

# SPECIAL REPORT: MANAGING AIR QUALITY BEYOND COVID-19

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# SPECIAL REPORT:

## Managing air quality beyond COVID-19

*From ECQ, MECQ and GCQ, air pollution rebounds with the return of transport and industry. What strategies can national and local governments pursue to solve air pollution and keep citizens safe and healthy?*

### Introduction

On March 16, 2020, transportation and industries ground to a near halt in Metro Manila as the government enforced an “enhanced community quarantine” (ECQ) in the country’s busiest metropolis. The lockdown was only one of the many across the globe that was implemented in an effort to slow down the spread of COVID-19. With the majority of the metro’s 2.5 million fossil fuel reliant motor vehicles off the road, air quality in the city was visibly improving. In fact, within less than 10 days, [an air monitoring laboratory](#) recorded a 180% decrease in PM2.5<sup>1</sup> since the start of the ECQ.

But two months later on May 16, with the easing of quarantine regulations and the return of motor vehicles around the capital brought on by the modified ECQ (MECQ), air pollution is gradually making a comeback.

Prior to the ECQ, smog was an everyday reality in Metro Manila. [Data](#) from the Department of Environment and Natural Resources (DENR) show that vehicular sources account for 65% of air pollution in the country, primarily in the capital. Air pollution is also expected to increase given the [projected 4.6% annual growth rate in energy demand](#). This demand is consistent with the [projected increase of road vehicles](#) to 24.8 million by 2030, compared to a baseline of 6.6 million in 2010.

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<sup>1</sup> PM2.5 is the term for fine particulate matter that is less than 2.5 micrometers in diameter. This pollutant can come from various sources, especially combustion of fuels. Because of its small size, it can impair lung function and is known to cause respiratory illnesses, heart disease, and premature death.



Every year, air pollution from fossil fuels takes millions of lives, increases risk to strokes, lung cancer and asthma, and costs the country trillions of dollars in economic losses. Filipinos have long been bearing the brunt of climate impacts, as well as health and economic impacts of dirty air. A Greenpeace Southeast Asia and CREA [report](#) released last February 2020 states that air pollution from fossil fuels—primarily coal, oil, and gas—is attributed to cause an estimated 27,000 premature deaths per year in the Philippines, and can cost the country up to approximately 1.9% of GDP in economic losses annually.

But air pollution doesn't have to be an inescapable reality. The ECQ gave Filipino citizens a glimpse of what cities can be like with vastly improved air quality. It also showed us that air pollution can be solved without sacrificing people's access to mobility.

Vehicles are a major source of air pollution, therefore improving mobility in cities is a key solution to the problem. Transport systems urgently need to be reorganized so that they use energy and resources efficiently and operate without emitting harmful pollutants. Meanwhile, cities need fewer and cleaner vehicles operating alongside greater use of climate -friendly mass public transport and widespread investments in shared mobility, walking and cycling. Finally, immediate policy reforms are essential to promote and encourage inclusive, sustainable and equitable mobility systems for the well-being of people.

### **About this report**

This report compiles data of two major air pollutants that are emitted from fossil fuel combustion, nitrogen dioxide (NO<sub>2</sub>) and fine particulate matter (PM<sub>2.5</sub>). Analysis of these two pollutants from March 15 to May 15, 2020 shows an initial and dramatic drop in air pollutant concentrations at the beginning of the lockdown, and the gradual rebound during the MECQ. With the metropolis shifting to looser restrictions on travel and other activities under the general community quarantine (GCQ) starting June 1, a return to smog and pollution levels prior to the ECQ may not be far behind.

While the report looks at the entire Metro Manila, it also gives closer examination to the air quality in seven major cities in the metropolis (Makati, Pasig, Manila, Quezon, Marikina, San Juan, and Caloocan), to show that the rebound trends are consistent across the capital.

