LIFEINDEXAIR

Report of the stakeholders' training courses

Deliverables B6.3

September 2021 (updated in October 2021)

THIS PROJECT IS FUNDED BY THE LIFE PROGRAM FROM THE EUROPEAN UNION

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

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Table of contents

SUMMARY

The LIFE Index-Air management tool was developed in the framework of the LIFE Index-Air project (LIFE15 ENV/PT/000674), aiming to cover the gap between ambient air quality management and real-life exposure of urban populations and related health risks. It aspires 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. The tool also aims to enhance the knowledge of the general public on PM pollution, its sources, means of exposure and health effects and to raise awareness regarding the adoption of sustainable and environmentally friendly practices in our everyday lives.

It is essential for the successful realization of LIFE Index-Air project that the developed Management Tool will be adopted by policy makers and relevant authorities in the five studied cities. For this reason task B6.3 was assigned to stakeholders' training where all functionalities of the tool were presented to stakeholders while they were also had the opportunity to examine the data collected by the project. The manual (book and video) developed in B1 was also distributed during the course.

This deliverable presents the minutes of the stakeholders' training courses organized in Lisbon, Kuopio, Treviso and Athens.

LIFE Index-Air

Webinar with Rede Portuguesa de Municípios Saudáveis

LIFE Index-Air - Development of an Integrated Exposure – Dose Management Tool for Reduction of Particulate Matter in Air – LIFE15ENV/PT/000674

Report of the webinar

Date: 19th of March 2021

Zoom meeting

Introduction

The present Minutes Report has been made to provide an overview of the Webinar with Rede Portuguesa de Municípios Saudáveis. The meeting took place on 19th of March 2021. This webinar was attended by a total of 100 participants with representatives of 33 Portuguese Municipalities

Marta Almeida, as coordinator of the project, made a lecture about the LIFE Index-Air functionalities, and implementation.

Objectives

The objectives of the webinar were:

1. Deepen the concepts of ecology and health;
2. Identify strategies and public policies that promote sustainable development;
3. Promote municipal actions that develop environmental health.

The objectives of the lecture dedicated to the LIFE Index-Air tool were:

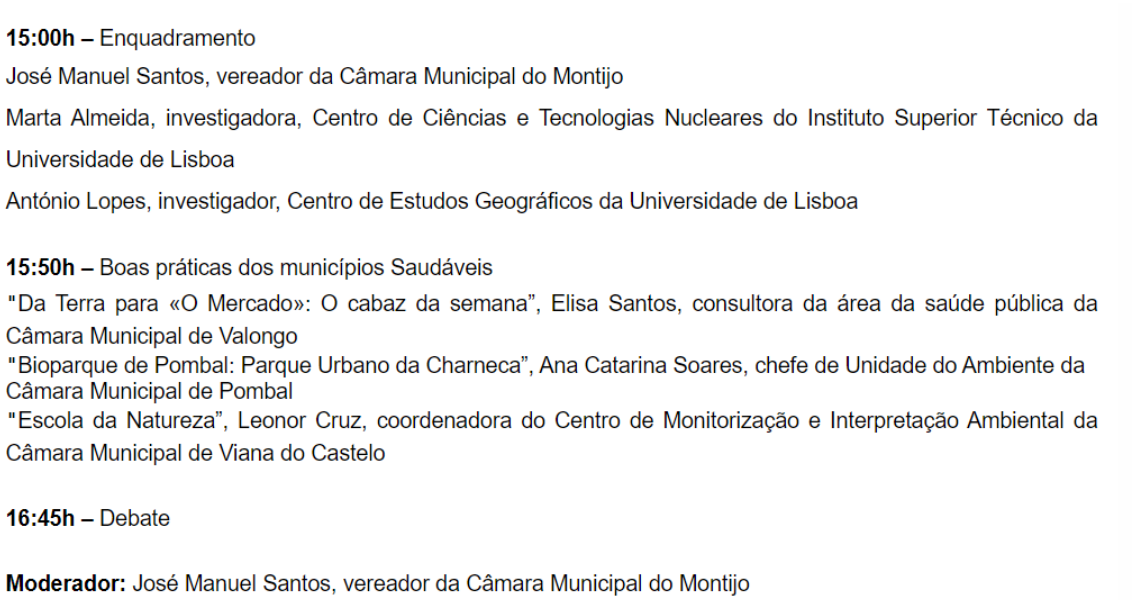
4. to highlight the motivation and goals of the LIFE Index-Air project;
5. to introduce the LIFE Index-Air Management Tool;
6. to train the stakeholders to run the LIFE Index-Air Management Tool;
7. to present the results of the implementation of the Tool in Lisbon as an example of application;

Participating Members

33 Portuguese Municipalities: 1 Lousã Municipality, 2 Avis Municipality, 3 Azambuja Municipality, 4 Braga Municipality, 5 Cascais Municipality, 6 Castro Marim Municipality, 7 Chamusca Municipality, 8 Coimbra Municipality, 9 Figueira da Foz Municipality, 10 Gondomar Municipality, 11 Grandola Municipality, 12 Lagoa (Açores) Municipality, 13 Lagoa (Algarve) Municipality, 14 Loures Municipality, 15 Matosinho Municipality, 16 Olhão Municipality, 17 Palmela Municipality, 18 Pombal Municipality, 19 Seia Municipality, 20 Serpa Municipality, 21 Sesimbra Municipality, 22 Setúbal Municipality, 23 Soure Municipality, 24 Terras do Bouro Municipality, 25 Torres Vedras Municipality, 26 Valongo Municipality, 27 Viana do Castelo Municipality, 28 Vila Franca de Xira Municipality, 29 Barreiro Municipality, 30 Entrocamento Municipality, 31 Montijo Municipality, 32 Porto Municipality, 33 Seixal Municipality

Agenda of the Meeting

The working agenda of the webinar is displayed in Figure 4.



15:00h – Enquadramento

José Manuel Santos, vereador da Câmara Municipal do Montijo

Marta Almeida, investigadora, Centro de Ciências e Tecnologias Nucleares do Instituto Superior Técnico da Universidade de Lisboa

António Lopes, investigador, Centro de Estudos Geográficos da Universidade de Lisboa

15:50h – Boas práticas dos municípios Saudáveis

"Da Terra para «O Mercado»: O cabaz da semana", Elisa Santos, consultora da área da saúde pública da Câmara Municipal de Valongo

"Bioparque de Pombal: Parque Urbano da Charneca", Ana Catarina Soares, chefe de Unidade do Ambiente da Câmara Municipal de Pombal

"Escola da Natureza", Leonor Cruz, coordenadora do Centro de Monitorização e Interpretação Ambiental da Câmara Municipal de Viana do Castelo

16:45h – Debate

Moderador: José Manuel Santos, vereador da Câmara Municipal do Montijo

Figure 1 – Working agenda of the webinar.

Important links

LIFE Index-Air presentation is available here

The Webinar was displayed online and it is possible to see it here

More information can be found here

Images of the webinar

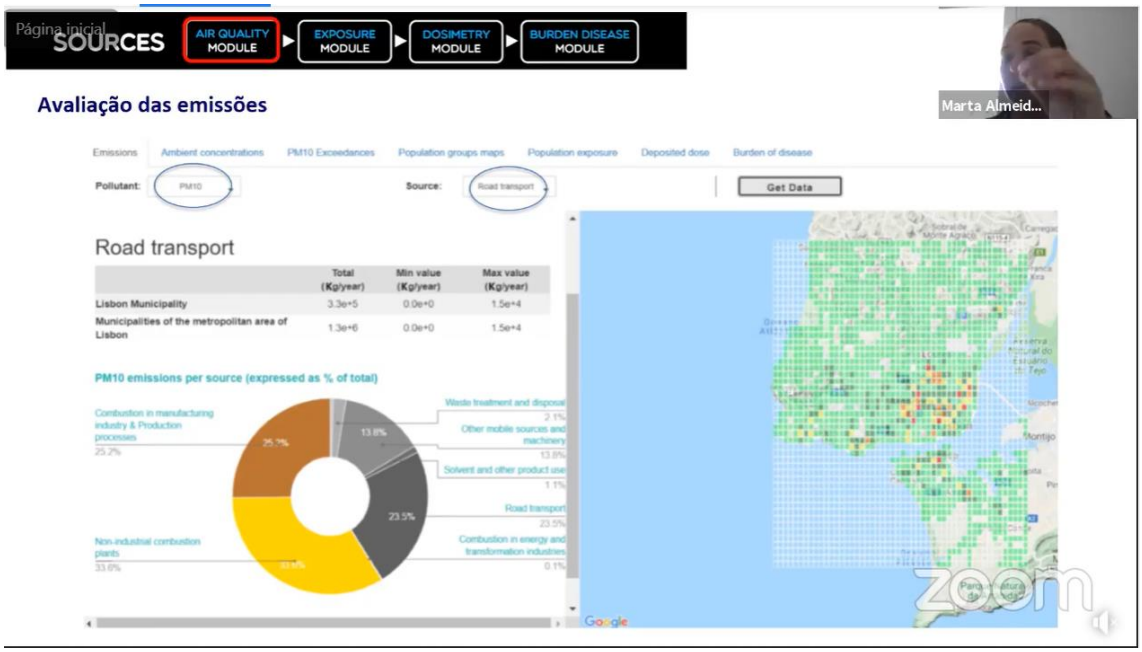


Figure 2 – Presentation the Tool's functions.

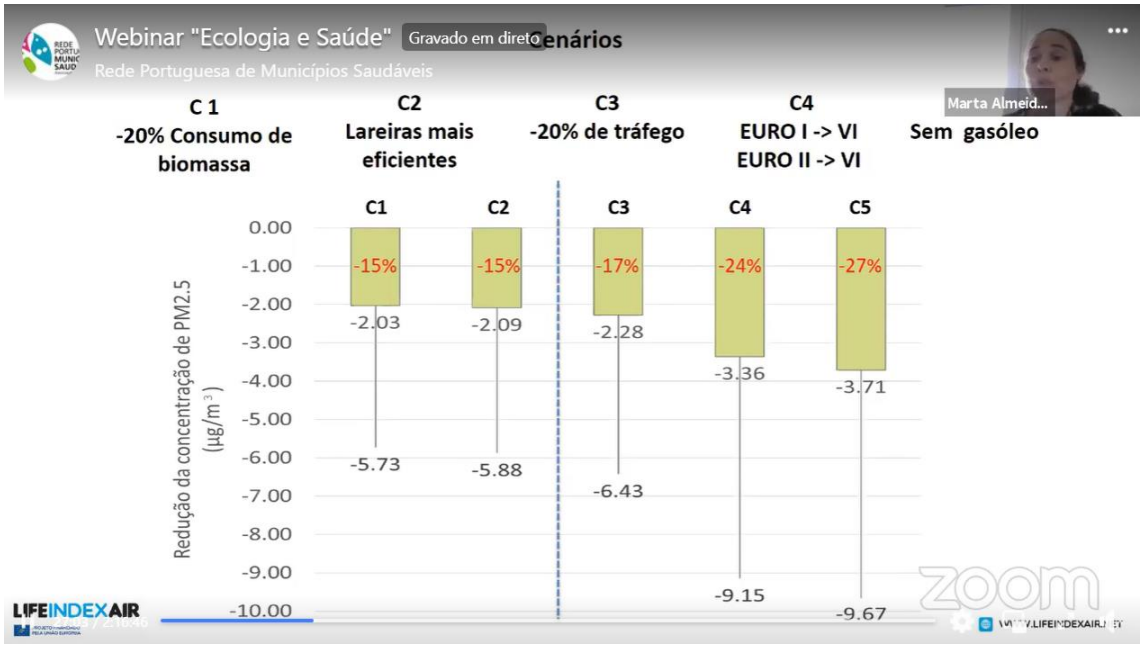


Figure 3 – Presentation of the implementation of the tool in Lisbon.

LIFE Index-Air

Meeting and training course with Regional Agency for Environmental Protection and Prevention of the Veneto (ARPAV)

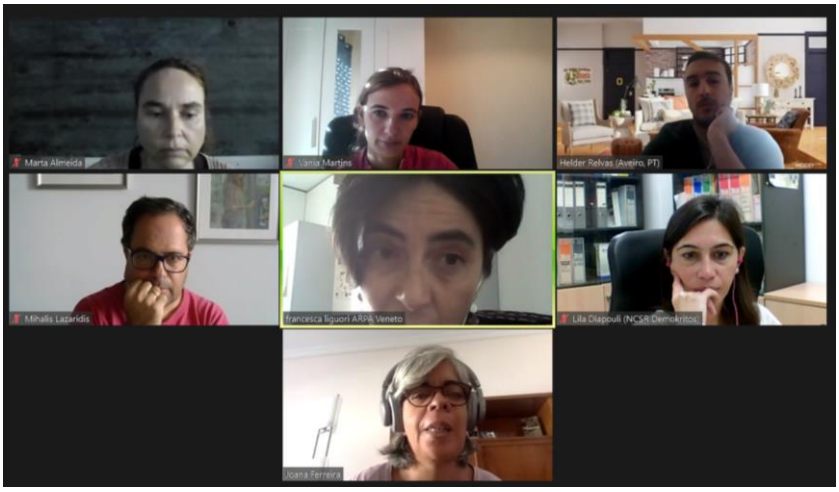
LIFE Index-Air - Development of an Integrated Exposure – Dose Management Tool for Reduction of Particulate Matter in Air – LIFE15ENV/PT/000674

Report of the meeting and training course with stakeholders

Date: 12th of October 2021

Zoom meeting

Chair: Marta Almeida
Rapporteur: Vânia Martins



Introduction

The present Minutes Report has been made to provide an overview of the meeting and training course with Regional Agency for Environmental Protection and Prevention of the Veneto (ARPAV). The meeting took place on 12th of October 2021. This meeting was attended by a total of 7 participants: 2 from IST, 2 from UAVR, 1 from NCSR-Demokritos, 1 from TUC and 1 from ARPAV.

ARPAV is a public body founded in 1996. The goal of the Agency is to control and preserve the environment in order to help the identification and elimination of risks to humans and to the environment.

More specifically, ARPAV is responsible for:

1. controlling of the environment including sources of pollution (e.g. industrial emissions, waste, radiation);
2. monitoring of the state of the environment, particularly the quality of air, water, and soil;
3. preventing risk factors and the promotion of an education aimed at favoring life styles, which respect the environment.

ARPAV coordinates its activities closely with others Public Bodies and Private Organizations in order to complete its tasks for the interest of whole society, having developed a large and structured network.

Marta Almeida, as coordinator of the project, was the chair of the meeting and nominated Vânia Martins (from IST team) as the rapporteur.

Objectives

The objectives of this meeting were:

8. to highlight the motivation and goals of the LIFE Index-Air project;
9. to introduce the LIFE Index-Air Management Tool;
10. to train the stakeholders to run the LIFE Index-Air Management Tool;
11. to present the results of the implementation of the Tool in Treviso;
12. to discuss the results obtained with stakeholder.

Participating Members

The following members of IST, UAVR, NCSR-Demokritos, TUC and stakeholder participated in the meeting:

- IST – Marta Almeida, Vânia Martins
- UAVR – Hélder Relvas, Joana Ferreira
- NCSR “Demokritos” – Lila Diapouli

- TUC – Mihalis Lazaridis
- ARPAV – Francesca Liguori

Agenda of the Meeting

The working agenda of the meeting is displayed in Figure 4.

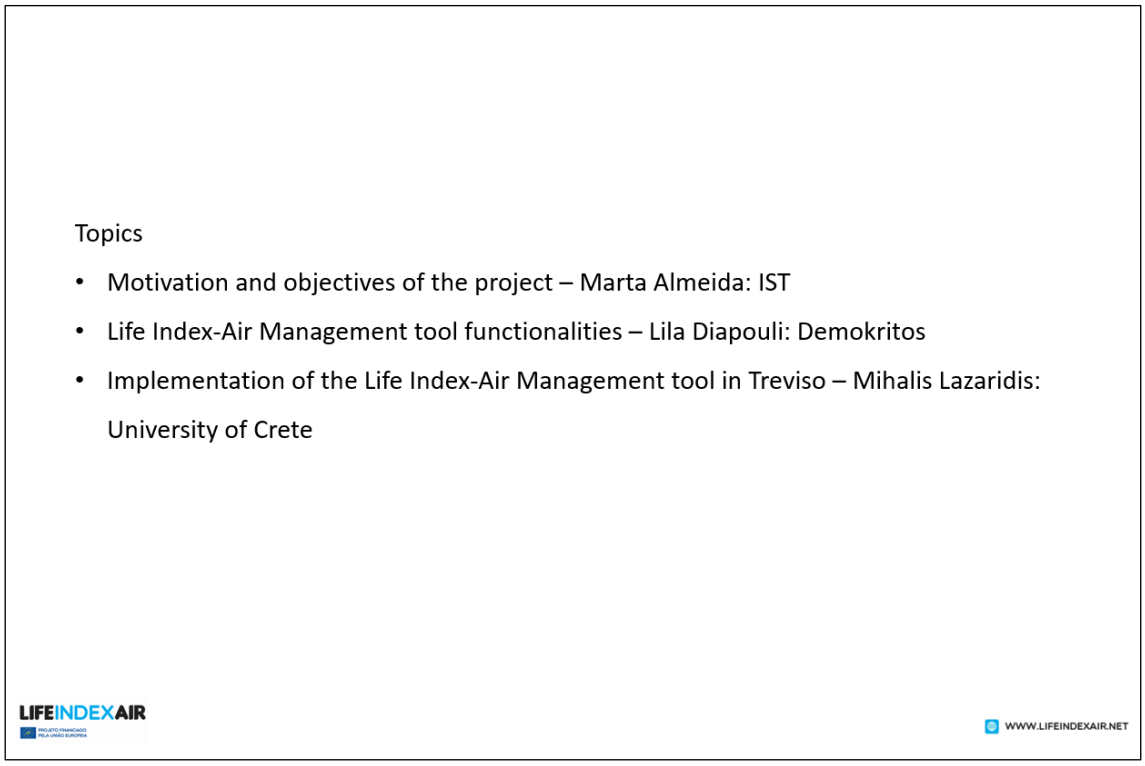


Figure 4 – Working agenda of the meeting.

Working resume

The meeting started at 9:00 with the introduction of all participants. Marta Almeida gave a general overview of the LIFE Index-Air project: motivation, goals and structure. Lila Diapouli introduced the LIFE Index-Air Management Tool and gave training regarding the different functions of the Tool. The manual for the Management Tool utilisation was presented. This manual includes the description of all the functions of the Operational Platform and the input data needed in the application of the “Scenario” tab. The results of the implementation of the Tool in Treviso were presented by Mihalis Lazaridis. Following the presentations, Francesca Liguori was able to exchange views, knowledge and experience and highlight different aspects of the issue of air quality management. In addition, she has gotten familiar with the Tool’s functions. Project partners indicated ways of effective use of the project outcomes.

The PowerPoint that supported this meeting is shown in Annex 1.

The meeting ended at 10:30.

Images of the online meeting

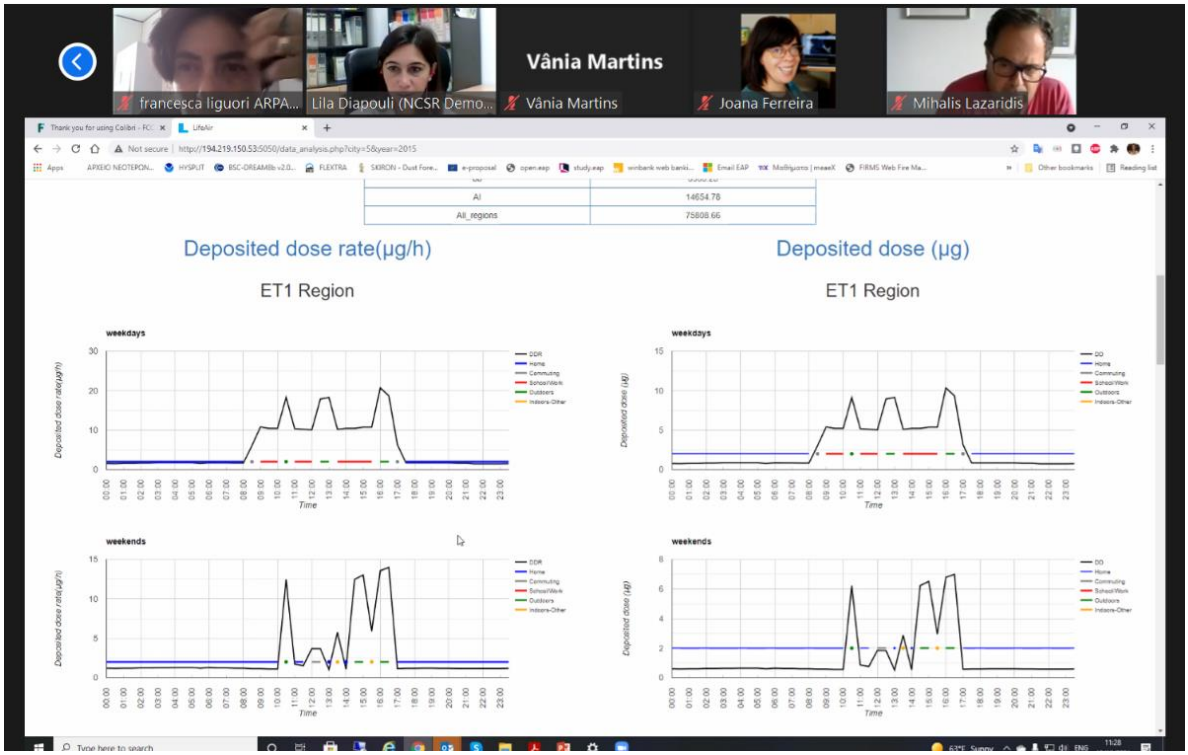


Figure 5 – Lila Diapouli presenting the Tool's functions.

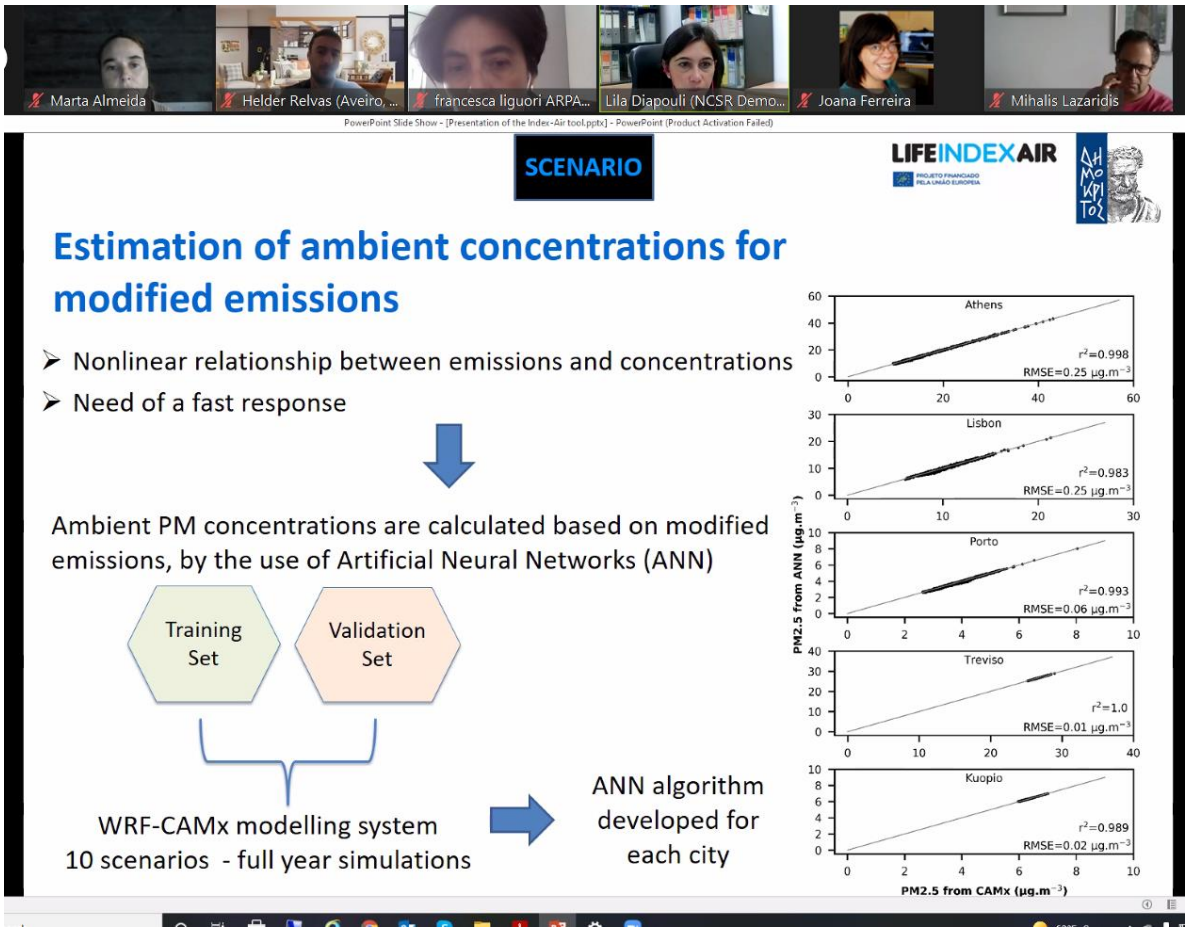


Figure 6 – Lila Diapouli presenting the functionalities of the scenario builder.

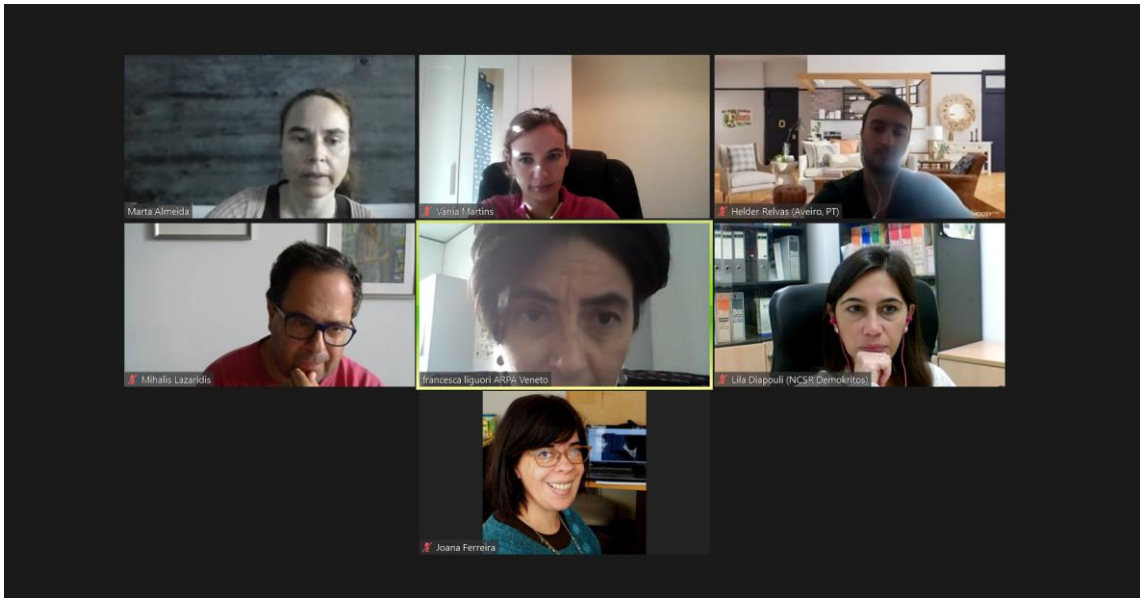


Figure 7 – Intervention by Francesca Liguori, ARPAV member (Stakeholder).

Main conclusions of the meeting

LIFE Index-Air partners presented the motivation, goals and structure of the project, as well as the results from the implementation of the management tool in Treviso. A part of the meeting was dedicated to the training of stakeholder in the use of LIFE Index-Air Management Tool. The meeting closed with a discussion between LIFE Index-Air team and stakeholder regarding details on the results presented. The functionalities of the Tool were demonstrated in detail, discussing as well on the different improvement measure scenarios that may be applied and the best ways to make use of the Tool's outcomes, with respect to environmental management and development of cost-effective mitigation strategies.

The improvement measures applied were targeting reductions to the relevant anthropogenic sources where reductions are possible such as: road traffic emissions and emissions from biomass burning for residential heating. The support training material (manual and video) is expected to further assist local and national authorities in the application of the Management Tool. The manual and video have been published in the project website in order to attract additional end users.

Francesca Liguori showed interest and motivation in using the Management Tool to enhance ARPAV current air quality policies. The main air quality concern is the occurrence of high pollutant emissions related to the biomass burning for residential heating in the Treviso area. ARPAV is interested in develop and apply cost-effective mitigation strategies and Francesca Liguori recognised that the Tool can be a good help.

The adoption of management tool by this authority ensures the use of project outcomes after the project end. The project partners will maintain the communication with this key stakeholder, providing support in the application of the management tool.

Approval of the Meeting Minute

According with the LIFE Index-Air Management Guide the minutes shall be considered as accepted if, within 10 calendar days from sending, no Member has sent an objection in writing to the chairperson. The chairperson will send the final version of the minutes by email to all the beneficiaries that were call to the meeting. Also a copy of the minutes will be archived in the LIFE Index-Air webpage.

Annex

Powerpoint of the meeting and training course with Regional Agency for Environmental Protection and Prevention of the Veneto (ARPAV)

Topics

- Motivation and objectives of the project – Marta Almeida: IST
- Life Index-Air Management tool functionalities – Lila Diapouli: Demokritos
- Implementation of the Life Index-Air Management tool in Treviso – Mihalis Lazaridis: University of Crete

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Motivation

EU urban population exposed to harmful levels of air pollution in 2013-2015

Round 90 % of Europeans living in cities are exposed to levels of air pollutants deemed damaging to health by the World Health Organization's more stringent guidelines.

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Motivation
Assessment of human exposure to particles

Measuring outdoor levels of particles at **fixed** ambient air quality **monitoring sites** has been the **traditional** way of **evaluating** urban air quality

This fixed monitoring stations are **supposed to assess** the exposure of all the population to particles

However, this approach **fails** to account for **all components** of exposure

1st There is a huge **heterogeneity** in the **concentrations** of pollutants within the city

2nd People spend more than **90% of the time indoors**

3rd There is a huge **heterogeneity** in **time** activity patterns of the population

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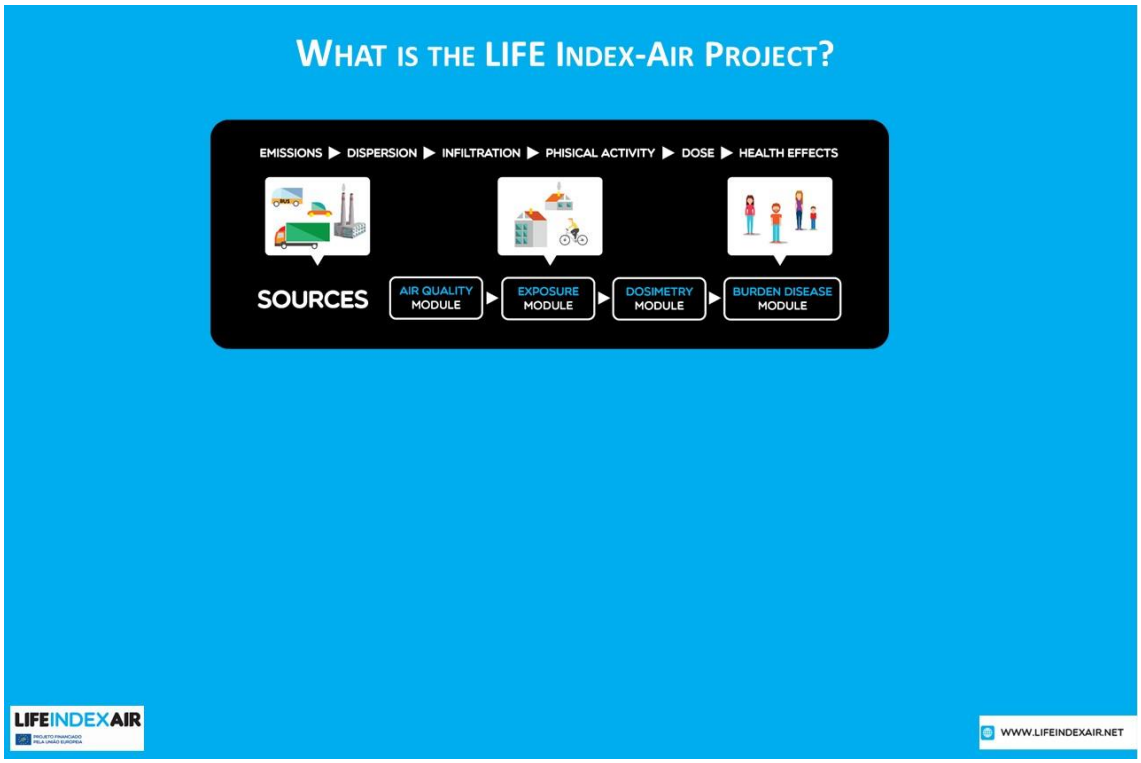
2nd People spend more than **90% of the time indoors**

3rd There is a huge **heterogeneity** in **time** activity patterns of the population

This brings the considerable importance of assessing the **personal integrated exposure** to particles as it is the key determinant of the **dose received by an individual** and to study the **sources associated with this exposure.**


WHAT IS THE LIFE INDEX-AIR PROJECT?
EMISSIONS ▶ DISPERSION ▶ INFILTRATION ▶ PHISICAL ACTIVITY ▶ DOSE ▶ HEALTH EFFECTS
SOURCES
AIR QUALITY MODULE
EXPOSURE MODULE
DOSIMETRY MODULE
BURDEN DISEASE MODULE
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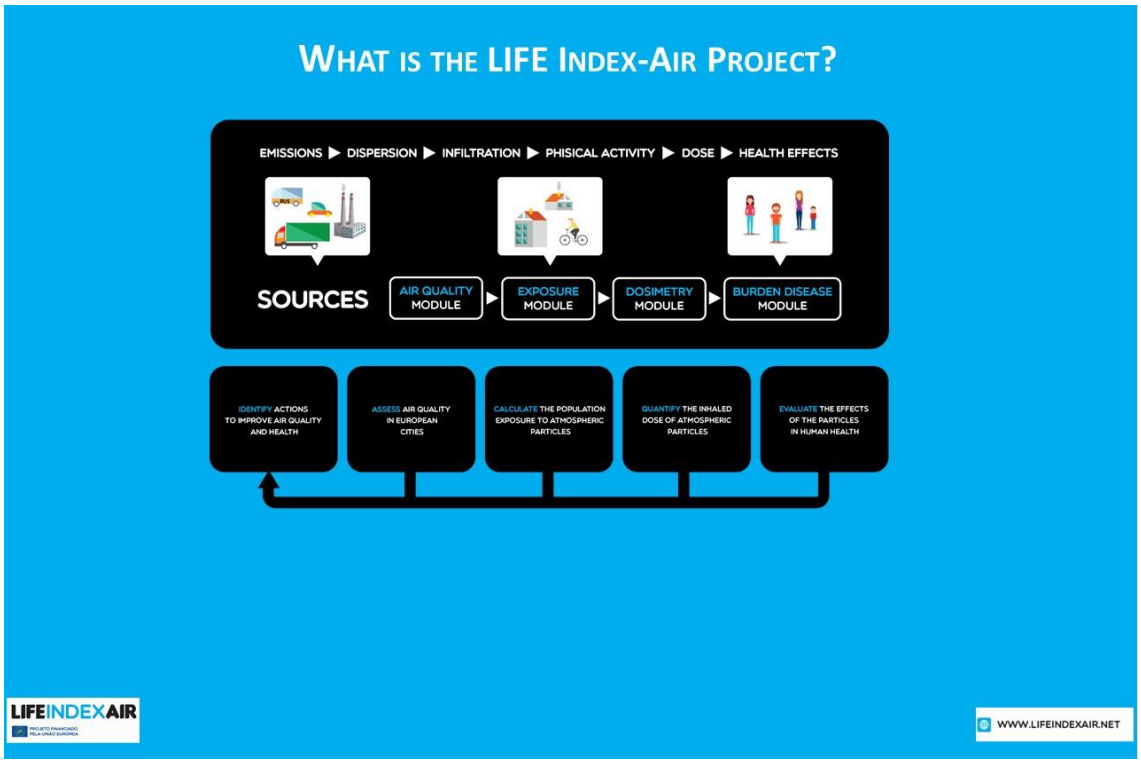
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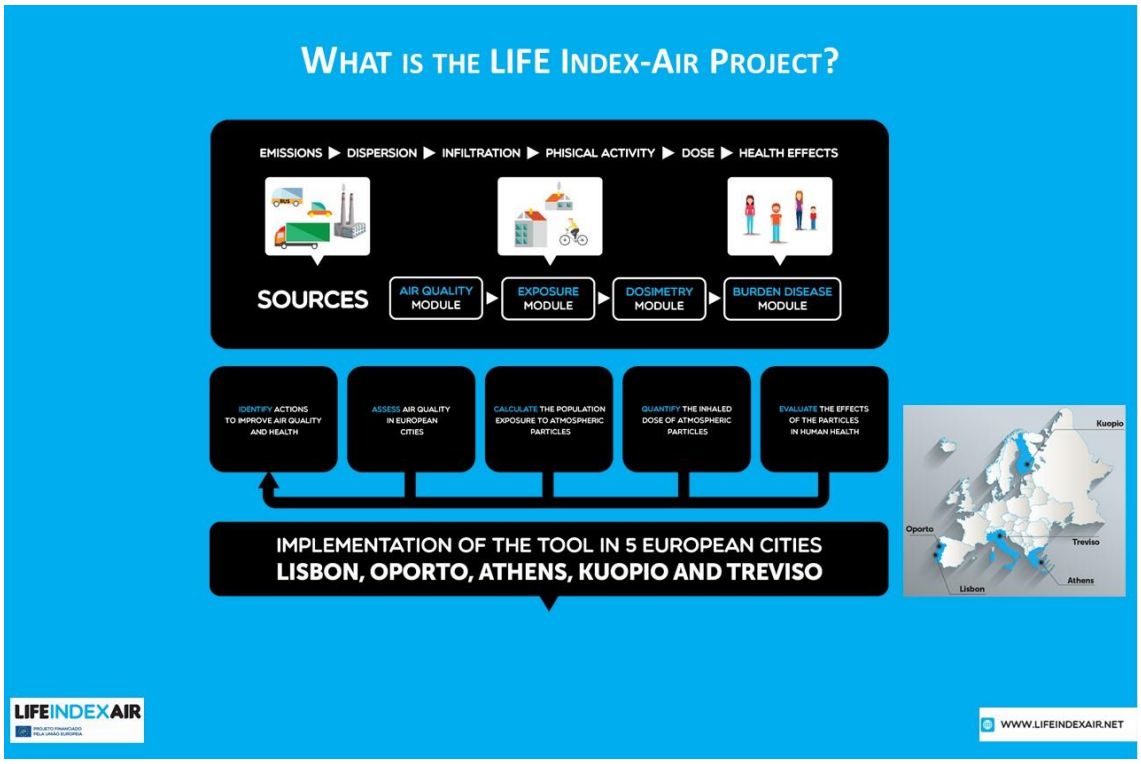
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IMPLEMENTATION OF THE TOOL IN 5 EUROPEAN CITIES
LISBON, OPORTO, ATHENS, KUOPIO AND TREVISO
Kuopio
Oporto
Treviso
Athens
Lisbon
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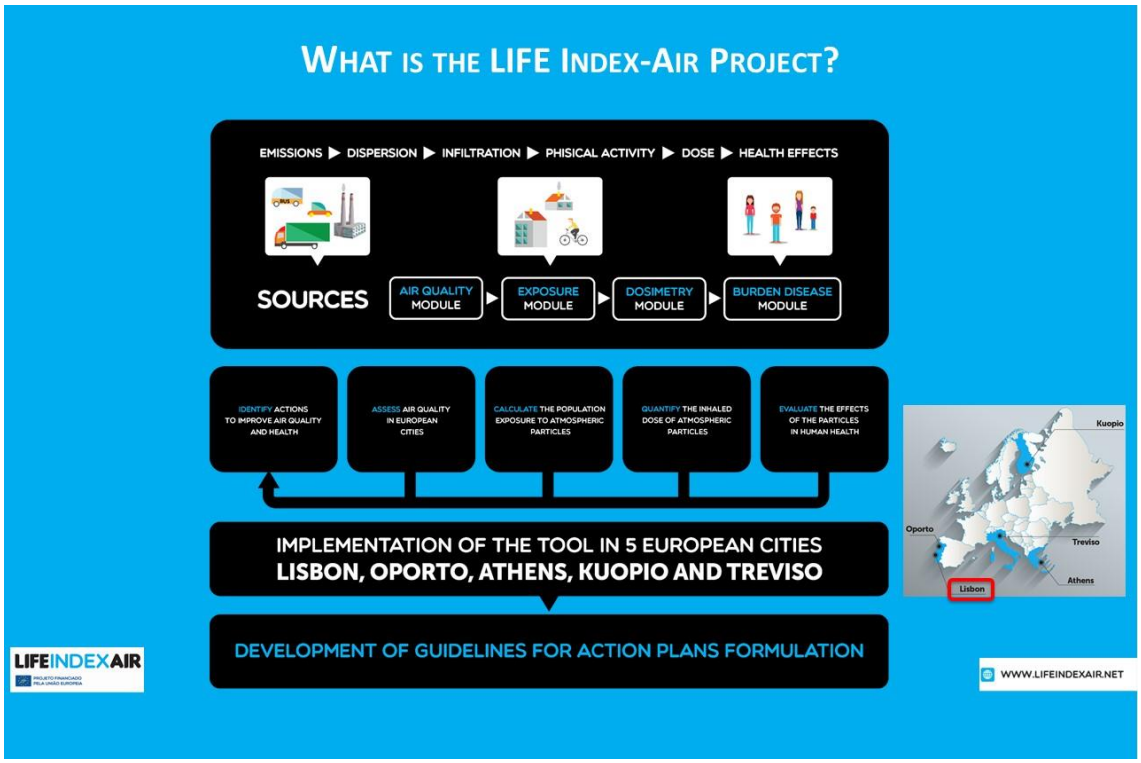
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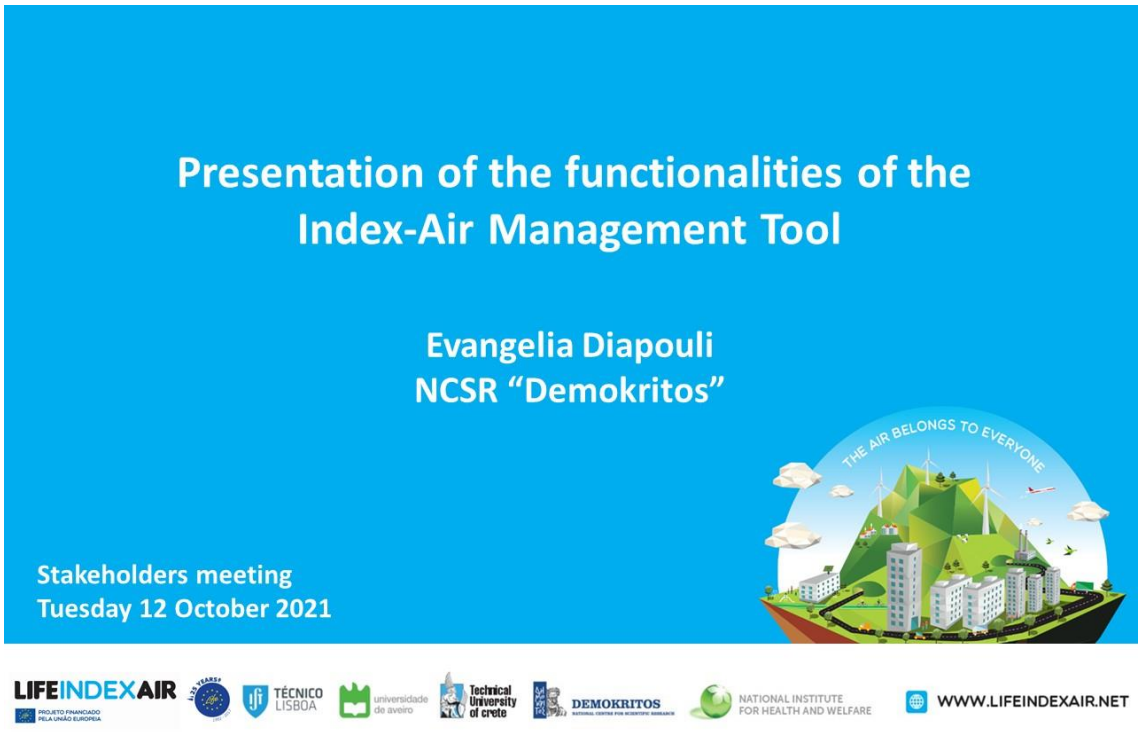
Presentation of the functionalities of the Index-Air Management Tool
Evangelia Diapouli
NCSR "Demokritos"
THE AIR BELONGS TO EVERYONE
Stakeholders meeting
Tuesday 12 October 2021
LIFEINDEXAIR
TÉCNICO LISBOA
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Technical University of crete
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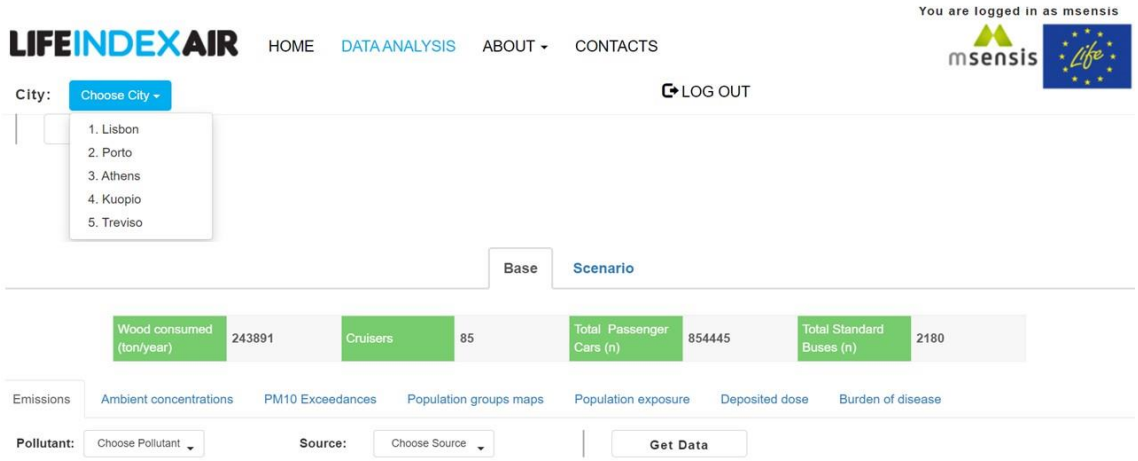
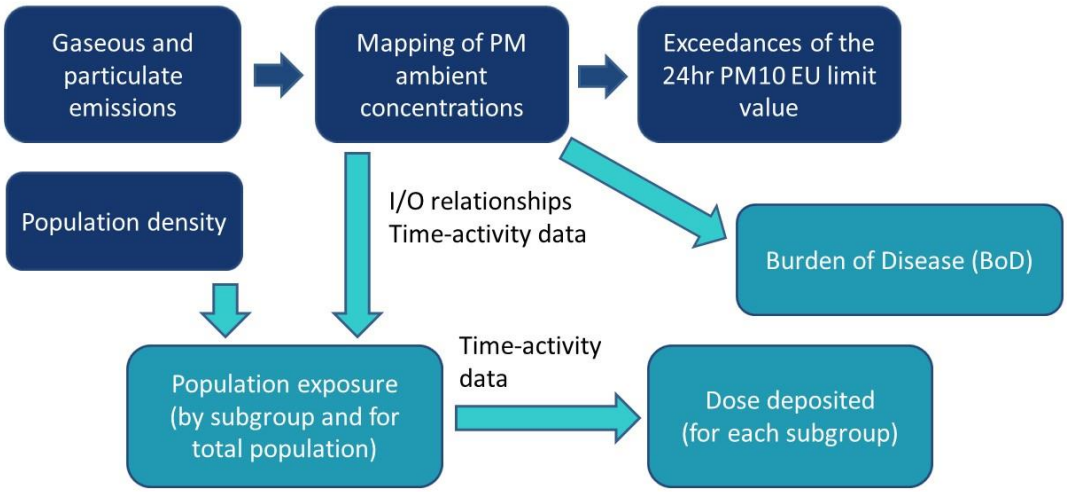
Introduction to the Index-Air tool
LIFEINDEXAIR
You are logged in as msensis
msensis
HOME
DATA ANALYSIS
ABOUT
CONTACTS
LOG OUT
LIFE INDEX-AIR PROJECT
PARTNERS
MANUAL
INFORMATIVE VIDEO
The Index-Air Tool is an integrated exposure-dose-burden of disease tool, which allows the quantitative assessment of policies and mitigation strategies for air quality management and protection of public health.
The tool analyses emission and ambient concentration data, based on current conditions as well as future scenarios determined by the user for testing different mitigation measures.
Through the application of a number of specialised models, it calculates population exposure to airborne particulate matter (PM), deposited dose and respective burden of disease.
A detailed manual and an informative video are also available, describing how the Index-Air Tool was developed and its features and mode of operation.
The tool is currently applied for 5 cities: Athens, Kuopio, Lisbon, Porto and Treviso. If you are interested in including your city in the LIFE Index-Air Tool, please contact: info@lifeindexair.com
THE AIR BELONGS TO EVERYONE
Management Tool
The Index-Air Tool was developed with the contribution of the LIFE financial instrument of the European Community (LIFE15 ENV/PT/000674). This work reflects only the authors' view and EASME is not responsible for any use that may be made of the information it contains.

