DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
Environmental Management Bureau

NATIONAL AIR QUALITY STATUS REPORT

2019/2020

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Project Team:
Engr. William P. Cuñado, Director, Environmental Management Bureau
Engr. Vizminda A. Osorio, OIC - Assistant Director
Engr. Marcelino N. Rivera Jr., OIC - Environmental Quality Management Division
Engr. Jundy T. Del Socorro, Chief - Air Quality Management Section
Karen Ann F. Pacpaco, OIC - Environmental Education and Information Division

EMB Technical Committee
Joel Michael A. Tugano
Edmundo L. Escubio
Wyona Kay C. Rativo
Paul Nathan B. Vallar
Mariam F. Salemizadeh
Chadbert Nikko D. Aquino
Arnon Brix P. Faustino
Angelo F. Villegas
Shaun Jasper C. Go
Felix Brylle P. Domingo
Mae Ann S. Gatchallan
Josephine L. Monilla

Technical Writers
Mylene G. Cayetano, RCh., PhD
Krishna E. Santos, MSc

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Department of Environment and Natural Resources
Environmental Management Bureau
Environmental Quality Management Division
Air Quality Management Section

2019-2020

NATIONAL AIR QUALITY STATUS REPORT

A MESSAGE FROM THE EMB DIRECTOR

In support to the programs of the Department of Environment and Natural Resources - Environmental Management Bureau (DENR-EMB) and as a manifestation of the implementation of the Clean Air Act of 1999, we are pleased to present the National Air Quality Status Report (NAQSR) covering the calendar years 2019 to 2020.

This report is in accordance to Section 6 of Republic Act 8749, also called as the Philippine Clean Act of 1999, and under Section 4 Rule XIV Part V of DAO 2000 – 81, or the Implementing Rules and Regulations of the Philippine Clean Air Act of 1999, the Department, through the Bureau, shall produce an annual NAQSR which provides updates and accomplishments on the activities of the Bureau in relation to Air Quality Management.

The NAQSR 2019 – 2020 report includes: (1) Extent of pollution in the country (2) Analysis and evaluation of the current states, trends and projection of air pollution at various levels (3) Identification of critical areas, activities or projects which will need closer monitoring or regulation (4) Other pertinent qualitative and quantitative information concerning the extent of air pollution and their air quality performance rating of industries in the country

In addition, this report also contains the status and updates of the following: (1) Air Quality Action Plans and Framework (2) Status of Air Quality Management (New Policies, Management of Air Pollution Sources, National Emissions Inventory, and Nationwide Ambient Air Quality Monitoring) (3) Special Air Quality Episodes (4) Opportunities in Air Quality Management including Best Practices (5) Other Agencies Actions Towards Air Quality (6) Summary and Way Forward.

Also you will will find in this report the circumstances, challenges and efforts that EMB faced during the pre-pandemic (CY 2019) and post-pandemic era (CY 2020).

We, at EMB, will continue our outmost commitment to maintain, and safeguard the rights of the people towards clean air and, at the same time, carry over our vision of a nation empowered to protect our natural resources in harmony to the pursuit of sustainable development for a clean and healthy environment.

Once more, let us continue doing our share and be committed to protect our finite natural resources, attuned to the pursuit of sustainable development, for a clean and healthy environment that enhances the Filipino Quality of life for present and future generations.

ABOUT THE FEATURED IMAGE

Image of the Sierra Madre and Metro Manila as seen in the image taken by Mr. Johair Addang which was taken on Monday, March 23 at 5 pm, using Samsung S20 Ultra at the roofdeck of Lumiere Residences in Pasig City. The image was taken during the implementation of the Enhanced Community Quarantine (ECQ) in Metro Manila. In general, the air pollution in Metro Manila visibly lessened as the quarantine and the suspension of public transportation forced everyone to stay at home. In-depth explanation about the effect of ECQ in terms of air pollution will also be discussed in this report.

Taal Volcano Eruption 2020, Image taken by: Alecs Ongcal/Rappler

PREFACE

As a periodical publication prepared by the Department of Environment and Natural Resources – Environmental Management Bureau, the National Air Quality Status Report (NAQSR) has been providing the summary of the extent of air pollution per type of pollutant per type of source in the country. This latest NAQSR covering the years 2019-2020 highlights on the episodes that affect the air pollution in the country – be it from natural sources (multiple volcanic eruptions of Mt. Mayon and Mt. Taal), from anthropogenic sources. This report also covers the air quality management approach in the new normal, during a global pandemic brought about by COVID-19. Contents include reports on the state and trends of air pollution pre-pandemic (2019) and during the pandemic (2020). The report also contains actions and initiatives from the government agencies and stakeholders, with recommendations for necessary executive and legislative action. The identification of critical areas, activities, or projects that will need closer monitoring or regulation are included in the way forward. Pertinent qualitative and quantitative information concerning the extent of air pollution and the air quality performance rating of industries in the country is also covered. Upon the approval of the Secretary of the Department, the National Air Quality Status Report shall be submitted to the office of the President and Congress on or before March 31 of every year and shall cover the preceding calendar year.

Source: DAO 2000-81-2 Part V Rule XIV Section 4

EXECUTIVE SUMMARY

The National Air Quality Status Report covering the years 2019-2020 highlights the transition of the air quality status and management from the regular activities until the global pandemic due to SARS-CoV-2 (COVID-19) was experienced in the Philippines. Despite the pandemic, the air quality management, led by the Department of Environment and Natural Resources - Environmental Management Bureau (DENR-EMB).

- The performance of all programs on the management of air pollution sources have maintained above target, ranging from 113%-197% in 2019 and 115%-155% in 2020.
- Policies on the establishment of breakpoints and stringent PM2.5 Air Quality Guideline Values, Establishment of Air Quality Network Data Center using Data Acquisition and Handling System, Guidelines on Isokinetic sampling in tampered stack, Guidelines on the issuance of Permit to Operate thru Online permitting and Monitoring System and revocation of Memorandum dated 2 March 2009 on the Sulfur Dioxide Ambient Air Monitoring.
- Policies at the regional level are harmonized with the local government level, in particular, the identification of areas to be designated as attainment or non-attainment areas kicked-off.
- The clean air action plans are revisited, and the crafting of the 10-year Clean air action plan was commenced.

The overall air quality nationwide in terms of PM10 has significantly improved by 55% from CY 2012 baseline, from 60 µg/Ncm in CY 2012 to 27 in CY 2020. The improvement in air quality nationwide was attributed to the limited human activity during the declaration of community quarantine period starting March 2020. However, with the declaration of community quarantine and strict implementation of lockdowns in Metro Manila, 75% data requirement for air quality monitoring stations was not achieved.

Aside from the periodic new year's eve air pollution, several other air pollution episodes were encountered in 2019-2020, such as the Transboundary transport of Southeast Asian haze in 2019, Mt. Mayon eruption in March 6-12, 2019, and the Mt. Taal eruption in January 12, 2020. These, has brought opportunities in the management of air quality at the national and regional level, such as the establishment of Taal Watch.

The series of community quarantine measures did not hinder the national and regional offices in providing their best practices in the management of air quality for stationary and mobile emissions. Initiatives from the health sector, academic sector and non-governmental sector are not diminished amid the COVID-19 outbreak.

The community quarantine measures also provided opportunities in air quality management. For instance, it commenced the construction of the online permitting system for permit to operate, as well as several trainings and workshops on air quality that are conducted virtually. Moreover, the establishment of the Bus Rapid Transit (EDSA Carousel), Implementation of Bike Lanes in major thoroughfares, monitoring of Crematoria and a number of responses by the Regional offices strengthened the actions in the protection of air quality from various emission sources amid the pandemic.

Lastly, there are challenges, gaps and actions remaining for the enhancement of air quality management in the country, and these are envisioned to be addressed in the coming years. Despite the pandemic, the air quality management, led by the Department of Environment and Natural Resources - Environmental Management Bureau (DENR-EMB) continues.

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LIST OF ABBREVIATIONS

AAQS	Ambient Air Quality Standards
AQMgtS	Air Quality Management System
AQMF	Air Quality Management Fund
AQ MIS	Air Quality Management Information System
AQG	Air Quality Guideline
AQI	Air Quality Index
AQMS	Air Quality Management Section
ASGB	Airshed Governing Board
ASBU	Anti-Smoke Belching Units
ATM	Air Traffic Management
BAM	Beta Attenuation Monitor
BLISTT-ASGB	Baguio-La Trinidad-Itogon-Sablan-Tuba-Tublay Airshed Governing Board
BPB ASGB	Bulacan Pampanga Bataan Airshed GoverningBoard
BRT	Bus Rapid transit
CAA	Clean Air Act
CAR	Cordillera Administrative Region
CDTA	Capacity Development Technical Assitance
CEMS	Continuous Emission Monitoring System
CENRO	City Environment and Natural Resource Office
CHED	Commission on Higher Education
CME	Coco-Methyl Ester
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COC	Certificate of Conformity
DA	Department of Agriculture
DAO	Department Administrative Order
DepEd	Department of Education
DENR	Department of Environment and Natural Resources
DILG	Department of Interior and Local Government
DLSU	De Lasalle University
DOAS	Differential Optical Absorption Spectroscopy
DOE	Department of Energy
DOF	Department of Finance
DOH	Department of Health
DoTr	Department of Transportation
DOST	Department of Science and Technology
DPWH	Department of Public Works and Highways
DTI	Department of Trade and Industry
EANET	Acid Deposition Monitoring Network in East Asia
ECC	Environmental Compliance Certificate

LIST OF ABBREVIATIONS

EMB	Environmental Management Bureau
ENRO	Environment and Natural Resources Office
EPSL	Environment and Pollution Studies Laboratory
GDP	Gross Domestic Product
Hg	Mercury
H_2S	Hydrogen Sulfied
IIS	Integrated Information System
IG	Implementing Guidelines
IRR	Implementing Rules and Regulations
JAO	Joint Administrative Orders
LGU	Local Government Unit
LRT	Light Rail Transit
LpM	Liters per Minute
LTFRB	Land Transportation Franchising and Regulatory Board
LTO	Land Transformation Office
MC	Memorandum Circular
MO	Memorandum Order
MV	Motor Vehicles
MVIC	Moter Vehicle Inspection Centers
MVIS	Motor Vehicle Inspection System
NAQSR	National Air Quality Status Report
NAAQGV	National Ambient Air Quality Guideline Value
NCR	National Capital Region
NEHAP	National Environmental Action Plan
NESSAP	National Emission Standards for Sources Specific
NGA	National Government Agencies
NGO	Non-Governmental Organizations
NO_2	Nitrogen Dioxide
NOx	Nitrogen oxides
NSO	National Statistics Office
OPMS	Online Permitting and Monitoring System
O_3	Ozone
PAGASA	Philippine Atmospheric, Geophysical, and Astronomical Services Adminsitration
Pb	Lead
PCA	Partnership for Clean Air
PCO	Pollution Control Officer
PETC	Private Emission Testing Center
PM	Particulate Matter
PM_{10}	Particulate Matter with aerodynamic diameter less than 10 micron

LIST OF ABBREVIATIONS

$PM_{2.5}$	Particulate Matter with diameter less than 2.5 microns
PMS	Particulate Matter System
PTO	Permit to Operate
PUB	Public Utility Bus
PUV	Public Utility Vehicle
QA	Quality Assurance
QC	Quality Control
RA	Republic Act
RCM	Rotary Club of Makati
RO	Regional Office
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxide
TC	Tricycle
TEOM	Tapered Element Oscillating Microbalance
UP-IESM	University of the Philippines - Institute of Environmental Science and Meteorology
US EPA	United States Environmental Protection Agency
UV	Utility Vehicle
WHO	World Health Organization

OVERVIEW OF THE REPUBLIC OF THE PHILIPPINES

300,000 km²
LAND AREAS

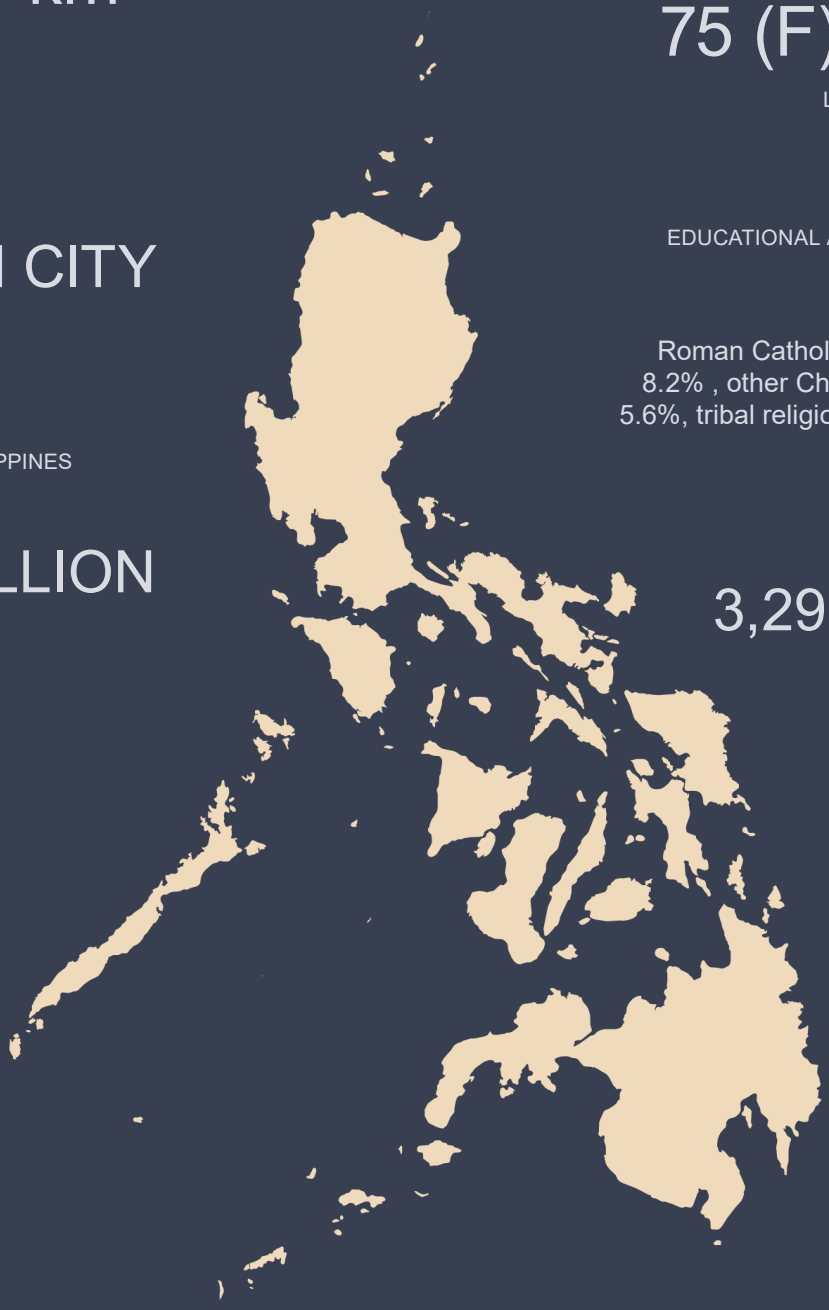
17
REGIONS

QUEZON CITY
LARGEST CITY

MANILA
CAPITAL OF THE PHILIPPINES

109.6 MILLION
POPULATION (2020)

2.5
FERTILITY RATE (2020)



75 (F), 67 (M)
LIFE EXPETANCY (2019)

10.1
EDUCATIONAL ATTAINMENT IN YEARS (2019)

Roman Catholic 80.6%, Protestant 8.2% , other Christian 3.4%, Muslim 5.6%, tribal religion 0.2%, other 1.9%, none 0.1%
Religion (2019)

3,298.83 USD
GDP (2020)

DATA SOURCES:
https://www.healthdata.org/philippines
https://www.gov.ph/web/explain/regions.html
https://datatopics.worldbank.org/world-development-indicators/

https://knoema.com/atlas/Philippines/Fertility-rate#:~:text=In%202020%2C%20fertility%20rate%20for%20Philippines%20was%202.5%20births%20per%20woman.

https://www.statista.com/statistics/971067/life-expectancy-at-birth-in-the-philippines-by-gender/#:~:text=In%202019%2C%20life%20expectancy%20at,about%2067.26%20years%20on%20average.

ENVIRONMENTAL MANAGEMENT BUREAU -
AIR QUALITY MANAGEMENT SECTION

INSTITUTIONAL MECHANISMS

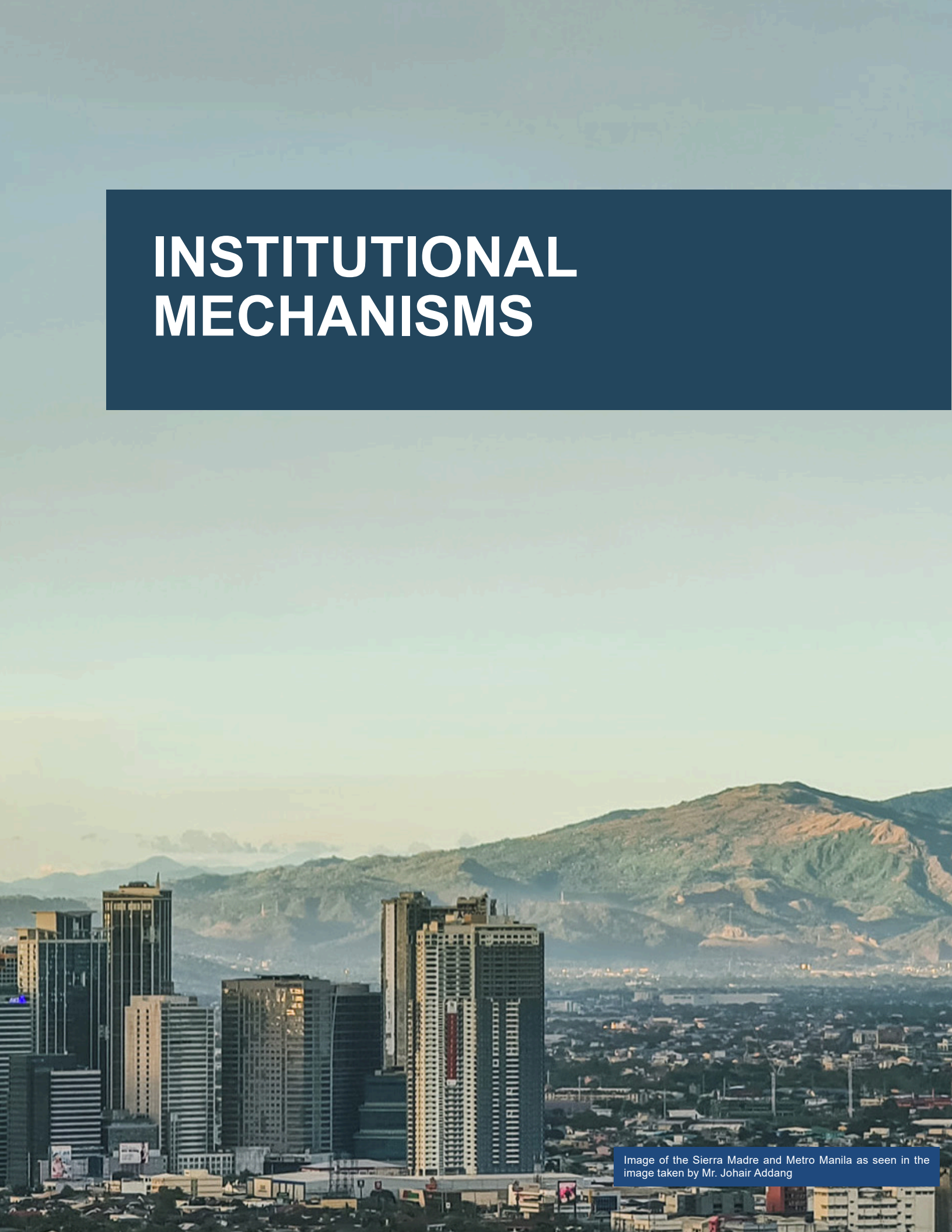


Image of the Sierra Madre and Metro Manila as seen in the image taken by Mr. Johair Addang

POLICY AND INSTITUTIONAL ASPECT IN AIR QUALITY MANAGEMENT

The Philippine Clean Air Act of 1999 (RA 8749) is the primary policy based on the basic principle of the government's role in protecting the advancing the right of the people to a balanced and healthful ecology that is synergistic with the natural environment. The RA 8749 also provides for the creation of a national program on air pollution management program that is based on area (jurisdiction), and that polluters must be responsible to any additionally generated air pollutants in exceedance to acceptable guidelines and standards. The RA 8749 ultimately aims to achieve and maintain healthy air for all and by all, as clean air is a basic human need, therefore be the concern of all.

