LIFEINDEXAIR

After-LIFE Plan

Deliverable E3.1

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TÉCNICO LISBOA · universidade de aveiro · Technical University of crete · DEMOKRITOS NATIONAL CENTRE FOR SCIENTIFIC RESEARCH · NATIONAL INSTITUTE FOR HEALTH AND WELFARE

WWW.LIFEINDEXAIR.NET

LIFE Index-Air

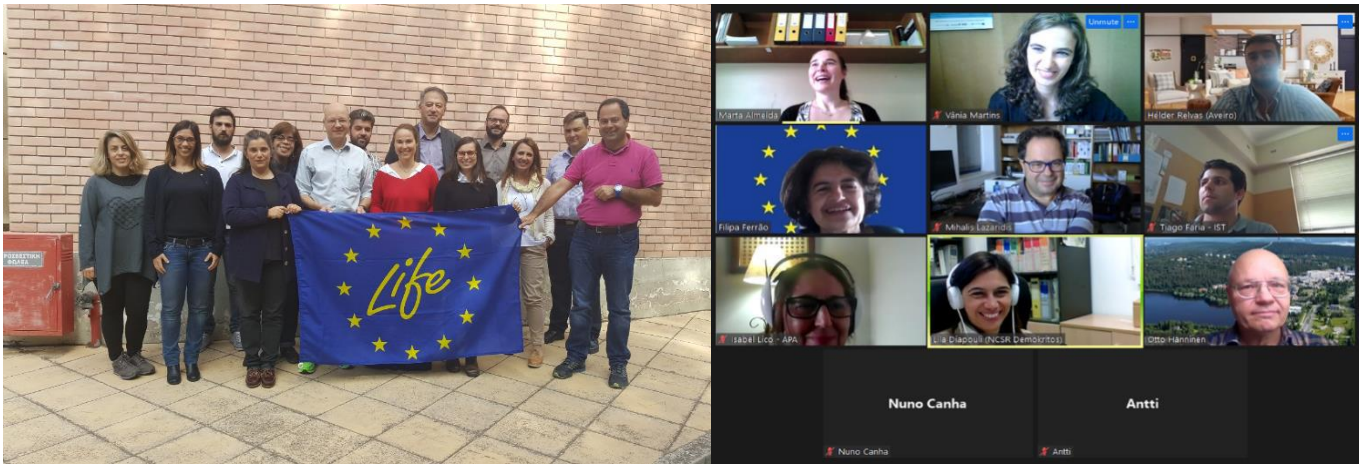
Six years working together to improve the air we breathe

In the last decade, there was a great improvement with respect to control strategies for anthropogenic emissions to the atmosphere. However, a substantial proportion of EU's population living in urban areas remains exposed to high levels of air pollution. Prompt action through efficient air quality management, considering outdoor and indoor sources, is required not only to ensure that the legal limits are not exceeded but principally to guarantee that the consequences of poor air quality are controlled and minimized.

In 2015, five partners across five European cities proposed the LIFE Index-Air project to the European LIFE programme for the Environment and Climate Action. We were responding to the EU priority "to safeguard the Union's citizens from environment-related pressures and risk to health and well-being".

After six years LIFE Index-Air contributed to the understanding of sources and factors affecting the exposure of the citizens to PM and to the reduction of the associated health impacts by:

- characterizing air quality in children's micro-environments (schools, homes, transport modes, outdoor) and identifying emission sources and factors affecting the integrated exposure of children to PM.
- developing the LIFE Index-Air Management Tool that considers the chain of events, from emissions to the atmosphere until health impacts, passing through exposure and inhaled dose. The tool provides a user-friendly interface, suitable for policy makers and other relevant stakeholders, to evaluate the effectiveness of selected air pollution mitigation measures with respect to ambient air quality, population exposure and the protection of public health.
- applying the tool in Lisbon, Oporto, Athens, Kuopio and Treviso to identify cost-effective air pollution abatement measures for these cities.
- implementing a citizen science approach to engage the population, make it aware of the complex processes that contribute to air pollution and change behaviours.

