

LIFE E-VIA

"Electric Vehicle nolse control by Assessment and optimisation of tyre/road interaction"

LIFE18 ENV/IT/000201

Deliverable	Report containing Replicability and Transferability plan
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Beneficiaries:

Comune di Firenze (FIRENZE) Continental Reifen Deutschland GmbH (CRD) I-Pool srl (I-POOL) Università Mediterranea di Reggio Calabria (UNIRC) Université Gustave Eiffel (UNI EIFFEL) Vie en.ro.se. Ingegneria (VIENROSE)

List of keywords: replicability, sustainability, transferability

Abbreviations:

C2M	Close to Market
CNOSSOS	COMMISSION DIRECTIVE (EU) 2015/996 of 19 May 2015 establishing common noise assessment methods according to Directive 2002/49/EC of the European Parliament and of the Council
CR asphalt	Crumb rubber asphalt
EV	Electric vehicle
ICEV	Internal Combustion Engine Vehicle
WHO	World Health Organization

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Executive Summary

The main aim of the LIFE E-VIA project is to tackle traffic noise pollution, in a future scenario involving a consistent portion of electric and hybrid vehicles.

The present deliverable is the outcome of the action B8 of LIFE E-VIA addressing the replication and transferability of the project results.

Action B8 is focused on 6 main sub-objectives:

- RT1 Low Noise Surfaces.
- RT2 Festivals and event replication.
- RT3 Follow up market oriented.
- RT4 Cnossos improved data base for strategic noise mapping
- RT5 3 Project based action plans
- RT6 CR-based pavements

1 Introduction

The LIFE E-VIA project has a high perspective of sustainability. Since the preparation of the project idea, efforts have been made to carefully plan replication, continuation and transfer activities. Specifically, each partner took on specific tasks based on its own configuration and existing and potentially expandable contact networks.

In particular, FIRENZE took over the "Low-noise surfaces - replication of solutions tested in the pilot area" (RT1) and the "Festivals and events replication" (RT2), whereas UNIRC and CRD dealt with the "Follow up market oriented" (RT3); VIENROSE and I-POOL were entrusted with "Cnossos improved database for strategic noise mapping" (RT4); VIENROSE dealt with "Project based action plans" (RT5) and lastly FIRENZE is assigned the task to monitor implementation of "CR-Based pavements" (RT6).

2 Replicability and transferability results

2.1 LOW NOISE SURFACES

2.1.1 Replication of solution tested in the pilot area

Objectives to be achieved during project lifetime:

During the project lifetime 1-2 applications of the solutions that will be proposed by the project in terms of optimized pavements will be implemented by suggesting them in the next noise mapping round (VIENROSE, IPOOL). – See Annex "Firenze - investments 2019-2021" for the description and contextualization of foreseen intervention. In particular it is planned to realize the following two areas, both inside the Low Emission Zone of the city of Florence, where hence more electric vehicles pass compared to the areas outside the LEZ: the first in "Via della Scala" (about 200/300m), and the second inside the entire Cascine park (about 500m). After the project's conclusion, FIRENZE will lay the new pavement for at least 500 m in 3 different sites in five years. Moreover, replications in south and central Europe (Italy and France) will be done in the mid term and in other European countries in the long term through the participation to other projects in order to improve the performances and adapting to different meteorological conditions.

As part of the ordinary road maintenance programs, which the municipality of Florence schedules every three years, asphalts of the same type as those tested in the E-VIA project will be used to repave infrastructures with similar characteristics to those of via Paisiello (pilot case, slip road in densely populated urban area).

These works, planned for the year 2022, have been postponed to 2023 due to urgent work on the rehabilitation of underground utilities.

More than 25,000 square meters of asphalt with technical characteristics analogous to those of the E-VIA project will be laid in Florence in 2023.

The Municipality of Florence has earmarked over 1.6Mln euro for the laying of these asphalts as part of the Noise Mitigation Plan. (see Annex 1 "DOCUMENTO PER LA VERIFICA DEL RISPETTO DEI CRITERI DI SELEZIONE E DEL CONTRIBUTO AI RISULTATI DEL PON METRO" – "DOCUMENT FOR VERIFYING THE COMPLIANCE WITH THE SELECTION CRITERIA AND CONTRIBUTION TO THE RESULTS OF THE NATIONAL OPERATIONAL PROGRAM"

Of this, EUR 1 million will be used to pay for the resurfacing of the two stretches of road that were scheduled to be resurfaced during the project (Via Bolognese and Via Senese, which were not carried out due to work on the underground utilities), while € 667,000 has been earmarked to complete the resurfacing of the remaining stretch of Via Paisiello, to resurface Via delle Cascine, Via delle Porte Nuove and Via del Ponte alle Mosse.

In the following images the timetable of the execution of works:

Completamento del Piano di Risanamento Acustico Comunale - asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Senese - REACTEU - <u>cod</u> opera 210290

						•						
	2021			2022				2023				
Trimestre	1	2	3	4	1	2	3	4	1	2	3	4
Progettazione							x					
Aggiudicazione								x				
Realizzazione									x	х	х	
Chiusura intervento												x

Municipality Noise mitigation plan – Low-noise asphalt, including rehabilitation of the roadbed – Via Senese – Opera code: 210290

Design Contracting Implementation Closure

Completamento del Piano di Risanamento Acustico Comunale - asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Bolognese - REACTEU - cod opera 210291

	2021			2022			2023					
Trimestre	1	2	3	4	1	2	3	4	1	2	3	4
Progettazione							x					
Aggiudicazione								x				
Realizzazione									x	х	х	
Chiusura intervento												x

Municipality Noise mitigation plan – Low-noise asphalt, including rehabilitation of the roadbed – Via Bolognese – Opera code: 210291

Design Contracting Implementation Closure

Completamento del Piano di Risanamento Acustico Comunale - pavimentazioni fonoassorbenti via delle Cascine, via Paisiello, via delle Porte Nuove, via del Ponte alle Mosse

Figure 1 – Timetable for the works of repaving

	2021			2022				2023				
Trimestre	1	2	3	4	1	2	3	4	1	2	3	4
Progettazione						x	x	x				
Aggiudicazione								x	x			
Realizzazione									x	х		
Chiusura intervento											х	x

Municipality Noise mitigation plan – Low-noise asphalt, including rehabilitation of the roadbed – Via delle Cascine, Via Paisiello, Via delle Porte Nuove, Via del Ponte alle Mosse

Design Contracting Implementation Closure

The following tables show the economic framework of the operation.

Table 1 - Economic framework of Via Senese repaving

Voci di spesa	Importo (€)	Note
Materiali inventariabili		
Materiali di consumo		
Costi per elaborazione dati		
Personale non dipendente da		
destinare allo specifico progetto		
Servizi esterni (compresi lavori)	395.481,57	(include lavori, oneri sicurezza non soggetti a ribasso e spese per incarichi esterni)
Missioni		
Convegni		
Pubblicazioni		
Costi forfettizzati e spese generali		
Consulenze e spese di deposito (per brevetti)		
Pagamento tasse di deposito o mantenimento (per brevetti)		
Costo del personale dipendente		
della PA		
IVA	90.163,94	
Altro	14.354,48	(include incentivo per funzioni tecniche, imprevisti, rilievi e indagini, allacciamenti e altre voci non incluse nelle precedenti elencazioni)
TOTALE		500.000,00*
*il totale della scheda progetto	allegata al provvedime	nto di approvazione dell'OI è pari ad €

Table 2 Economic framework of Via Bolognese repaving

Voci di spesa	Importo (€)	Note
Materiali inventariabili		
Materiali di consumo		
Costi per elaborazione dati		
Personale non dipendente da		
destinare allo specifico		
progetto		
Servizi esterni (compresi	395.481,57	(include lavori, oneri sicurezza
lavori)		non soggetti a ribasso e spese per incarichi esterni)
Missioni		
Convegni		
Pubblicazioni		
Costi forfettizzati e spese		
generali		
Consulenze e spese di		
deposito (per brevetti)		
Pagamento tasse di deposito o		
mantenimento (per brevetti)		
Costo del personale		
dipendente della PA		
IVA	90.163,94	
Altro	14.354,48	(include incentivo per funzioni
		tecniche, imprevisti, rilievi e
		indagini, allacciamenti e altre
		voci non incluse nelle
		precedenti elencazioni)
TOTALE	5	0.000,00*

Municipality Noise mitigation plan – Low-noise asphalt, including rehabilitation of the roadbed – Via Senese – Opera code: 210290

Works to be contracted

VAT

Other costs (Surveys and investigations, connections, etc.)

Municipality Noise mitigation plan – Low-noise asphalt, including rehabilitation of the roadbed – Via Bolognese – Opera code: 210291

Works to be contracted

VAT Other costs (Surveys and investigations, connections, etc.)