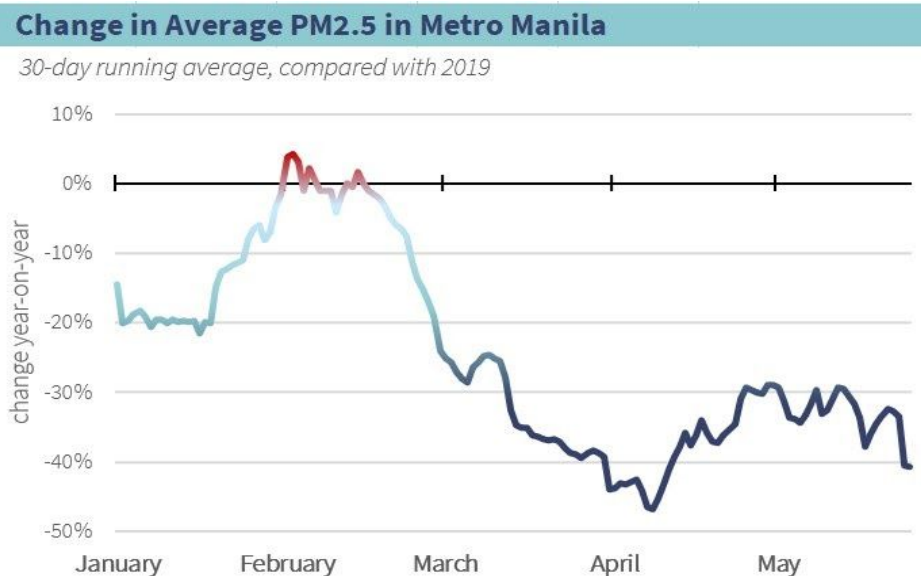
The report also briefly examines the link between air pollution, human health in general and COVID-19 in particular. Finally, this document lays down recommendations for national government policy makers as well as local government unit (LGU) officials to reduce air pollution post COVID-19, in order to safeguard people's health and ensure a better normal.

## Air Quality trends

While Metro Manila was under ECQ from March 15 to May 15, 2020, levels of tropospheric nitrogen dioxide (NO<sub>2</sub>) dropped by approximately 52% in comparison to 2019 levels. Similarly, station monitoring of fine particulate matter (PM<sub>2.5</sub>) reflects that the first 30 days had the lowest PM<sub>2.5</sub> air pollution levels that Metro Manila has had on record, averaging 11.59 ug/m<sup>3</sup>. This was mainly caused by a significant drop in transportation. Measures to tackle the spread of COVID-19 heavily restricted social and economic activity to essential services within the Philippine capital and between surrounding provinces, which drastically reduced both NO<sub>2</sub> and PM<sub>2.5</sub> levels.



SOURCE: CREA Analysis of IQ Air monitoring data



The concentration of both NO<sub>2</sub> and PM<sub>2.5</sub> levels in the atmosphere have been steadily increasing since the beginning of May, even prior to the shift to MECQ. As energy demand and production were reportedly operating at a loss; this steady increase in urban emissions was mostly driven by transportation activity. Vehicles, heavy traffic, and congestion contribute to approximately 88% of emissions in the National Capital Region ([DENR, 2016](#)). Although private vehicles and motorcycles make up [70% of vehicles on the road](#), about 82% of NO<sub>x</sub> are emitted by trucks, buses, and utility vehicles, while utility vehicles and motorcycles are responsible for over 90% of PM<sub>10</sub> emissions. Cities like Marikina, Manila and Quezon City — which have major connecting highways that serve as a backbone in transporting supplies and assistance during the lockdown and which are reportedly seeing more vehicles on the road — saw the highest increases in air pollution levels during MECQ.

### The rebound is happening across all cities

A closer look at air quality in seven major Metro Manila cities — Makati, Pasig, Manila, Quezon City, Marikina, San Juan, and Caloocan — show that levels of NO<sub>2</sub> and PM<sub>2.5</sub> drastically diminished within the first two weeks of ECQ (with the exception of Caloocan). Quezon City and Manila saw the highest reductions of the six. Although the metro’s overall air quality remained much improved compared to previous years, the air quality gains are now sliding back in all these cities. This change is expected as the country remains heavily reliant on highly polluting fossil fuel energy sources across all sectors.

The most drastic rebound in Metro Manila’s satellite-based NO<sub>2</sub> levels occurred in the first two weeks of May. Data showed an increase by almost 50% in comparison to the last two weeks of April 2020. With MECQ, NO<sub>2</sub> increased by an additional 24% when compared to the first two weeks of May.

