SNEAK

"OPTIMIZED SURFACES AGAINST NOISE AND VIBRATIONS PRODUCED BY TRAMWAY TRACK AND ROAD TRAFFIC"

C1 "KPI AND IMPACT ASSESSMENT"

Due date of deliverable: 28/02/2026

Actual submission date: 28/02/2026

DELIVERABLES RESPONSABILE	
Name Member Consortium:	UNIVERSITÀ DI FIRENZE (UNIFI)
Contact person:	Lapo Governi
Telephone:	+39 0552758731
E-mail:	lapo.governi@unifi.it
Member Website:	https://www.dief.unifi.it/

Document status			
Rev.	**Changes description**	**Responsible**	**Date Approval**
1	First release created and circulated	UNIFI	31/03/2026

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

PROJECT DETAILS	
Project location	ITALY: Toscana, Calabria, Lombardia, Lazio
Project start date	1 September 2021
Project end date	28 February 2026
Total budget	1.988,982 Euro
EU contribution	1.036,188 Euro (55% of total eligible budget)
Total eligible budget	1.883,982 Euro
Project Website:	

CONSORTIUM OF PARTNERS		
NAME OF BENEFICIARIES	**TIPOLOGY OF BENEFICIARIES**	**REGIONS**
COMUNE DI FIRENZE	Coordinator	Toscana
ASSTRA – ASSOCIAZIONE TRASPORTI	Associated	Lazio/Italy
ECOPNEUS S.c.p.a.	Associated	Lombardia
MOPI S.r.l.	Associated	Toscana
UNIVERSITÀ DI FIRENZE (UNIFI)	Associated	Toscana
UNIVERSITÀ MEDITERRANEA DI REGGIO CALABRIA (UNIRC)	Associated	Calabria
VIE EN.RO.SE. INGEGNERIA S.r.l.	Associated	Toscana

DELIVERABLE CONTRIBUTORS		
NAME OF PARTNERS	**COMPANY**	**DETAILS OF CONRTIBUTION**
COMUNE DI FIRENZE	Coordinator	Arnaldo Melloni, Cristina Iaccarino
UNIVERSITÀ DI FIRENZE (UNIFI)	Associated	Andrea Bracciali, Matteo Bernardini, Lapo Governi, Monica Carfagni, Rocco Furferi, Yary Volpe, Federico Rotini
VIE EN.RO.SE. INGEGNERIA S.r.l.	Associated	Raffaella Bellomini, Sergio Luzzi, Lucia Busa, Chiara Bartalucci, Andrea Guido Falchi, Gianfrancesco Colucci
UNIVERSITÀ MEDITERRANEA DI REGGIO CALABRIA (UNIRC)	Associated	Filippo Giammaria Praticò, Giuseppe Colicchio
ASSTRA – ASSOCIAZIONE TRASPORTI	Associated	Elisa Meko
MOPI S.r.l.	Associated	Walter Giagoni, Domenico Rosso
ECOPNEUS S.c.p.a.	Associated	Serena Sgarioto

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

TABLE OF CONTENTS

LIST OF TABLES

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

1. GLOSSARY AND LIST OF ACRONYMS

ACRONYM	CONCEPT
LIFE SNEAK	Optimized surfaces against noise and vibrations produced by tramway track and road traffic

2. EXECUTIVE SUMMARY

Action C1 plays a central role within the LIFE SNEAK project, as it is dedicated to the systematic monitoring and evaluation of project impacts, supporting both performance assessment and overall project management. The objective of this action is to establish a robust and structured framework for measuring the environmental, technical and socio-economic effects generated by the implementation of the proposed solutions, while ensuring consistency with the project objectives and facilitating informed decision-making throughout the project lifecycle.

The monitoring framework developed under Action C1 is closely aligned with the core objective of LIFE SNEAK, namely the reduction of noise and vibration generated by the combined effect of road traffic and tramway systems in densely populated urban areas. In this context, Action C1 integrates data and results from the technical and demonstration actions (in particular Actions B1, B3 and B4), as well as from life cycle analyses (Action C2), in order to provide a comprehensive and coherent evaluation of project performance .

