INNOAIR

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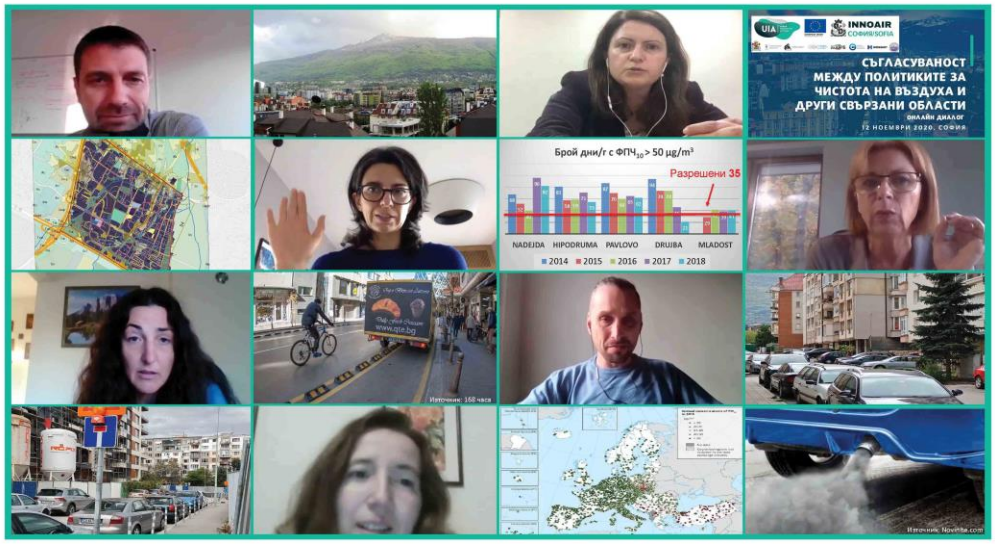
Innovative demand responsive green public transportation for cleaner air in urban environment

Multi-stakeholder dialogue on air pollution interdependencies Workshop report



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Key data

Stakeholder dialogue, air pollution, Interdependencies, co-design

Statement of originality

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Abstract

Within the INNOAIR project, and more specifically WP4: “Green Corridors” – a data driven joint collaborative research, a multi-stakeholder dialogue event on air pollution interdependencies was organized. The event brought together a broad pool of stakeholders, representatives of different levels of air quality policy and governance, public and private organizations, research institutes and academia, businesses, NGOs and citizens.

The multi-stakeholder dialogue event combined different forms of participation and engagement: a moderated roundtable discussion, presentations, co-design small group work, thus securing the utilization of a peer-to-peer approach in the dialogue allowing all participants to share knowledge and potential solutions for common challenges.

This report presents briefly the objectives, proceedings and outcomes of the multi-stakeholder dialogue event – the identified and prioritized air pollution interdependencies. It aims to be of further use and reference for the development of D4.1.3 - Guide book on air pollution interdependencies for various stakeholders, as well as other related project activities and deliverables related to the development of pilot implementations and behavior change.

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Dialogue goals and format

The INNOAIR project European organized a multi-stakeholder dialogue on air pollution interdependencies event on November 12, 2020.
The goal of the event was:

- To bring together and consult a variety of stakeholders, diversify view points and strengthen the air quality ecosystem;
- To identify interdependencies regarding air pollution in order to avoid inefficient short-sighted fixes and approaches;
- To help foster the collaborative approach required to deliver actions for enhancing air quality and reducing air pollution in the future;
- To explore potential further action for Sofia most challenging air quality problems and, where possible and appropriate, explore scope for possible measures;
- To promote synergies and avoid policy tensions between air quality policies, climate and energy policies, transport policies, agricultural policies and other policies, as well as links with health policy.

Also linked to the above is the potential to utilize a peer-to-peer approach in the dialogue allowing all participants to share knowledge and potential solutions for common challenges.
Due to the epidemic situation the multi-stakeholder event was held online via zoom webinar, with the following format: a series of presentations/contributions to outline different areas of interdependencies, presented by project partners and stakeholders, followed by a moderated discussion. The agenda is presented in Appendix 1. It was based on the need for a supportive and collaborative information exchange and ownership from both INNOAIR project and the stakeholders. The focus of the dialogue was how the future situation can be approved – how the identified and prioritized interdependencies need to influence positively the planned project activities. All presentations of speakers are published at: https://bit.ly/INNOAIR-dialogue-presentations.

Around 100 persons took part in the event – representatives of relevant departments of Sofia Municipality, public and private organizations, NGOs, academia, research centres and citizens. The list of participants is presented in Appendix 2. The dialogue process was open, with open invitations both publicized broadly and sent directly, and operated on a voluntary basis. The multi-stakeholder dialogue aimed to include different levels of air pollution management – although the focus was the municipal level, it also included regional and national level.