Introduction to the Index-Air tool



BASE

Calculation steps



http://194.219.150.53:5050/

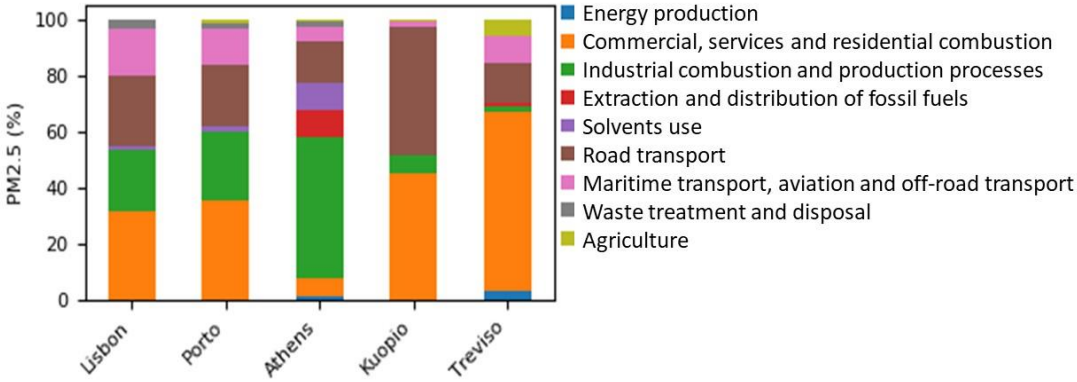
BASE

Mapping of ambient PM concentrations

Emission Inventory
Gridded emissions by SNAP macrosector for gaseous and particulate pollutants (1x1 km²)

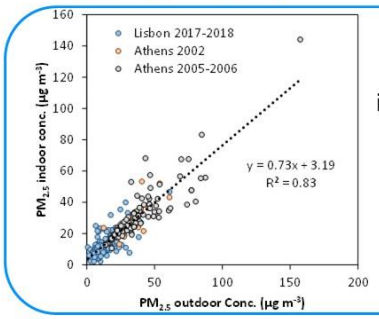
B3.1 Meteorological Modelling — WRF
3D meteorological fields (Temp, Wind, Water vapour, Precipitation,...)

CAMx **B3.2 Dispersion Modelling**
Surface gridded concentrations by PM species, 1h, 1x1km²



BASE

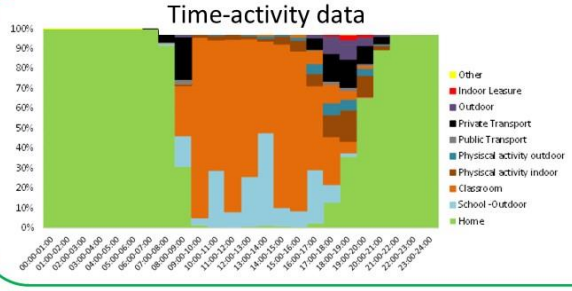
Mapping of population exposure



Indoor / outdoor relationships for selected indoor microenvironments

Estimation of indoor concentrations

Time-activity data



Estimation of personal exposure through the microenvironmental approach

$$E = \frac{1}{T} \cdot \sum_j \int C_j \cdot dt_j$$

BASE

Mapping of population exposure

Ambient concentrations (µg/m³)

Population density (number of people, nop)

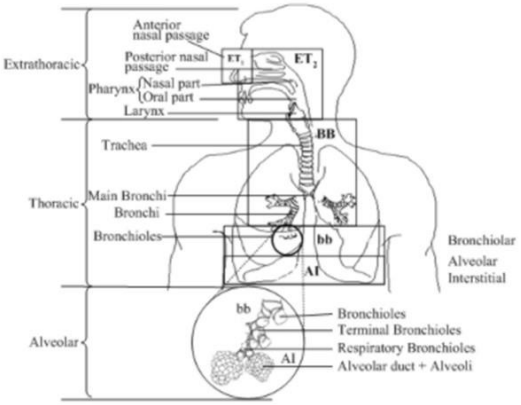
Population exposure (µg/m³·nop)

BASE

PM dose deposited on the respiratory tract

- ✓ Based on average 30-min exposures (for weekdays and weekends separately)
- ✓ Under the specific anatomical and physiological conditions determined by the subject's age and activity

- ➢ Calculation of dose for PM2.5, PM10 and PM2.5-10
- ➢ Daily variability of dose & daily and yearly cumulative dose

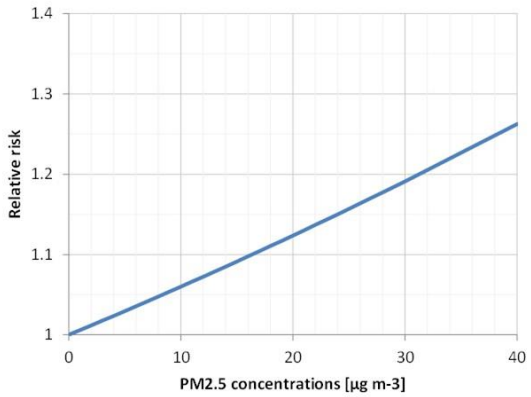


BASE

Burden of Disease due to PM2.5 exposure

The Burden of Disease methodology is based on Concentration – Response functions found through epidemiological studies and calculates:

- ✓ YLL - years of life lost due to premature mortality
- ✓ YLD - disability weighted years lived with disabilities
- ✓ DALY - disability adjusted life years = YLL + YLD
- ✓ Number of Deaths



C-R functions for natural mortality from HRAPIE recommendations (Heroux et al. 2015).

SCENARIO

Application of alternative scenarios

3 types of emissions:

- ✓ Vehicular traffic
- ✓ Residential wood combustion
- ✓ Cruise shipping

➢ Reference values for base emission parameters

Modification of emission parameters and /or time-activity patterns

SCENARIO

Emission parameters

- **Vehicular Traffic**
  - Apportionment (%) of total passenger cars per fuel type (petrol, diesel or electric)
  - Apportionment (%) of petrol passenger cars per age (Euro I to Euro IV)
  - Apportionment (%) of diesel passenger cars per age (Euro I to Euro IV)
  - Apportionment (%) of standard buses per fuel type (diesel, natural gas or electric)
  - Apportionment (%) of diesel standard buses per age (Euro I to Euro IV)
  - Total number of passenger cars
  - Total number of standard buses
- **Residential heating**
  - Apportionment (%) of wood burning devices per type
  - Quantity of wood consumed (in tons/year).
- **Cruise shipping**
  - Number of cruisers (for Athens, Lisbon and Porto)

SCENARIO

Estimation of ambient concentrations for modified emissions

- Nonlinear relationship between emissions and concentrations
- Need of a fast response

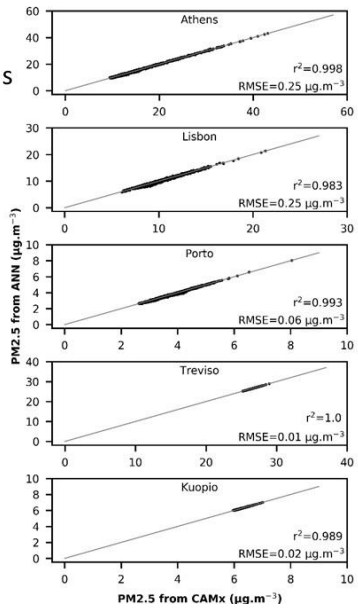
Ambient PM concentrations are calculated based on modified emissions, by the use of Artificial Neural Networks (ANN)

Training Set

Validation Set

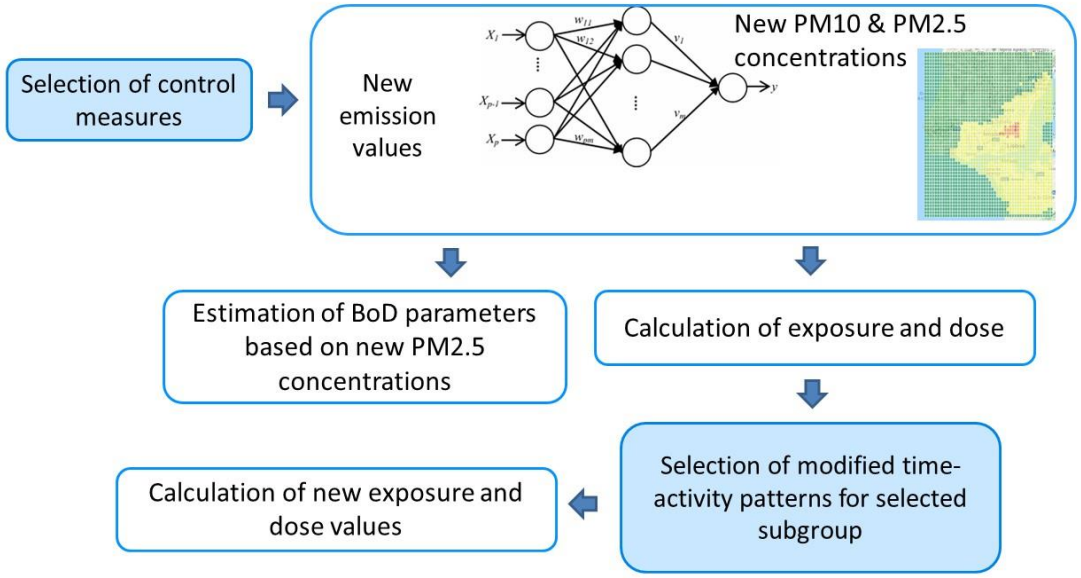
WRF-CAMx modelling system
10 scenarios - full year simulations

ANN algorithm developed for each city



SCENARIO

Calculation steps



SCENARIO

Reference values for emission parameters

Vehicular traffic

Table A1e. Treviso: Base case input data for Traffic.

Total number of passenger cars	140111	**Total number of standard buses**	360
Petrol Passenger Cars (%)	51.35	Diesel Standard Buses (%)	100
Diesel Passenger Cars (%)	48.65	Natural Gas Standard Buses (%)	0
Electric Passenger Cars (%)	0.00	Electric Standard Buses (%)	0

	Petrol Passenger Cars	Diesel Passenger Cars	Diesel Standard Buses
Euro I (%)	16.12	2.78	20.71
Euro II (%)	19.70	7.43	16.16
Euro III (%)	14.94	22.57	25.64
Euro IV (%)	31.72	34.58	19.96
Euro V (%)	14.62	30.48	16.62
Euro VI (%)	2.90	2.16	0.91

SCENARIO

LIFEINDEXAIR

Reference values for emission parameters

Residential wood burning

Table A2e. Treviso: Base case input data for Residential heating.

Type of device	Contribution (%)
Fireplace	13.70
More Efficient Fireplaces	13.69
Woodstove	36.26
Wood burning furnace	0.00
Salamander Stove	20.79
Boiler	3.23
Oven	7.61
Wood burning water heater	4.72
Furnace	0.00
Quantity of wood consumed (tons/year)	74631

SCENARIO

LIFEINDEXAIR

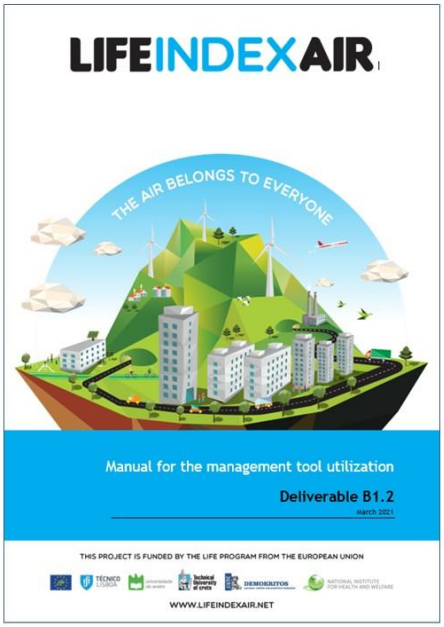
Reference values for emission parameters

Cruise ships

Table A3. Base case input data for Cruise ships.

City	Number of cruise ships
Athens	622
Lisbon	300
Porto	85

- All emission parameters should be filled in in each scenario screen.
- For each type of mitigation measure (Traffic, Residential heating and Cruise shipping), it is recommended to run initially the scenario with the base case data and use this output as reference for all modified scenario comparisons.



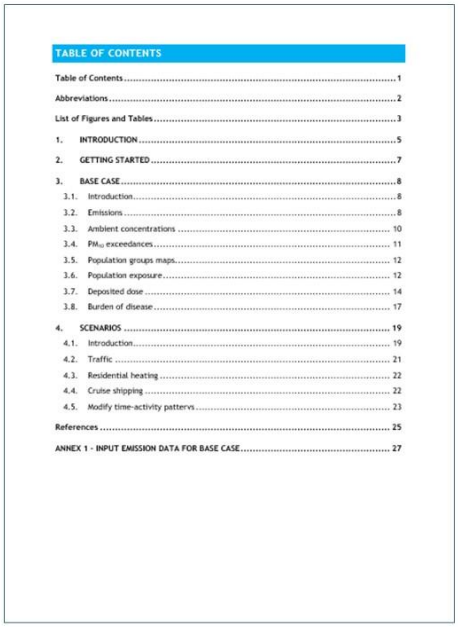


TABLE OF CONTENTS

Introduction

- Treviso is located in the region of Veneto in the North-Eastern part of Italy (approximately 30 km North of Venice).
- Air pollution sources:

- **Road:** The motorisation rate is high in Metropolitan Area of Treviso. Specifically, 610-700 passenger cars per 1,000 inhabitants (Eurostat, 2019).
- **Rail:** The Treviso central railway station has 7,000,000 million passenger movements each year (Centostazioni , 2010)
- **Airport:** Treviso has an airport with 24,116 aircraft movements and 3,254,731 passengers in 2019 (Assaeroporti, 2019)
- **Industry:** There are many companies such as textile, construction and paper milling (https://sarasotasistercities.org/treviso-province-italy/).

Base case

Emissions-Treviso municipality

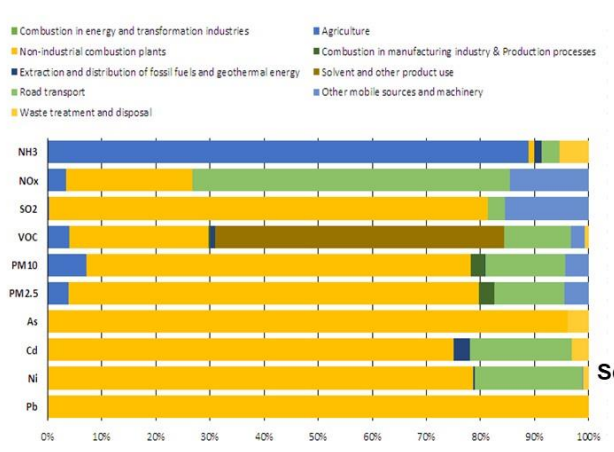


Figure 1 – Share of Treviso municipality emissions (%) of the main pollutants, by sector group in 2015

Agriculture sector

largest source

NH_3 (89%)

Non-industrial combustion plants sector

SO_2 (81%)

PM_{10} (71 %)

$PM_{2.5}$ (76 %)

metals (75-100%)

Solvent and other product use sector

VOC (53%)

Road transport sector

NOx (59%)

Base case

Emissions-other municipalities of the metropolitan area of Treviso

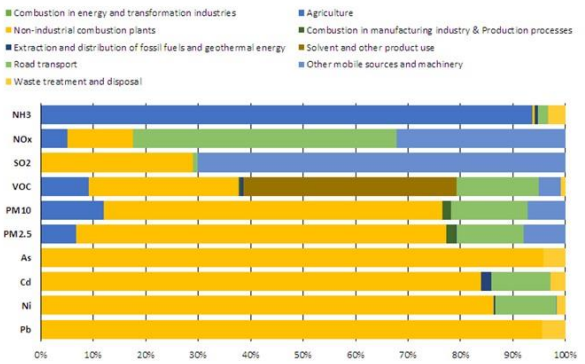


Figure 2 –Share of other municipalities of the metropolitan area of Treviso emissions (%) of the main pollutants, by sector group in 2015.

Agriculture sector

largest source

NH_3 (94%)

Non-industrial combustion plants sector

PM_{10} (64 %) $PM_{2.5}$ (71 %) metals (84-96%)

Solvent and other product use sector

VOC (41%)

Road transport sector

NOx (50%)

Other mobile sources and machinery SO_2 (70 %)

Base case

Ambient concentrations

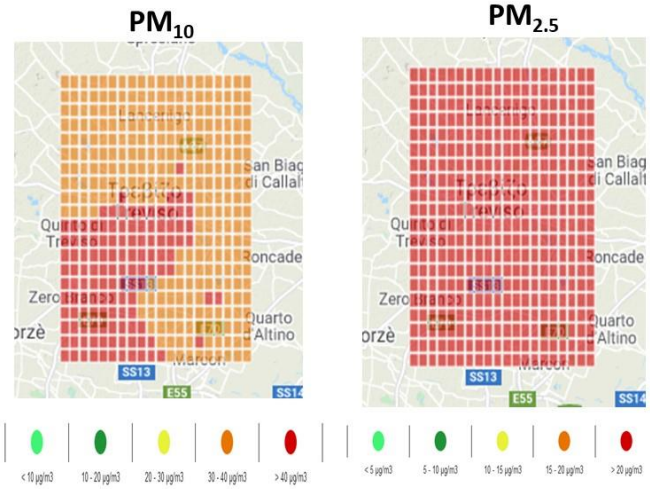


Figure 3 – Annual average ambient concentrations of PM (µg/m^3) in Treviso.

The annual PM_{10} concentrations were below the annual limit value (40 µg/m^3).

Annual PM_{10} concentration

39.4 µg/m^3 for Treviso municipality

38.7 µg/m^3 for other municipalities

The annual $PM_{2.5}$ concentrations were above the annual limit value (20 µg/m^3)

Annual $PM_{2.5}$ concentration

26.5 µg/m^3 for Treviso municipality

26.1 µg/m^3 for other municipalities

Base case

PM_{10} Exceedances

Table 1 – Number of PM_{10} exceedance days for Treviso

	Minimum	Maximum
Treviso Municipality	91	112
Other municipalities of the metropolitan area of Treviso	83	118

The daily limit value (50 µg/m^3) should not be exceeded more than 35 times a year based on directive 2008/50/EC.

Both in the Treviso municipality (112 exceedances/year) and the other municipalities of the metropolitan area of Treviso(118 exceedances/year) the EU guidelines were exceeded.

Base case

Population Groups

ALL GROUPS (ALL AGES)

Figure 4 – Map with spatial distribution (1 km x 1 km) of all population across Treviso, expressed in number of people (nop).

Treviso municipality has a population density of 1003 inhabitants/km^2.

Population-5 subgroups

- 56% were working adults (26-65 years old),
- 25% were elderly people (> 65 year old),
- 12 % students (11-25 years old),
- 4 % elementary school children (5-10 years old)
- and 3 % pre-school children (<5 years old).

Base case

Population exposure

Table 2 – PM and heavy metals annual average exposure for each population group in Treviso

		PM_{10}	$PM_{2.5}$	As	Cd	Ni	Pb
		$\mu g/m^3$*nop		ng/m^3*nop			
Treviso Municipality	All groups	31000	23000	600	440	2200	5200
	Pre-school children	1200	840	22	16	81	190
	Elementary school children	1200	870	22	17	83	200
	Students	4200	2900	76	56	280	660
	Working adults	18000	13000	340	240	1300	2900
	Elderly	6800	5200	140	100	530	1200
Other municipalities of the metropolitan area of Treviso	All groups	14000	11000	330	210	1400	2400
	Pre-school children	590	410	12	7.8	47	90
	Elementary school children	540	380	12	7.2	49	83
	Students	1900	1300	42	26	180	290
	Working adults	8200	6100	190	110	790	1300
	Elderly	3100	2400	80	48	350	550

- The annual average exposure to PM and heavy metals weighted by the number of people (nop) in Treviso.
- Therefore, population exposure is higher in Treviso municipality in comparison with the other municipalities due to the larger population in Treviso municipality.
- Regarding the heavy metal, the highest population exposure was obtained for Pb (5200 ng/m^3), followed by Ni (2200 ng/m^3), As (600 ng/m^3) and Cd (440 ng/m^3).

Base case

Deposited Dose of PM_{10}

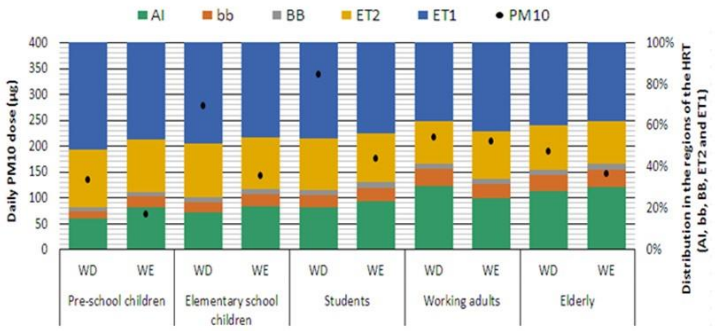


Figure 5 – Daily deposited dose of PM_{10} (µg) and its distribution in the different regions of the human respiratory tract (HRT) for each population group in Treviso.

- Daily deposited dose of PM_{10} ranged from 135.5 µg (pre-school children) to 339.5 µg (students) on weekdays while on weekends the daily deposited dose ranged from 68.9 µg (pre-school children) to 210.4 µg (working adults).
- Higher deposited dose was observed on weekdays than on weekends due to the high dose in school environment during weekdays.
- The daily deposited dose was higher in the ET1 and ET2 regions on both weekdays and weekends for all population groups.

Base case

Deposited Dose of $PM_{2.5}$

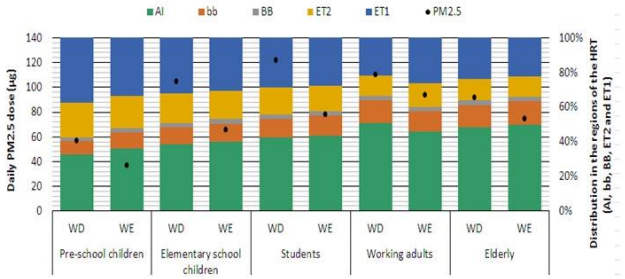


Figure 6 – Daily deposited dose of $PM_{2.5}$ (µg) and its distribution in the different regions of the human respiratory tract (HRT) for each population group in Treviso.

- The daily deposited dose of $PM_{2.5}$ ranged from 57.4 µg (pre-school children) to 122.6 µg (students) on weekdays.
- Regarding weekends, the daily deposited dose in the human respiratory tract ranged from 37.4 µg (pre-school children) to 94.1 µg (working adults)
- Finally, the daily deposited dose was higher in AI region on both weekdays and weekends.

Base case

BURDEN OF DISEASE

Table 3 – Upper respiratory infections and natural mortality per population sub-group in Treviso.

	Upper Respiratory Infections			Natural Mortality		
	Pre-school children	Elementary school children	All groups	Working adults	Elderly	All groups
DALY	0.40	0.43	0.83	14000	20000	35000
YLL= number of years lost	0.00	0.00	0.00	6400	15000	21000
YLD=years lived with a disease	0.40	0.43	0.83	8100	5400	13000
Deaths	0.00	0.00	0.00	180	1200	1400
Sick days (mild)	–	4400	–	–	–	–
Sick days (moderate)	–	2700	–	–	–	–
Sick days (severe)	–	55	–	–	–	–
Days of school absenteeism	–	1500	–	–	–	–
Total sick days	–	7200	–	–	–	–

- Upper Respiratory Infections were used for the children population groups (pre-school children and elementary school children).
- Natural Mortality was used for adults over 25 years old (working adults and elderly).
- The days of school absenteeism and the total sick days were 1500 and 7200, respectively.
- In total, 1400 premature deaths were attributed to $PM_{2.5}$ exposure.

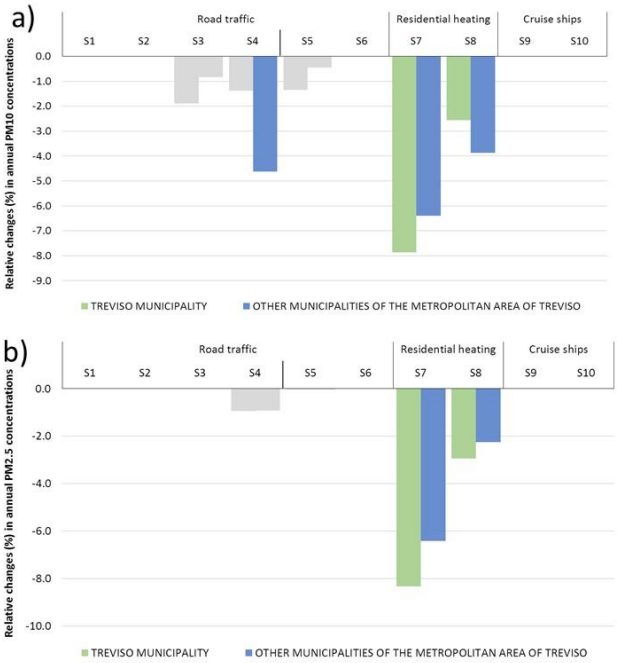
Scenarios

Table 4- Scenarios applied in tool for Treviso

Sector		Scenario code	Measure
Road traffic	Passenger cars fleet	S1	To replace the no. of diesel cars to electric cars
		S2	To consider all cars as electric
		S3	To reduce the total no. of cars by 50%
		S4	To remove the cars from EURO I, II, III and IV - > 50% of cars are EURO V and 50% are EURO VI
	Buses fleet	S5	To change the buses fleet to EURO V (50%) and EURO VI (50%)
		S6	To consider all buses as electric
Residential heating		S7	To replace inefficient devices (Fireplaces, Woodstove and Salamander Stove) for "More Efficient Fireplaces"
		S8	20% reduction of wood consumed

- The scenarios of Table 4 were implemented in Treviso.
- There are not cruise ships in Treviso and hence the scenarios of Cruise ships (S9 & S10) were not implemented.

Scenarios



- The grey bars represent the relative changes (between the base and measure values) that are within the uncertainty of the Tool (± 2%).
- Only scenarios S4,S7 and S8 achieve relative changes (reduction) in annual PM concentrations.
- The higher relative change in annual PM_{10} was observed for scenario S7 (7.9 % and 6.4 % decrease in Treviso municipality and other municipalities, respectively).
- The same observation was observed for $PM_{2.5}$. Specifically, scenario S7 decrease $PM_{2.5}$ concentrations by 8.3 % and 6.4% in Treviso municipality and other municipalities, respectively.

Figure 7-Relative changes (%) in annual a) PM_{10} and b) $PM_{2.5}$ concentrations

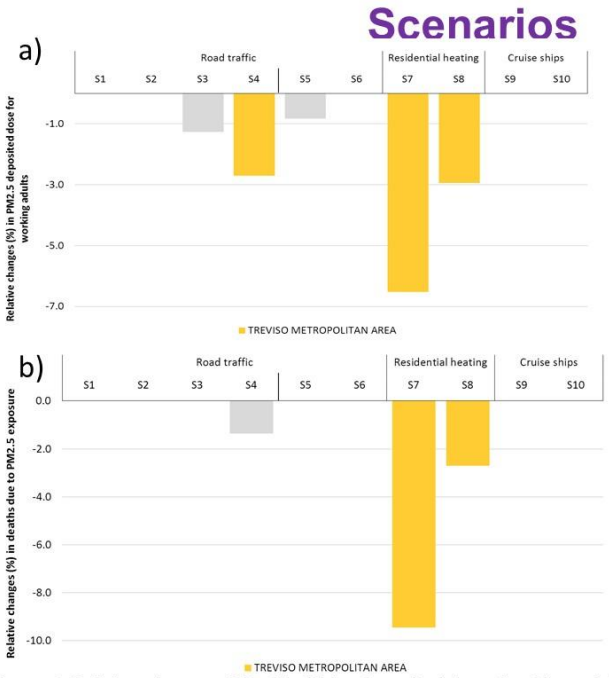


Figure 8-Relative changes (%) a) in $PM_{2.5}$ deposited dose (working adults) and b) in deaths due to $PM_{2.5}$ exposure

Scenario S7 achieves the highest relative change (%) in PM deposited dose, followed by S8 and then S4.

The values for the other scenarios are within the range of uncertainty of the Tool (± 2%).

In addition, scenarios S7 and S8 achieve 9.5% and 2.7 % reduction in deaths due to $PM_{2.5}$ exposure, respectively.

The most important measures taking into account the most efficient reductions are the residential heating scenarios (S7 & S8).
Therefore, it is important to implement measures to reduce emissions from residential heating.

LIFE Index-Air

Meeting and training course with Lisbon and Tagus Valley Regional Coordination and Development Commission (CCDR-LVT)

LIFE Index-Air - Development of an Integrated Exposure – Dose Management Tool for Reduction of Particulate Matter in Air – LIFE15ENV/PT/000674

Report of the meeting and training course with stakeholders

Date: 13th of October 2021

Zoom meeting

Chair: Marta Almeida
Rapporteur: Vânia Martins

Introduction

The present Minutes Report has been made to provide an overview of the meeting and training course with Lisbon and Tagus Valley Regional Coordination and Development Commission (CCDR-LVT). The meeting took place on 13th of October 2021. This meeting was attended by a total of 8 participants: 3 from IST, 3 from UAVR and 2 from CCDR-LVT.

CCDR-LVT is a decentralized body of central government. Its mission is to promote an integrated and sustainable development of the Lisbon region (NUT II). CCDR-LVT is tasked with coordinating and promoting in the Lisbon region governmental policies with regard to regional planning and development, environment, land management, inter-regional and cross-border cooperation and also support local government and inter-municipal associations. CCDR-LVT's fields of intervention also encompass the management of regional operational programs funded by the European Union, as well as other regional development financing instruments.

More specifically, CCDR-LVT is responsible by:

1. conduct the management and evaluation of air quality in LVT region, ensuring its quality;
1. ensure the accuracy of the pollutant measurements in LVT region;
2. ensure the availability of information on ambient air quality in LVT region;
3. ensure that exceedances in LVT region are communicated to the local authorities, health authorities and the public;
4. develop, promote the implementation and monitor the air quality plans for the LVT territory, which establish measures to achieve the limit values;
5. emit an opinion on private air quality monitoring networks installed under the scope of the facility licensing procedures in LVT region.

Marta Almeida, as coordinator of the project, was the chair of the meeting and nominated Vânia Martins (from IST team) as the rapporteur.

Objectives

The objectives of this meeting were:

13. to highlight the motivation and goals of the LIFE Index-Air project;
14. to present the works developed to identify the main pollutant emission sources in Lisbon;
15. to introduce the LIFE Index-Air Management Tool;
16. to train the stakeholders to run the LIFE Index-Air Management Tool;
17. to present the results of the implementation of the Tool in Lisbon;
18. to discuss the results obtained with stakeholders.

Participating Members

The following members of IST, UAVR and stakeholders participated in the meeting:

- IST – Marta Almeida, Vânia Martins, Tiago Faria
- UAVR – Hélder Relvas, Joana Ferreira, Ana Isabel Miranda
- CCDR-LVT – Luísa Nogueira, Sandra Mesquita

Agenda of the Meeting

The working agenda of the meeting was the following:

- Motivation and goals
- Identification of pollutant emission sources in Lisbon
- LIFE index-Air decision support tool
- Implementation of the tool in Lisbon

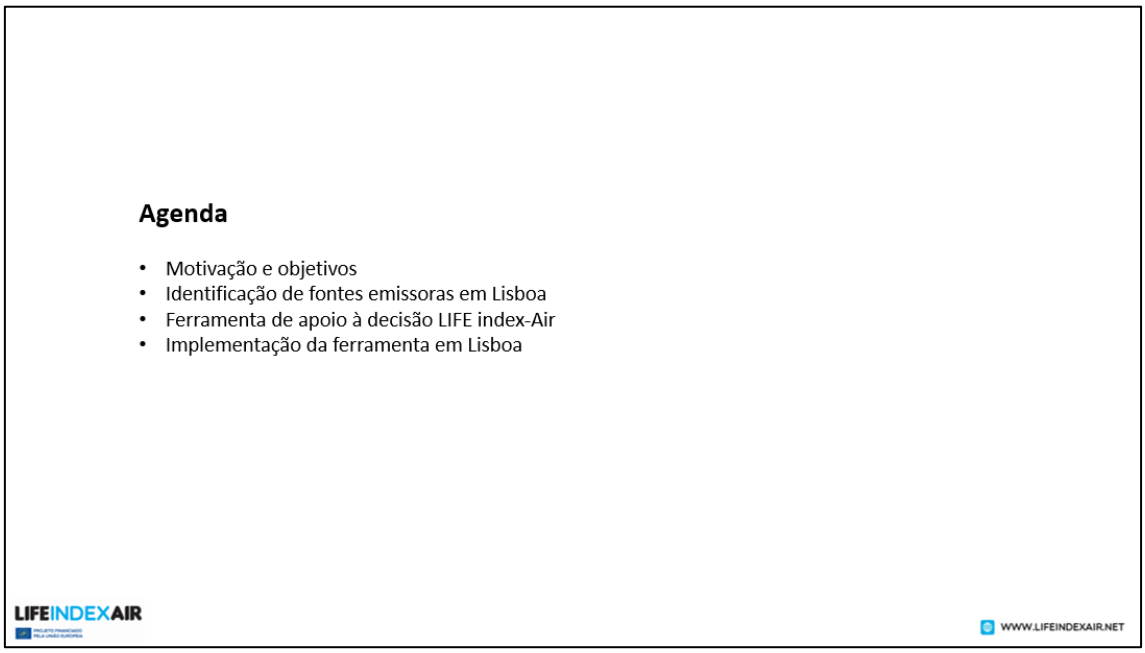


Figure 8 – Working agenda of the meeting.

Working resume

The meeting started at 9:00 with the introduction of all participants. Marta Almeida gave a general overview of the LIFE Index-Air project: motivation, goals and structure, and presented the scientific works developed to identify the pollutant emission sources in Lisbon. The presentation of these results was followed by the demonstration of the LIFE

Index-Air Management Tool and training of stakeholders in the use of the Tool by Hélder Relvas. The manual for the management Tool utilisation was presented. This manual includes the description of all the functions of the Operational Platform and the input data needed in the application of the “Scenario” tab. The results of the implementation of the Tool in Lisbon were presented by Marta Almeida. The PowerPoint that supported this meeting is shown in Annex 1. The presentations were followed by a discussion between LIFE Index-Air team and stakeholders, regarding the results presented. Sandra Mesquita and Luísa Nogueira asked questions about functions/options of the Tool and gave feedback on the results obtained for Lisbon. Project partners closed the meeting by pointing out the ways to make effective application of emission control scenarios and use of the project outcomes.

The meeting ended at 11:10.

Images of the online meeting

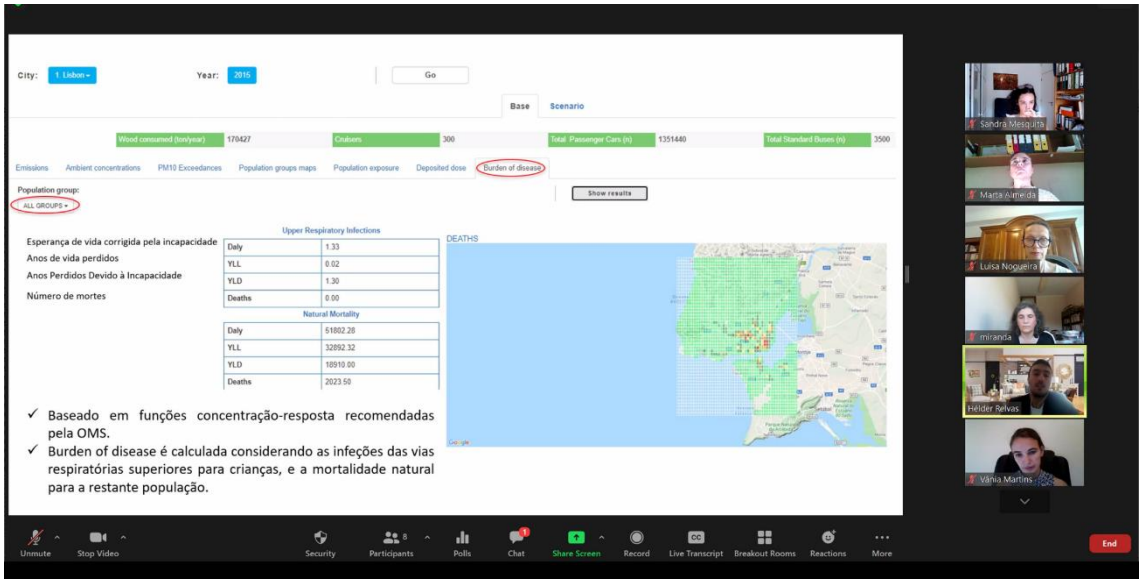


Figure 9 – Hélder Relvas demonstrating the LIFE Index-Air Management Tool.

Figure 10 – Marta Almeida presenting the results of the improvement measures applied in Lisbon.

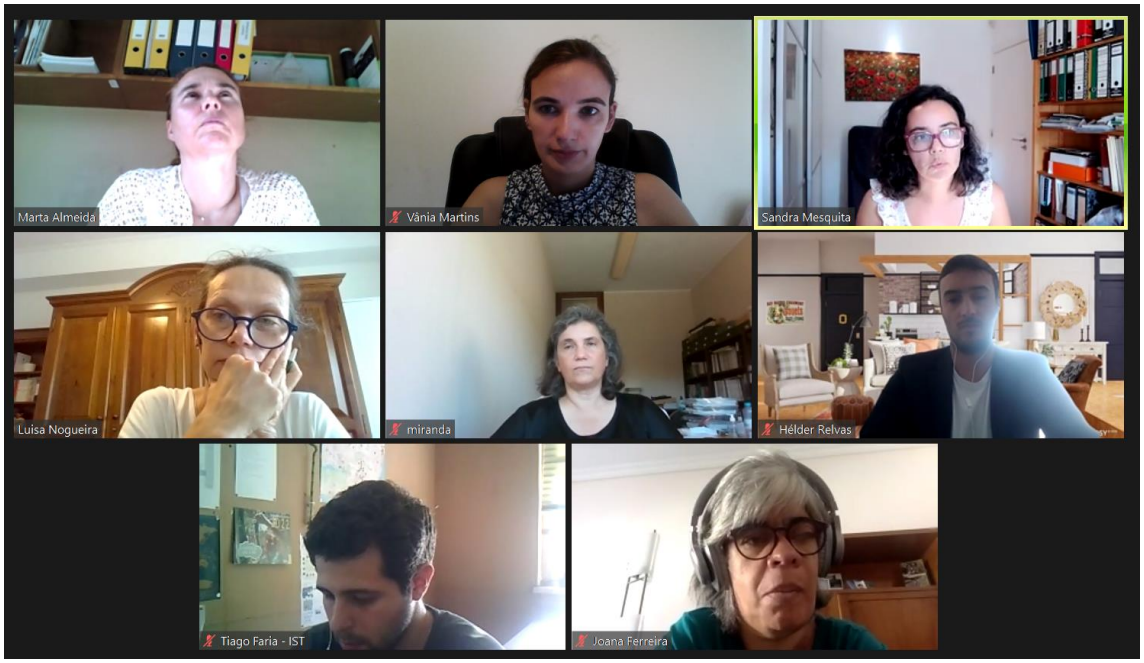


Figure 11 – Intervention by Sandra Mesquita, CCDR-LVT member (Stakeholder).