Table 3 Economic framework of Via delle Cascine, Via Paisiello, Via delle Porte Nuove, Via del Ponte alle Mosse repaving

Voci di spesa	Importo (€)	Note
Materiali inventariabili		
Materiali di consumo		
Costi per elaborazione dati		
Personale non dipendente da		
destinare allo specifico		
progetto		
Servizi esterni (compresi	395.481,57	(include lavori, oneri sicurezza
lavori)		non soggetti a ribasso e spese
		per incarichi esterni)
Missioni		
Convegni		
Pubblicazioni		
Costi forfettizzati e spese		
generali		
Consulenze e spese di		
deposito (per brevetti)		
Pagamento tasse di deposito o		
mantenimento (per brevetti)		
Costo del personale		
dipendente della PA		
IVA	90.163,94	
Altro	14.354,48	(include incentivo per funzioni
		tecniche, imprevisti, rilievi e
		indagini, allacciamenti e altre
		voci non incluse nelle
		precedenti elencazioni)
TOTALE	50	0.000,00*

Municipality Noise mitigation plan – Low-noise asphalt, including rehabilitation of the roadbed – Via delle Cascine, Via Paisiello, Via delle Porte Nuove, Via del Ponte alle Mosse

Works to be contracted

VAT

Other costs (Surveys and investigations, connections, etc.)

2.1.2 Follow up market oriented

Objectives to be achieved during project lifetime:

UNIRC will aim at patenting the set-up solutions and at creating a start-up or spin-off to commercialize the technology to which possibly also I-POOL will participate. This process will begin just after the project's conclusion and this is going to be a strong partnership in terms of access to French, Italian and international markets. To this end, a market study and a business plan will be prepared. The transferability to other geographical areas will be guaranteed considering that the test site will be in France and the pilot one in Italy. The pavement design concept will have general characteristics independent from the national products.

The procedure for the set-up of the spin off has been initiated by the DIIES Department of UNIRC on 20th July 2021 during the periodic Council. The Spin off "SMART ASSET SOLUTION" (Acronym: S.A.S.) has as its main objective the provision of a viable and timely supply to the demand for innovative technology applications for today's cities and transportation infrastructure. Specifically, the services and products offered by the Spin off, concern, "smart" monitoring of road infrastructure and design of innovative asphalt mixes as well as will extend its scope to maintenance activities.

2.2 FESTIVALS AND EVENT REPLICATION

2.2.1 Festivals and event replication

Objectives to be achieved during project lifetime:

During the project lifetime 1 initiative will be proposed in Eurocities meetings by FIRENZE involving at least 25 EU cities.

Moreover, after the project's end, at least one more festival will be organised by Florence municipality. Finally, being Florence a member of Eurocities, training and awareness raising among cities will be guaranteed during the Eurocities meetings.

The LIFE E-VIA PROJECT has been presented in the Eurocities Environment Forum of Oslo 23-25 October 2019. 21 cities participating: Bergen, Braga, Bristol, Copenhagen, Florence, Ghent, Guimaraes, Hamburg, Helsinki, Malaga, Mannheim, Mezitli, Milan, Munster, Oslo, Porto, Reims, Strasbourg, Turin, Varna and Zaragoza.

In the following images, the cover page of the agenda, the dedicated agenda item, a pic of LIFE E-VIA Project manager, Mr. Arnaldo Melloni, during the speech.



Figure 2 – Cover page of the official Agenda of the Working group Noise of Eurocities meeting

	10:30 Coffee break and Networking								
i.	11:00	Subject: Subject: Round table Projects Rapporteur: Mr Enrico Gallo, Mr Arnaldo Melloni, Ms Chiara Bartalucci, all participants Expected action: 1. Presentations 2. Sharing views and experiences	WD 5.1 LIFE E- VIA (The relationship between electric vehicles, asphalt and tires) (AM) WD 5.2 Noise as a partner of quality of life (SL)						
5	12:00	Subject: Railway Noise (how BaneNor is working on the rail	WD 06.1 PM						

Figure 3 - Agenda item for discussing LIFE E-VIA project



Figure 4 – The LIFE E-VIA PM, Mr. Arnaldo Melloni, during the project presentation

FOLLOW-UP MARKET ORIENTED

2.2.2 Follow-up market oriented

Objectives to be achieved during project lifetime:

CRD aims to use technologies developed during the project whenever applicable, in CRD's regular tyre line development cycle. Based on typical tyre line life cycles and future market requirements, it is expected that technologies from this project will be part of an EV-centered development approach for at least two of these future tyre lines at some point after the project ends. Since the technology development of a new product may require time longer then project duration, and also because the implementation depends on timing constraints such as market circumstances and product life cycles, no specific time-to-market can be given, though an estimate of one to five years after project end seems realistic.

In order to thoroughly analyse the market opportunity of the new asphalt and tyres, during last monitoring visit it has been agreed:

- To add a specific annex to this report, (Annex 2), about the "Exploitation Plan and market analysis" concerning the new asphalt (UNIRC).
- To maintain the "Technology exploitation plan for the transfer of EV tyre noise optimization technology into the market" by the AB Continental Reifen Deutschland GmbH (CRD) to clearly analyse the possibility of exploitation and transfer of the new, as a <u>confidential</u> deliverable of B8 Action (Deliverable n. 30).
- To summarise the above-mentioned documents main operational aspects in a public paragraph of the After Life Plan (Action E2, Deliverable n. 33).

Moreover, the project coordinator around mid-December 2022 received an invitation from the LIFE Close-tomarket team to update the C2M checklist, after having a preliminary compilation in the first few months after the start of the project.

In agreement with the partners and the LIFE Close-to-market team, it was decided to fill out two separate questionnaires, one on the new asphalt developed by partner UNIRC and one on the tires optimized by CRD. In each questionnaire, indications were given about the innovation of the developed products, maturity and competition of the market, assessment of the possible customer base, team and management capacity of the developer, future financial plan, etc.

In the Annex 3, the filled questionnaires are included.

2.3 CNOSSOS IMPROVED DATABASE FOR STRATEGIC NOISE MAPPING

2.3.1 Replicability and transferability of project output EU policies oriented

Objectives to be achieved during project lifetime:

During the project's lifetime, once the CNOSSOS database will have been improved for strategic noise mapping by the LIFE E-VIA project, it will be tested in 3 noise maps (VIENROSE, I-POOL). ARPAT, in the framework of the collaboration guaranteed in the support letter will provide data measured in several measurement campaigns to be integrated in the LIFE EVIA database for electric fleet.

After the project's end:

it is expected that the coefficients derived into the project will permit the noise prediction. As a consequence, 3 further applications of the CNOSSOS improved database will be made for strategic mapping.

The guidelines developed by the project will be adopted as regional standard at least by 2 Italian regions (TOSCANA and CALABRIA expected) with, hopefully, minor adaptations. In fact, according to the provided letters of interest, TOSCANA region is interested in adopting the new technologies developed by the LIFE EVIA project for low-noise surfaces in the next phase of the regional action plan implementation and the CALABRIA region will evaluate the possibility of adopting the new method and technologies for enhancing the presence of EV on its territory, also based on the fact that it is involved in an investment plan for sustainable mobility. The new database will be sent and proposed to be used to ALL the institutional subjects in charge for noise mapping activities of France, Italy and Germany. Furthermore, partners will present the new database in international and national conferences, to the stakeholders involved in the Noise Working Group of Eurocities and via them to the DG Environment, in order to guarantee the circulation of data and implementation in CNOSSOS Method.

The database is implemented and the coefficients for electric vehicles and asphalt have been found.

The coefficients were processed and tested on Via Paisiello.

The coefficients will certainly be used in the action plans, as the switch to electric vehicles will certainly be used in the action plans of several managers of public transport, particularly in agglomerations.

If there had been no extension on the deadline of the action plans (originally June 2023, now June 2024), they would have already been used.

2.4 PROJECT BASED ACTION PLANS

2.4.1 Replication of the solution tested in the pilot area

Objectives to be achieved during project lifetime: none

After the project's end, in the frame of the implementation of Action Plans for Agglomerations and Major Roads as indicated in the Environmental Noise Directive 2002/49/EC, VIENROSE will adapt and propose as possible solutions to mitigate noise in the cities and major roads, the ones developed in the frame of the LIFE E-VIA project. At least three action plans of Italian cities/major roads will test output of LIFE E-VIA project.

This replication goal, expected after the end of the project, was actually anticipated. The actions already realized are listed below.

Life E-VIA asphalt was proposed by VIENROSE:

- 1) In the **Noise action plan of the Comune of Inzago (MI)** and has already been laid and tested in three road sections.
- 2) As a standard reference for the Piano Triennale di Bonifica dell'inquinamento acustico of Regione Lombardia

Inzago Noise Action Plan

The road on which the asphalt was laid is a local road, Strada Provinciale "Padana Superiore", in the municipality of Inzago, classified as F according to the Italian Highway Code, with a total length of 2.5 km. The resurfacing work was carried out at three different times on three sections of the same infrastructure.



Figure 5 - Territorial overview of repaving interventions

Below the tables summarizing the noise reduction measured in correspondence of the receivers building facades (during night period).