Air Quality Management is primarily tasked to the Department of Environment and Natural Resources (DENR), through its line Agency, the Environmental Management Bureau (EMB). The DENR is the primary agency responsible for the conservation, management, development, and proper use of the country's environment and natural resources, specifically forest and grazing lands, mineral resources, including those in reservation and watershed areas, and lands of the public domain, as well as the licensing and regulation of all natural resources as may be provided for by law in order to ensure equitable sharing of the benefits derived therefrom for the welfare of the present and future generations of Filipinos. The EMB, on the other hand, formulates plans. Programs, and appropriate environmental quality standards for the prevention of pollution and the protection of the environment and ensures their implementation. The EMB was converted from a staff bureau to line bureau through the Republic Act No. 8749, otherwise known as the Clean Air Act of 1999 on June 23, 1999.

The Air Quality Management Section (AQMS) under the Environmental Quality Management Division (EQMD) of the Environmental Management Bureau (EMB) - Central Office in coordination with the EMB Regional Office Environmental Monitoring and Enforcement Division (EMED) and Clearance and Permitting Division (CPD) is mainly tasked to implement and enforce the Philippine Clean Air Act of 1999 or RA 8749.

Table 1 also lists the other Philippine Government agencies that have roles in Air Quality Management, according to RA 8749.

AGENCIES	BASIS UNDER THE RA 8749	ROLES
Department of Transportation (DoTr)	Section 21 Section 25 Section 46	The DoTr is mandated to implement the emission standards for motor vehicle, impose the fines and penalties for violation of these standards and conduct emission testing and apprehensions. It is also mandated to establish roadside motor vehicle inspection system. The DoTr contribute towards the establishment of the Motor Vehicle Inspection system (MVIS).
Department of Trade and Industry (DTI)	Section 21 Section 22 Section 46	The DTI shall contribute on the related training program and shall promulgate the necessary regulations prescribing the useful life of vehicles and engines including devices to ensure that such vehicles will conform to the emissions which they were certified to meet.
Bureau of Product Standards (BPS)		Shall be consulted on the set specifications for all types of fuel and fuel-related products, to improve fuel composition for increased efficiency and reduced emissions: Provided, however, That the specifications for all types of fuel and fuel-related products set-forth pursuant to this section shall be adopted by the BPS as Philippine National Standards (PNS)
Bureau of Import Services (BIS)	IRR Rule XII, Section 2	Bureau of Import Services (BIS) shall formulate regulations and guidelines that will ensure rebuilt and imported secondhand motor vehicles and engines will satisfy the emission standards for rebuilt and imported secondhand motor vehicles.

AGENCIES	BASIS UNDER THE RA 8749	ROLES
Department of Energy (DoE)	Section 26	The DoE shall consultatively set specifications for all types of fuel and fuel- related products, to improve fuel composition for increased efficiency and reduced emissions. The DOE shall also specify the allowable content of additives in all types of fuels and other fuel-related products. Such standards shall be based primarily on threshold levels of health and research studies.
Department of Science and Technology	Section 15 Section 22 Section 26 Section 33 Section 31	Coordinated by the DENR on the establishment of a National Research and Development Program for the prevention and control of air pollution, with special emphasis to research on and the development of improved methods having industry-wide application for the prevention and control of air pollution
Philippine Nuclear Institute		Regulate all projects that will involve Radioactive Emissions
Philippine Atmospheric, Geophysical and Astronomical Services Administration		Regularly monitor meteorological factors affecting environmental conditions including ozone depletion and greenhouse gases and coordinate with the DENR to effectively guide air pollution monitoring and standard- setting activities
Philippine Statistics Authority	IRR, Part V, Section 3	PSA shall design the Air Quality Database which shall be computerized and stored in a manner accessible to the public and shall contain data collected from the Ambient Air Monitoring Network and the Emissions Inventory.

AGENCIES	BASIS UNDER THE RA 8749	ROLES
Department of Interior and Local Government – Local Government Unit	Section 8 Section 10 Section 24 Section 36 Section 37 Section 7	Prepare and develop an action plan consistent with the Integrated Air Quality Framework to attain and maintain the ambient of air quality standards within their respective airsheds;
		Prepare and implement a program for designation of non-attainment areas;
		Develop and submit to the DENR through the Bureau a procedure for carrying out the action plan for their jurisdiction, provided that the Department through the Bureau shall maintain its authority to independently inspect the enforcement procedure adopted.
		Prepare and develop an action plan consistent with the Integrated Air Quality Framework to attain and maintain the ambient of air quality standards within their respective airsheds;
		Prepare and implement a program for designation of non-attainment areas;
		Develop and submit to the DENR through the Bureau a procedure for carrying out the action plan for their jurisdiction, provided that the Department through the Bureau shall maintain its authority to independently inspect the enforcement procedure adopted.
Department of Education	Section 39	Public Education and Information Campaign, a continuing air quality information and education campaign shall be promoted by the DENR.
Department of Agriculture		
Philippine Information Agency		

MANDATE

The DENR-EMB is mandated to implement the following national environmental laws:

Presidential Decree 1586 (Environmental Impact Statement System)

The Environment Impact Assessment System was formally established in 1978 with the enactment of Presidential Decree no. 1586 to facilitate the attainment and maintenance of rational and orderly balance between socio-economic development and environmental protection. EIA is a planning and management tool that will help government, decision makers, the proponents and the affected community address the negative consequences or risks on the environment. The process assures implementation of environment-friendly projects.

Republic Act 8749 (Clean Air Act of 1999)

The law aims to achieve and maintain clean air that meets the National Air Quality guideline values for criteria pollutants, throughout the Philippines, while minimizing the possible associated impacts to the economy.

Under **E.O. 192**, EMB is mandated to provide research and laboratory services; and serve as secretariat in the adjudication of pollution cases.

Under **EO 320**, EMB is designated as the secretariat of the Designated National Authority for CDM of the Kyoto Protocol to the United Nations Framework Convention on Climate Change.

FUNCTIONS

1. Advise the Secretary on matters relating to Environmental Management.
2. Formulate plans and policies and set appropriate environmental quality standards (Water, Air And Noise) for the prevention, control of pollution and protection of the environment.
3. Exercise direct supervision over its regional offices in the implementation of plans and programs. The central and regional offices of the bureau discharge both staff and regulatory functions.
4. Issue permits, clearances Under RA 8749, RA 9003, RA 9275, RA 6969 and PD 1586 and monitor compliance to said laws.
5. Provide secretariat support to the pollution adjudication board per EO 192.
6. Provide secretariat support to the National Solid Waste Management Commission as provided for in Section 4 of Ra 9003.
7. Develop and implement a research and development program in support of the following:

    - Environmental And Compliance Monitoring; And
    - Study of existing and potential environmental problems and issues
    - Implement a system for the recognition of environmental laboratories
    - Promote public information and education to encourage participation of an informed citizenry in environmental quality planning and monitoring.
    - Serve as focal point agency for international agreements/commitments

INSTITUTIONAL ASPECTS
OUR VALUES

VISION

A nation empowered to protect our finite natural resources, attuned to the pursuit of sustainable development, for a clean and healthy environment that enhances the Filipino Quality of life for present and future generations

MISSION

To protect, restore, and enhance environmental quality towards good public health, environmental integrity and economic viability.

AIR QUALITY MANAGEMENT (2019-2020)

Image of the Sierra Madre and Metro Manila as seen in the image taken by Mr. Johair Addang

Status Of Development Of New Policies On Air Quality

EMB MEMORANDUM CIRCULAR NO. 2020-003

Mandating all EMB Regional Offices (EMB-ROs) to establish an Air Quality Network Center using a uniform Data Acquisition and Handling System (DAHs) which shall act as repository of industrial emission of firms required to install Continuous Emission Monitoring Systems (CEMS) / Continuous Opacity Monitoring System (COMS).

OBJECTIVE

To establish a system which shall act as a central repository of all data and information related to industrial emissions of firms required to install CEMS/COMS in compliance with Section 19 of RA 8749.

DATA-HANDLING

All EMB-ROs shall establish a secure infrastructure to receive and store CEMS/COMS data and shall be responsible in ensuring that their respective DAHS, as well as the firm/proponent's DAHS are compatible with the existing DAHS used by the EMB-Central Office (EMB-CO). The DAHS of each RO shall be accessed in the central DAHS of the EMB CO.

Furthermore, each EMB-RO shall ensure that tampered or altered CEMS/COMS data sent by the firm/proponent in their respective jurisdiction shall be issued Notice of Violation (NOV).

To effectively monitor the compliance of industries, the EMB-ROs are instructed to require all firms operating CEMS/COMS to transmit (in real-time) data based on the following:

Parameter	Required Data Readings Recorded	I-hour equivalent based on DAO 2017-14
Gases and PM	Once every fifteen (15) minutes	Average of four (4) 15-minute readings
Opacity	Once every five (5) minutes	60 x 5-minute rolling average

* https://air.emb.gov.ph/wp-content/uploads/2020/02/EMB-MC-2020-003.pdf

Status Of Air Quality Management Fund

In 2016, the Air Quality Management Fund (AQMF), formerly labeled Fund 155, was changed to fund 337 due to UACS's revised chart of accounts. The fund collections reported here include supervision and regulation enforcement fees, other service income, other gains, LTP fines, and Penalties. The following details can be seen through the help of the National Budget Circular 542, to which it shall maintain a transparency seal containing information such as annual reports and assessment reports as required under the National Budget Circular Nos. 507 and 507-A dated January 31, 2007, and June 12, 2007, respectively, for the last three (3) years.

	2019 [7]			2020 [8]		
AQMF	Target	Actual	Variance	Target	Actual	Variance
Supervision and Regulation Enforcement Fees	₱114,205,000.00	₱130,032,966.04	14%	₱ 119,918,000.00	₱ 79,451,558.54	-34%
Other Service Income	₱25,000.00	₱77,933.00	212%	₱ 26,000.00	₱ 236,840.50	811%
Other Gains	-	-	-	-	-	-
LTO Fines and Penalties	-	₱58,643.50	-	-	-	-
Total	₱114,230,000.00	₱130,169,542.54	-	₱ 119,944,000.00	₱ 79,688,399.04	-

! From 2019 to 2020, variance in actual versus the target of collections and remittances has decreased (from 14% in 2019 to -34% in 2020).

https://emb.gov.ph/transparency-seal-2/
https://emb.gov.ph/wp-content/uploads/2020/02/FAR-5-as-of-December-2019.pdf
https://emb.gov.ph/wp-content/uploads/2021/02/FAR-5-as-of-December-31-2020.pdf

Status Of Management Of Air Pollution Sources

Mobile sources was found to be the largest source of air pollution having 81% for the 2018 National Emission Inventory. The DENR - Environmental Management Bureau (EMB) partner agencies and other Local Government Units (LGU) of the Bantay Tambutso Program also known as the Anti-Smoke Belching Operation has conducted roadside apprehension of smoke-belching vehicles in the strategic areas in Metro Manila.

The following local government units participated in this program: Makati City, Mandaluyong City, San Juan City, Muntinlupa City, Pasig City, Municipality of Pateros, Paranaque City, and Pasay City; as well as the Metro Manila Development Authority (MMDA). The Linis Hangin: Bantay Tambutso program aims to improve air quality by regulating motor vehicles.

Management Of Stationary Sources

Implementation of Clean Air Regulation		2019			2020		
		Target	Total	Percentage of Accomplishment (vs Annual)	Target	Total	Percentage of Accomplishment (vs Annual)
Issuance of Permit to Operate	PO for Air issued (no.) (Moving Target)	8,667	13,406	155%	8,728	9,999	115%
	New	2,096	4,139	197%	2,171	2,646	122%
	Renewal	5,571	9,267	141%	6,557	7,353	112%
Industrial Compliance Monitoring	Firms/Industries surveyed (no.)	2,612	3,725	143%	2,709	4,200	155%
	Firms/Industries monitored (no.)	15,989	18,089	113%	15,859	19,521	123%

"Stationary source" refers to any building or fixed structure, facility or installation that emits or may emit any air pollutant. Existing stationary sources of air emissions situated within an attainment region for a specific pollutant or pollutants will be required to pay a charge for the mass rate of emissions for those pollutants.

For stationary sources, the EMB conducts source emission testing of firms to determine their compliance with the National Emission Standards for Source Specific Air Pollutants (NESSAP). Further, all source of air pollution that may emit or emits air pollutants must secure a valid Permit to Operate (PTO) issued by the EMB Regional Director unless otherwise stated under Annex C of MC 2020-17. Firms operating such sources are required to designate a Pollution Control Officer (PCO) to oversee all environmental permits and clearances and submit Quarterly Self Monitoring Reports (SMRs) and Semi Annual Compliance Monitoring Report (CMR) (if applicable) to the EMB. In view of the voluminous stationary sources, the DENR-EMB through DAO 2013-26 has Accredited Third Party Source Emission Testing Firms to cater the testing needs. Further, for large sources which may emit >750 tons/year of any regulated pollutant, installation of Continuous Emission Monitoring (CEMS) / Continuous Opacity Monitoring System (COMS) is required. The CEMS/COMS data are submitted in real-time to the EMB Data Acquisition and Handling System (DAHs) of the EMB Central and Regional Offices.

A PTO includes the name and address of the firm, date of issuance and expiration of PTO, applicable emission limits, reportorial requirements, list of APSI and APCD with corresponding capacity, and operational and other conditions.

https://emb.gov.ph/wp-content/uploads/2015/10/DAO-2000-82.pd

Management Of Mobile Sources

		2019			2020		
Implementation of Clean Air Regulation		Target	Total	Percentage of Accomplishment (vs Annual)	Target	Total	Percentage of Accomplishment (vs Annual)
Issuance of COC	COC issued (no.)	300	610	195%	300	425	147%
Monitoring of Private Emission Testing Centers (PETCs)	PETCs Monitored with a report submitted (no.)	567	678	120%	571	768	135%

The DENR-EMB monitors the Private Emission Testing Centers (PETCs) nationwide. Mobile sources was found to be the largest source of emissions, 'due to various factors, such as the continuous operation of pre-Euro and noncompliant (to emission standards) motor vehicles, traffic congestion, and the continual increase of motor vehicles operating on the roads, among others.

DENR-EMB issues Certificate of Conformity (COC) for new motor vehicles as a requirement for initial registration with the Land Transportation Office (LTO), the application for COC is done thru the Online Permitting and Monitoring System (OPMS) of DENR-EMB. The actual number of COCs issued are shown in Table 5.

To reduce vehicular emissions, non-motorized transport (bicycle use) is being promoted as well as the use of 'cleaner fuels' such as liquefied petroleum gas (LPG) and compressed natural gas (CNG). Hybrid cars and electric vehicles are also aining more support from the government, private and public sector.

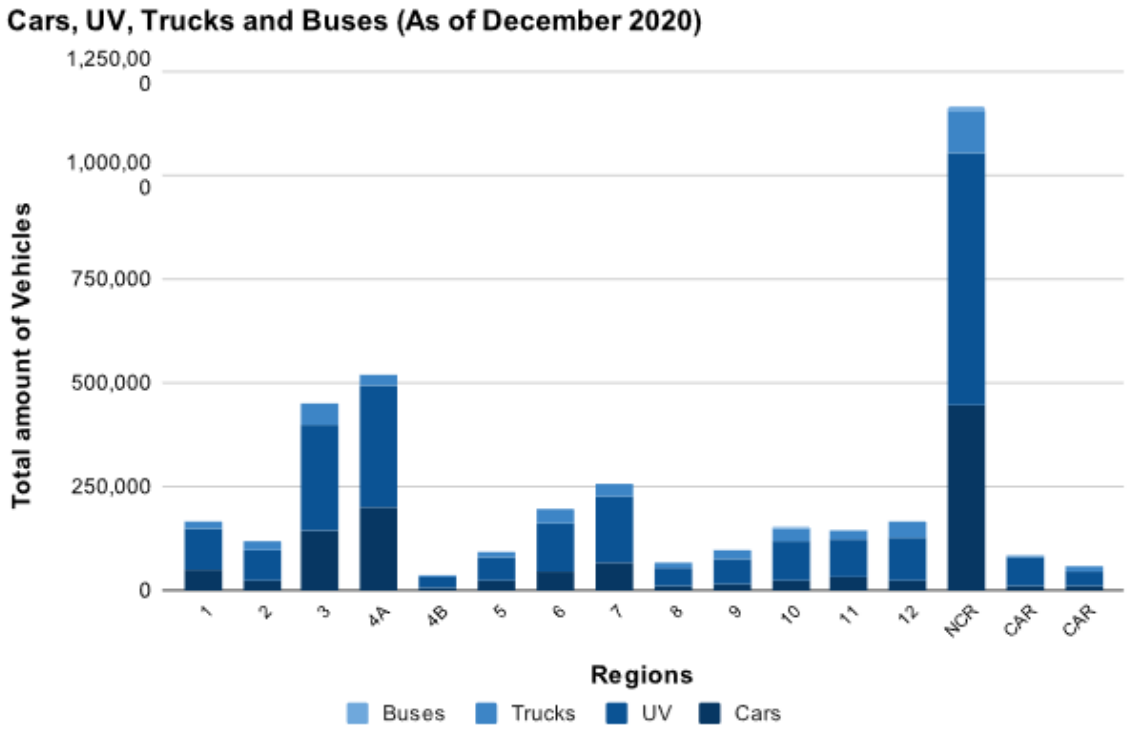
Plots Of Vehicle Registration

In the Annual Report of the Land Transportation Office (LTO) for 2019 and 2020, the total number of vehicles registered in the Philippines numbers 12,725,305 for 2019 and decreased to 11,851,192 in 2020. The LTO classifies the Motor Vehicles (MVs) for registration into seven groups: cars, utility vehicles (UV), sports utility vehicles (SUV), trucks, buses, motorcycles/tricycles (MC/TC), and trailers.

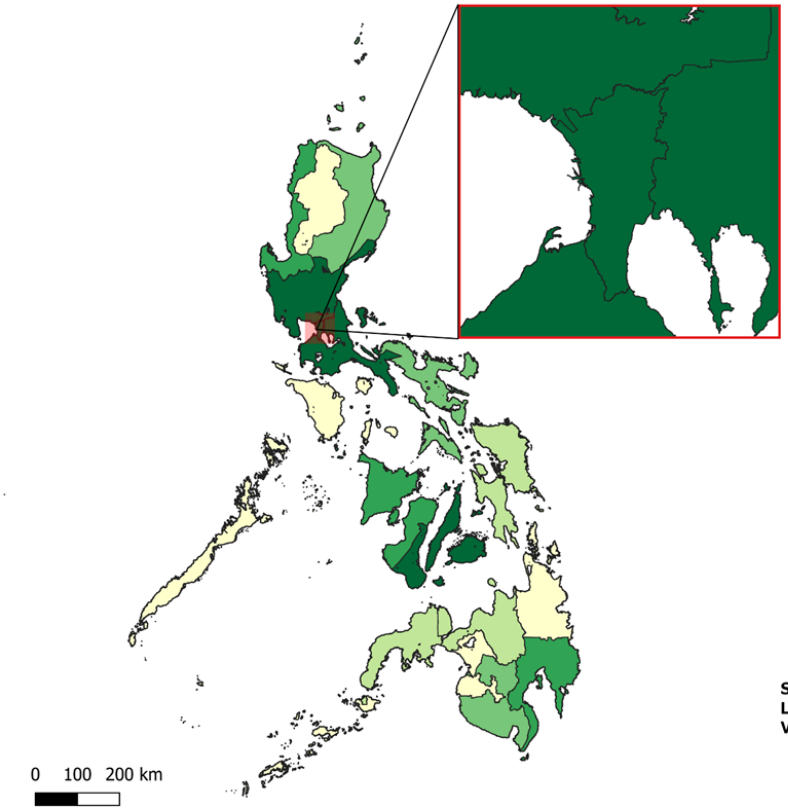
It should also be noted that during April 2020, there were no transactions that occurred in all the regions due to the Enhanced Community Quarantine Lockdown (ECQ). Due to the EQC, LTO issued Memorandum Circular No. 2020-2203 or the Extension of Validity of Motor Vehicles Registration with the plate numbers ending in 6,7,8,9 and 0, up until December 31, 2020 .