The multi-stakeholder dialogue is closely coordinated with the development of the new Sofia Municipal Program for Air Quality 2021 – 2026, which pursues the same objectives of improving implementation of relevant policies and proposing measures, addressing the causes of implementation gaps, and looking for solutions for air quality improvement.

Interdependencies and co-benefits concept

The speakers' presentations and the roundtable discussions outlined different factors that affect the quality of the air in Sofia:

- the relief and the meteorological conditions;
- the main sources of air pollution – traffic and mobility, household heating, construction, industry, agriculture;
- other factors affecting the air quality: road infrastructure and maintenance, infrastructure for active transport, traffic organization, public transport scheme, availability and accessibility, public transport vehicle fleet, energy efficiency and energy consumption, green areas and parks;
- synergies or lack of synergies between different levels of policies and governance – European, national, local, including charges, taxes and incentives;
- monitoring and reporting challenges;
- societal challenges and views.

Participants agreed we cannot look at air pollution on its own. We have to look at it as a part of a system of interactions between natural, social and economic environments. Thus, Sofia air quality should be considered as a dynamic system with spatial boundaries[1], consisting of:

- actors: individuals, groups of individuals, organizations/companies/institutions;
- relationships: the connections between actors;
- interactions in space and time of material, energy and interaction[2].

The interaction between actors, as well as in space and time, through which they impact on each other, are called interdependencies. These interactions and interdependencies vary in intensity and duration.

There are the various mechanisms of interdependencies (adapted from Dawson, R.J.[3]):

MECHANISMS OF INTERDEPENDENCY	DESCRIPTION/EXAMPLE
Functional	When one element is connected to and relies on another to operate (e.g. recycling, or circular economy).
Physical	When two processes share the same physical element or physical attributes (e.g. pedestrians and cyclist sharing sidewalks)
Geographic	When a geographical feature has impact of different processes (e.g. The geographical location (a valley in the mountain areas of the western part of the country) favors the accumulation of pollutants, especially during winter when thermal inversions lead to stagnant conditions for a couple of days.)
Economic & financial	When economic and functional aspects impact on different processes (e.g. vehicle taxation linked to the pollution levels cost, or public transport tariff affecting its usage).
Institutional & policies	When a national/local policy create "top down" interdependencies amongst societal agents (e.g. the national program for energy efficiency of residential blocks of flats influencing both supply and demand).
Social	When individuals and organizations interact locally, "bottom up" (e.g. air pollution risks are mediated by the attitudes, motivations, culture, values and different sets of concerns of individuals, organizations, government and society. These can lead to different policy, procedural and behavioral responses and acceptance of policies).

Table 1: Mechanisms of interdependencies

While risks and costs are important to consider, it is equally important not to overlook co-benefits in policy making and communications as well. Air pollution reduction will result in parallel positive effects in other areas, and consideration of these co-benefits is critical in the cost-benefit analysis of policies and measures and in the communication of these measures.

Main air pollution interdependencies in Sofia

Air pollution and natural-geographic characteristics of Sofia

Sofia is placed in the semi-closed Sofia valley surrounded by many mountains. This topography of the city prevents dispersion of the pollutants and results in unfavorable air quality conditions. The inversions are frequent in more than 50% of days in the year, mainly in autumn and winter[4]. Sofia is among the 5 big cities in Europe with the most unfavourable conditions in terms of climate factors that affect air quality. This is a constant factor that cannot be altered and all scenarios and measures need to consider it.

Air pollution and health

The particle matter (PM or PM_{10}, $PM_{2.5}$, PM_1), NO_x and ozone on ground level are the three pollutants that have biggest impact on human health – from respiratory problems, to harmful effects on the cardiovascular system, to premature death. Exposure to PM for instance reduces global average life expectancy at birth by one year[5].

Air pollution and global warming

One of the factors playing important role in the climate change processes observed nowadays is the dispersion of air pollutants in near ground atmospheric boundary layer that captures and retains the heat released by the Earth's surface in the lower layers of the atmosphere. Significant part of this pollution is resulting from different human activities. It comes from cars, factories, homes, and power plants that burn fossil fuels such as oil, coal, natural gas, and gasoline[6]. The change in the regional climate patterns attributes to the increased levels of atmospheric carbon dioxide, black carbon, PM, etc. produced by poor combustion of the fossil fuels. Climate change has the potential to create new interdependencies and reinforce existing ones. For instance, raising temperature in combination with densely built-in urban environment increases heat island effect, which generates use of more air conditioning, which in turn produces more air pollution, contributing to an increase in greenhouse gas emissions, as well as to health problems.

