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## Status Of Air Quality In Tirana During Quarantine Imposed Due To Covid-19 Global Pandemic.

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### Abstract

*This research paper builds on the analytical work conducted by Co-PLAN, Institute for Habitat Development under the “Green Lungs for Our Cities” project, supported by the EU Delegation in Albania. This specific publication consists on the analysis of data from a dedicated ground-based monitoring process conducted from March 11<sup>th</sup> to May 11<sup>th</sup>, 2020 in 4 different locations of Tirana on  $PM_{2.5}$ ,  $PM_{10}$  and  $NO_2$ , based on the protocol and practice established by the Alternative Monitoring Methodology of the Green Lungs project (link). Other sources, such as publications from World Bank “Regional Note on Air Quality Management in Western Balkans”, +IQAir “2019 World Air Quality Report”, European Environmental Agency “Air Quality in Europe – 2019 report” and “Assessing air quality through citizens science”, were also consulted during the analysis of data from this 62-days monitoring practice. The data provide an overview of how concentration levels of the selected air pollutants changed during the lockdown phase and after the removal of measures. The purpose of the monitoring process and of the report was threefold: (i) to verify the direct linkages between air pollutants and sources of pollution, (ii) raise awareness on air pollution among state and non-state actors, (iii) propose relevant measures to reduce urban air pollution for the near to mid-term future.*

### Keywords

Sustainability, sustainable cities, COVID-19, post-Pandemic, air quality

## Introduction

Air pollution in Albania constitutes the most pressing environmental and urban health risk facing the population. Ambient air pollution (AAP) is a serious local health problem that accounts for an estimated 5350 premature deaths per year and an average of 184 days of life loss country-wide (European Environmental Agency, 2019). Most common health implications related to high concentration of pollutants in air are, acute lower respiratory infections, increased risk for lung cancer, strokes, ischemic heart disease, chronic obstructive pulmonary disease and increased stress level. Polluted air damages vegetation and habitats whereas most commonly it leads to severe decrease of ecosystem services especially those close to urban and industrial areas. In Albania air pollutants originate from a range of sources that can be ranked by their impact:

- Combustion from vehicle engines combined with low fuel quality;
- Construction sector and heavy industry;
- SME that operates Medium and/or Low Combustion Plants;
- Illegal burning of waste and agriculture corps.

It is mandatory that from most of pollutants (*Sulphur Dioxide SO<sub>2</sub>, Nitrogen Dioxide NO<sub>2</sub>, Ozone O<sub>3</sub>, Particulate Matter PM, Carbon Monoxide and Dioxide CO & CO<sub>2</sub>*) monitoring practice have to report more than 75% of time during a year (6570 hrs. per year) so that it meets the requirements of the Ambient Air Quality Directive (European Union, 2008). From 2015 there were no accredited station in Albania that monitors and reports statistically accepted data on air pollution. Therefore most of citations on Albania's air pollution in any status reports from EU agencies, World Bank, WHO are referring to an information more than 5 years old. In the meantime, it is exactly the period between 2015-2020 when uncontrolled emissions have increased significantly and pollution concentration is considered to be the most important environmental risk to human health especially in Tirana and Elbasan. Given the contexts where the Albanian public is not informed in specific regarding the status of urban air quality and in the overall regarding the urban and environmental health from years now, citizen science and initiatives to fill this gap have contributed to a level in factorizing Air Pollution as a main concern in Tirana. Nowadays there are there main sources of information and fully accessible for public at large, namely:

1. *Green Lungs for Our Cities*. A project funded by the EU Delegation in Albania and implemented by Co-PLAN Institute for Habitat Development and Milieukontakt Albania. Indicatively monitoring the concentration of 8 different types of pollutants in Tirana, Durres, Elbasan and Shkoder Municipalities. Providing information via the dedicated Online Platform link regarding 2340 monitoring practices and results.