The spatial map reported that the regions of 4B, 13, and 9 registered a small number of motorized vehicles. The highest number of motor vehicles registered, new renewal as of December 2020, was recorded in the NCR region. Lastly, there was no data available for the ARMM region for both years.

In retrospect, there is an estimated number of vehicles and emissions from motor vehicles that are allowed to ply the thoroughfares of Metro Manila. These vehicles are used by volunteers, media, government offices, frontline services, and skeletal forces. In addition to the above, as per the Land Transportation Office (LTO) 2019 Annual Report, there were 93,115 registered government vehicles. The government vehicles are also assumed to be allowed to ply during the ECQ.



Memorandum Circular No. 2020-2203: Extension of Validity of Motor Vehicles Registration of Motor Vehicles with Plate Numbers Ending in 6, 7, 8, 9 and 0 (lto.gov.ph)

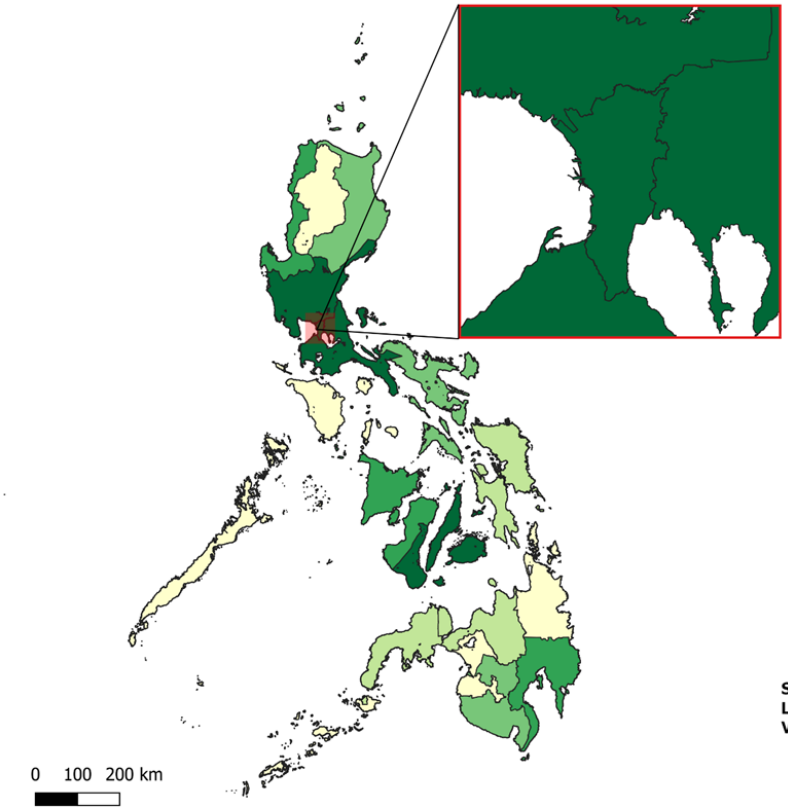


2019 LTO Registered Vehicles per Region

Legend:

Boundary_Regional
- 0 - 252007
- 252007 - 489943
- 489943 - 592387
- 592387 - 1002966
- 1002966 - 3076088

Source:
Land Transportation Office - Registered Vehicles as of December 2020



2020 LTO Registered Vehicles per Region

Legend:

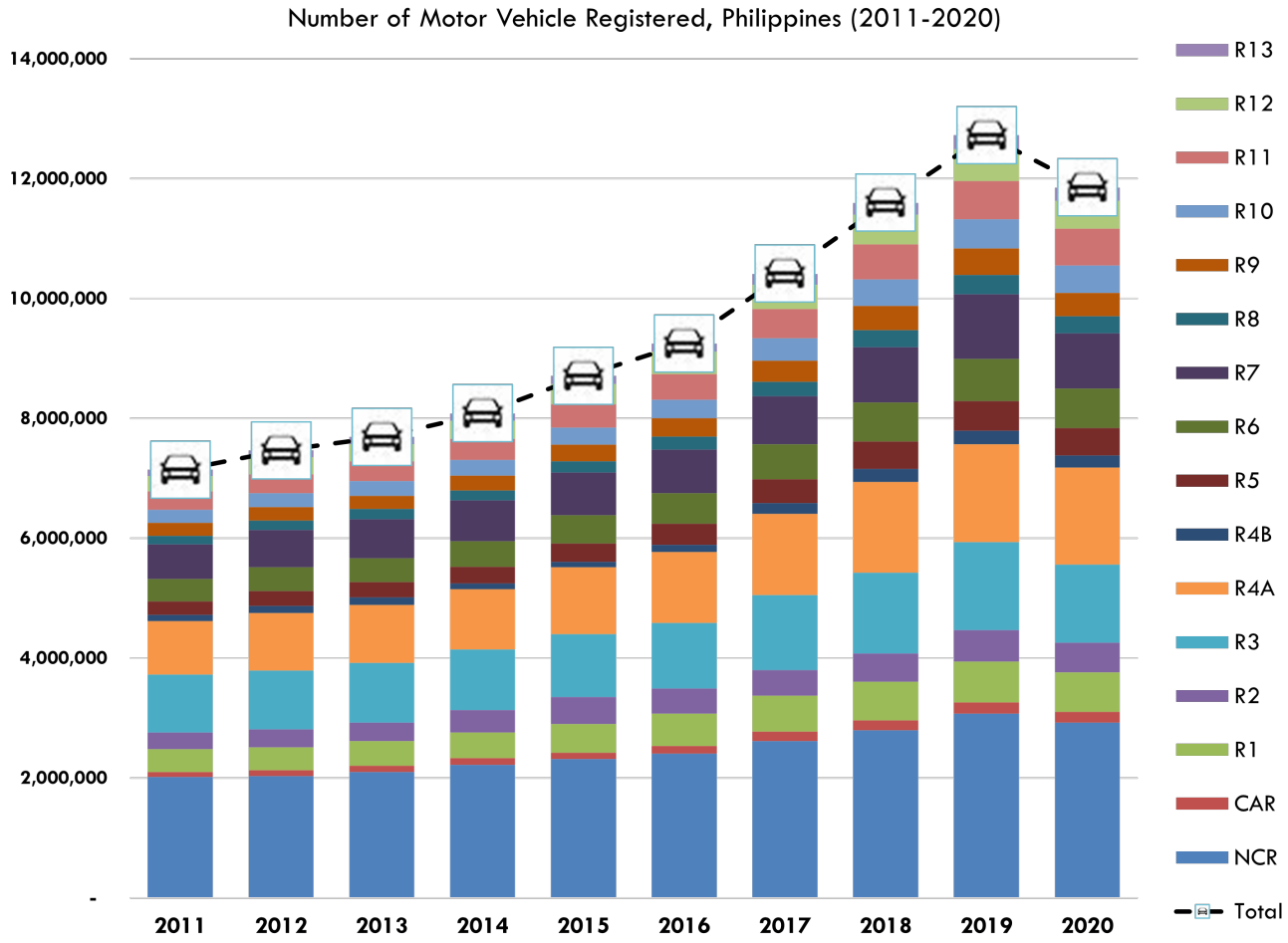
Boundary_Regional
- 0 - 231129
- 231129 - 454740
- 454740 - 567625
- 567625 - 869787
- 869787 - 2926338

Source:
Land Transportation Office - Registered Vehicles as of December 2020

Plots Of Vehicle Registration

Since the number of motor vehicles registered in the country increases through the years, the actual number of COCs issued is also expected to increase.

Furthermore, from 109,197 units sold in 2019, passenger automobiles sold in 2020 fell by 36.2 percent to 69,638 units. This category accounted for 32% of all vehicle sales in the previous year. Furthermore, commercial vehicles, which accounted for 68 percent of overall sales in 2020, had a greater drop.

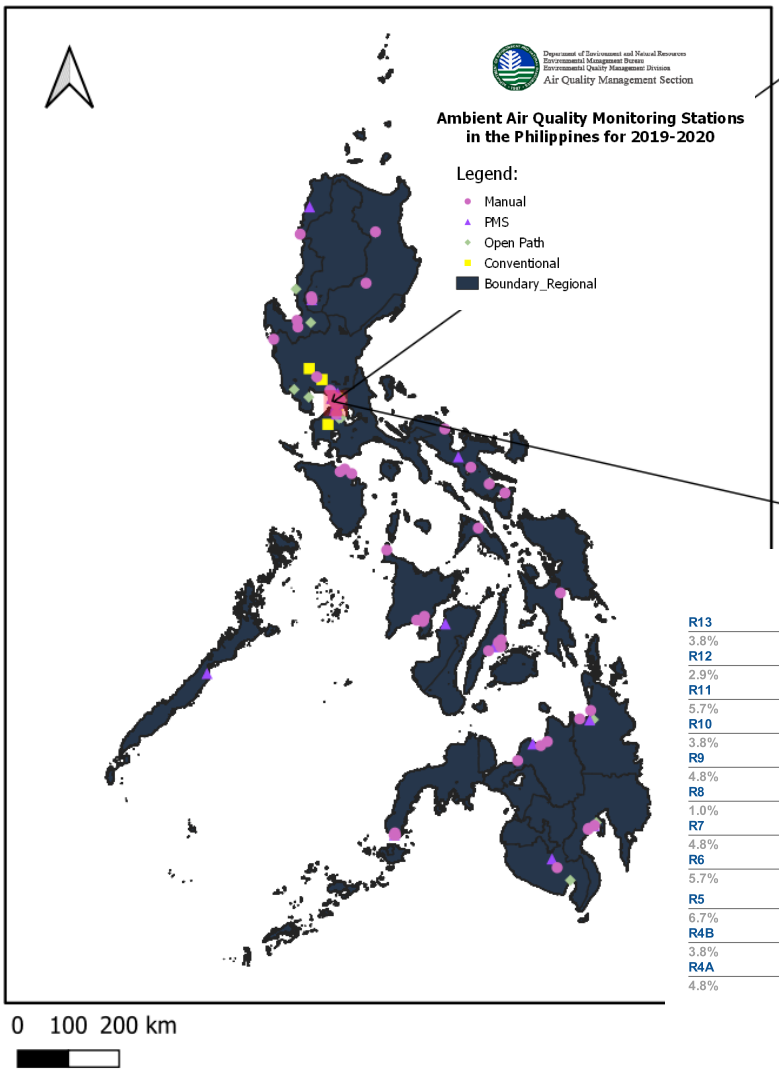


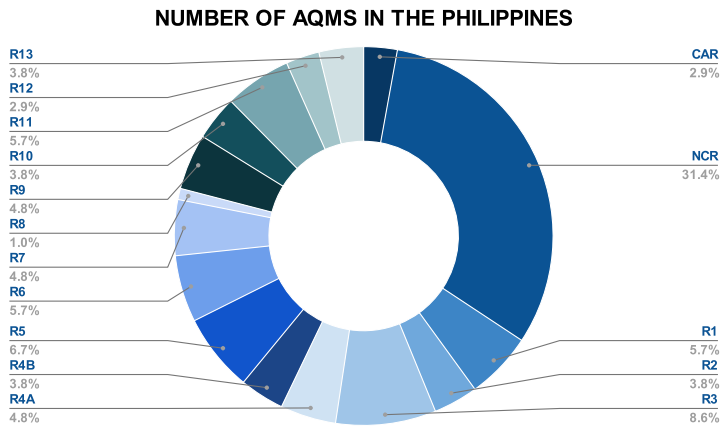
DATA SOURCE: Land Transportation Office

https://www.pna.gov.ph/articles/1127379#:~:text=The%20volume%20of%20passenger%20cars,sales%20in%20the%20previous%20year.
DENR-EMB Physical Performance Report and BAR

Status Of Ambient Air Quality Monitoring (AAQM)

The sampling equipment is located all over the Philippines classified according to the monitoring and criteria pollutants monitored. The highest number of AQMS stations were in NCR with 31.4%, followed by 8.6% in Region 3, 6.7% in Region 5, 5.7% in Region 1,6, and 11, 4.8% in Region 4-A,7,9, 3.8% in Region 13, 10, 4-B and 2, 2.9% in CAR and Region 12, and Region 8 with only 1%. It reveals that most of the ambient stations for Northern Luzon were located along the coastlines and that the majority of the AQMS stations are jammed in NCR compared to the other regions.

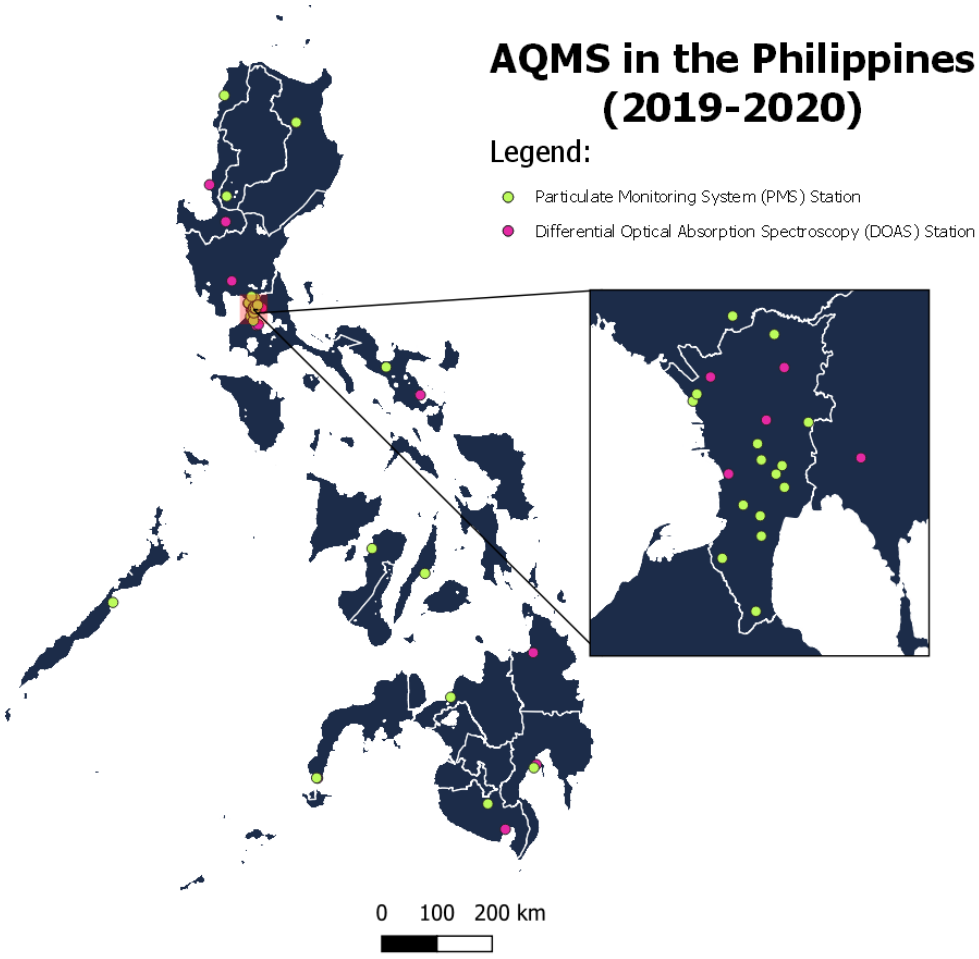




AAQM IN NUMBERS...

In 2020, a total of 106 AQMS stations can be found in the whole Philippines. Fifty-one (51) of the stations for AQMS used the manual sampling method, twenty-five (25) stations used the Particulate Matter Monitoring System (PMS), twenty-one (21) stations for Open-Path, five (5) stations for Conventional, and one (1) station for Conventional and Mercury Method.

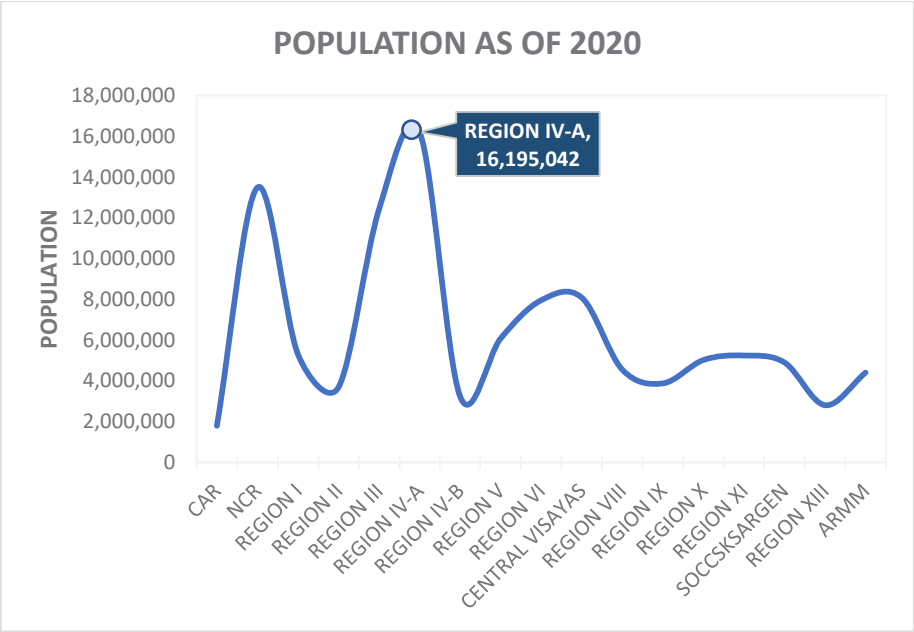
51	27	21	5	1
MANUAL STATIONS	PMS STATIONS	OPEN-PATH STATIONS	CONVENTIONAL STATIONS	CONVENTIONAL/ MERCURY STATION

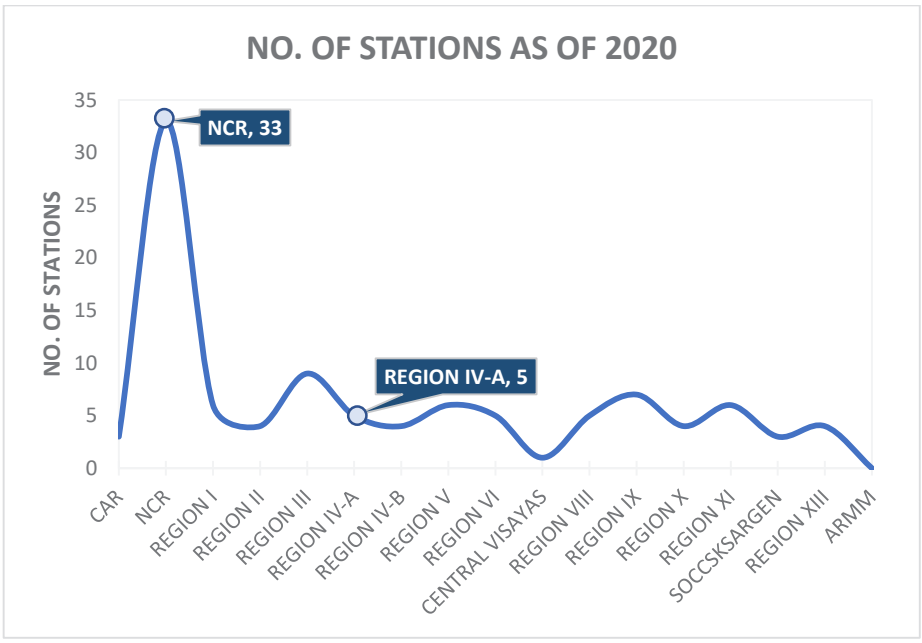


Furthermore, there were also stations that were considered as damaged or no longer available for use. The stations were marked as damaged due to the environmental impact towards the machine and/or parts of the machine were broken and were not available to produced data due for a long time.

DATA SOURCE: EMB-CO AQMS

Population vs Stations





DATA SOURCE: Philippine Statistics Authority & EMB-CO AQMS

IN TERMS OF POPULATION (2020)

It is also essential to know how many people are served by these stations. According to the graph for the population and the amount of AQMS, the NCR still has the most stations for 2019-2020. However, NCR ranks as the second-highest region in population with 13,484,462, following Region 4A with 16,195,042. Following the NCR Region with Region 3, the stations and population were balanced. However, the remaining regions show a limited number of AQMS compared with the number of people.

Ambient Air Quality Monitoring Results

The annual geometric mean was calculated per region using the annual averages from the monitoring stations with qualified numbers of data. The criteria is that in order to be included in the regional geometric average, the data capture rate in the station must not be less than 75%.