Air pollution and biodiversity

On a small territory there is a significant concentration of biological species in rivers, lakes, parks and forests. 1195 animal species are identified and 47 types of habitats[7].

The air pollution exercises direct impact on ecosystems particularly by sulphur and nitrogen emissions, and ground-level ozone as it affects their ability to function and grow. Emissions of both sulphur dioxide and nitrogen oxides deposit into water, on vegetation and on soils as "acid rain", thereby increasing their acidity with adverse effects on flora and fauna[8].

Air pollution and transport

The Sofia municipality has strong developed transport functions. The capital is the largest and most highly developed complex transport center in the country. The urban transport in Sofia Municipality is carried out through strongly developed network of electric transport (metro, trolleybuses and trams) and bus transport with a density comparable to that of other developed European cities of similar size and territory. Sofia has a culture of car use and high level of traffic congestion in certain areas. The car park is old, the average car age is 16 years. Over ½ of all vehicles in Sofia have Euro standard below 4. Though affordable and generally good, public transport is not evenly distributed and some neighbourhoods have limited access and transport options. The development of the transport system has direct influence not only on the air quality but on the whole socio-economic development of Sofia as well.

Air pollution and the urban environment

Urban planning directly affects the air quality in the city. As most cities, Sofia is designed around the use of cars. The infrastructure for safe cycling routes is still underdeveloped. There are city areas with small roads and walkways. Certain city areas have deteriorated air ventilation – due to their location on a low terrace and proximity to intensive sources of pollution, or due to poor urban planning and dense construction blocking the fresh air coming from Vitosha Mountain to the city center. Urban planning directly influences the amount of dust in the PM as well.

Air pollution and citizen perception

With the exception of some days in winter, air pollution is mostly invisible, and therefore many citizens are unaware of it or underestimate its effects. There are many misconceptions about good and bad response and behavior in relation to air pollution, as well as about cause-effect links. Oftentimes the dominant view is that the municipal government ought to solve the air pollution problems without the citizens changing their customary habits and behavior.

Air pollution and government (including government bodies and the normative framework they impose)

National and local government bodies have a tremendous impact on mitigating air pollution through the policies they impose, namely tax policy (on vehicles, housing, etc.); subsidies (for instance for alternative energy sources, or energy efficiency of buildings); regulation (of traffic, construction, etc.); pollution permits (carbon trading schemes); changing citizen behavior (through advertising and other communication tools). However, inefficient government spending preferences may have a negative effect on air pollution.

Air pollution and economic performance

As a capital city Sofia has the highest GDP per capita in Bulgaria. Its population is growing and has increased by 10% in the last 10 years. The sector of services consists of 89%, while the sector of industry forms 11% of the local economy, contributing to low levels of industry pollution. The emissions inventory shows that one of the biggest sources of pollution is household combustion of solid fuels. Around 15%[9] of households are defined as energy poor, which makes burning solid fuels their only heating choice. Currently 56 999 households (9.2% of all[10]) use coal and wood for heating. Low-income persons also buy and drive cheap cars that cause significant pollution.
In addition, the interdependencies form different chain connections, such as:

air pollution -> health issues -> economic performance -> demographic change
citizen perception -> favourable vehicle taxation -> high car ownership -> air pollution

The links are not always directly linear but are more complex.

Finally, the air-borne pollution, transporting pollutants over long distances, from other countries and even continents, is growing. Therefore, coordinated international efforts are necessary to address properly this challenge.

Conclusions and recommendations: what does it mean for Sofia?

The air pollution interdependencies, though diverse and complex, can be grouped in three major areas:

1/ urban environment;
2/ citizen perception;
3/ (local) government policy.

As the municipal government and most of the residents recognize the air pollution emergency, mitigation approaches will continue to be identified and developed. This will happen in an environment where other interventions are already taking place to address other priorities both at individual and community levels. Identifying the synergies between the various sets of interventions will make possible to clearly underline the co-benefits and therefore to tackle climate risks more effectively.

The best strategy is to spend money fostering the development of “clean” production technologies that do not cause air, water, environmental pollution rather than spending money dealing with the effects of the pollution on the environment.

Regarding municipal policies, they need to overcome the gap between scientific research and municipal norms. Wherever possible, more flexibility is needed so that local government can respond faster to the increasing pressure from citizens. Better and regularly used mechanisms for co-design of policies with the broad participation of stakeholders are necessary, too. Lack of coordination among different levels of government should also be addressed in an efficient and timely manner to avoid dispersing efforts and resources and sending the wrong messages.

