AIRFRESH

LIFE19 ENV/FR/00086

AIRFRESH

Air pollution removal by urban forests for a better human well-being

After-LIFE Communication Plan

Action E1
Reporting Date: 01/12/2024

Data Project	
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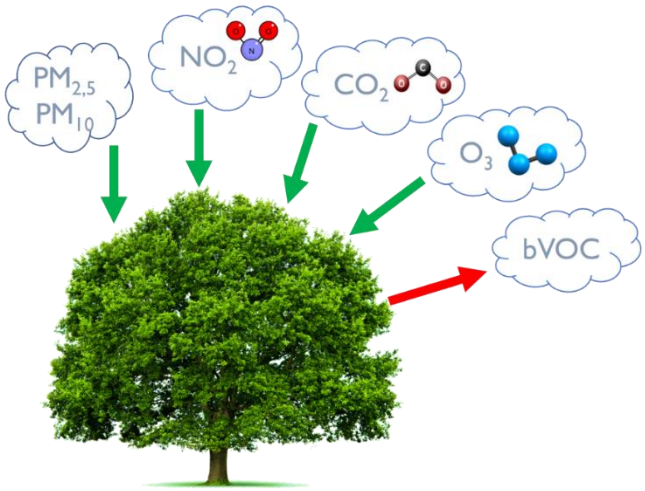
1. Overview of the project

Mass urbanization is one of the most urgent challenges of the 21st century, i.e. 82% of the European Union population will live in cities in 2030. **Air pollution** is one of the most pressing environmental challenges faced by modern cities urging international cooperation and **unified research efforts**. Air pollutants such as particulate matter (PM), nitrogen dioxide (NO_2), and tropospheric ozone (O_3) are a **threat to human health** (e.g., respiratory and cardiovascular diseases, asthma lung cancer) and natural ecosystems.

Project scope and objectives



Urban reforestation, e.g., by increasing the tree density in cities, and peri-urban reforestation near densely populated cities where it is not easy to plant trees, can help **improve air quality** and meet clean air standards in cities.

Therefore, efforts for **optimizing urban greenness** for healthy cities are needed. The European Union launched the **Biodiversity Strategy for 2030** asking municipalities with at least 20,000 inhabitants to develop ambitious Urban Greening Plans.

However, **careful selection of species** is needed to avoid unintended side effects, such as the emission of biogenic volatile organic compounds (bVOCs) which can contribute to O_3 formation. Some municipalities have hurriedly planted any tree species anywhere, and these strategies have degraded air quality.

To efficiently reduce air pollution and target **carbon-neutral and climate-resilient cities**, a quantitative assessment of the role of urban trees in affecting air quality and thermal environment and a **suitable selection of tree species** are needed. In AIRFRESH, we have selected **Aix-en-Provence** in France and **Florence** in Italy as living labs.

Test area: species selection, planting, maintenance, field campaigns, data collection.

Estimation & mapping of ecosystem services at city scale by satellite images and modelling.

Scaling-up & Replication in follower cities.

For the first time, AIRFRESH aimed to:

- Quantify* the **environmental and health benefits** provided by a newly planted test area. * *based on in-situ data*
- Quantify the **air pollution removal by urban trees** at city scale.
- Propose **recommendations for reforestation policies** for meeting air quality standards.

Project achievements

Test area: tree planting, maintenance and field campaigns

Two test areas were implemented in January 2022 (400 fast-growing trees, mix of species, > 3 m tall, 1-hectare). The environmental benefits were estimated before and after reforestation through key indicators. Continuous measurements of air pollution concentrations and meteorology were carried out in and around the area, above and below the canopy, before and after tree planting using AirQino sensors (air temperature, relative humidity, wind direction and speed, particles ($PM_{2.5}$, PM_{10}) and gaseous air pollutants (NO_2, CO_2, O_3). Assessment of biodiversity (flora and fauna) were carried out (e.g. soil biodiversity, environmental DNA). Regarding CO_2 emissions, a Life Cycle Analysis was accomplished to calculate the Carbon Footprint linked to nursery cultivation, tree planting, and maintenance over time.