2. *Air Quality monitoring also on 8 components*, conducted by a cooperation between Vodafone Albania and Tirana Municipality for a total of 3 stations in Tirana. Providing real-time

information via the dedicated app Tirana Ime.

3. *Two sensors from IQ Air Visual* program were privately installed in Tirana, thus providing real-time data on the concentration of PM<sub>2.5</sub> via the global online platform link. As from the state institutions there are no publication of any monitoring practice nor a status report on air quality during the last years the national and social media was feed by civil society initiatives during 2019 and kept this issue in their highlights as there are more than 45 articles and broadcasts dedicated to this topic. On the other hand, communities are now fully aware regarding the unhealthy status of the urban air in Tirana and other main cities. Immediate effects in the decrease of pollution concentration were seen and sensed by all, this due to the restrictions imposed from March 2020 amid global pandemic caused by COVID-19.

## A unique case-study

By conducting regular daily monitoring practices from March 11<sup>th</sup> to May 11<sup>th</sup>, 2020 for a total of 62 days, in order to identify the changes of Air Pollution in Tirana for NO<sub>2</sub>, PM<sub>2.5</sub>, and PM<sub>10</sub> and address indicatively the correlation between measures and pollution level. Four locations were selected for this monitoring campaign, following the project findings from 2019 whereas these areas were all exceeding the allowed standards both in terms of concentration and days exposed. These locations are situated on the western part of Tirana's ring, namely Vasil Shanto crossroad, 21 Dhjetori crossroad, Architecture and Civil Engineering crossroad and Zogu Zi roundabout. A total of 681



Figure 1. Photos from the monitoring locations.

monitoring practices were conducted for an overall coverage by 10% of the total time.

In order to fully interpret the findings, a detailed correlation with imposed restriction by the central government was kept. Chronologically on March 11<sup>th</sup> public transport, construction sector and public gatherings were halted until a second notice. Two days later the full quarantine was imposed and there was no activity happening anywhere in the city. The very first finding can be addressed to the decrease of pollution level by 12.7% two days after the public transport and heavy vehicles were not circulating in the city. Following with the second finding, it took just one week without vehicles and construction for the pollutants (NO<sub>2</sub>, PM<sub>2.5</sub>, and PM<sub>10</sub>) concentration to drop below the EU standards in the Albanian Capital. On March 14<sup>th</sup> a high concentration of smog was inexplicably present in the city during the afternoon and evening. None of the sensors used during this campaign indicated any increase, as it was for the odour of Sulphur that oriented us to measure and control in various resources the real-time concentration of the Sulphur Dioxide. The result was that from 18:00 to 23:00 the SO<sub>2</sub> concentration reached a peak of 166 µg/m<sup>3</sup>. Even that there were few media's reporting the unprecedented situation, none of them explicitly identified the source causing this pollution. Nevertheless, it can be addressed to the waste being burned either in Tirana or Durres Municipality due to increased amount of waste generated from over-consumption that characterized first days of quarantine in our country. My results indicate a difference by 14% from day to day in terms of pollution concentration decreasing in the monitored areas. From April 5<sup>th</sup> to 7<sup>th</sup> we registered a record low pollution level in all the locations whereas the results are as following:

a. PM<sub>10</sub> = 6µg/m<sup>3</sup> (6 times lower than EU standard and 3 times lower than WHO standard)

b. PM<sub>2.5</sub> = 1.5µg/m<sup>3</sup> (13 times lower than EU standard and 7 times lower than WHO standard)

c. NO<sub>2</sub> = 7µg/m<sup>3</sup> (6 times lower than EU and WHO standard)