Road Section 1 (year 2021)

Codifica Scenario di Misura	Periodo di riferimento	L' _{Aeq} [dB(A)]	Attenuazione [dB(A)]
SC01	TR notturno	39,8	F F
SC02	TR notturno	34,3	5,5
SC03	TR notturno	40,9	4 5
SC04	TR notturno	36,4	4,0

Road Section 2 (year 2022)

Codifica Scenario di Misura	Periodo di riferimento	L' _{Aeq} [dB(A)]	Attenuazione [dB(A)]
SC01 (2021)	TR notturno	34.4	E O
SC01 (2020)	TR notturno	39.8	5.5

Road Section 3 (year 2023)

Codifica Scenario di Misura	Periodo di riferimento	L' ₆₆₆ . [dB(A)]	Attenuazione [dB(A)]	
\$C03 (2023)	TR notturno	34,7	63	
SC03 (2020)	TR notturno	40,9	0,2	



Piano Triennale di Bonifica dell'inquinamento acustico of Regione Lombardia

Figure 6 - Cover page of the Lombardia Region "Three-year regional noise abatement plan"

In the paragraph 6.5 of the "Three-year regional noise abatement plan", the planning tool produced by a grouping of companies coordinated by Vie en.ro.se. and adopted by the Lombardy Region in December 2022, the analysis of potential environmental impacts of plan Interventions is described; the asphalt tested in the LIFE E-VIA project was suggested as the optimal standard, with reference to both noise abatement potential and LCC and LCA values.

With regard to the potential environmental impacts of "Three-year regional noise abatement plan" interventions, these are briefly described below with reference to the design, construction and operation phases. In general, when choosing the types of intervention (type of barrier for interventions that envisage the construction of noise barriers, type of asphalt for interventions that envisage the laying of low-noise pavements), the types of intervention that define adequate noise abatement levels will be valorised, but, at the same time, those that minimise the overall environmental impact of the work in relation to the different phases of construction, operation and decommissioning of the work. With regard to the assessment of environmental impact, in the process of choosing the intervention typology, the projects that demonstrate that they have selected the best typology based also on LCA and LCC analyses will be rewarded and valorised. For example, LCA/LCC analyses have recently been produced for some low-noise pavement types that have defined the environmental impact of the solution over its entire life cycle: see the results of the LIFE E-VIA project: https://life-evia.eu/.

2.5 CR BASED PAVEMENTS

2.5.1 Replication and transferability of project output

Objectives to be achieved during project lifetime:

Based on the received letters of interest, three CR (crumb-rubber) CR-based pavement initiatives will be carried out by Ecopneus after the project's conclusion. This is going to further boost the replicability of the actions and results of the project. Ecopneus, in the Italian context, will promote the results among public and private infrastructures' owners; Tuscany and Calabria regions will hopefully test and implement the solutions developed in the project on the infrastructures located on their territories.

Ecopneus is a partner in the LIFE SNEAK project together with the Municipality of Florence, the University of Reggio Calabria and Vienrose. In this context, optimised asphalts are being tested for urban areas where the presence of vibrations is relevant.

Three dissemination events are planned within the LIFE SNEAK project: in all these events Ecopneus will also promote the results of the E-VIA project, in which the optimised asphalt laid in the pilot area contained a part of recycled rubber powder.

ANNEX 1





DOCUMENTO PER LA VERIFICA DEL RISPETTO DEI CRITERI DI SELEZIONE E DEL CONTRIBUTO AI RISULTATI DEL PON METRO

> Asse 6 - Ripresa verde, digitale e resiliente (REACT-EU FESR) OS 6.1 Transizione verde e digitale delle città metropolitane Azione 6.1.4 – Qualità dell'ambiente e adattamento ai cambiamenti climatici Operazione codice locale progetto FI6.1.4 <u>"Piano</u> di Risanamento Comunale " finanziato nell'ambito della risposta dell'Unione alla pandemia di Covid-19

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A. VERIFICA DEL RISPETTO DEI CRITERI DI SELEZIONE

PROGRAMMA OPERATIVO NELL'AMBITO DELL'OBIETTIVO "INVESTIMENTI IN FAVORE DELLA CRESCITA E DELL'OCCUPAZIONE" v. 8.0 approvato con Decisione di esecuzione della Commissione Europea <u>C(</u>2021)6028 del 09 agosto 2021)

L'azione complessiva sostiene interventi di miglibramento della qualità ambientale del contesto urbano, di sostegno al processo di transizione ecologica e di rispetto degli standard qualitativi ambientali dei piani di classificazione acustica e risanamento acustico del territorio.

Operazioni di recupero, risanamento e miglioramento ambientale finalizzate alla mitigazione degli impatti sonori e al miglioramento del comfort acustico dell'ambiente urbano, della qualità di vita e alla riduzione della peine ambientale e dei fattori che contribuiscono a determinarla. Contrastando gli effetti nocivi dell'inquinamento acustico in ambiente urbano e favorendo il ricrearsi di un ambiente naturale che crei condizioni favorevoli alle attività umane e alla fruizione degli spazi verdi.

L'azione sostiene principalmente:

- interventi di risanamento acustico volti a mitigare l'impatto acustico delle aree urbane delle residenze private e dei ricettori sensibili in primis le scuole primarie esposti al traffico veicolare attraverso l'utilizzo di interventi diretti sulla sorgente o di opere di mitigazione interposte tra sorgenti e ricevitori.
- Interventi volti a migliorare la fruibilità, la vivibilità e la qualità dello spazio urbano di interesse collettivo dal punto di vista ambientale, per lo svolgimento delle attività urbane, quali parchi e giardini pubblici e aree quiete in generale, anche attraverso soluzioni per aumentare i benefici di un paesaggio sonoro gradevole e ridurre lo stress acustico <u>urbano (</u>ad es. interventi per favorire la quiete di parchi e giardini e il passaggio a suoni gradevoli e di qualità).
- Gli interventi sono localizzabili nelle viabilità a forte percorrenza, presso le scuole comunali esposte al rumore urbano e nei parchi, giardini e luoghi pubblici in generale

Palazzo Vecchio, P.zza Signoria 50122 Firenze





Target d'utenza: cittadini e turisti residenti e studenti

Beneficiari: Amministrazioni comunali e/o loro società in-house, PMI e concessionari servizi a partecipazione pubblica, previa verifica dellanormativa sugli aiuti di Stato

Criteri di selezione

• Rilevanza e coerenza a livello urbano rispetto alle priorità di ripresa verde, digitale, resiliente;

Nell'ottica di valorizzare gli spazi urbani, residenziali e sensibili, le scuole e gli spazi verdi, gli interventi proposti forniscono una soluzione ideale per mitigare gli impatti da rumore indotto e da stress correlato al fine di migliorare la qualità della vita, la vivibilità delle aree urbane e la fruibilità delle aree quiete, definite come luoghi non solo a bassa rumorosità e "protetti" dal frastuono cittadino ma anche come zone di piacevole sosta e riequilibrio del corpo e della mente, acusticamente appaganti.

• Coerenza con la strategia di transizione ecologica della Città metropolitana a livello di settore o di strategia integrata (presenza in piano o programma di rigenerazione urbana, piani del verde urbano, piano dei rifiuti infrastrutture verdi etc..) per cui l'intervento possa considerarsi una forma di attuazione e/o di preparazione

La definizione di 14 aree quiete inserite in maniera diffusa in tutto il perimetro cittadino, quali aree con determinati parametri acustici, misurabili e valutabili, in termini di qualità sonora e comfort acustico, rappresenta il punto di partenza di un percorso urbano di creazione di zone di calma che non rappresentino solo delle isole di quiete all'interno dell'ambito cittadino ma che siano la partenza di un miglioramento diffuso della qualità del comfort urbano.

In base invece al piano comunale di classificazione acustica e al Piano d'azione comunale sono perseguibili quegli obbiettivi normativi di rumorosità di zona e di protezione delle abitazioni e dei ricettori sensibili quali le scuole. L'obbiettivo minino di raggiungere livelli idonei a quelli previsti dalla normativa vigente si aggiunge quello di traguardare ove possibile livelli di qualità definiti sempre dalla normativa di settore nelle varie classi acustiche.

• Massimizzazione del servizio ecosistemico rispetto alla tipologia di intervento

La mitigazione del rumore stradale in ampie porzioni di territorio particolarmente esposte, oltre a garantire la mitigazione dell'impatto acustico presso residenti e ricettori sensibili, concorrerà all'obbiettivo di regolazione naturale e di protezione degli ambienti limitrofi a quelli di <u>intervento</u> <u>con</u> effetti benefici diffusi in termini di sostenibilità e creazione di habitat naturali e favorevoli ello sviluppo ecosistemico delle arre urbane.

L'introduzione invece, in parchi e giardini pubblici, di elementi naturali di protezione dal rumore e

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la creazioni di situazioni favorevoli alla diffusione di suoni <u>naturali e</u> piacevoli avrà il duplice scopo di ridurre lo stress indotto dalla pressione sonora del circuito urbano sui cittadini favorendo quindi lo sviluppo di servizi ecosistemi sia culturali aggiungendo valori estetici, <u>ricreativi, e</u> culturali alle aree urbane sia di regolazione che fornendo habitat adatti per la crescita della biodiversità in ambito cittadino.

Produzione di effetti efficaci e concreti nel supportare il processo di ripresa e resilienza

La creazione e il miglioramento di aree urbane "quiete" ovvero sia bassa rumorosità che acusticamente piacevoli è da intendersi come un percorso di miglioramento del livello di comfort cittadino con l'obbiettivo di ridurre la pressione ambientale e lo stress conseguente aumentato in modo esponenziale negli ultimi decenni in ambito urbano. Il potenziamento e la fruibilità di spazi verdi vivibili garantirà una spinta propulsiva al processo di ripresa e resilienza coadiuvato dalla mitigazione dell'impatto acustico derivante da traffico stradale che, con interventi mirati, contribuirà al miglioramento di ampie zone di territorio urbano garantendo attrattività e funzionalità di spazi e luoghi.