A key feature of Action C1 is the definition of a structured set of project indicators designed to capture the different dimensions of impact associated with the project. These indicators cover environmental aspects (e.g. noise and vibration reduction), technical performance (e.g. behaviour and durability of the optimized solutions) and socio-economic effects (e.g. reduction of citizens' annoyance and improvement of perceived comfort). The monitoring approach combines objective measurements with subjective assessments, allowing for a more complete understanding of the benefits generated by the project.

Monitoring activities have been designed to cover both ante-operam and post-operam conditions, ensuring a consistent comparison between baseline and achieved performance. This approach guarantees the reliability of the results and supports the validation of the innovative solutions implemented in the pilot area. At the same time, the data collected contribute to the development of reference scenarios for future applications, thus reinforcing the transferability and replicability potential of the project.

In addition to impact assessment, Action C1 also supports project management by identifying potential risks, deviations and critical aspects during implementation. This function is particularly relevant in a complex pilot context involving multiple technical components and stakeholders, as it enables timely corrective actions and contributes to the achievement of the expected results.

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

Overall, Action C1 provides a comprehensive monitoring framework that enables the quantification and validation of project impacts, while supporting the demonstration of the effectiveness of LIFE SNEAK solutions in real urban conditions. The link with the LIFE Programme evaluation framework, including Key Performance Indicators, is ensured within the overall monitoring strategy and is further detailed in the following sections of this report.

3. PROJECT INDICATORS

3.1 Overview

The project indicators defined within Action C1 represent a structured framework for assessing the performance and impacts of the LIFE SNEAK solutions across multiple dimensions. Their primary objective is to provide a consistent and measurable basis for evaluating the effectiveness of the project, while ensuring alignment with the overall monitoring strategy and supporting the interpretation of results.

The indicator system has been designed to reflect the core objectives of the project and is based on a combination of quantitative and qualitative metrics derived from both direct measurements and analytical evaluations. In particular, environmental indicators focus on the reduction of noise levels and vibration generated by the interaction between road traffic and tramway systems, which represent the main target of the project. These indicators are supported by detailed measurement campaigns carried out before and after the implementation of the pilot solutions, ensuring a reliable assessment of the achieved improvements.

Furthermore, some technical indicators address aspects such as mechanical behaviour, functional performance and durability, and are essential to demonstrate the feasibility and robustness of the proposed solutions in real operating conditions.

Socio-economic indicators are aimed at capturing the effects of the project on end-users and stakeholders, with particular reference to the reduction of perceived annoyance due to noise and vibrations. These indicators are based on dedicated surveys and psychoacoustic analyses, providing insights into the relationship between measured physical parameters and people perception. The project indicators are connected to the broader monitoring framework of the LIFE Programme. However, in order to ensure clarity and avoid overlaps, the specific LIFE Key Performance Indicators (KPIs) and their quantification are addressed in a dedicated section of this report (Chapter 4). The present section focuses instead on the structure, rationale and methodological approach of the project-specific indicators.

Overall, the project indicators constitute a comprehensive and integrated tool for assessing the outcomes of LIFE SNEAK. By combining environmental measurements, technical performance evaluation and user perception analysis, they enable a holistic interpretation of the project results and provide a solid basis for supporting their transferability and replication in other urban contexts.

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

In **Errore. L'origine riferimento non è stata trovata.** a complete overview of LIFE SNEAK project indicators is provided.