Mapping and Assessment of Ecosystems and their Services

Sicard et al., 2023 have developed a **satellite-based approach** for detecting, delineating, and classifying urban vegetation in both public and private areas. The main characteristics of individual trees (e.g., species, height, canopy cover) are derived from very-high resolution satellite imagery WorldView-2 or Pleiades (0.5 m spatial resolution). We have developed an innovative single-tree model (**FlorTree**) to quantify and map the air pollutants removal capacity of about **220 plant species**, e.g., CO_2, O_3, PM_{10}, $PM_{2.5}$, and NO_2. Cooling effect by vegetation is also quantified. The hourly meteorological data and surface air pollutants concentrations are obtained with WRF-CHIMERE model with a spatial resolution of <1km.

In Aix-en-Provence and Florence, 22 dominant plant species and grassland were identified and classified with an overall accuracy of 84% (Sicard et al., 2023). The geo-located characteristics of urban trees, green spaces as well as **open areas potentially available for renaturation** are mapped in a GIS environment. In **Aix-en-Provence**, the vegetated areas (trees and grass) cover 39.6% of the studied area, and the **413,960 adult trees** have eliminated in 2023: 225 tons O_3 (formation: 9 tons, removal: 234 tons), 41 tons NO_2 (6,600 cars[1]), 97 tons PM_{10} (147,400 cars[1]), 16,560 tons CO_2 (10,400 cars[1]) and lawns/herbaceous have eliminated 423 tons CO_2 (about 2.6%). The 414,000 adult trees have eliminated 3.1% and 2.8% of the NO_x and CO_2 local emissions and 36.7% of PM_{10} emissions. In **Florence**, the vegetated areas cover 30.3% of the studied area, and the **553,450 adult trees** have eliminated: 530 tons O_3 (formation: 22 tons, removal: 552 tons), 73 tons NO_2 (17,140 cars[1]), 185 tons PM_{10} (281,550 cars[1]), 25,205 tons CO_2 (15,890 cars[1]).

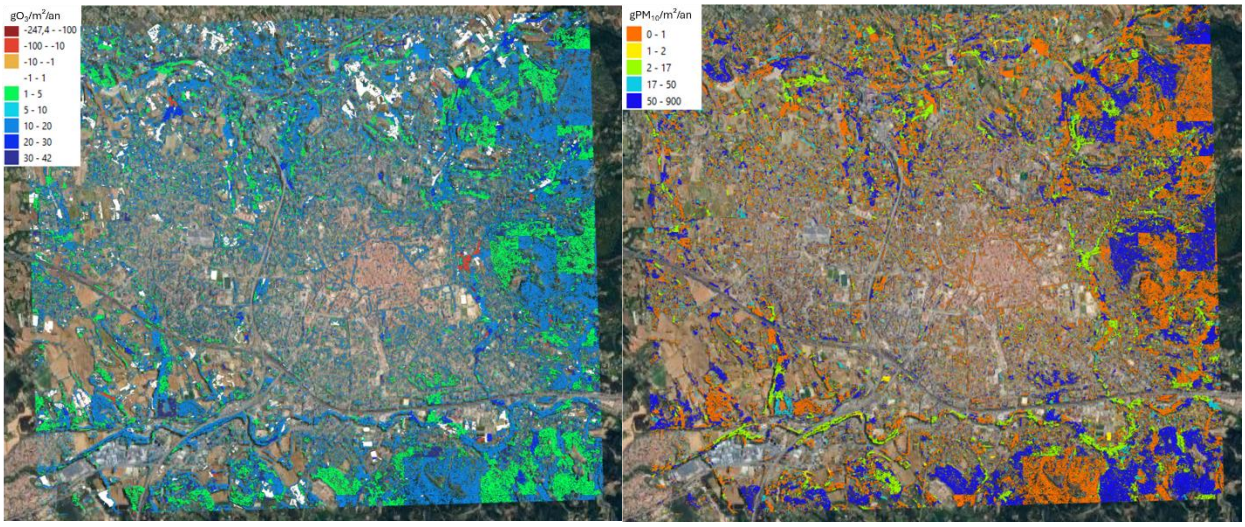


Figure 1 *– Spatial distribution of the removed ozone (left) and PM_{10} (right) by individual trees (g per m² of leaf area per year) in Aix-en-Provence for the year 2023.*

The 3-30-300 Rule Compliance: A Geospatial Tool for Urban Planning

The **3-30-300 rule**, introduced in 2021, mandates that every citizen should see at least three mature trees from their home, live in neighborhoods with at least 30% tree canopy cover, and be within 300 meters of a high-quality green space.