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B. CONTRIBUTO DELL'OPERAZIONE AL RAGGIUNGIMENTO DEI RISULTATI DEL PROGRAMMA PON METRO

(Selezionare ed indicare gli indicatori pertinenti per la tipologia di operazione descritta)

Indicatori di output

Indicare se e di quanto l'operazione contribuisce al raggiungimento dei valori obiettivo per la Città di Firenze

Indicatore (fonte dati: monitoraggio)	Unità di misura	Valore obiettivo (2023)
IO18 (n. Azioni/progetti finanziati)	n.	7???
IO19 (Infrastrutture verdi costruite o ristrutturate per l'adattamento ai cambiamenti climatici)	ha	???

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C. PIANO FINANZIARIO ed ECONOMICO (BUDGET) DELL'OPERAZIONE

(Inserire le informazioni sulle fonti di finanziamento/Cronoprogramma attività/cronoprogramma finanziario (informazioni già presenti nella scheda progetto, da riportare).

Fonti di finanziamento							
Risorse PON METRO							
Altre risorse pubbliche (bilancio comunale)							
Risorse private (se presenti)							
Costo totale							

Cronoprogramma finanziario							
2021							
2022							
2023							
Totale							

Completamento del Piano di Risanamento Acustico Comunale - asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Senese - REACTEU - cod opera 210290

	20	21			20	22			20	23		
Trimestre	1	2	3	4	1	2	3	4	1	2	3	4
Progettazione							x					
Aggiudicazione								x				
Realizzazione									x	х	х	
Chiusura intervento												х

Completamento del Piano di Risanamento Acustico Comunale - asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Bolognese - REACTEU - cgd opera 210291

	20	21			20	22			20	23		
Trimestre	1	2	3	4	1	2	3	4	1	2	3	4
Progettazione							x					
Aggiudicazione								x				
Realizzazione									x	х	х	
Chiusura intervento												х

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Completamento del Piano di Risanamento Acustico Comunale - barriere fonoassorbenti Viadotto dell'Indiano

	20	21			20	22			20	23		
Trimestre	1	2	3	4	1	2	3	4	1	2	3	4
Progettazione						x	x					
Aggiudicazione								x				
Realizzazione									x	х	x	
Chiusura intervento												x

Completamento del Piano di Risanamento Acustico Comunale - barriere fonoassorbenti viadotto Marco Polo

	20	21			20	22			20	23		
Trimestre	1	2	3	4	1	2	3	4	1	2	3	4
Progettazione						x	x					
Aggiudicazione								x				
Realizzazione									x	x		
Chiusura intervento											x	

Completamento del Piano di Risanamento Acustico Comunale - pavimentazioni fonoassorbenti via delle Cascine, via Paisiello, via delle Porte Nuove, via del Ponte alle Mosse

	2021			20	22			2023				
Trimestre	1	2	3	4	1	2	3	4	1	2	3	4
Progettazione						x	x	x				
Aggiudicazione								x	x			
Realizzazione									x	х		
Chiusura intervento											х	х

Completamento del Piano di Risanamento Acustico Comunale - valorizzazione aree quiete con interventi finalizzati al miglioramento della fruibilità

	2021				20	22			2023				
Trimestre	1	2	3	4	1	2	3	4	1	2	3	4	
Progettazione						х	х						
Aggiudicazione								х					
Realizzazione									х	х	х		
Chiusura intervento												х	

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VOCI DI SPESA - Descrivere le voci di spesa in modo dettagliato (es. per il personale specificare il nr. unità, la qualifica, il costo orario/mensile e le ore/mesi dedicati al progetto, per gli acquisti di beni e servizi specificare il bene o il servizio acquistato ecc.)

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Tabella 1 – Quadro Economico dell'operazione

Completamento del Piano di Risanamento Acustico Comunale - asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Senese - REACTEU - cod opera 210290

Voci di spesa	Importo (€)	Note
Materiali inventariabili		
Materiali di consumo		
Costi per elaborazione dati		
Personale non dipendente da		
destinare allo specifico progetto		
Servizi esterni (compresi lavori)	395.481,57	(include lavori, oneri sicurezza non
		soggetti a ribasso e spese per
		incarichi esterni)
Missioni		
Convegni		
Pubblicazioni		
Costi forfettizzati e spese		
generali		
Consulenze e spese di deposito		
(per brevetti)		
Pagamento tasse di deposito o		
mantenimento (per brevetti)		
Costo del personale dipendente		
della PA		
IVA	90.163,94	
Altro	14.354,48	(include incentivo per funzioni
		tecniche, imprevisti, rilievi e
		indagini, allacciamenti e altre voci
		non incluse nelle precedenti
		elencazioni)
TOTALE		500.000,00*

*il totale della scheda progetto allegata al provvedimento di approvazione dell'OI è pari ad €

Completamento del Piano di Risanamento Acustico Comunale - asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Bolognese - REACTEU - cod opera 210291

Voci di spesa	Importo (€)	Note
Materiali inventariabili		
Materiali di consumo		
Costi per elaborazione dati		
Personale non dipendente da		
destinare allo specifico		
progetto		
Servizi esterni (compresi	395.481,57	(include lavori, oneri sicurezza
lavori)		non soggetti a ribasso e spese
		per incarichi esterni)
Missioni		
Convegni		

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Pubblicazioni			
Costi forfettizzati e spese			
generali			
Consulenze e spese di			
deposito (per brevetti)			
Pagamento tasse di deposito o			
mantenimento (per brevetti)			
Costo del personale			
dipendente della PA			
IVA	90.163,94		
Altro	14.354,48		(include incentivo per funzioni tecniche, imprevisti, rilievi e indagini, allacciamenti e altre voci non incluse nelle precedenti elencazioni)
TOTALE		500.000,00	*

Completamento del Piano di Risanamento Acustico Comunale - barriere fonoassorbenti viadotto dell'Indiano

Voci di spesa	Importo (€)	Note
Materiali inventariabili		
Materiali di consumo		
Costi per elaborazione dati		
Personale non dipendente da		
destinare allo specifico progetto		
Servizi esterni (compresi lavori)	Euro 698.513,89	(include lavori, oneri sicurezza non
		soggetti a ribasso e spese per
		incarichi esterni)
Missioni		
Convegni		
Pubblicazioni		
Costi forfettizzati e spese		
generali		
Consulenze e spese di deposito		
(per brevetti)		
Pagamento tasse di deposito o		
mantenimento (per brevetti)		
Costo del personale dipendente		
della PA		
IVA	Euro 146.599,20	
Altro	Euro 54.886,91	(include incentivo per funzioni
		tecniche, imprevisti, rilievi e
		indagini, allacciamenti e altre voci
		non incluse nelle precedenti
		elencazioni)
TOTALE	900.000,00	38:

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Completamento del Piano di Risanamento Acustico Comunale - barriere fonoassorbenti viadotto Marco Polo

Voci di spesa	Importo (€)	Note
Materiali inventariabili		
Materiali di consumo		
Costi per elaborazione dati		
Personale non dipendente da		
destinare allo specifico progetto		
Servizi esterni (compresi lavori)	Euro 388.387,86	(include lavori, oneri sicurezza non
		soggetti a ribasso e spese per
		incarichi esterni)
Missioni		
Convegni		
Pubblicazioni		
Costi forfettizzati e spese		
generali		
Consulenze e spese di deposito		
(per brevetti)		
Pagamento tasse di deposito o		
mantenimento (per brevetti)		
Costo del personale dipendente		
della PA		
IVA	Euro 80.902,80	
Altro	Euro 30.709,34	(include incentivo per funzioni
		tecniche, imprevisti, rilievi e
		indagini, allacciamenti e altre voci
		non incluse nelle precedenti
		elencazioni)
TOTALE	500.000,00	*

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Completamento del Piano di Risanamento Acustico Comunale - pavimentazioni fonoassorbenti via delle Cascine, via Paisiello, via delle Porte Nuove, via del Ponte alle Mosse

Voci di spesa	Importo (€)	Note	
Materiali inventariabili			
Materiali di consumo			
Costi per elaborazione dati			
Personale non dipendente da			
destinare allo specifico progetto			
Servizi esterni (compresi lavori)	538.627,47	(include lavori, oneri sicurezza non	
		soggetti a ribasso e spese per	
		incarichi esterni)	
Missioni			
Convegni			
Pubblicazioni			
Costi forfettizzati e spese			
generali			
Consulenze e spese di deposito			
(per brevetti)			
Pagamento tasse di deposito o			
mantenimento (per brevetti)			
Costo del personale dipendente			
della PA			
IVA	114.021,79		
Altro	15.065,02	(include incentivo per funzioni	
		tecniche, imprevisti, rilievi e	
		indagini, allacciamenti e altre voci	
		non incluse nelle precedenti	
		elencazioni)	_
TOTALE	667.714,28	*	

Completamento del Piano di Risanamento Acustico Comunale - valorizzazione aree quiete con interventi finalizzati al miglioramento della fruibilità

Voci di spesa	Importo (€)	Note
Materiali inventariabili		
Materiali di consumo		
Costi per elaborazione dati		
Personale non dipendente da		
destinare allo specifico progetto		
Servizi esterni (compresi lavori)	235.930,23	(include lavori, oneri sicurezza non soggetti a ribasso e spese per incarichi esterni)
Missioni		
Convegni		
Pubblicazioni		
Costi forfettizzati e spese		

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generali		
Consulenze e spese di deposito		
(per brevetti)		
Pagamento tasse di deposito o		
mantenimento (per brevetti)		
Costo del personale dipendente		
della PA		
IVA	48.604,65	
Altro		(include incentivo per funzioni
	15.465,12	tecniche, imprevisti, rilievi e
		indagini, allacciamenti e altre voci
		non incluse nelle precedenti
		elencazioni)
TOTALE	300.000,00	ale .