From the second week of the April, when the construction sector restarted their work on full capacity and also private vehicles were more and more present on the streets, until the end of my monitoring campaign it can be noted that slight increase of pollutant concentration in daily basis with moderate factor of 9% difference from day to day. It can also be noted the impact that strict measures on closing activities and movement during weekends had in regard to significant decrease of pollution in the city. To conclude with the fact that it was unprecedented for Tirana citizens to experience healthy air quality for a consecutive 52 days in a row. It is also important to note that from last week of April activities and circulation was moderately open without time restriction, beside public transport (urban-inter-urban and schools) that is foreseen to reopen on 15<sup>th</sup> of June. Nevertheless, the increase of concentration during the second week of May are not only attributed to the mass opening of all activities and transport in the city rather than to the meteorological conditions that characterized the whole Balkan Peninsula with Sahara Sandstorm. Which for the sake of the citation were

present for 10 days and more aggressive in terms of fine dust particles present in the air and latter covering urban and natural surface after the rainfall.

### Technical Findings

A more specific interpretation for each of the monitored pollutant: a. PM<sub>10</sub> average from March 11<sup>th</sup> to May 11<sup>th</sup> 25.76µg/m<sup>3</sup> and the lowest registered value 6µg/m<sup>3</sup> (6 times lower than EU standard and 3 times lower than WHO standard)

Therefore, indicating a substantial decrease by 41% comparing to the 2019 yearly average and standing at least 36% below the EU standard but nevertheless it didn't reach to meet the WHO standard whereas even during COVID-19 in Tirana we were at least 6% above their exposure standard. Tirana was reported to have a yearly average concentration of PM<sub>10</sub> = 50.6µg/m<sup>3</sup> during 2016 (RGJM, 2017). While the same source reported an increased concentration during 2017 PM<sub>10</sub> = 62.4µg/m<sup>3</sup> which is also the last report on Air from the state authorities. On the

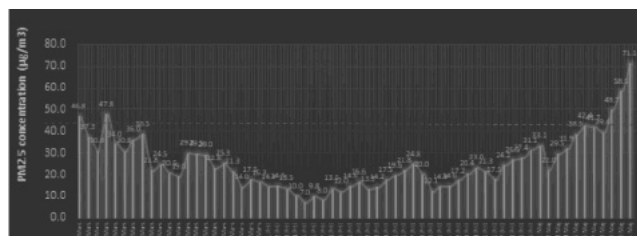


Figure 2. Daily concentration of PM<sub>10</sub> during the lock-down

other hand, from the Green Lungs project. on same component we registered an average yearly concentration of 43.8µg/m<sup>3</sup> during 2019.

b. PM<sub>2.5</sub> average from March 11<sup>th</sup> to May 11<sup>th</sup> 19.1µg/m<sup>3</sup> and the lowest registered value 1.5µg/m<sup>3</sup> (13 times lower than EU standard and 7 times lower than WHO standard)

Given the context where numerous researchers have cited direct link of fine particular matter to the aggravated effects of COVID-19, such pollutant in my case indicates a substantial decrease by 31% comparing to the 2019 yearly average and standing at least 25% below the EU standard but nevertheless it didn't reach to meet the WHO standard whereas even during COVID-19 in Tirana we were at least 91% above their exposure standard. Tirana has not reported a yearly average concentration of since 2015 therefore we can referee only to the data provided by Green Lungs project. During 2019 we registered an average yearly concentration of 27.8µg/m<sup>3</sup>. It is important to be

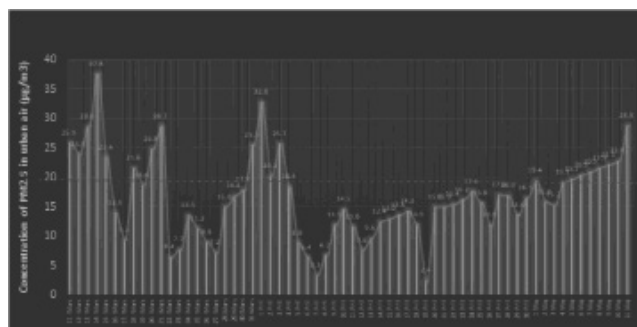
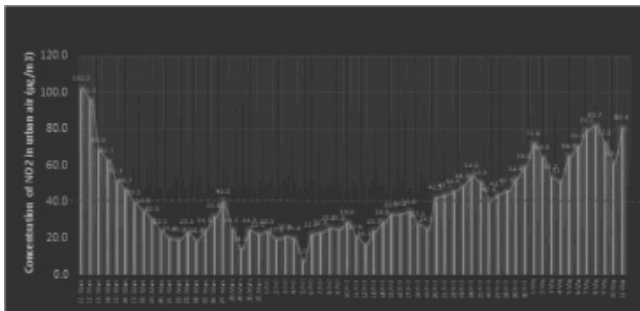