[1] *emissions of private cars registered in France which has driven an average of 12,200 km during the year with an average speed of 70 km/h.*

In Aix-en-Provence, **18% of buildings** are fully compliant and 4% of buildings are non-compliant with the 3-30-300 rule. In Florence, **4% of buildings** are compliant and 37% of buildings are non-compliant with the 3-30-300 rule. Compliance with two components represents 56% and 19% of the buildings in Aix-en-Provence and Florence.

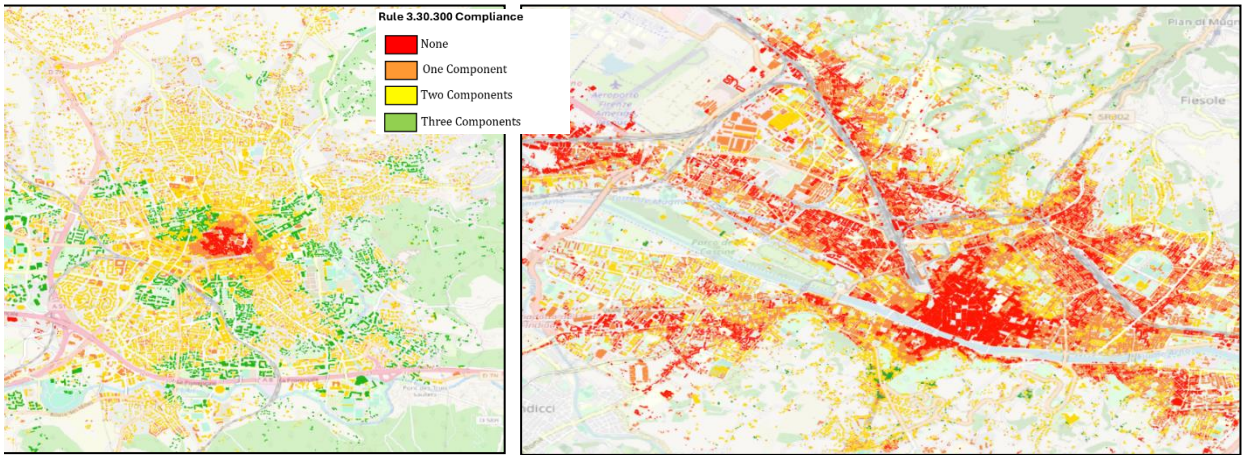


***Figure 2** - Rule 3.30.300 compliance in the study areas of Aix-en-Provence (left) and Florence (right) combining the three components: red for non-compliance, orange for compliance with one component, yellow for two components, and green for full compliance.*

FlorTree: Guidelines for city planners and decision-makers

FlorTree is a "**single-tree" model** designed to assist urban planners and decision-makers in selecting tree species most suitable to mitigate urban air pollution effectively. The model evaluates species-specific traits and environmental conditions, integrating critical factors such as tree morphology, stomatal conductance, leaf surface area, and bVOC emissions. FlorTree allows users to input site-specific data, such as local climate, pollution levels, and urban design constraints, to generate tailored recommendations.

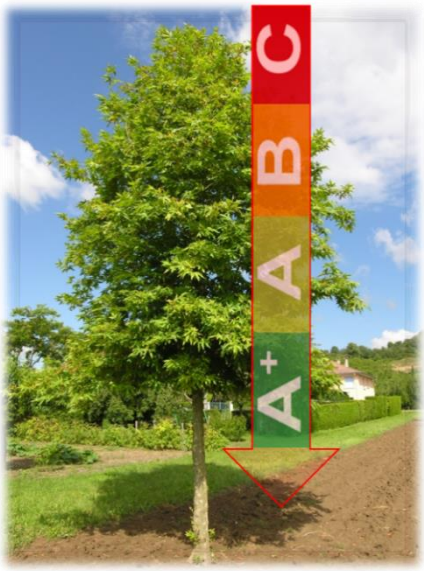
Key Features of FlorTree:

- **Species-Specific Data:** 220 tree and shrub species, assessing their ability to remove air pollutants.
- **Climate and Pollution Integration:** Considers local climate variables along with pollution concentrations.
- **Pollutant-Specific Recommendations:** Enables selection based on targeted specific pollutants.
- **User-Friendly Interface:** Accessible to city planners without advanced technical expertise.