Figure 12 – Intervention by Luísa Nogueira, CCDR-LVT member (Stakeholder).

Main conclusions of the meeting

LIFE Index-Air partners presented the motivation, goals and structure of the project, as well as the results from the implementation of the management tool in Lisbon. A part of the meeting was dedicated to the training of stakeholder in the use of LIFE Index-Air Management Tool. The meeting closed with a discussion between LIFE Index-Air team and stakeholders regarding details on the results presented. Among the topics discussed during the meeting were the methodologies applied for the development of the Tool's algorithm and the included databases on emission strengths and concentration levels. The functionalities of the Management Tool were demonstrated in detail, including the possibilities offered by the Tool for emissions management and control.

The improvement measures applied were targeting reductions to the relevant anthropogenic sources where reductions are possible such as: road traffic emissions, emissions from biomass burning for residential heating and cruise shipping emissions.

The support training material (manual and video) is expected to further assist local and national authorities in the application of the Management Tool. The manual and video have been published in the project website in order to attract additional end users.

Sandra Mesquita asked if it is possible to change the emissions inventory used in the scenario base of the Tool with updated data. UAVR team answered that it is possible, but it would imply the simulation of all the modules and the insertion of the new information in the Tool by mSensis. This additional work would require extra funding for pay mSensis service, which is not valid.

Luísa Nogueira stated that would be interesting to introduce more improvement measures in the scenario builder, especially in terms of the cruise ship scenario, such as changing cruise ship technology.

The project results will be disseminated in the CCDR-LVT website.

The adoption of Management Tool by this authority ensures the use of project outcomes after the project end. The project partners will maintain the communication with this key stakeholder, providing support in the application of the Tool.

Approval of the Meeting Minute

According with the LIFE Index-Air Management Guide the minutes shall be considered as accepted if, within 10 calendar days from sending, no Member has sent an objection in writing to the chairperson. The chairperson will send the final version of the minutes by email to all the beneficiaries that were call to the meeting. Also a copy of the minutes will be archived in the LIFE Index-Air webpage.

Annex

Powerpoint of the meeting and training course with Lisbon and Tagus Valley Regional Coordination and Development Commission (CCDR-LVT)

Agenda

- Motivação e objetivos
- Identificação de fontes emissoras em Lisboa
- Ferramenta de apoio à decisão LIFE index-Air
- Implementação da ferramenta em Lisboa

Motivação

População Europeia exposta a níveis de poluentes atmosféricos prejudiciais em 2013-2015

	EU limit/target values	WHO guidelines
$PM_{2.5}$	7–8 %	82–85 %
PM_{10}	16–20 %	50–62 %
O_3	7–30 %	95–98 %
NO_2	7–9 %	7–9 %
BaP	20–25 %	85–91 %
SO_2	<1 %	20–38 %

90 % da população que vive em cidades europeias está exposta a níveis de poluentes atmosféricos que excedem os valores guia definidos pela Organização Mundial de Saúde

LIFEINDEXAIR

Air Quality in Europe – 2017 Report
EEA Report | No 13/2017

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Motivação

Avaliação da exposição humana a poluentes atmosféricos

Avaliar os níveis de poluentes atmosféricos em **estações de monitorização fixas** tem sido a forma tradicional de **avaliar a exposição humana a esses poluentes**

Estas estações de monitorização fixas supostamente avaliam a **exposição de toda a população aos poluentes**

No entanto, esta abordagem não contabiliza todos os componentes que determinam a exposição

1º Existe uma enorme **heterogeneidade nas concentrações** de poluentes dentro da cidade

2º Pessoas ocupam mais de **90%** do tempo no interior dos edifícios

3º Há uma grande heterogeneidade nos **padrões de ocupação do tempo** da população

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Motivação
Avaliação da exposição humana a poluentes atmosféricos
Avaliar os níveis de poluentes atmosféricos em estações de monitorização fixas tem sido a forma tradicional de avaliar a exposição humana a esses poluentes
Estas estações de monitorização fixas supostamente avaliam a exposição de toda a população aos poluentes
No entanto, esta abordagem não contabiliza todos os componentes que determinam a exposição
1º Existe uma enorme heterogeneidade nas concentrações de poluentes dentro da cidade
2º Pessoas ocupam mais de 90% do tempo no interior dos edifícios
3º Há uma grande heterogeneidade nos padrões de ocupação do tempo da população
A avaliação da exposição integrada a poluentes é essencial para determinar a dose recebida pelo individuo uma vez que esta influencia diretamente os impactes na saúde.
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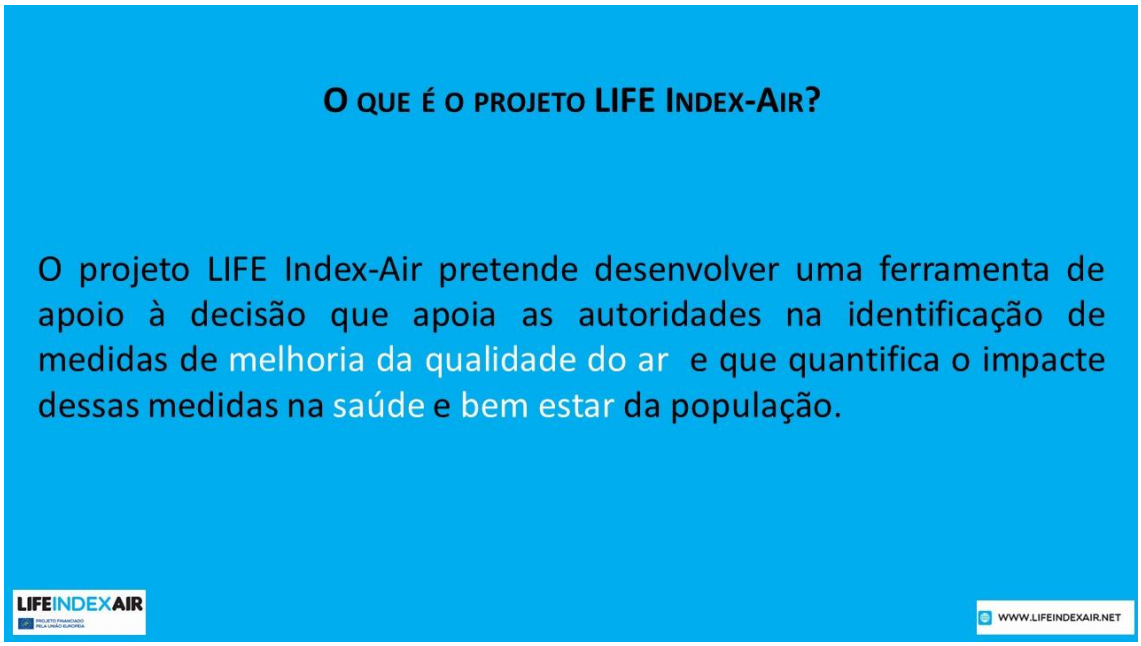
O QUE É O PROJETO LIFE INDEX-AIR?
O projeto LIFE Index-Air pretende desenvolver uma ferramenta de apoio à decisão que apoia as autoridades na identificação de medidas de melhoria da qualidade do ar e que quantifica o impacte dessas medidas na saúde e bem estar da população.
LIFEINDEXAIR
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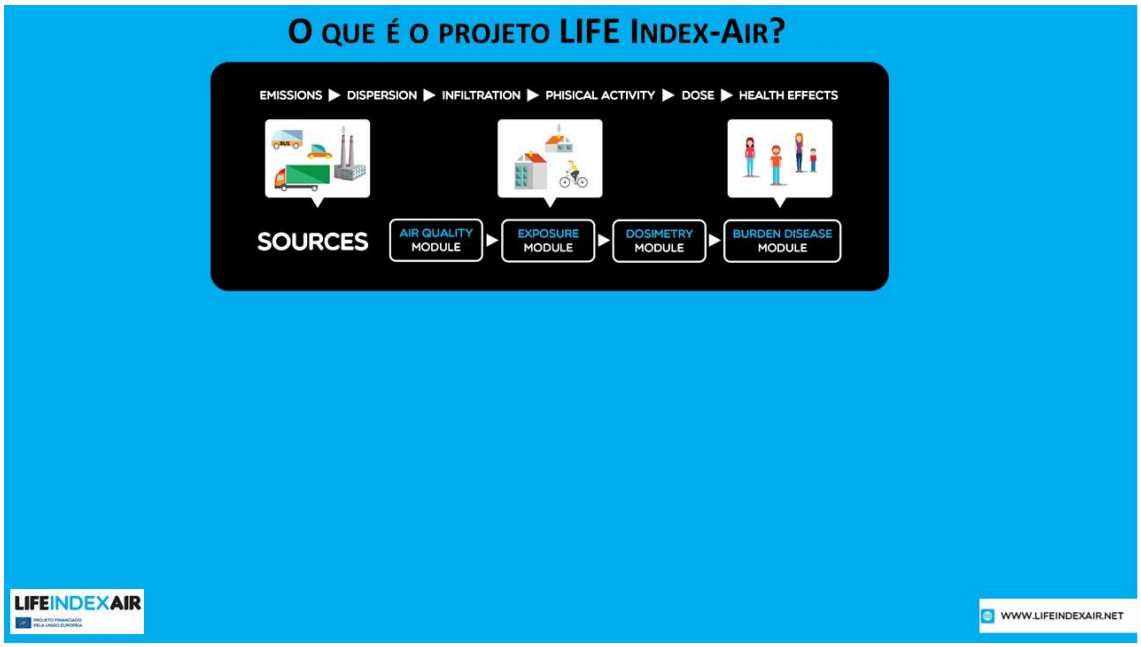
O QUE É O PROJETO LIFE INDEX-AIR?
EMISSIONS ▶ DISPERSION ▶ INFILTRATION ▶ PHISICAL ACTIVITY ▶ DOSE ▶ HEALTH EFFECTS
SOURCES
AIR QUALITY MODULE
EXPOSURE MODULE
DOSIMETRY MODULE
BURDEN DISEASE MODULE
LIFEINDEXAIR
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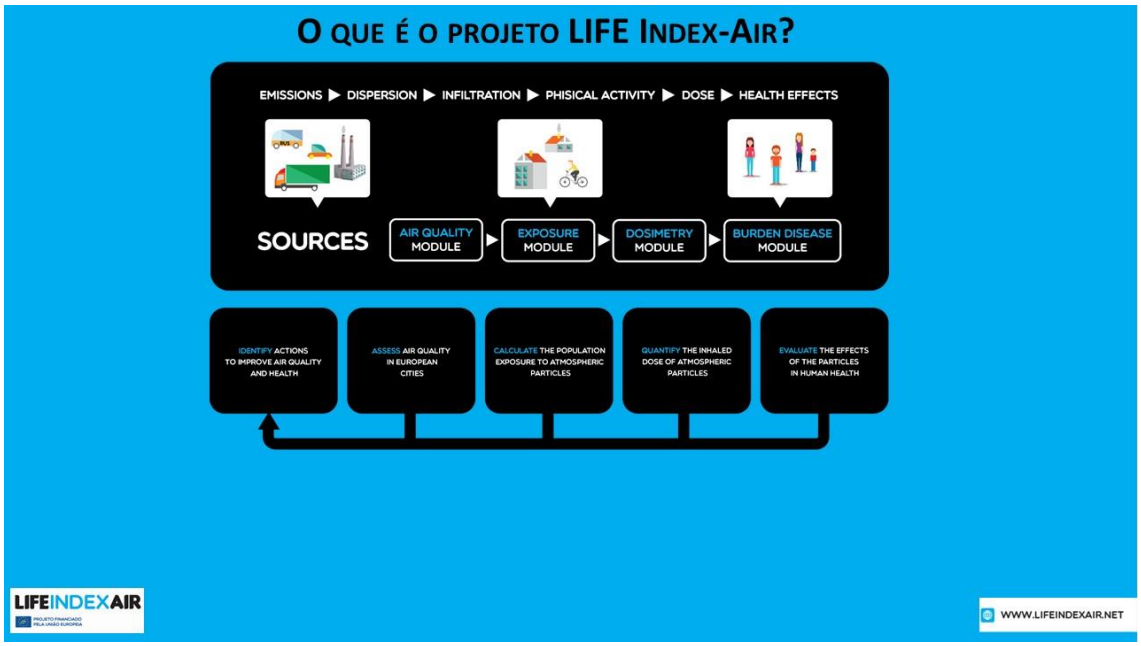
O QUE É O PROJETO LIFE INDEX-AIR?
EMISSIONS ▶ DISPERSION ▶ INFILTRATION ▶ PHISICAL ACTIVITY ▶ DOSE ▶ HEALTH EFFECTS
SOURCES
AIR QUALITY MODULE
EXPOSURE MODULE
DOSIMETRY MODULE
BURDEN DISEASE MODULE
IDENTIFY ACTIONS TO IMPROVE AIR QUALITY AND HEALTH
ASSESS AIR QUALITY IN EUROPEAN CITIES
CALCULATE THE POPULATION EXPOSURE TO ATMOSPHERIC PARTICLES
QUANTIFY THE INHALED DOSE OF ATMOSPHERIC PARTICLES
EVALUATE THE EFFECTS OF THE PARTICLES IN HUMAN HEALTH
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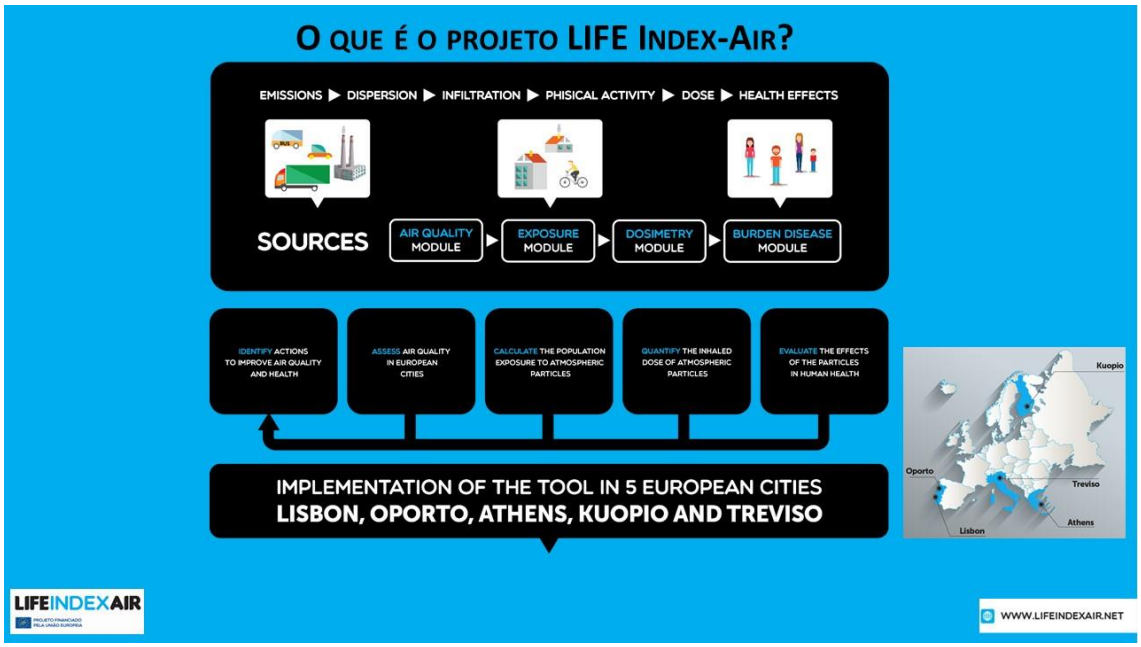
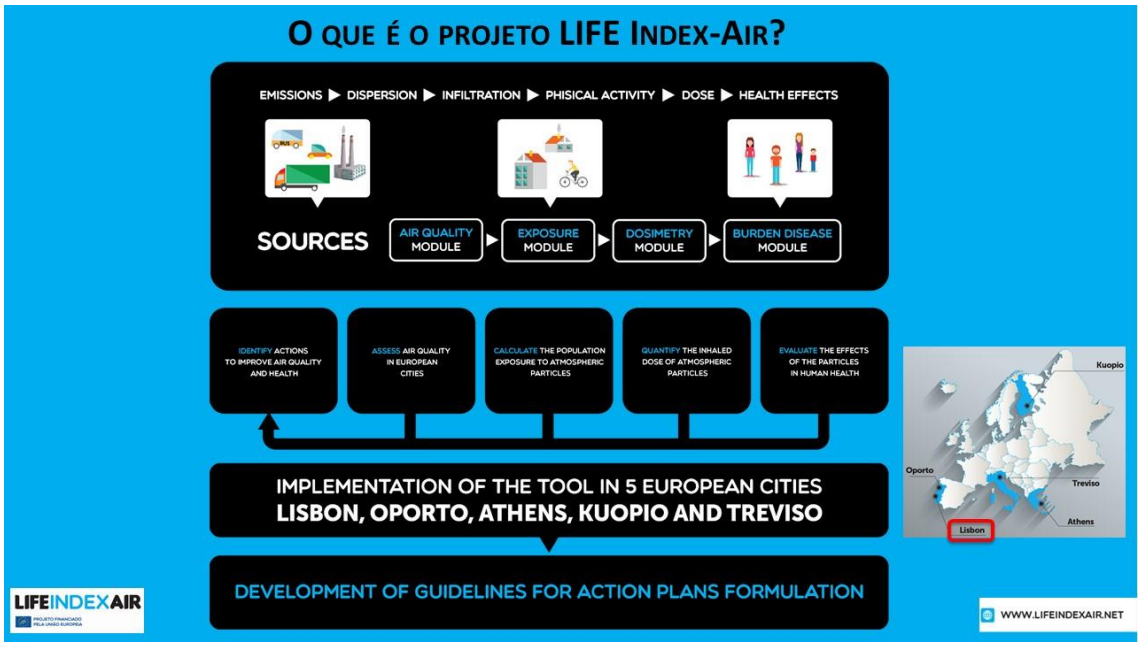

O QUE É O PROJETO LIFE INDEX-AIR?
EMISSIONS ▶ DISPERSION ▶ INFILTRATION ▶ PHISICAL ACTIVITY ▶ DOSE ▶ HEALTH EFFECTS
SOURCES
AIR QUALITY MODULE
EXPOSURE MODULE
DOSIMETRY MODULE
BURDEN DISEASE MODULE
IDENTIFY ACTIONS TO IMPROVE AIR QUALITY AND HEALTH
ASSESS AIR QUALITY IN EUROPEAN CITIES
CALCULATE THE POPULATION EXPOSURE TO ATMOSPHERIC PARTICLES
QUANTIFY THE INHALED DOSE OF ATMOSPHERIC PARTICLES
EVALUATE THE EFFECTS OF THE PARTICLES IN HUMAN HEALTH
IMPLEMENTATION OF THE TOOL IN 5 EUROPEAN CITIES
LISBON, OPORTO, ATHENS, KUOPIO AND TREVISO
Kuopio
Oporto
Treviso
Athens
Lisbon
LIFEINDEXAIR
WWW.LIFEINDEXAIR.NET


O QUE É O PROJETO LIFE INDEX-AIR?
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LISBON, OPORTO, ATHENS, KUOPIO AND TREVISO
DEVELOPMENT OF GUIDELINES FOR ACTION PLANS FORMULATION
Kuopio
Oporto
Treviso
Athens
Lisbon
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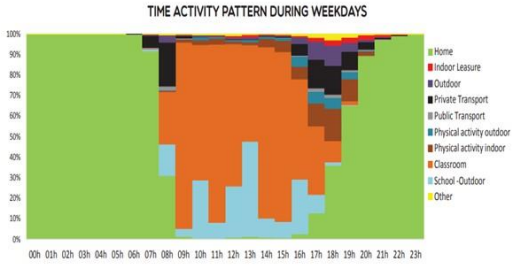
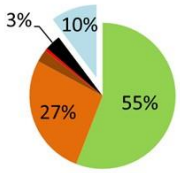
1 – Avaliação da contribuição das fontes emissoras para a exposição a PM

Padrões de tempo atividade

26 escolas
4000 estudantes e professores
6000 questionários





1 – Avaliação da contribuição das fontes emissoras para a exposição a PM

Objetivo:

- Validação modelos
- Razão interior/exterior
- Identificação de fontes

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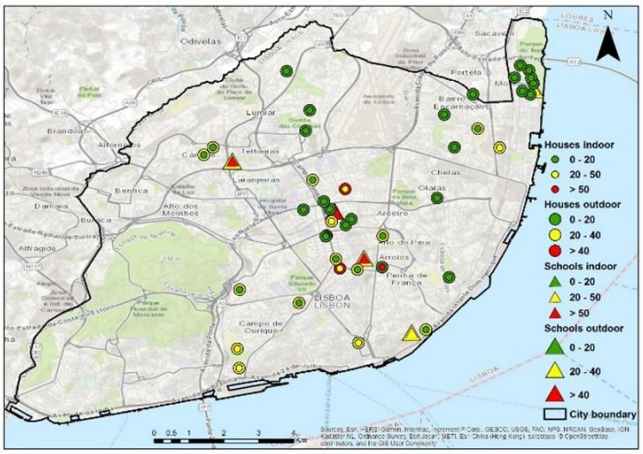
PM2.5 + PM10 + Elements (As + Cd + Ni + Pb) + PAHs (BaP) + EC/OC

1 – Avaliação da contribuição das fontes emissoras para a exposição a PM

Concentração mássica de PM10 em ambientes interiores e exteriores



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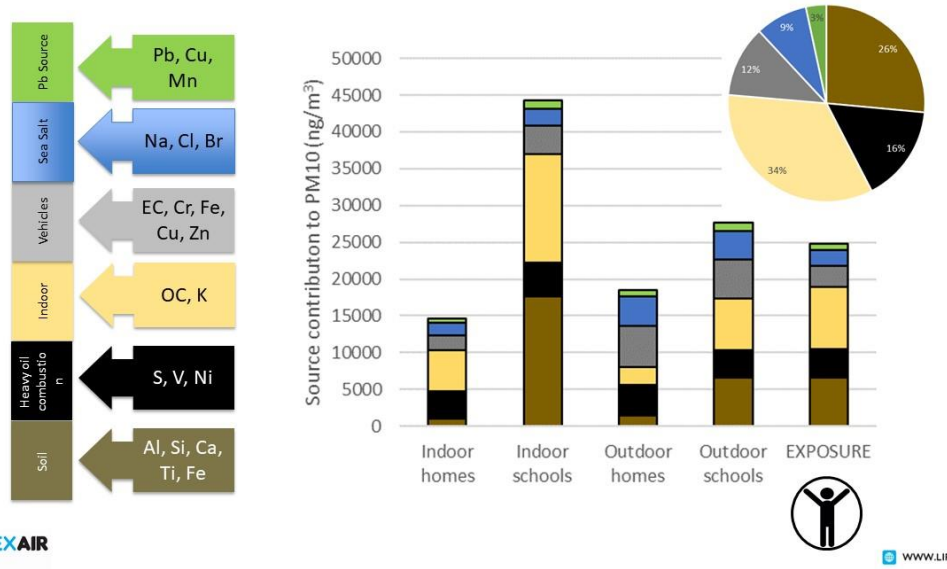
1 – Avaliação da contribuição das fontes emissoras para a exposição a PM



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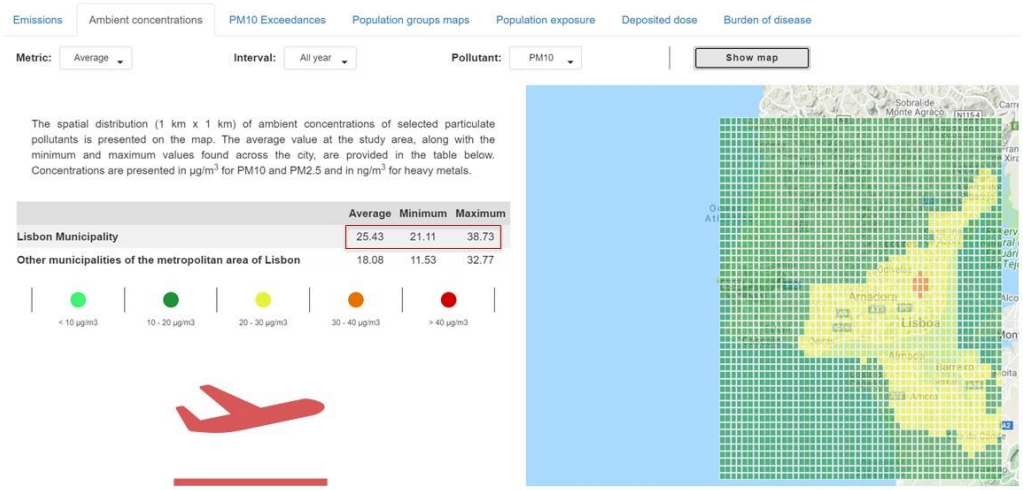
2 – Avaliação da contribuição dos transportes para a concentração, exposição e dose



WRF-CAMx model

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Metodologia

Escola primária localizada a 200 m do aeroporto de Lisboa

2 Fev 2020 – 7 Jul 2021

Amostrador Leckel MVS6 - PM10 em filtros Teflon
Filtros analisados por:
PIXE - Elementos
Cromatografia iónica- Iões solúveis em água
MABI - Multi-wavelength absorption black carbon instrument – Carbono negro

Personal Cascade Impactor Sampler / SKC Leland Legacy pump – Distribuição por tamanho: <0.25; 0.25 to 0.5; 0.5 to 1.0; 1.0 to 2.5; e >2.5µm
EPA-PMF-5 – Identificação e contribuição das fontes para o PM10
Dosimetry Model ExDoM2 – Deposição das partículas no trato respiratório (Chalvatzaki and Lazaridis, 2015)

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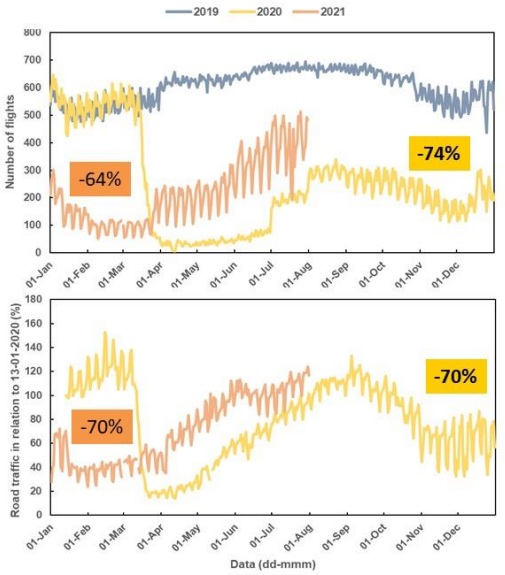
Redução do tráfego durante o COVID



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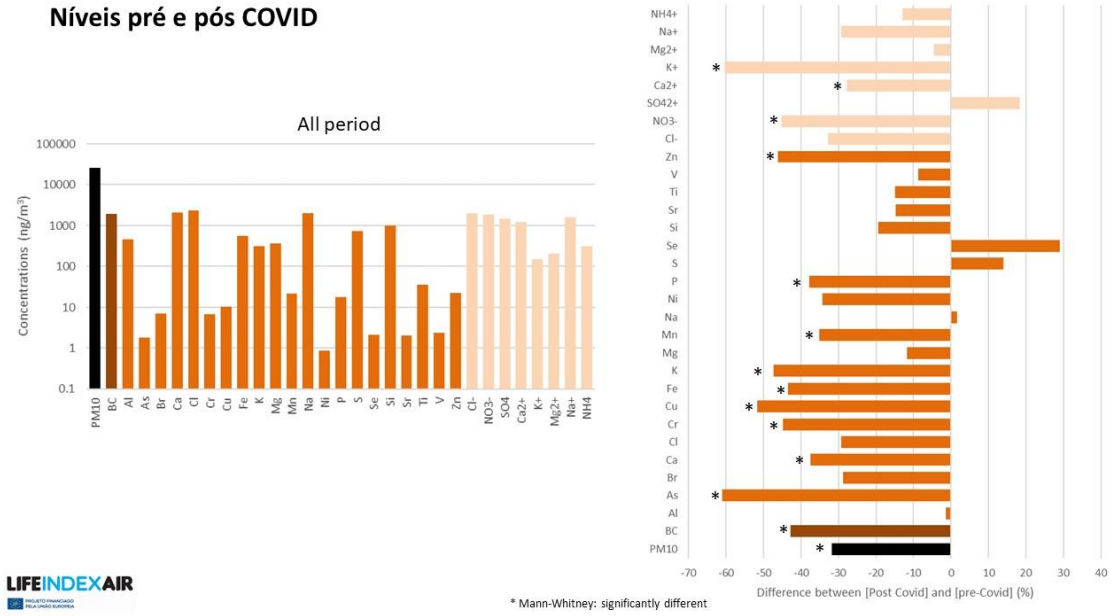
Níveis pré e pós COVID
All period
Concentrations (ng/m³)
100000
10000
1000
100
10
1
0.1
PM10 BC Al As Br Ca Cl Cr Cu Fe K Mg Mn Na Ni P S Se Si Sr Ti V Zn Cl- NO3- SO4 Ca2+ K+ Mg2+ Na+ NH4
NH4+ Na+ Mg2+ K+ Ca2+ SO42+ NO3- Cl- Zn V Ti Sr Si Se S P Ni Na Mn Mg K Fe Cu Cr Cl Ca Br As Al BC PM10
-70 -60 -50 -40 -30 -20 -10 0 10 20 30 40
Difference between [Post Covid] and [pre-Covid] (%)
* Mann-Whitney: significantly different
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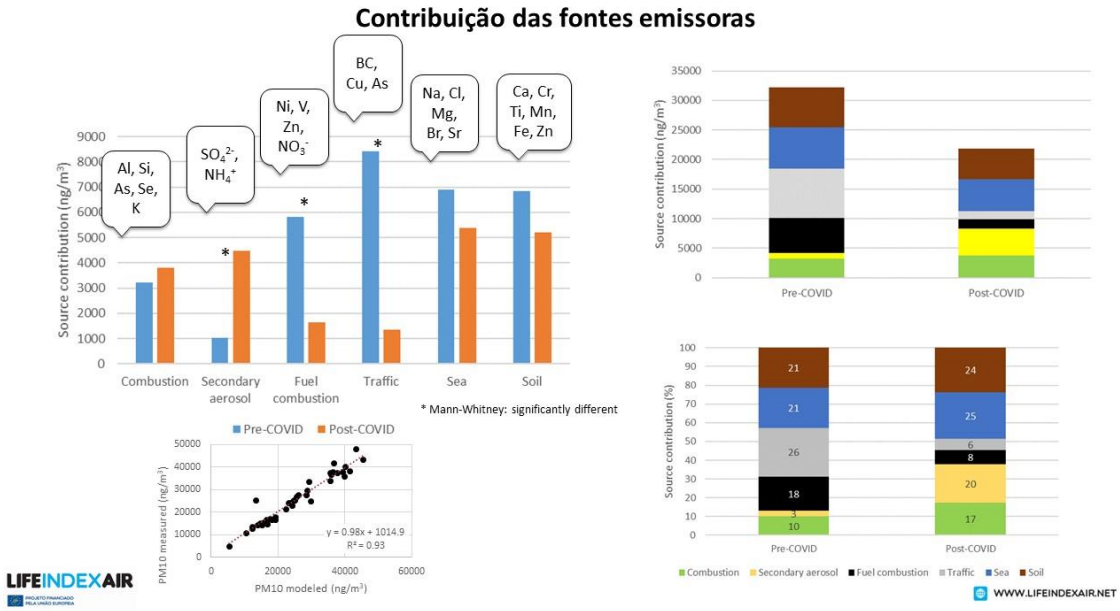
Contribuição das fontes emissoras
Source contribution (ng/m³)
Al, Si, As, Se, K
SO4 2-, NH4 +
Ni, V, Zn, NO3 -
BC, Cu, As
Na, Cl, Mg, Br, Sr
Ca, Cr, Ti, Mn, Fe, Zn
Combustion
Secondary aerosol
Fuel combustion
Traffic
Sea
Soil
* Mann-Whitney: significantly different
Pre-COVID
Post-COVID
PM10 measured (ng/m³)
PM10 modeled (ng/m³)
y = 0.98x + 1014.9
R² = 0.93
Source contribution (ng/m³)
Source contribution (%)
21
21
26
18
3
10
24
25
6
8
20
17
Combustion
Secondary aerosol
Fuel combustion
Traffic
Sea
Soil
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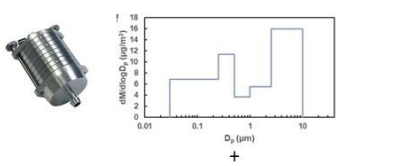
LIFEINDEXAIR

Dose diária



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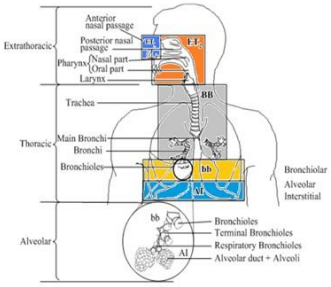
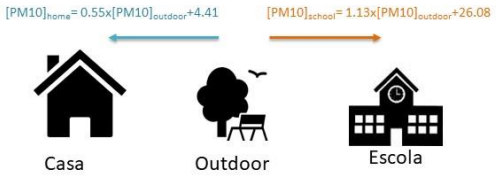


Dosimetry Model ExDoM2
(Chalvatzaki and Lazaridis, 2015)

- Padrão tempo atividade – questionários
- Indoor vs Outdoor – medições realizadas nas 40 casas e 5 escolas



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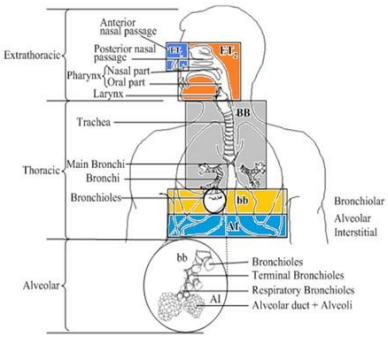
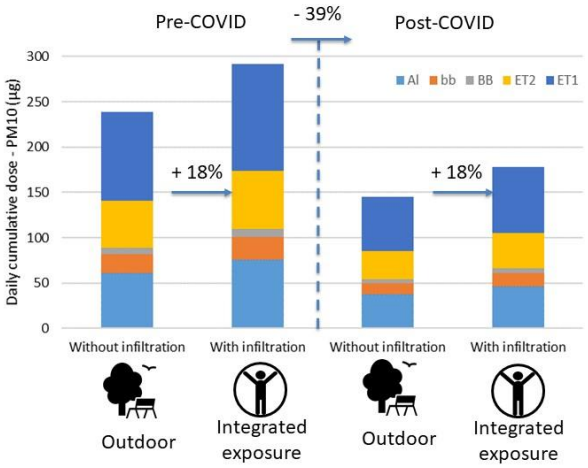
Dose diária





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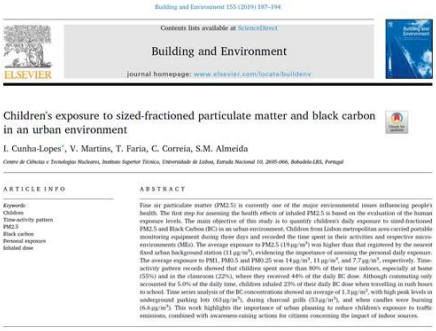
3 – Avaliação da contribuição de fontes interiores para a exposição

Avaliação da exposição de crianças a poluentes através de medições móveis



Building and Environment 155 (2019) 187–194

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journal homepage: www.elsevier.com/locate/buildenv

Children's exposure to sized-fractioned particulate matter and black carbon in an urban environment

I. Cunha-Lopes*, V. Martins, T. Faria, C. Correia, S.M. Almeida

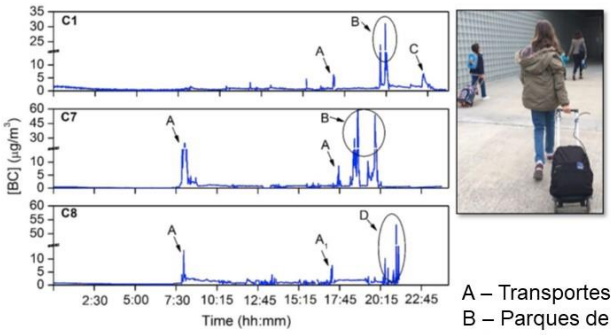
Centro de Ciências e Tecnologias Nucleares, Instituto Superior Técnico, Universidade de Lisboa, Estrada Nacional 10, 2695-066, Bobadela-LRS, Portugal

ARTICLE INFO

Keywords:
Children
Time-activity pattern
PM2.5
Black carbon
Personal exposure
Inhaled dose

ABSTRACT

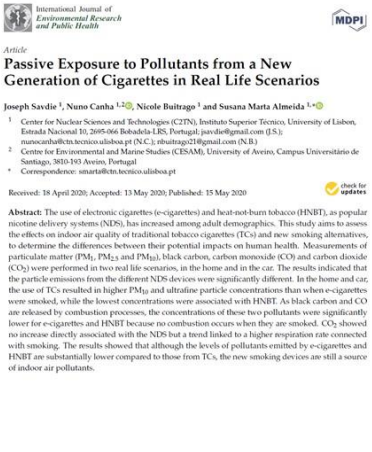
Fine air particulate matter (PM2.5) is currently one of the major environmental issues influencing people's health. The first step for assessing the health effects of inhaled PM2.5 is based on the evaluation of the human exposure levels. The main objective of this study is to quantify children's daily exposure to sized-fractioned PM2.5 and Black Carbon (BC) in an urban environment. Children from Lisbon metropolitan area carried portable monitoring equipment during three days and recorded the time spent in their activities and respective micro-environments (MEs). The average exposure to PM2.5 (19 μg/m³) was higher than that registered by the nearest fixed urban background station (11 μg/m³), evidencing the importance of assessing the personal daily exposure. The average exposure to PM1, PM0.5 and PM0.25 was 14 μg/m³, 11 μg/m³, and 7.7 μg/m³, respectively. Time-activity pattern records showed that children spent more than 80% of their time indoors, especially at home (55%) and in the classroom (22%), where they received 44% of the daily BC dose. Although commuting only accounted for 5.0% of the daily time, children inhaled 23% of their daily BC dose when travelling in rush hours to school. Time series analysis of the BC concentrations showed an average of 1.3 μg/m³, with high peak levels in underground parking lots (63 μg/m³), during charcoal grills (57 μg/m³), and when candles were burning (6.4 μg/m³). This work highlights the importance of urban planning to reduce children's exposure to traffic emissions, combined with awareness-raising actions for citizens concerning the impact of indoor sources.



A – Transportes
B – Parques de estacionamento
C- Velas
D - Churrasco

3 – Avaliação da contribuição de fontes interiores para a exposição

Exposição a poluentes resultantes da nova geração de cigarros



International Journal of Environmental Research and Public Health

MDPI

Article

Passive Exposure to Pollutants from a New Generation of Cigarettes in Real Life Scenarios

Joseph Savdie [1], Nuno Canha [1,2], Nicole Buitrago [1] and Susana Marta Almeida [1,*]

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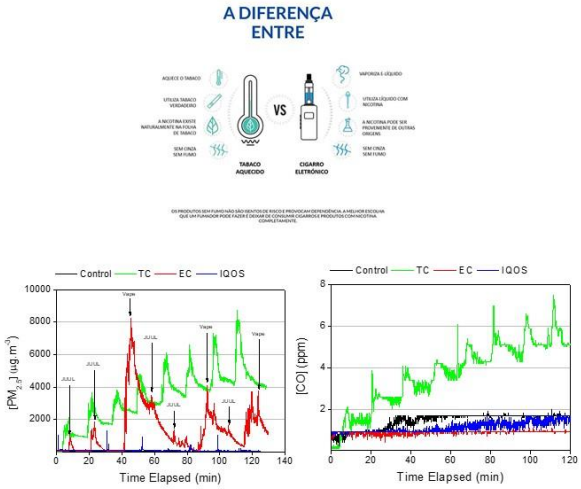
Received: 18 April 2020; Accepted: 13 May 2020; Published: 15 May 2020

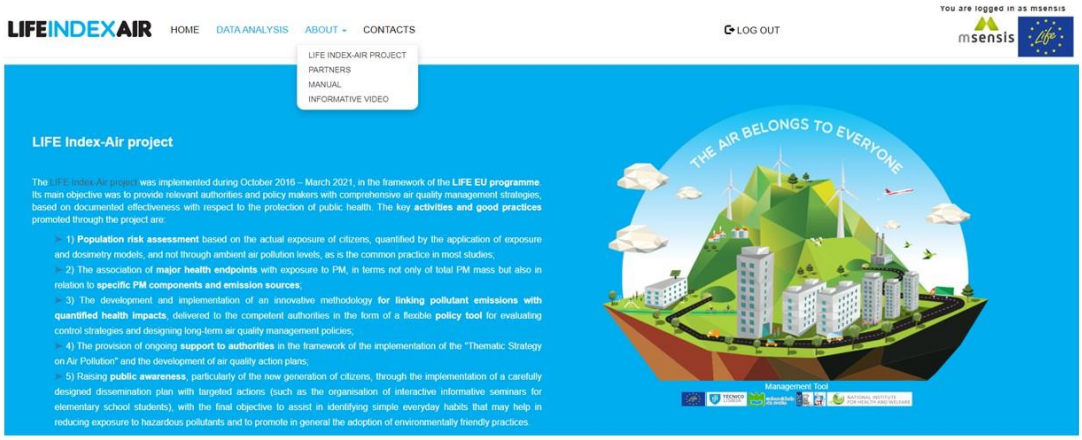
check for updates

Abstract: The use of electronic cigarettes (e-cigarettes) and heat-not-burn tobacco (HNBT), as popular nicotine delivery systems (NDS), has increased among adult demographics. This study aims to assess the effects on indoor air quality of traditional tobacco cigarettes (TCs) and new smoking alternatives, to determine the differences between their potential impacts on human health. Measurements of particulate matter (PM_1, $PM_{2.5}$ and PM_{10}), black carbon, carbon monoxide (CO) and carbon dioxide (CO_2) were performed in two real life scenarios, in the home and in the car. The results indicated that the particle emissions from the different NDS devices were significantly different. In the home and car, the use of TCs resulted in higher PM_{10} and ultrafine particle concentrations than when e-cigarettes were smoked, while the lowest concentrations were associated with HNBT. As black carbon and CO are released by combustion processes, the concentrations of these two pollutants were significantly lower for e-cigarettes and HNBT because no combustion occurs when they are smoked. CO_2 showed no increase directly associated with the NDS but a trend linked to a higher respiration rate connected with smoking. The results showed that although the levels of pollutants emitted by e-cigarettes and HNBT are substantially lower compared to those from TCs, the new smoking devices are still a source of indoor air pollutants.