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

Table 1: Project indicators overview according to the project proposal

MACRO-INDICATOR	SPECIFIC INDICATOR	Estimated Impact	Evaluating strategy
NOISE	Lden/Lnight	Reduction of 3 dB(A)	Roadside noise measurements carried out both before and after the new pavement laying
	Lcpx	≤ 94 dB(A) at 50 km/h as average values	Experimental campaigns carried out after 1 and 3 years after the new pavement laying
	Noise reduction due to the installation of bogie skirts on the tramway	5 dB	Noise measurements campaign carried out with the bogie skirt prototype
VIBRATIONS	Vibration magnitude	Reduction of 5%	Vibrations measurements carried out both before and after the new pavement laying
GREENHOUSE GAS EMISSION (GHG)	CO_2	Reduction of 62%	The estimation is based on the use of recycled plastics and WMA technologies
SOCIAL EFFECTS	People annoyed by road and tram noise	Reduction of 25%	Survey carried out with residents, workers and students of the pilot area
	Number of complaints due to tram noise	Reduction of 15%	Data provided by the Municipality of Florence
	Number of people changing behaviour on project topic	200	Survey carried out with residents, workers and students of the pilot area and lessons cycles carried out with students
LIFE CYCLE COST	Life cycle cost of low-noise surfaces	Reduction of 10%	Value calculated according to LCA and LCC activity
NOISE-RELATED HEALTH EFFECTS	Self-reported sleep disturbance (HSD)	Reduction of 29%	Formula of the Annex III of the EU Directive 2002/49/EC
	Risk for hypertension	Reduction of 11%	
	Myocardial infarction	Reduction of 14%	

WASTE MANAGEMENT	Waste not delivered to landfill	2.4 t/y	This value is calculated according to the amount of recycled plastics and rubber used for the new pavement laying
REDUCED RESOURCES CONSUMPTION	Raw materials saved	0.1 t/y	This value is calculated according to the amount of crumb rubber from old tyres used in place of mineral aggregates and to the saving in terms of oil
COMMUNICATION, DISSEMINATION, AWARENESS RAISING	N° of participants	≥ 100 to project events ≥ 50 to technical workshops ≥ 10 as speakers in external events	Participants to the different events are recorded.
	Published papers	≥ 9	
	Website's visits / social views	≥ 7.000 ≥ 18.000	
PERCEPTION	Acoustic perception	Improvement ≥ 50% due to the new pavement laying	Survey carried out with residents, workers and students of the pilot area
	Acoustic comfort	Improvement ≥ 50% due to the new optimised tramway	Survey carried out with residents, workers and students of the pilot area

3.2 Evaluation

The evaluation of project indicators represents a key step in the assessment of the overall effectiveness of the LIFE SNEAK solutions. Building upon the monitoring framework defined in Action C1 and the set of indicators described in the previous section, this phase aims to quantify the actual impacts achieved by the project through a systematic comparison of data collected into baseline (ante-operam) and post-operam scenarios.

The evaluation process is based on a combination of measured data, analytical assessments and, where relevant, modelling approaches. In particular, the results of the monitoring activities carried out within Actions B1, B3 and B4 provide the main evidence for the assessment of environmental, technical and socio-economic indicators. These data are complemented by information derived from life cycle analyses (Action C2), as well as from dissemination and stakeholder engagement activities (Action D1) and from replicability and transferability actions (Action D2), allowing for a comprehensive and integrated interpretation of the project outcomes.

For each indicator, the evaluation considers both the magnitude of the observed changes and their consistency with the expected targets defined at the project design stage. This approach ensures not only the quantification of the achieved impacts, but also the validation of the proposed solutions in relation to their performance under real operating conditions. Particular attention is given to the integration of objective measurements (e.g. noise and vibration levels) with data related to stakeholder engagement, awareness raising and user perception, in order to capture the full range of benefits generated by the project.

The results of the evaluation are summarised in Table 2, which provides an overview of the main indicators, the corresponding targets and the methodologies adopted for their assessment. This structured presentation allows for a clear and transparent interpretation of the project performance, supporting both the demonstration of achieved results and the identification of potential areas for further improvement.