AIRFRESH key messages

- A new methodology (Sicard et al., 2023) was developed to detect, classify, and map individual trees and green spaces at city scale, and quantify the amount of pollutants they remove from the urban air (FlorTree).
- The results allow identifying priority areas for greening in densely populated cities.
- Peri-urban forests influence climate conditions and air quality within the cities. Thus peri-urban areas can be a target for greening strategies.
- Private trees in Aix-en-Provence and Florence were more than 80% of the total, stressing the need of policies for private owners.
- Trees remove air pollutants from the air, e.g. PM_{10}, NO_2, O_3 and CO_2, but their efficiency depends on the species and local climate conditions.
- Scientifically-sound recommendations of the best/worst woody species for urban polluted environments were made available (FlorTree). Recommendations differ in different cities.
- The amount of removed pollutants can compensate the emissions from thousands of cars, e.g. in Aix-en-Provence, trees remove every year 41 tons NO_2 (corresponding to the emissions from 6,600 cars), 97 tons PM_{10} (147,400 cars) and 16,560 tons CO_2 (10,400 cars)
- A methodology was developed for checking compliance of each building with the 3-30-300 rule.
- Increasing tree cover in Aix-en-Provence and Florence to 30% could prevent 50 premature deaths each year.
- The economic value of air pollution removal and Urban Heat Island reduction by current vegetation, as estimated in terms of avoided premature deaths, was 550 M€ for the city of Florence, and 150 M€ for Aix-en-Provence. The economic value is city dependent.
- This is the first time that air pollution and warming reductions by urban forests are quantified in tandem.
- These results help the implementation of the EU strategies, e.g. on biodiversity protection and Green Deal, that target planting of 3 billion trees by 2030 in the EU.

Environmental and Socio-economic benefits of the project



Each reforested area has eliminated in 2023 1.5 tons O_3, 170 kg NO_2 (40 cars[1]),150 kg PM_{10} (220 cars[1]), 21 tons CO_2 (13 cars) and increase carbon stocks (2.6 tons). Ambient air is 1.5 °C cooler compared to surrounding area. In summer, we observed a **reduction of 55% of O_3 peaks** at tree level. Planting urban forests can mitigate climate change effects as trees remove CO_2 from the atmosphere. However, by setting up a new urban forest, greenhouse gases emissions occur during cultivation in the nursery, planting, and maintenance operations. The Carbon Footprint was equal to 14.7t CO_2 equivalent with maintenance over time as the most CO_2-emitting phase (62%). The model highlighted that **13 years** are needed to reach a positive CO_2 balance. We observed significant increases in i) soil biodiversity; ii) in vertebrates; iii) in species and number of insectivorous birds. Compared to the current tree cover, **each 5%-point increase in tree canopy cover** could reduce by 3.0% and 1.4% the annual $PM_{2.5}$ and NO_2 mean concentrations, and by 1.3% the summertime mean of the daily maximum 8-hours O_3.

The dissemination activity allowed the scientific community, stakeholders and the public to be aware of LIFE AIRFRESH best practices to reduce air pollution impacts and the role of urban forest against climate change and air pollution. The w**ebsite** received on av. 195 visits per month, **35 A3 boards** and 2 notice boards were installed, **24 articles in newspapers/magazines**, **4TV and 4 radio interviews**, 9 stakeholder-oriented meetings, **4 policy briefs**, > 20 talks in scientific workshops, **11 scientific papers**, 2 expert workshops organized.

2. After-LIFE objectives

The present plan sets out how the activities are planned to continue and to develop after the end of the project, and how the longer-term management of both test areas will be secured. It gives details regarding what actions will be carried out, when, by whom, and using what sources of financing. Moreover, it defines how the beneficiaries plan to continue disseminating and communicating results after the end of the project and indicates what external support could be helpful.

Although the project has ended, several methods developed by the project will be further developed in other projects. The **AirQino sensors will continue collecting air pollution and meteorological data** after the end of the project as this activity does not require additional resources if the sensors do not need maintenance. The **validation of guidelines** allows the transfer of these innovative methodologies for a more coherent policy on urban forest in Europe, in response to the climate change challenges. After completion of the project, **major dissemination** methods will be contact with experts, through participation to conferences and meetings, publications and internet according with the **Knowledge Exchange Strategy**. The **website** will be regularly updated and maintained for free by ACRI-ST for at least 5 years. Partners are active in the main networks related to urban forestry e.g., International Union of Forest Research Organizations (IUFRO), European Forest Institute (EFI), Working Group on Effects (WGE), COST Action CA23148 "*European Network for the Integrative Approach of Urban Forestry*" and can get financial support for experience-sharing. The results will be transferred to COST Action CA23148 to **encourage the adoption of these new approaches on a pan-European scale and beyond**. All reports, guidelines, fact sheets, newsletters, police briefs and a database including all LIFE AIRFRESH data will be made **freely available**. The most effective means of disseminating will be the **project website**.