It is important to note that the station data, when averaged, may not entirely represent the air pollution in the whole region because of the confounding factors of land use, topography, and meteorology that tend to differentiate the air quality from one place to another in a particular region.

Among the regions, NCR, Region 5, and Region 13 have complete annual monitoring values of TSP from 2004 to 2018. On the other hand, Regions 6 and Region 7 completed the monitoring from 2016 to 2018.

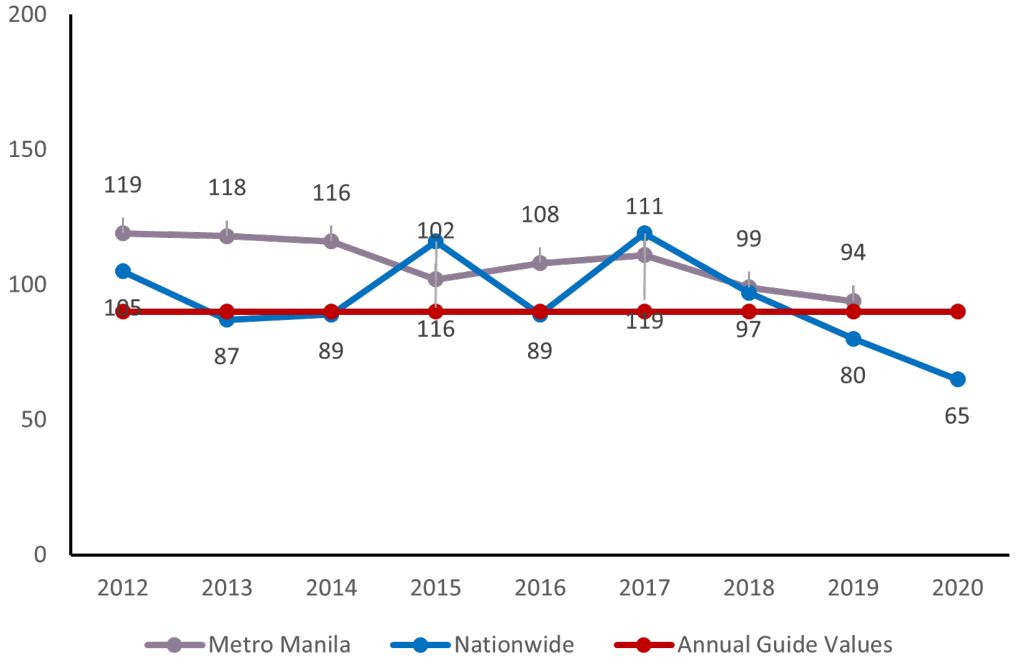
In 2019 the PM_{10} values for shows that for Metro Manila (45 ug/NCM) attained a larger value compared to the nationwide values (35 ug/NCM) and for the TSP values wherein, Metro Manila reached 94 ug/NCM compared to the Nationwide value of 90 ug/NCM.

However, with the declaration of community quarantine and strict implementation of lockdowns in Metro Manila, 75% data requirement for air quality monitoring stations in Metro manila was not achieved in CY 2020 . Hence, data captured in 2020 may not be representative.

Overall, the air quality nationwide in terms of PM_{10} has significantly improved by 55% from 2012 baseline (From 60 µg/Ncm in 2012 to 27 µg/Ncm in 2020). The improvement in air quality nationwide was attributed to the limited human activity during the declaration of community quarantine period starting March 2020.

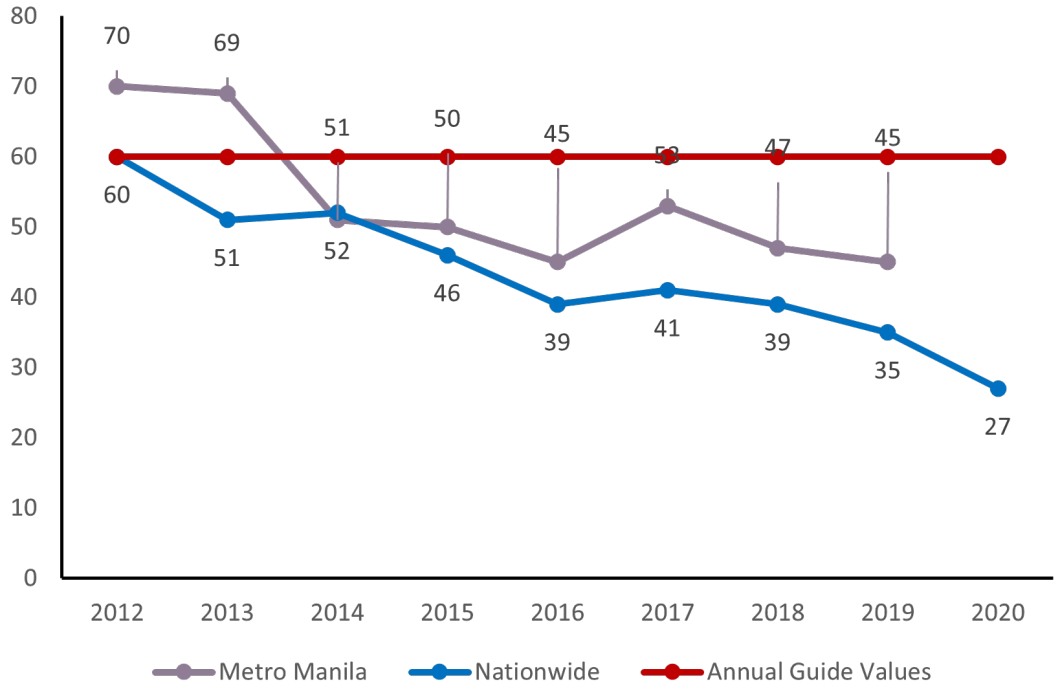
ANNUAL AVERAGE

Total Suspended Particles (TSP)
CY 2012 - 2019



ANNUAL AVERAGE

Particulate Matter 10 (PM_{10})
CY 2012 - 2020




PAMAHALAANG
BAYAN NG
BUENAVISTA


CAPITOL


15°1'44"N, 120°40'38"E
accuracy: 10ft


7.06574°N, 125.58565°E
accuracy: 2m
6/27/20
10:13 AM

Ambient Air Quality Monitoring Capability Of EMB

The purpose of having a prescribed monitoring equipment and technology is to provide safeguard to the DENR-EMB in reporting reliable data - to ensure that any data released is with satisfactory quality, and at par with national and international standards. This safeguard results in the DENR-EMB becoming restrictive in the choice of monitoring equipment and technology, which is both an advantage and a disadvantage to them. Currently, the DENR-EMB monitoring network is references on the USEPA requirements*, with considerations also given to the local conditions and data availability, such as population, economic activities/ development, and land uses. Required equipment technology of the DENR-EMB-CO is restrictive because its monitoring objective is mainly for compliance to regulation.

From 2016-2020, there are two kinds of Air Quality Monitoring Stations (AQMS) installed throughout the Philippines, a Continuous Ambient Air Quality Monitoring Station, and a Manual Monitoring Station.

Continuous Ambient Air Quality Monitoring Station

Continuous Open-Path Monitoring Station

- **Differential Optical Absorption Spectroscopy (DOAS)** - is an equivalent method used for measuring the concentration of Ozone, Sulfur Oxides, Nitrogen Oxides, Benzene, Toluene, p-Xylene in the air. Calibration Requirement: Reference and Span: O_3, SO_x, NO_x, Benzene, Toluene, p-Xylene (BTX).
- **Non–Dispersive InfraRed (NDIR)** - is a USEPA reference method for measuring the concentration of Carbon Monoxide (CO) pollutants in the air. Calibration Requirement: Zero and Span: CO.
- **Tapered Element Oscillating Microbalance (TEOM)** - a USEPA equivalent method used for measuring PM_{10} and $PM_{2.5}$, which uses the gravimetric principle using a standard flow rate of thve following: 3.00 liters per minute (lpm) for $PM_{2.5}$, 1.67 lpm for PM Coarse, and 12.00 lpm for Bypass Flowrate, for a total flow rate of 16.67 lpm. Calibration Requirement: Flow Rate, Ambient Temperature and Pressure
- **Meteorological Instruments (MET)** - composed of sensors to monitor Temperature, Pressure, Relative Humidity, Global Radiation, RainFall, Wind Speed and Wind Direction. Calibration Requirement: Span values as per manufacturer's specification.

Particulate Matter Monitoring System (PMS)

- **Beta Attenuation Monitor (BAM)** - is a USEPA equivalent method which measures the particulate matter (PM_{10} and $PM_{2.5}$ in the air. Calibration Requirement: Mass Foil, Flow Rate, Ambient Temperature and Pressure.
- **Meteorological Instruments (MET)** - composed of sensors to monitor Temperature, Pressure, Relative Humidity, Global Radiation, RainFall, Wind Speed and Wind Direction. Calibration Requirement: Span values as per manufacturer's specification.

Conventional Monitoring Stations (CMS)

- It uses various USEPA equivalent methods monitoring instruments for the continuous measurements of Sulfur Dioxide (SO_2), Nitrogen Dioxide (NO_2) and Ozone (O_3).

* Table 1 of the IRR, Item B. For the TSP Appendix B, PM10 Appendix J. 40 CFR Part 50 Appendix A, C, D, E, F,G, and J

Manual Monitoring Stations

The manual monitoring stations used the USEPA reference method monitoring instruments particularly the gravimetric method for the measurements of Total Suspended Particulates (TSP), PM_{10} and $PM_{2.5}$. The frequency of sampling for this kind of station is once every six (6) days, pursuant to the provisions under the section 12 of the RA 8749.

CALIBRATION

In view of the conduct calibration and training on the CAAQMS and Manual Monitoring station of EMB Regional Offices, Selected EMB regions outsourced the calibration and training from third-party sources annually. The service proider also provides calibration certificate using NIST traceable Flowrate Transfer Standard (FTS) with S/N: M150801 and was calibrated last March 28, 2019 with one year validity.

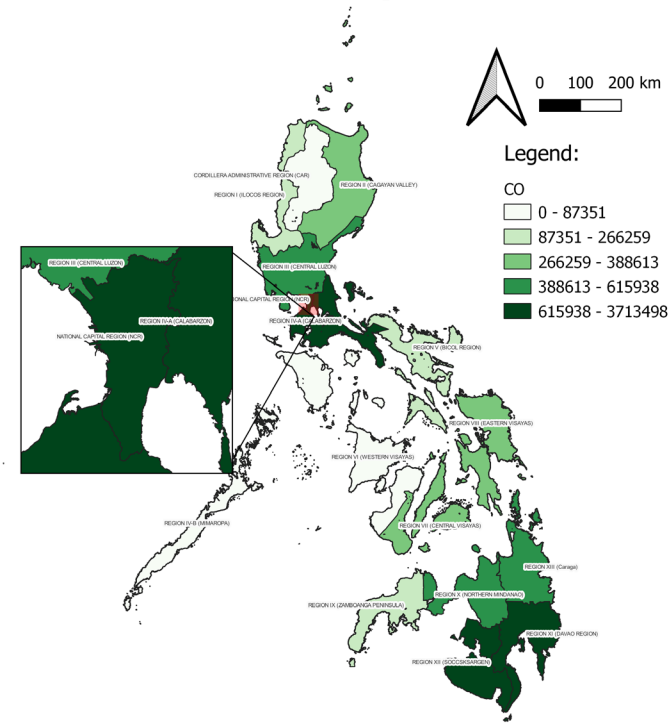
Status of Emission Inventory

The CY 2018 Emission Inventory showed that the prominent emission source generally came from the Mobile Sources. In some cases, the area sources are higher in the region.

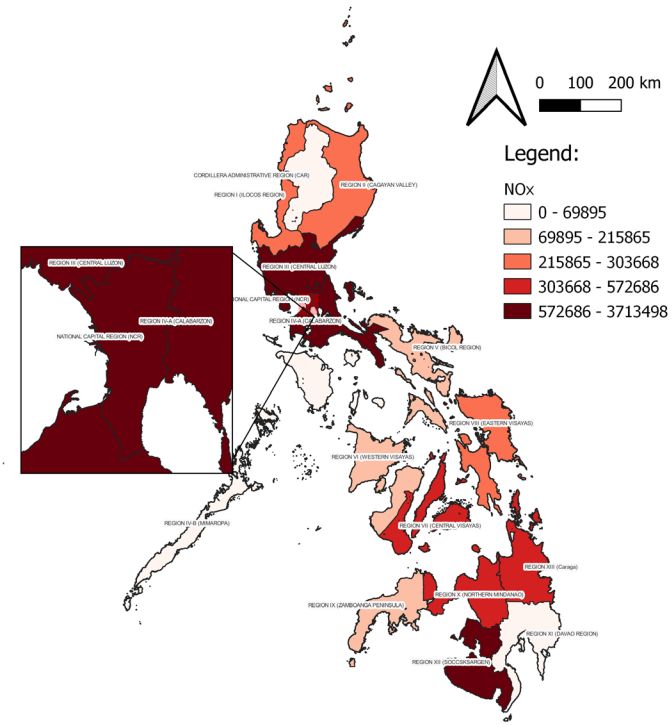
Using the spatial maps it can be seen that for CO, Region 11 has a higher area source compared to mobile sources, Region 2 for NO_x, and Region 2 and 12 for SO_x. Lastly, the stationary sources were found to have a less contribution with the emission for the year of 2018.

Furthermore, we can see the results for the regional percentage in the pie charts below. The pie charts were divided into PM, SO_x, CO, NO_x, and VOCs; this was furthermore categorized into three divisions, stationary pollution, mobile sources, and area sources.