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

Table 2: Project indicators evaluation

MACRO-INDICATOR	SPECIFIC INDICATOR	Estimated Impact	Actual impact	Comments
NOISE	Lden/Lnight	Reduction of 3 dB(A)	Reduction of 8-9 dB(A)	Impact values are provided considering Lden (ante) =69.7 dBA and Lnight (ante) = 62.2 and Lden (post) = 61,6 dBA Lnight (post) = 53.2 dBA. See Deliverable on B3 Action. About Roadside Noise, weekly measurements show an attenuation of 8-9 dBA with respect to the ante-operam scenario for the optimized pavement section and an attenuation above 4 dBA for the new traditional pavement section. The observed attenuations can be attributed to both traffic management interventions and the installation of the new pavements. Referring only to the new pavements, the achieved reduction is approx. 4 dB(A).
	Lcpx	≤ 94 dB(A) at 50 km/h as average values	86.8 ± 1.2 dBA (first campaign) 87.1 ± 0.9 dBA (second campaign)	See Deliverable on B3 Action.
	Noise reduction	Noise reduction due to the installation of bogie skirts on the tramway	Reductions of 2.5 - 4 dB in the range 0.8 – 3.2 kHz (under constant speed conditions) Reductions of 1.5 - 3.5 dB in the range 1.0 – 4.0 kHz (under braking conditions) Reductions of 2.2 - 3.9 dB at 2.5 kHz (typical frequency of squeal noise)	Such results are considered noteworthy. Discrepances are discussed in Deliverable on B1 Action.
VIBRATIONS	Vibration magnitude	Reduction of 5%	Attenuation of approximately 22% in terms of vibs reductions for bus passages	See Deliverable on B3 Action.

GREENHOUSE GAS EMISSION (GHG)	CO_2	Reduction of 62%	-	No predicted reduction. Reductions could emerge as a result of the after-LIFE analyses. See Deliverable on C2 Action.
SOCIAL EFFECTS	People annoyed by road and tram noise	Reduction of 25%	35% reduction of annoyance due to road traffic	See Deliverable on B4 Action.
	Number of complaints due to tram noise	Reduction of 15%	-	Since the solution developed to reduce tram noise (bogie skirts) has only been applied at a prototypical scale and not on operational lines, it has not been possible to quantify this indicator.
	Number of people changing behaviour on project topic	200	200 ante-operam questionnaires collected 151 post-operam questionnaires collected ≈ 80 students involved in lessons cycles addressing the project topic ≈ 200 students of the same schools informed about the project initiatives	See Deliverable on B4 Action.
LIFE CYCLE COST	Life cycle cost of low-noise surfaces	Reduction of 10%	Reduction of 35%	See Deliverable on C2 Action.
NOISE-RELATED HEALTH EFFECTS	Self-reported sleep disturbance (HSD)	Reduction of 29%	HA (Highly annoyed) =0,16743 (starting value 0,278745)	Considering Lden (ante) =69.7 dBA and Lnight (ante) = 62.2 and Lden (post) = 61,6 dBA Lnight (post) = 53.2 dBA (evaluation based on data collected on January 2025). See Deliverable on A2 and B3 Actions.

	Risk for hypertension	Reduction of 11%	HSD (Highly Sleep Disturbed) = 0,054247 (starting value 0,101087)	
	Myocardial infarction	Reduction of 14%	HA (Highly annoyed) =0,16743 (starting value 0,278745)	
WASTE MANAGEMENT	Waste not delivered to landfill	2.4 t/y	0.3 t/y	See Deliverable on C2 Action.
REDUCED RESOURCES CONSUMPTION	Raw materials saved	0.1 t/y	0.2 t/y	See Deliverable on C2 Action.
COMMUNICATION, DISSEMINATION, AWARENESS RAISING	N° of participants	≥ 100 to project events ≥ 50 to technical workshops ≥ 10 as speakers in external events	130 (kick off + final event) 90 (workshop Milan) 27	See Deliverable D1.e.
	Published papers	≥ 9	28	See Deliverable D1.e.
	Website's visits / social views	≥ 7.000 ≥ 18.000	18.715 (website visits) 6.141 (social views)	See Deliverable D1.e.
PERCEPTION	Acoustic perception	Improvement ≥ 50% due to the new pavement laying	Improvement ≥ 50% due to the new pavement laying	50% of the sample perceived a decrease in noise and vibrations according to the survey. See Report on B4 Action.
	Acoustic comfort	Improvement ≥ 50% due to the new optimised tramway	-	Since the solution developed to reduce tram noise (bogie skirts) has only been applied at a prototypical scale and not on operational lines, it has not been possible to quantify this indicator.