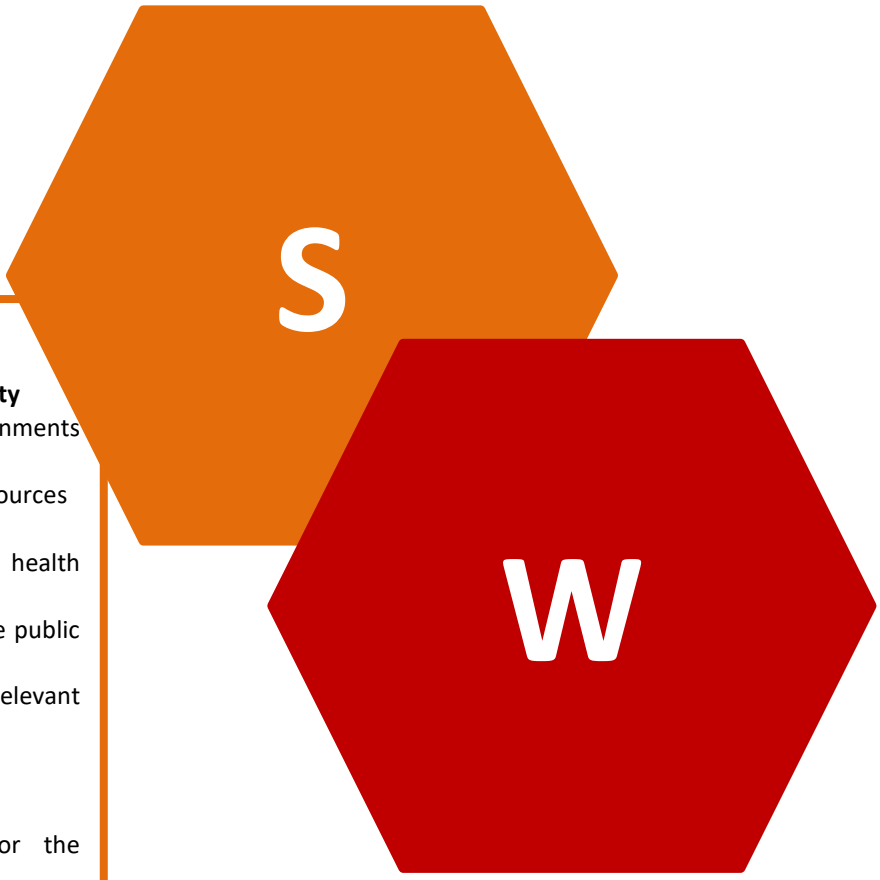


Kick-off meeting: 20th October 2016

Last monitoring meeting: 21st October 2021

LIFE Index-Air

SWOT Analysis



Strengths

LIFE Index-Air developed work with impact for the society

- Air Quality (AQ) data for different microenvironments (MEs)
- Identification and characterization of emission sources
- Open source management tool
- Information on emissions, exposure, dose and health effects
- City specific guidelines for the protection of the public health from air pollution
- Knowledge transferred to policy makers/relevant authorities
- Empowerment of the population

New product - open source management tool

- Enhancement of set of tools available for the stakeholders
- Scientific outputs
- Opportunities for new projects and collaborations

Interdisciplinary and international approach

Increased the collaboration between partners

- New knowledge
- Access to measurement/analysis facilities
- New research and project opportunities

Increased the team

- 20 young researchers paid by the project
- 17 of them will continue in the institutions after the end of the project