Emission Inventory 2018 for CO

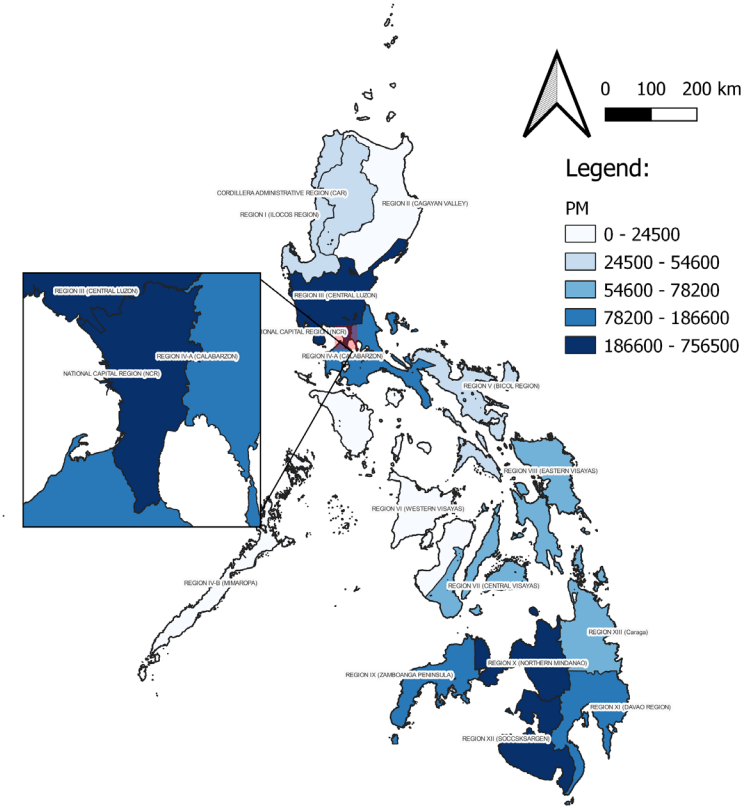


Emission Inventory 2018 for NOx

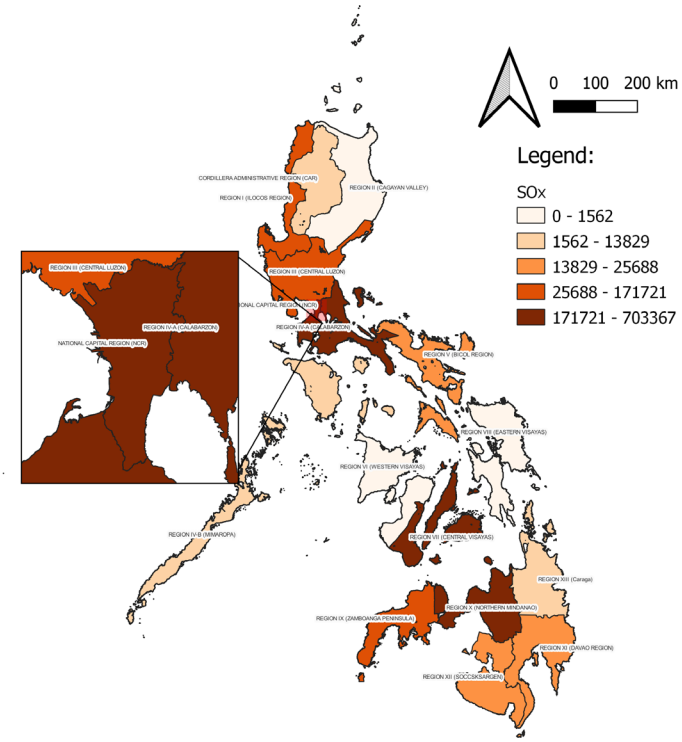


*The data for 2021 Emission Inventory will be featured on NAQSR 2021

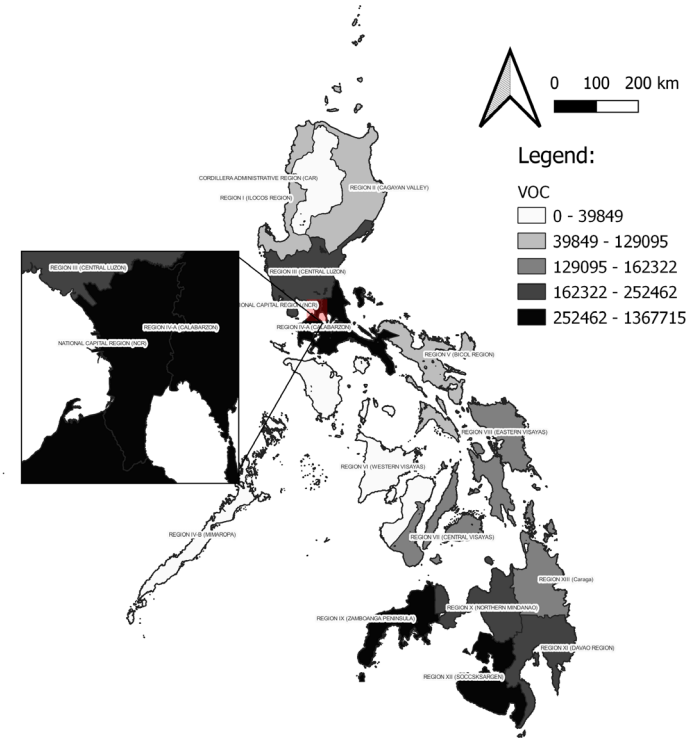
Emission Inventory 2018 for PM



Emission Inventory 2018 for SOx

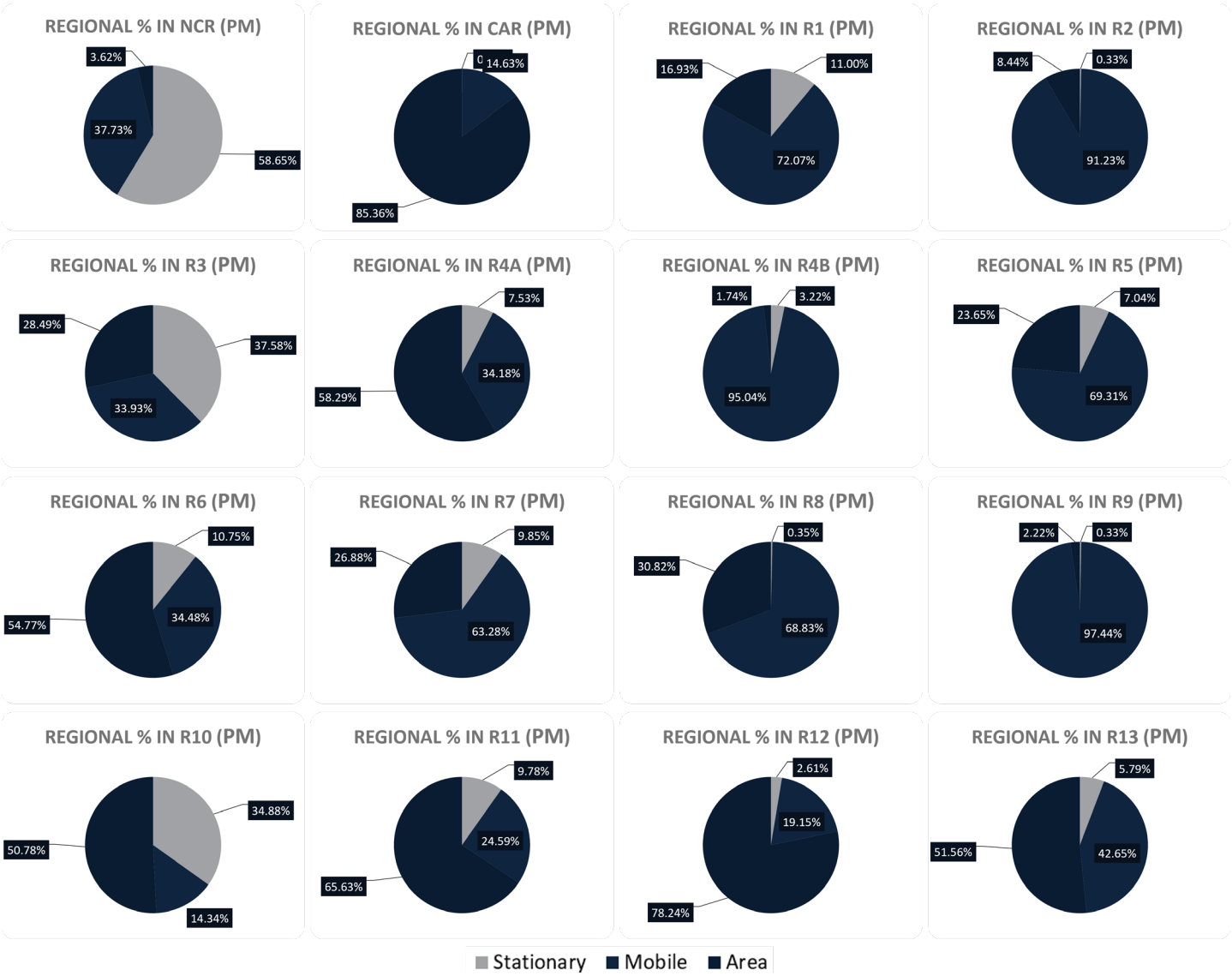


Emission Inventory 2018 for VOC



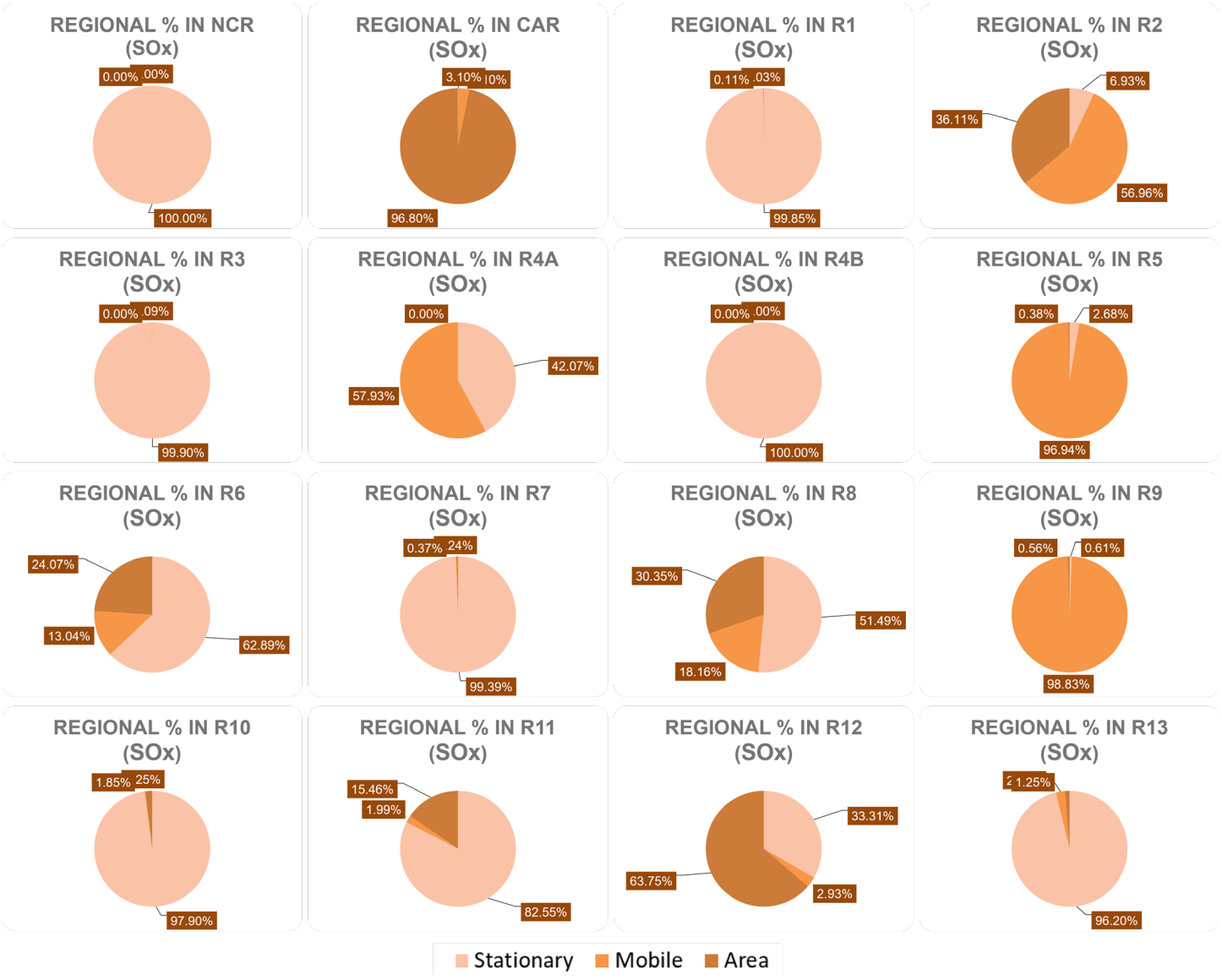
DATA SOURCE: EMB-CO AQMS

Regional Percentage for Particulate Matter



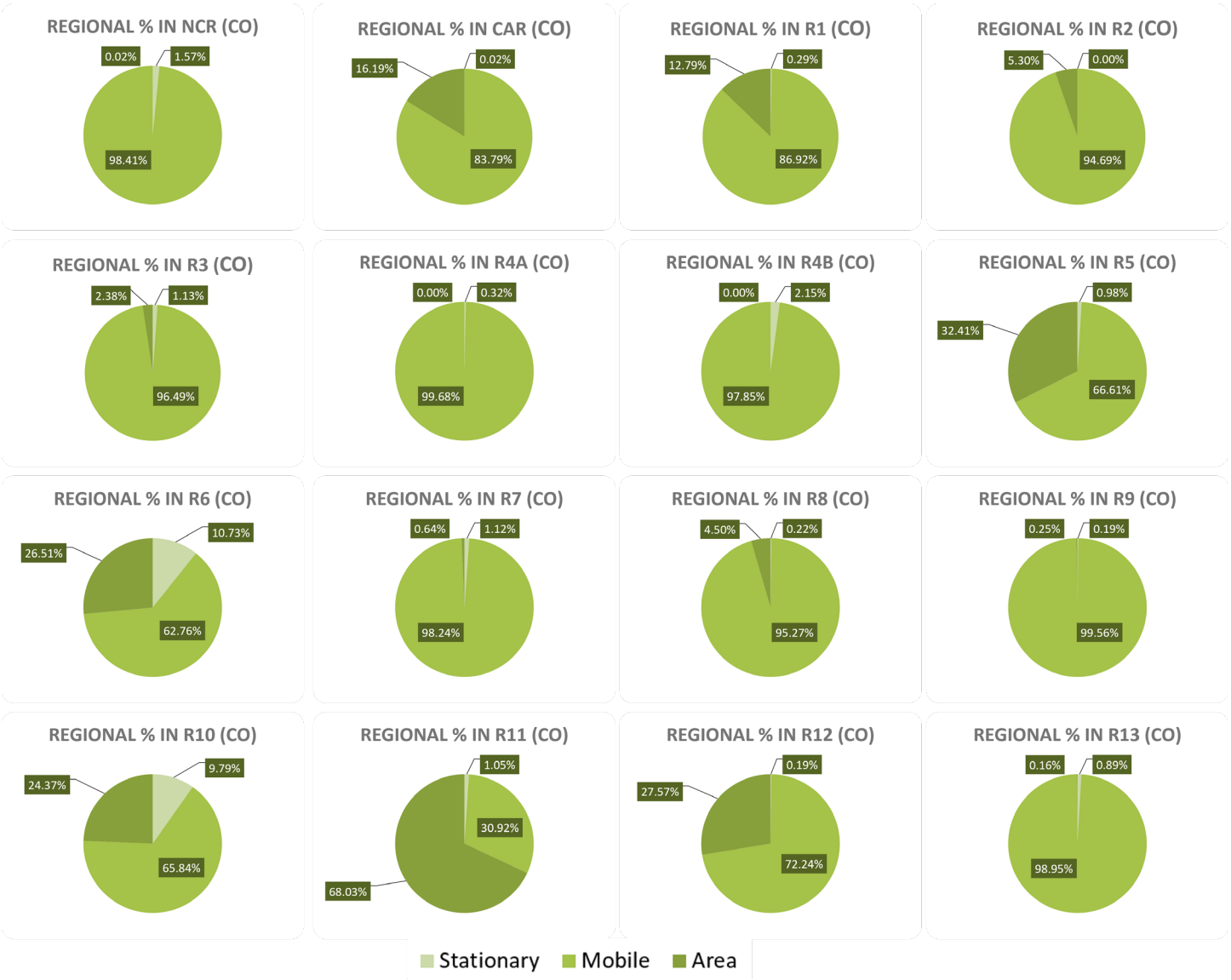
DATA SOURCE: EMB-CO AQMS

Regional Percentage for SOx



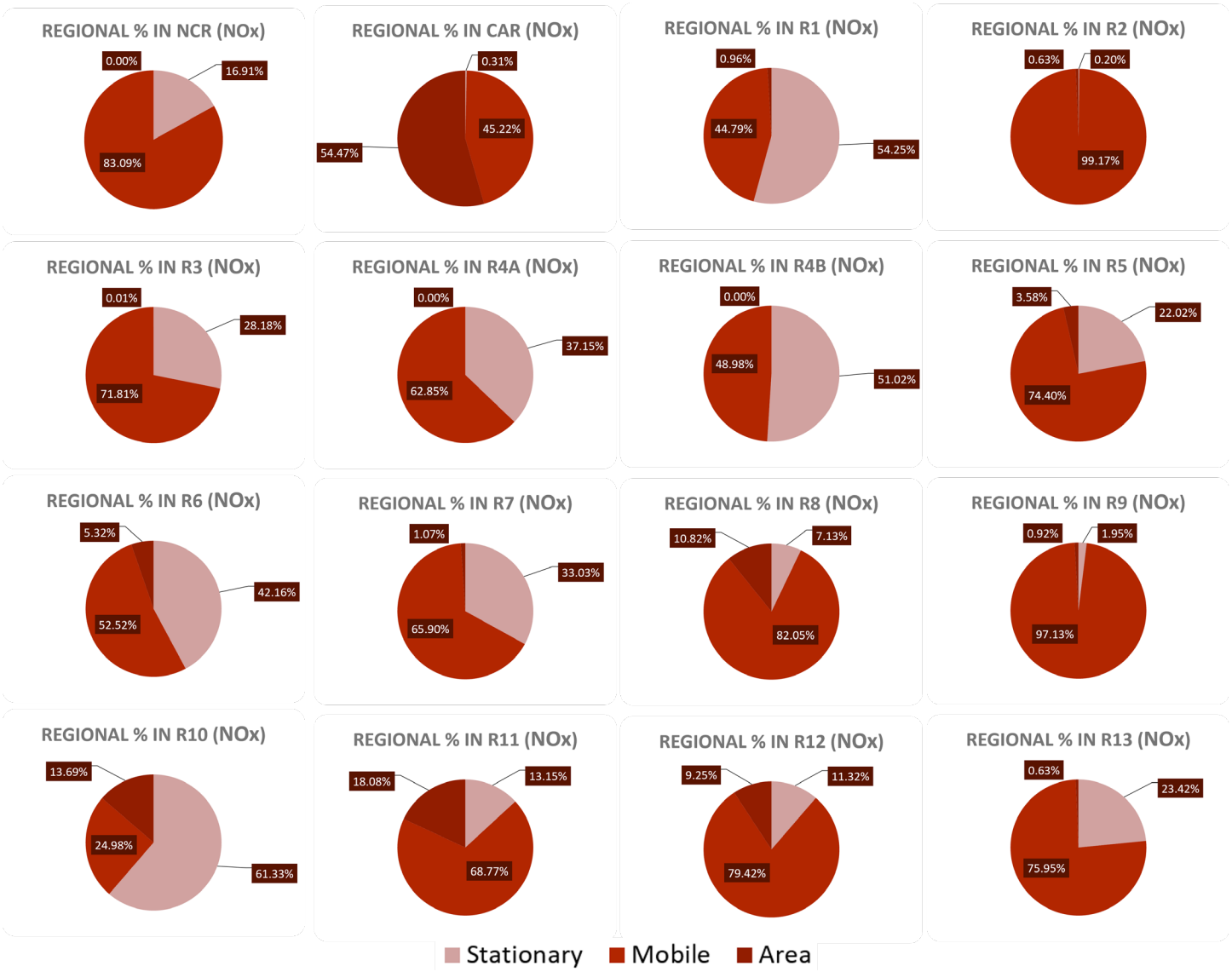
DATA SOURCE: EMB-CO AQMS

Regional Percentage for CO



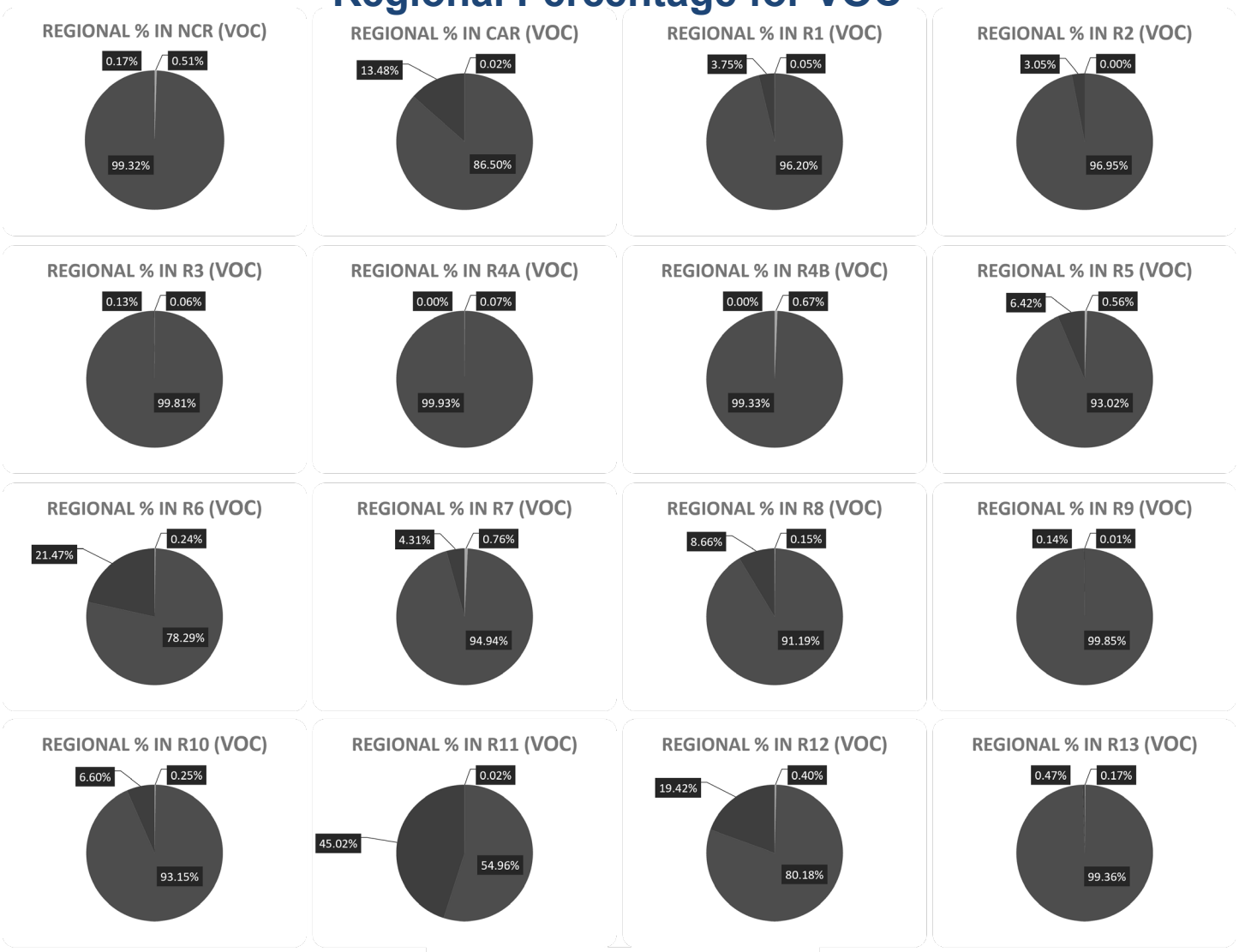
DATA SOURCE: EMB-CO AQMS

Regional Percentage for NOx



DATA SOURCE: EMB-CO AQMS

Regional Percentage for VOC



DATA SOURCE: EMB-CO AQMS

STRATEGIC ACTIONS (2019-2020)

Updating Air Quality Guideline values ($PM_{2.5}$ and AQI breakpoints)

In compliance with RA 8749 or the Philippine Clean Air Act of 1999, as well as Section 2 of DENR Administrative Order (DAO) 2000-81 or the Review of Air Quality Guideline Values, the Environmental Management Bureau-Department of Environment and Natural Resources (EMB-DENR), together with its created Technical Working Group (TWG) reviewed the $PM_{2.5}$ Air Quality Index (AQI) Breakpoints.

To protect public health, safety, and the general welfare, the formulated the $PM_{2.5}$ AQI Breakpoints under the DENR Administrative Order No. 2020-14 or Establishing the Breakpoints for $PM_{2.5}$ Air Quality Index (AQI) and amending Section 5 (a) of DAO 2013-13 “Establishing the Provisional National Ambient Air Quality Guideline Values for $PM_{2.5}$ ” was established including the cautionary statements.


DENR-EMB-AQMS Public Forum on the
Development of PM2.5 Breakpoints
for AQI Reporting


Airtoday.ph Stations'
New Year PM2.5 Per Minute Concentration
Variations of Particulate Matter Concentrations
in Roadsides of National Capital Region
DO WINDS AFFECT THE AIR QUALITY OF
THE NCR?