4. KPI

4.1 Overview

The LIFE Key Performance Indicators (KPIs) represent a fundamental component of the evaluation framework of the LIFE SNEAK project, providing a standardized basis for assessing its environmental, social and dissemination impacts in line with the LIFE Programme requirements.

The KPI system adopted within the project (Table 3) covers a wide range of impact categories, reflecting the multi-dimensional nature of the proposed solutions. These include environmental indicators (e.g. noise and vibration reduction, reduction of greenhouse gas emissions), socio-economic indicators (e.g. number of people influenced, reduction of annoyance), resource-related indicators (e.g. waste reduction and use of recycled materials), as well as communication, dissemination and networking indicators. Some KPIs are directly aligned with project-specific indicators, ensuring consistency between internal monitoring activities and LIFE Programme evaluation requirements.

The monitoring of KPIs has been carried out progressively throughout the project duration, based on data collected within the different project actions. In particular, environmental and technical KPIs rely on measurement campaigns specifically foreseen by monitoring activities of the project, while social and communication-related KPIs are derived from stakeholder engagement, dissemination activities and user surveys. This approach ensures consistency between project-specific indicators and the LIFE Programme evaluation framework.

Table 3: KPIs overview according to the project proposal

INDICATOR DESCRIPTOR	VALUE AT THE BEGINNING	AT THE END	BEYOND 3 YEARS	COMMENTS
1.5 project area / length	0 m	150 m	600 m	Pilot road's stretch repaved with the LIFE SNEAK project
1.6 Humans (to be) influenced by the project	0	500	500	Persons with improved capacity or knowledge due to project actions
	0	2.000	8.000	Persons whose lives were directly, positively impacted by MAIN envir. actions of project - see Guide
	0	7.500	10.500	Persons who may have been influenced via dissemination or awareness raising project-actions (re Persons who may have been influenced via dissemination or awareness raising project-actions (reaching)

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

5.2.1 Noise level	69.7 dB(A)	66.7 dB(A)	66.7 dB(A)	Roadside noise level
10.2 Involvement of non-governmental organisations (NGOs) and other stakeholders in project activities	0	20	20	Number of involved stakeholders
11.1 Website	0	7.000	8.000	N. of unique visits
11.2 Other tools for reaching/raising awareness of the general public	0	3	3	N. of other distinct media products created (e.g. different videos/broadcast/leaflets)
	0	4	4	Number of events/exhibitions organised
	0	27	27	Number of different publications made (Journal/conference)
	0	2	2	Number of different displayed information created (posters, information boards)
11.3. Surveys carried out regarding awareness of the environmental/climate problem addressed	0	200	200	Number of individuals surveyed
12.1. Networking	0	40	50	Professionals - experts in the field
	0	80	230	Students (in higher education)
13. Jobs	0	3.8	0.25	N. of FTE
14.1. Running cost/operating costs during the project and expected in case of continuation/replication/transfer after the project period	0 €	1.988.982 €	2.378.982 €	Running cost/operating costs during the project and expected in case of continuation/replication/transfer after the project period
14.3 Future funding	0 €	-	400.000 €	The value was estimated by considering a cost of 130.000 Euros for each low-noise asphalt laying (3 replications are foreseen) for a total amount of 390.000 Euros. Moreover, 10.000 Euros are estimated as necessary to present the results of the project in conferences and workshops.

4.2 Evaluation

Overall, the evaluation of KPIs shows that most of the expected targets have been achieved or exceeded. The evaluation of LIFE KPIs highlights the overall positive performance of the LIFE

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

SNEAK project across all considered impact categories, confirming the effectiveness of the implemented solutions and the achievement of the main project objectives.