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Tabella 2 - Informazioni aggiuntive per operazioni "multi-intervento"

Denominazione interventi	Tipologia intervento	CUP intervento	Codice locale progetto	Costo lordo intervento (<u>€)+</u> +	Procedura di aggiudicazione prevalente
asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Senese - REACTEU - cod opera 210290	Realizzazione LL.PP.	NON ANCORA ASSEGNATO	NON ANCORA ASSEGNATO	500.00,00	Procedura negoziata ai sensi dell'art. 1, comma 2, lett. B) del D.L. 16.7.2020, n. 76, come modificato dal D.L. 77/2021
asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Bolognese - REACTEU - cod opera 210291	Realizzazione LL.PP.	NON ANCORA ASSEGNATO	NON ANCORA ASSEGNATO	500.000,00	Procedura negoziata ai sensi dell'art. 1, comma 2, lett. B) del D.L. 16.7.2020, n. 76, come modificato dal D.L. 77/2021

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barriere fonoassorbenti Viadotto dell'Indiano	Realizzazione LL.PP.	NON ANCORA ASSEGNATO	NON ANCORA ASSEGNATO	900.000,00	Procedura negoziata ai sensi dell'art. 1, comma 2, lett.B) del D.L. 16.7.2020, n. 76, come modificato dal D.L. 77/2021
barriere fonoassorbenti viadotto Marco Polo	Realizzazione LL.PP.	NON ANCORA ASSEGNATO		500.000,00	Procedura negoziata ai sensi dell'art. 1, comma 2, lett.B) del D.L. 16.7.2020, n. 76, come modificato dal D.L. 77/2021
pavimentazioni fonoassorbenti via delle Cascine, via Paisiello, via delle Porte Nuove, via del Ponte alle Mosse	Realizzazione LL.PP.	NON ANCORA ASSEGNATO	NON ANCORA ASSEGNATO	667.714,28	Procedura negoziata ai sensi dell'art. 1, comma 2, lett.B) del D.L. 16.7.2020, n. 76, come modificato dal D.L. 77/2021
valorizzazione aree quiete con interventi finalizzati al miglioramento della fruibilità	Realizzazione LL.PP.	H19J21005550 001		300.000,00	Procedura negoziata ai sensi dell'art. 1, comma 2, lett.B) del D.L. 16.7.2020, n. 76, come modificato dal D.L. 77/2021
			Totale costo operazione		

**la scheda progetto deve riportare una descrizione specifica dei singoli interventi di cui consta l'operazione ammessa a finanziamento, con evidenza del rispettivo costo lordo e della corrispondente procedura di aggiudicazione prevalente.

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Cronoprogramma di spesa per operazioni "multi-intervento"

asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Senese - REACTEU - cod opera 210290

Cronoprogram ma Finanziario	Totale operazione***	Intervento Codice locale progetto	Intervento Codice locale progetto	Intervento Codice Locale progetto
2021				
2022	10.000,00			
2023	490.000,00			
TOTALE	500.000,00			

asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Bolognese - REACTEU - cod opera 210291

Cronoprogram ma Finanziario	Totale operazione***	Intervento Codice locale progetto	Intervento Codice locale progetto Fl	Intervento Codice locale progetto
2021				
2022	10.000,00			
2023	490.000,00			
TOTALE	500.000,00			

barriere fonoassorbenti Viadotto dell'Indiano

Cronoprogram ma Finanziario	Totale operazione***	Intervento Codice locale progetto	Intervento Codice locale progetto Fl	Intervento Codice locale progetto
2021				
2022	25.000,000			
2023	875.000,00			
TOTALE	900.000,00			

barriere fonoassorbenti viadotto Marco Polo

Cronoprogram ma Finanziario	Totale operazione***	Intervento Codice locale progetto	Intervento Codice locale progetto Fl	Intervento Codice locale progetto
2021				
2022	15.000,00			
2023	485.000,00			
TOTALE	500.000,00			

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pavimentazioni fonoassorbenti via delle Cascine, via Paisiello, via delle Porte Nuove, via del Ponte alle Mosse

Cronoprogram ma Finanziario	Totale operazione***	Intervento Codice locale progetto	Intervento Codice locale progetto Fl	Intervento Codice locale progetto
2021				
2022				
2023	667.714,28			
TOTALE	667.714,28			

valorizzazione aree quiete con interventi finalizzati al miglioramento della fruibilità

Cronoprogram ma Finanziario	Totale operazione***	Intervento Codice locale progetto	Intervento Codice locale progetto Fl	Intervento Codice locale progetto
2021				
2022	15.000,00			
2023	285.000,00			
TOTALE	300.000,00			

***il totale della previsione di spesa per ciascuna annualità deve coincidere con il valore cumulato indicato nella scheda progetto approvata dall'OI.

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QUADRO ECONOMICO DEI SINGOLI INTERVENTI CENSITI NELL'OPERAZIONE:

- Intervento codice locale progetto Codice locale progetto FI_6.1.4 Completamento del Piano di Risanamento Acustico Comunale - asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Senese - REACTEU - cod opera 210290

	Quadro econ		
Codice operazione Presente all'interno del Piano operativo	Voci di spesa	Importo (€)	Note
	Progettazione e studi		
	Acquisizione aree o immobili		
	Lavori	363.362,00	
	Oneri di sicurezza	11.238,00	
	Servizi di consulenza	25.475,52	Servizi di Ingegneria e Architettura (con IVA)
	Interferenze		
	Imprevisti	5.237,74	(con IVA)
	IVA su lavori e oneri di sicurezza 10%		
FI 6140	IVA residua	82.412,00	22% su lavori e oneri sicurezza
11_0.1.45	Oneri di investimento		
	Lavori a carico del concessionario		
	Oneri di sicurezza a carico del concessionario		
	Altro	12.274,73	Comprende gli incentivi per funzioni tecniche ex art. 113 D.lgs 50/2016, rilievi ed indagini, spese allacciamenti e varie (con IVA)
	TOTALE	500.000,0	

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Completamento del Piano di Risanamento Acustico Comunale - asfalto fonoassorbente compreso risanamento del sottofondo - tratto via Bolognese - REACTEU - cod opera 210291

	Quadro economico					
Codice operazione Presente all'interno del Piano operativo	Voci di spesa	Importo (€)	Note			
	Progettazione e studi					
	Acquisizione aree o immobili					
	Lavori	363.362,00				
	Oneri di sicurezza	11.238,00				
	Servizi di consulenza	25.475,52	Servizi di Ingegneria e Architettura (con IVA)			
	Interferenze					
	Imprevisti	5.237,74	(con IVA)			
	IVA su lavori e oneri di sicurezza 10%					
FI 614a	IVA residua	82.412,00	22% su lavori e oneri sicurezza			
11_0.1.45	Oneri di investimento					
	Lavori a carico del concessionario					
	Oneri di sicurezza a carico del concessionario					
	Altro	12.274,73	Comprende gli incentivi per funzioni tecniche ex art. 113 D.lgs 50/2016, rilievi ed indagini, spese allacciamenti e varie (con IVA)			
	TOTALE	500.000,0				

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Completamento del Piano di Risanamento Acustico Comunale - barriere fonoassorbenti Viadotto dell'Indiano

	Format quadro economico				
Codice operazione Presente all'interno del Piano operativo	Voci di spesa	Importo (€)	Note		
	Progettazione e studi	23.472,34			
	Acquisizione aree o immobili				
	Lavori	617.000,00			
	Oneri di sicurezza	49.360,00			
	Servizi di consulenza	8.681,55	Direzione Lavori e Coordinamento sicurezza in fase di esecuzione		
	Interferenze				
	Imprevisti	29.319,84	(con IVA)		
	IVA su lavori e oneri di sicurezza 10%				
FI_	IVA residua	146.599,20	22% lavori e oneri sicurezza		
	Oneri di investimento				
	Lavori a carico del concessionario				
	Oneri di sicurezza a carico del concessionario				
	Altro	25.567,07	Comprende gli incentivi per funzioni tecniche ex art. 113 D.lgs 50/2016, rilievi ed indagini, spese allacciamenti e varie (con IVA)		
	TOTALE	900.000,00			

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Completamento del Piano di Risanamento Acustico Comunale - barriere fonoassorbenti viadotto Marco Polo

	Format quadro economico				
Codice operazione Presente all'interno del Piano operativo	Voci di spesa	Importo (€)	Note		
	Progettazione e studi	15.072,94			
	Acquisizione aree o immobili				
	Lavori	340.500,00			
	Oneri di sicurezza	27.240,00			
	Servizi di consulenza	5.574,92	Direzione Lavori e Coordinamento sicurezza in fase di esecuzione		
	Interferenze				
	Imprevisti	16.180,56	(con IVA)		
	IVA su lavori e oneri di sicurezza 10%				
FI_	IVA residua	80.902,80	22% lavori e oneri sicurezza		
	Oneri di investimento				
	Lavori a carico del concessionario				
	Oneri di sicurezza a carico del concessionario				
	Altro	14.528,78	Comprende gli incentivi per funzioni tecniche ex art. 113 D.lgs 50/2016, rilievi ed indagini, spese allacciamenti e varie (con IVA)		
	TOTALE	500.000,00			