2.1 Maintenance of the newly planted test areas & data collection

Description - Beyond 2024, both municipalities will secure the project sustainability by i) maintaining the test areas (e.g. irrigation, pruning) implemented by the project; ii) planting additional urban trees; iii) spreading the project results to all citizens by producing a brochure with "recommended" tree species to plant at home; and iv) taking into account the recommendations and strategies for tree planting and maintenance. Thanks to the site maintenance carried out at the end of the project, both test areas are functional and under remote control. Remote stations will continue to record and transmit meteorological and air quality data after the end of the project. In case sensors need further maintenance, financial support from national and international sources will be searched for. Personnel support will be provided by the partners within their institutional activities. Then the project sustainability at **long-term is secured**. Beyond 2024, trees will be planted to compensate for the CO_2 emissions due to travels for project meetings (estimated at 1.5 tons CO_2 i.e. **15 trees** per participant). These trees will be planted during the After-LIFE period and recorded by the website.

Beneficiary responsible: ACRI-ST and CNR.

Estimated amount - Beyond January 2025, only data storage will be indispensable, and this does not need any further co-financing. For maintenance by both the municipality of Aix-en-Provence and Florence, resources (€ 19,500 per year for each area) are already planned in the annual city budget (e.g., the annual budget for green spaces is about € 1.1 million in Aix-en-Provence). Resources for **tree planting** (15 trees x 50€ = **750€** per individual participant**)** to compensate the project-travelling CO_2 emissions are expected from national authorities, as already obtained for compensating the travel emissions due to a national conference of *Italian Society of Silviculture and Forest Ecology*.

2.2 Replication of activities in Bucharest

Description – From 1st January 2025, partners started to collect the data needed (e.g., vegetation structure, tree distribution, local settings) for replication in Bucharest (1.9 million of inhabitants, 140 km²). Early and continued dialogue with Romanian end-users and stakeholders has been crucial.

In November 2024, we organized the final project meeting back-to-back a Stakeholders meeting on urban green in Bucharest. The main objective of the one-day meeting has been to show our activities, main outputs, and to start the discussion with relevant stakeholders from potential follower cities (e.g., Bucharest, Chișinău, Sofia, Vilnius, Warsaw) about the replication activities such as the tree detection and classification, compliance with the 3-30-300 rule, air quality modelling, quantification of air pollution removal capacity of urban trees beyond 2024. The stakeholders meeting has been a way to transfer gained experience and concrete results from both front-runner cities in urban pollution control with nature-based solutions but also to create a community of practices in other cities.

By July 2025, the individual trees will be detected and classified as dominant tree species. The annual removal of air pollution by forest category will be quantified and mapped over Bucharest.

Beneficiary responsible - ACRI-ST
Estimated amount: 6,800 € (20 working days)

2.3 Environmental and Socio-economic impacts

Description – The Environmental and Socio-economic impacts and benefits of LIFE AIRFRESH will be ensured and carefully evaluated beyond the project by 2030 thanks to the Key Performance Indicators. In line with the LIFE Regulation (Article 19), partners will use the Green Procurement during training and workshops, to improve environmental impacts beyond 2024.

Beneficiary responsible: ENEA
Estimated amount: 1,200 € per year (2 working days)

2.4 Dissemination

Description - Synthesize key findings, collate, maintain and disseminate reliable information generated by LIFE AIRFRESH, provide the basis of dissemination campaigns and results exploitation, prepare and conduct outreach activities with a wide range of stakeholders, create the basis for long-lived exploitation of LIFE AIRFRESH results, help practitioners and decision makers to make use of the new knowledge generated by LIFE AIRFRESH.