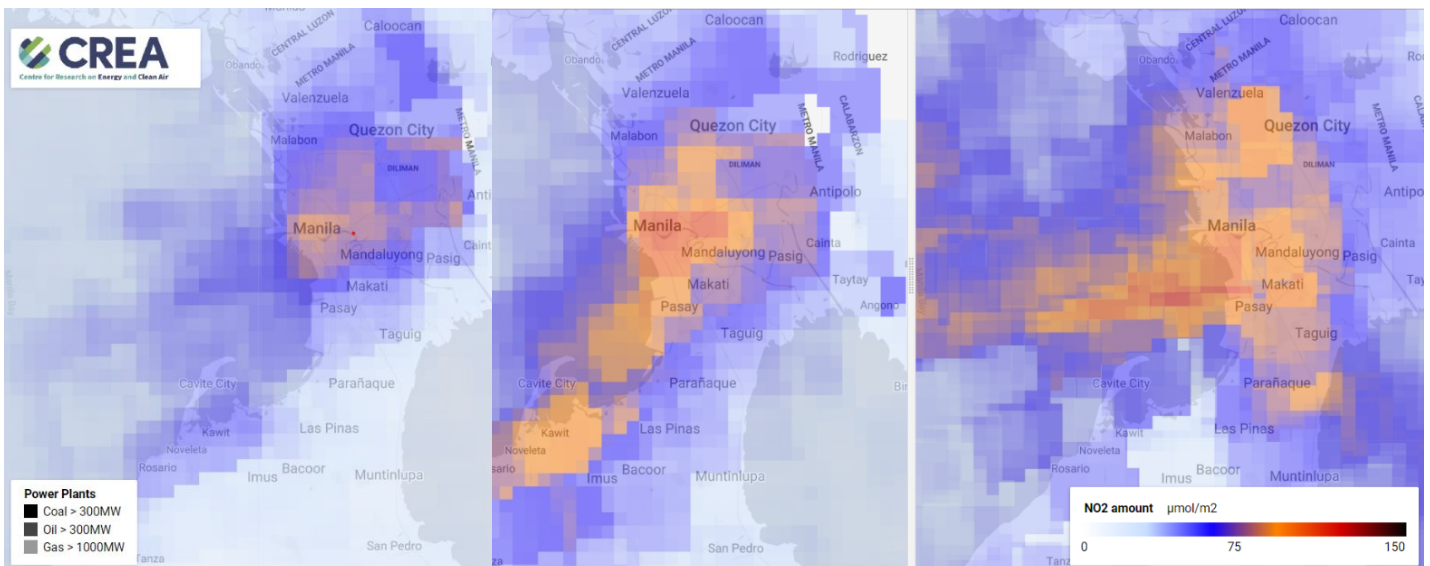
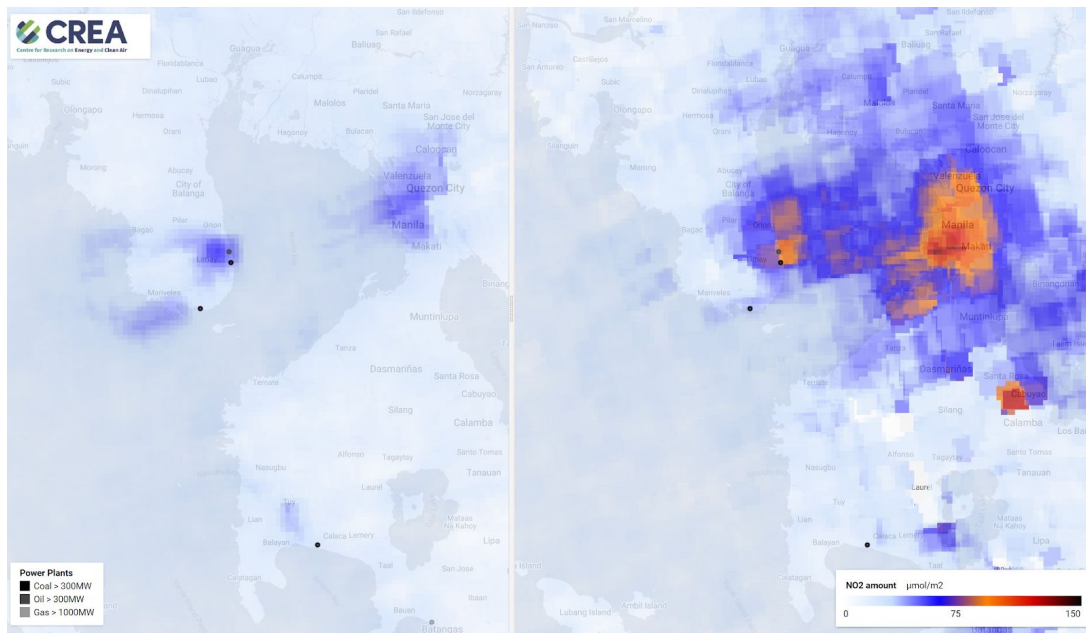