Increased the training capabilities

- 7 MSc
- Students from IST courses

Increased the visibility of the team

- Other research institutions
- Authorities
- Companies
- NGOs

Increased the available equipment and software

- Equipment and software developed, acquired and maintained

Increased the research productivity

- 22 Articles published
- 1 book

Increased the participation in conferences

Increased the experience in management and coordination of projects

Weaknesses

The development of the tool was much more challenging than expected

- Delayed completion of the project
- Extensive data required
- Work related in the quantification of the measures impact and scenario module were not contemplated in the proposal
- Need for more centralized and organized management of all files
- The necessary costs (in terms of personnel costs and the external assistance costs) were underestimated

The Index-Air tool outputs are strongly affected by the quality of input data

- More detailed and realistic information on emission parameters may enhance the effectiveness of the tool to capture current situation and scenario forecasts
- Good quality and quite detailed input data are needed for the inclusion of other cities in the tool

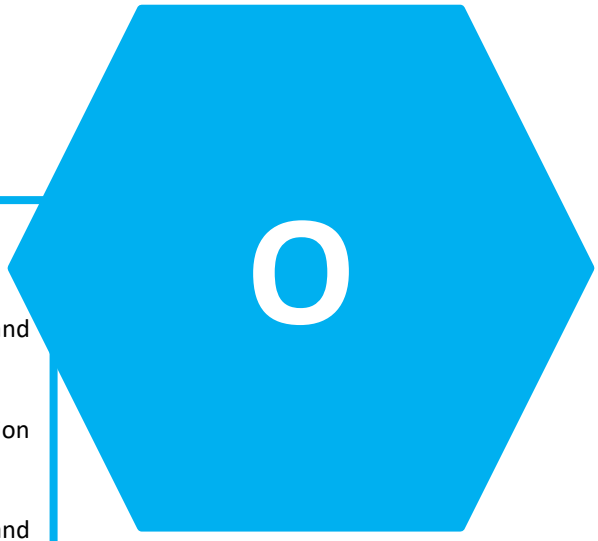
The expansion of the tool for new cities and new sources will be time consuming and will need additional funding

Dissemination of the project could have been more efficient:

- Focus on stakeholders related with the air quality management, while the relation with the others was not so deep
- Dissemination of the project outputs to European organizations (for instance: DG ENV, EEA) was not performed adequately

LIFE Index-Air

SWOT Analysis



Opportunities

The LIFE Index-Air decision support tool:

- is in alignment with policies, strategies and stakeholders' interests
- is based on available solutions
- can be extended with more advanced decision support features
- provides services, especially to municipalities
- allows dissemination to regional authorities and students

Improvement of environmental health coverage in schools

Improvement of city level AQ planning by including better exposure and health estimates using the tool

New research opportunities based on the experience obtained and the project collaborations and results, such as:

- More detailed characterization of the indoor MEs
- Microbiological characterization of the MEs
- Emergent pollutants – collaboration with Aarhus University
- Aerosol size distribution in indoor MEs and implications for deposited dose in Human Respiratory Tract
- Estimating personal / population exposure and health impacts based on real-time data obtained by low-cost sensor networks
- Quantification of the impact of sources taking profit of the COVID pandemics
- Characterization of indoor sources (fireplaces, new generation of cigarettes , etc)
- Exposure during sleep

New projects funded (transference of knowledge produced in the LIFE Index-Air)

- FCT ExpoLIS, HypnosAir and BigAir
- Interreg 3SQAIR, Hospital Sudoe 4.0 and Mouseia
- Fundo Ambiental A-Tu-Ar
- EEA Grants Pab_LAB
- H2020 ECF4CLIM
- ERA-PLANET SMURBS
- LIFE FROSTDEFEND
- Nordforsk Nordic WelfAir
- Academy of Finland APPEAL
- Michael J. Fox Foundation FINPARK
- H2020 ULTRHAS

New services

- Municipality of Loures, Seixal and Chania
- Perfecture Crete
- Sport Lisboa e Benfica (football club)
- Collaboration with industry for air cleaners

Threats

The continuous application of the tool by authorities and policy makers depends on their intention to make use or not of this research product

The effective use of the tool in the long-term depends on the possibility to update the databases (e.g. every 5-10 years)

The adoption of the pollution mitigation measures, based on the outcome of the tool and the guidelines provided by the project, may not be possible due to national economic development policies

Alternative technologies and tools may appear

Complexity of the tool may discourage un-trained end-users

LIFE Index-Air after life plan

The work will continue. Always together. Always to improve the air we breathe.