The multi-stakeholder dialogue was held while the COVID-19 global pandemic is occurring. COVID-19 requires containment measures that significantly impact the lives of individuals, the economy, health and social care systems. Indirectly, it seems to affect air quality with factors such as a reduction in use of public transport and an increase in personal car use offset against increased home working for example. There is also emerging evidence of a link between exposure to air pollution and mortality from COVID-19[11]. It remains to be observed and studied how the pandemic continues to impact air quality related domains.

Appendix 1: Agenda

СЪГЛАСУВАНОСТ МЕЖДУ ПОЛИТИКИТЕ ЗА ЧИСТОТА НА ВЪЗДУХА И ДРУГИ СВЪРЗАНИ ОБЛАСТИ

Онлайн диалог

12 ноември, 2020

16:00 – 18:00

Столична община и партньорите й Асоциация за развитие на София, Софийски университет „Св. Климент Охридски“, Пловдивски университет „Паисий Хилендарски“, Национален институт по метеорология и хидрология, Национално сдружение на общините в България, Център за градска мобилност ЕАД и Моудшифт Европа ЕАД организират обществен диалог за обсъждане на взаимозависимостите в областта на качеството на въздуха: интелигентната мобилност, интелигентната секторна интеграция, енергията от възобновяеми източници, саниране на сгради, отоплението на жилища, селското стопанство и промишлеността, промяна на поведенческите модели на гражданите и други. Целта на диалога е подобряване съгласуваността на общинските политики.

Събитието е част от проекта ИНОЕЪР – „Иновативен обществен транспорт, отговарящ на търсенето на потребителите, за по-чиста градска среда“, съфинансиран от Европейския фонд за регионално развитие чрез Инициативата „Иновативни дейности за градско развитие“. Това е първият български проект, избран за финансиране от Инициативата.

ПРОГРАМА

16:00 – 16:10 **Откриване**

Кристиан Кръстев, заместник-кмет на СО и ръководител на проекта

16:10 – 17:10 **Взаимосвързаност на мерките за чистота на въздуха**

Теодора Полимерова, Столична община, *„Разработвани мерки в новата програма за КАВ“*

Миля Димитрова, Софияплан, *„Възможностите на Европейски зелен пакт“*

Петър Сеизов, Денкщат, *„Качеството на въздуха - от кои мерки имаме нужда?"*

Боряна Димитрова, Алфа Рисърч, *„Нагласи на гражданите"*
Доц. Елена Христова, НИМХ, *„Принос на различни видове източници към замърсяването с ФПЧ10 в гр. София"*

17:10 – 17:30 **Модерирана дискусия и заключение**

Модератор: ***Елица Панайотова***, „Зелена София"

РЕГИСТРАЦИЯ

Може да се включите в диалога за обсъждане на взаимозависимостите в областта на качеството на въздуха, като се регистрирате ТУК.

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[1] According to the requirement of the European and national legislation the territory of the country is divided into 6 regions for air quality monitoring and management. One of these regions is Agglomeration Sofia with the territorial scope of Sofia Municipality - 1348,9 km².

[2] https://www.researchgate.net/publication/318601827_Defining_System_a_Comprehensive_Approach

[3] Dawson, R.J. (2015) Handling Interdependencies in Climate Change- Risk Assessment. Climate, 3, 1079-1096; doi:10.3390/cli3041079. https://www.mdpi.com/2225-1154/3/4/1079

[4] Hristova, E.; Veleva, B.; Georgieva, E.; Branzov, H. Application of Positive Matrix Factorization Receptor Model for Source Identification of PM10 in the City of Sofia, Bulgaria. Atmosphere 2020, 11, 890

[5] Apte, J., Brauer, M., Cohen, A., Ezzati, M. (2018), Ambient Pm2.5 Reduces Global and Regional Life Expectancy.
https://www.researchgate.net/publication/327167942_Ambient_PM_25_Reduces_Global_and_Regional_Life_Expectancy

[6] https://www.epa.gov/

[7] https://vizia.sofia.bg/2019/03/05/biodiversity/

[8] http://www.unece.org/

[9] National Statistical Institute and World Bank Group (2018), Mapping Poverty in Bulgaria. https://www.nsi.bg/sites/default/files/files/publications/povmap.pdf

[10] Sofia Municipal Program for Air Quality 2021-2026

[11] Conticini, E., Frediani, B., Caro, D. (2020) Can atmospheric pollution be considered a co-factor in extremely high level of SARS-CoV-2 lethality in Northern Italy? Environmental Pollution. 261. https://doi.org/10.1016/j.envpol.2020.114465