Figure 3: TROPOMI Satellite NO<sub>2</sub> in Metro Manila from April 25 to May 4 (left), May 5 to 15 (center), and May 16 to 26 (right) show a visible increase as lockdown measures ease.



*Figure 4: Satellite measurements show a rebound in emissions both in the Metro Manila urban region and the industrial areas in Limay, Bataan (coal power plant and oil refinery) and Calamba, Laguna (manufacturing industries).*

During the first week of May, Sentinel-5 Precursor satellite data reflected a significant rebound in atmospheric NO<sub>2</sub> over Marikina, San Juan, and Makati, where levels more than doubled in comparison to the last week of April. The cities of San Juan, Manila, and Quezon City also saw a notable surge — approximately 44, 35, and 22 percent respectively — from the previous week. Caloocan only saw a minimal increase of 6% that week but its NO<sub>2</sub> increased by nearly 47% the following week.

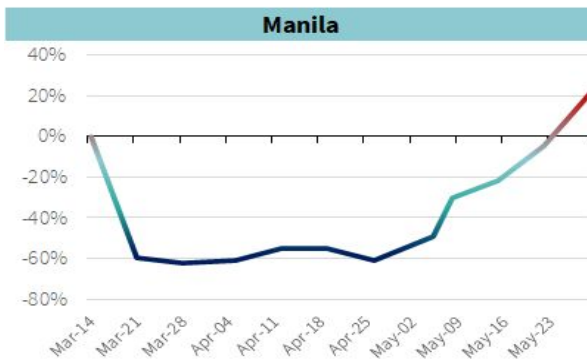
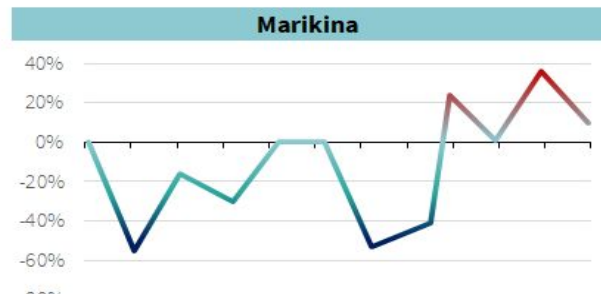
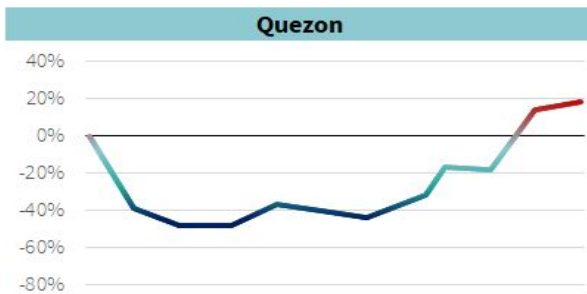
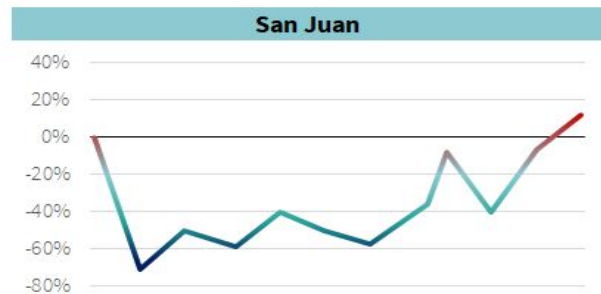
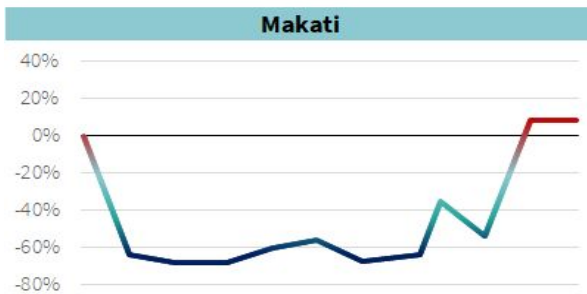
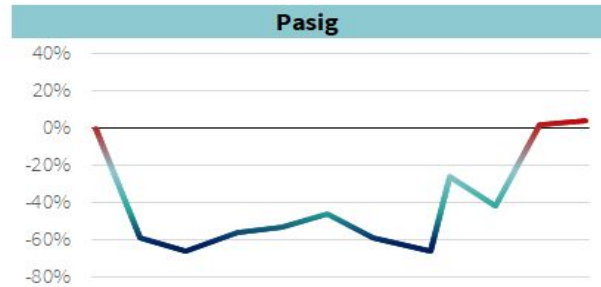
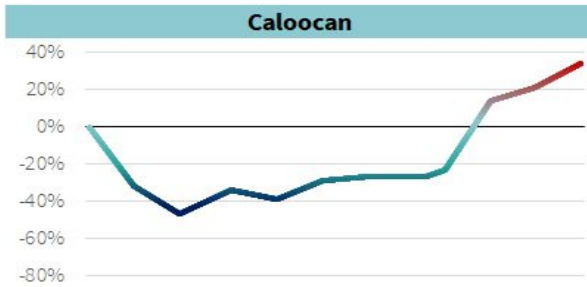
With the introduction of MECQ, Makati and Pasig saw the largest single week jump in NO<sub>2</sub> levels—increasing by around 75% from the previous week. San Juan also experienced a 56% increase, while the cities of Quezon and Marikina increased by around 35%; and Manila by only 21%.