The After Life Plan of the LIFE Index-Air project aspires to ensure the sustainability of the project outcome, the transference of knowledge and further promote its outputs. The main aspects addressed by the plan are:

- Maintenance, implementation and future updates of the LIFE Index-Air Management Tool;
- Scientific activities that will fill gaps identified by the project and/or use knowledge generated by the LIFE Index-Air work;
- Dissemination, awareness and training focusing on capacity building and behavioral change in the field of air quality;
- Maintenance of the information and dissemination platforms.

Maintenance, implementation and future updates of the LIFE Index-Air Management Tool

Overview of the development and implementation of the LIFE Index-Air management tool and assessment of the situation at the end of the project

- LIFE Index-Air Management Tool and respective manual available to provide policy makers with the means to assess citizens' exposure to PM and related health effects, as well as to evaluate the effectiveness of selected air pollution mitigation measures with respect to ambient air quality, population exposure and the protection of public health;
- LIFE Index-Air Management Tool implemented in 5 cities – Lisbon, Porto, Athens, Kuopio and Treviso;
- Guidelines for action plans formulation developed for Lisbon, Porto, Athens, Kuopio and Treviso;
- 140 stakeholders trained on the LIFE Index-Air tool utilization.

Activities to be developed after the end of the project to guarantee the sustainability of the tool

Activity	Resources needed	Cost	Funding	Partner involved
Maintenance, implementation and future updates of the LIFE Index-Air tool				
Migration of the tool from MSENSIS to the IST server	Infrastructure and personnel hours	500 €	IST and NCSR-D internal resources	IST and NCSR-D
Help Desk to support the users of the tool	Personnel hours	2 000 €	Beneficiaries internal resources	Help desk based on IST but all partners will give support in their area of intervention
Promotion of the utilization of the tool by the authorities by: - organizing meetings with authorities and stakeholders, from all participating countries and also at an European level, for the continuous update of the tool capabilities and mitigation strategies; - participating in workshops, seminars, fairs and other events.	Personnel hours + travel costs	4 000 €	Beneficiaries internal resources	All beneficiaries
Promotion of the utilization of the tool for trainning and awareness purposes by: - organizing seminars, workshops and events for the general public; - using the tool as educational material in the classes given by the partners in university.	Personnel hours + travel costs	2 000 €	Beneficiaries internal resources	All beneficiaries
Expansion of the tool to other regions and to other sources *estimated value per city	Personal hours External services	7000 €*	This activity depends on future funded projects or on services paid by the interested users	All beneficiaries
Expansion of the tool considering IAQ models, IAQ sources, and indoor measures	Personal hours External services	40 000 €	This action depends on the approval of the proposal INCHILDHEALTH submitted to Horizon Europe call HORIZON-HLTH-2021-ENVHLTH-02 or other funding or other funding	IST, NCSR-D and TUC

Scientific activities

Overview of the main scientific activities developed during the project and assessment of the situation at the end of the project

- The children's exposure to carbonaceous matter and to PM major and trace elements was assessed;
- The children's potential exposure to bioburden in indoor environments was evaluated;
- Factors affecting the exposure to physicochemical and microbiological pollutants in transports were studied;
- The sources contributing to the daily exposure of children were identified;
- The air quality levels of regulated metals were modeled;
- The personal dose received by school children was assessed;
- The human health risks from particulate air pollution was characterized;
- The contribution of factors influencing the risk of SARS-CoV-2 infection in indoor environments was modeled.

The LIFE Index-Air project identified gaps knowledge that led to new research fields.