Active website

The LIFE AIRFRESH website will be used actively for real time dissemination of information and will be available for at least 5 years in the after-LIFE. Next, the majority of the information at the LIFE AIRFRESH website will be transferred into the websites of the partners. Also by keeping on-line and upgraded the website it will be possible to continue to offer visibility to the project results after the end of the project itself. This will be achieved by a website editor (Nikolai Maltsev, ACRI-ST) who is willing to update the text/images/others even after the project end.

Participation to international workshops

LIFE AIRFRESH experts will present the project results in various seminars and meetings. To allow the project continuity, stakeholder-oriented sessions for city representatives, policymakers and politicians will be organized after completion of the project to promote cities-for-healthy-people. The main events are the biennial conference of the IUFRO RG8.04, COST Action CA23148 and the UNECE Expert Panel on *Clean Air in Cities* with experts in urban forestry and air pollution, politicians, policymakers, and wider stakeholders. These events provide a fantastic science-policy arena to inform them about the optimal use of trees, as a cost-effective approach, for sustainable cities. Beneficiaries, with their **own resources**, will continue these various activities. **Partners are active** in the main urban forest networks in the field of air pollution, i.e. UNECE, SISEF, IUFRO, COST and EFI and are able to get financial support for attending events and publishing; experience-sharing is possible even without any further co-financing.

Publication in national and international journals

Detailed information on the results from the project is communicated to professionals by means of articles in national and international journals. Publications produced by the project will be available for open access in a PDF-format at the project website. These publications will be also delivered to experts. Hereafter the tentative list of scientific publications, based on the results of LIFE AIRFRESH, foreseen in the next months:

- Tree canopy cover and air pollution-related mortality in European cities – Pierre Sicard et al.
- The 3-30-300 Rule Compliance: A Geospatial Tool for Urban Planning – Marco Lopez et al.
- Leveraging peri-urban forests to reduce urban mortality – Alessandro Anav et al.
- Air pollution removal capacity provided by urban trees at city scale – Pierre Sicard et al.

Transfer of knowledge & best practices

From 2025, partners will continue large awareness and education activities to raise citizens and stakeholders' awareness about air pollution issues as well as training politicians and officials on urban trees benefits to promote *cities-for-healthy-people* and improve the quality of life of citizens.

Based on gained experience and concrete results, from both front-runner cities (Aix-en-Provence and Florence) and follower cities (Zagreb and Bucharest), knowledge **transfer to city planners** and companies of the gardening sector will also be an important contribution of LIFE AIRFRESH to the sustainability of project results. Educational activities and information for city planners will be implemented to use the project outputs (e.g. list of tree species) and guidelines/recommendations for the sustainable urban forest management. As experts and active in IUFRO RG8.04, COST Action CA23148 and the UNECE Expert Panel on *Clean Air in Cities*, the transferability and sustainability of activities across EU is secured. These actions are intended to diffuse results to obtain an active communication between different actors: public, scientists, political decision-makers, local authority.

Beneficiary responsible: All partners
Estimated amount: 3,600 € per year (6 working days)

2.5 Science-policy-stakeholder interaction

Description - All partners are active in dissemination and will perform these after-LIFE activities back-to-back with the activities supported by other projects. LIFE AIRFRESH will keep the promotion of its best practices amongst competent authorities to transfer results for a more coherent policy in EU. **Knowledge Exchange Strategy** establishes the approach to engaging with target stakeholders, and the mechanisms and media to be used, taking into account different policy sectors and audiences relevant to the work of LIFE AIRFRESH. Main tools for the best practices dissemination are the following technical guidelines produced by MOTTLES:

1. *Guidelines of Good Practices for designing and implementing urban forest*
2. *FlorTree: A unifying modelling framework for estimating the species-specific pollution removal by individual trees and shrubs*
3. *The 3-30-300 Rule Compliance: A Geospatial Tool for Urban Planning*
4. *Environmental and Socio-economic benefits provided by urban trees in European cities*
5. *Guidelines for uptake of urban and peri-urban forestry into policy and local planning*
6. *Guidelines to test, develop and replicate urban forests*

The results and recommendations will serve as support for **further development of policies in support of urban air quality and climate change governance in EU Member States**. The Knowledge Exchange Strategy of LIFE AIRFRESH is described by different target stakeholders.

Identification of stakeholders and users

Stakeholder engagement is a horizontal issue in LIFE AIRFRESH. LIFE AIRFRESH applied a **trans-disciplinary alliance approach** with iterative engagement and communication with multiple stakeholders including representatives of city partners, follower cities and main policymakers. Stakeholders have been a critical element of the project research to a) help guide the overall research direction to ensure relevance; b) provide local knowledge, data and insights, and c) aid dissemination of the project outputs. To achieve this aim, it was important to engage stakeholders from the very beginning of the project.