Figure 3. Daily concentration of PM<sub>2.5</sub> during the lock-down period in Tirana (11.March.2020 – 11.May.2020)

noted that the second week of May was characterized by meteorological conditions caused by the Sahara Sand-storm that was present in the whole region.

$c.NO_2$  = average from March 11<sup>th</sup> to May 11<sup>th</sup>  $42.1\mu g/m^3$  and the lowest registered value  $7\mu g/m^3$  (6 times lower than EU and WHO standard)

Nitrogen dioxide is considered to be the main problem in Tirana during the last 5 years now. It is directly linked with two acute problems that our city faces on a daily basis. Low level of mobility within the city whereas traffic congestions constricts most of the drivers and passengers to endure 200 hours of traffic per year and an average of 244 liters of fuel being burned in traffic (GJOKA, 2020). The second problem consist on a worst-scenario combination for a city as dense as Tiana, whereas the low quality of fuel is being burned in ICE vehicles that are part of one of the oldest fleet in the region. As a first finding it can be stated that even-though we experienced around 35 days in a row with  $NO_2$  concentration below the EU AND who standard of  $40\mu g/m^3$  the overall average of these monitoring campaign stands 5.3% above the EU and WHO standards. In terms of comparison with the concentration of previous years. Tirana was reported to have a yearly average concentration of  $NO_2 = 24.5\mu g/m^3$  during 2016 (RGJM, 2017). While the same source reported an increased concentration during 2017  $NO_2 = 67.5\mu g/m^3$  which is also the last report on Air from the state authorities. On the other hand, form the Green Lungs project. on same component we registered an average yearly concentration of  $112\mu g/m^3$  during 2019. Finally, we can state that enforced restrictions banning all transport means in Tirana contributed directly by reducing the  $NO_2$  concentration in urban air by 62% from the previous year. Nevertheless, it should be mentioned that by the



**Figure 4.** Daily concentration of  $NO_2$  during the lock-down period in Tirana (11.March.2020 – 11.May.2020)

end of the monitoring campaign, when transport means were gradually open in full (beside public transportation) the concentration started to increase by an average of  $1.47\mu g/m^3$  per day.

## Conclusions

From the very beginning of the global pandemic caused by COVID-19 there were two main in regard to Air Pollution. One that indicated a rapid decrease of pollution right after quarantine was imposed and the other one linking the clinical effects of the virus with populations living in polluted areas. For example, that someone who lives for decades in a county with high levels of fine particulate pollution is 8%\* more likely to

die from COVID-19 than someone who lives in a region that has just one unit (one microgram per cubic meter) less of such pollution (Harvard University, 2020). While across Europe the EEA database with more than 4000 monitoring stations indicated in real time how the  $NO_2$  concentration decreased by 24% in Milan, 40% in Barcelona and 56% in Madrid comparing to the same period of 2019. Similar air quality information was visually provided by Copernicus Atmosphere Monitoring Service via Sentinel 5 satellite that indicated in detail the decrease of pollutants especially in high dense urban areas. Tirana on the other hand registered a 64% which strengthens my statement that pollution load emitted from fuel burning in the transport sector also from traffic and emission standard of the existing fleet are the very foundation of air pollution in our city.