3 – Avaliação da contribuição de fontes interiores para a exposição

Exposição a poluentes emitidos por lareias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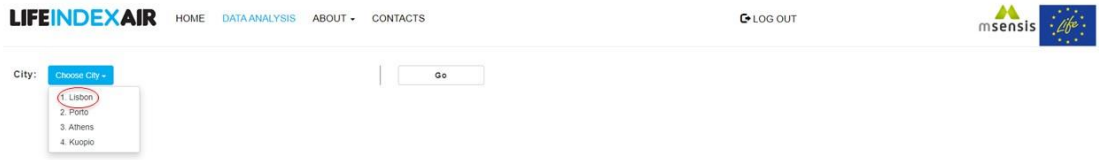
HOME
DATA ANALYSIS
ABOUT
CONTACTS
LOG OUT
You are logged in as msensis
msensis
LIFE INDEX-AIR PROJECT
PARTNERS
MANUAL
INFORMATIVE VIDEO
LIFE Index-Air project
The LIFE Index-Air project was implemented during October 2016 – March 2021, in the framework of the LIFE EU programme. Its main objective was to provide relevant authorities and policy makers with comprehensive air quality management strategies, based on documented effectiveness with respect to the protection of public health. The key activities and good practices promoted through the project are:
1) Population risk assessment based on the actual exposure of citizens, quantified by the application of exposure and dosimetry models, and not through ambient air pollution levels, as is the common practice in most studies;
2) The association of major health endpoints with exposure to PM, in terms not only of total PM mass but also in relation to specific PM components and emission sources;
3) The development and implementation of an innovative methodology for linking pollutant emissions with quantified health impacts, delivered to the competent authorities in the form of a flexible policy tool for evaluating control strategies and designing long-term air quality management policies;
4) The provision of ongoing support to authorities in the framework of the implementation of the "Thematic Strategy on Air Pollution" and the development of air quality action plans;
5) Raising public awareness, particularly of the new generation of citizens, through the implementation of a carefully designed dissemination plan with targeted actions (such as the organisation of interactive informative seminars for elementary school students), with the final objective to assist in identifying simple everyday habits that may help in reducing exposure to hazardous pollutants and to promote in general the adoption of environmentally friendly practices.
THE AIR BELONGS TO EVERYONE
Management Tool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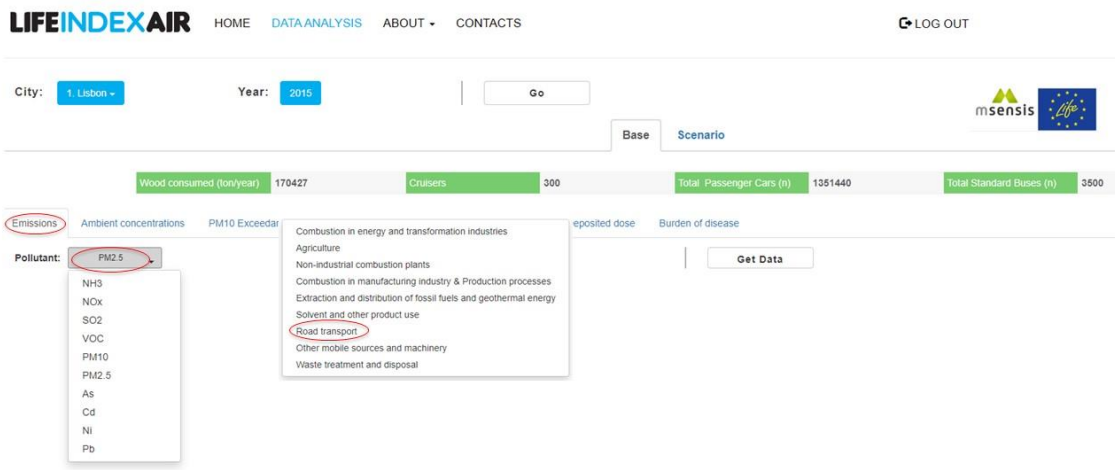
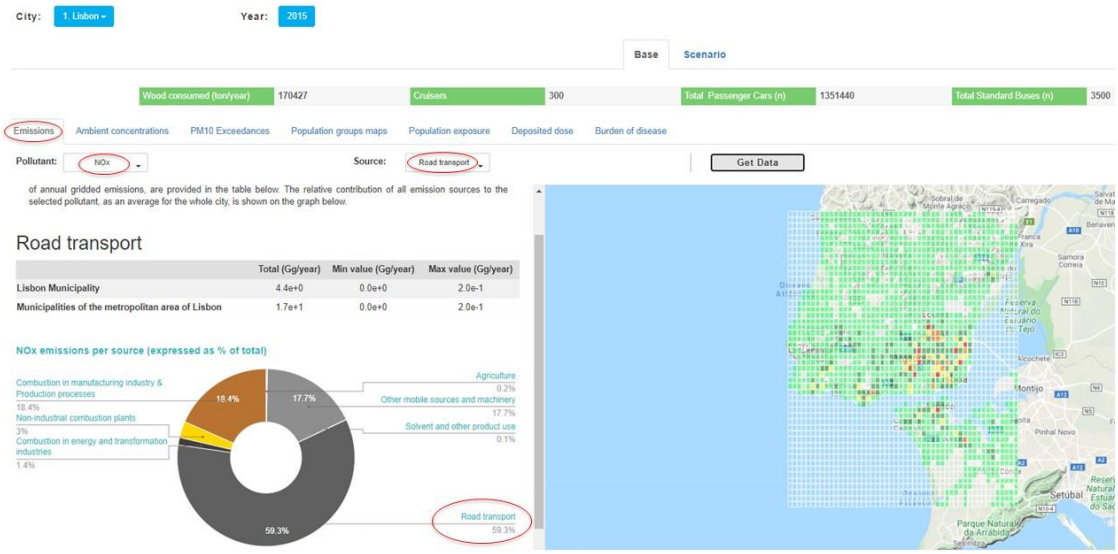
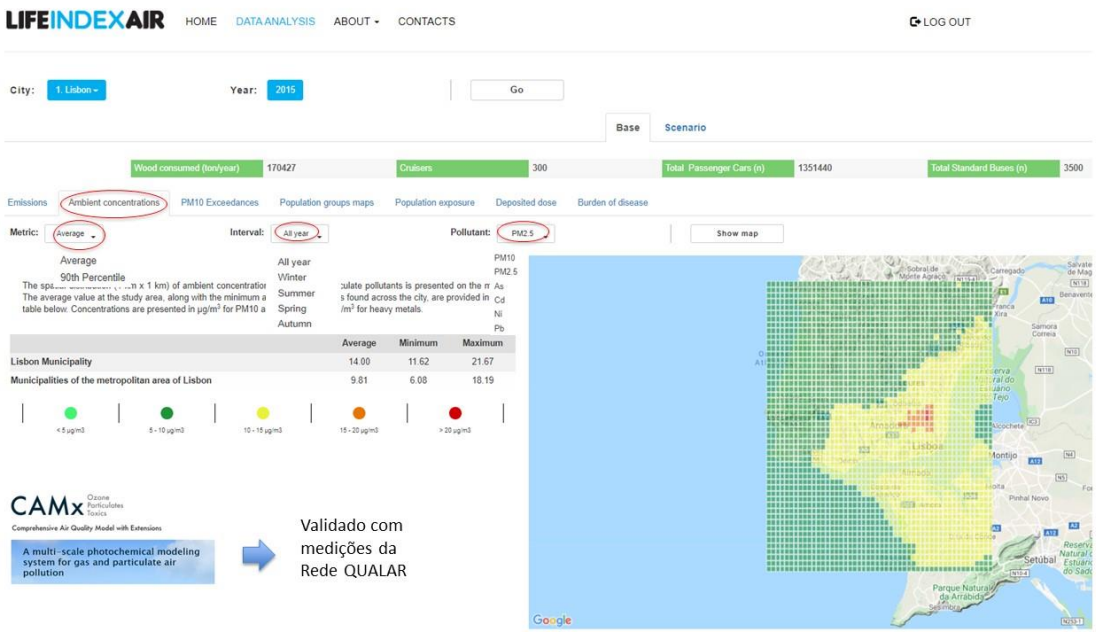
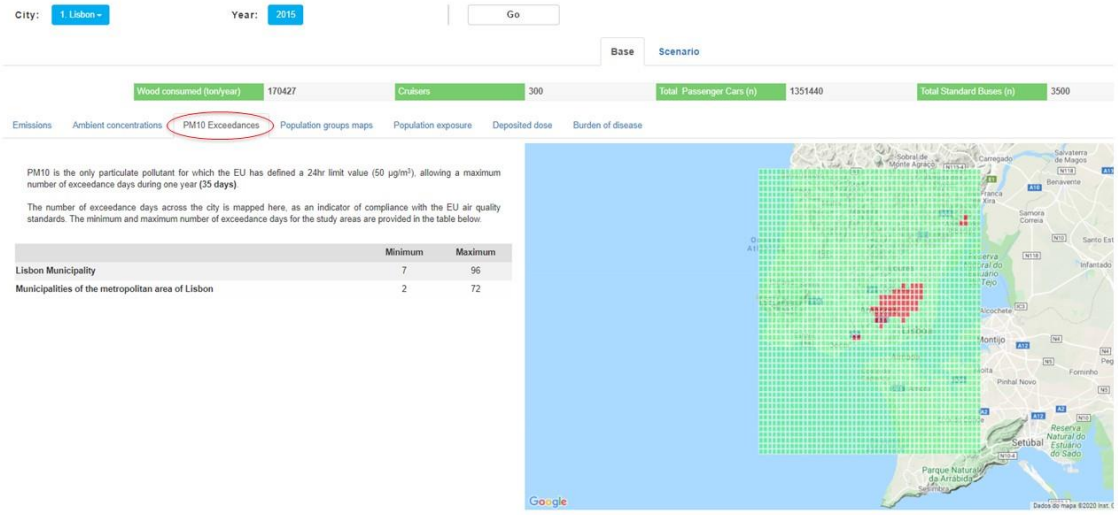
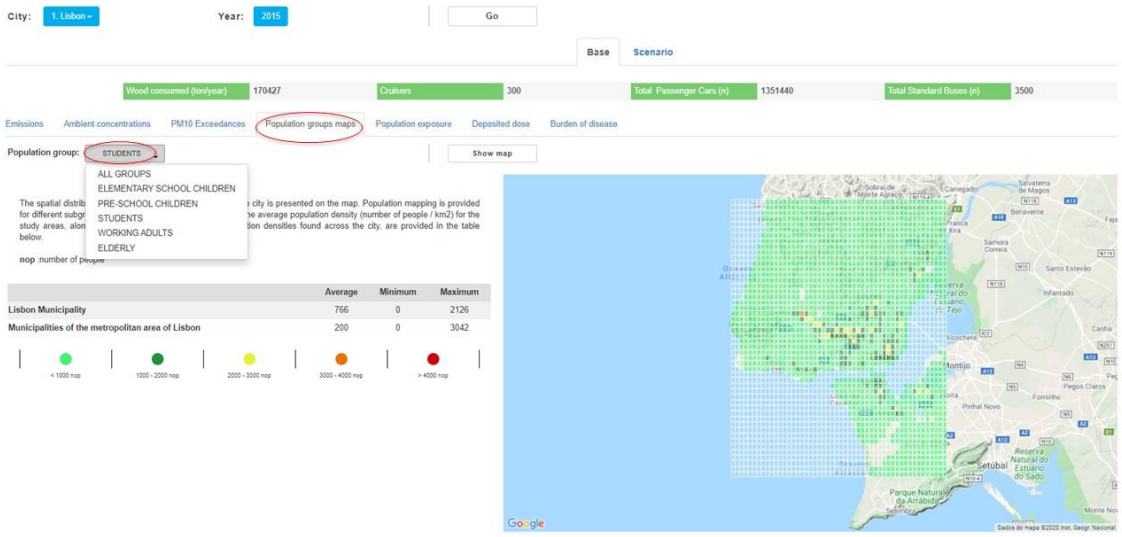
DATA ANALYSIS
ABOUT
CONTACTS
LOG OUT
msensis
City:
Choose City
1. Lisbon
2. Porto
3. Athens
4. Kuopio
Go

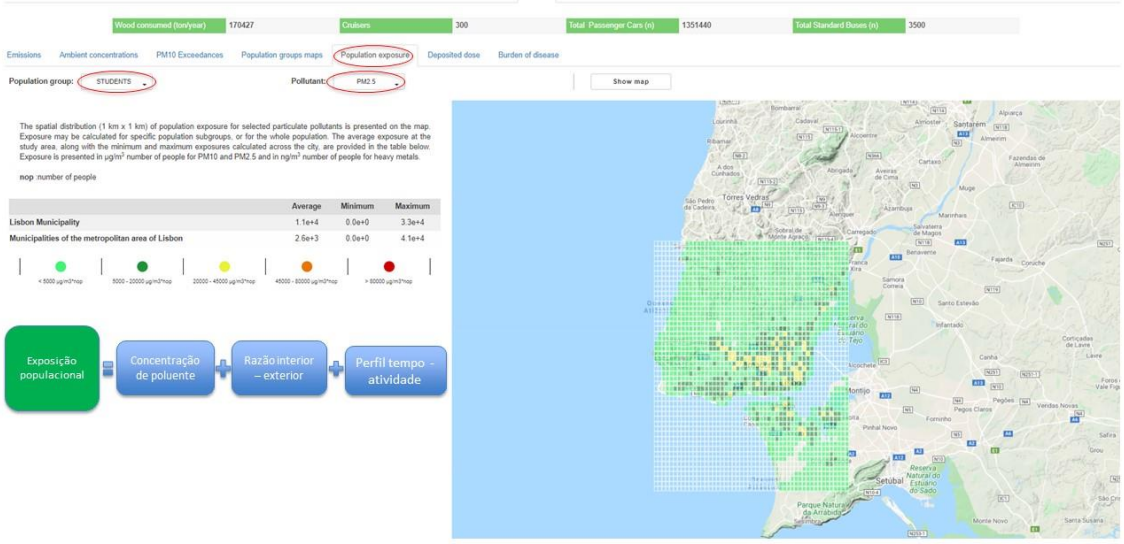

LIFEINDEXAIR
HOME
DATA ANALYSIS
ABOUT
CONTACTS
LOG OUT
City:
1. Lisbon
Year:
2015
Go
msensis
Base
Scenario
Wood consumed (ton/year)
170427
Cruisers
300
Total Passenger Cars (n)
1351440
Total Standard Buses (n)
3500
Emissions
Ambient concentrations
PM10 Exceedar
eposited dose
Burden of disease
Pollutant:
PM2.5
NH3
NOx
SO2
VOC
PM10
PM2.5
As
Cd
Ni
Pb
Combustion in energy and transformation industries
Agriculture
Non-industrial combustion plants
Combustion in manufacturing industry & Production processes
Extraction and distribution of fossil fuels and geothermal energy
Solvent and other product use
Road transport
Other mobile sources and machinery
Waste treatment and disposal
Get Data

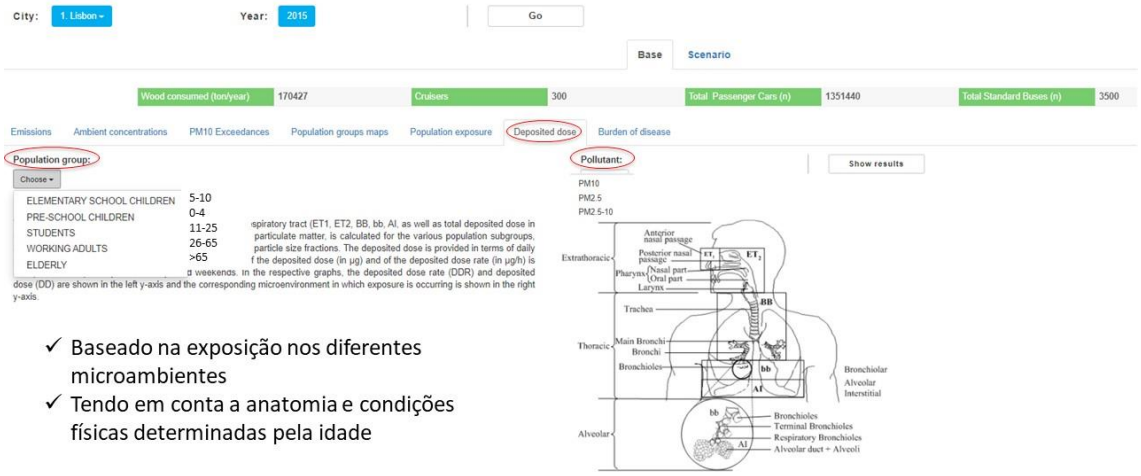

City:
1. Lisbon
Year:
2015
Base
Scenario
Wood consumed (ton/year)
170427
Cruisers
300
Total Passenger Cars (n)
1351440
Total Standard Buses (n)
3500
Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
Pollutant:
NOx
Source:
Road transport
Get Data
of annual gridded emissions, are provided in the table below. The relative contribution of all emission sources to the selected pollutant, as an average for the whole city, is shown on the graph below.
Road transport
Total (Gg/year)
Min value (Gg/year)
Max value (Gg/year)
Lisbon Municipality
4.4e+0
0.0e+0
2.0e-1
Municipalities of the metropolitan area of Lisbon
1.7e+1
0.0e+0
2.0e-1
NOx emissions per source (expressed as % of total)
Combustion in manufacturing industry & Production processes
18.4%
Non-industrial combustion plants
3%
Combustion in energy and transformation industries
1.4%
Agriculture
0.2%
Other mobile sources and machinery
17.7%
Solvent and other product use
0.1%
Road transport
59.3%
18.4%
17.7%
59.3%


LIFEINDEXAIR
HOME
DATA ANALYSIS
ABOUT
CONTACTS
LOG OUT
City: 1. Lisbon
Year: 2015
Go
Base
Scenario
Wood consumed (ton/year) 170427
Cruisers 300
Total Passenger Cars (n) 1351440
Total Standard Buses (n) 3500
Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
Metric: Average
Interval: All year
Pollutant: PM2.5
Show map
Average
90th Percentile
All year
Winter
Summer
Spring
Autumn
PM10
PM2.5
As
Cd
Ni
Pb
Average
Minimum
Maximum
Lisbon Municipality
14.00
11.62
21.67
Municipalities of the metropolitan area of Lisbon
9.81
6.08
18.19
< 5 µg/m3
5 - 10 µg/m3
10 - 15 µg/m3
15 - 20 µg/m3
> 20 µg/m3
CAMx
Ozone
Particulates
Toxics
Comprehensive Air Quality Model with Extensions
A multi-scale photochemical modeling system for gas and particulate air pollution
Validado com medições da Rede QUALAR
Google


City: 1. Lisbon
Year: 2015
Go
Base
Scenario
Wood consumed (ton/year) 170427
Cruisers 300
Total Passenger Cars (n) 1351440
Total Standard Buses (n) 3500
Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
PM10 is the only particulate pollutant for which the EU has defined a 24hr limit value (50 µg/m3), allowing a maximum number of exceedance days during one year (35 days).
The number of exceedance days across the city is mapped here, as an indicator of compliance with the EU air quality standards. The minimum and maximum number of exceedance days for the study areas are provided in the table below.
Minimum
Maximum
Lisbon Municipality
7
96
Municipalities of the metropolitan area of Lisbon
2
72
Google

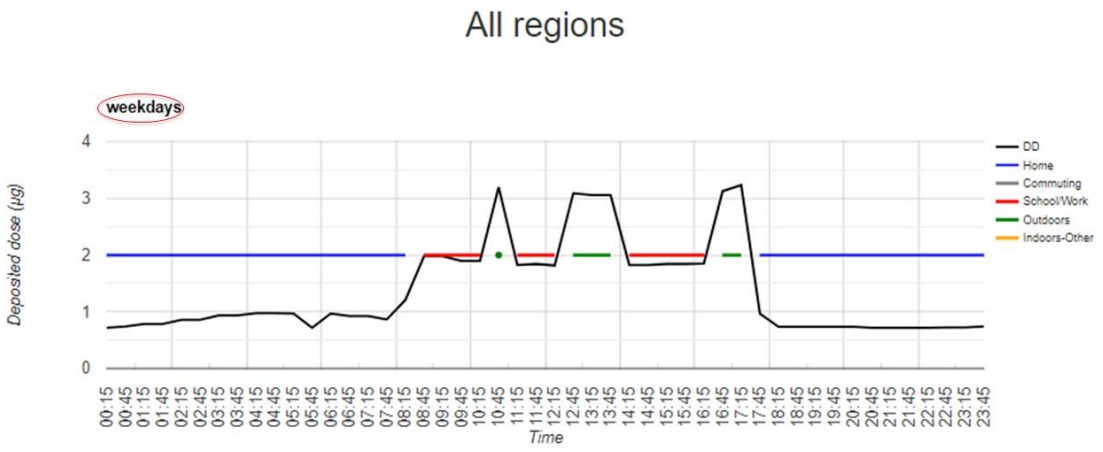

City: 1. Lisbon
Year: 2015
Go
Base
Scenario
Wood consumed (ton/year) 170427
Cruisers 300
Total Passenger Cars (n) 1351440
Total Standard Buses (n) 3500
Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
Population group: STUDENTS
Show map
ALL GROUPS
ELEMENTARY SCHOOL CHILDREN
PRE-SCHOOL CHILDREN
STUDENTS
WORKING ADULTS
ELDERLY
nop :number of people
Average Minimum Maximum
Lisbon Municipality 766 0 2126
Municipalities of the metropolitan area of Lisbon 200 0 3042
< 1000 nop
1000 - 2000 nop
2000 - 3000 nop
3000 - 4000 nop
> 4000 nop
Google

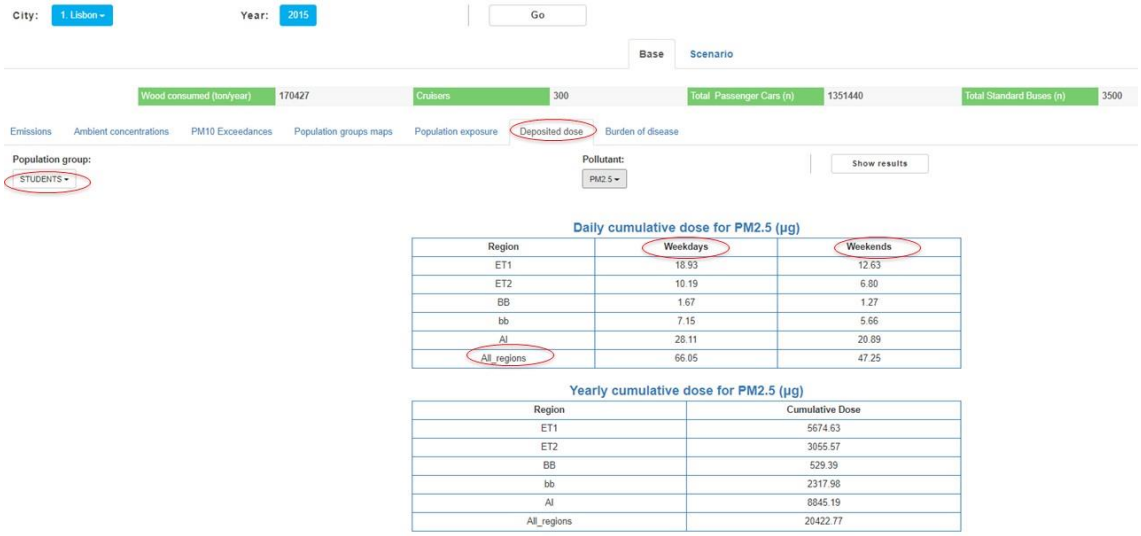

Wood consumed (ton/year) 170427
Cruisers 300
Total Passenger Cars (n) 1351440
Total Standard Buses (n) 3500
Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
Population group: STUDENTS
Pollutant: PM2.5
Show map
The spatial distribution (1 km x 1 km) of population exposure for selected particulate pollutants is presented on the map. Exposure may be calculated for specific population subgroups, or for the whole population. The average exposure at the study area, along with the minimum and maximum exposures calculated across the city, are provided in the table below. Exposure is presented in μg/m³ number of people for PM10 and PM2.5 and in ng/m³ number of people for heavy metals.
nop :number of people
Average Minimum Maximum
Lisbon Municipality 1.1e+4 0.0e+0 3.3e+4
Municipalities of the metropolitan area of Lisbon 2.6e+3 0.0e+0 4.1e+4
Exposição populacional
Concentração de poluente
Razão interior – exterior
Perfil tempo - atividade



- ✓ Baseado na exposição nos diferentes microambientes
- ✓ Tendo em conta a anatomia e condições físicas determinadas pela idade

Dose cumulativa de PM2.5 (µg) para estudantes em Lisboa



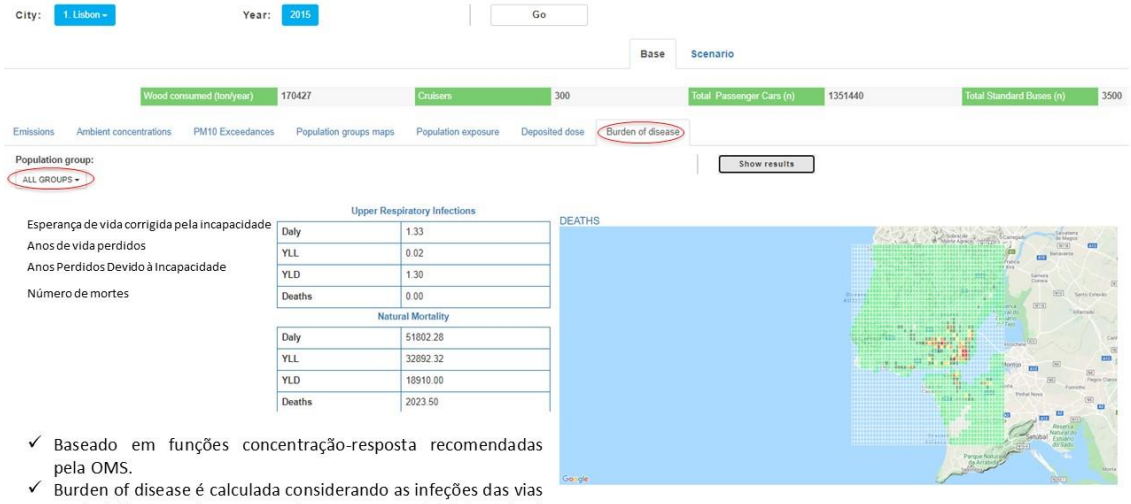


Daily cumulative dose for PM2.5 (µg)

Region	Weekdays	Weekends
ET1	18.93	12.63
ET2	10.19	6.80
BB	1.67	1.27
bb	7.15	5.66
AI	28.11	20.89
All_regions	66.05	47.25

Yearly cumulative dose for PM2.5 (µg)

Region	Cumulative Dose
ET1	5674.63
ET2	3055.57
BB	529.39
bb	2317.98
AI	8845.19
All_regions	20422.77



Esperança de vida corrigida pela incapacidade
Anos de vida perdidos
Anos Perdidos Devido à Incapacidade
Número de mortes

Upper Respiratory Infections

Daly	1.33
YLL	0.02
YLD	1.30
Deaths	0.00

Natural Mortality

Daly	51802.28
YLL	32892.32
YLD	18910.00
Deaths	2023.50

DEATHS

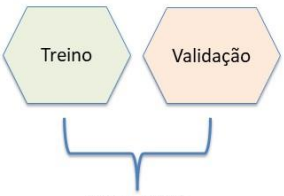
- ✓ Baseado em funções concentração-resposta recomendadas pela OMS.
- ✓ Burden of disease é calculada considerando as infeções das vias respiratórias superiores para crianças, e a mortalidade natural para a restante população.

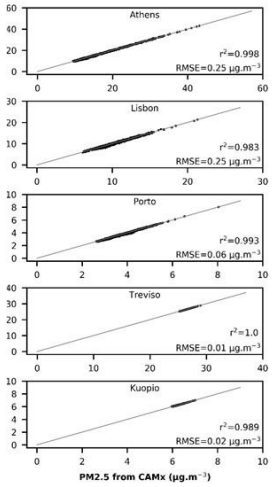
SCENARIO

Estimativa das concentrações após alteração nas emissões

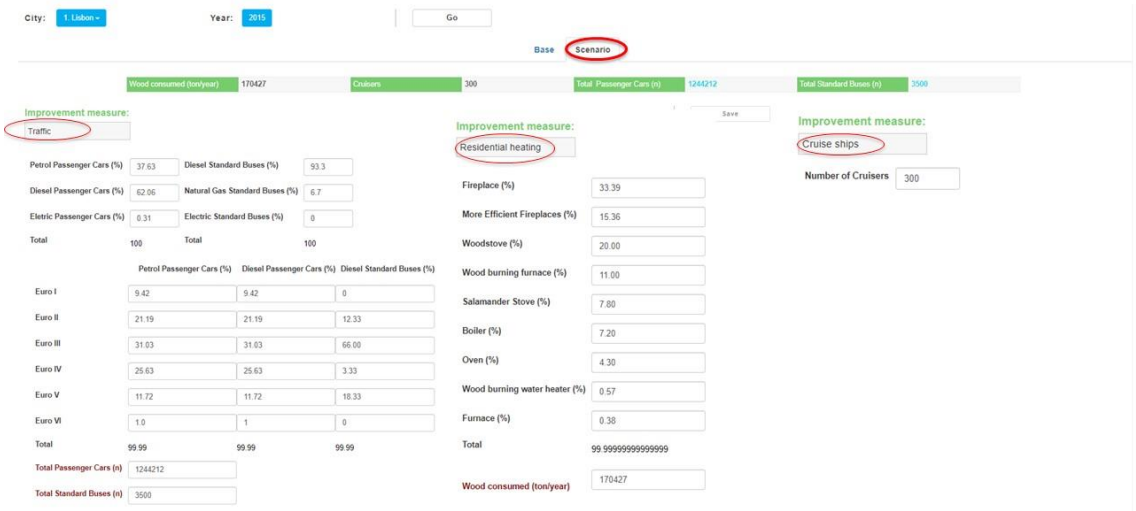
- Relação não linear entre emissões e concentrações
- Necessidade de rapidez

As concentrações de PM são estimadas usando Redes Neuronais Artificiais

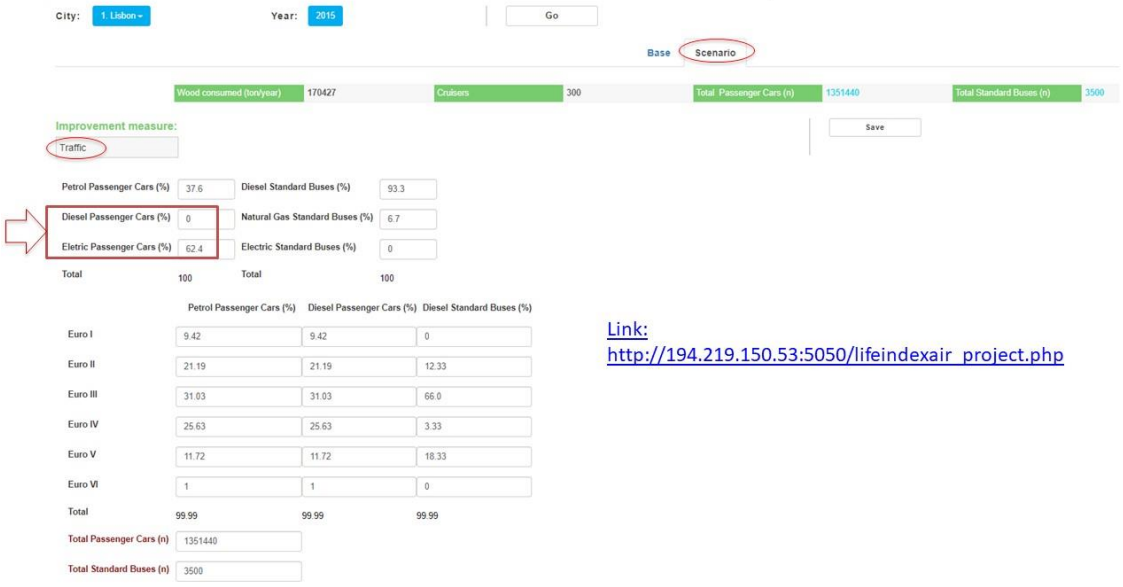




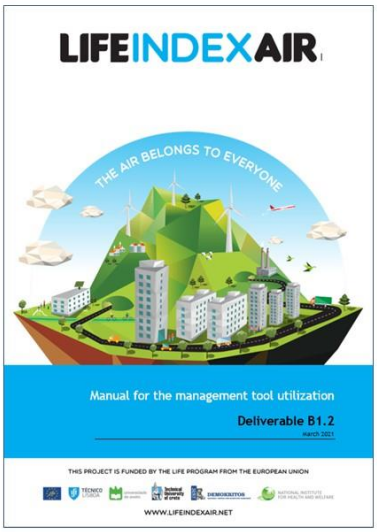
Medidas de mitigação da poluição

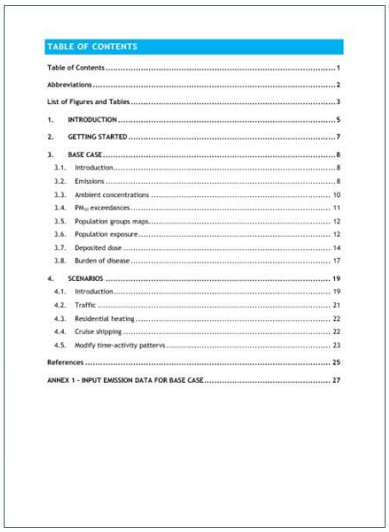


Novo cenário – Substituir veículos a diesel por elétricos

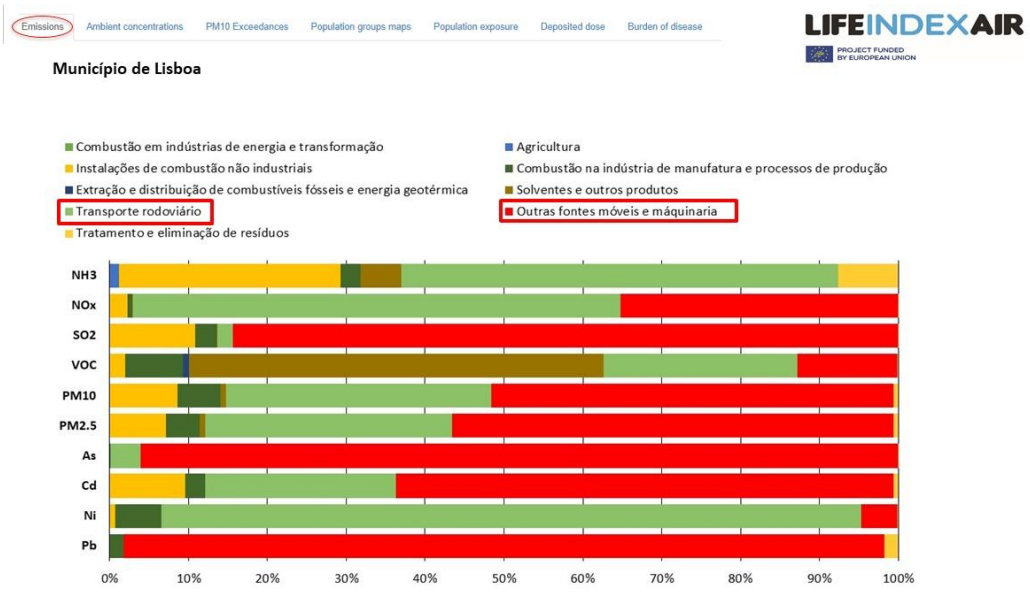


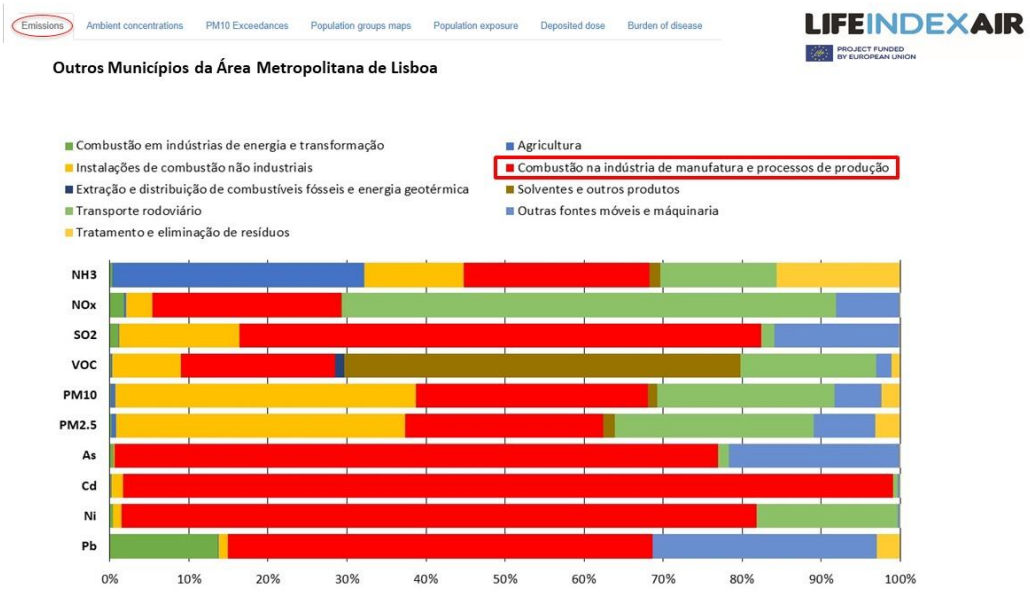
Link:
http://194.219.150.53:5050/lifeindexair_project.php

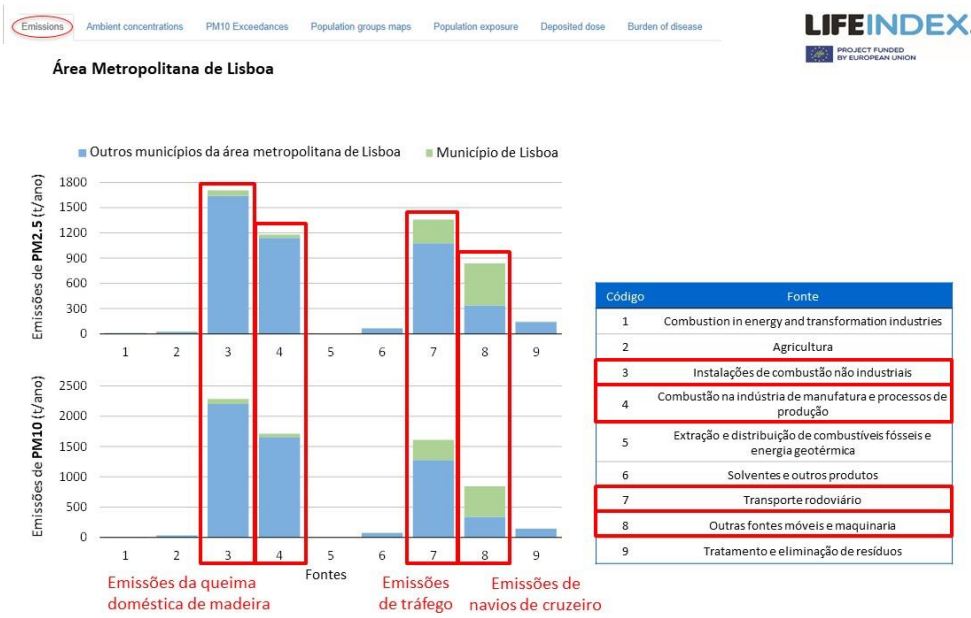


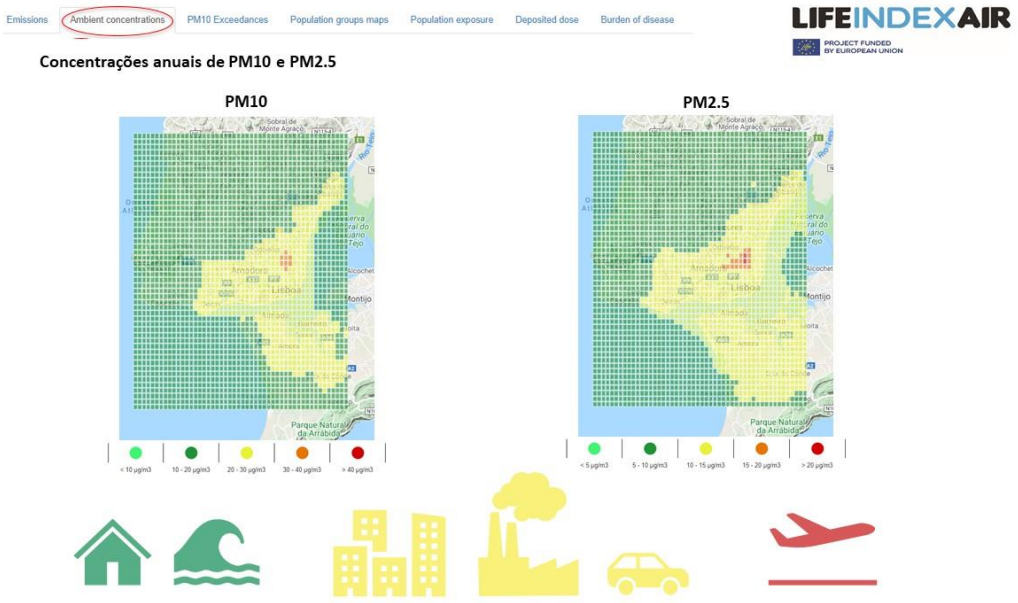


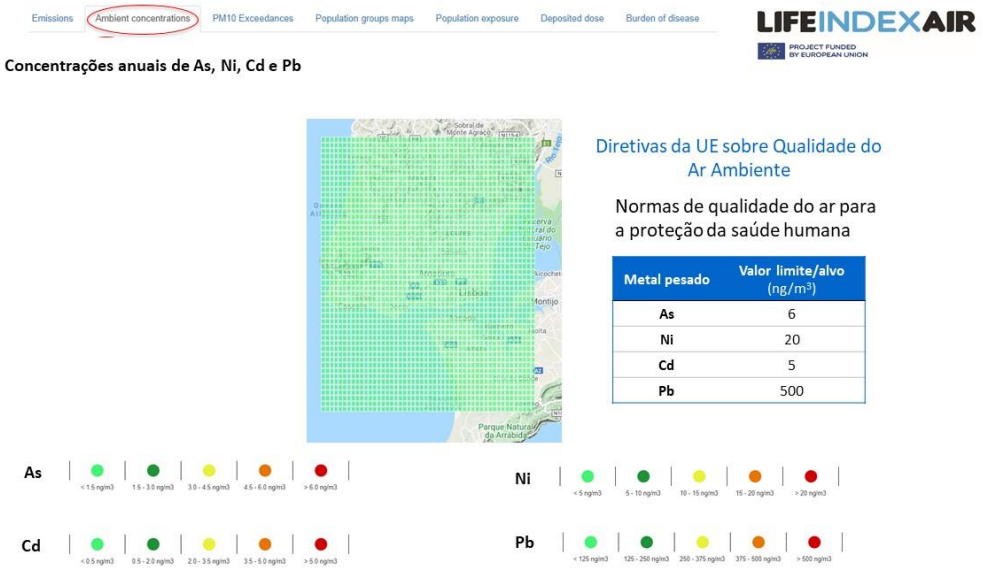

Implementação da Ferramenta de apoio à decisão LIFE Index-Air em Lisboa
THE AIR BELONGS TO EVERYONE
TÉCNICO LISBOA
LIFEINDEXAIR
PROJETO FINANCIADO PELA UNIÃO EUROPEIA
TÉCNICO LISBOA
universidade de aveiro
Technical University of crete
DEMOKRITOS
NATIONAL INSTITUTE FOR HEALTH AND WELFARE
WWW.LIFEINDEXAIR.NET

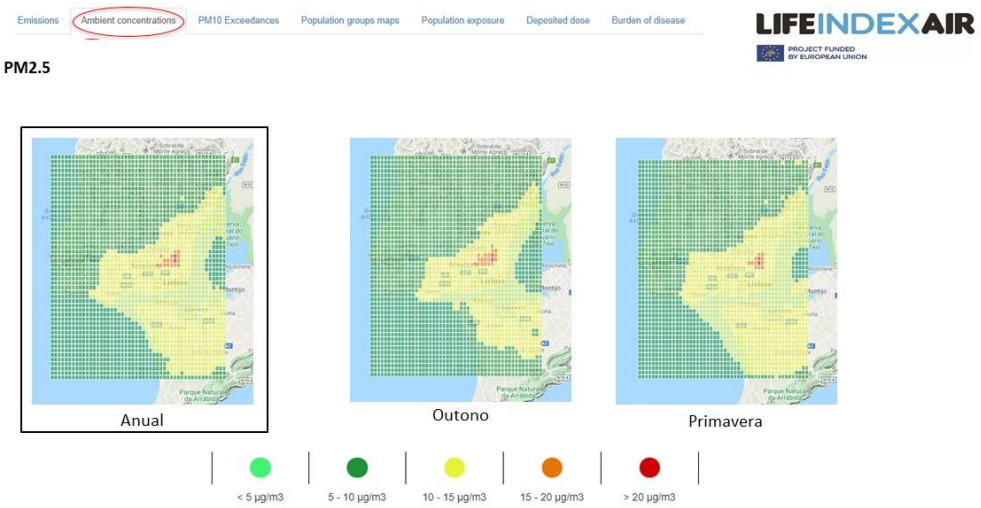

Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
Município de Lisboa
Combustão em indústrias de energia e transformação
Agricultura
Instalações de combustão não industriais
Combustão na indústria de manufatura e processos de produção
Extração e distribuição de combustíveis fósseis e energia geotérmica
Solventes e outros produtos
Transporte rodoviário
Outras fontes móveis e máquinaria
Tratamento e eliminação de resíduos
NH3
NOx
SO2
VOC
PM10
PM2.5
As
Cd
Ni
Pb
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