These increases have resulted in NO<sub>2</sub> rebounding to levels prior to the lockdown across all the seven cities. As of June 1, 2020, the levels observed from the TROPOMI satellite in the majority of the examined cities (specifically Marikina, Caloocan, Quezon City, Makati, Marikina, and Manila) are now higher than those in early March.



## Weekly Average of Satellite NO2

% change from pre-lockdown levels



Six of the seven cities saw similar improvements in PM2.5 concentrations during the ECQ, with Marikina and Quezon City seeing the most dramatic reduction in comparison to previous years. Unlike NO2 levels however, PM2.5 levels did not dramatically rebound with the MECQ. One possible explanation for this is that transportation activities within cities remain limited, even with the increase of vehicles and traffic on major roads and highways. Caloocan was a visible outlier in this trend; the city did not see any sustained decrease in PM2.5 at any point during the ECQ. Instead, pollution increased throughout April and has since reached levels higher than those prior to the lockdown.

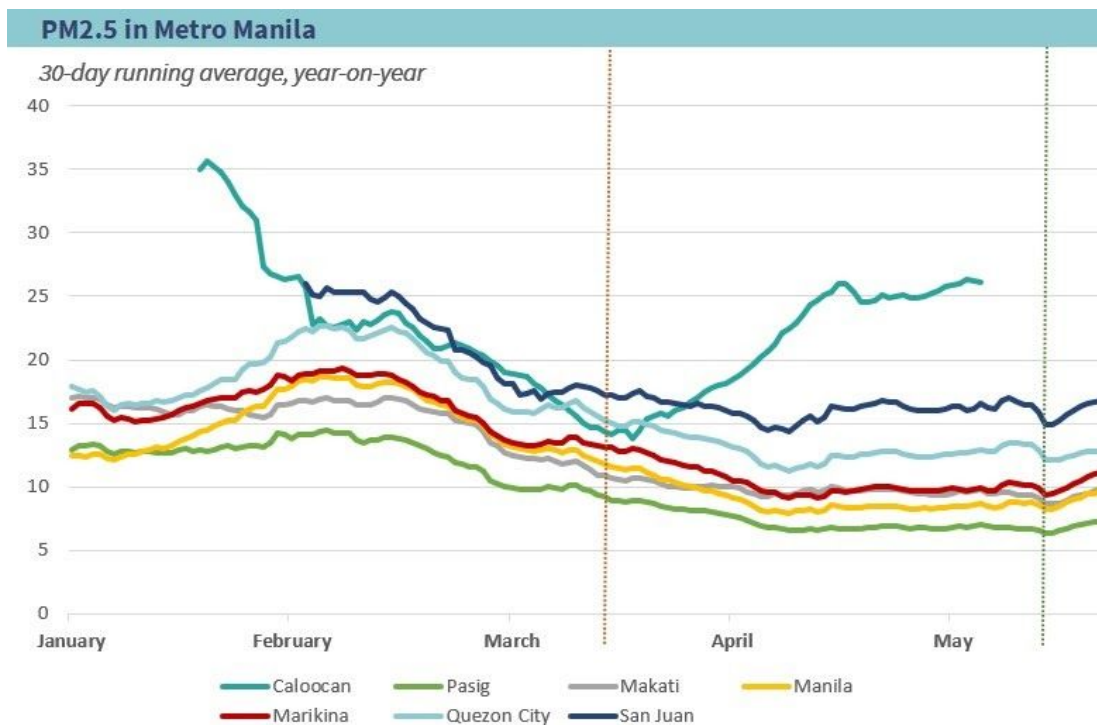


Figure 6: PM2.5 in most cities in Metro Manila saw a reduction in PM2.5 during ECQ and MECQ. Only Caloocan saw rising concentrations. (SOURCE: IQAir)

Between the seven cities, Pasig City saw the most sustained improvements in both NO2 and PM2.5 throughout the ECQ. On the other hand, Caloocan experienced the least improvements in overall concentrations of the two pollutants over the same period of time.

### Air pollution increases vulnerability to the pandemic and environmental impacts

The rebound has far-reaching implications for the country’s recovery, as air pollution, particularly from the burning of fossil fuels in transportation and industry, impacts not only health but also climate and the environment. NO2 and PM2.5 are linked to severe respiratory and cardiovascular health illnesses. Exposure to high levels of air pollution affects the body’s natural defenses against airborne viruses [and increases vulnerability to the current pandemic](#). Short-lived climate pollutants