LGU Policies On Air Quality

LIST OF PASSED POLICIES FOR 2019-2020

REGIONS	DOCUMENT NO.	TITLE / DESCRIPTION	MUNICIPAL/CITY
CAR		Implementation of the ambient air quality monitoring stations Creation of the Anti-Smoke Belching Taskforce to enforce their Clean Air Ordinance.	Baguio City
NCR	Ordinance Number 8607	Declaring a parcel of land, known then as DECs property, located at arroceros street manila, across the street from the metropolitan theatre and the Mehan Garden and beside pasig river as a permanent forest park pursuant to the republic Act 5752 to be known as the arroceros forest park and appropriating funds.	Manila City
	E.O No 35 Series of 2020	Establishing the “Hinga Maynila” Task force for better Air Quality Management in the city of Manila	
R1		Strict Implementation of Environmental Code with pertinent provisions on Clean Water, Clean Air and Ecological Solid Waste Management of all covered Cities/Municipalities of NEPA Airshed	City of Dagupan City of San Carlos City of Urdaneta Municipality of Binalonan Municipality of Binmaley Municipality of Calasiao Municipality of Laoac Municipality of Lingayen Municipality of Malasiqui Municipality of Manaoag Municipality of Mangaldan Municipality of Mapandan Municipality of Pozzorubio Municipality of San Fabian Municipality of San Jacinto Municipality of San Manuel Municipality of Sta. Barbara Municipality of Sison
		Enactment and Strict Implementation of the ff: • Anti-Smoke Ordinances • Anti-Open burning Ordinance • Anti-Burning of Agricultural Waste	
		Designation of LGU Members to the NEPA Airshed Anti-Smoke Belching Unit composite team	
		Ordinance on Traffic re-routing in the covered Cities of NEPA Airshed	City of Dagupan City of San Carlos City of Urdaneta
		Ordinance on Relocation of street vendors (grilling activities) in San Carlos City	City of San Carlos

LGU Policies On Air Quality

LIST OF PASSED POLICIES FOR 2019-2020 (continuation)

REGIONS	DOCUMENT NO.	TITLE / DESCRIPTION	MUNICIPAL/CITY
R2	City Ordinance No. 6 CC-102	Burning of All Kinds of waste is prohibited	Santiago City
	City Ordinance No. 9 CC-035	Anti-Smoking Ordinance of the City	
		Oplan Usok – Sita Enforcement (Monitoring of LGU Vehicles and Generators of Businesses)	
R3		Smoke Belching Operations	Balanga City and Province of Bataan
		Designated Smoking Area in Public Places	
		Ban on smoking and Selling of Cigarettes, conduct of Pathways for Clean Air and Clean Energy Project in collaboration with Clean Air Asia	
R4A		For this time period, as draft ordinances are still under committee hearing, the city adopts RA 8749 and issued citation tickets for violation such as smoking in public places and open burning	San Pedro, Laguna
		There are no new policies on Air quality from 2019 to 2020. However, provisions on Air Quality Management of the Environmental Code of the city of Biñan are still in effect.	Biñan, Laguna
		Air quality management is part of the Quezon Environment Code as approved by virtue of Provincial Ordinance No. 2013-19 (i.e. Article IV, Sections 20-33).	Quezon Province

LGU Policies On Air Quality

LIST OF PASSED POLICIES FOR 2019-2020 (continuation)

REGIONS	DOCUMENT NO.	TITLE / DESCRIPTION	MUNICIPAL/CITY
R4B	Municipal Ordinance No. 05, S. 2019	An ordinance Updating the sanitation Code of the Municipality of San Jose, Romblon Pursuant to the Local Government Code of 1991 and other Pertinent areas	Municipality of San Jose, Romblon
	Municipal Ordinance No. 07, S. 2019	An Ordinance Updating the Local Environmental Code of San Jose, Romblon	Municipality of San Jose, Romblon
	Municipal Ordinance No. 07, S. 2020	An Ordinance Prohibiting the use or operation of motor vehicles with noisy/modified muffler within the Municipality of San Jose, Romblon of Prescribing Penalties thereof	Municipality of San Jose, Romblon
	Municipal Ordinance No. 005-2019	Anti-Smoking Ordinance of the Municipality of Bataraza	Municipality of Bataraza, Palawan
	Ordinance No. 57-2020	Environmental Code of the Municipality of Kalayaan	Municipality of Kalayaan, Palawan
	Ordinance No. 2021-46	Ordinance Prohibiting Open Burning of Agricultural and Other Solid Waste in the Municipality of Odiongan, Romblon and Prescribing Penalties for Violation Thereof	Municipality of Odiongan, Romblon
	Resolution No. 46, S. 2021	Ordinance Prohibiting the Open Burning of Garbage	Municipality of San Jose, Romblon
	Ordinance No. 1 series of 2021	Smoke-Free Ordinance	Municipality of Magdiwang

LGU Policies On Air Quality

LIST OF PASSED POLICIES FOR 2019-2020 (continuation)

REGIONS	DOCUMENT NO.	TITLE / DESCRIPTION	MUNICIPAL/CITY
R5	Executive Order No. 17-2018	Aired infomercial audio/video clips of Information and Education Campaign about the Air Quality in Legazpi City, Airshed Programs, and Air Pollution Effects in social media, broadcast media, cinemas, private malls, and private and government-owned outdoor/indoor LED screen.	Legazpi City
	City Ordinance No. 99-084	Anti-Smoke Belching Ordinance of the City of Naga	Naga City
		Emission & Sound Level Testing of Tricycles/Trimobile	
		Sound Level Testing of Generator Sets of business/commercial establishments and requiring said establishments to provide sound-proofing materials and secure Permit-to-Operate (PTO) from DENR-EMB V	
	City Ordinance No. 2021-010	An ordinance regulating the Land Filling Back Filling Activity in the City of Naga	
R6	Maritime Industry Authority Regional Office VI – MARINA Circular No. SR 2020-06	"Rules and Regulations on the Mandatory Use of 0.50% M/M Sulphur Limit on Fuel Oil for all Philippine Registered Ships in Compliance to Annex VI of MARPOL 73/78, as amended	Metro Iloilo
	EO No. 6	Stricter Enforcement of Zoning Sanitation and other environmental ordinances.	Oton
		Farmer's Field School on Climate Change Adaptation and Mitigation.	Pavia P4MP Farmers Association (Pavia, Iloilo)
		Phase out for the modernization program	Iloilo City Alliance of Drivers Association (ICADA) c/o Metro Iloilo Transport Service Cooperative

LGU Policies On Air Quality

LIST OF PASSED POLICIES FOR 2019-2020 (continuation)

REGIONS	DOCUMENT NO.	TITLE / DESCRIPTION	MUNICIPAL/CITY
R7		EMB 7 is urging LGUs within Metro Cebu Airshed to procure their own ambient air quality monitoring equipment for them to have basis in creating future policies on air quality management.	Metro Cebu
		Already have their own air quality monitoring equipment and use it in conducting investigation for complaints pertaining to emissions from industries.	Mandaue
R8		Relocation of industries thru proposed city zoning revision	
		Traffic Management	
R9	No Policies Passed for 2019-2020		
R10		In the last quarter of CY 2020, LGU-members of the airshed board have approved their respective 5-year Air Quality Management Action Plan which detailed the various activities that the LGUs have to undertake to maintain the air quality in their respective jurisdiction. The action plan covered issues from stationary, mobile and areas sources of air pollution.	
R11	No Policies Passed for 2019-2020		
R12		Strengthening airshed programs such as adoption of RA 8749 to local ordinances and involving the members of the governing board on air quality monitoring and responses.	
R13		Anti-Smoke Belching ordinance (with corresponding penalty/fees)	
		Creation of ASBU	Cabadbaran City
		Ordinance on proper solid waste management (prohibition of solid waste burning)	

Designation of attainment and nonattainment areas as of 2020

The Bureau shall delineate areas where the existing ambient air quality is at or below (that is, complies with) National Ambient Air Quality Guideline Values given in Part II and designate such areas as “attainment areas.” Designation of attainment areas will be based on monitoring data collected using the reference methods in Part II and other relevant information, including meteorological data and data covering existing nearby sources.

One of the Air Quality Principles stated in the IRR of RA 8749 is the recognition that the cleaning of the environment is primarily area-based and that air quality management and control are most effective at the level of airsheds. As defined in the act, “Airsheds” are areas with similar climate, meteorology and topology which affect the interchange and diffusion of pollutants in the atmosphere. Sub-areas within Airsheds may therefore have similar air quality, and face similar problems, development programs and prospects.

https://air.emb.gov.ph/list-of-airsheds-in-the-philippines/

Regular Airsheds in the Philippine for 2019-2020

Pursuant to the Section 10 of the Clean Air Act (RA 8749) and Rules VIII to XIII, Part III of the Implementing Rules and Regulations (DAO 2000-81), these guidelines for the designation of attainment and non-attainment areas in an airshed are hereby formulated.

Attainment Areas

An area shall be designated as an attainment area if any of the following conditions are met/satisfied:

1. The calculated maximum representative annual concentration for any site in the area during each year of the three (3) years does not exceed the National Ambient Air Quality Guideline Values (NAAQGV).
2. The calculated annual concentrations are representative for only two (2) years, and the maximum concentration for any site in the area is equal to or less than three-fourths of the guideline values level.
3. The calculated annual concentrations are representative for only one year and the maximum concentration at any site is equal to or less than one-half of the level of the guideline values.

Non-Attainment Areas

An area is non-attainment if the calculated representative annual concentration at any site during any of the three (3) years exceeds the Air Quality Guideline Values.

Extreme concentration or highly irregular events do not generally significantly influence the annual average. However, their exclusion can be considered on a case-by-case basis.

Designated Airsheds in the Philippines as of CY 2020

As of 2020, there are 22 airsheds in the Philippines, 5 of which are specially designated geothermal airsheds due to the presence of a geothermal plant. For each of the airsheds officially designated, Governing boards have also been established. The overall air pollution control/management program, including the general relationship between attainment areas, non-attainment areas, and air emissions source requirements is discussed in DAO-2000-82.

Regular Airsheds in the Philippines

REGION	NAME OF AIRSHED	DAO / MC No.	DATE SIGNED
NCR	NATIONAL CAPITAL REGION AIRSHED	DAO 2011-11	October 19, 2011
CAR	BLISTT AIRSHED	DAO 2003-04	February 12, 2003
1	NORTHEASTERN PANGASINAN (NEPA) AIRSHED	DAO 2004-07	March 23, 2004
2	METRO TUGUEGARAO (PIESTTA) AIRSHED	DAO 2004-05	May 23, 2004
3	BULACAN - PAMPANGA - BATAAN AIRSHED	DAO 2011-11	October 19, 2011
4A	CAVITE - LAGUNA - RIZAL AIRSHED	DAO 2011-11	October 19, 2011
4B	BACO-CALAPAN CITY-NAUJAN AIRSHED	DAO 2006-02	January 16, 2006
5	NAGA CITY AIRSHED	DMC 2003-13	July 14, 2003
	LEGAZPI CITY AIRSHED	MC 2015-03	March 26, 2015
6	METROPOLITAN ILOILO AIRSHED	DAO 2005-11	June 10, 2005
7	METRO CEBU AIRSHED	DMC 2002-11	October 07, 2002
8	TACLOBAN CITY AIRSHED	DAO 2015-11	May 29, 2015
9	ZAMBOANGA CITY AIRSHED	DMC 2003-20	September 30, 2003
10	METRO CAGAYAN DE ORO AIRSHED	DMC 2003-17	September 12, 2003
11	DAVAO CITY AIRSHED	DAO 2003-02	February 12, 2003
12	SOUTH COTABATO AIRSHED	DAO 2004-22	August 3, 2004
13	AGUSAN DEL NORTE - BUTUAN CITY AIRSHED	DMC 2003-09	June 10, 2003

Geothermal Airsheds in the Philippines

REGION	NAME OF AIRSHED	DAO / MC No.	DATE SIGNED
4A	MAKILING - BANAHAW (MAK-BAN) GEOTHERMAL AIRSHED	DAO 2009-02	February 11, 2009
5	BACON-MANITO (BAC-MAN) GEOTHERMAL AIRSHED	DAO 2004-11	May 18, 2004
7	SOUTHERN NEGROS GEOTHERMAL AIRSHED	DAO 2004-14	May 18, 2004
8	LEYTE GEOTHERMAL AIRSHED	DAO 2004-12	May 18, 2004
12	NORTH COTABATO GEOTHERMAL AIRSHED	DAO 2004-13	May 18, 2004

Procedures in the Establishment of the Geothermal Airshed

The procedures in the establishment of the geothermal airshed are hereby provided:

- The Department shall undertake the inventory of all sources of hydrogen sulfide emissions in the geothermal areas and other pollutants that may be identified as critical in the future based on actual sampling, engineering estimates or other academic approaches, with the assistance of the project operator.
- The project operator shall conduct air dispersion modeling studies to determine the airshed boundary.
- The project operator shall submit to DENR-EMB the air dispersion modelling studies, management measures and the proposed air quality monitoring program.
- The Department, through the Bureau, shall delineate the boundaries of the airshed, upon consultation with the stakeholders.
- Upon consultation with appropriate local government authorities, the Secretary of the Department, upon recommendation of the Bureau shall, from time to time, revise the designation of airsheds utilizing eco-profiling techniques and undertaking scientific studies.

Revisiting the Clean Air Action Plan

The Department of Environment and Natural Resources (DENR), through the Environmental Management Bureau (EMB), in partnership with the Clean Air Asia, facilitated the Interagency Workshop on the Integrated Air Quality Improvement Framework –National Air Quality Control Action Plan on 20 November 2019. The workshop became a venue for the government agencies and other stakeholders to assess the achievements and needs in implementing the Philippine Clean Air Act.

In the workshop, World Café Session was facilitated. World Café Session is a dynamic group discussion where participants were grouped into three and rotated in stations where they discussed different topics with the moderator, in relation to the provisions of the Philippine Clean Air Act. In Station 1, roles of each agency were shared, specific programs and policies being implemented were identified and strengths and challenges in performing each role was discussed. In Station 2, strengths, and points for development in communicating and coordinating with other agencies were shared. In Station 3, the needs to perform roles of each agency were shared.

Also, breakout session was facilitated, by grouping in relation to control of (1) stationary source emissions, (2) mobile source emissions and (3) area source emissions. What can be further integrated into the Integrated Air Quality Improvement Framework (IAQIF) and National Air Quality Control Action Plan (NAQCAP) was discussed in consideration of what is currently done and what should be done way forward. Each of the three (3) groups brainstormed what can be included in terms of their agency's role, other agencies and groups' inclusion and roles in the NAQCAP.

CLEAN AIR ACTION PLANS

Section 19: Review of Mass Emission Rates Standards

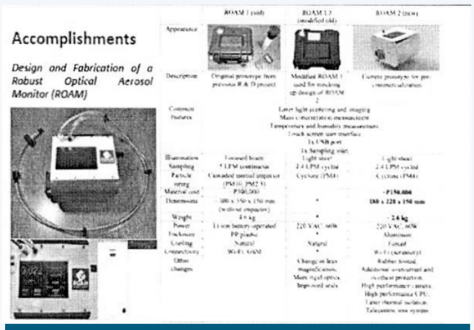
The review of emission standards from concentration-based to mass-rate units will consider the impacts to economy, health and availability of pollution control technologies and its cost implications. The DENR-EMB headed by the Air Quality Management Section (AQMS) and the Sampling Assessment Team (SAT) in partnership with the Clean Air Asia, De La Salle University (DLSU), and US Environmental Protection Agency (USEPA) for technical support. Consultation meetings and workshops with stakeholders from the industry are held to gather input in the standards development, especially on best available control technologies (BACT) that maybe employed to meet more stringent emissions standards.

On May 31, 2019, the DENR-EMB in Partnership with Clean Air Asia conducted a one-(1) day Consultation Workshop on Best Available Control Technologies for the Policy Review of the Mass Emission Rate Standards (MERS) for Stationary Sources held at Crowne Plaza, Ortigas, Pasig City.

DATA SOURCE: EMB-CO AQMS

CLEAN AIR ACTION PLANS

Air Research Roadmap (DOST)



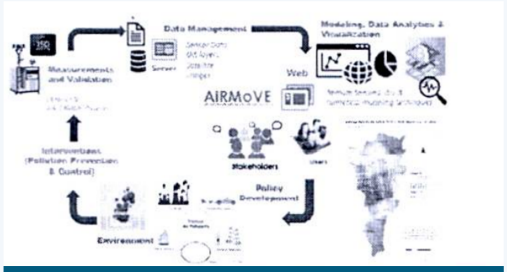
The project envisions market translation of an inexpensive optical aerosol mass monitor (dubbed ROAM or Real-time/Robust Optical Aerosol Monitor) with promising performance characteristics comparable to a commercial equivalent.

Tempospatial Distribution and Transboundary Transport of Atmospheric Fine Particles across Bashi Channel, Taiwan Strait, and South China Sea was also implemented by Dr. Gerry Bagtasa of UP-IESM, Diliman. This is a bilateral cooperation under the MECO-TECO Program. Fine particulates PM 2.5 were simultaneously measured in Burgos (Ilocos Norte), Checheng Southern Taiwan) and Dongsha Island (Partas Island, South China Sea, Taiwan).

ZEOSKIN

This study will complement ventilation and filtering system of indoor air which can help to reduce the risk caused by polluted air that most of us are exposed to. It is the hope that this technology can penetrate the green building market and to contribute to more sustainable cities and communities.

Aluminosilicate Technology for Compact Air Purification is also a project to be implemented by UP-Diliman. The project envisions to build a powerful yet portable air purifier for automotive air filtration systems which works as a particulate filter, harmful gas remover, and anti-microbial filter



This project will support the existing air quality monitoring systems through the use of geospatial and engineering solutions such as Remote Sensing (RS), Geographic Information Systems (GIS) and numerical modeling. The project highlights the combined use of these technologies recommendations for air pollution control and

2019-2020
CLIMATE ACTIONS

National Environmental Awareness Month/Philippine Clean Air Act And Climate Change Consciousness Week "Tree Planting Activity" (c) DENR Region 11

CLIMATE ACTIONS

Plans and Programs of the Climate Change Service

- DENR Administrative Order No. 2021-22: Guidelines on Mainstreaming, Cascading and Institutionalizing Climate Change Concerns in the Environment and Natural Resources (ENR) Priority Programs – The guidelines are made to adopt the identified climate change indicators for the DENR priority programs and projects in the annual work and financial plans of the DENR Offices and to determine the needed actions or interventions to enhance and institutionalize mainstreaming of climate change in the DENR priority programs and projects. Clean Air as mentioned in Section 3 of DAO 2021-22 is one of the priority programs of DENR CCS. Climate responsive output and outcome indicators in the said program was also mentioned in its Annex B.
- Designated National Authority (DNA) of the DENR for the Clean Development Mechanism (CDM) of the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) to facilitate and promote development of CDM project activities that contribute to the UNFCCC objective of stabilization of greenhouse gas concentrations in the atmosphere.
- Operationalize the DENR's Climate Information and Knowledge Management Framework and System.

CLIMATE ACTIONS

The Nationally Determined Contributions (NDCs) including the Philippine's commitment to 75% reduction in GHG

The Paris Agreement requests each country to outline and communicate their post-2020 climate actions, known as their NDCs. Together, these climate actions determine whether the world achieves the long-term goals of the Paris Agreement and to reach global peaking of greenhouse gas (GHG) emissions as soon as possible and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of GHGs. The Philippines' NDC supports the country's national development objectives and priorities of sustainable industrial development, poverty eradication and inclusive growth, energy security, and social and climate justice, and the transformation of its socio-economic sectors towards a climate and disaster-resilient and low carbon economy.

Image source: https://www.officialgazette.gov.ph/2016/04/27/ph-sign-paris-climate-agreement/

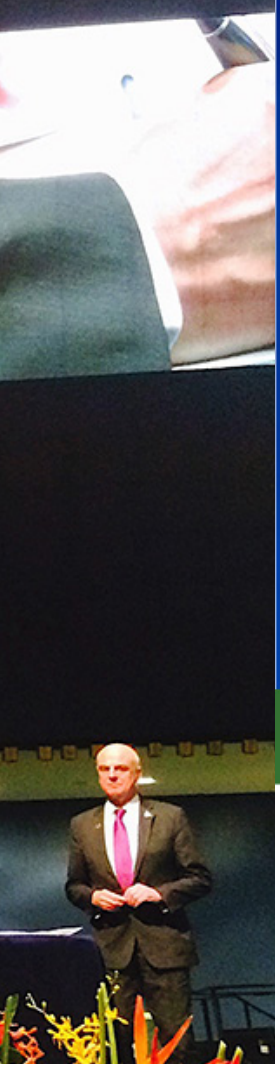


Photo by: Rappler

TOP STORIES

ADDRESSING CLIMATE CHANGE IS JUST AS URGENT AS ADDRESSING COVID-19

PRESIDENT RODRIGO DUTERTE

In terms of greenhouse gas (GHG) emissions, the Philippines emits an average of 1.98 metric tons of carbon dioxide equivalent per capita in 2020, or way below the global average of four (4) metric tons per capita. The Philippines commits to a projected GHG emissions reduction and avoidance of 75%, of which 2.71% is unconditional and 72.29% is conditional, representing the country's ambition for GHG mitigation for the period 2020 to 2030 for the sectors of agriculture, wastes, industry, transport, and energy. This commitment is referenced against a projected business-as-usual cumulative economy-wide emission of 3,340.3 MtCO2e for the same period. The country's climate change mitigation actions shall strengthen the resilience and adaptive capacity of the country, including through enhanced access to climate finance, technology development and transfer, and capacity building, especially on the implementation of the policies and measures on and the uptake of circular economy and sustainable consumption and production practices.