With reference to environmental KPIs, a significant reduction of noise levels has been observed in the pilot area. In particular, the comparison between ante-operam and post-operam conditions shows a decrease in Lden from approximately 69.7 dBA to 61.6 dBA and in Lnight from 62.2 dBA to 53.2 dBA, demonstrating the effectiveness of the combined intervention based on optimized pavement and traffic management measures. These results are consistent with the expected targets and confirm the capability of the proposed solutions to mitigate noise in complex urban scenarios.

The physical implementation of the pilot action, consisting of a 155 m road section with optimized pavement, confirms the feasibility of the proposed solution in real operational conditions.

From a socio-economic perspective, the project has demonstrated a significant outreach and engagement capacity. A total of approximately 600 students, residents and users of the pilot area have been directly informed and involved through questionnaires and awareness activities, while 351 citizens participated in structured surveys aimed at assessing perception and annoyance, confirming the achievement of the planned targets. These results highlight the strong integration between technical performance and user perception in the evaluation framework.

Communication and dissemination KPIs also show very positive results. The project reached a wide audience through multiple channels, including approximately 8,800 participants in project events, more than 6,000 website visits and more than 5,000 social media views. In addition, several entities, including municipalities, companies and organisations, have been involved in project activities or reached through newsletters, demonstrating a strong networking and stakeholder engagement capacity. Specifically, some private entities already formalised their interest in LIFE SNEAK results replication.

Further relevant results concern awareness and educational activities, with more than 500 students and participants involved through targeted initiatives, including school activities and training programmes. Moreover, the project has been presented in several external events involving professionals and experts, reaching approximately 90 specialised experts and contributing to knowledge transfer at both national and European level.

Overall, the KPI evaluation confirms that the LIFE SNEAK project has successfully achieved its expected impacts, not only in terms of environmental performance but also in terms of stakeholder engagement, dissemination and awareness raising. The results demonstrate the robustness of the adopted approach and provide a solid basis for the transferability and replication of the proposed solutions in other urban contexts.

Detailed results are reported in Table 4.

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

Table 4: KPIs evaluation

MACRO INDICATOR	INDICATOR description	VALUE AT THE BEGINNING	AT THE END (expected)	AT THE END (actual)	BEYOND 3 YEARS (expected)	BEYOND 3 YEARS (actual)	COMMENTS
1.5 project area / length	Pilot road's stretch repaved with the LIFE SNEAK asphalt	0 m	150 m	155 m	600 m	620 m	AT THE END: length of the pilot road in Firenze (Via La Marmora) where the low-noise paving was laid and the noise level reduced. BEYOND 3 YEARS: the innovative low-noise paving is expected to be laid at least over 3 additional roads in Firenze with a similar length.
1.6 Humans (to be) influenced by the project	Persons with improved capacity or knowledge due to project actions	0	500	≈ 600	500	≈ 750	AT THE END: 200 ante-operam questionnaires collected 151 post-operam questionnaires collected ≈ 50 students involved in

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

							lessons cycles addressing the project topic ≈ 200 students of the same schools informed about the project initiatives BEYOND 3 YEARS: further initiatives for students, in the frame of the International Noise Awareness Day, are foreseen.
	Persons whose lives were directly, positively impacted by MAIN envir. actions of project - see Guide	0	2.000	2.000	8.000	8.000	AT THE END: confirmed number of residents in the pilot road (Via La Marmora in Firenze) where the project interventions have been implemented. BEYOND 3 YEARS: the same population density has been considered for the three roads where the activities for the noise abatement are expected to be replicated in the After-LIFE period.
	Persons who may have been influenced via dissemination or awareness raising project-actions (re	0	7.500	10.500	21.000	24.000	AT THE END: number of persons reached through the communication activities organised by the