There is an increased risk that cities of western Balkans could suffer an increased pollution load being emitted in their cities where the energy systems is depending from Thermal Power Plants. Quarantine during the spring of 2020 indicated significant increase of energy demand by house-holds. Cities such as Prishtina, Belgrade, Skopje and Sarajevo local and central governments should be prepared if there should be a second wave of the pandemic and requiring people to quarantine during wintertime. This means that emissions from the coal/lignite power plants will increase significantly. In the case of Albania the central government should be prepared to avoid such situation in cities such as Korca, Pogradec, Kukes, Tropoja, Dibra and Shkodra, where citizens are still using wood, coal and pellets with very low calorific input also not applying any standard of emissions from these products being traded in the upper mentioned locations. The World Bank report “Regional Note on Air Quality Management in the Western Balkans” not only requires for increased efforts to avoid the potential increase of pollution during this year winter time but also reflects on a larger scale that such emissions will affect also the neighbouring countries (World Bank, 2020).

This said, in specific for Albania as we are do not have a coal-based energy system, we are more likely to face an increased pollution concentration since early winter 2020. Also more emissions are expected to increase concentration of urban ait pollutants especially during day time since most of activities will be conducted in active day-hours. Nevertheless we already have to bear in daily basis with  $NO_2$  concertation 2-times above the National, EU and WHO standard of  $40\mu g/m^3$ , with toxic emissions (dioxins and furans) from waste being burned in incinerators and open dump-sites, public works and private construction activities that do not invest any cent in terms of reducing their air pollution footprint.

Nevertheless, the current crisis, beside its multiple impacts on our socio-economy, offered a glimpse of what a resilient and sustainable society should look like once the Paris Agreement commitments are met and EU Green New Deal is implemented. Decarbonisation of energy, transport and industry sectors appears clearly to be the most resilient solution for a sound socio-economic shift toward a climate friendly and clean future.

## Policy Suggestions:

1. There is an emergent need that Albania invests and establishes an Air Quality monitoring and reporting network in line with the National Strategy for Air Quality DCM No. 594, date 10.9.2015 and National Plan for the Management of Air Quality DCM No.412/2019.

2. Finalize full transposition of the following directives in the Albanian Legislation:

- 2008/50/EC on Ambient Air Quality
- 2016/2284/EC on National Emission Ceiling
- 2016/802/EC on Sulphur Content
- 2009/126/EC Stage II of VOCs from petrol
- 2015/2193/EU Directive on Medium Combustion Plants
- 2010/75/EU Directive on Industrial Emissions Directive

3. Capacitate and enable a close cooperation of NEA and IPH where from one part there is a scientific interpretation of the pollution concentration and the other evaluates economic value in terms of the welfare-based approach of pollution exposure and overall urban-environment health status.

4. Transition toward a low-carbon economy will significantly decrease most of fossil fuel combustion sources. This should be a mid-term objective, therefore investments should be oriented and defined at a central level with a climate-neutral approach. Investments cannot continue to be made without an orientated decision making process, whereas in Albania and mostly in Tirana we are still not aware of both immediate and long-term footprints that private and public investments have in terms of Air Pollution and Ecosystem Services. There is by far not a single practice of Benefit-Cost Analysis that includes the ES, Air Pollution and Urban Health in the exercise.

5. The local government of Tirana and its Council should immediately should put emphasis on restricting air pollution from public and private transport, traffic congestion, construction and industrial sector, as these appear from the last 5 year to have become very-well known stationary sources.

6. In Tirana, the most exposed category of the population toward the exceeding concentration of pollution in daily basis is disproportionately distributed. There should be a feasible solution that any action taken to reduce air pollution do not burden poor and vulnerable people.

7. Public investments should be oriented toward climate-friendly interventions therefor a National Emission Target should be set after the Air Monitoring Network is established and the National Emission Analysis is conducted.

## Concrete Measures

Emission from public transport is assessed at 22kt per year in Tirana, sourcing by a fleet of only 305 busses. An immediate renew of these fleet should be subject of Tirana Municipality.