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Completamento del Piano di Risanamento Acustico Comunale - pavimentazioni fonoassorbenti via delle Cascine, via Paisiello, via delle Porte Nuove, via del Ponte alle Mosse

	Quadro economico				
Codice operazione Presente all'interno del Piano operativo	Voci di spesa	Importo (€)	Note		
	Progettazione e studi				
	Acquisizione aree o immobili				
	Lavori	492.366,82			
	Oneri di sicurezza	25.914,04			
	Servizi di consulenza	20.346,61	Servizi di Ingegneria e Architettura (con IVA)		
	Interferenze				
	Imprevisti	5.000,00	(con IVA)		
	IVA su lavori e oneri di sicurezza 10%				
T	IVA residua	114.021,79	22% su lavori e oneri sicurezza		
·	Oneri di investimento				
	Lavori a carico del concessionario				
	Oneri di sicurezza a carico del concessionario				
	Altro	10.065,02	Comprende gli incentivi per funzioni tecniche ex art. 113 D.lgs 50/2016, rilievi ed indagini, spese allacciamenti e varie (con IVA)		
	TOTALE	667.714.29			

Palazzo Vecchio, P.zza Signoria 50122 Firenze





Completamento del Piano di Risanamento Acustico Comunale - valorizzazione aree quiete con interventi finalizzati al miglioramento della fruibilità

	Format quadro economico			
Codice operazione Presente all'interno del Piano operativo	Voci di spesa	Importo (€)	Note	
	Progettazione e studi	0,00		
	Acquisizione aree o immobili	0,00		
	Lavori	212.432,92		
	Oneri di sicurezza	8.497,32		
	Servizi di consulenza	15.000,00	Incarichi professionali (_ compreso IVA)	
	Interferenze	0,00		
FI_6.1.4g1 - Completamento del Piano	Imprevisti	4.418,60	(compreso IVA)	
di Risanamento Acustico	IVA su lavori e oneri di sicurezza 22%	48.604,65		
Comunale - valorizzazione	IVA residua	0,00		
finalizzati al miglioramento	Oneri di investimento	0,00		
della fruibilità (CUP	Lavori a carico del concessionario	0,00		
H19J21005550001)	Oneri di sicurezza a carico del concessionario	0,00		
	Altro	11.046,51	Comprende gli incentivi per funzioni tecniche ex art. 113 D.lga 50/2016, rilievi ed indagini, spese allacciamenti e varie	
	TOTALE	€300.000,00		

Data

Firma

Palazzo Vecchio, P.zza Signoria 50122 Firenze

ANNEX 2

Market analysis

Introduction

When dealing with the exploitation plan of the asphalt solutions set up in the LIFE E-VIA, the following main financial markets could be considered:

- Asphalt/road market:
 - Asphalt components (e.g., bitumen, aggregates, and additives). Indeed, UNIRC focused on these components.
 - Asphalt plants. Indeed, the introduction of crumb rubber could have consequences also on asphalt plants.
 - Crumb rubber and tyres. Indeed, UNIRC focused on the introduction of crumb rubber according to the dry method.
 - Road works firms. Indeed, the process of pavement construction involves road work enterprises.
- Vehicle brands. Indeed, tyres are an essential part of vehicles.

The asphalt market has its own characteristics:

- For the production of asphalt concretes, there are often local players (usually 50-200 km far from each other);
- For the production of asphalt binders, there are often regional players (300-1000 km far from each other);
- For the production of additives, there are often national or international players;
- Patenting a new asphalt concrete formula is possible but quite unusual.

Asphalt market

Based on [1], the global asphalt market size is expected to reach **USD 321.5 million** by 2027, exhibiting a Compound Annual Growth Rate (CAGR) of 4.8% during the forecast period. About 70% of the bitumen is used in road construction which is likely to cause an uptrend in market growth. Increasing construction of the paving asphalt, along with favourable funding, awareness to improve the ageing of the infrastructure, and advances in non-building construction activities, such as highway and street segments are the key attributes driving the market trend [1]. Rapid urbanization across the globe is one of the key factors driving the growth of the market. The increasing usage of reclaimed asphalt pavements (RAP) in residential and commercial driveways, parking lots, schools, and playground blacktops is catalysing the market growth [2].

On the basis of application, the global asphalt market is segmented into [3]:

- Asphalt Cement
- Emulsion
- Paving
- Roofing
- Others

On the basis of the end-use industry, the global asphalt market is segmented into [3]:

- Residential
- Non-residential

On the basis of region, the global asphalt market is segmented into [3]:

- North America (U.S., Canada)
- Latin America (Brazil, Argentina, Mexico, Rest of Latin America)
- Europe (U.K., Germany, Italy, Spain, France, Poland, Russia, Rest of Europe)
- Asia Pacific (China, India, South Korea, Japan, ASEAN, Australia, Rest of Asia Pacific)
- Middle East (Gulf Cooperation Council (GCC), Israel, Rest of the Middle East)
- Africa (Northern Africa, South Africa, Central Africa)

Crumb rubber market

Based on [4], the huge amount of tires produced, the tire's longevity, and the tire's environmental impact are all problematic components in the tire, making it a difficult source of trash. Due to the tire's great durability and lack of biodegradability, valuable landfill space may be wasted. Therefore, the rising awareness about environmental conservation, tire recycling has become a top priority. Also, one of the most significant waste sources is worn-out tires and tire recycling is required to combat this waste. Apart from core rubber, additional by-products such as steel, wire-free chips, rubber & so on are obtained from tire shredding and may be utilized fuel additive or as fuel feedstock [4].

The global crumb rubber market was valued over **USD 1.4 Bn** in 2020. It is estimated to expand at a Compound Annual Growth Rate (CAGR) of 4.8% from 2021 to 2031. The global crumb rubber market is expected to cross the value of **USD 2.4 Bn** by the end of 2031. Understanding the segments helps in identifying the importance of different factors that aid the market growth [5].

By Type:

- Crumb Rubber from Passenger Car
- Crumb Rubber from Commercial Vehicle

By Application:

- Tire Derived Fuel
- Ground Rubber
- Civil Engineer
- Other

In Italy there are several consortia, for example:

- EcoTyre
- Ecopneus
- PneuLife
- Greentire
- Consorzio Green Power
- Corgom
- Cobat

Asphalt plant market

For asphalt plants, there are a few big players. Based on [6], the asphalt plant market revenue is expected to grow to **USD 2.47 Bn** by the year **2027**. This represents a Compound Annual Growth Rate (CAGR) of 2.8% from the year 2019 to 2027.

Whereas, in terms of volume, the market was valued at 4,127 units in 2018 and is anticipated to reach 4,831 units by 2027 thereby registering a CAGR growth rate of 1.8% from 2019 to 2027. The global asphalt plant market is experiencing exponential growth owing to the growing number of highway development projects. The companies operating in the asphalt plant market are focusing on offering technologically advanced products that meet the varying demands of the customers. Another factor supporting the growth of the <u>asphalt plant market</u> is urbanization, which is supporting the increasing demand for modern infrastructures such as new roads and highways [6].

The market for asphalt mixing plants is anticipated to increase as a result of the recent significant rise in the construction and transportation industries. The global Asphalt Mixing Plants Market is anticipated to rise as a result of an increase in demand from various industries, including the construction of bridges, tunnels, and buildings. Road construction employs the utilization of asphalt mixing plants. As a result, it is anticipated that increased investment in the construction of roads and infrastructure will fuel the expansion of the global Asphalt Mixing Plants Market. Additionally, a spike in commercial and passenger vehicle sales is predicted to fuel market growth [7].

Asphalt Mixing Plants Market, By Product [7]:

- Portable
- Stationary

Asphalt Mixing Plants Market, By Application [7]:

- Road construction
- Others

Exploitation plan-asphalts

Creation of a spin-off

In 2021 the proposal for a spin-off underwent department approval.

Status of UNIRC

The University MEDITERRANEA of Reggio Calabria (UNIRC) is a public body. Under this assumption, basically, UNIRC is not a business player.

Business plan

Based on the above, this business plan is tentatively referred to the creation of a spin-off.

Executive summary

The Spin-off has as its main objective the supply of a valid and timely offer to the demand for low-noise pavements for cities and current transport infrastructures. Specifically, the services and products offered by the Spin-off concern the design of innovative bituminous conglomerate mixtures, hopefully using CR-based solutions. The target market of the products is that of cities and infrastructures and has an international extension, given that the solutions that the Spin-off wants to propose can be adapted to any territorial context (e.g. different climatic and/or environmental conditions, different methods construction and management, etc).

The market growth trend is positive, given that the need for innovative and sustainable solutions which respect the environment and improve human health (for example reducing noise pollution from road traffic noise), is rapidly and continuously increasing. The possible competitors of the Spin-off are those companies that design and/or test mixtures in bituminous conglomerate with innovative and/or recycled materials.

