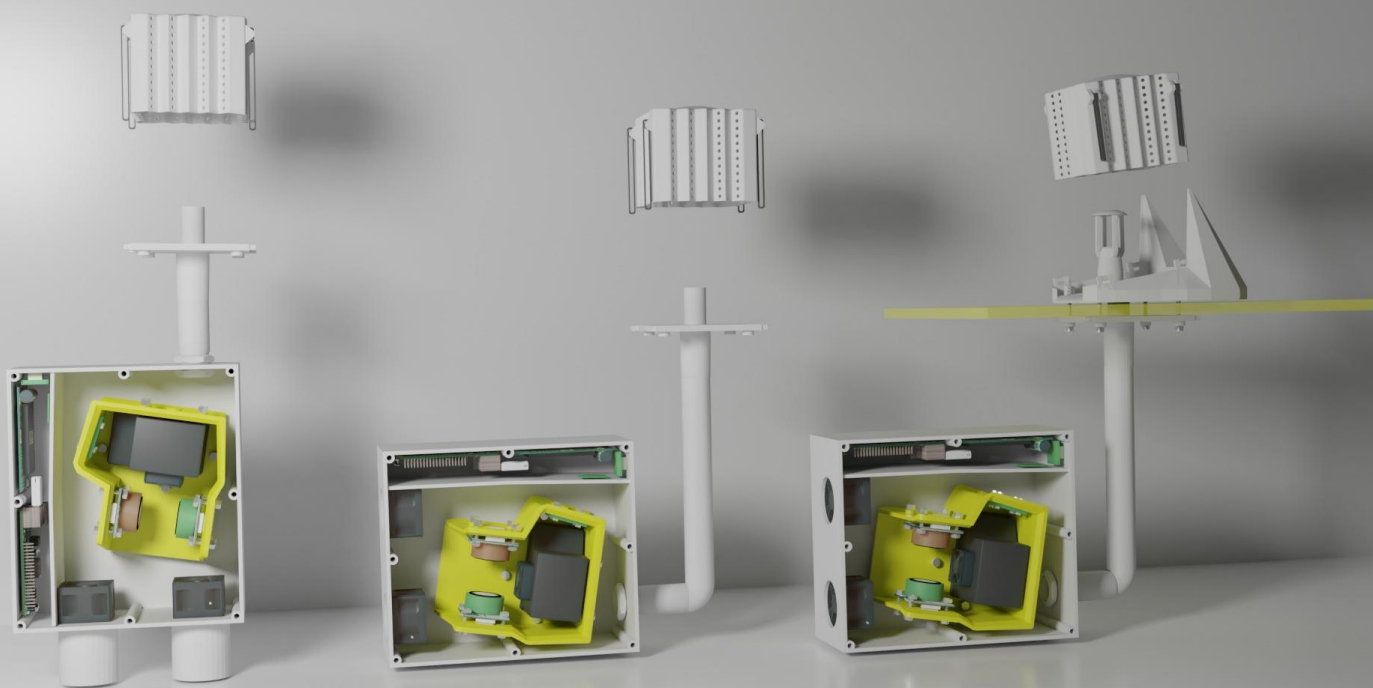


ExpoLIS

Assessment of Human Exposure to Air Pollution
to Change the Way People Move in cities

Newsletter 4

August 2020







Welcome to the fourth edition of the ExpoLIS Newsletter!

This newsletter is based on the ExpoLIS project. This and the future editions will aim to present the work that has been developed, the main outputs and dissemination activities.



In 2018, two partners joined to propose a new project to the Portuguese Foundation for Science and Technology (FCT). In the last years there has been an improvement in Air Quality in urban areas due to the latest emission control strategies. However, the citizens are still exposed to levels of air pollution above the limits imposed by the legislation. The ExpoLIS project was created with the objective of developing a system that will characterize Air Quality, support air pollution improvement measures and ultimately decrease the citizens exposure to air pollutants.

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Meeting the stakeholders and authorities

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Meeting the stakeholders and the relevant authorities is fundamental to receive their feedback regarding the final outputs of the project and identifying new opportunities. Their support is fundamental throughout the entire project and, therefore, the appropriate stakeholders and authorities have been identified and consulted. In this way, throughout the implementation of the project, their consultation will optimize the implementation of the project.

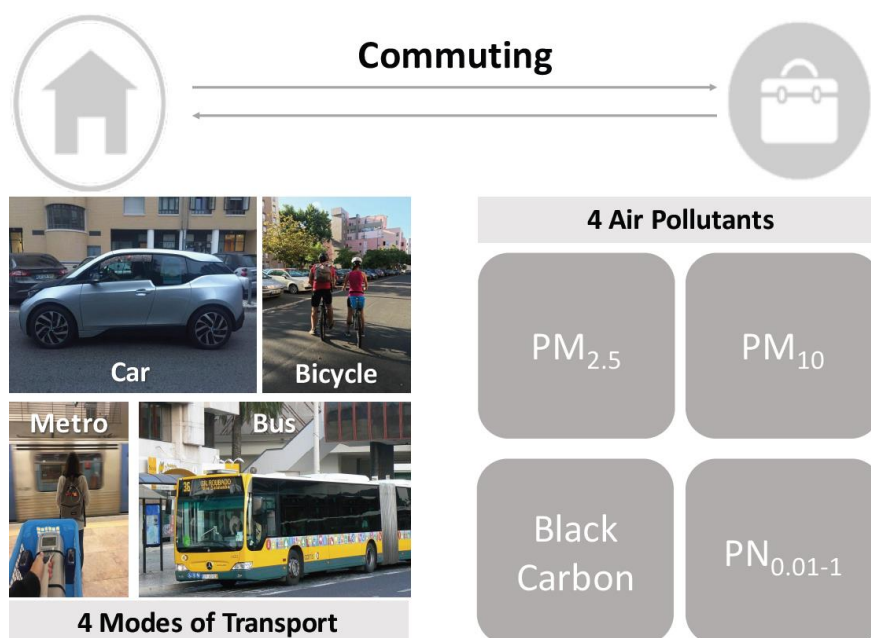
Until now, the ExpOLIS project has already promoted several meetings with stakeholders and authorities, namely:

- 📅 Meeting with CARRIS to present the project objectives, work plan and to discuss the development of the ExpOLIS sensor node
- 📅 Workshop “Mobilidade Elétrica para a melhoria da Qualidade do Ar nas cidades”
- 📅 Workshop “Smart Cities, Smart Health”
- 📅 Online meeting with CCDR-LVT to present the project objectives and work plan
- 📅 36th meeting of GTAR promoted by the Environmental Protection Agency



Particle exposure and inhaled dose while commuting in Lisbon

While commuting, individuals are exposed to high concentrations of urban air pollutants that can lead to adverse health effects. In the ExpoLIS project we assessed commuters' exposure to particulate matter (PM) when travelling by car, bicycle, metro and bus in Lisbon. Mass concentrations of $PM_{2.5}$ and PM_{10} were higher in the metro. On the other hand, the highest BC and $PN_{0.01-1}$ average concentrations were found in car and bus mode, respectively. In cars, the outdoor concentrations and the type of ventilation appeared to affect the indoor concentrations. In fact, the use of ventilation led to a decrease of $PM_{2.5}$ and PM_{10} concentrations and to an increase of BC concentrations. The highest inhaled doses were mostly observed in bicycle journeys, due to the longest travel periods combined with enhanced physical activity and, consequently, highest inhalation rates.



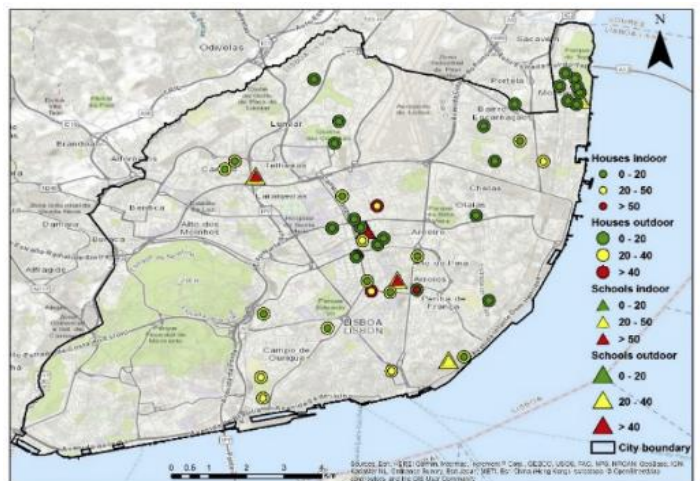
Read the complete article here:

<https://doi.org/10.1016/j.envpol.2019.113547>

Children's exposure and dose assessment to particulate matter in Lisbon

Exposure to Particulate Matter (PM) has been associated with adverse health effects. In the ExpoLIS project we quantified children's exposure to PM and the respective inhaled dose in Lisbon. For that, a time activity pattern survey was performed with the participation of 1189 children. In addition, PM was sampled inside 5 schools, 40 homes, 4 modes of transportation and in the respective outdoor environments. Time-activity pattern records showed that children spent 86% of their time indoors, especially at home and in the classroom. The PM_{2.5} and PM₁₀ concentrations in classrooms (35.3 $\mu\text{g m}^{-3}$ and 65.4 $\mu\text{g m}^{-3}$, respectively) were more than double than in homes (14.5 $\mu\text{g m}^{-3}$ and 18.2 $\mu\text{g m}^{-3}$, respectively) and highly exceeded the limit values established by the Portuguese legislation for indoor air quality.

The high indoor-to-outdoor concentration ratios (I/O) calculated in schools for PM_{2.5} (1.8) and PM₁₀ (2.1) suggest that a substantial fraction of particles was generated by indoor sources. PM daily patterns for classrooms showed the importance of occupancy, resuspension of dust and cleaning activities for the elevated levels of particles. The average daily children exposure was 20.6 $\mu\text{g m}^{-3}$ for PM_{2.5} and 31.5 $\mu\text{g m}^{-3}$ for PM₁₀. During weekdays, the classrooms contributed with 42% and 50% to the PM_{2.5} and PM₁₀ daily exposure, and with 36% and 41% to the PM_{2.5} and PM₁₀ inhaled dose, respectively. Children spent 3.4% of the time commuting which contributed to 6.3% of their exposure to PM_{2.5}. This work quantitatively demonstrated that indoor microenvironments (MEs) are the main contributors to personal exposure to PM and respective inhaled dose.



Read the complete article here:

<https://doi.org/10.1016/j.buildenv.2020.106666>

Meet the team

Patrícia Baptista

Patrícia Baptista is a researcher at IN+, IST. She has been active in quantifying the energy and environmental impacts of alternative energy conversion technologies, including buses, combining the use of experimental methods and models.



What will you find in the next issue?

-  ExpoLIS in the 2020 International Conference and Exposition on Electrical and Power Engineering
-  ExpoLIS in the 5th International Conference on Smart and Sustainable Technologies
-  Game-Like 3D Visualisation of Air Quality Data
-  Factors affecting the exposure to physicochemical and microbiological pollutants in vehicle cabins while commuting in Lisbon
-  Events with students
-  ExpoLIS in the European Night of Researchers 2019 and in the Ecology Day 2019
-  Meet the team: Pedro Mariano

Keep in touch!



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