LIFE AIRFRESH has defined stakeholders as those who are interested in or affected by air pollution and climate change and wish to address these two issues by means of mitigation planning through cross-border cooperation. LIFE AIRFRESH included stakeholders that guaranteed the transfer of LIFE AIRFRESH results facilitating the uptake of LIFE AIRFRESH recommendations by policy actions and management plans at Member State and European levels. The list has been regularly updated during the project duration as soon as new stakeholders are identified and contacted. Close and active consultation has been maintained with them throughout the project.

Functionally, we can classify LIFE AIRFRESH possible stakeholders into the following groups:

Stakeholder affiliation & group	Relevance to LIFE AIRFRESH
City partners City partners Municipalities Public authorities Civil protection agencies Civil society Local population Public figures (e.g. politicians)	To inform public authorities about the scientific findings in relation to urban air pollution, climate change and citizens' wellbeing. To discuss the results and use them to design/update/revise integrated city plans for climate protection and air pollution control. To enable collaboration of public authorities in tackling policy bottlenecks and creating visions of green, smart and healthy cities and to gather from them data and information at city level to apply the methodology and tools. To support the implementation of awareness raising tools. To inform citizens about the benefits provided by urban trees. To inform citizens about health and wellbeing benefits/risks associated with exposure to urban environment To share experience with other cities. To engage public in the dissemination campaigns. To use fora for public health as a multiplier for broader dissemination of project results and awareness campaigns.
Engineering sector City planners Engineers Architects & designers Environmental professionals	To encourage uptake of tools in any environmental and urban structural intervention. To gather feedback on the recommendations.
Industry & SMEs Private/commercial sector	To identify new areas of collaboration and co-creation with business in Europe and worldwide. To commercialize Research & Development results.
Decision & policymakers Relative Ministries Municipalities Politicians European Commission European Council	To cooperate in order to identify feasible options for reducing air pollution and carbon emissions in European cities. To provide them with tools for cost-effective and cost-benefit analysis To provide science-based evidence for decision-making To engage them in a dialogue about tackling air pollution and climate change To support discussion on regulatory and safety issues To strengthen cooperation at European level across Member States
Academic/Scientific community University Community Researchers Leading scientific programmes Scientific networks	To enable staff, students and researchers to participate in workshops. To invite students to join school exchange programmes. To widen up the network of scientific experts of the project and exchange ideas and valuable scientific data. To exchange knowledge with the aim of creating training material, fact sheets, technical material and briefs.
International organizations World Health Organization United Nations Food and Agriculture Organization IUFRO	To raise awareness of the possibilities for using research data in campaigns & citizen science. To spread the word about the project's latest scientific data. To influence international programmes (i.e. UN Sustainable Development Goals). To use their broad platforms as a multiplier of dissemination.
Non-Governmental Organizations Environmental organizations Public health organizations	To use their online platforms and campaigns to reach out to a broader public. To work together so that we can turn technical data reports into layman language.
Media & press Local & nation-wide news agencies TV & radio stations City bloggers and journalists Environmental journalists	To help us reach out to the broader city inhabitants. To convert the project results into layman language. To provide them with science-based evidence for news posting. To promote the vision of green, smart, healthy cities

Mapping of dissemination tools to stakeholders' groups

Overall, stakeholder engagement is planned to be delivered through the following channels:

The **project website** and social media channels have been developed with the aim to increase awareness about the project research and results at the broadest possible international scale and enhance the project interactions with a wider audience.

Dissemination and information materials (brochures, flyers, newsletters etc.) have been developed and will be communicated as a toolkit to stakeholders, audiovisual material as a supportive tool.

A series of **annual workshops** on methodological advances and new findings will be carried out inviting stakeholders.

Training workshops will take place targeting key stakeholders and regulators (e.g. policy makers).

Exchange of **young scientists** between the participating consortium partners will be done on the use of LIFE AIRFRESH on certain key scientific issues decided by project team members.

A **Dissemination and Exploitation** (DE) Forum will serve as a virtual place to reach out to stakeholders and end-users, to exchange and discuss experiences, methodologies and results.