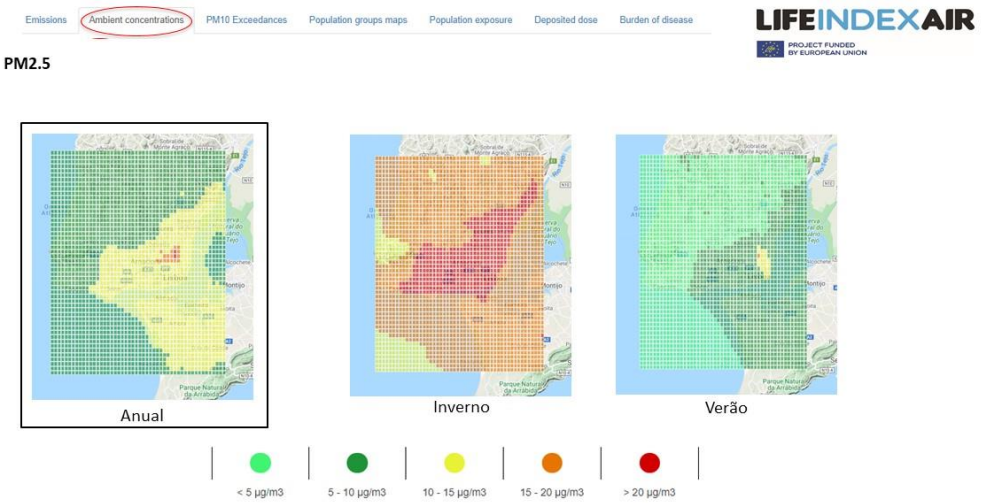

Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
Outros Municípios da Área Metropolitana de Lisboa
Combustão em indústrias de energia e transformação
Agricultura
Instalações de combustão não industriais
Combustão na indústria de manufatura e processos de produção
Extração e distribuição de combustíveis fósseis e energia geotérmica
Solventes e outros produtos
Transporte rodoviário
Outras fontes móveis e máquinaria
Tratamento e eliminação de resíduos
NH3
NOx
SO2
VOC
PM10
PM2.5
As
Cd
Ni
Pb
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%


Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
Área Metropolitana de Lisboa
Outros municípios da área metropolitana de Lisboa
Município de Lisboa
Emissões de PM2.5 (t/ano)
Emissões de PM10 (t/ano)
Fontes
Emissões da queima doméstica de madeira
Emissões de tráfego
Emissões de navios de cruzeiro
Código
Fonte
1 Combustion in energy and transformation industries
2 Agricultura
3 Instalações de combustão não industriais
4 Combustão na indústria de manufatura e processos de produção
5 Extração e distribuição de combustíveis fósseis e energia geotérmica
6 Solventes e outros produtos
7 Transporte rodoviário
8 Outras fontes móveis e maquinaria
9 Tratamento e eliminação de resíduos


Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
Concentrações anuais de PM10 e PM2.5
PM10
PM2.5


Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
Concentrações anuais de As, Ni, Cd e Pb
Diretivas da UE sobre Qualidade do Ar Ambiente
Normas de qualidade do ar para a proteção da saúde humana
Metal pesado
Valor limite/alvo (ng/m³)
As 6
Ni 20
Cd 5
Pb 500
As
Ni
Cd
Pb

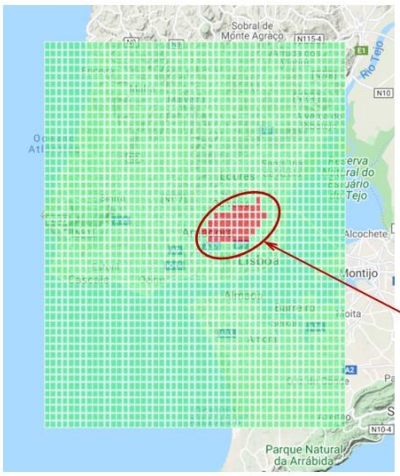

Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
PM2.5
Anual
Outono
Primavera
< 5 µg/m3
5 - 10 µg/m3
10 - 15 µg/m3
15 - 20 µg/m3
> 20 µg/m3


Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
PM2.5
Anual
Inverno
Verão
< 5 µg/m3
5 - 10 µg/m3
10 - 15 µg/m3
15 - 20 µg/m3
> 20 µg/m3

Emissions | Ambient concentrations | PM10 Exceedances | Population groups maps | Population exposure | Deposited dose | Burden of disease

LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION

PM10



Diretivas da UE sobre Qualidade do Ar Ambiente

Normas de qualidade do ar para a proteção da saúde humana

Valor limite diário de PM10 = 50 µg/m^3

Não deve ser excedido em mais de 35 dias/ano

células onde o valor limite diário foi excedido mais de 35 dias/ano

Emissions | Ambient concentrations | PM10 Exceedances | Population groups maps | Population exposure | Deposited dose | Burden of disease

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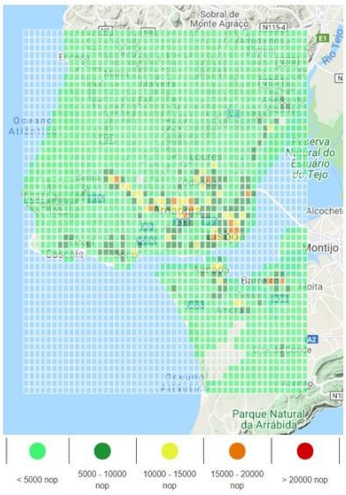
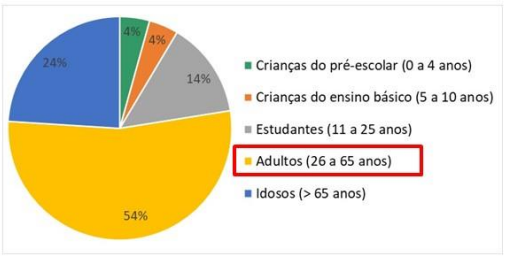
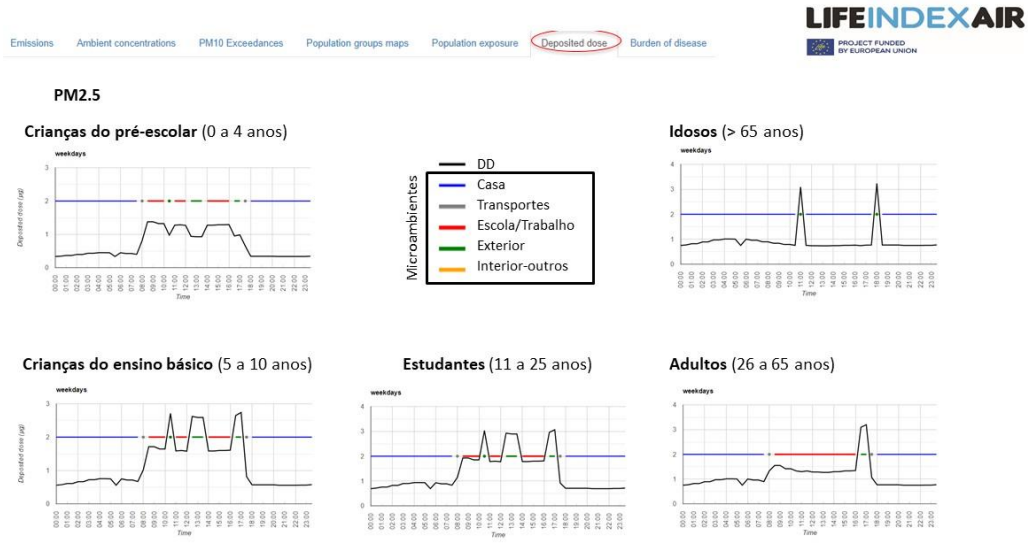
PROJECT FUNDED BY EUROPEAN UNION

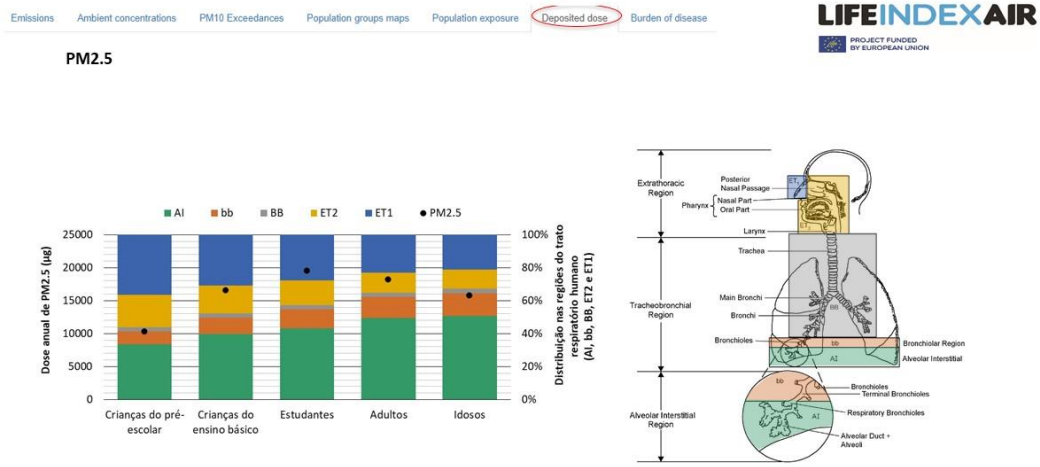
Densidade populacional (nº de pessoas/km^2)

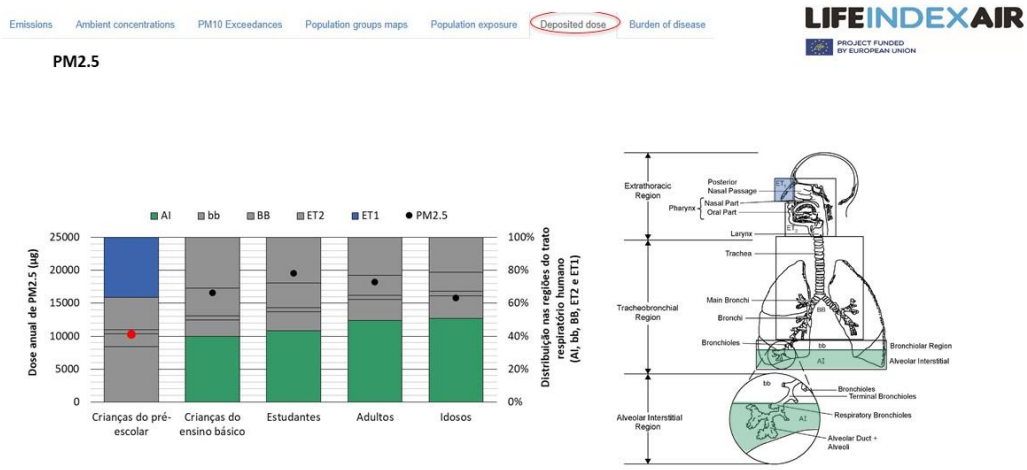





Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
µg/m³ · nº de pessoas
PM2.5 (µg/m³)
População
Exposição
µg/m³ · pessoas


Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
PM2.5
Crianças do pré-escolar (0 a 4 anos)
Idosos (> 65 anos)
Microambientes
DD
Casa
Transportes
Escola/Trabalho
Exterior
Interior-outros
Crianças do ensino básico (5 a 10 anos)
Estudantes (11 a 25 anos)
Adultos (26 a 65 anos)

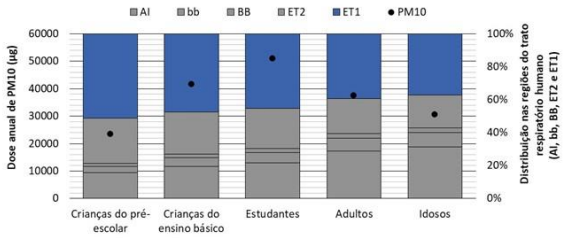

Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
PM2.5
AI
bb
BB
ET2
ET1
PM2.5
Dose anual de PM2.5 (µg)
Distribuição nas regiões do trato respiratório humano (AI, bb, BB, ET2 e ET1)
Crianças do pré-escolar
Crianças do ensino básico
Estudantes
Adultos
Idosos
Extrathoracic Region
Posterior Nasal Passage
Pharynx
Nasal Part
Oral Part
Larynx
Trachea
Tracheobronchial Region
Main Bronchi
Bronchi
Bronchioles
Bronchiolar Region
Alveolar Interstitial
Alveolar Interstitial Region
Terminal Bronchioles
Respiratory Bronchioles
Alveolar Duct + Alveoli

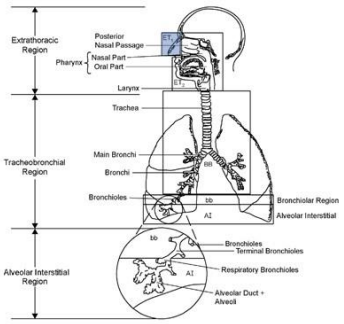

Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
PM2.5
AI
bb
BB
ET2
ET1
PM2.5
Dose anual de PM2.5 (µg)
Distribuição nas regiões do trato respiratório humano (AI, bb, BB, ET2 e ET1)
Crianças do pré-escolar
Crianças do ensino básico
Estudantes
Adultos
Idosos
Extrathoracic Region
Posterior Nasal Passage
Pharynx
Nasal Part
Oral Part
Larynx
Trachea
Tracheobronchial Region
Main Bronchi
Bronchi
Bronchioles
Bronchiolar Region
Alveolar Interstitial
Alveolar Interstitial Region
Terminal Bronchioles
Respiratory Bronchioles
Alveolar Duct + Alveoli

Emissions | Ambient concentrations | PM10 Exceedances | Population groups maps | Population exposure | Deposited dose | Burden of disease

LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION

PM10



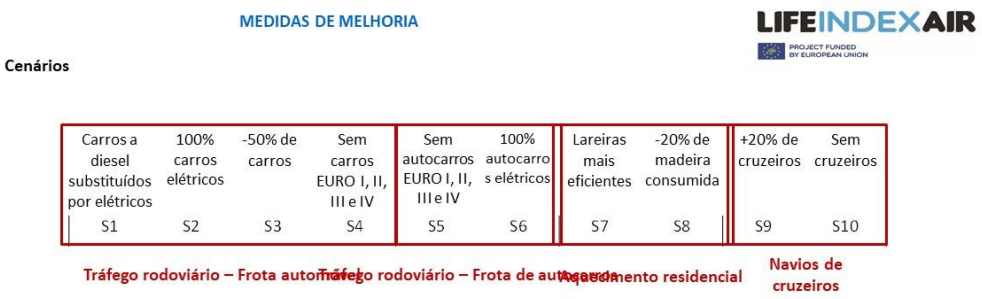


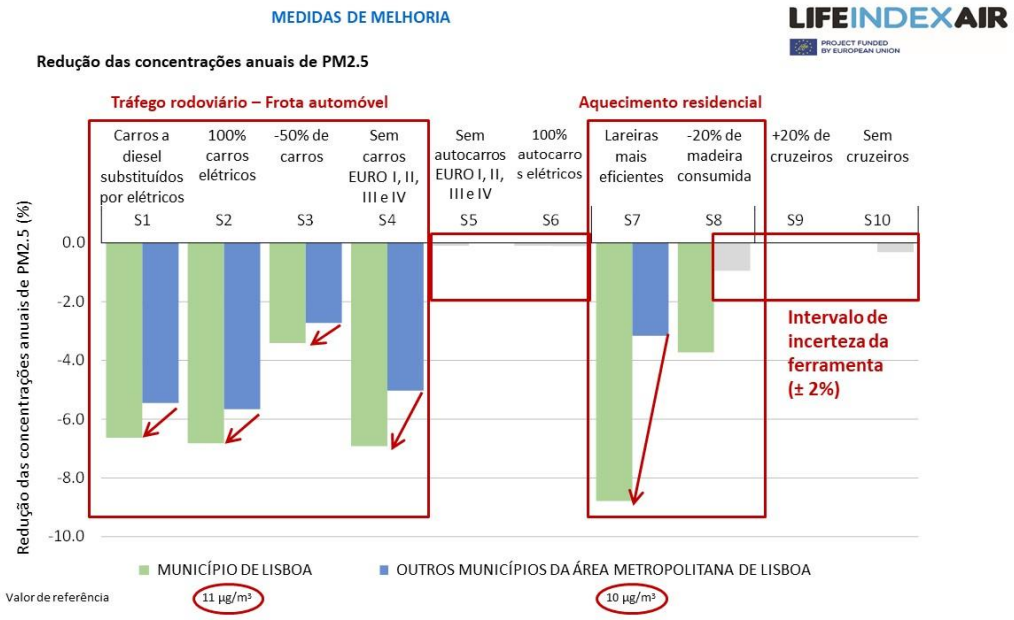
Emissions | Ambient concentrations | PM10 Exceedances | Population groups maps | Population exposure | Deposited dose | Burden of disease

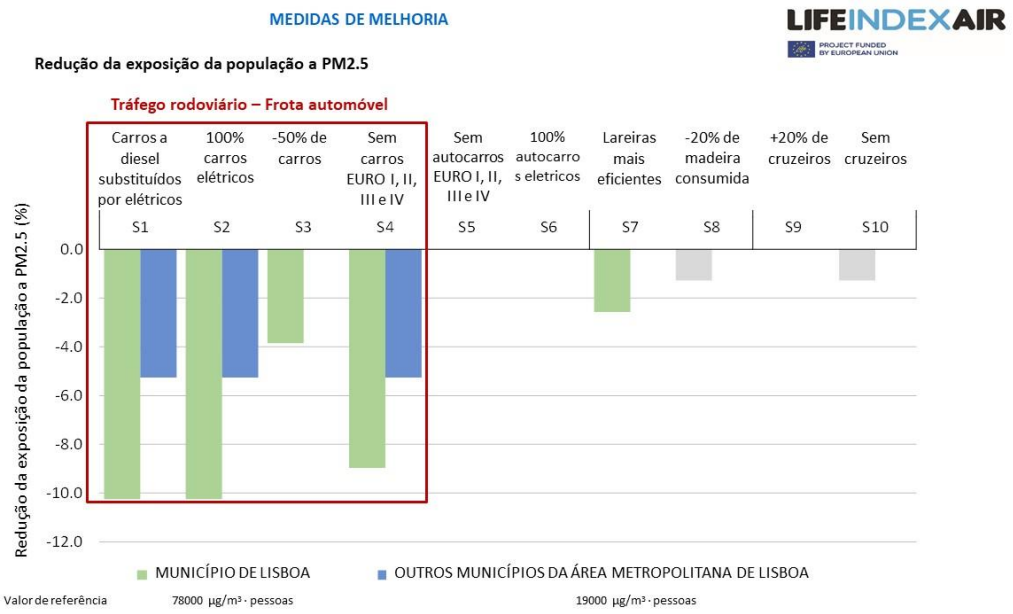
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION

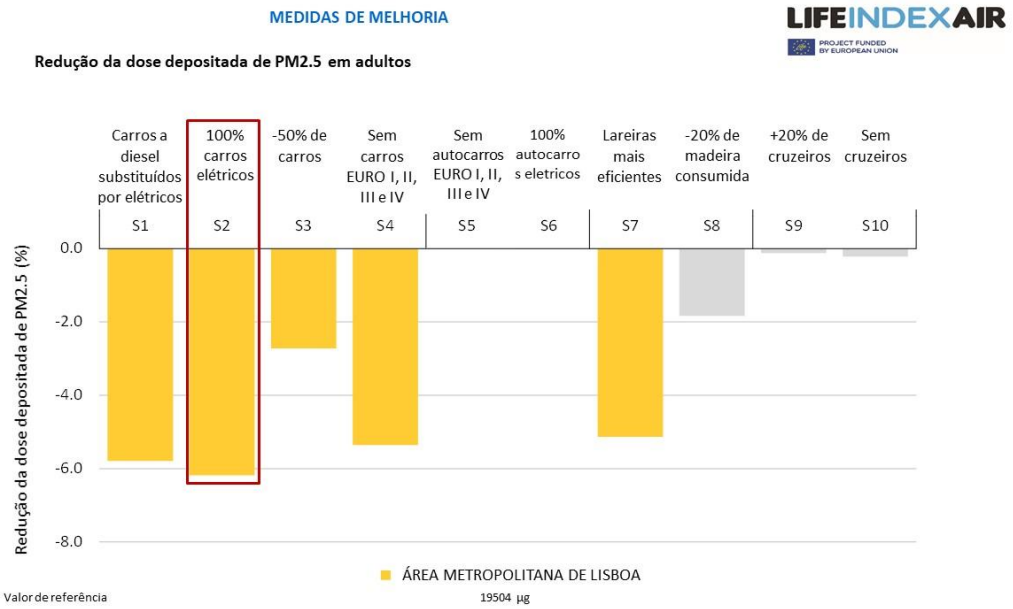
Impactes da exposição a PM2.5 na saúde humana

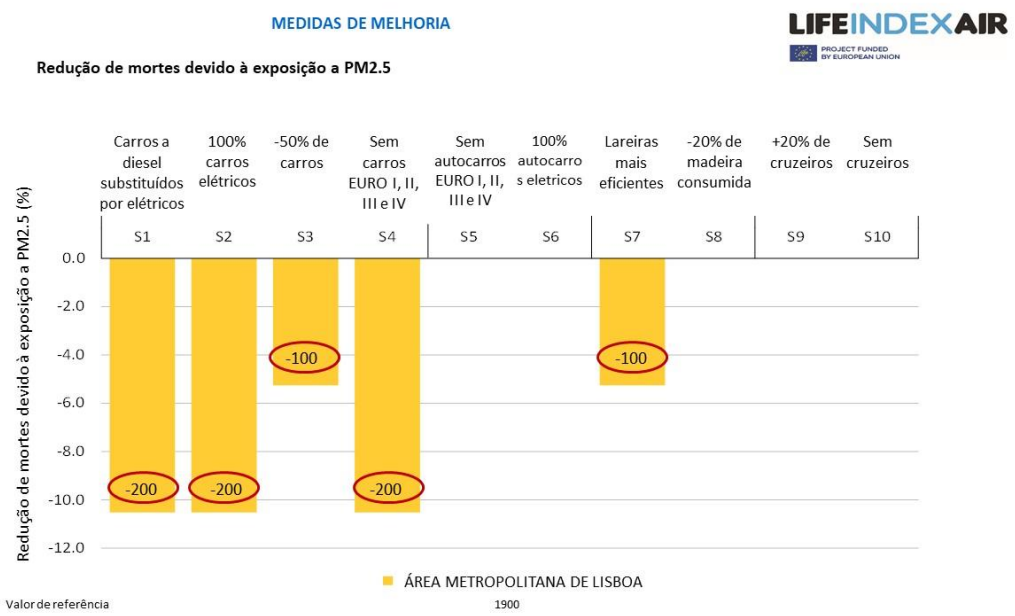
	Infecções das vias respiratórias superiores			Mortalidade natural		
	Crianças do pré-escolar	Crianças do Ensino básico	Todos os grupos	Adultos	Idosos	Todos os grupos
Anos perdidos de vida saudável (DALY)	0.61	0.69	1.30	23000	28000	**51000**
Anos de vida perdidos por morte prematura (YLL)	0.00	0.02	0.02	11000	21000	**32000**
Anos de vida perdidos por doença e/ou incapacidade (YLD)	0.61	0.67	1.30	11000	7200	**19000**
Mortes	0.00	0.00	0.00	320	1700	**2000**
Dias de doença (ligeira)	–	**6400**	–	–	–	–
Dias de doença (moderada)	–	**4000**	–	–	–	–
Dias de doença (severa)	–	**80**	–	–	–	–
Dias de absentismo escolar	–	**2000**	–	–	–	–
Total de dias de doença	–	**11000**	–	–	–	–


MEDIDAS DE MELHORIA
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
Cenários
Carros a diesel substituídos por elétricos
100% carros elétricos
-50% de carros
Sem carros EURO I, II, III e IV
Sem autocarros EURO I, II, III e IV
100% autocarros elétricos
Lareiras mais eficientes
-20% de madeira consumida
+20% de cruzeiros
Sem cruzeiros
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
Tráfego rodoviário – Frota automóvel
Tráfego rodoviário – Frota de autocarros
Aquecimento residencial
Navios de cruzeiros


MEDIDAS DE MELHORIA
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
Redução das concentrações anuais de PM2.5
Tráfego rodoviário – Frota automóvel
Aquecimento residencial
Carros a diesel substituídos por elétricos
100% carros elétricos
-50% de carros
Sem carros EURO I, II, III e IV
Sem autocarros EURO I, II, III e IV
100% autocarros elétricos
Lareiras mais eficientes
-20% de madeira consumida
+20% de cruzeiros
Sem cruzeiros
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
Redução das concentrações anuais de PM2.5 (%)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
Intervalo de incerteza da ferramenta (± 2%)
MUNICÍPIO DE LISBOA
OUTROS MUNICÍPIOS DA ÁREA METROPOLITANA DE LISBOA
Valor de referência
11 µg/m³
10 µg/m³


MEDIDAS DE MELHORIA
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
Redução da exposição da população a PM2.5
Tráfego rodoviário – Frota automóvel
Carros a diesel substituídos por elétricos
100% carros elétricos
-50% de carros
Sem carros EURO I, II, III e IV
Sem autocarros EURO I, II, III e IV
100% autocarros eletricos
Lareiras mais eficientes
-20% de madeira consumida
+20% de cruzeiros
Sem cruzeiros
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
Redução da exposição da população a PM2.5 (%)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
MUNICÍPIO DE LISBOA
OUTROS MUNICÍPIOS DA ÁREA METROPOLITANA DE LISBOA
Valor de referência
78000 µg/m³ · pessoas
19000 µg/m³ · pessoas


MEDIDAS DE MELHORIA
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
Redução da dose depositada de PM2.5 em adultos
Carros a diesel substituídos por elétricos
100% carros elétricos
-50% de carros
Sem carros EURO I, II, III e IV
Sem autocarros EURO I, II, III e IV
100% autocarros eletricos
Lareiras mais eficientes
-20% de madeira consumida
+20% de cruzeiros
Sem cruzeiros
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
Redução da dose depositada de PM2.5 (%)
0.0
-2.0
-4.0
-6.0
-8.0
ÁREA METROPOLITANA DE LISBOA
Valor de referência
19504 µg


MEDIDAS DE MELHORIA
LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION
Redução de mortes devido à exposição a PM2.5
Carros a diesel substituídos por elétricos
100% carros elétricos
-50% de carros
Sem carros EURO I, II, III e IV
Sem autocarros EURO I, II, III e IV
100% autocarros eletricos
Lareiras mais eficientes
-20% de madeira consumida
+20% de cruzeiros
Sem cruzeiros
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
Redução de mortes devido à exposição a PM2.5 (%)
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-200
-200
-100
-200
-100
ÁREA METROPOLITANA DE LISBOA
Valor de referência
1900


LIFE INDEX AIR
IMPROVING OUR LIFE
PROJECT FUNDED BY EUROPEAN UNION
Thank you!
smarta@ctn.tecnico.ulisboa.pt
THE AIR BELONGS TO EVERYONE
Follow us on :
• Facebook: https://www.facebook.com/LIFEIndexAir/
• Twitter: https://twitter.com/LIFEIndexAir
• Instagram: https://www.instagram.com/LIFE.Index.Air/
• ResearchGate: https://www.researchgate.net/project/LIFE-Index-Air
LIFEINDEXAIR
WWW.LIFEINDEXAIR.NET

LIFE Index-Air

Meeting and training course in City of Kuopio

LIFE Index-Air - Development of an Integrated Exposure – Dose Management Tool for Reduction of Particulate Matter in Air – LIFE15ENV/PT/000674

Report of the Second stakeholder Meeting City of Kuopio
Training school City of Kuopio

Date: 22nd of June 2021

Online meeting, Microsoft Teams

Chair: Heli Lehtomäki
Rapporteur: Heli Lehtomäki

Introduction

The present Minutes Report has been generated in order to provide an overview of the Second stakeholder meeting and the Training school meeting of the LIFE Index-Air project in Kuopio. The meetings were hosted by the Finnish Institute for Health and Welfare (THL) online via Teams on 22 June 2021. These meetings were held as part of a Tuesday seminar serie at THL.

Heli Lehtomäki (THL) was the chair of the meeting and the rapporteur.

1.1 Objectives

The main aim of the Second stakeholder meeting was to give an overview of the LIFE Index-Air project activities and present the main results for the stakeholders. The main aim of the Training school meeting was to present the LIFE Index-Air tool functionalities and guide stakeholders in the usage of the tool, as well as present the tool results for Kuopio.

1.2 Participating Members

The invitation for the Second stakeholder meeting and Training school meeting was sent by e-mail on 7 June 2021 to stakeholder at the City of Kuopio by Heli Lehtomäki. In addition to this email invitation sent by Heli Lehtomäki, the Tuesday seminar event, including these two meetings, was advertised at THL webpage and an invitation was sent via email by Kirsi Korhonen to Tuesday seminar mailing list on 10 June 2021.

The following members participated in the meeting:

- Finnish Institute for Health and Welfare (THL):

Antti Korhonen
Eveliina Nurmi
Heli Lehtomäki
Isabell Rumrich
Jasim Rand
Jouko Tuomisto
Virpi Kollanus
Miina Juntunen
Otto Hänninen
Päivi Ruokojärvi
Taina Siponen
Tarja Yli-Tuomi

- City of Kuopio

Erkki Pärjälä
Mikko Sokura
Olli Pärjälä

- National Supervisory Authority for Welfare and Health (Valvira)

Kutvonen Juho

- Regional State Administrative Agency for Southern Finland (AVI)

Sini Mustakallio

- University of Eastern Finland (UEF)

Anne Lipponen

- Other (institution not given)

Maija Kirsi
Nina Mäki-Kihniä

The participant lists of the Second stakeholder meeting and the Training school meeting are included in the Annex 1 and Annex 2.

1.3 Agenda of the Meeting

The working agenda of the Second stakeholder meeting was the following:

1. Introduction of the project structure and timetable
2. Motivation of the project
3. Methodology of the measurement campaign
4. Overview of the main results
5. The main conclusions of the project

The working agenda of the Training school meeting was the following:

1. The main purpose of the LIFE Index-Air tool
2. The tool manual
3. Different features of the tool
4. Baseline and scenario results for Kuopio
5. Information sources for the tool and for the LIFE Index-Air project

The program of the meeting including the Second stakeholder meeting and the Training school meeting is available on Annex 3.

1.4 Working resume and discussion

The meeting started at 14:32 with a brief welcome speech and presentation of the meeting agenda by Heli Lehtomäki.

Second stakeholder meeting (started at 14:35 and ended 15:07)

Eurooppalaisen EU LIFE Index-Air -hankkeen yleisesittely ja tulokset: Väestön altistus, terveysvaikutukset ja torjuntatoimet viidessä EU-kaupungissa – Otto Hänninen gave an overview of the LIFE Index-Air project. He presented the project partners, project timetable and structure, motivation of the project, measurement campaign in Lisbon, and the main results and conclusions of the project.

Training school meeting (started at 15:09 and ended 15:43)

EU LIFE Index-air Verkkotyökalu – Antti Korhonen presented the main purpose of the tool, went through different functionalities of the tool, and gave guidance in the tool usage. While presenting the tool functionalities Antti also showed tool results for Kuopio in baseline and for different scenarios.

There was discussion about usage of the LIFE Index-Air tool for estimating air pollution concenctation for a specific school. We noted that it would be interesting, but the resolution of the tool nor the purpose are fit for such consideration.

From the City of Kuopio there was also interest towards which emission data source has been used in the modelling of the air quality. We also discussed about representativeness of the air pollution measurement stations of the exposure. In Kuopio the measurement stations are mainly showing the air quality in the most polluted areas.

1.5 Main conclusions of the meeting

The LIFE Index-Air stakeholder meeting #1 can be summarised as followed:

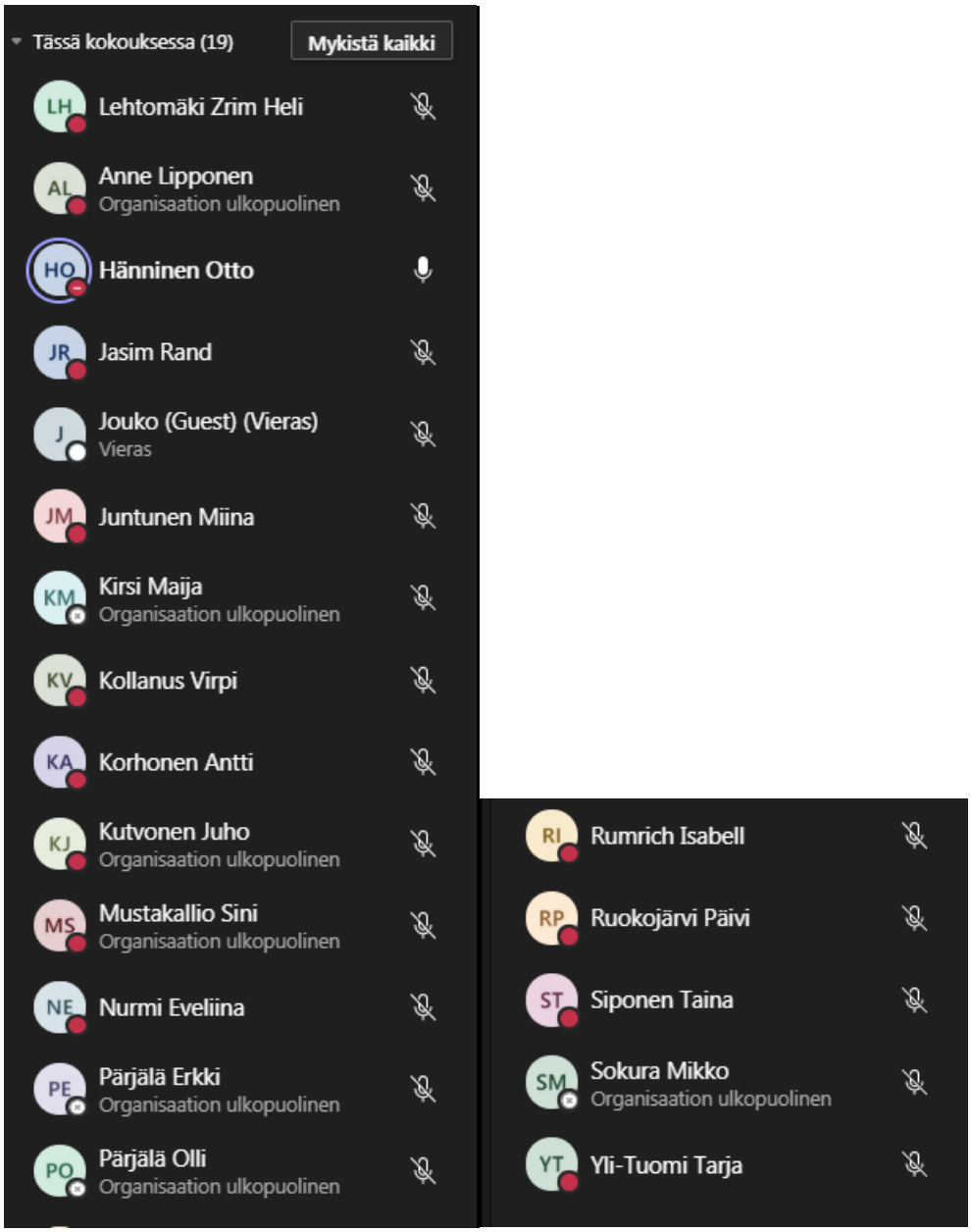
- An overview of the LIFE Index-Air project was given
- The main results and conclusions of the project were presented
- Special focus was set on the tool results for Kuopio
- LIFE Index-Air tool was introduced for the stakeholders
- Guidance in the tool usage was given
- There was wide interestest towards the meeting with participants from at least four different institutions

1.6 Approval of the Meeting Minute

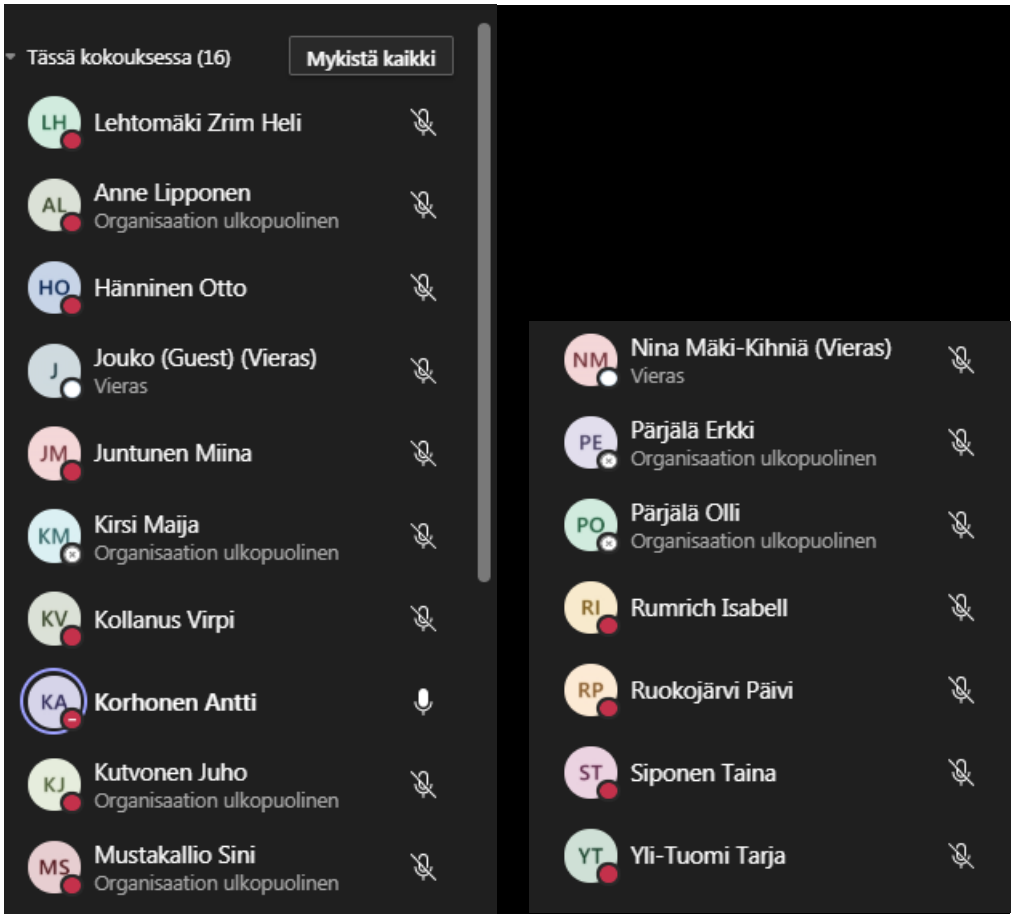
According with the LIFE Index-Air Management Guide the minutes shall be considered as accepted if, within 10 calendar days from sending, no Member has sent an objection in writing to the chairperson. The chairperson will send the final version of the minutes by email to all the beneficiaries that were called to the meeting. A copy of the minutes will be archived in the LIFE Index-Air webpage.

ANNEXES

Annex 1: List of Participants of the Second stakeholder meeting



Annex 2: List of Participants of the Training school meeting



Annex 3: Agenda of the meeting

THL:n tiistaiseminaari: LIFE Index-Air

21-06-2021 klo 14:30-15:30

- 14:30-15:00 Erikoistutkija Otto Hänninen
  - Hankkeen yleisesittely sekä keskeisimmät tulokset

-15:00-15:30 Tutkija Antti Korhonen
  - Verkkotyökalun ominaisuudet, käyttö sekä tulokset Kuopion osalta

LIFEINDEXAIR
PROJECT FUNDED BY EUROPEAN UNION

Annex 4: Presentations

Index Air

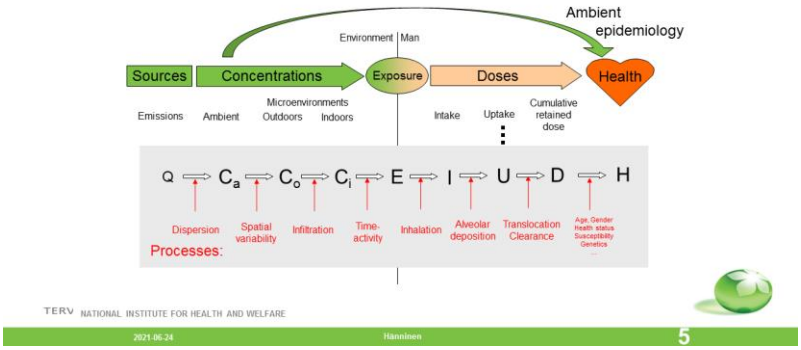
EU LIFE -project LIFE15 ENV/PT/000674

- 2016-10-01 .. 2020-03-31 (3½ years)
- Extension 1 ..2021-03-31
- Extension 2 ..2021-09-30

- Kuopio
  - 1st stakeholder meeting 2017-01-09
  - 2nd stakeholder meeting 2021-06-22

2021-06-22 Hänninen, O: INDEX AIR 4

Exposure metrics and processes

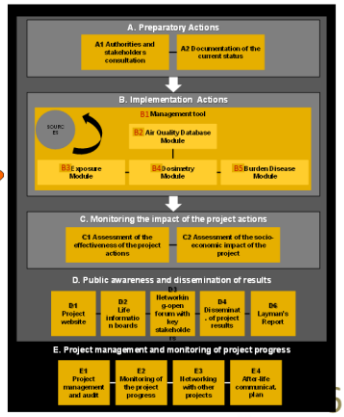


TERV NATIONAL INSTITUTE FOR HEALTH AND WELFARE

2021-06-24 Hänninen 5

Actions

- A1 Authorities and stakeholder consultation
- A2 Technical planning
- **B1 Management tool**
- **B2 Air quality database module**
- **B3 Exposure module**
- **B4 Dosimetry module**
- **B5 Burden of disease module**
- **B6 Implementation of the management tool**
- **B7 Development of guidelines for action plans**
- C1 Assessment of the project effectiveness
- C2 Assessment socioeconomic impact
- D1 Networking
- D2 Dissemination pack
- E1 Project management
- E2 Project monitoring
- E3 After-LIFE communication plan



LIFEINDEXAIR 2021-06-22 Hänninen, O: INDEX AIR WWW.LIFEINDEXAIR.NET

Motivation

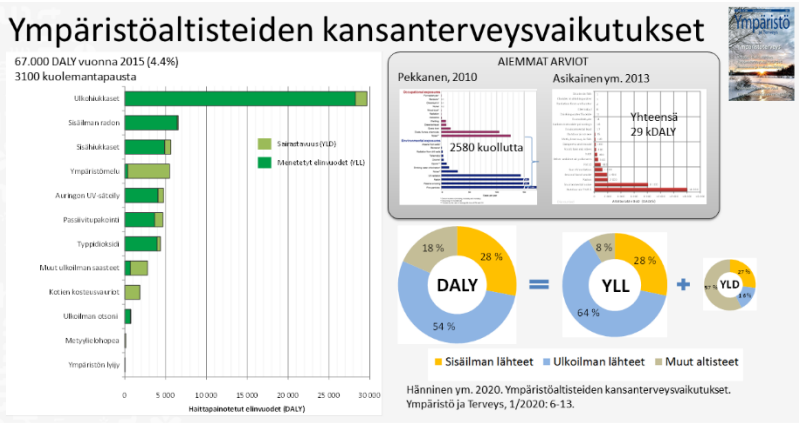
EU urban population exposed to harmful levels of air pollution in 2013-2015

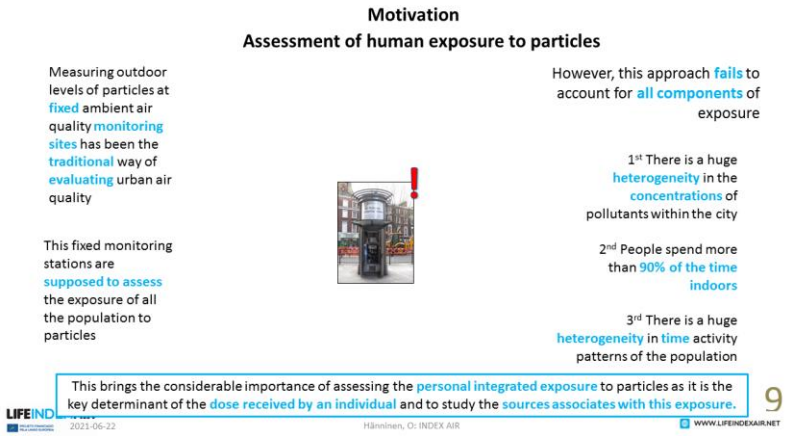
WHO AQ GL Update 2021 !?