- The indoor air quality assessment performed in the interior of the homes and schools indicated the importance of specific sources and the need of additional measurements to characterize indoor sources profiles;
- Results showed that emergent chemical and microbiological pollutants are very relevant not only for the health impact assessment but also for source apportionment;
- The assessment of the individual / population exposure is a complex and expensive task and the development of low cost sensor networks can be used to estimate exposure and the related health impacts;
- Measurements performed during commuting indicated that transports are important contributors for the daily exposure and, therefore, the development of mobile sensors and new IoT solutions, to visualize information and select healthy daily paths, can have positive impacts for the health of the citizens.

During the project, the LIFE Index-Air team started working on some of these topics and submitted proposals to obtain funding to support their research. Some of the proposals have already been approved and the knowledge generated in the LIFE Index-Air project is being used and transferred to other consortia and regions.

Scientific activities to be developed after the end of the project

Activity	Resources needed	Cost	Funding	Partner involved
Scientific activities				
Assessment of children exposure to: - emergent pollutants; - microbiological parameters.	Personal hours Equipment Consumables	500 000 €	Action dependent on the approval of the submitted proposal INCHILDHEALTH submitted to Horizon Europe call HORIZON-HLTH-2021-ENVHLTH-02 or other funding	IST, NCSR-D and TUC
Improvement of the knowledge about indoor air quality levels and sources in schools	Personal hours Equipment Consumables	168 000 €	Interreg Sudoe peoject 3SQAIR: Sustainable Smart Strategy for Air Quality Assurance in Classrooms	IST
Assessment of the exposure using mobile sensors	Personal hours Equipment Consumables	168 000 €	National funding through ExpoLIS project	IST
Assessment of the exposure during the sleeping period	Personal hours Equipment Consumables	145 000 €	National funding through HypnosAir project	IST
Publication of 5 articles with LIFE Index-Air findings in peer reviewed journals	Personnel hours	4 000 €	Internal resources	All beneficiaries
Communication of the project results in conferences	Personnel hours + travel costs	5 000 €	National and European projects already approved Services	All beneficiaries

Dissemination, awareness and training

Overview of the dissemination, awareness and training activities developed during the project and assessment of the situation at the end of the project

Increase public awareness about health benefits of clean air and active citizens' involvement are essential for changing behaviors, improving social acceptance and supporting air quality management measures. LIFE Index-Air project engaged students, teachers, parents and the wider community to foster transformational change of behaviors in the spirit of citizen science.

- 1 International Conference
- 27 seminars
- 16 open forum
- 10 courses
- 79 awareness campaigns
- 2 manuals
- 15 technical reports
- 63 communications in international conferences
- 21 scientific papers

Dissemination, awareness and training activities to be developed after the end of the project

Activity	Resources needed	Cost	Funding	Partner involved
Capacity building and change of behaviors				
Activities to raise public awareness and engagement will be organized in schools, festivals and science communication events, using the LIFE Index-Air educational tools	Personnel hours + travel costs	3,000 €	Colaboration with municipalities, schools and universities	All beneficiaries
Promotion of dissemination activities in workshops and seminars	Personnel hours + travel costs	3,000 €	Internal resources National and European projects already approved	All beneficiaries

Maintenance of the information and dissemination platforms

Overview of the information and dissemination platforms developed during the project and assessment of the situation at the end of the project

LIFE Index-Air project disseminated its activities and outcomes and made available informative material on air quaity through the project website and the social networks Facebook, Instagram, Linkedin, ResearchGate, Youtube and Twitter.

- Number of unique visits to the website – 154560
- Number of downloads of documents from the website – 19527
- Number of comments/likes in the social networks – 3713

Information and dissemination platforms to be maintained after the end of the project

Activity	Resources needed	Cost	Funding	Partner involved
Information and dissemination platforms				
Maintenance and update of the project website at least until 2026	Personnel hours	3 000 €	Internal resources	IST
Maintenance and update of the social platforms at least until 2026	Personnel hours	1 000 €	Internal resources	IST