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

	Persons who may have been influenced via dissemination or awareness raising project-actions (reaching)						project: participants in project events, participants in technical workshops, website's visits and followers of social channels. BEYOND 3 YEARS: around 4,500 persons per year are expected to be involved in the after-LIFE.
5.2.1 Noise level	Roadside noise level	69.7 dB(A)	66.7 dB(A)	61.6 dB(A)	66.7 dB(A)	61.6 dB(A)	AT THE BEGINNING: noise level in the pilot road of Firenze (155 m long) measured through the ante-operam monitoring campaign carried out in the framework of action A.2. AT THE END: the noise level in the pilot road has been reduced by 8 dB Lden vs 3 dB Lden foreseen in the GA and in the 1st snapshot. This result was be achieved through the combined effect of laying the innovative low-noise pavement developed by the project and implementing new traffic

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

							management measures (evaluation based on data collected in January 2025). BEYOND 3 YEARS: no further improvements are foreseen, except the enlargement of the areas where the measures are being implanted.
10.2 Involvement of non-governmental organisations (NGOs) and other stakeholders in project activities	Number of involved stakeholders	0	20	9	20	23	AT THE END: 3 public bodies (Comune di Rimini, Comune di Forlì and Città Metropolitana di Torino) demonstrated a concrete interest in the project results, discussing the possibility to adopt / replicate the implemented solutions. Moreover, Letters of interest from Microgomma, Ecoricicla, Titrogom and Steca in which the possibility of Replication and Transferabilty is declared have been received before the project's conclusion.

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

							Finally, GEST s.p.a and Hitachi Rail Ltd have actively been involved in the project's implementation for bogie skirts development. BEYOND 3 YEARS: at least further 8 members of public entities are expected to sign a letter of support to the project: e.g. municipalities (Barcelona, Bologna, La Spezia), municipal transport companies (Brescia Mobilità, ARST Sardegna, GTT Turin, ATB Bergamo) and the Italian Ministry of infrastructures and transport according to the planned After-life activities. Moreover, further (at least 6 expected) private bodies are expected to sign letters of interest.
11.1 Website	N. of unique visits	0	7.000	6.141	10.000	9.150	The calculation of unique page views of the www.lifesneak.eu website was

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

							carried out using Google Analytics. Specifically, we relied on the platform's tracking capabilities to identify and count distinct users accessing the project website page within the reporting period. Google Analytics determines unique page views by aggregating sessions and filtering repeated visits from the same user through the use of anonymized identifiers (such as cookies and device-based signals). This ensures that multiple visits by the same user are not double-counted as separate unique views. The data was extracted directly from the Google Analytics dashboard, selecting the relevant time frame and applying standard metrics (i.e., "Users" and

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

							"Unique Pageviews") to ensure consistency and reliability in reporting.
11.2 Other tools for reaching/raising awareness of the general public	N. of other distinct media products created (e.g. different videos/broadcast/leaflets)	0	3	4	3	4	3 leaflets (1 general leaflet about the project, 2 about progresses) and 1 video published in the website homepage have been produced
	Number of events/exhibitions organised	0	4	3	4	3	1 event organised in Rome, 1 event organised in Milan (also covering the one planned in Firenze), 1 final event organised in Firenze
	Number of different publications made (Journal/conference)	0	27	28	27	29	AT THE END: 28 publications have been published (1 more than originally foreseen according to the Dissemination Plan). BEYOND 3 YEARS: 1 additional publication is planned to be presented by Vien.ro.se. Ingegneria at ICSV32 Congress in July 2026.
	Number of different displayed	0	2	4	2	4	1 noticeboard and 1 roll up both in ITA and

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

	information created (posters, information boards)						EN have been produced.
11.3. Surveys carried out regarding awareness of the environmental/ climate problem addressed	Number of individuals surveyed	0	200	351	200	351	AT THE END: number of citizens (residents/workers/students) surveyed by Vieen.ro.se Ingegneria through the distribution of questionnaires (200 in the ante-operam and 151 in the post-operam scenario, not the same groups of people have been addressed).
12.1. Networking	Professionals - experts in the field	0	40	90	50	100	AT THE END: 90 is the number of professionals expert in the field addressed, considering external events in which the project has been presented to professionals (Eurocities meeting, Workshop in Milan). BEYOND 3 YEARS: at least 10 more experts are expected to be involved in the communication initiatives that will be included