like black carbon — a component of particulate matter — and methane, [affect climate change by accelerating global warming and glacial melt](#). Air pollution also threatens food and water systems, [reducing sunlight that reaches plants and crops](#) and even affecting the [trajectory and intensity of monsoons](#). Prioritizing clean energy and transportation in COVID-19 recovery efforts will be vital in keeping air pollution at manageable levels and in reducing compounding risks to human lives and livelihoods brought to light by the health crisis.

## Conclusion and recommendations

As epicenters of growth, [cities need to provide an environment that puts in high premium the health and wellness of both people and the planet](#). But as cities become polluted, city dwellers and local government units must be at the forefront in addressing climate, health, and economic crises.

The Philippines is no stranger to this issue as the majority of its cities in Metro Manila battle the COVID-19 pandemic. In the midst of this health crisis, [linkages between exposure to poor air quality and the virus continues to emerge](#). Managing air pollution during the time of this pandemic will require keeping the demand for transport low and deploying alternative modes of mobility that are accessible to all.

As the most vulnerable sectors to dangerous air quality are the urban poor, incorporating their welfare in the development of solutions will not only help the Philippines recover but will also bridge socioeconomic gaps in the megacity of Metro Manila, both in the short and long term.

The promotion of biking as the primary mode of mobility should not only be done in major thoroughfares such as EDSA, but across all cities in Metro Manila. Coincidentally, walking and biking have become the primary modes of mobility for urban poor and low-income earners with no option to take any form of mass public transportation during the community quarantine.