Data Source:
DENR-Climate Change Division
DENR-Forestry

CLIMATE ACTIONS

Climate parameters in the context of air quality including climate agenda (2019-2020)

Short-lived climate pollutants are powerful climate forcers that remain in the atmosphere for a much shorter period of time than carbon dioxide (CO2), yet their potential to warm the atmosphere can be many times greater. Certain short-lived climate pollutants are also dangerous air pollutants that have harmful effects for people, ecosystems and agricultural productivity. These short-lived climate pollutants black carbon, methane, tropospheric ozone, and hydrofluorocarbons are the most important contributors to the man-made global greenhouse effect after carbon dioxide, responsible for up to 45% of current global warming. If no action to reduce emissions of these pollutants is taken in the coming decades, they are expected to account for as much as half of the warming caused by human activity. The following are the recent/ongoing activities on SLCPs:

Advancing the Clean Air, Health and Climate Integration Agenda in the Association of Southeast Asian Nations (ASEAN) Region © CCAO

CLIMATE ACTIONS

Advancing the Clean Air, Health and Climate Integration Agenda in the ASEAN Region (2019-Present)

This project aims to translate 25 clean air measures identified in the Climate Air Coalition report, “Air Pollution in Asia and the Pacific: Science-based Solutions,” into implementable actions for countries in the ASEAN region. Implementing these measures could help 1 billion people breathe cleaner air by 2030 and reduce global warming by a third of a degree Celsius by 2050. Other benefits would include positive impacts on crop yield, socio-economic development, and progress towards achieving the Sustainable Development Goals.

National Strategy to Reduce Short-Lived Climate Pollutants from the Municipal Solid Waste Sector in the Philippines (Active)

The report was developed through a multi-stakeholder consultation process led by the DENR through EMB’s Climate Change Division (CCD) and Solid Waste Management Division (SWMD), with guidance from the multi-agency National Solid Waste Management Commission (NSWMC), in coordination with the Climate Change Commission (CCC), and with assistance from the Institute for Global Environmental Strategies (IGES), under its Climate and Clean Air Coalition (CCAC)-supported Municipal Solid Waste (MSW) Initiative. To identify the key issues and solutions to reduce SLCPs from MSW, the NSWMC formed a core group of experts (CGE) who supported DENR-EMB, stakeholders and experts in a series of focus group discussions (FGDs) and consultations. The finalization of the strategic measures has been made in line with a pre-identified set of guiding principles.

Clean Air for a Sustainable Future: A Transdisciplinary Approach to Mitigate Emissions of Black Carbon in Metro Manila, Philippines (TAME-BC) (2020- Ongoing)

The project aims to reduce Black Carbon (BC) emission levels in a rapidly urbanizing megacity of Metro Manila and to raise the awareness of different types of stakeholders on air pollution. The transdisciplinary approach envisions to jointly define the existing problem of air pollution, particularly BC and its health and other impacts. Project activities have kicked-off in August 2019 towards the development of policies, measures and technological innovations to mitigate BC emissions.

Poster of the Climate Change Commission of the Philippinesfor the 2020 Philippine Clean Air Month conducted last November 2020.

CLIMATE ACTIONS

Concrete actions on emissions reduction

Monitoring, Reporting and Verification (MRV) is a term used to describe all measures which countries take to collect data on emissions, mitigation actions and support. The MRV system would significantly improve the existing reporting and monitoring systems in these sectors that would facilitate a clear understanding of climate actions as well as clarity and tracking of progress towards achieving the country's NDCs. Reporting, as part of the MRV, is implemented through the national communications and BURs. Parties are required to report on their actions to address climate change in their national communications, which include information on the GHG inventories, adaptation, mitigation actions and their effects, constraints and gaps, support needed and received. One example is the submission of Self-Monitoring Reports (SMRs) of industries in which environmental compliance and overall environmental performance can be monitored.

Self-reporting requires that facilities provide the enforcement program with self- monitoring or recordkeeping data periodically and/or upon request. Self-monitoring, self-recordkeeping, and self-reporting provide more extensive information on compliance than can be obtained with periodic inspections.

2019-2020 AIR QUALITY EPISODES

Lightning strikes as a column of ash rises from the crater of Taal Volcano as it erupts on January 12, 2020, as seen from Tagaytay, Cavite province, Philippines (c) Ezra Acayan / Getty

VOLCANO ERUPTIONS (2018-2020)

Volcanic ash consists of powder-size to sand-size particles that have been blown into the air by an erupting volcano. Exposure to falling ash may cause several health problems. Anyone who already suffers health problems such as bronchitis, emphysema, or asthma should avoid exposure to volcanic ash.

PM stands for particulate matter: the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small that they can only be detected using an electron microscope.

TAAL VOLCANO ERUPTION

January 12–22, 2020

On 12 January 2020 at 7:30 PM, the Department of Science and Technology – Philippine Institute of Volcanology and Seismology (DOST – PHIVOLCS) has raised the Alert Level 4 (Hazardous Eruption Imminent) as Taal Volcano in Batangas, located about 60 kilometers south of Manila, spewed ash 10 – 15 km high following a phreatic or steam-driven eruption in several points inside the crater which had begun at 1:00 PM. As of noon, Taal Volcano remained under Alert Level 4 as it spews lava fountains.

The DOST – PHIVOLCS issued through a bulletin at 8:00 AM 13 January 2020 that spewing of lava is called a magmatic eruption recorded from 2:49 AM to 4:28 AM. This eruption is characterized by weak lava fountaining accompanied by thunder and lightning.

The Department of Environment and Natural Resources (DENR), through the Environmental Management Bureau (EMB), conducted ambient air quality monitoring in the affected areas (National Capital Region, Central Luzon, CALABARZON).

Initial monitoring results consist of 17 stations (12 NCR, 3 Region 4A, 2 Region 3). Monitoring started at 9:00 pm January 12, 2020, up to noon of January 13, 2020. For NCR, four (4) stations have recorded an AQI of Unhealthy for Sensitive Groups levels, namely Las Piñas City Station, Taguig City Station, Mandaluyong and San Juan City Station.

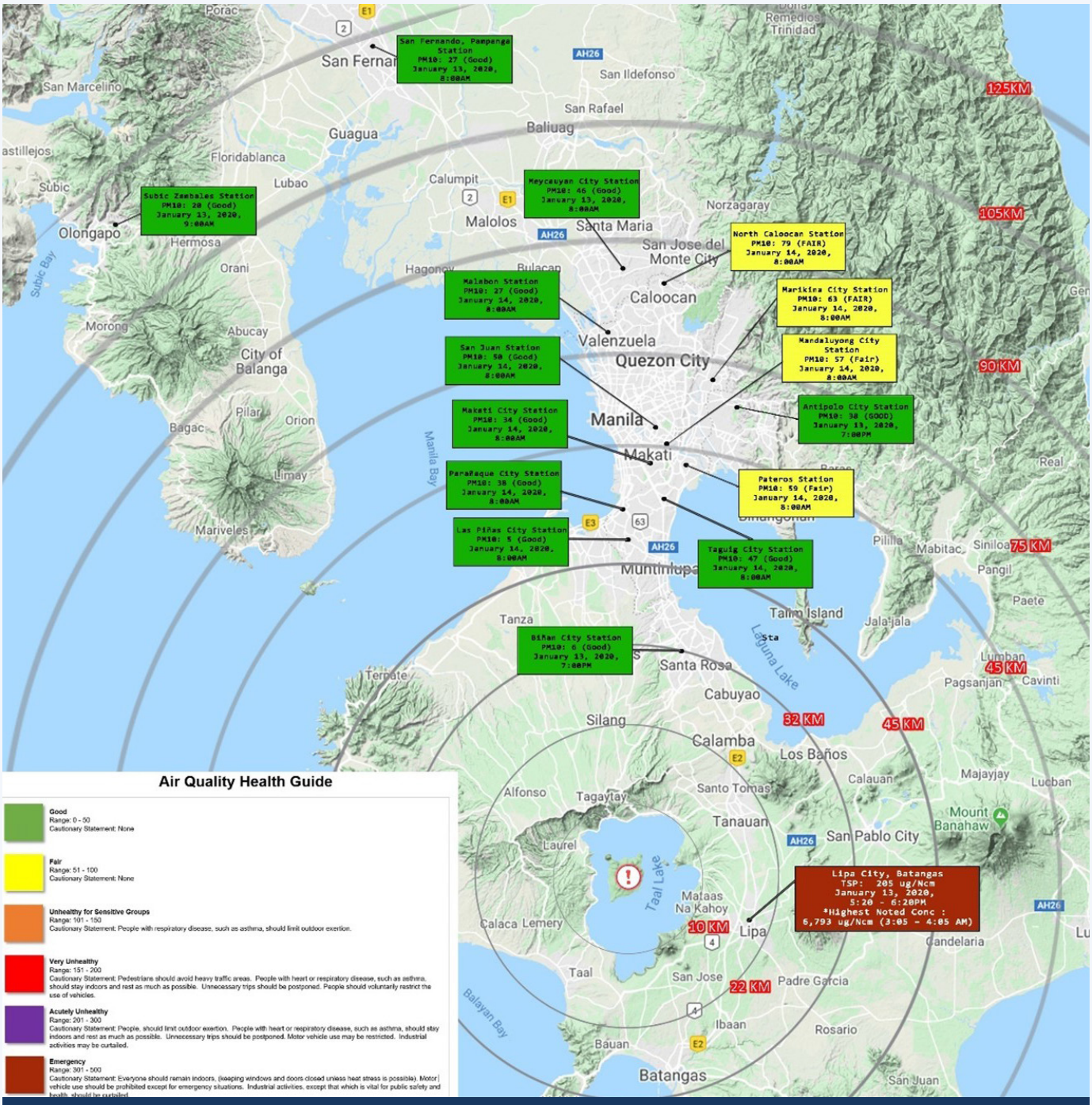
Station	PM10	Date and Time
Subic Zambales Station	20	January 13, 2020 ; 9:00 am
San Fernando, Pampanga Station	27	January 13, 2020 ; 8:00 am
Meycauyan City Station	46	January 13, 2020 ; 8:00 am
Malabon Station	27	January 14, 2020 ; 8:00 am
North Caloocan Station	79	January 14, 2020 ; 8:00 am
Marikina City Station	63	January 14, 2020 ; 8:00 am
Mandaluyong City Station	57	January 14, 2020 ; 8:00 am
San Juan Station	50	January 14, 2020 ; 8:00 am
Makati City Station	34	January 14, 2020 ; 8:00 am
Paranaque City Station	38	January 14, 2020 ; 8:00 am
Las Pinas City Station	5	January 14, 2020 ; 8:00 am
Antipolo City Station	38	January 13, 2020 ; 7:00 pm
Pateros Station	59	January 14, 2020 ; 8:00 am
Taguig City Station	47	January 14, 2020 ; 8:00 am
Binan City Station	6	January 13, 2020 ; 7:00 pm

Station	TSP	Date and Time	Highest Noted Concentration
Lipa City, Batangas Station	205 ug/NCM	January 13, 2020 ; 5:20-6:20 pm	6, 793 ug/NCM (3:05-4:05 am)

In addition, the TSP manual monitoring station located at Purok 1, Barangay Balintawak, Lipa City has measured hourly TSP concentrations up to 6,793 ug/Ncm (3:05 – 4:05 AM), 6,381 ug/Ncm (6:10 – 7:10 AM), 2,231 ug/Ncm (7:15 – 8:15 AM), 1,522 ug/Ncm (8:20 – 9:20 AM), and 524 ug/Ncm (2:50 – 3:50 PM) way above the 300 ug/Ncm ambient air quality guideline value.

The Department of Environment and Natural Resources (DENR), through the Environmental Management Bureau (EMB), conducted ambient air quality monitoring in the affected areas (National Capital Region, Central Luzon, CALABARZON). Tthe estimated distance of the ambient air quality monitoring stations from Taal Volcano were also plotted.

Assessment of wind direction and speed show surface winds coming from the northeast to the southwest may affect the dispersion of the ash plume coming from the Taal Volcano. Light particles such as PM_{10} and $PM_{2.5}$ may remain suspended above the 10 – 15 km ash-plume height influenced by the upper Planetary Boundary Layer (PBL). During boreal winter, lower-level winds are northeasterly (ground to around 2 km). Upper air (>10km) winds are westerly due to subtropical jet stream. If jet steam is north of Luzon, the wind is southerly. When the jet stream is over Luzon, winds are westerly (towards east). The forecast shows westerly upper air winds from Tuesday onwards.



Location of the DENR-EMB Air Quality Monitoring Stations located around the Taal Volcano. The Air Quality Monitoring Guide is also discussed on the right side of the figure.

Furthermore, another study from Lagman and UP-IESM-EPSL in 2021 described the transport process and deposition of ashfall during the eruption over CALABARZON and National Capital Region by using eruption data, meteorological parameters, ashfall images and air quality data on January 12-16, 2020. It was identified that various wind speed and direction at different atmospheric pressure levels contributed to transport of ashfall at different areas.

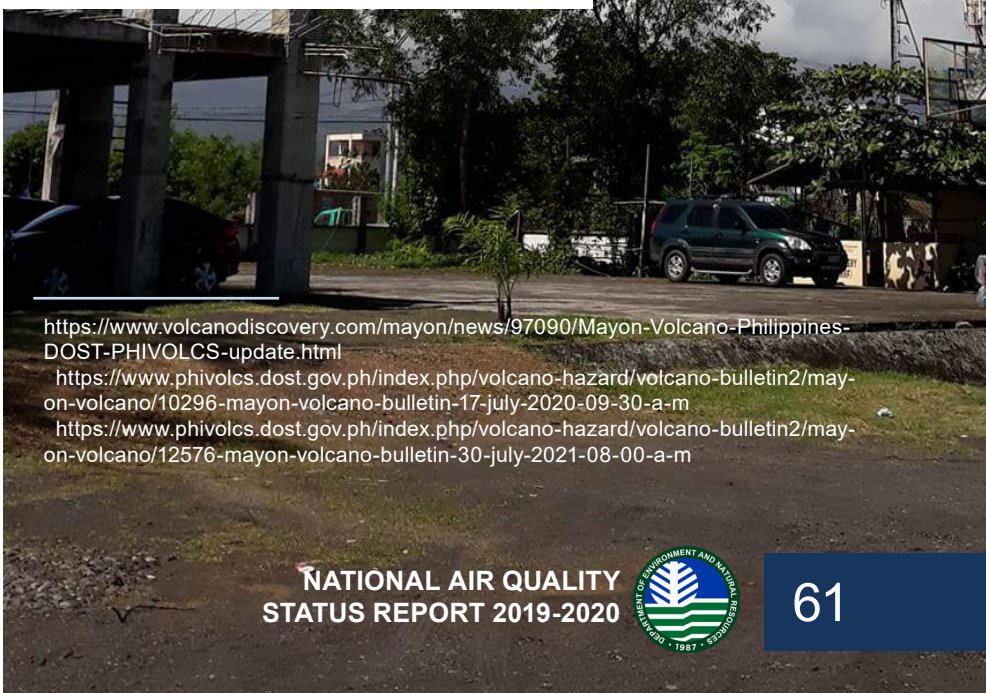
On January 12, high ash plume was influenced by southerly winds based on NOAA HYSPLIT trajectory and dispersion models as supported by ERA-5 reanalysis data, sounding data, and satellite images. Same data was used to analyze the transport of low volcanic ash plumes on January 13-16 which was generally influenced by northeasterly winds as prevailing winds. Ashfall incidents were identified in the Provinces of Cavite, Laguna, Batangas, Rizal, and Cities of Quezon, Marikina, Muntinlupa, Taguig, Parañaque, Mandaluyong, Las Piñas and Pasig based on the ashfall images collected that underwent image analysis. Based on image analysis, highest ashfall area was identified in Batangas Province. Moreover, 24-hour concentration of total suspended particulates from January 13-14 in Lipa City, Batangas reached acutely unhealthy level. Emission flux on January 13 reached 399, 168 ug m-2 which can be linked to the particles released during the eruption. From January 12-16, 2020, PM10 and PM2.5 concentration on January 12 from the Lung Center of the Philippines air quality monitoring station had the highest total emission flux equivalent to 17,460 ug m-2. On January 12, long range transport of high ash plume was observed while low volcanic ash plume affected the southwestern part of the volcano during the succeeding days.

MAYON VOLCANO EMISSION

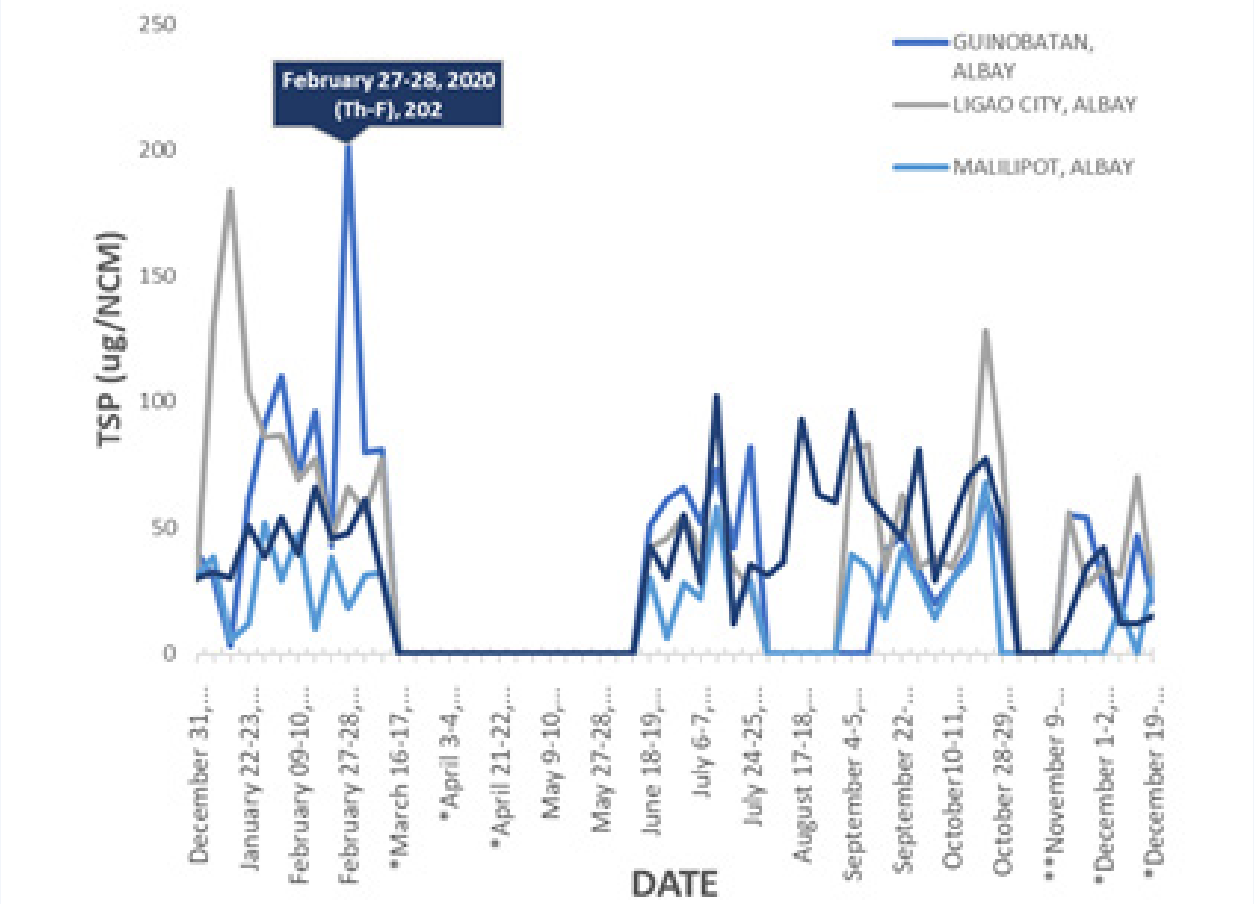
2019 – July 30, 2020

Mayon Volcano's seismic monitoring network recorded one volcanic earthquake over the last 24 hours. DOST-PHIVOLCS observed weak steam emissions with plumes drifting east-northeast. Sulfur dioxide (SO_2) emissions was measured at 115 tonnes/day on 10 January 2020. Ground deformation data from Precise Levelling surveys obtained on 23 – 30 October 2019 indicate a slight deflation of the edifice relative to 16 – 25 July 2019. However, the volcano generally remains inflated relative to the early 2019 baseline level. This is consistent with recent electronic tilt data. Continuous GPS data also showed inflation of the edifice since February 2019.