Either any buss part of the public transport fleet meets EURO-6 standard or we attempt to electrify the fleet or the system. An alternative for public transport could consist also on developing the appropriate infrastructure that either Tram, Train, Metro or Trolley is offered for Tirana outer Ring, Kombinat Kinostudio, Inner Rign, Train Station to Rinas Airport (along the economic area of the Highway) All these combined could reduce by half the usage of the private cars in Tirana for daily basis purposes.

-Emissions from heavy vehicles mostly used for public service operations and largely nowadays by the construction sector do not meet at least the EURO-3 standard of emission. Therefore, both central gov. institutions in collaboration with local authorities should enforce that these operators either meet the emission criteria to operate within the high dense urban area or they will be subject to a polluter pay tax for the air emissions.

-Emissions from private vehicles and motors are subject to technical control by the SGS company that licenses the vehicle technical conditions. Their practice includes a quantitative measurement of the exhaust system. Therefore, we insist that is important for each vehicle to be monitored for each of the specific pollutants causing problem with air pollution in Tirana (PM, NO<sub>2</sub>, VOC, SO<sub>2</sub>, HC, CO). Whoever does not meet the threshold of EURO-IV or above should not be provided with a renewed license.

-Electric vehicles are more present in Tirana more than ever before, introduced in large by Taxi companies that immediately felt the opportunity and now are expanding as they appear to be economically benefiting and facing traditional ICE with unequal competition. Fiscal policies should be drafted for that private owners of ICE vehicles can transit toward E-Vehicles. A practice now presents in all EU countries whereas in some other there are objectives to phase out all ICE by 2030. For Tirana this would be the ultimate solution in terms of removing for good the main source of Urban Air Pollution but it would require that the whole mobility and accessibility system is revised as a new charging network would be needed in Tirana but also country-wide.

-There is an initiative to prohibit vehicle circulation and transport during weekends in Tirana as a practice that had successful result on the decrease of certain pollutant in ambient Air. In our opinion, such intervention would affect and implicit significant economic sectors and also family routines that basically are ensured by the fundamental human rights. We as Co-PLAN would be more in favour, that for a dense city as Tirana that lacks urban parks at a neighbourhood level it would be beneficiary for citizens and also Urban Air to creat Low Emission Zones that would allow the circulation with a reduced speed only for vehicles that meet EURO-5 standard ore above and Ultra Low Emission Zones that wither do not allow any transport mean at all or could regulate only the presence of E-Vehicles.

Finally, it is sound to at least require that the law on Environmental Protection and Permitting and monitoring for the Construction, Transport and Industry Sector is respected. That all the activities being provided an environmental permit shall be subject to spot-monitoring from the institutions and that they

report their pollution foot-print accordingly. The abuse with irrelevant and non-sense data being provided by self-monitoring report, whereas not a single public investment nor a private construction activity didn't calculate from 2018 to nowadays their pollution load from their process and transport nor their delivered a scientific monitoring practice to indicate their daily-footprint. This should end immediately as the law is there to be respected and implemented equally by all.

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### Abbreviations List

AAQ	Ambient Air Quality
AM	Air Monitoring
AAP	Ambient Air Pollution
AKBN	National Agency of Natural Resources
CC	Climate Change
CO <sub>2</sub>	Carbon Dioxide
CO	Carbon Monoxide
COP	Conference of Parties
EC	European Commission
EU	European Union
EV	Electric Vehicles
HC	Hydro Carbons
ICE	Ignition Combustion Engines
IPH	Institute for Public Health
LEZ	Low Emission Zone
MIE	Ministry of Infrastructure and Energy
MTE	Ministry of Tourism and Environment
NO <sub>x</sub>	Nitrogen Oxides
PA	Paris Agreement
PM <sub>10</sub>	Particular Matter 10micrometer
ppm	Part Per Million
WB	World Brank
ULEZ	Ultra Low Emission Zone