As fears around the spread of the virus remain, public transport will face a massive capacity challenge, as maintaining strict social distancing will mean these will have to operate with significantly less capacity per trip. With options like the Manila Light Rail Transit System, jeepneys, and buses being made limited or unavailable, the response of many Filipinos will be to default to private cars and motorbikes. This could have a higher impact in the seven cities which benefited from access to the MRT/LRT. A surge in private vehicles and motorcycles could see traffic and congestion return across Metro Manila—as we are already seeing—and with it, a return to dangerous air pollution levels.

With the current restriction on mass public transport, this may be the right time to improve its efficiency, safety and accessibility. This must include unyielding air quality standards, starting with the stricter implementation of the Clean Air Act. Such efforts must be supported by investments and commitments that could be impactful in the long term. Shifts to low-carbon transport that rely on green and renewable energy sources, integration of inclusive mobility to city planning and land-use



plans, creation of more green spaces, and reclaiming city streets for people are some of the solutions that will truly address Metro Manila's transportation emissions problem and improve its air quality.

Policies and infrastructure must prioritize the need to protect the mobility of people, such as bikers and pedestrians and must encourage the use of mobile markets and health services to bring essential services closer to the people.

Behavioral changes driven by the community quarantine, such as choosing to buy basic essentials in the nearest street market, opting to stay home, buying produce from local farmers, and growing one's own produce to lessen the frequency of visiting a market, must continue to be encouraged.

The call for greener economies is urgent and the solutions are available to make this possible in ways that could reform cities and restart their local economies.

Following the above, this report sets out the following key recommendations for reducing air pollution in the Philippines in the context of the current health crisis and beyond:

- **Maintain flexible remote work arrangements or apply staggered work shifts, where possible.** Such efforts have contributed to controlling the spread of the virus. By continuing to minimize physical interaction in various workplaces, this could also save employees from long commutes, help lessen vehicles on the road, and prevent the spread of COVID-19.
- **Promote people-centric urban design.** Cities are shaped by their citizens, and the life of each city is its people. It is therefore essential that every city space should be designed, allocated for, and managed to support the physiological, mental and societal well-being of people. In the proposed sustainability plan for transport and its integration to the comprehensive land use plans and national land-use plan, it is therefore important to have community-based city design, where people in their cities will be the primary planners of their cities, and not just beneficiaries. Local government units should foster an active citizenry to be able to ensure that all development plans and city designs are inclusive, equitable, holistic and addresses the needs of the people.

The limited resources in a city should always be sustainably allocated to all. Public city spaces, such as green spaces, parks and urban forests, should be created, expanded and managed. Unfortunately for the Philippines, despite existing laws that govern the provision of public spaces in the country, the dedicated area in Metro Manila for public spaces is only 0.03% of its land area, which is extremely low compared to cities like Singapore at 47% and Hongkong at 40% ([Green City Index, 2019](#)). Therefore, we strongly suggest that in the development of the city development plan, public spaces should be planned in parallel with the establishment of mobility programs.

- **Support and rebuild trust in mass transit.** Completely phasing out mass public transport is unsustainable and will hurt many who work for the sector and rely on it. Rather than banning the mass transport systems, providing clear guidance for safety and implementing sanitation measures like cleaning regimes; issuing PPEs to drivers and staff; mandating face coverings for passengers; and increasing trips to account for limiting the number of passengers per ride could safely allow the rail transit system, buses and public utility vehicles to run and lessen private vehicles on the road in the short term.

Stimulus packages should also be directed to the displaced drivers and transport related workers and these displaced workers should be tapped for local government relief and response initiatives such as jeepalengke, delivery services etc. Government offices and private companies should also look at providing shuttle buses to their employees as transportation support.

Looking into the future, national leaders, cities, municipalities, and transportation agencies must actively invest, improve, and expand rail and bus rapid transport systems, subsidize the modernization of public utility jeeps, shift to service oriented mass transport systems that are not dependent on fare / boundary systems for transport workers.

- **Promote low-cost, active and carbon-neutral transport options to enable micro-mobility,** both for sustainability and health reasons, and as a public priority to keep cities moving and enable economic activity. The priority for urban mobility development should be in the order of walking, cycling, mass transport and private vehicles. Local governments should consider reclaiming city streets for people by pedestrianization and designating no-car areas within cities, creating safe bike and walking routes and supporting infrastructure to encourage non-motorized transport.