Company description

For the company description, see "Status of UNIRC"

Market analysis

For the market analysis, see section "Market analysis"

Products and services

Quiet pavement technologies.

Marketing, Logistics and Operations, and Financial Plan

These are the main steps:

- Patenting
- Setting up processes. Designing the required machines
- Having this solution included in the major Italian contract specifications
- Commercialising the product

References

[1] https://www.fortunebusinessinsights.com/asphalt-market-102998, Asphalt Market Size, Share & Industry Analysis, By Product (Paving, Roofing, and Others), By Application (Roadways, Waterproofing, Recreation, and Others), and Regional Forecast, 2020-2027. (2020).

[2] https://www.imarcgroup.com/asphalt-market, Asphalt Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2023-2028. (2022).

[3] https://www.coherentmarketinsights.com/market-insight/asphalt-market-2982, Asphalt Market, by Product Type (Hot Asphalt, Medium Curing (MC) Cold Mix Asphalt, and Unique Paving Materials (UPM) Asphalt), by Application (Asphalt Cement and Others), by End-Use Industry, and by Region – Size, Share, Outlook, and Opportunity . (2023).

[4] https://www.fortunebusinessinsights.com/tire-shredder-market-106090, 2 Tire Shredder Market Size, Share & Industry Analysis, By Type (Electrical Tire Shredder, Hydraulic Tire Shredder), By Application (Shredding of Rubber Tires, Shredding of Radial Tires) And Regional Forecast 2023-2030. (2022).

[5] https://www.transparencymarketresearch.com/crumb-rubber-market.html, Crumb Rubber Market - Global Industry Analysis, Size, Share, Growth, Trends, and Forecast, 2021-2031. (2022).

[6] https://www.theinsightpartners.com/reports/asphalt-plant-market, 1.3 Asphalt Plant Market to 2027 -Global Analysis and Forecast by Type (Drum Plant and Batch Plant), Product (Stationary Plant and Portable Plant), Application (Road Construction, Aggregate Processing, and Others). (2020).

[7] https://www.verifiedmarketresearch.com/product/asphalt-mixing-plants-market/, Global Asphalt Mixing Plants Market Size By Product (Portable, Stationary), By Application (Road Construction), By Geographic Scope And Forecast. (2022).

ANNEX 3

Annex 3.1 ASPHALT QUESTIONNAIRE

C2M Checklist

Response ID:902 Data

1. LIFE Programme and Close-to-market Projects: Supporting promising companies

Dear project beneficiaries,

Welcome to the checklist of the LIFE <u>Programme</u>, which has as <u>ultimate goal</u> to support you to become economically successful and to get to the market your environmental solution. With the checklist, we identify close-to-market projects and map the business development of the promising companies. On this basis we offer support to further develop your ideas and business.

We understand that you came to LIFE with the idea of a product or service to support EU environmental and climate policy goals. Now you are ahead of the journey to get your business forward and reach your goals. This checklist is the first step on your journey, where we will identify your needs more in detail and offer you help during our cooperation.

As this is an important part of the process, please fill-in the checklist carefully and give us the opportunity to understand your needs. You can save your answers and come back to it or update your answers at any time (use button in top right corner to save the answers). You will need about 15-20 minutes to fill this out directly.

In case of further questions, please contact our team via e-mail C2Mexpert@neemo.eu

Yours sincerely, LIFE C2M team

2.

2. Introduction

1. Your LIFE project's acronym:

LIFE E-VIA

2. Contact information of the Beneficiary So we can follow up with contacts for help and support.

	Your answer
Identification Number of the project	LIFE2018-ENV-IT-000201
Coordinating Beneficiary	Comune di Firenze
Coordinating Beneficiary email address (fill in to receive PDF review of your answers)	arnaldo.melloni@comune.fi.it
URL of Beneficiary	www.comune.fi.it
Address of Beneficiary	via Benedetto <u>Fortini</u> , 37
Person responsible for completing the checklist (surname and name)	Melloni Arnaldo
Function/position of the person responsible for completing the checklist	
What product/service is the company selling?	
Coordinating beneficiary represents one of the following*	Government organization
How many other SMEs are / were participating in the project?	
a) University e) Non-profit organization	
 a) University e) Non-profit organization f) Government organization 3. Does your project intend to have a product / license / service ready at the er No 	nd of the project duration (or earlie
 a) University e) Non-profit organization f) Government organization 3. Does your project intend to have a product / license / service ready at the er No 4. Do you intend to produce a prototype? 	nd of the project duration (or earlie
 a) University e) Non-profit organization f) Government organization 3. Does your project intend to have a product / license / service ready at the en No 4. Do you intend to produce a prototype? Yes 	nd of the project duration (or earlie
 a) University e) Non-profit organization f) Government organization 3. Does your project intend to have a product / license / service ready at the er No 4. Do you intend to produce a prototype? Yes 5. Is there a private commercial entity in the project partnership? Yes 	nd of the project duration (or earlie
 a) University e) Non-profit organization f) Government organization 3. Does your project intend to have a product / license / service ready at the en No 4. Do you intend to produce a prototype? Yes 5. Is there a private commercial entity in the project partnership? Yes Note: In case you answered YES to at least 2 out of 3 questions, then this is a guestions and you still consider your project as a potential close-to-market car questionnaire. 	nd of the project duration (or earlie good basis for us to be able to pro e you answered NO to 2 or more in ndidate, please, continue completi
 a) University e) Non-profit organization f) Government organization 3. Does your project intend to have a product / license / service ready at the er No 4. Do you intend to produce a prototype? Yes 5. Is there a private commercial entity in the project partnership? Yes Note: In case you answered YES to at least 2 out of 3 questions, then this is a g support to your project. Please, go ahead in filling in this questionnaire. In case questions and you still consider your project as a potential close-to-market car questionnaire. You can save this survey and come back to it or update your answers at any tip 	nd of the project duration (or earlie good basis for us to be able to pro e you answered NO to 2 or more in ndidate, please, continue completi me.

Yes

11.

3. Innovation

For each clearly distinguishable marketable product/service that your LIFE project will develop / has developed please answer the questions below (please fill in a separate questionnaire for each clearly distinguishable marketable

product/service).

7. Please enter a title for the marketable product/service resulting from your LIFE <u>project.(</u>In less than 200 characters, spaces included.)

Low noise asphalt made with crumb rubber from recycled tyres

8. Describe the innovation. (In less than 500 characters, spaces included.)

Quiet pavement technology (HMA containing crumb rubber).

9. Is the innovation developed within the project:

Innovation is being exploited (TRL 9)

10. Characterise the type of innovation:

Significantly improved product

11. What is the level of innovation?

Obviously innovative and easily appreciated advantages to customers

12. How will the innovation be exploited?

No exploitation planned

13. Is there a clear owner of the innovation in the consortium or multiple owners?

Clear owner

14. Indicate who is the owner / who are the owners of the innovation:

Mainly UNIRC

15. Indicate the steps in order to bring the innovation to (or closer to) the market:

	Done or ongoing	Planned	Not planned but needed/desirable	Not planned and not needed
Technology transfer				Х
A partner's research team and business units are both engaged in activities relating to this innovation				Х
Market study				Х
Prototyping in laboratory environment	х			
Prototyping in real world environment				
Pilot, demonstration or testing activities	х			
Feasibility study	х			
Launch a start-up or spin-off				х
Licensing the innovation to a 3rd party				Х
Complying with existing standards	х			
Contribution to standards	х			
Raise capital				Х
Raise funding from public sources				х
Business plan				
Securing intellectual property rights (patents, copyright)			Х	
Product/service sale price determination				Х

Other (please specify)

In your estimation, what range of finance needs to be for commercialisation of your innovation?

16. Indicate (up to a maximum of 3) key <u>organisation(s)</u> within the consortium delivering this innovation (including your <u>organisation</u>). For each of these identify under the next question their needs to fulfil their market potential.

Organisation 1: UNIRC

17. Indicate their needs to fulfill their market potential:

LIFE18 ENV/IT/000201-LIFE E-VIA

	Organis	ation 1	Organis	ation 2	Organis	ation 3
	Yes	No	Yes	No	Yes	No
Investor readiness training		х				
Investor introductions		х				
Business plan development		х				
Expanding to more markets		Х				
Legal advice (IPR or other)		Х				
Mentoring or Coaching		Х				
Partnership with other SME(s)		Х				
Partnership with large corporates		Х				
Incubation/Startup accelerator		Х				
Executive Training		Х				
Team management & staffing	Х					
Commercial analysis		Х				
Marketing and customer communications		х				
Supply chain management		Х				

4. Market maturity

18. Market maturity: The market targeted by this innovation is:

Emerging: There is a growing demand and few offerings are available.

19. Market dynamics - the market is:

Holding steady

20. Are there other markets for this innovation that you are not yet targeting?

Yes

.

Please provide details:

Bitumen production, aggregate production, crumb rubber production

21. Has a trademark been registred for this innovation?

No

22. How would you describe your market presence and knowledge in those targeted markets where the marketable product/service will be sold/commercialised?

Low: No market presence with no or low related market knowledge

5. Competition

23. Market competition: How strong is competition in the target market?

Several major players with strong competencies, infrastructure and offerings

24. When do you expect that your innovation / product could be commercialised (from today)?

Between 1 and 3 years

Customer evaluation

25. For the private company/companies chosen as one of the 3 key innovators, will this innovation be used by mainly current or new customers?