Press releases will be issued to disseminate the project results to the media, online scientific journals, news agencies, and press stakeholders to ensure a high impact and wide distribution of the project output.

In the table below we map the dissemination tools that the LIFE AIRFRESH team has developed to the specific stakeholder groups.

Table 1. Mapping of dissemination tools to stakeholder groups.

Stakeholder Groups	Dissemination Tools								
	Project website	DE Forum	Project newsletter	Events/ Workshops	Social media	Audiovisual material	Technical material	Training	Press releases
City partners	+	+	+	+	+	+	+	+	+
Municipalities	+	+	+	+	+	+	+	+	+
Public authorities	+	+	+	+	+	+	+	+	+
Civil society/ local population	+			+	+	+			+
Fora for public health	+	+	+	+	+	+	+	+	+
City planners	+	+	+	+	+	+	+	+	+
Engineers	+	+	+	+	+	+	+	+	+
Architects & designers	+	+	+	+	+	+	+	+	+
Environmental professionals	+	+	+	+	+	+	+	+	+
Private/ commercial sector	+	+	+	+	+	+	+	+	+
Ministries/ Politicians	+	+	+	+	+	+	+		+
EU bodies (EC)	+	+	+	+	+	+	+		+
University community	+	+	+	+	+	+	+	+	+
Researchers	+	+	+	+	+	+	+	+	+
Scientific networks & programmes	+	+	+	+	+	+	+	+	+
WHO, UN, IUFRO	+	+	+	+	+	+	+		+
Non-governmental organizations	+	+	+	+	+	+	+		+
Media outlets	+	+	+	+	+	+			+
Journalists	+	+	+	+	+	+			+

Beneficiary responsible – All partners
Estimated amount: 3,600 € per year (6 working days)

3. Beyond LIFE AIRFRESH - Transferability of project results

FlorTree can be applied in any city. By expanding the sets of socio-economic, climatic, urban planning, soil, phenology, and air pollution data (Zagreb, Bucharest, Vilnius, Tokyo), our approach has been validated and guidelines refined. Follower cities will build on the evidence and knowledge base generated in front-runner cities to develop their own local urban plans for replicating and adapting nature- based solutions to suit their local settings.

We expect to find a future project (European and/or national funding) to finance new larger-scale activities, e.g. European mapping of urban forests including a valuation of benefits of ecosystem services and/or the implementation of a ***Digital Twin***.

Digital Twin as a decision-making and planning tool

By combining the LIFE AIRFRESH approach with climate change and air quality scenarios, a Digital Twin can be designed to help urban planners assess the benefits of various planning scenarios. Digital Twin helps accelerate urban climate resilience by simulating climate change scenarios, identifying areas prone to the urban heat island effect and high-risk populations, and locating opportunities to incorporate more nature into cities. Data and models are available (Manzini et al., 2023; Sicard et al., 2023; Anav et al., 2024) for launching the actual replication works.

4. Evaluation of risks

No serious issue was reported during the LIFE AIRFRESH project. Then, we foresee no legal, regulatory or administrative risks also for the after-LIFE AIRFRESH activities.

Vandalism is the major risk to a successful set-up of the AirQino sensors. The occurrence of potential damage is promptly transmitted via GPRS so that fast repair and maintenance are possible. In case of very serious damage, a station can be quickly replaced.

Data access: CNR personnel responsible for the data center validation and storage is well experienced as Italian World Meteorological Organization data center. Risks of data loss is minimized by copying the data from the FTP to separate hard disks.

Transmission failure: Power supply is assured by street lighting and backup batteries. In case of transmission failure, the data-logger memory ensures the integrity of acquired data.

Stakeholder disengagement: We have implemented solid networks, regularly update the website, and use social media to circulate relevant messages to keep project activities in the minds of target audiences.

5. Conclusions

City partners and citizens at large are the core focus group of the LIFE AIRFRESH research. By putting people first, the participant cities of LIFE AIRFRESH will not only contribute to governance but will also transfer ownership of the policies to citizens, thus reducing risk of failure. Through the use of innovative technologies and web-based tools, LIFE AIRFRESH will assist and train stakeholders in urban forests implementation and maintenance as well as educate them about the health and environmental benefits provided by urban trees (win-win approach). However, all partners are responsible for the continuous monitoring of the engagement of their local stakeholder networks as well as support actions that will help sustain constructive relationships and create shared value for the project.

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