Investing in e-mobility is also another viable pathway for local governments to pursue, and this must begin with increasing battery charging infrastructure for bikes, scooters and e-jeeps, so that both businesses and private citizens are given incentives to make shifts.

In addition, the government should provide not just policy and infrastructure, but develop and implement management systems dedicated to non-motorized mobility and other green and zero-emission micro mobility, and others. Soft infrastructure can also be done, such as enabling policies for carless streets, zero-emission roads, and pedestrian-only zones.

- **Tighten vehicle emission standards from Euro 2 to 4 to 6, and implement accordingly.** While a surge in private vehicle use could create a problem in the capital, trucks and buses still account for a good portion of emissions. The responsibility of maintaining and retiring vehicles that violate vehicle emissions should be placed on private companies. Properly

implementing such standards can also control the types of new vehicles put on the road and slowly disincentivize fossil-fuel powered vehicles.

Jeepney modernization to improve emission standards should not cause jeepney drivers to be displaced or lose their livelihoods. Therefore, this program must be implemented alongside strengthening social and financial support for transitioning jeepney drivers and operators. Governments should also encourage cooperatives rather than corporate ownership of fleets, as this will be better for drivers and commuters in the long term.

- **Develop real-time monitoring capabilities of dangerous pollutants** such as PM10, PM2.5, Sulfur Dioxide (SO<sub>2</sub>), NO<sub>x</sub>, Carbon Monoxide (CO), Ozone (O<sub>3</sub>), and Ammonia (NH<sub>4</sub>). In the Philippines, there is a limited number of real-time monitoring stations for air quality. Furthermore, access to air quality data is also limited and the stations are frequently malfunctioning, resulting in gaps in data, hampering the country's ability to measure and monitor air quality and evaluate emissions sources and exposure to better protect public health and the environment. The Department of Natural Resources (DENR) as the lead agency handling air pollution in the country must be further strengthened, more funds and manpower should be allocated to the agency to increase their capacity in air quality monitoring.
- **Strengthen industrial air pollution standards.** Philippine emissions standards for power plants and industry are some of the weakest in Southeast Asia. Emissions must be controlled from the stack as air pollution from such plants and facilities disperse to their surrounding areas and affect the wider population. These not only contribute to the rebound in air pollution in areas near the facilities, but also in the metro cities as power generation, oil refining operations, and industrial production resume. The government must strengthen emission standards to reduce air pollution emissions and its impacts, while planning a managed and just transition to cleaner energy sources in the long run. The review and update of current air pollution standards under Republic Act 8749 or the Clean Air Act of 1999 must be expedited and implemented immediately.

Solutions in the transportation sector, which this report has found to be a significant contributor to the rebound in pollution, are widely available and increasingly affordable; there are already various cities across the Philippines that are working on employing these solutions.

Moving forward, if the government is willing to use the opportunities and lessons learned from the pandemic and amplify it through policies and infrastructure, active mobility and micro mobility, as well as invest in efficient and safe mass public transport, then a return to the massive pollution levels before COVID-19 can be avoided. It must be noted that solving air pollution, particularly from fossil fuels, is not only good for people's health, it is also a solution to the climate crisis. At the local level, addressing air pollution is a key aspect of making cities livable and sustainable. At the national level, it means addressing the climate crisis while helping build climate resilient communities.



## About the Authors

**Centre for Research on Energy and Clean Air (CREA)** is a new independent research organisation focused on revealing the trends, causes, and health impacts, as well as the solutions to air pollution. CREA uses scientific data, research and evidence to support the efforts of governments, companies and campaigning organizations worldwide in their efforts to move towards clean energy and clean air, believing that effective research and communication are the key to successful policies, investment decisions and advocacy efforts. CREA was founded in December 2019 in Helsinki and has staff in several Asian and European countries.

**Greenpeace** is a global, independent campaigning organization that uses peaceful protest and creative communication to expose global environmental problems and promote solutions that are essential to a green and peaceful future. Greenpeace has been present in the Philippines since 2000, working to safeguard the constitutional rights of Filipinos to a balanced and healthful ecology.