Current customers

26. How close and in-touch are you with your future potential / existing customers / any sales of LIFE project product?

Low - have not contacted potential customers yet

7. Team & Management

27. To understand more about your team and management structure, <u>stability</u> and outlook, please select what is your current setup:

Low - Our management and operational teams are incomplete

28. To understand more about the management team's expertise, please select what is relevant for your project:

Low - Our management team is quite new to both the industry (technically) and the business or commercial environment.

8. Future financial planning

29. To understand how <u>aware</u> you are of your future financial needs, please select what is relevant for your project, so we can help you be prepared for the future

I do not know how much funds or from which party may I obtain. Might need some help here.

What range of finance needs to be raised?

30. Secured or potential sources of future financing: The aim is to better understand which sources LIFE projects have chosen or could consider for future financing after LIFE

Public finance programme (National or EU)

9. Additional questions

31. Any information, comments or notes you want to share with us?

10. Thank You!

We want to thank you for your participation in the mapping analysis of the Close-to-Market ("C2M") initiative within the LIFE programme and for completing the online C2M guidance

checklist! We are looking forward to future cooperation.

Yours sincerely, LIFE C2M team C2Mexpert@neemo.eu

C2M Checklist email

Feb 16, 2023 04:38:24 Success: Email Sent to: arnaldo.melloni@comune.fi.it

Annex 3.2 TYRE QUESTIONNAIRE

C2M Checklist

Response ID:884 Data

1. LIFE Programme and Close-to-market Projects: Supporting promising companies

Dear project beneficiaries,

Welcome to the checklist of the LIFE <u>Programme</u>, which has as <u>ultimate goal</u> to support you to become economically successful and to get to the market your environmental solution. With the checklist, we identify close-to-market projects and map the business development of the promising companies. On this basis we offer support to further develop your ideas and business.

We understand that you came to LIFE with the idea of a product or service to support EU environmental and climate policy goals. Now you are ahead of the journey to get your business forward and reach your goals. This checklist is the first step on your journey, where we will identify your needs more in detail and offer you help during our cooperation.

As this is an important part of the process, please fill-in the checklist carefully and give us the opportunity to understand your needs. You can save your answers and come back to it or update your answers at any time (use button in top right corner to save the answers). You will need about 15-20 minutes to fill this out directly.

In case of further questions, please contact our team via e-mail C2Mexpert@neemo.eu

Yours sincerely, LIFE C2M team

2.

2. Introduction

1. Your LIFE project's acronym:

LIFE E-VIA

2. Contact information of the Beneficiary <u>So</u> we can follow up with contacts for help and support.

	Your answer
Identification Number of the project	LIFE2018-ENV-IT-000201
Coordinating Beneficiary	Comune di Firenze
Coordinating Beneficiary email address (fill in to receive PDF review of your answers)	arnaldo.melloni@comune.fi.it
URL of Beneficiary	
Address of Beneficiary	
Person responsible for completing the checklist (surname and name)	Arnaldo Melloni
Function/position of the person responsible for completing the checklist	
What product/service is the company selling?	
Coordinating beneficiary represents one of the following*	
How many other SMEs are / were participating in the project?	

* For this marked question above, choose one of the following options:

- a) Small or Medium-sized enterprise (SME)
- b) Mid-cap company
- c) Large companies
- d) University
- e) Non-profit organization
- f) Government organization

Does your project intend to have a product / license / service ready at the end of the project duration (or earlier)?
 No

4. Do you intend to produce a prototype?

Yes

5. Is there a private commercial entity in the project partnership?

Yes

Note: In case you answered YES to at least 2 out of 3 questions, then this is a good basis for us to be able to provide support to your project. Please, go ahead in filling in this questionnaire. In case you answered NO to 2 or more initial <u>questions</u> and you still consider your project as a potential close-to-market candidate, please, continue completing the questionnaire.

You can save this survey and come back to it or update your answers at any time.

6. Have you you answered YES to at least 2 out of 3 questions above?

Yes

11.

3. Innovation

For each clearly distinguishable marketable product/service that your LIFE project will develop / has developed please answer the questions below (please fill in a separate questionnaire for each clearly distinguishable marketable

product/service).

7. Please enter a title for the marketable product/service resulting from your LIFE project.(In less than 200 characters, spaces included.)

Novel processes to develop a holistic noise optimized EV tyre

8. Describe the innovation. (In less than 500 characters, spaces included.)

Within LIFE E-VIA existing, validated and already industrialized technologies were combined using novel approaches for measurement processes and target conflict balancing during the development process to develop a holistic noise optimized EV type which has a good noise performance under urban conditions while simultaneously maintaining performance levels for other critical parameters like rolling resistance or wet grip.

9. Is the innovation developed within the project:

Innovation is already developed, but not yet being exploited (TRL 7 or 8)

10. Characterise the type of innovation:

Significantly improved product

11. What is the level of innovation?

Innovative but could be difficult to convert customers

12. How will the innovation be exploited?

Only deployed as new to the organisation/company (new internal process implemented)

13. Is there a clear owner of the innovation in the consortium or multiple owners?

Clear owner

14. Indicate who is the owner / who are the owners of the innovation:

Continental Reifen Deutschland GmbH

15. Indicate the steps in order to bring the innovation to (or closer to) the market:

LIFE18 ENV/IT/000201-LIFE E-VIA

	Done or ongoing	Planned	Not planned but needed/desirable	Not planned and not needed
Technology transfer				Х
A partner's research team and business units are both engaged in activities relating to this innovation	х			
Market study				Х
Prototyping in laboratory environment	х			
Prototyping in real world environment	х			
Pilot, demonstration or testing activities	х			
Feasibility study	х			
Launch a start-up or spin-off				Х
Licensing the innovation to a 3rd party				Х
Complying with existing standards				Х
Contribution to standards				Х
Raise capital				Х
Raise funding from public sources				Х
Business plan				Х
Securing intellectual property rights (patents, copyright)				Х
Product/service sale price determination				Х

In your estimation, what range of finance needs to be for commercialisation of your innovation?

16. Indicate (up to a maximum of 3) key <u>organisation(s)</u> within the consortium delivering this innovation (including your <u>organisation</u>). For each of these identify under the next question their needs to fulfil their market potential.

Organisation 1: Continental Reifen Deutschland GmbH

17. Indicate their needs to fulfill their market potential:

LIFE18 ENV/IT/000201-LIFE E-VIA

	Organisation 1		Organisation 2		Organisation 3	
	Yes	No	Yes	No	Yes	No
Investor readiness training		Х				
Investor introductions		х				
Business plan development		х				
Expanding to more markets		х				
Legal advice (IPR or other)		Х				
Mentoring or Coaching		х				
Partnership with other SME(s)		Х				
Partnership with large corporates		Х				
Incubation/Startup accelerator		х				
Executive Training		Х				
Team management & staffing		Х				
Commercial analysis		Х				
Marketing and customer communications		х				
Supply chain management		Х				

4. Market maturity

18. Market maturity: The market targeted by this innovation is:

The market is not yet existing and it is not yet clear that the innovation has potential to create a new market.

19. Market dynamics – the market is:

Holding steady

20. Are there other markets for this innovation that you are not yet targeting?

No

.

Please provide details:

21. Has a trademark been registred for this innovation?

No

22. How would you describe your market presence and knowledge in those targeted markets where the marketable product/service will be sold/commercialised?

High: Well established long-term historical market presence with significant related market knowledge

5. Competition

23. Market competition: How strong is competition in the target market?

Several major players with strong competencies, infrastructure and offerings

24. When do you expect that your innovation / product could be commercialised (from today)?

Between 1 and 3 years

6. Customer evaluation

25. For the private company/companies chosen as one of the 3 key innovators, will this innovation be used by mainly current or new customers?

Current customers

26. How close and in-touch are you with your future potential / existing customers / any sales of LIFE project product?

Other - Write In: Not applicable

7. Team & Management

27. To understand more about your team and management structure, stability and outlook, please select what is your current setup:

High - We have a complete team; operational team (technical, sales/advertisement, economic/business related) in place and management team is competent and committed to the next years of <u>development</u>

28. To understand more about the management team's expertise, please select what is relevant for your project:

High - Our management team has a combination of industry (technically capable) and business (commercially capable) development experience

8. Future financial planning

29. To understand how <u>aware</u> you are of your future financial needs, please select what is relevant for your project, so we can help you be prepared for the future

What range of finance needs to be raised?

30. Secured or potential sources of future financing: The aim is to better understand which sources LIFE projects have chosen or could consider for future financing after <u>LIFE</u>

Own funding

9. Additional questions

31. Any information, comments or notes you want to share with us?

Many questions in this questionnaire aren't really applicable if the "innovation" (answer to question 10) isn't really a new product or service. In view of this questions 9 and 24 were only answered because they need to be filled.

10. Thank You!

We want to thank you for your participation in the mapping analysis of the Close-to-Market

("C2M") initiative within the LIFE programme and for completing the online C2M <u>guidance</u> checklist! We are looking forward to future cooperation.

Yours sincerely, LIFE C2M team C2Mexpert@neemo.eu

C2M Checklist email

Jan 31, 2023 11:04:52 Success: Email Sent to: arnaldo.melloni@comune.fi.it