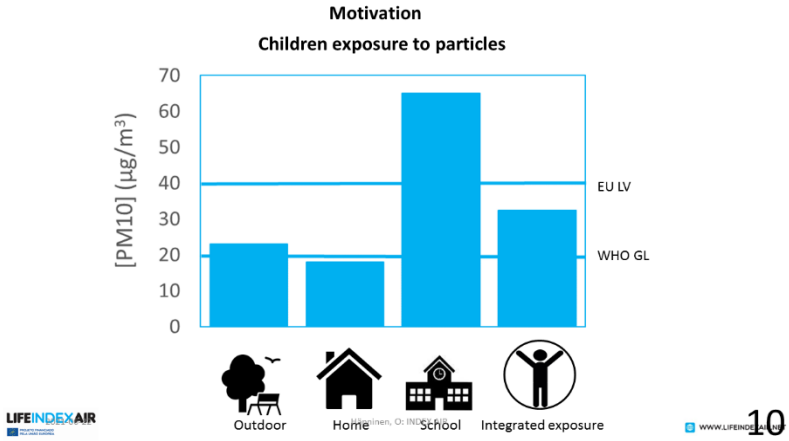
Air Quality in Europe – 2017 Report EEA Report | No 13/2017

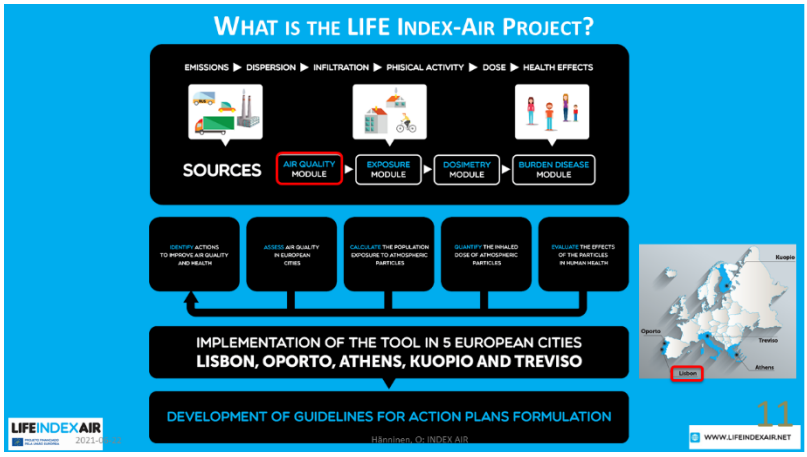
Round 90 % of Europeans living in cities are exposed to levels of air pollutants deemed damaging to health by the World Health Organization's more stringent guidelines.

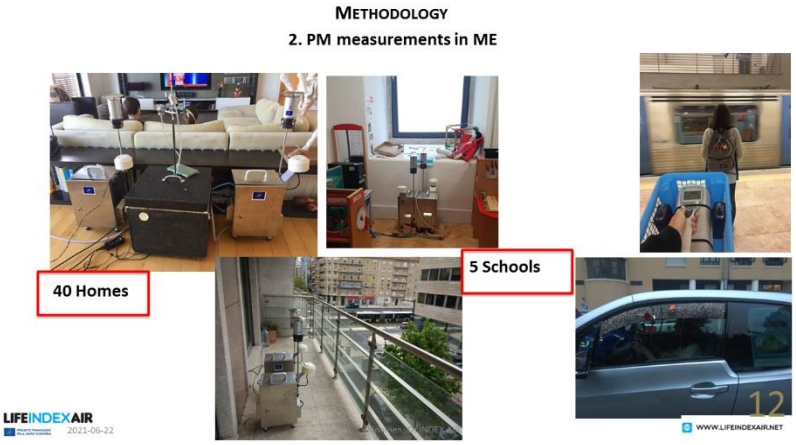
LIFEINDEXAIR 2021-06-22 Hänninen, O: INDEX AIR 7 WWW.LIFEINDEXAIR.NET

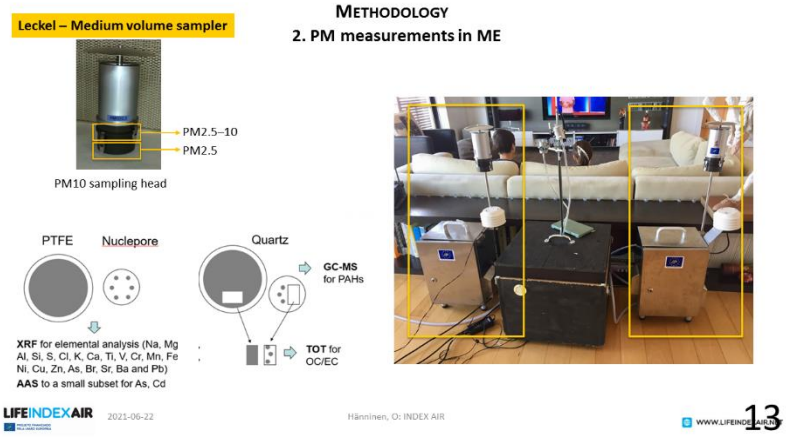

Ympäristöaltisteiden kansanterveysvaikutukset
67.000 DALY vuonna 2015 (4.4%)
3100 kuolemantapausta
Ulkohukkaset
Sisäilman radon
Sisähukkaset
Ympäristömelu
Auringon UV-säteily
Passiivitupakointi
Typpidioksidi
Muut ulkoilman saasteet
Kotien kosteusvauriot
Ulkoilman otsoni
Metyylielohapea
Ympäristön lyijy
Menetetyt elinvuodet (YLL)
0
5 000
10 000
15 000
20 000
25 000
30 000
Haittapainotetut elinvuodet (DALY)
AIEMMAT ARVIOT
Pekkanen, 2010
Asikainen ym. 2013
2580 kuollutta
Yhteensä
29 kDALY
DALY
18 %
28 %
54 %
YLL
8 %
28 %
64 %
YLD
Sisäilman lähteet
Ulkoilman lähteet
Muut altisteet
Hänninen ym. 2020. Ympäristöaltisteiden kansanterveysvaikutukset.
Ympäristö ja Terveys, 1/2020: 6-13.


Motivation
Assessment of human exposure to particles
Measuring outdoor levels of particles at fixed ambient air quality monitoring sites has been the traditional way of evaluating urban air quality
This fixed monitoring stations are supposed to assess the exposure of all the population to particles
However, this approach fails to account for all components of exposure
1st There is a huge heterogeneity in the concentrations of pollutants within the city
2nd People spend more than 90% of the time indoors
3rd There is a huge heterogeneity in time activity patterns of the population
This brings the considerable importance of assessing the personal integrated exposure to particles as it is the key determinant of the dose received by an individual and to study the sources associates with this exposure.
2021-06-22
Hänninen, O: INDEX AIR
WWW.LIFEINDEXAIR.NET
9

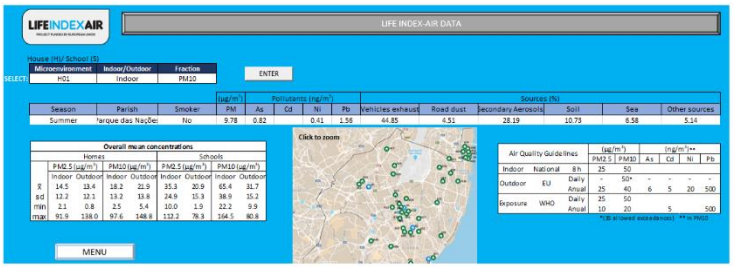

Motivation
Children exposure to particles
[PM10] (µg/m³)
70
60
50
40
30
20
10
0
EU LV
WHO GL
Outdoor
Home
School
Integrated exposure
WWW.LIFEINDEXAIR.NET
10


WHAT IS THE LIFE INDEX-AIR PROJECT?
EMISSIONS ▶ DISPERSION ▶ INFILTRATION ▶ PHISICAL ACTIVITY ▶ DOSE ▶ HEALTH EFFECTS
SOURCES
AIR QUALITY MODULE
EXPOSURE MODULE
DOSIMETRY MODULE
BURDEN DISEASE MODULE
IMPLEMENTATION OF THE TOOL IN 5 EUROPEAN CITIES
LISBON, OPORTO, ATHENS, KUOPIO AND TREVISO
DEVELOPMENT OF GUIDELINES FOR ACTION PLANS FORMULATION
Kuopio
Oporto
Treviso
Athens
Lisbon
LIFEINDEXAIR
11
WWW.LIFEINDEXAIR.NET

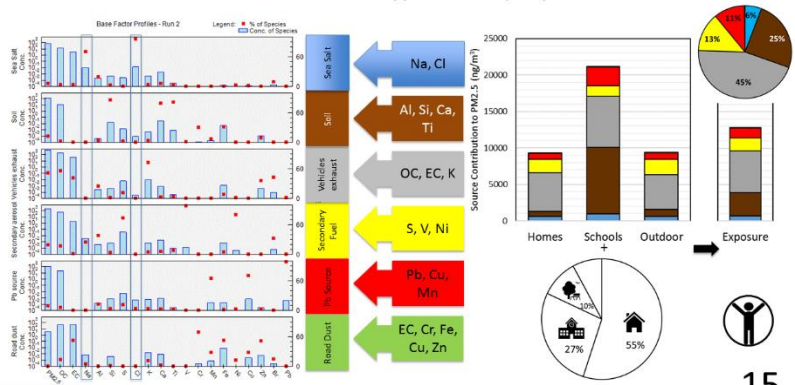

METHODOLOGY
2. PM measurements in ME
40 Homes
5 Schools
LIFEINDEXAIR
2021-06-22
12
WWW.LIFEINDEXAIR.NET


Leckel – Medium volume sampler
METHODOLOGY
2. PM measurements in ME
PM2.5–10
PM2.5
PM10 sampling head
PTFE
Nuclepore
Quartz
GC-MS
for PAHs
XRF for elemental analysis (Na, Mg
Al, Si, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe
Ni, Cu, Zn, As, Br, Sr, Ba and Pb)
AAS to a small subset for As, Cd
TOT for
OC/EC
LIFEINDEXAIR
2021-06-22
Hänninen, O: INDEX AIR
13
WWW.LIFEINDEXAIR.NET

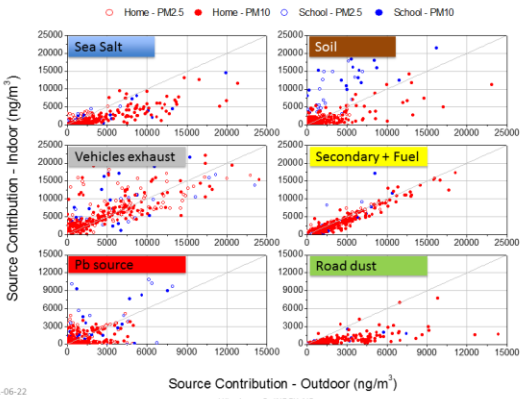
LIFE Index-Air: helping citizens to get involved



PM2.5 Source Apportionment (PMF)



Source Apportionment: Indoor versus Outdoor



LIFE Index-Air: helping citizens to get involved

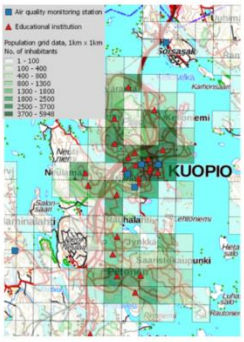
LISBON ENGAGEMENT IN NUMBERS

NUMBER OF SCHOOLS 26
NUMBER OF AWARENESS SESSIONS 60
TOTAL NUMBER OF STUDENTS 3796
TOTAL NUMBER OF TEACHERS 165
STREET EVENT DAYS 5

2021-06-22 Hänninen, O: INDEX AIR 17

Educational institutes in Kuopio

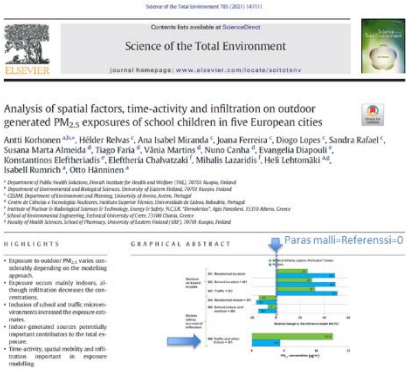
- 48 schools in Kuopio area
  - 42 basic schools (age: 7-15 yr)
  - 4 upper secondary schools (16-18 yr)
- 23 schools in the central area (shown in the figure)
- All together over 13,200 pupils from which 10,300 in the central area



2016-02-02 Hänninen, O 18

Korhonen et al. 2021

- **Ulkoilma-altistukset**
- **Kotisijainnin ulkoilma**
- **Koti, koulu, liikenne**
- **Infiltraatio ulkoa sisälle**
- **(sisälähteitä ei huomioitu!)**



2021-06-22 Hänninen, O: INDEX AIR 19

Mikroympäristöjen rooli koululaisten altistuksessa

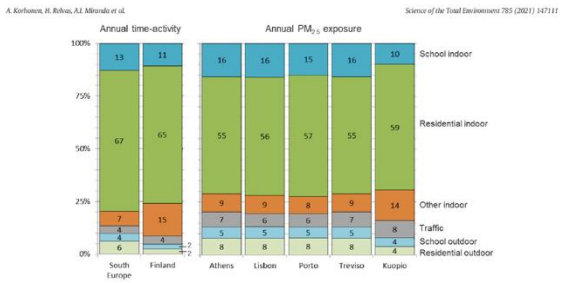


Fig. 2. Time-activity and contribution of each microenvironment to outdoor-originated $PM_{2.5}$ exposures of school children. Exposures are clearly dominated by indoor environments.

2021-06-22 Hänninen, O: INDEX AIR 20

http://www.lifeindexair.net/deliverables/

B5 Burden of disease & Health Impact Assessment

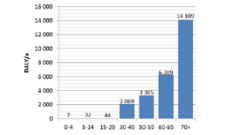


Figure 1 Disability adjusted life years (DALYs) attributable to PM2.5 exposure in Finland in 2015 by age groups (based on Lehtomäki et al. 2018).

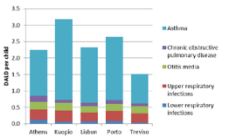


Figure 2 Background health in the target cities for 5-14 years old children described in disability adjusted life days (DALD) per child.

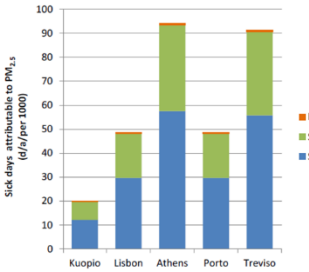


Figure 6.Estimated annual number of sick days, by severity, attributed to $PM_{2.5}$ in the target cities per thousand children in 5-14 year olds. (note: includes also holidays and weekends)

LIFEINDEXAIR

Lehtomäki ym. 2018

at home
at school

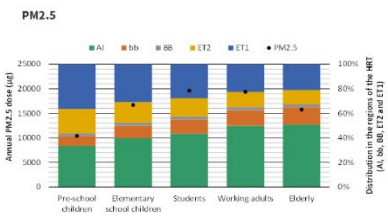
Kuopio:
11 605 children (5-14 yr)
ca. 230 sickdays

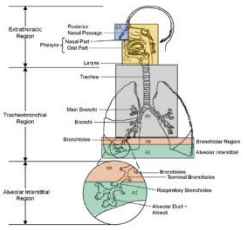
2021-06-22 Hänninen, O: INDEX AIR 21

LISBON

DEPOSITED DOSE

LIFEINDEXAIR





Respiratory tract deposition modelling by Techical University of Crete, Mihalis Lazaridis et al.

2016-02-02 Hänninen, O 22

Conclusions 1

- Children spend 90% of the time indoors.
- Six sources contributing to PM concentrations were included: vehicles exhaust, secondary sulfates, soil, Pb source, sea salt and road dust.
- Indoor concentration levels were comparable to those found outdoors for traffic emissions, secondary aerosol and sea salt, demonstrating penetration of outdoor pollution to indoors.
- Outdoor levels of particles at fixed ambient air quality monitoring sites fails to account for all sources contributing the personal exposure.

- Indoor sources that contribute to the indoor levels of particles missing!

LIFEINDEXAIR 2021-06-22 Hänninen, O: INDEX AIR 23 WWW.LIFEINDEXAIR.NET

Conclusions 2: Index Air Tool

- Internet-based INDEX AIR tool available
- Data ready for the participating five cities
  - Kuopio, Athens, Lisbon, Porto, Treviso
  - New cities can be added

  - Baseline (2015) emissions, air quality, exposure, dose, health impacts
  - Scenario tool for policy effectiveness evaluation

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EU LIFE Index-Air

Verkkotyökalu

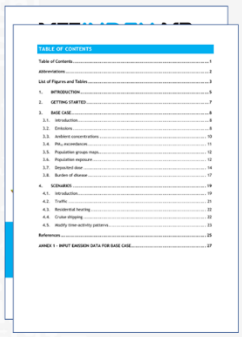
Antti Korhonen
22.06.2021
Terveyden ja hyvinvoinnin laitos

Käyttötarkoitus

- Index-Air verkkotyökalu mahdollistaa hiukkasten väestöaltistuksen, annoksen ja terveysvaikutuksien arvioinnin perusvuoden tilanteessa (v.2015) sekä käyttäjän määrittämissä päästövähennysskenaarioissa
- Verkkotyökalu sisältää nykyisellään 5 eri kaupunkia.
  - Ateena, Lissabon, Porto, Kuopio ja Treviso
  - Uusien kaupunkien lisääminen mahdollista

thl Korhonen; Index-Air LIFEINDEXAIR 22.06.2021 2

Verkkotyökalun käsikirja ja video



B1.2 Manual for the management tool utilization
https://www.lifeindexair.net/deliverables/

Verkkotyökalun esittelyvideo
https://www.lifeindexair.net/life-index-air-tool-presentation-video-available/

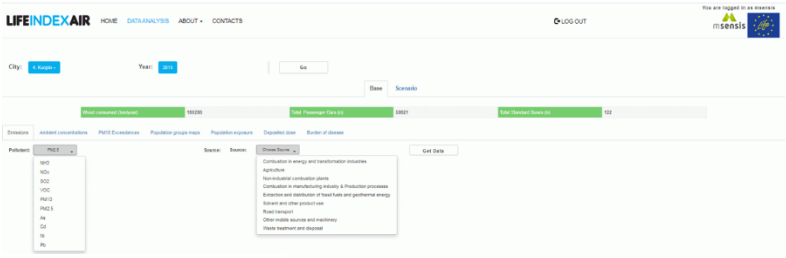
thl Korhonen; Index-Air LIFEINDEXAIR 22.06.2021 3

LIFE Index-Air verkkotyökalu

Kuva 1. LIFE Index-Air verkkotyökalun aloitussivu.

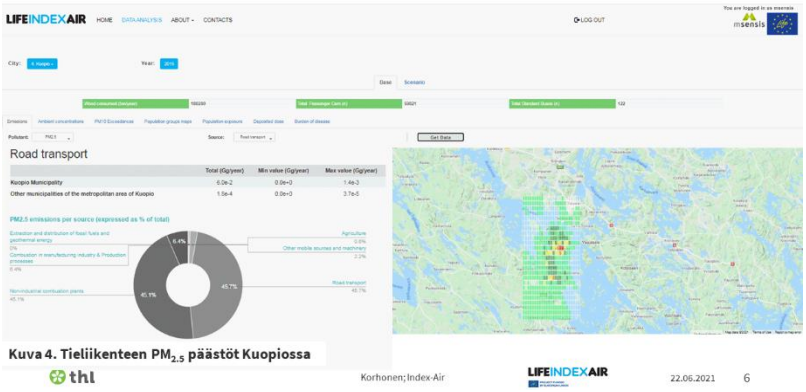
Kuva 2. Valittavana olevat kaupungit.

Päästöt



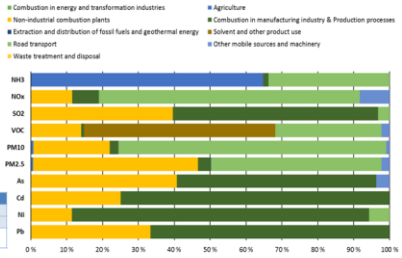
Kuva 3. Ilmansaasteet ja päästölähteet

Tieliikenteen pienhiukkaspäästöt



Kuva 4. Tieliikenteen $PM_{2.5}$ päästöt Kuopiossa

Päästöjen määrä ja jakauma

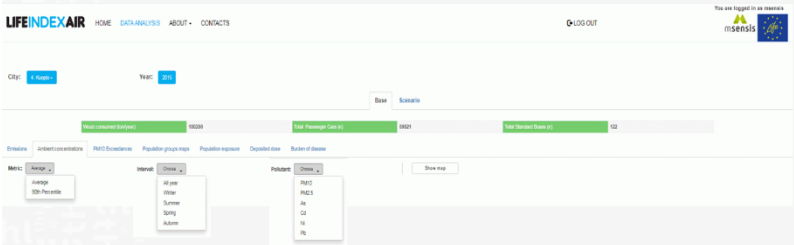


Kuva 5. Ilmansaasteiden päästöjakauma lähteittäin

Taulukko 1. Ilmansaasteiden päästöjen määrä

	NH_3	NOx	SO_2	VOC	PM_{10}	$PM_{2.5}$	As	Cd	Ni	Pb
	Total emissions									
	t/year						kg/year			
Kuopio	29.3	495.0	21.0	2063.0	295.1	126.1	2.7	0.4	3.5	0.3

Pitoisuudet (1/2)

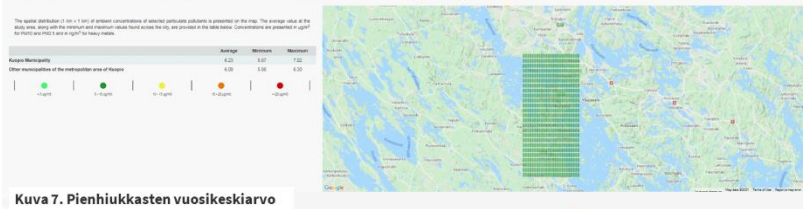


Kuva 6. Valittavana olevat parametrit ilmansaasteiden pitoisuuksien tarkasteluun.

Pitoisuudet (2/2)

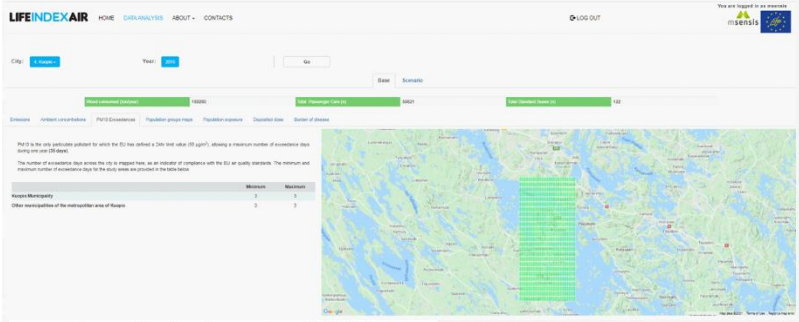
Taulukko 2. Hiukkasten ja raskasmetallien vuosikeskiarvopitoisuudet

	Annual concentrations					
	PM_{10}	$PM_{2.5}$	As	Cd	Ni	Pb
	µg/m³		ng/m³			
Average	11.92	6.23	0.20	0.16	0.61	1.59
Minimum	11.11	5.97	0.17	0.15	0.55	1.46
Maximum	13.89	7.02	0.21	0.17	0.65	1.67



Kuva 7. Pienhiukkasten vuosikeskiarvo

PM_{10} vuorokausiraja-arvon ylitykset



Kuva 8. PM_{10} vuorokauden raja-arvon (50 µg/m³) ylitykset

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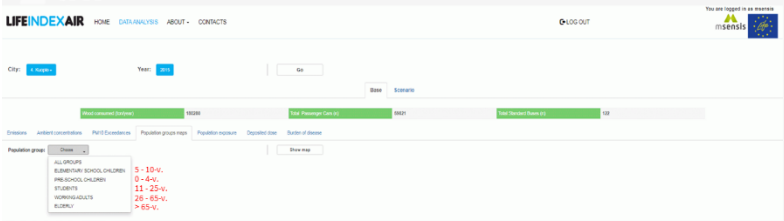
Väestöryhmät



Kuva 9. Väestöryhmien ikäjakaumat

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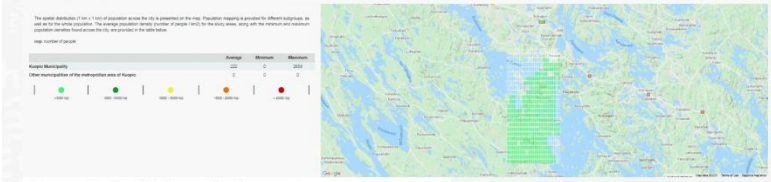
Väestö

Taulukko 3. Asukastiheys väestöryhmittäin

	Population density	
	Average (number of people / grid cell)	Maximum (number of people / grid cell)
All groups	222	2 658
Pre-school children (<5 years old)	11	80
Elementary school children (5-10 years old)	12	92
Students (11-25 years old)	44	465
Working adults (26-65 years old)	114	1 382
Elderly (> 65 years old)	40	700



Kuva 10. Keskimääräinen väestö per ruutu

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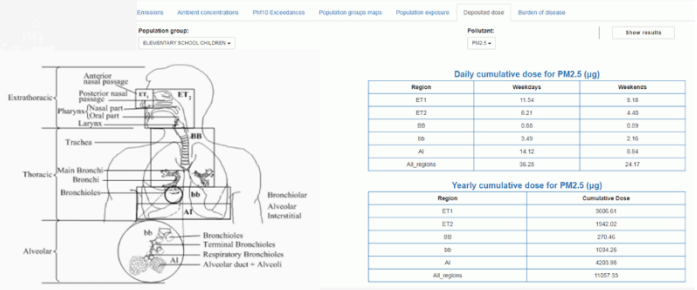
Väestön altistuminen

Taulukko 4. Kuopiolaisten ilmansaastealtistus

	Annual average exposure					
	µg/m³ - nop		ng/m³ - nop			
Kuopio municipality	PM_{10}	$PM_{2.5}$	As	Cd	Ni	Pb
Total	2 700	1 600	38	33	120	240
Pre-school children	150	83	1.9	1.6	6	12
Elementary school children	160	92	2.1	1.9	6.8	13
Students	590	340	7.8	6.8	25	48
Working adults	1 300	740	19	16	60	130
Elderly	250	260	6.5	5.7	21	43

Kuva 11. Kuopiolaisten $PM_{2.5}$ altistuminen

Pienhiukkasannos



Daily cumulative dose for PM2.5 (µg)

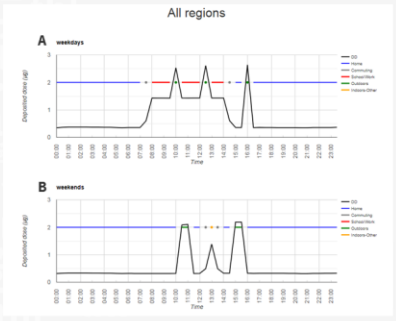
Region	Weekdays	Weekends
ET1	11.54	8.16
ET2	6.21	4.40
BB	0.88	0.59
bb	3.49	2.16
Al	14.12	8.84
All_regions	36.25	24.17

Yearly cumulative dose for PM2.5 (µg)

Region	Cumulative Dose
ET1	3636.61
ET2	1942.02
BB	270.46
bb	1034.26
Al	4203.96
All_regions	11057.33

Kuva 12. Kuopion ala-asteikäisten vuorokausi ja vuosi $PM_{2.5}$ annos

Hiukkasannos työpäivinä ja viikonloppuna



Taulukko 5. Kuopiolaisten $PM_{2.5}$ vuorokausiannos (µg)

		Daily dose for $PM_{2.5}$ (µg)					
		ET1	ET2	BB	bb	Al	All regions
Pre-school children	Workdays	5.6	5.2	0.6	1.7	7.9	25.0
	Weekends	5.4	2.9	0.3	1.0	4.3	13.9
Elementary school children	Workdays	11.5	6.2	0.9	3.5	14.1	36.3
	Weekends	8.2	4.4	0.6	2.2	8.8	24.2
Students	Workdays	10.9	5.9	1.0	4.5	17.4	39.7
	Weekends	8.1	4.4	0.7	3.0	11.6	27.8
Working adults	Workdays	7.2	3.9	0.7	3.4	13.9	29.0
	Weekends	9.1	4.9	0.8	3.5	14.6	32.8
Elderly	Workdays	7.4	4.0	0.7	3.2	12.8	27.9
	Weekends	7.2	3.9	0.7	3.1	12.4	27.2

Taulukko 6. Kuopiolaisten PM_{10} vuorokausiannos (µg)

		Daily dose for PM_{10} (µg)					
		ET1	ET2	BB	bb	Al	All regions
Pre-school children	Workdays	30.1	16.2	1.0	1.9	8.5	57.7
	Weekends	16.8	9.0	0.6	1.2	4.7	32.2
Elementary school children	Workdays	46.2	24.9	2.2	4.9	18.4	96.6
	Weekends	29.9	16.1	1.4	3.1	11.5	62.0
Students	Workdays	51.3	27.6	2.8	7.2	24.9	113.5
	Weekends	35.1	18.9	1.9	4.8	16.5	77.2
Working adults	Workdays	35.1	18.9	2.0	5.4	20.0	81.5
	Weekends	39.4	21.2	2.2	5.6	20.7	89.1
Elderly	Workdays	33.7	18.2	1.9	5.2	18.4	77.4
	Weekends	32.8	17.7	1.9	5.0	17.9	75.3

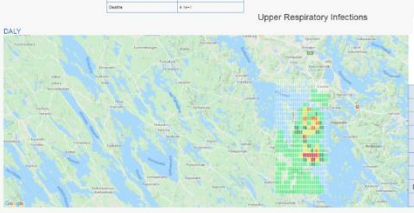
Kuva 13. Kuopion ala-asteikäisten $PM_{2.5}$ annos A) työpäivinä ja B) viikonloppuisin

Tautitaakka

Haittapainotettu elinvuosi
Menetetyt elinvuodet
Vajaakuntoisena eletyt elinvuodet

Upper Respiratory Infections

DALY



Taulukko 7. Pienhiukkasten tautitaakka Kuopiossa väestöryhmittäin

	Upper Respiratory Infections (n)			Natural Mortality (n)		
	Pre-school children	Elementary school children	Children total	Working adults	Elderly	Adults total
DALY	0.014	0.012	0.026	480	580	1060
YLL	0.000	0.000	0.000	240	430	670
YLD	0.014	0.012	0.026	240	150	390
Deaths	0.000	0.000	0.000	7	34	41
Sick days (mild)	–	140	–	–	–	–
Sick days (moderate)	–	86	–	–	–	–
Sick days (severe)	–	1.7	–	–	–	–
Days of school absenteeism	–	45	–	–	–	–
Total sick days	–	230	–	–	–	–

Kuva 14. Pienhiukkasten tautitaakka Kuopiossa

Skenaariot

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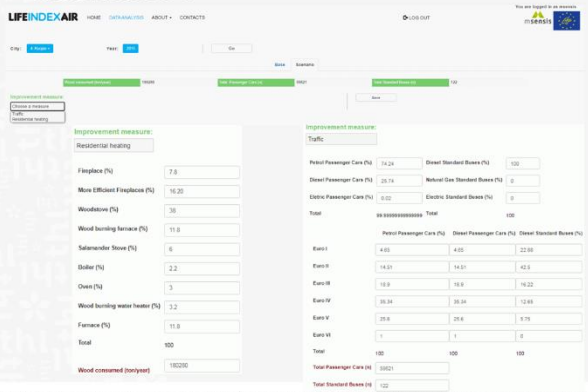


Kuva 15. Puunkulutus, puun polttolaitteiden ja autojen (käyttövoima ja Euro päästöluokitus) suhteellinen jakauma, sekä autojen lukumäärä perusskenaarioissa. 17

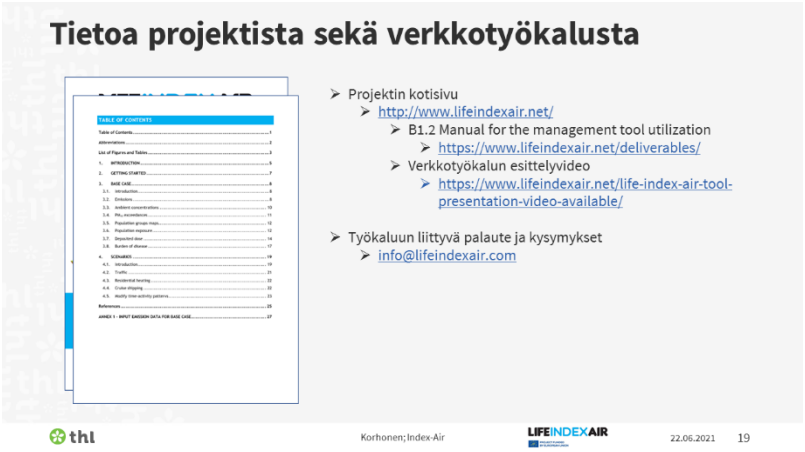
Päästövähennystoimenpiteiden vaikutus annokseen

Taulukko 8. Puun pienpolton ja liikenteen päästövähennysskenaarioiden vaikutus hiukkasannokseen (PM_{10} ja $PM_{2.5}$)

		Kuopio							
		Base	Road traffic					Residential heating	
		Reference	S1	S2	S3	S4	S5	S6	S7	S8
		pg	Reduction of PM deposited dose in %							
PMBD	Pre-school children	17 404	-0.63	-6.29	-0.01	-0.18	0.00	0.00	-3.18	-1.84
	Elementary school children	29 228	-0.72	-0.94	-0.01	-0.21	0.00	0.00	-3.61	-2.09
	Students	35 167	-0.67	-0.87	-0.01	-0.19	0.00	0.00	-3.35	-1.94
	Working adults	31 138	-0.94	-1.23	-0.01	-0.27	0.00	0.00	-4.66	-2.70
	Elderly	28 166	-0.84	-1.10	-0.01	-0.24	0.00	0.00	-4.18	-2.42
PM2.5	Pre-school children	7 518	-0.66	-0.86	-0.01	-0.19	0.00	0.00	-3.31	-1.92
	Elementary school children	11 140	-0.77	-1.01	-0.01	-0.22	0.00	0.00	-3.85	-2.23
	Students	12 445	-0.71	-0.92	-0.01	-0.20	0.00	0.00	-3.54	-2.05
	Working adults	11 255	-0.96	-1.26	-0.01	-0.28	0.00	0.00	-4.77	-2.76
	Elderly	10 166	-0.87	-1.14	-0.01	-0.25	0.00	0.00	-4.33	-2.51

Taulukko 9. Puun pienpolton ja liikenteen päästövähennysskenaariot Kuopiossa

Sector		Scenario code	Measure
Road traffic	Passenger cars fleet	S1	To replace the no. of diesel cars to electric cars
		S2	To consider all cars as electric
		S3	To reduce the total no. of cars by 50%
		S4	To remove the cars from EURO I, II, III and IV- > 50% of cars are EURO V and 50% are EURO VI
	Buses fleet	S5	To change the buses fleet to EURO V (50%) and EURO VI (50%)
		S6	To consider all buses as electric
Residential heating		S7	To replace inefficient devices (Fireplaces, Woodstove and Salamander Stove) for "More Efficient Fireplaces"
		S8	20% reduction of wood consumed


Tietoa projektista sekä verkkotyökalusta
TABLE OF CONTENTS
Projektin kotisivu
http://www.lifeindexair.net/
B1.2 Manual for the management tool utilization
https://www.lifeindexair.net/deliverables/
Verkkotyökalun esittelyvideo
https://www.lifeindexair.net/life-index-air-tool-presentation-video-available/
Työkaluun liittyvä palaute ja kysymykset
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22.06.2021
19

LIFE Index-Air

Meeting and training course with the Greek Ministries of Environment & Energy and Health

LIFE Index-Air - Development of an Integrated Exposure – Dose Management Tool for Reduction of Particulate Matter in Air – LIFE15ENV/PT/000674

Report of the meeting and training course with stakeholders

Date: 30th of September 2021

Zoom meeting

Chair: Konstantinos Eleftheriadis
Rapporteur: Evangelia Diapouli

Introduction

The present Minutes Report has been made to provide an overview of the meeting and training course with representatives from the Greek Ministry of Environment and Energy and the Greek Ministry of Health. The meeting took place on the 30th of September 2021. This meeting was attended by a total of 7 participants: 2 from NCSRD, 3 from the Ministry of Environment & Energy and 2 from the Ministry of Health. Both ministries are key stakeholders for the project in Greece.

Konstantinos Eleftheriadis was the chair of the meeting and nominated Evangelia Diapouli as the rapporteur.

Objectives

The objectives of this meeting were:

1. to highlight the motivation and goals of the LIFE Index-Air project;
2. to present the project results and the outcome of the LIFE Index-Air tool for Athens;
3. to introduce the LIFE Index-Air Management Tool;
4. to train the stakeholders to run the LIFE Index-Air Management Tool;
5. to discuss the results obtained with stakeholders.

Participating Members

The following members of NCSRD and stakeholders participated in the meeting:

- NCSRD – Konstantinos Eleftheriadis, Evangelia Diapouli
- Ministry of Environment and Energy – Eirini Tsilibari, Anastasios Adamopoulos, Eirini Kokoretsi
- Ministry of Health – Vasiliki Karaouli, Sofia Tzala

Agenda of the Meeting

The working agenda of the meeting was the following:

- Motivation, goals and overview of the LIFE Index-Air project
- Pilot implementation of the Index-Air Management Tool in Athens
- Overview of the Index-Air Management Tool
- Practical training on the Index-Air Tool

Working resume

The meeting started at 11:00 with the welcome and introduction of all participants. The first part of the meeting included two presentations. Konstantinos Eleftheriadis presented a general overview of the LIFE Index-Air project: motivation, goals and outcome. Next, Evangelia Diapouli presented the results from the pilot implementation of the Index-Air Management Tool, focusing mainly on the city of Athens. The second part of the meeting was dedicated to the demonstration of the Index-Air Management Tool and the training of stakeholders on the use of the Tool. Evangelia Diapouli presented an overview of the Index-Air Management Tool. Following the presentation, the representatives from the two ministries accessed the online Tool and were trained on its use, with the assistance of Evangelia Diapouli. At the end of the meeting, the LIFE Index-Air team and stakeholders discussed on the project results and the Index-Air Tool. V. Karaouli and S. Tzala from the Ministry of Health were impressed from the outputs of the Tool and the overall work done in the framework of the project. E. Tsilibari and A. Adamopoulos from the Ministry of Environment and Energy were also impressed by the significant results provided by the Tool, in terms of population exposure and health. They commented on the importance of updating the tool, in order to guarantee its continuous use. They also commented on the importance of including high quality input data. The PowerPoint presentations that supported this meeting are shown in Annex 4.

The meeting ended at 15:00.

Images of the online meeting

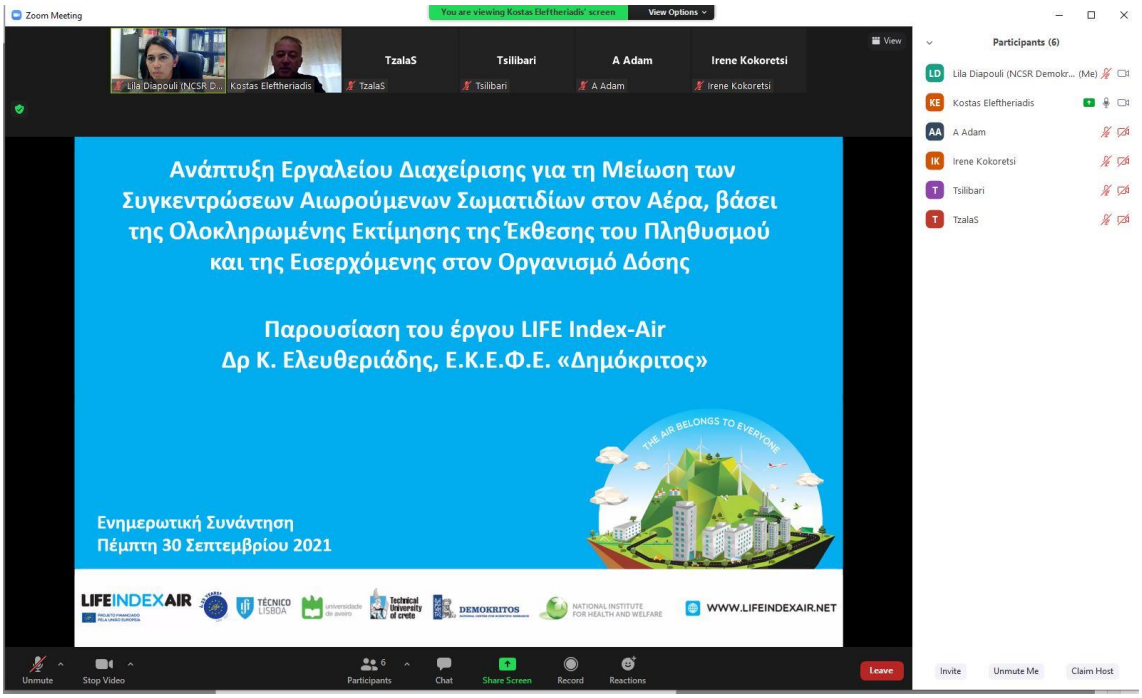


Figure 10 – Konstantinos Eleftheriadis and Evangelia Diapouli welcome the participants.

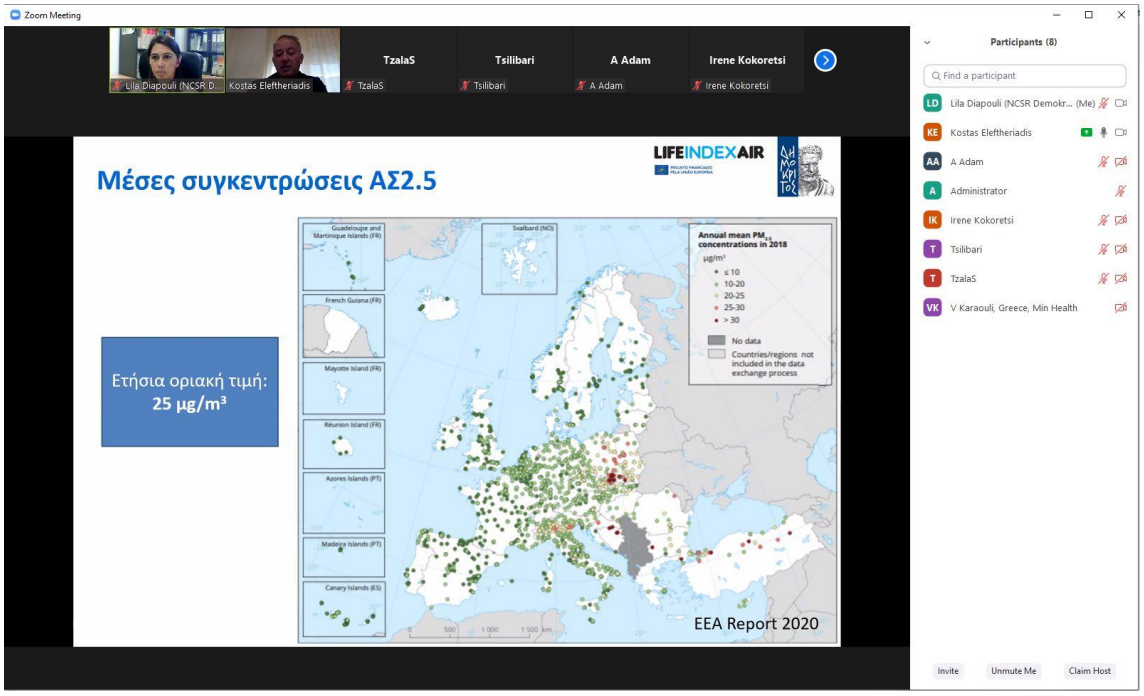


Figure 11 – Konstantinos Eleftheriadis presents the motivation behind the Index-Air project.