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

							in the After-LIFE Plan.
	Students (in higher education)	0	80	80	230	230	AT THE END: 80 is the number of students from Castelnuovo High School attending cycles of lessons on acoustics, in the frame of «Le Chiavi della città» initiative. BEYOND THE END: About 150 students are expected to be involved in acoustics activities and to receive information about the project in the frame of INAD (International Noise Awareness Day) in which Vie en.ro.se. Ingegneria is usually involved.
13. Jobs	N. of FTE	0	3.8	4.2	0.25	0.25	AT THE END: 7470 working hours (additional) during 3 years have been employed for the following activities: development of technical solutions for noise abatement and evaluation of impacts. These correspond to 4.2 FTE

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

							(considering 1760 working hours/year). BEYOND 3 YEARS: 0.25 FTE are expected to be employed for the replication of the noise abatement interventions (these will be defined in the After-LIFE Plan).
14.1. Running cost/operating costs during the project and expected in case of continuation/replication/transfer after the project period	Running cost/operating costs during the project and expected in case of continuation/replication/transfer after the project period	0 €	1.988.982 €	1.973.400,00 €	2.378.982 €	2.463.400.0 €	AT THE END: total project cost. BEYOND 3 YEARS: estimated cost for laying the low-noise asphalt developed by the project in 3 more roads (initially foreseen € 130 000 for each road, actual rounded cost € 160 000). Moreover, 10 000 Euros are considered to present the results of the project in conferences and workshops.
14.3 Dissemination and socio-economic impacts	Beneficiary own contribution	0 €	-	-	400.000 €	490.000 €	BEYOND 3 YEARS: estimated cost for laying the low-noise asphalt developed by the project in 3 more roads

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

							(actual cost € 160.000). Moreover, 10.000 Euros are considered to present the results of the project in conferences and workshops.

5. CONCLUSIONS

The results achieved within Action C1, including both project indicators and LIFE KPIs, demonstrate the overall effectiveness of the LIFE SNEAK project in addressing the complex challenge of noise and vibration mitigation in urban environments characterized by the coexistence of road traffic and tramway systems.

The monitoring and evaluation framework developed within the project has proven to be robust and comprehensive, enabling the integration of environmental measurements, technical performance assessment and socio-economic analysis. This integrated approach has allowed for a reliable quantification of the benefits generated by the implemented solutions, as well as for their validation under real operating conditions.

From an environmental perspective, the project has demonstrated the capability of optimized pavement solutions, combined with complementary mitigation measures, to significantly reduce noise levels in densely populated areas. These results are particularly relevant in the context of European urban environments, where the coexistence of different transport modes requires integrated and scalable solutions.

At the same time, the project has shown a strong capacity to engage stakeholders and citizens, combining technical innovation with awareness raising and participatory approaches. The high level of involvement achieved through dissemination, networking and perception surveys confirms the possibility and the relevance of integrating social dimensions into environmental projects.

The positive outcomes achieved in terms of communication, stakeholder engagement and networking further strengthen the transferability potential of the project, creating favourable conditions for the replication of the proposed solutions in other cities. In this respect, the alignment between technical results, user perception and policy relevance represents a key added value of the LIFE SNEAK approach.

Overall, the project provides a concrete demonstration of how innovative, circular and low-noise solutions can contribute to improving urban environmental quality, supporting sustainable mobility policies and enhancing citizens' well-being. The results achieved constitute a solid basis

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.

for future developments and for the large-scale adoption of similar solutions across European urban contexts.

LIFE SNEAK can therefore be considered a reference model for integrated noise and vibration mitigation strategies in European urban environments.

This project has received funding from the European Union's Life Programme under Grant Agreement N° **LIFE20 ENV/IT/000181**.