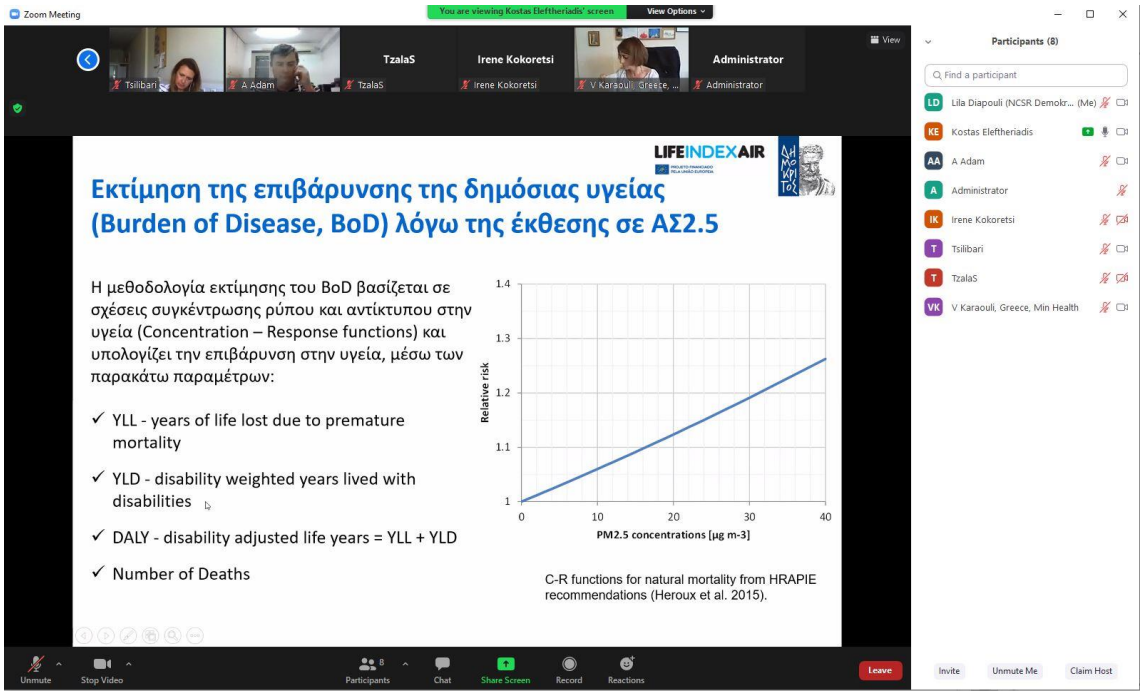


Figure 12 – Konstantinos Eleftheriadis presents the methodological apporaches followed in the project.

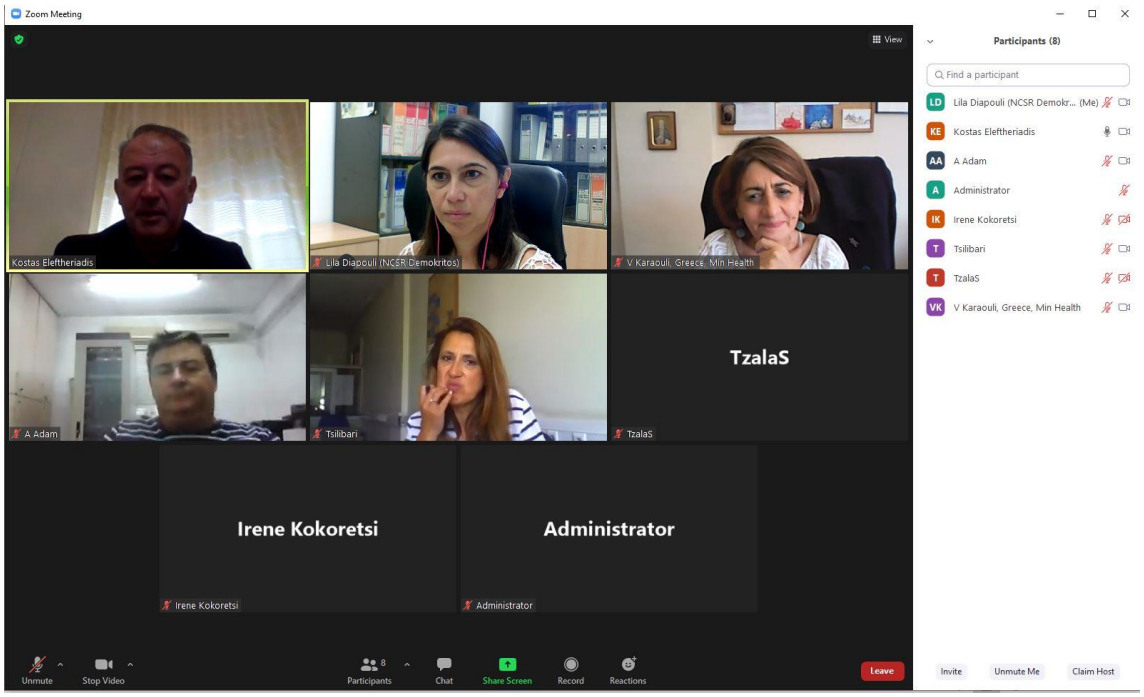


Figure 13 – Final discussion between the NCSRD team and stakeholders.

Main conclusions of the meeting

The project key stakeholders in Greece, the Ministries of Environment & Energy and of Health, participated in the meeting and training course, with the objective to be informed on the final outcome of the project, to assess in detail the functionality and effectiveness of the Index-Air Management Tool and to be trained in its use. The Management Tool received very positive feedback, with both stakeholders expressing their interest to use the Tool and obtain further results from the scenario module. The main points raised during the discussion are:

- It is essential that the Tool is updated in order to guarantee its sustainability. E. Tsilibari and A. Adamopoulos mentioned that the EMEP emission inventories are updated every 4 years and this period could be the basis for the update of the Tool. K. Eleftheriadis mentioned the very good and continuous cooperation of NCSRD with Msensis company, which facilitates future changes and updates. Of course, the modelling work needed for the Tool update should be also taken into consideration.
- E. Tsilibari and A. Adamopoulos commented on the difficulty to obtain reliable data on the use of wood for residential heating in Athens, and Greece in general. All acknowledged the importance of good quality data for the scenario module. The low impact of measures related to residential wood burning and changes in the bus fleet may be also due to a not so realistic characterisation of these sources. As better and more detailed data may become available, it is important to incorporate them in the Tool.

- A. Adamopoulos commented on the quality of the EMEP emission inventory for Greece. The Ministry of Environment and Energy is responsible for the provision of this data and they are working on enhancing the quality and spatial resolution of the reported emissions. In addition, it should be noted that the EMEP emissions needed further spatial and temporal disaggregation to be inserted into the Tool.
- The Ministry of Environment & Energy showed great interest on the estimates of population exposure and its mapping.
- The Ministry of Health appreciated very much the possibilities of the Tool with respect to assessing the burden of disease for current and future scenarios.

The adoption of the Index-Air Management Tool by these two national authorities ensures the use of the project outcomes after the project end. The project partners will maintain the communication with these two key stakeholder, providing support in the application of the Tool.

Approval of the Meeting Minute

According with the LIFE Index-Air Management Guide the minutes shall be considered as accepted if, within 10 calendar days from sending, no Member has sent an objection in writing to the chairperson. The chairperson will send the final version of the minutes by email to all the beneficiaries that were call to the meeting. Also a copy of the minutes will be archived in the LIFE Index-Air webpage.

ANNEXES

Annex 1: Invitation to the Meeting and Training Course

Annex 2: Agenda of the Meeting and Training Course

Annex 3: List of Participants

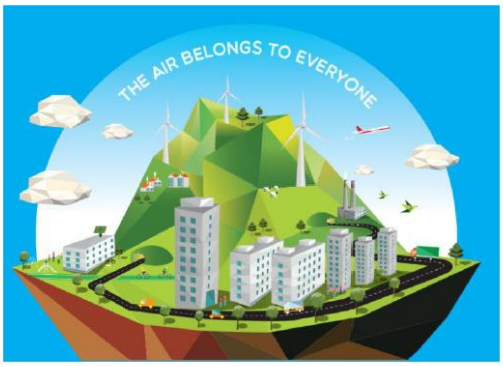
Annex 4: Presentations

Annex 1: Invitation to the Meeting and Training Course

LIFE INDEX-AIR - Ανάπτυξη Εργαλείου Διαχείρισης για τη Μείωση των Συγκεντρώσεων Αιωρούμενων Σωματιδίων στον Αέρα, βάσει της Ολοκληρωμένης Εκτίμησης της Έκθεσης του Πληθυσμού και της Εισερχόμενης στον Οργανισμό Δόσης

ΠΡΟΣΚΛΗΣΗ

Το Ε.Κ.Ε.Φ.Ε. «Δημόκριτος» σας προσκαλεί στην **Ενημερωτική Συνάντηση** σχετικά με τα τελικά αποτελέσματα του έργου LIFE Index-Air και στο **Εκπαιδευτικό Σεμινάριο** πάνω στη χρήση του **εργαλείου** άσκησης περιβαλλοντικής πολιτικής **Index-Air.**



Πέμπτη 30 Σεπτεμβρίου 2021 και ώρα 11:00 π.μ.

Διαδικτυακή Εκδήλωση

Πληροφορίες: Ευαγγελία Διαπούλη

E-mail: ldiapouli@ipta.demokritos.gr **Τηλ: +30 210 6503259**

Annex 2: Agenda of the Meeting and Training Course

LIFEINDEXAIR

PROJECT FUNDED BY EUROPEAN UNION

Πέμπτη 30/9/2021

Διαδικτυακή εκδήλωση

Ενημερωτική Συνάντηση του έργου LIFE Index-Air

11:00 – 11:10	Υποδοχή συμμετεχόντων
11:10 – 11:40	Παρουσίαση του έργου LIFE Index-Air *Δρ Κωνσταντίνος Ελευθεριάδης, Ε.Κ.Ε.Φ.Ε. «Δημόκριτος»*
11:40 – 12:00	Πιλοτική εφαρμογή του εργαλείου Index-Air *Δρ Ευαγγελία Διαπούλη, Ε.Κ.Ε.Φ.Ε. «Δημόκριτος»*
12:00 – 12:30	Συζήτηση

Εκπαιδευτικό Σεμινάριο πάνω στη χρήση του εργαλείου Index-Air

13:00 – 13:30	Παρουσίαση του εργαλείου άσκησης περιβαλλοντικής πολιτικής Index-Air *Δρ Ευαγγελία Διαπούλη, Ε.Κ.Ε.Φ.Ε. «Δημόκριτος»*
13:30 – 14:30	Πρακτική εξάσκηση πάνω στη χρήση του εργαλείου Index-Air

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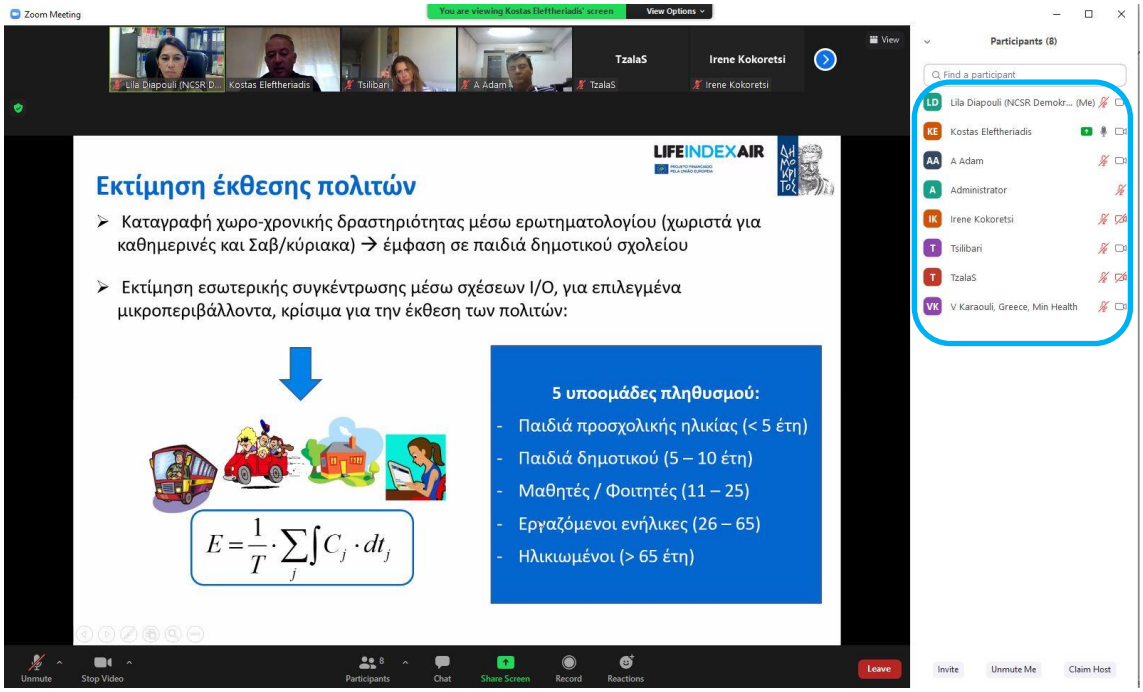
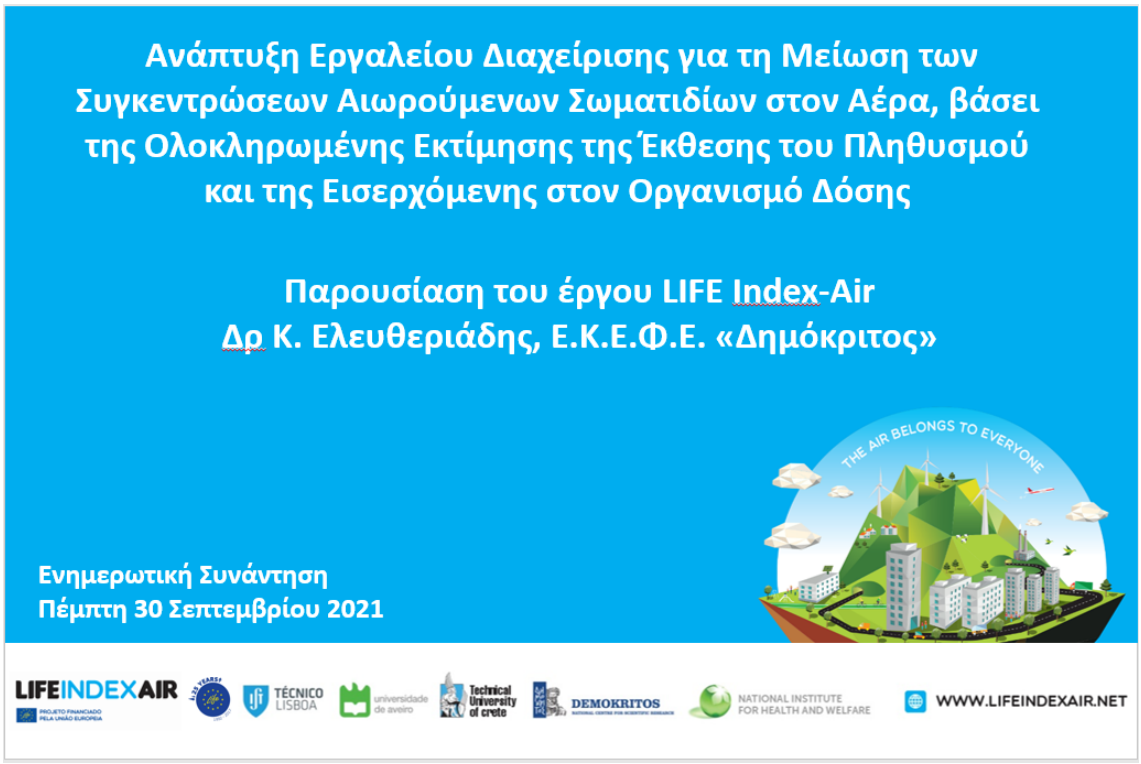
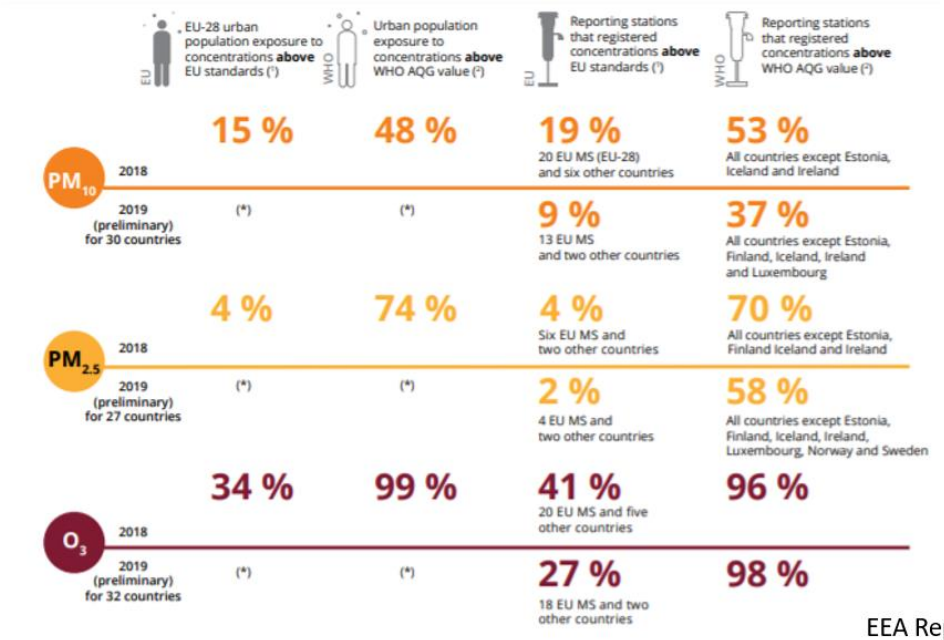
Annex 3: List of Participants



Annex 4: Presentations



Ατμοσφαιρική ρύπανση στην Ευρώπη

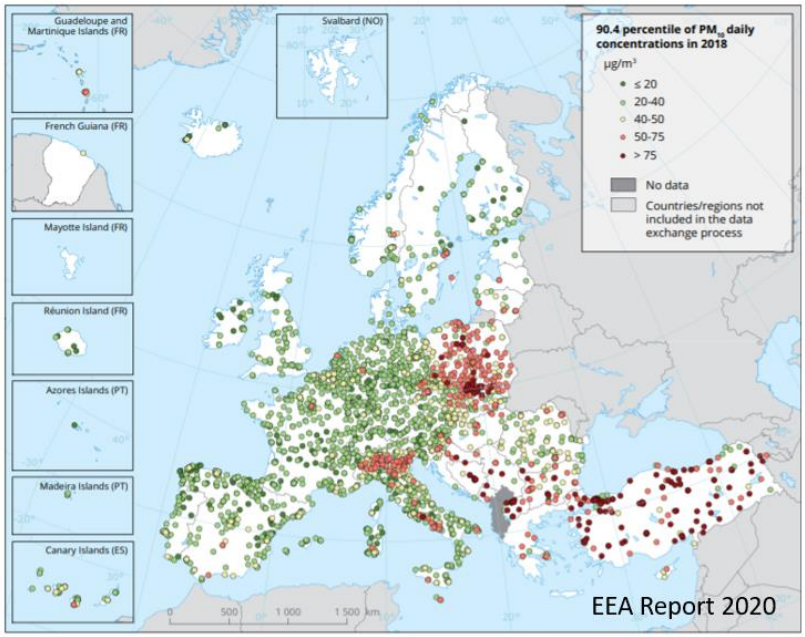


EEA Report 2020

Μέγιστες (90.4 perc.) συγκεντρώσεις ΑΣ10

Ετήσια οριακή τιμή:
40 μg/m³

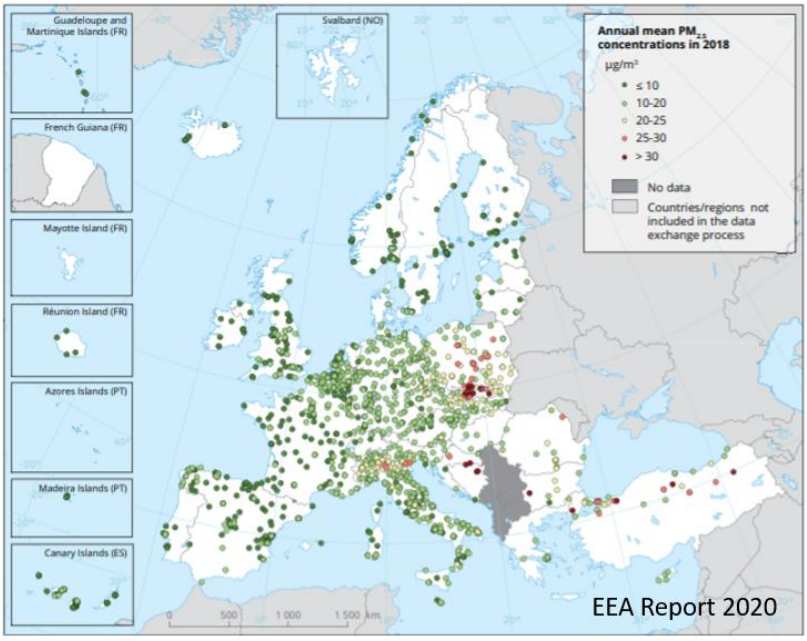
Ημερήσια οριακή τιμή:
50 μg/m³



EEA Report 2020

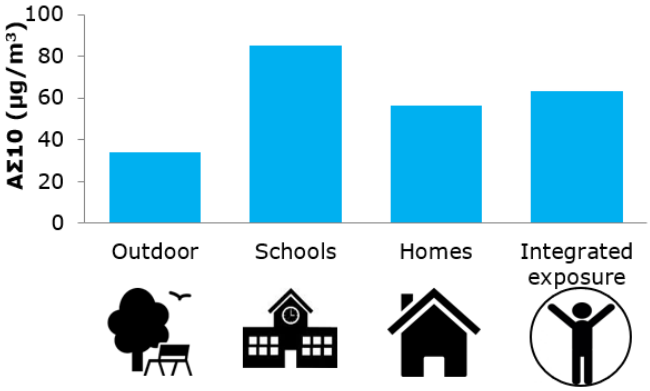
Μέσες συγκεντρώσεις ΑΣ2.5

Ετήσια οριακή τιμή:
25 μg/m³



Εκτίμηση έκθεσης πληθυσμού

- Οι εξωτερικές συγκεντρώσεις παρουσιάζουν σημαντική χωρική διακύμανση
- Οι αστικοί πληθυσμού περνούν άνω του 90% της ημέρας του σε εσωτερικούς χώρους
- Σημαντικές διαφοροποιήσεις στο ημερήσιο πρόγραμμα δραστηριοτήτων



Στόχος έργου LIFE Index-Air

- Ανάπτυξη ενός καινοτόμου και ευέλικτου εργαλείου άσκησης πολιτικής για την αναγνώριση αποτελεσματικών μέτρων μείωσης της ρύπανσης από ΑΣ και προστασίας της δημόσιας υγείας.

Χαρτογράφηση συγκεντρώσεων εξωτερικής ατμόσφαιρας

↓

Εκτίμηση έκθεσης πολιτών

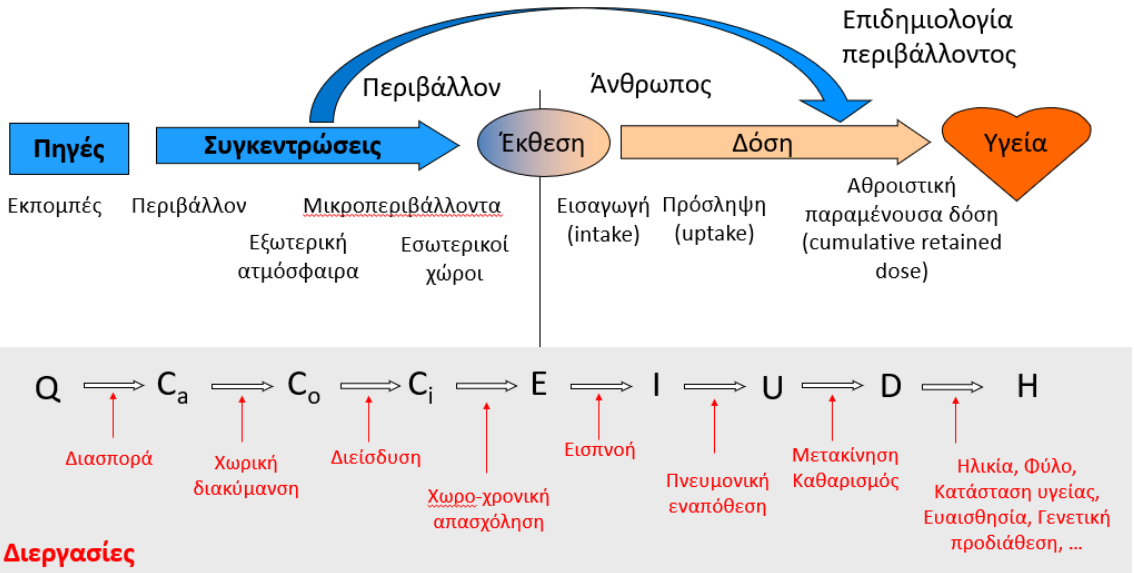
↓

Μοντέλο δοσιμετρίας

↓

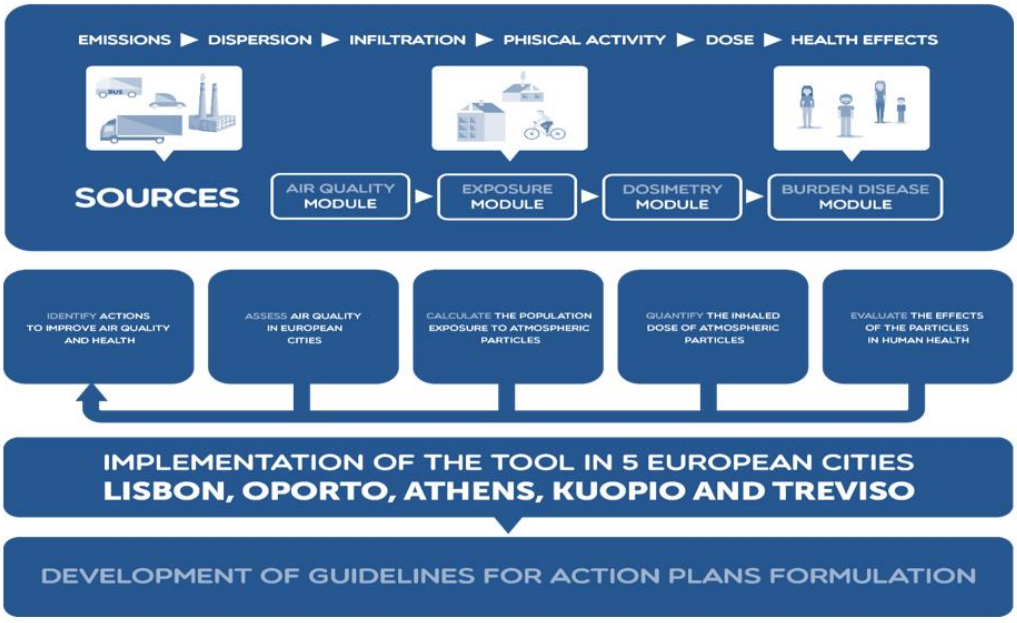
Μεθοδολογία BoD

Επιστημονική προσέγγιση

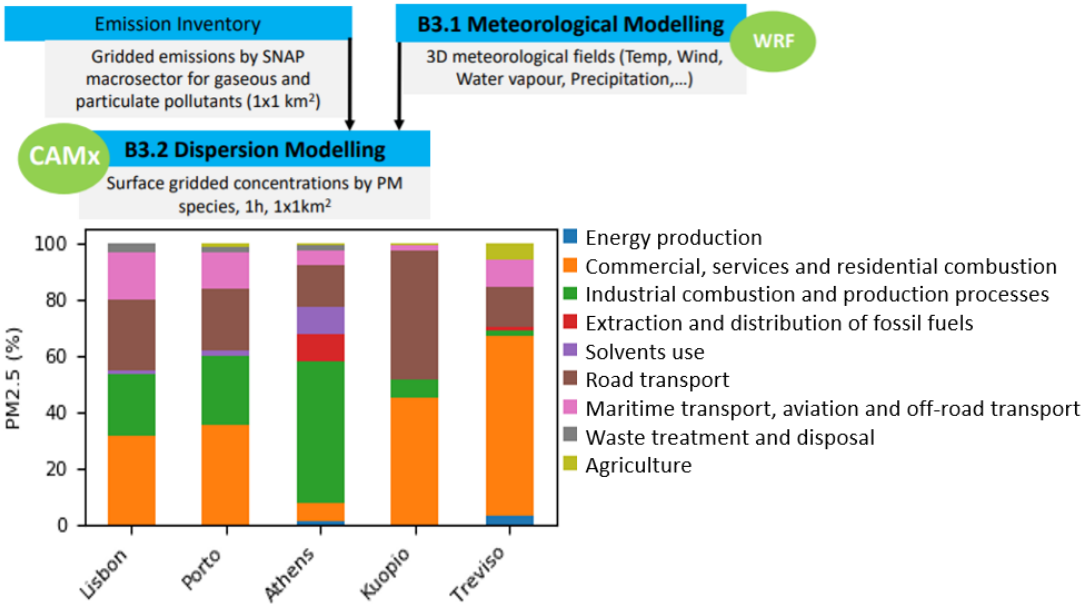


Schematic by Otto Hanninen

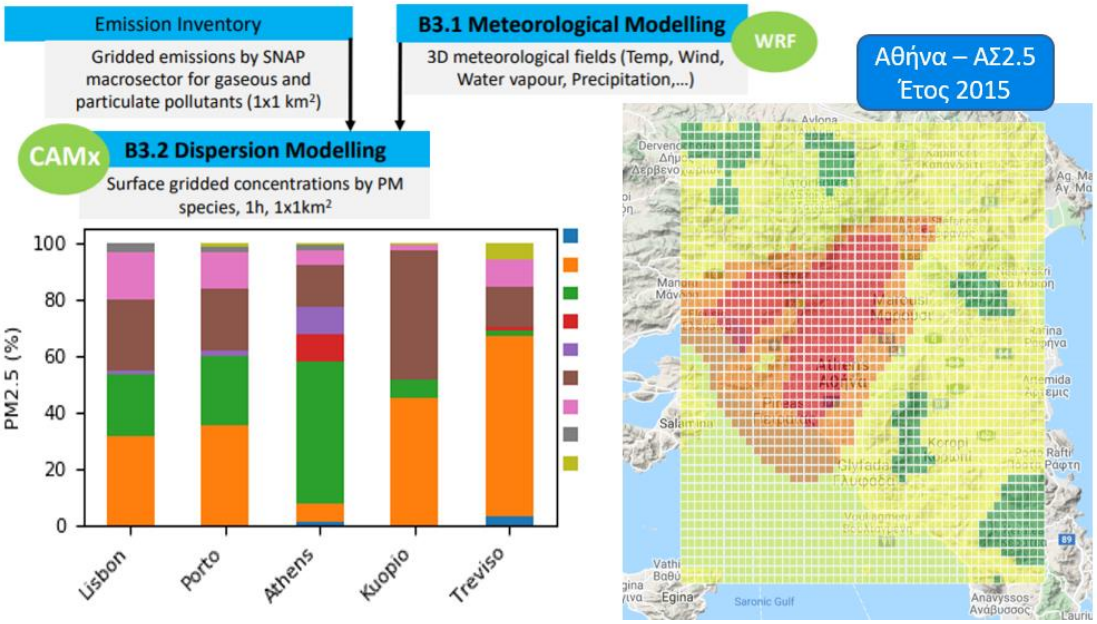
Επιμέρους στόχοι & Κύριες δράσεις



Χαρτογράφηση ατμοσφαιρικών συγκεντρώσεων



Χαρτογράφηση ατμοσφαιρικών συγκεντρώσεων



Συλλογή δεδομένων συγκέντρωσης και χημικής σύστασης ΑΣ

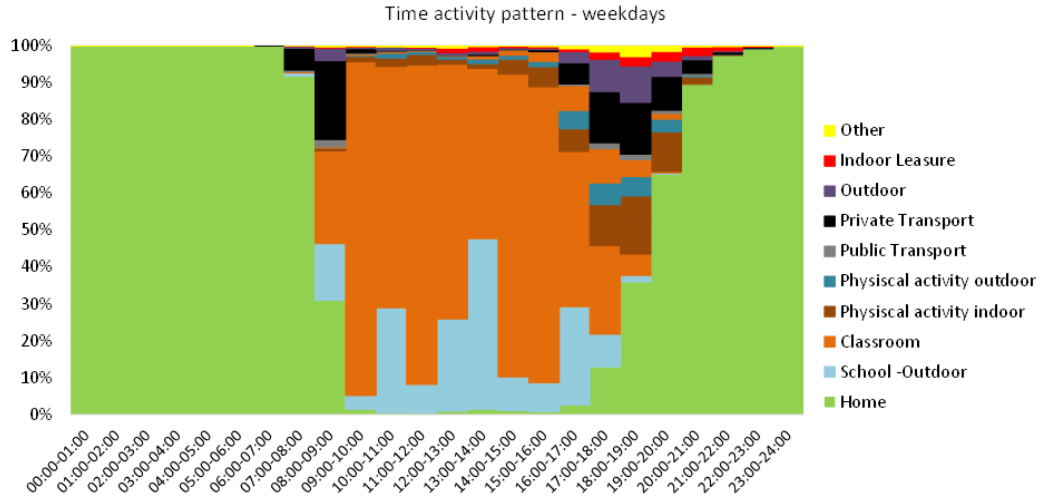
- Από προηγούμενες καμπάνιες μέτρησης στην εξωτερική ατμόσφαιρα και επιλεγμένους εσωτερικούς χώρους
- Από σταθμούς παρακολούθησης της ατμοσφαιρικής ρύπανσης (πχ εθνικά δίκτυα ή/και ερευνητικοί σταθμοί)
- Μέσω στοχευμένης καμπάνιας στην Λισαβόνα, στο πλαίσιο του έργου

→

- ✓ Επικύρωση του μοντέλου
- ✓ Υπολογισμός σχέσεων I/O (εσωτερικής ως προς εξωτερική συγκέντρωση)

Εκτίμηση έκθεσης πολιτών

- Καταγραφή χωρο-χρονικής δραστηριότητας μέσω ερωτηματολογίου (χωριστά για καθημερινές και Σαβ/κύριακα) → έμφαση σε παιδιά δημοτικού σχολείου



Εκτίμηση έκθεσης πολιτών

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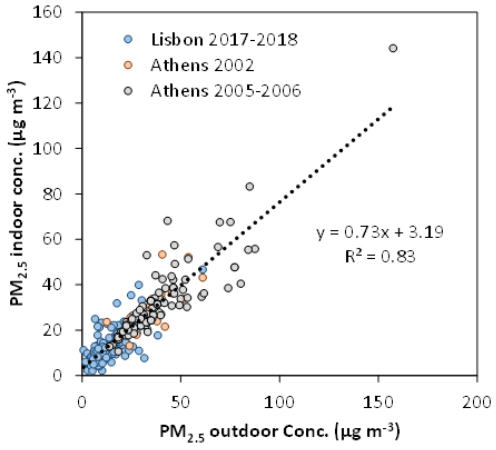
- Εκτίμηση εσωτερικής συγκέντρωσης συναρτήσει της εξωτερικής, για επιλεγμένα μικροπεριβάλλοντα, κρίσιμα για την έκθεση των πολιτών:

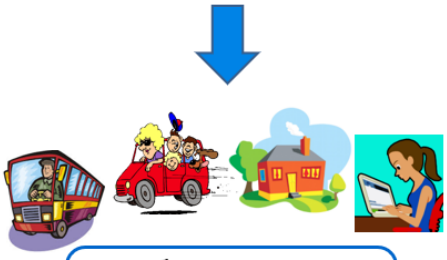
  - ✓ Κατοικίες
  - ✓ Σχολεία
  - ✓ Χώροι γραφείων
  - ✓ Μέσα μεταφοράς
  - ✓ Εσωτερικοί χώροι υψηλής συγκέντρωσης ατόμων (καταστήματα, εστιατόρια, κλπ.)



Εκτίμηση έκθεσης πολιτών

- Καταγραφή χωρο-χρονικής δραστηριότητας μέσω ερωτηματολογίου (χωριστά για καθημερινές και Σαβ/κύριακα) → έμφαση σε παιδιά δημοτικού σχολείου

- Εκτίμηση εσωτερικής συγκέντρωσης μέσω σχέσεων I/O, για επιλεγμένα μικροπεριβάλλοντα, κρίσιμα για την έκθεση των πολιτών:



$$E = \frac{1}{T} \cdot \sum_j \int C_j \cdot dt_j$$

5 υποομάδες πληθυσμού:

- Παιδιά προσχολικής ηλικίας (< 5 έτη)
- Παιδιά δημοτικού (5 – 10 έτη)
- Μαθητές / Φοιτητές (11 – 25)
- Εργαζόμενοι ενήλικες (26 – 65)
- Ηλικιωμένοι (> 65 έτη)

Εκτίμηση έκθεσης πληθυσμού

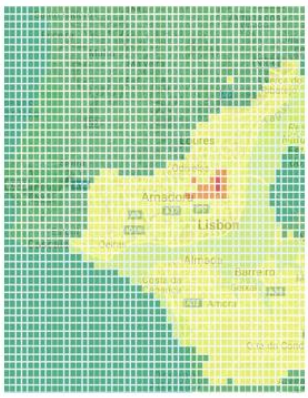
Χωρική κατανομή εξωτερικών συγκεντρώσεων (1km x 1km, 1 hour)

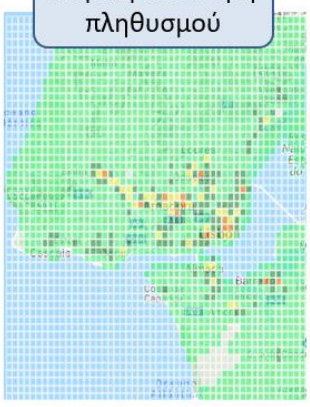
Δεδομένα χωρο-χρονικής απασχόλησης

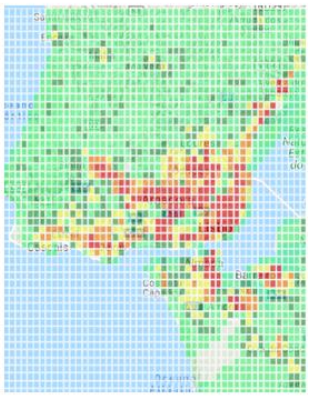
Σχέσεις εσωτερικών / εξωτερικών συγκεντρώσεων

Χωρική κατανομή πληθυσμού

Χωρική κατανομή επιπέδων έκθεσης (1km x 1km, 24 hours)



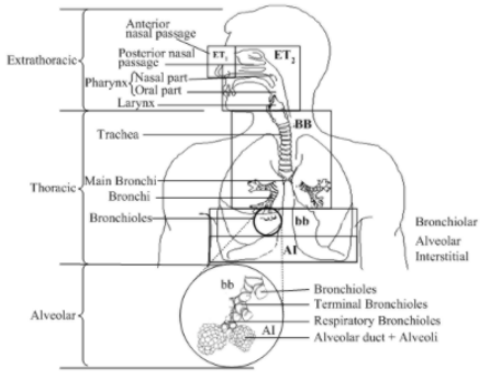




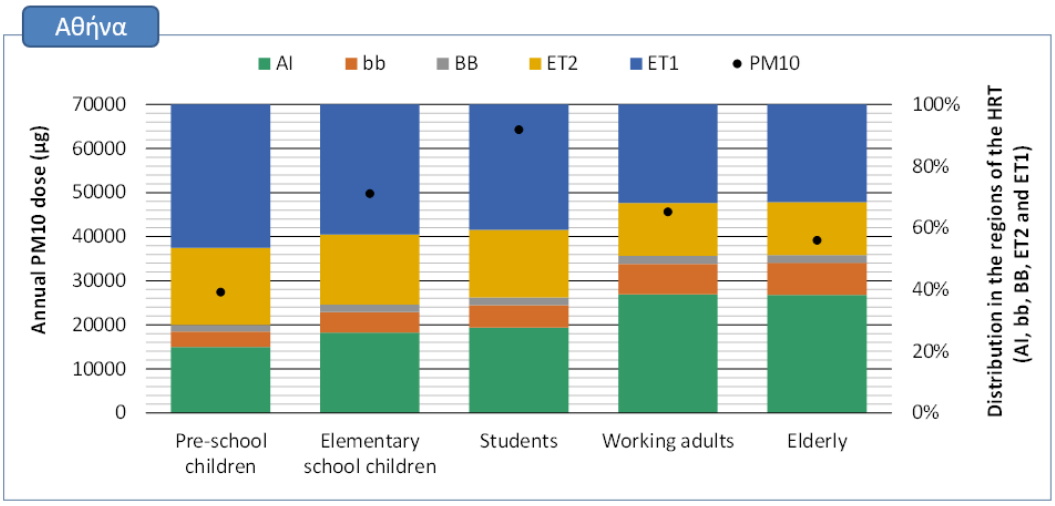
Εκτίμηση δόσης ΑΣ στον ανθρώπινο οργανισμό

Εκτίμηση της δόσης $ΑΣ_{10}$, $ΑΣ_{2.5}$ και $ΑΣ_{2.5-10}$ σε 5 περιοχές του ανθρώπινου αναπνευστικού συστήματος (ET1, ET2, BB, bb & AI), με χρήση του μοντέλου ExDoM2.

- Χρήση χαρακτηριστικής κατανομής μεγέθους ΑΣ σε κάθε πόλη
- Εκτίμηση για κάθε υποομάδα πληθυσμού, με βάση:
  - ✓ τα ιδιαίτερα ανατομικά και φυσιολογικά χαρακτηριστικά της,
  - ✓ το πρόγραμμα δραστηριότητας και
  - ✓ τα επίπεδα προσωπικής έκθεσης.



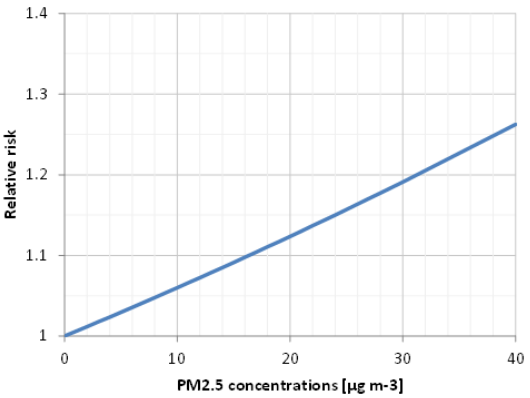
Εκτίμηση δόσης ΑΣ στον ανθρώπινο οργανισμό



Εκτίμηση της επιβάρυνσης της δημόσιας υγείας (Burden of Disease, BoD) λόγω της έκθεσης σε ΑΣ2.5

Η μεθοδολογία εκτίμησης του BoD βασίζεται σε σχέσεις συγκέντρωσης ρύπου και αντίκτυπου στην υγεία (Concentration – Response functions) και υπολογίζει την επιβάρυνση στην υγεία, μέσω των παρακάτω παραμέτρων:

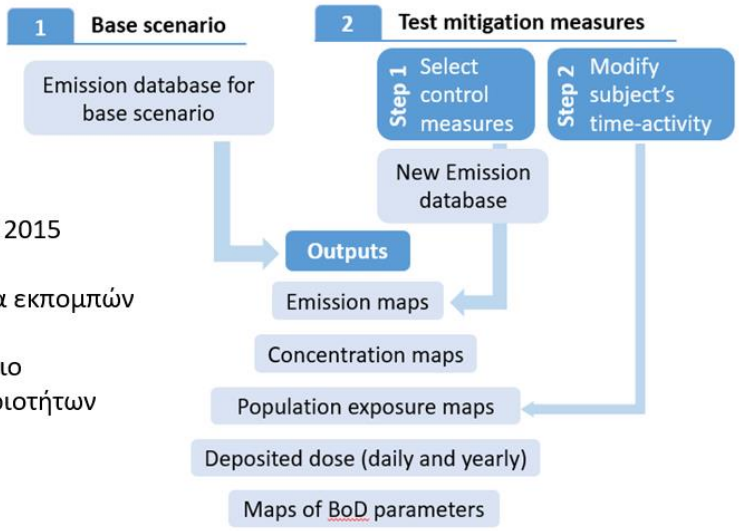
- ✓ YLL - years of life lost due to premature mortality
- ✓ YLD - disability weighted years lived with disabilities
- ✓ DALY - disability adjusted life years = YLL + YLD
- ✓ Number of Deaths



C-R functions for natural mortality from HRAPIE recommendations (Heroux et al. 2015).

Ανάπτυξη του εργαλείου άσκησης πολιτικής Index-Air

- ➢ Σενάριο βάσης: Έτος 2015
- ➢ Εναλλακτικά σενάρια εκπομπών
- ➢ Εναλλακτικό ημερήσιο πρόγραμμα δραστηριοτήτων



Εφαρμογή εναλλακτικού σεναρίου

- Μη γραμμική σχέση μεταξύ συγκέντρωσης και εκπομπών
- Ανάγκη για μικρούς υπολογιστικούς χρόνους

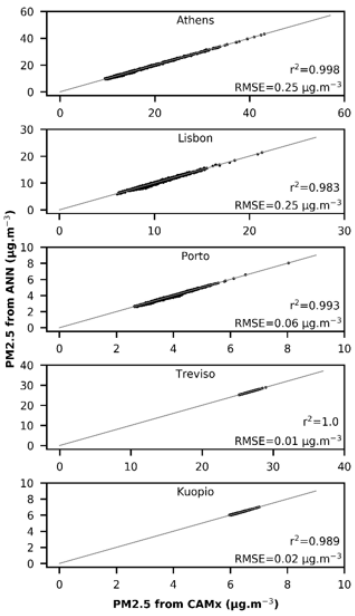
Υπολογισμός της εξωτερικής συγκέντρωσης ΑΣ, για τη διαφοροποιημένη βάση των εκπομπών, με χρήση Τεχνητών Νευρωνικών Δικτύων (Artificial Neural Networks, ANN)

Training Set

Validation Set

WRF-CAMx modelling system
10 σενάρια – Ετήσιος υπολογισμός συγκέντρωσης (1km x 1km)

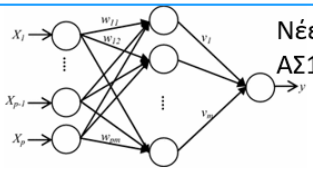
Αλγόριθμος υπολογισμού για κάθε πόλη



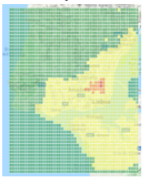
Εφαρμογή εναλλακτικού σεναρίου

Επιλογή μέτρων ελέγχου εκπομπών

Νέες τιμές εκπομπών



Νέες συγκεντρώσεις ΑΣ10 & ΑΣ2.5



Υπολογισμός BoD βάσει εξωτερικής συγκέντρωσης ΑΣ2.5

Υπολογισμός έκθεσης και δόσης στον οργανισμό

Επιλογή εναλλακτικού ημερήσιου προγράμματος για υποομάδα του πληθυσμού

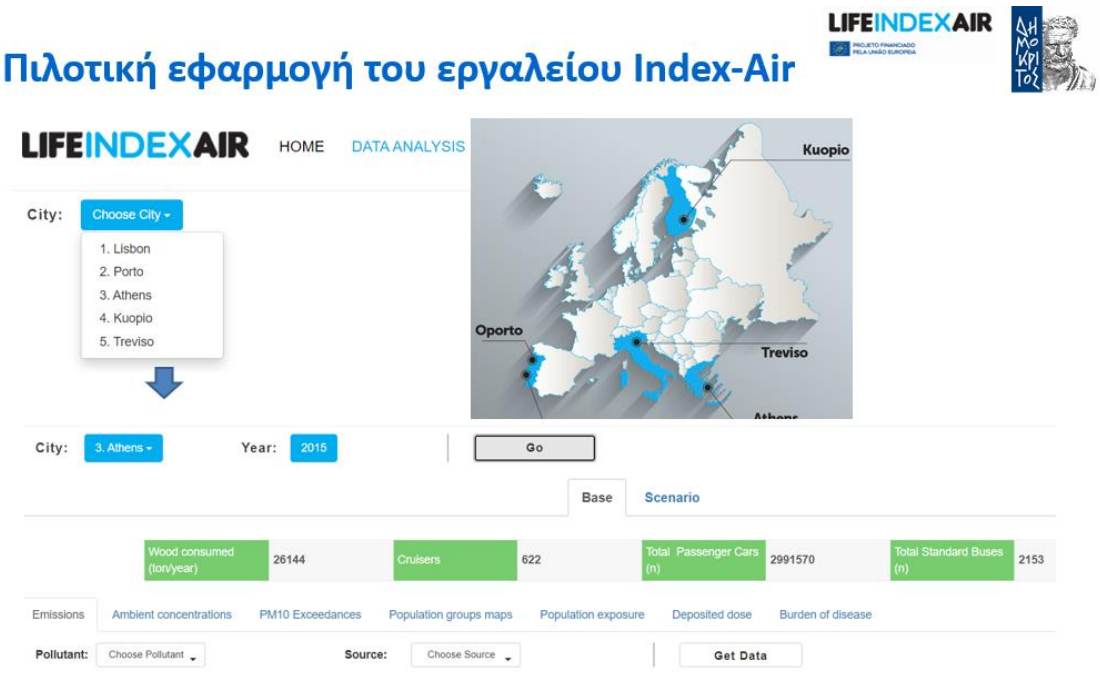
Υπολογισμός έκθεσης και δόσης στον οργανισμό

Τελικά παραδοτέα του έργου

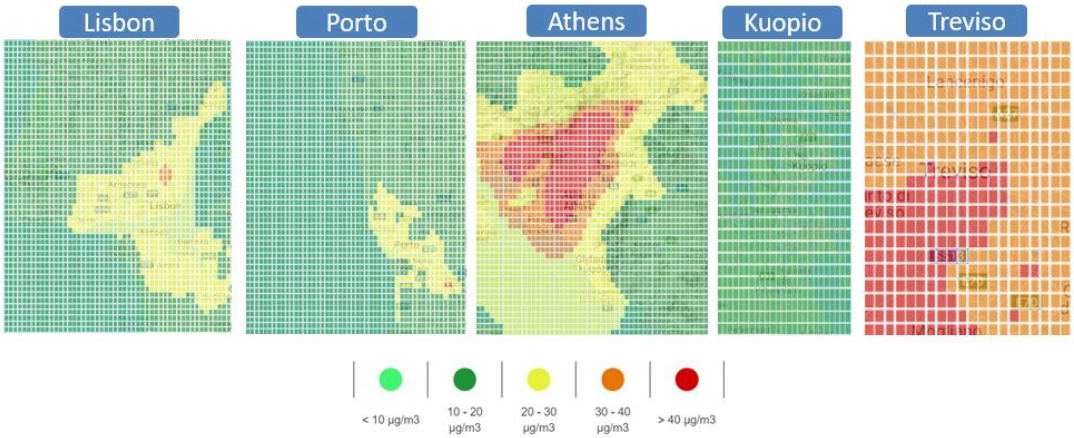
- ✓ Το εργαλείο Index-Air είναι διαθέσιμο διαδικτυακά
- ✓ Οδηγός χρήσης σε ηλεκτρονική μορφή και εκπαιδευτικό βίντεο
- ✓ Πιλοτική εφαρμογή του εργαλείου στις 5 πόλεις (Αθήνα, Κουόπιο, Λισαβόνα, Πόρτο, Τρεβίζο)
- ✓ Παρουσίαση υφιστάμενης κατάστασης & προτεινόμενες δράσεις για μείωση των συγκεντρώσεων των ΑΣ και προστασία της δημόσιας υγείας

TÉCNICO LISBOA · universidade de aveiro · Technical University of crete · DEMOKRITOS · NATIONAL INSTITUTE FOR HEALTH AND WELFARE · WWW.LIFEINDEXAIR.NET


Ανάπτυξη Εργαλείου Διαχείρισης για τη Μείωση των Συγκεντρώσεων Αιωρούμενων Σωματιδίων στον Αέρα, βάσει της Ολοκληρωμένης Εκτίμησης της Έκθεσης του Πληθυσμού και της Εισερχόμενης στον Οργανισμό Δόσης
Πιλοτική εφαρμογή του εργαλείου Index-Air
Δρ Ε. Διαπούλη, Ε.Κ.Ε.Φ.Ε. «Δημόκριτος»
THE AIR BELONGS TO EVERYONE
Ενημερωτική Συνάντηση
Πέμπτη 30 Σεπτεμβρίου 2021
LIFEINDEXAIR
TÉCNICO LISBOA
universidade de aveiro
Technical University of crete
DEMOKRITOS
NATIONAL INSTITUTE FOR HEALTH AND WELFARE
WWW.LIFEINDEXAIR.NET

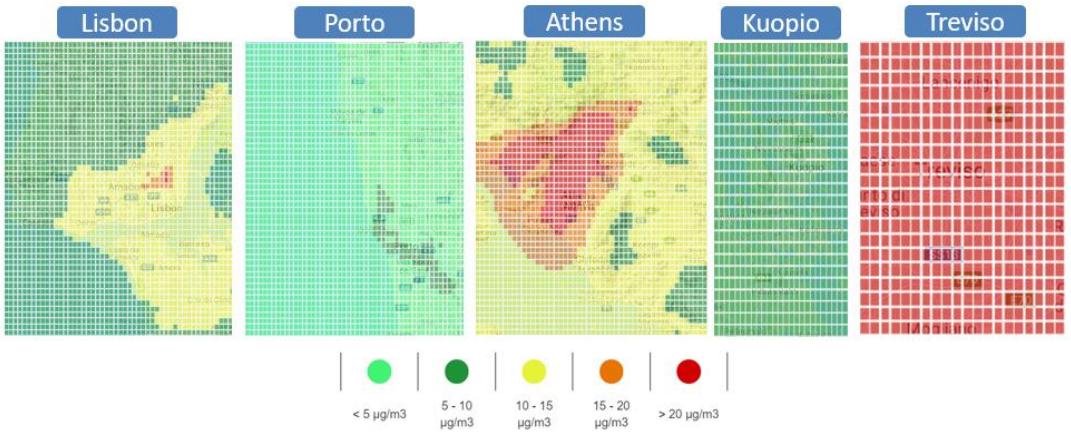

Πιλοτική εφαρμογή του εργαλείου Index-Air
LIFEINDEXAIR
LIFEINDEXAIR
HOME
DATA ANALYSIS
City:
Choose City
1. Lisbon
2. Porto
3. Athens
4. Kuopio
5. Treviso
Kuopio
Oporto
Treviso
City:
3. Athens
Year:
2015
Go
Base
Scenario
Wood consumed (ton/year)
26144
Cruisers
622
Total Passenger Cars (n)
2991570
Total Standard Buses (n)
2153
Emissions
Ambient concentrations
PM10 Exceedances
Population groups maps
Population exposure
Deposited dose
Burden of disease
Pollutant:
Choose Pollutant
Source:
Choose Source
Get Data

Ατμοσφαιρικές συγκεντρώσεις ΑΣ10



PM_{10} (μg/m³)	Lisbon	Porto	Athens	Kuopio	Treviso
Central municipality	25.4	20.9	40.2	11.9	39.8
Other municipalities	18.1	16.2	26.3	11.4	38.6

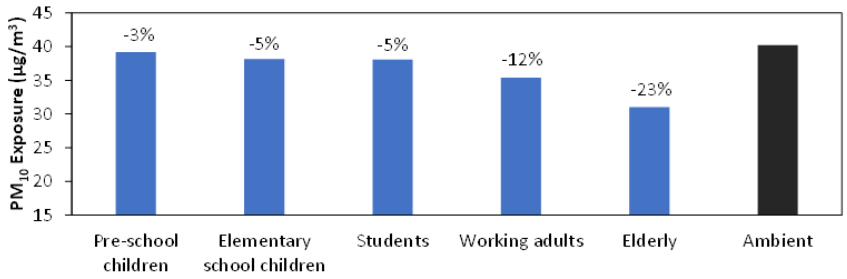
Ατμοσφαιρικές συγκεντρώσεις ΑΣ2.5

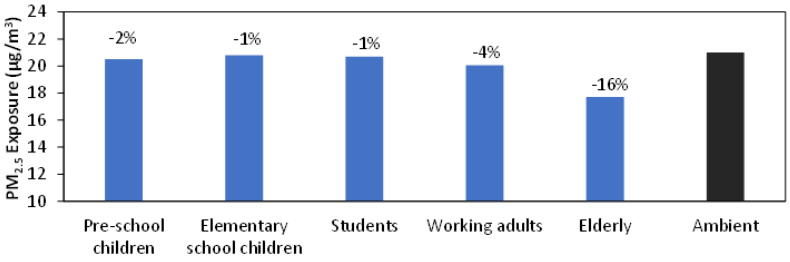


$PM_{2.5}$ (μg/m³)	Lisbon	Porto	Athens	Kuopio	Treviso
Central municipality	13.8	5.0	21.0	6.2	26.8
Other municipalities	10.0	4.0	13.8	6.1	26.0

Προσωπική έκθεση πολιτών

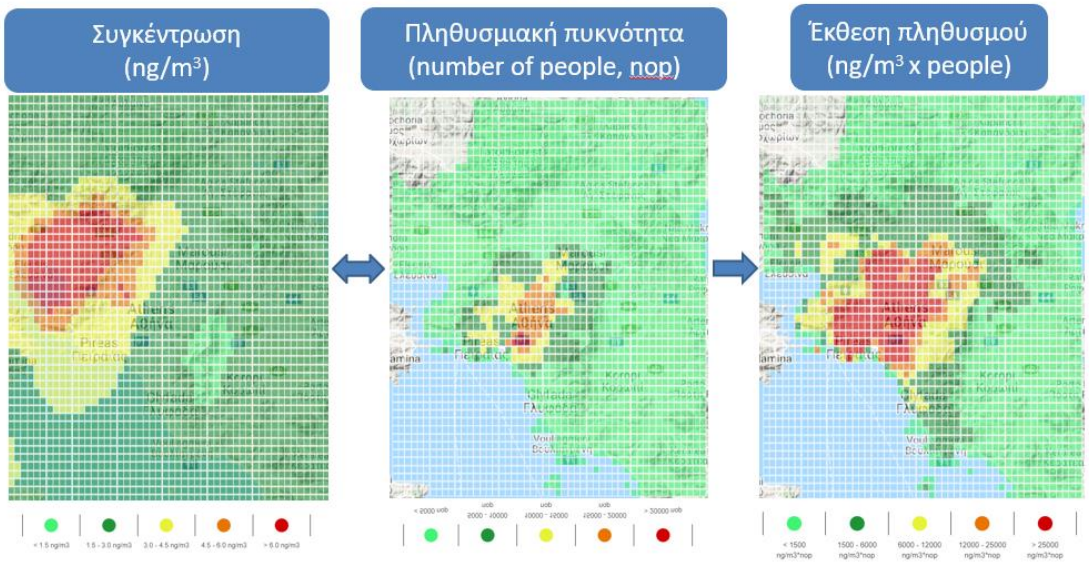
Αθήνα – Μέσες τιμές για το Δήμο Αθηναίων



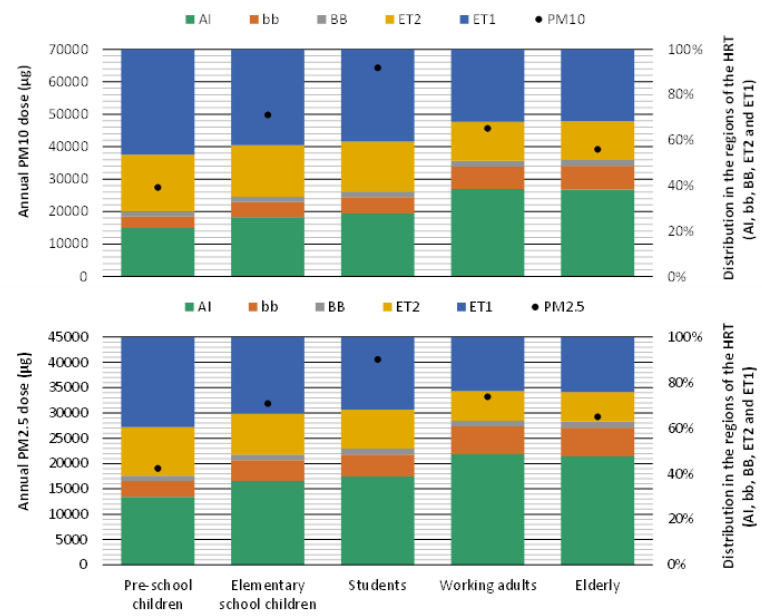


Έκθεση πληθυσμού

Αθήνα – Αρσενικό (As) στα ΑΣ10



Δόση ΑΣ στον ανθρώπινο οργανισμό

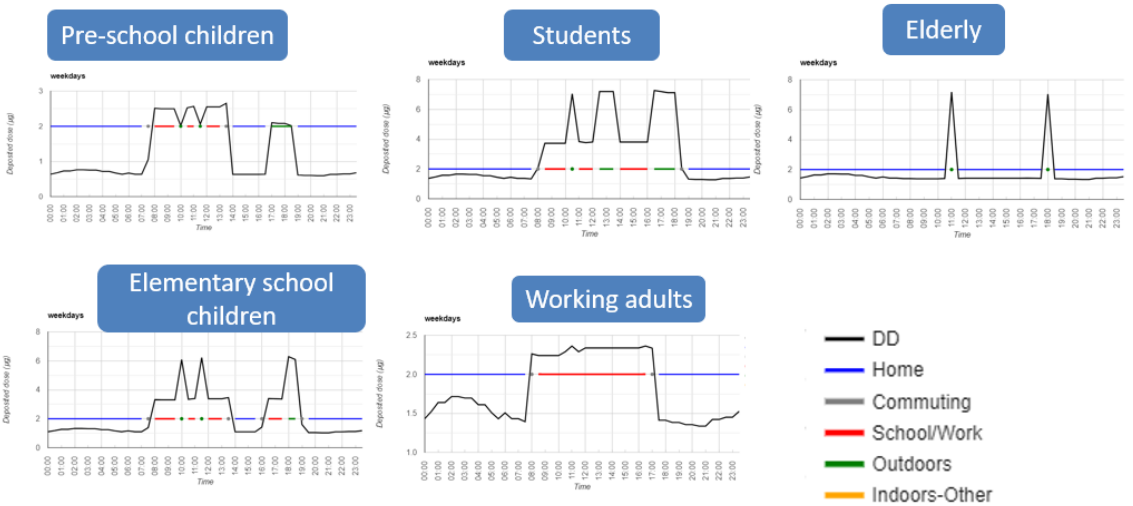


Αθήνα

Ετήσια δόση ΑΣ λόγω έκθεσης σε ΑΣ10 και ΑΣ2.5

Δόση ΑΣ στον ανθρώπινο οργανισμό

Αθήνα: Συνολική δόση στο αναπνευστικό σύστημα λόγω έκθεσης σε ΑΣ2.5

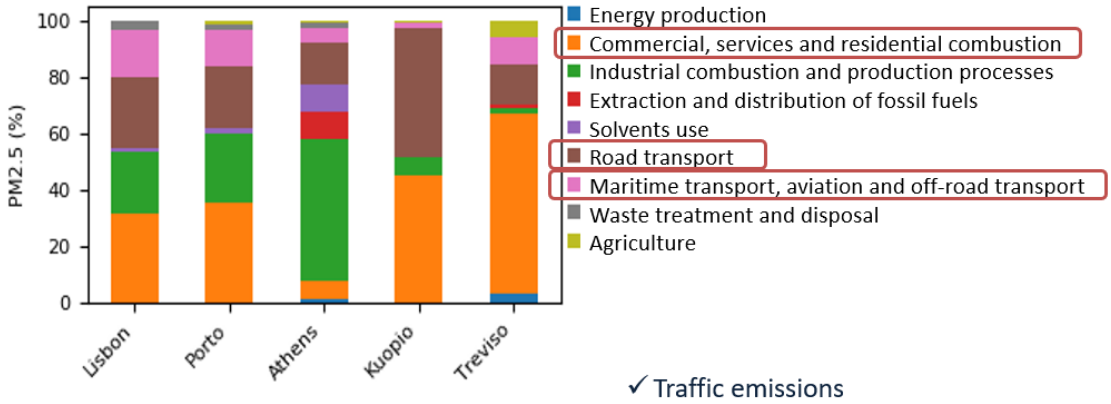


Επιβάρυνση στη δημόσια υγεία

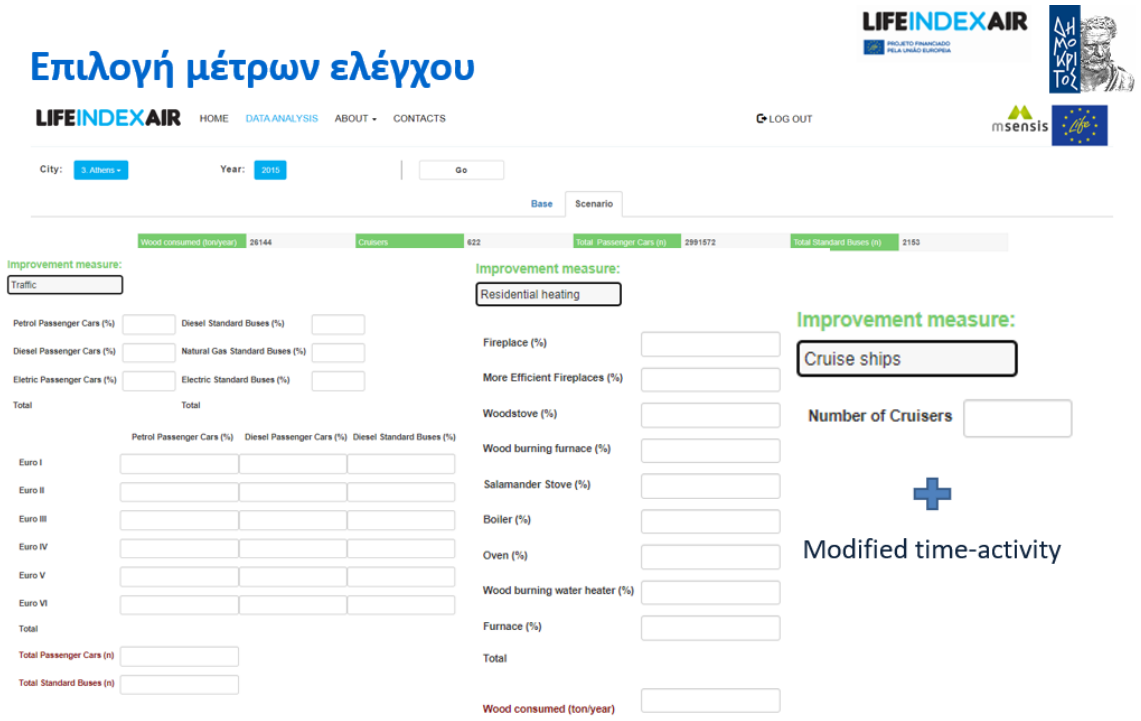
Athens: Burden of disease

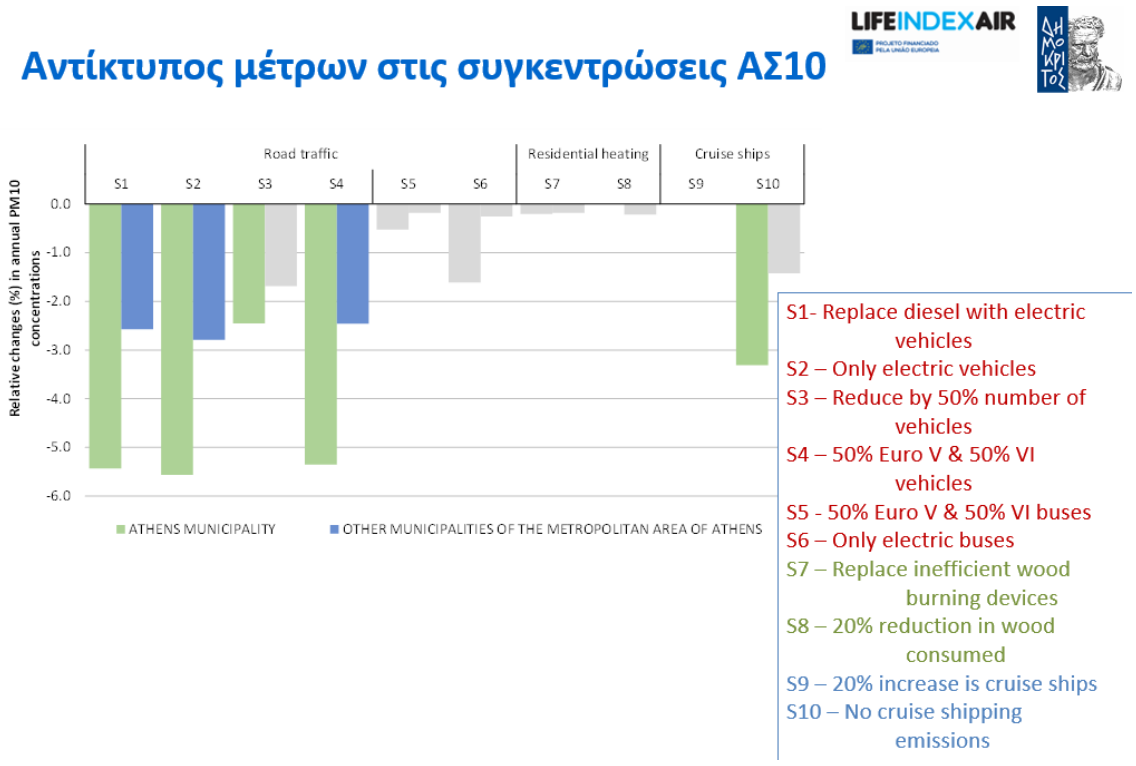
	Upper Respiratory Infections			Natural Mortality		
	Pre-school children	Elementary school children	All groups	Working adults	Elderly	All groups
DALY	1.20	1.10	2.20	46000	56000	100000
YLL	0.00	0.00	0.00	23000	43000	66000
YLD	1.20	1.10	2.20	23000	13000	36000
Deaths	0.00	0.00	0.00	640	3400	4100
Sick days (mild)	–	11000	–	–	–	–
Sick days (moderate)	–	7200	–	–	–	–
Sick days (severe)	–	140	–	–	–	–
Days of school absenteeism	–	3500	–	–	–	–
Total sick days	–	19000	–	–	–	–

Επιλογή μέτρων ελέγχου

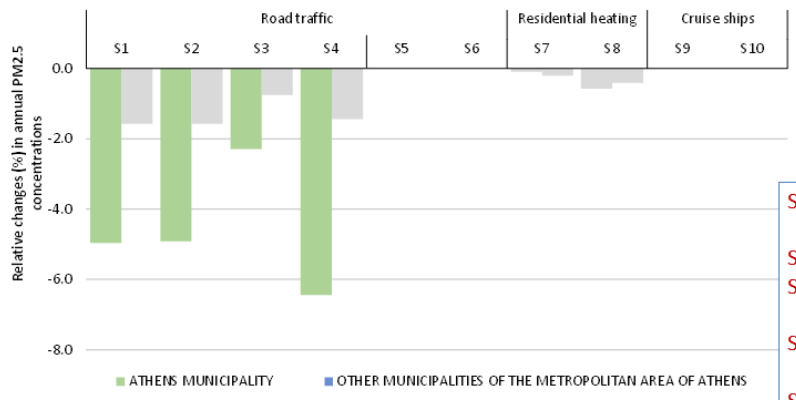


- ✓ Traffic emissions
- ✓ Domestic wood burning
- ✓ Cruise shipping


Επιλογή μέτρων ελέγχου
LIFEINDEXAIR
HOME
DATA ANALYSIS
ABOUT
CONTACTS
LOG OUT
msensis
City:
3. Athens
Year:
2015
Go
Base
Scenario
Wood consumed (ton/year) 26144
Cruisers 622
Total Passenger Cars (n) 2991572
Total Standard Buses (n) 2153
Improvement measure:
Traffic
Petrol Passenger Cars (%)
Diesel Passenger Cars (%)
Eletric Passenger Cars (%)
Total
Diesel Standard Buses (%)
Natural Gas Standard Buses (%)
Electric Standard Buses (%)
Total
Petrol Passenger Cars (%)
Diesel Passenger Cars (%)
Diesel Standard Buses (%)
Euro I
Euro II
Euro III
Euro IV
Euro V
Euro VI
Total
Total Passenger Cars (n)
Total Standard Buses (n)
Improvement measure:
Residential heating
Fireplace (%)
More Efficient Fireplaces (%)
Woodstove (%)
Wood burning furnace (%)
Salamander Stove (%)
Boiler (%)
Oven (%)
Wood burning water heater (%)
Furnace (%)
Total
Wood consumed (ton/year)
Improvement measure:
Cruise ships
Number of Cruisers
Modified time-activity

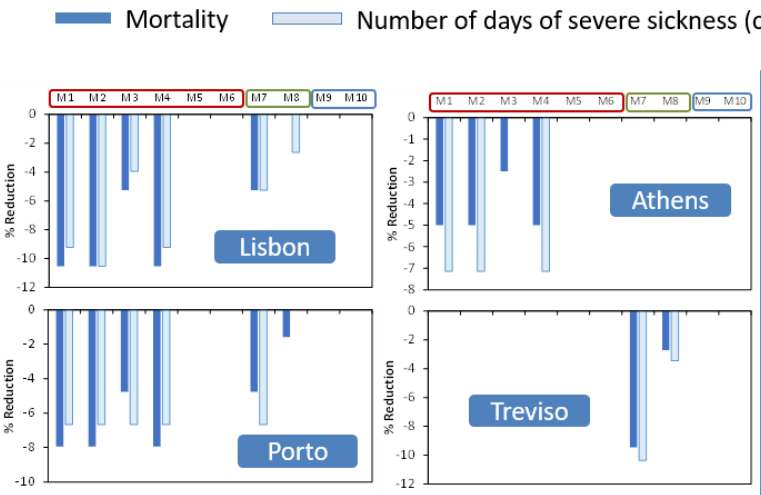

Αντίκτυπος μέτρων στις συγκεντρώσεις ΑΣ10
LIFEINDEXAIR
Road traffic
Residential heating
Cruise ships
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
Relative changes (%) in annual PM10 concentrations
ATHENS MUNICIPALITY
OTHER MUNICIPALITIES OF THE METROPOLITAN AREA OF ATHENS
S1- Replace diesel with electric vehicles
S2 – Only electric vehicles
S3 – Reduce by 50% number of vehicles
S4 – 50% Euro V & 50% VI vehicles
S5 - 50% Euro V & 50% VI buses
S6 – Only electric buses
S7 – Replace inefficient wood burning devices
S8 – 20% reduction in wood consumed
S9 – 20% increase is cruise ships
S10 – No cruise shipping emissions

Αντίκτυπος μέτρων στις συγκεντρώσεις ΑΣ2.5



S1- Replace diesel with electric vehicles
S2 – Only electric vehicles
S3 – Reduce by 50% number of vehicles
S4 – 50% Euro V & 50% VI vehicles
S5 - 50% Euro V & 50% VI buses
S6 – Only electric buses
S7 – Replace inefficient wood burning devices
S8 – 20% reduction in wood consumed
S9 – 20% increase is cruise ships
S10 – No cruise shipping emissions

Αντίκτυπος μέτρων στη δημόσια υγεία



M1- Replace diesel with electric vehicles
M2 – Only electric vehicles
M3 – Reduce by 50% number of vehicles
M4 – 50% Euro V & 50% VI vehicles
M5 - 50% Euro V & 50% VI buses
M6 – Only electric buses
M7 – Replace inefficient wood burning devices
M8 – 20% reduction in wood consumed
M9 – 20% increase is cruise ships
M10 – No cruise shipping emissions

Γενικά συμπεράσματα

- Το εργαλείο άσκηση πολιτικής Index-Air συσχετίζει τις εκπομπές ατμοσφαιρικών ρύπων με τις συγκεντρώσεις των ΑΣ, την προσωπική έκθεση και την έκθεση του πληθυσμού, τη δόση των σωματιδίων που εναποτίθενται στο αναπνευστικό σύστημα του ανθρώπου, και την συνολική επιβάρυνση στη δημόσια υγεία.
- Η εφαρμογή των εναλλακτικών σεναρίων δίνει τη δυνατότητα αξιολόγησης της αποτελεσματικότητας μέτρων ελέγχου που σχετίζονται με την οδική κυκλοφορία, την οικιακή καύση βιομάζας και τις εκπομπές από κρουαζιερόπλοια.
- Η πιλοτική εφαρμογή του εργαλείου αναγνώρισε ως σημαντικές πηγές σωματιδιακής ρύπανσης την οδική κυκλοφορία στη Λισαβόνα, στο Πόρτο και στην Αθήνα, και την οικιακή καύση ξύλου στο Τρεβίζο, στη Λισαβόνα και στο Πόρτο.

Ανάπτυξη Εργαλείου Διαχείρισης για τη Μείωση των Συγκεντρώσεων Αιωρούμενων Σωματιδίων στον Αέρα, βάσει της Ολοκληρωμένης Εκτίμησης της Έκθεσης του Πληθυσμού και της Εισερχόμενης στον Οργανισμό Δόσης

Παρουσίαση του εργαλείου άσκησης περιβαλλοντικής πολιτικής Index-Air
Δρ Ε. Διαπούλη, Ε.Κ.Ε.Φ.Ε. «Δημόκριτος»

Εκπαιδευτικό Σεμινάριο
Πέμπτη 30 Σεπτεμβρίου 2021

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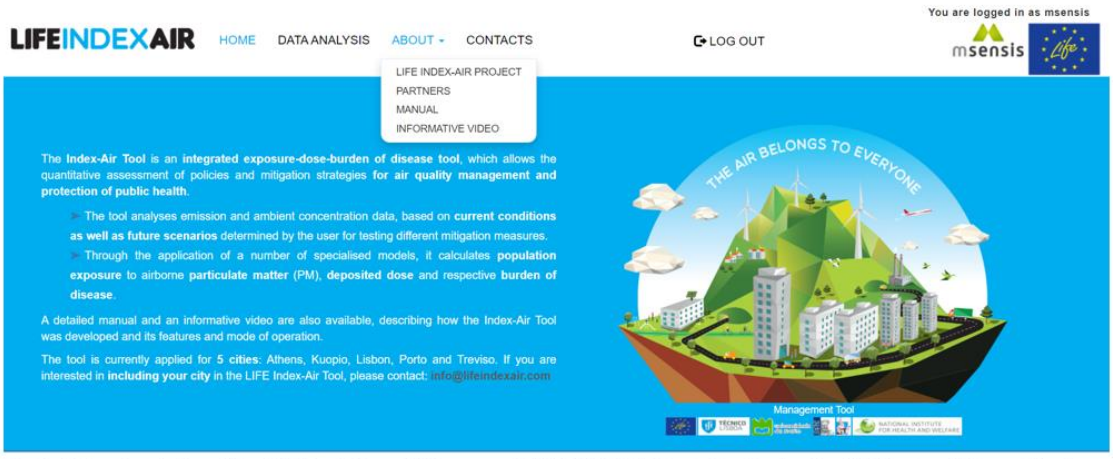
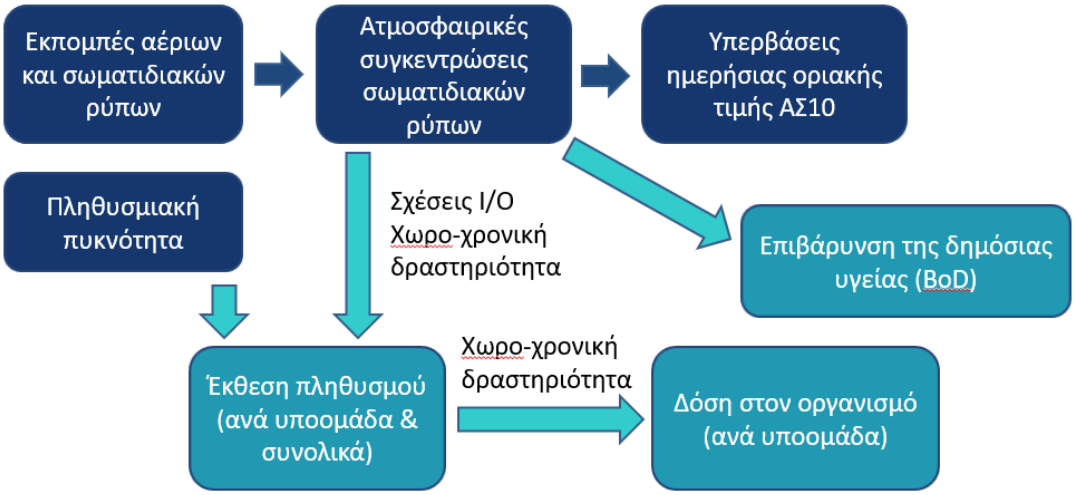
Παρουσίαση και πρακτική εφαρμογή του εργαλείου Index-Air

LIFEINDEXAIR



The Index-Air Tool was developed with the contribution of the LIFE financial instrument of the European Community (LIFE15 ENV/PT/000674). This work reflects only the authors' view and EASME is not responsible for any use that may be made of the information it contains.

Υπολογιστικά βήματα



Εναλλακτικά σενάρια εκπομπών

- **Vehicular Traffic**
  - Apportionment (%) of total passenger cars per fuel type (petrol, diesel or electric)
  - Apportionment (%) of petrol passenger cars per age (Euro I to Euro IV)
  - Apportionment (%) of diesel passenger cars per age (Euro I to Euro IV)
  - Apportionment (%) of standard buses per fuel type (diesel, natural gas or electric)
  - Apportionment (%) of diesel standard buses per age (Euro I to Euro IV)
  - Total number of passenger cars
  - Total number of standard buses
- **Residential heating**
  - Apportionment (%) of wood burning devices per type
  - Quantity of wood consumed (in tons/year).
- **Cruise shipping**
  - Number of cruisers (for Athens, Lisbon and Porto)

Τιμές αναφοράς παραμέτρων εκπομπών

Οδική κυκλοφορία

Table A1a. ATHENS: Base case input data for Traffic.

Total number of passenger cars	2991572	**Total number of standard buses**	2153
Petrol Passenger Cars (%)	92.40	Diesel Standard Buses (%)	80.80
Diesel Passenger Cars (%)	7.20	Natural Gas Standard Buses (%)	19.20
Electric Passenger Cars (%)	0.40	Electric Standard Buses (%)	0.00

	Petrol Passenger Cars	**Diesel Passenger Cars**	**Diesel Standard Buses**
Euro I (%)	12.09	12.09	22.89
Euro II (%)	20.66	20.66	42.49
Euro III (%)	31.63	31.63	16.22
Euro IV (%)	27.24	27.24	12.65
Euro V (%)	7.38	7.38	5.75
Euro VI (%)	1.00	1.00	0.00

Τιμές αναφοράς παραμέτρων εκπομπών

Οικιακή καύση ξύλου

Table A2a. ATHENS: Base case input data for Residential heating.

Type of device	**Contribution (%)**
Fireplace	3.20
More Efficient Fireplaces	1.80
Woodstove	8.00
Wood burning furnace	5.30
Salamander Stove	31.00
Boiler	31.00
Oven	16.00
Wood burning water heater	1.50
Furnace	2.20
Quantity of wood consumed (tons/year)	26144

Τιμές αναφοράς παραμέτρων εκπομπών

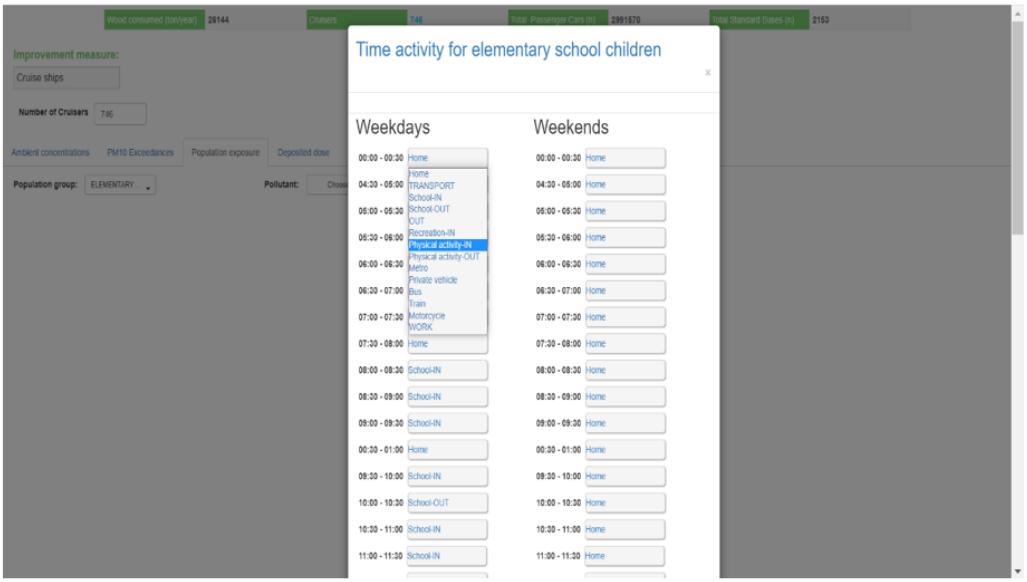
Εκπομπές από κρουαζιερόπλοια

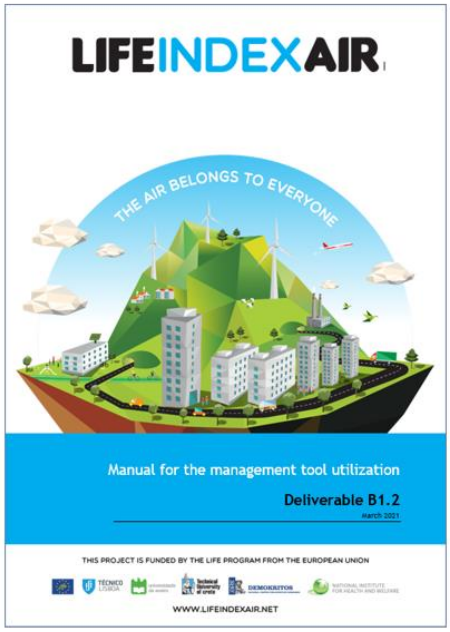
Table A3. Base case input data for Cruise ships.

City	Number of cruise ships
Athens	622
Lisbon	300
Porto	85

- Πρέπει να συμπληρωθούν όλες οι παράμετροι σε κάθε κατηγορία μέτρων.
- Προτείνεται η σύγκριση των εναλλακτικών σεναρίων με το σενάριο αναφοράς που προκύπτει με χρήση του αλγόριθμου ANN.

Εναλλακτικά σενάρια ημερήσιας δραστηριότητας για επιλεγμένη υποομάδα

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Manual for the management tool utilization

Deliverable B1.2

March 2021

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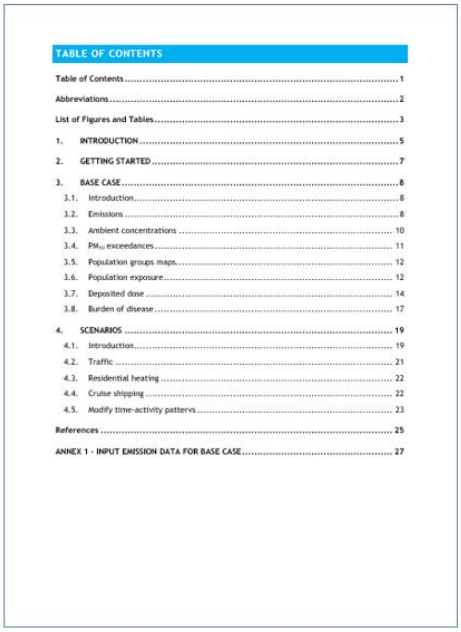
TABLE OF CONTENTS