On the evening of February 4, 2020, PHIVOLCS reported to the public that the crater of Mayon Volcano began to glow, indicating that magma was still present slightly beneath the volcano's surface. Even though this phenomenon alerted officials and the public, the Mayon Volcano remained at an Alert Level 2 out of 5. On July 17, 2020, the Alert Level 2 was reduced to the Alert Level 1. On July 30, 2021, PHIVOLCS-DOST lifted the volcano's alert level status.

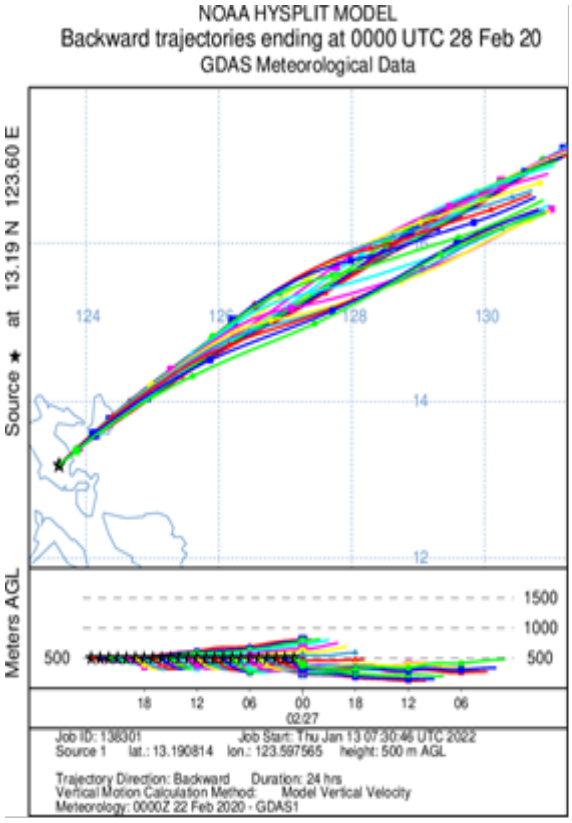


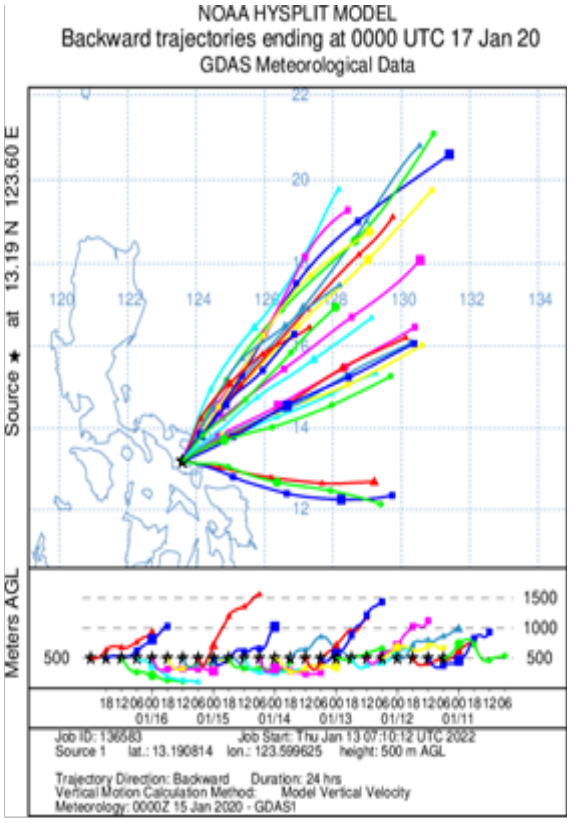
https://www.volcanodiscovery.com/mayon/news/97090/Mayon-Volcano-Philippines-DOST-PHIVOLCS-update.html
https://www.phivolcs.dost.gov.ph/index.php/volcano-hazard/volcano-bulletin2/mayon-volcano/10296-mayon-volcano-bulletin-17-july-2020-09-30-a-m
https://www.phivolcs.dost.gov.ph/index.php/volcano-hazard/volcano-bulletin2/mayon-volcano/12576-mayon-volcano-bulletin-30-july-2021-08-00-a-m

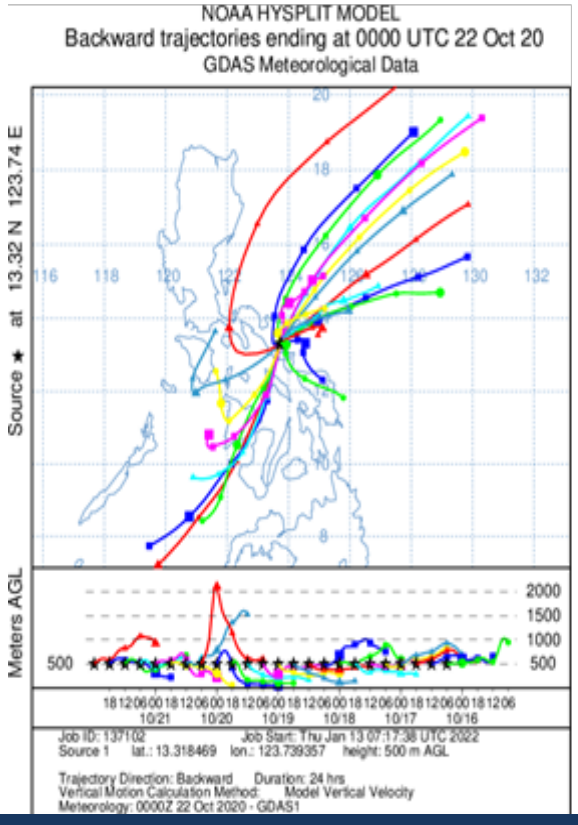


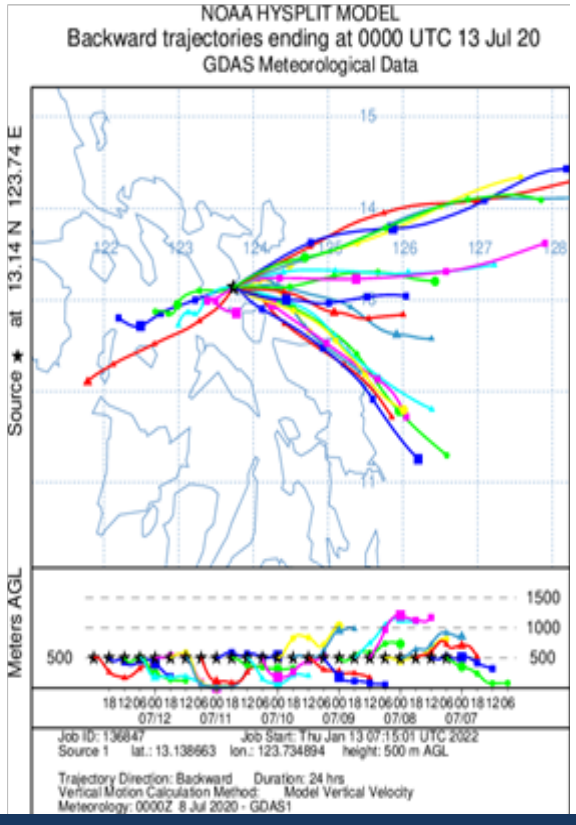
Mt. Mayon Eruption Monitoring of Total Suspended Particulates

Location of the Ambient Air Quality Monitoring Stations located near Mt. Mayon.









Backward Trajectory Model showing the movement of the air pollutants and wind trajectory during the Mt. Mayon Eruption using the NOAA Hysplit

The EMB Ambient Team with EMB - AQMS Chief Engr. Jundy Del Socorro as they conduct ambient air sampling during the Mt. Mayon Eruption

NOAA HYSPLIT showing the air trajectory during the 2020 station samplings. The following stations were the following: a) Guinobatan, b) Ligao, c) Malilipot, and d) Legazpi. The backward trajectory model run for 24 hours starting at 500 meters AGL with the trajectory starting every 1 hour.

The NOAA HYSPLIT was used as a guide on how the wind affects the travel of pollutants from one place to another. Moreover, it also shows which locations will be affected by the high amount of air pollutants that time. Knowing the movement of the wind and the current weather during the explosion is important for the general public to know.

During this time the the public is also advised to follow evacuation procedures, stay indoors, close all windows and doors, ensure safe water and food supply, and wear masks until further notice. The exposure to ash may induce the health effects such as nose irritation, throat irritation, eye irritation, minor skin problems, coughing, and injuries due to collapsing objects and vehicular accidents.

2019 - 2021 NEW YEARS EVE CELEBRATION

According to Executive Order (EO) 28 Series of 2017, President Rodrigo Duterte has ordered the Philippine National Police (PNP), in coordination with the Department of Health (DOH), the Department of Interior and Local Government (DILG), the Department of Environmental and Natural Resources (DENR), and the Bureau of Fire Protection (BFP) to enforce the EO as mentioned earlier which shall include allowable areas for community fireworks and confiscation and destruction of prohibited firecrackers and pyrotechnic devices.

The quality of air in Metro Manila the first hours of January 1, 2019, became poor due to the fireworks displays celebrating the New Year and the cold weather brought by Tropical Depression Usman which affected the dispersion of Air Pollutants.

According to the air quality monitoring website Airtoday.ph run by the Rotary Club of Makati, their two monitoring stations at Ayala Avenue Makati City and Lung Center of the Philippines in Quezon City recorded very high levels of particulate matter (PM) throughout the night.

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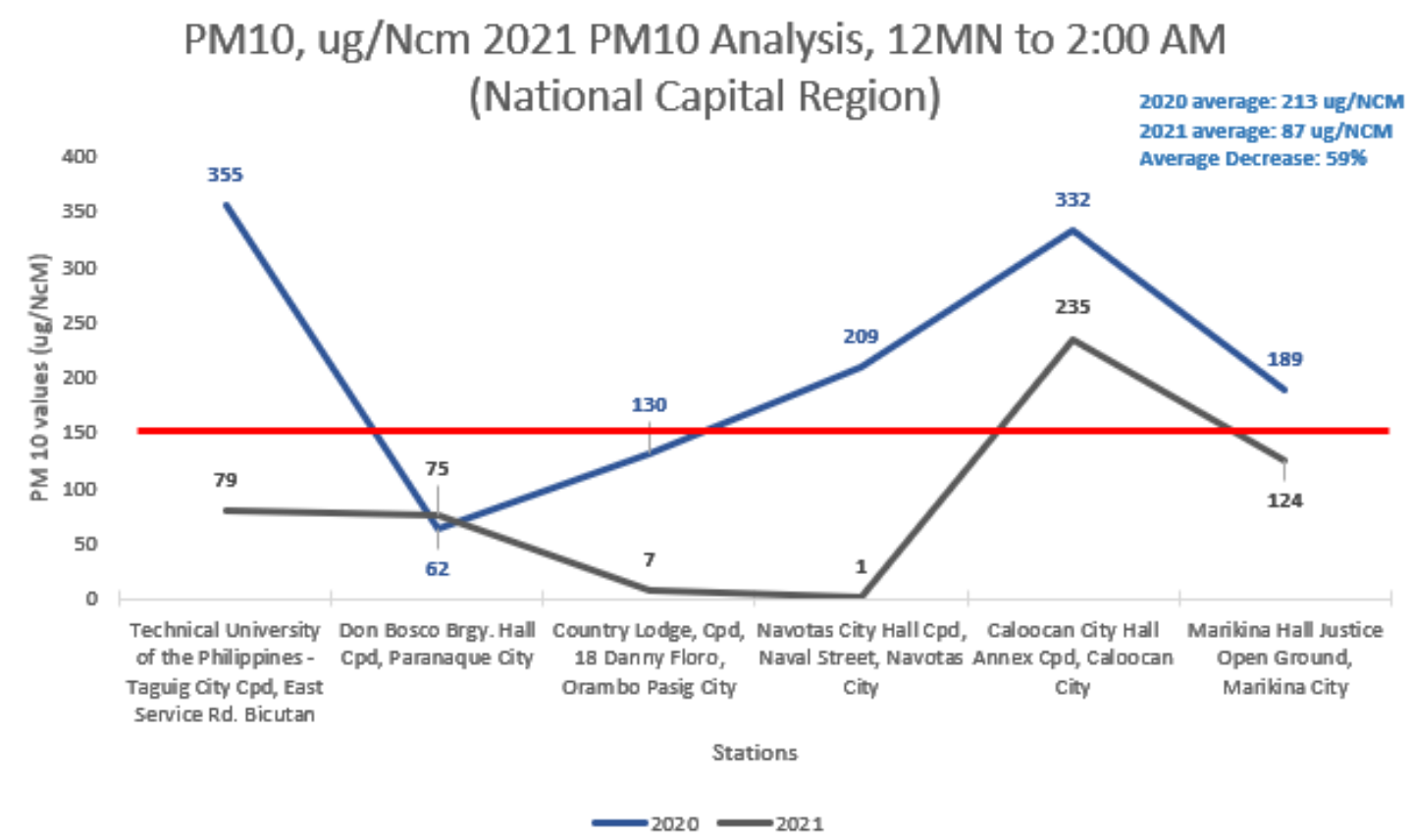
https://interaksyon.philstar.com/trends-spotlights/2019/01/01/141478/fireworks-lead-to-air-pollution-and-risks-of-stroke-lung-cancer-other-respiratory-diseases/

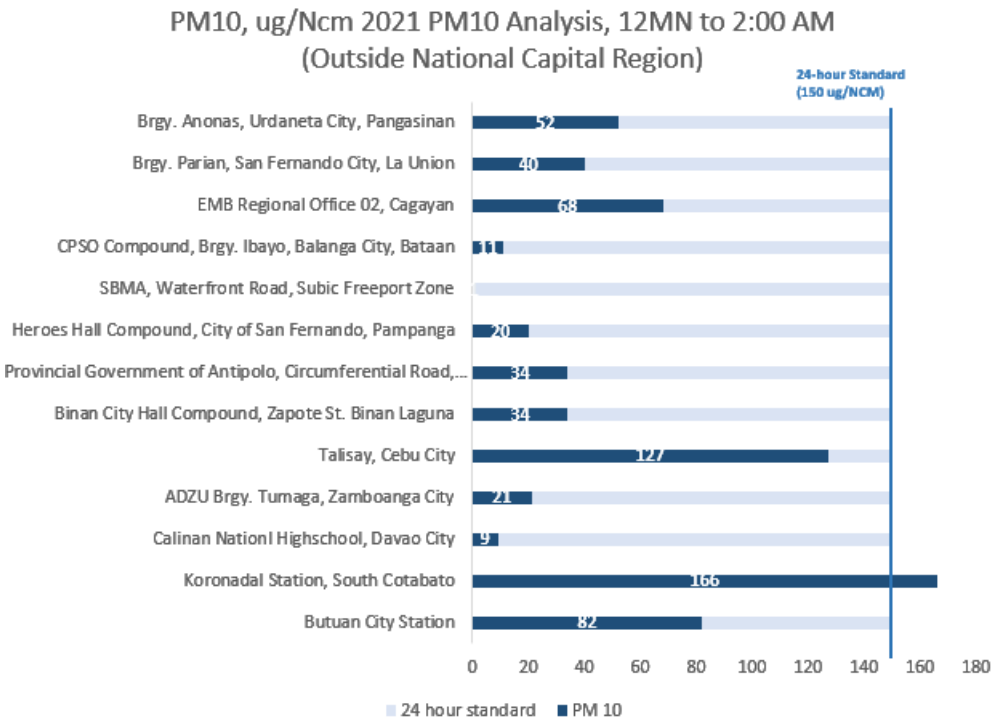
2019-2021 NYE DENR Air Quality Observations

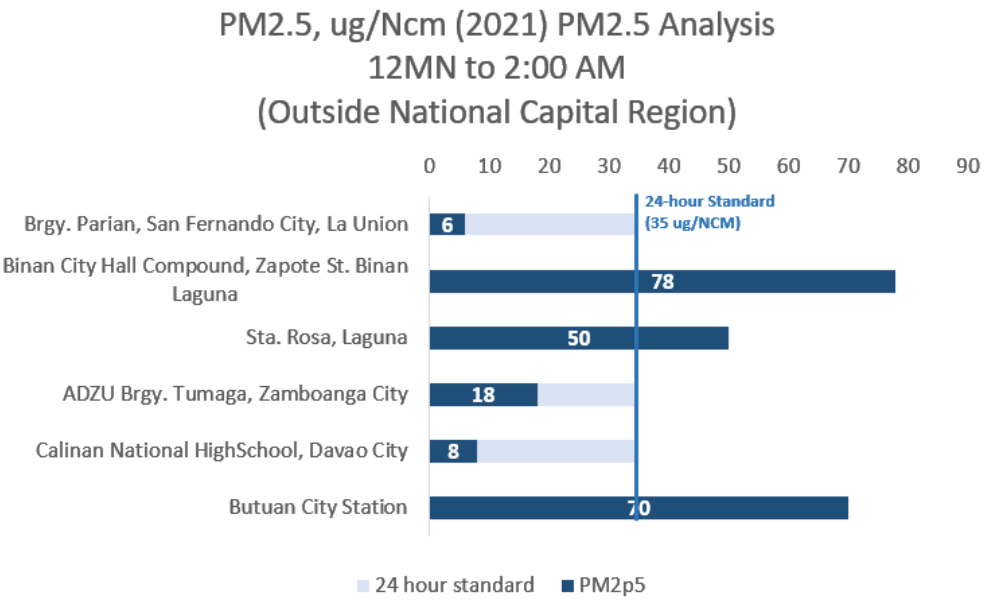


The graph clearly shows there is a decreasing trend in PM2.5 concentrations for most of the sampling sites (Manila Observatory, Barangka, Marikina, Valle Verde and Almanza, Las Pinas) in the past three years. In general, the air quality in Metro Manila during New Year's Eve is improving.

Although there seems to be a considerable decrease in the average $PM_{2.5}$ concentration for the past three years, this New Year's Eve pollution levels in all sites except Las Piñas remained "unhealthy" according to the US EPA 24hr standard. This means that PM exposure at this level may still pose health risks, especially to sensitive individuals (e.g. children, elderly, people with respiratory conditions). Even though there have been significant improvements in reducing air pollution during New Year's Eve, more progress is still necessary to maintain safe levels of air quality.

During the CY 2021 New Year's Eve celebration, a total of eight (8) stations in the National Capital Region (NCR) measured PM2.5 ambient air quality data. Six (6) stations in the National Capital Region (NCR) were comparable to the CY 2020 NYE. It was found that the NYE 2021 have significantly lower concentrations of PM_{10} compared to the NYE 2020 at an average of 59% decrease, this may be attributed to the strict measures being implemented by the Metro Manila Mayors pursuant to MMDA Resolution No. 20-17 "Prohibiting Individual and Household Use of Firecrackers and Other Pyrotechnic Devices During General Community Quarantine."





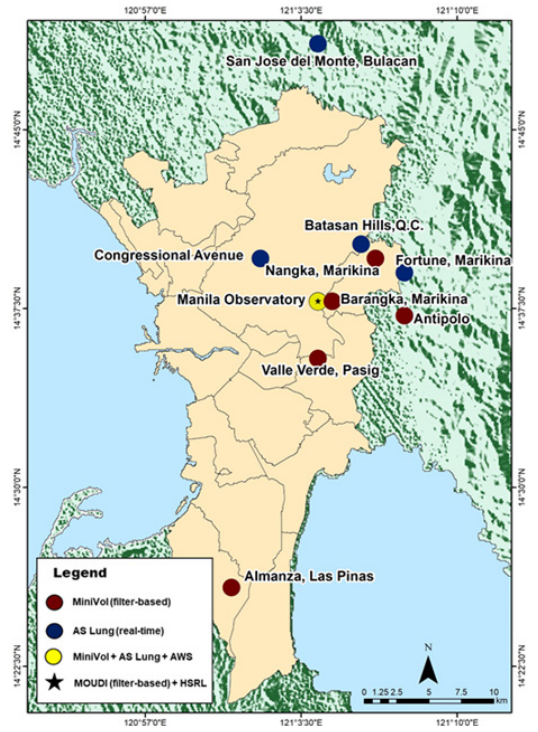
During the CY 2021 New Year's Eve celebration, a total of thirteen (13) stations and six (6) stations measured PM_{10} and $PM_{2.5}$ ambient air quality data outside the National Capital Region (NCR), respectively.

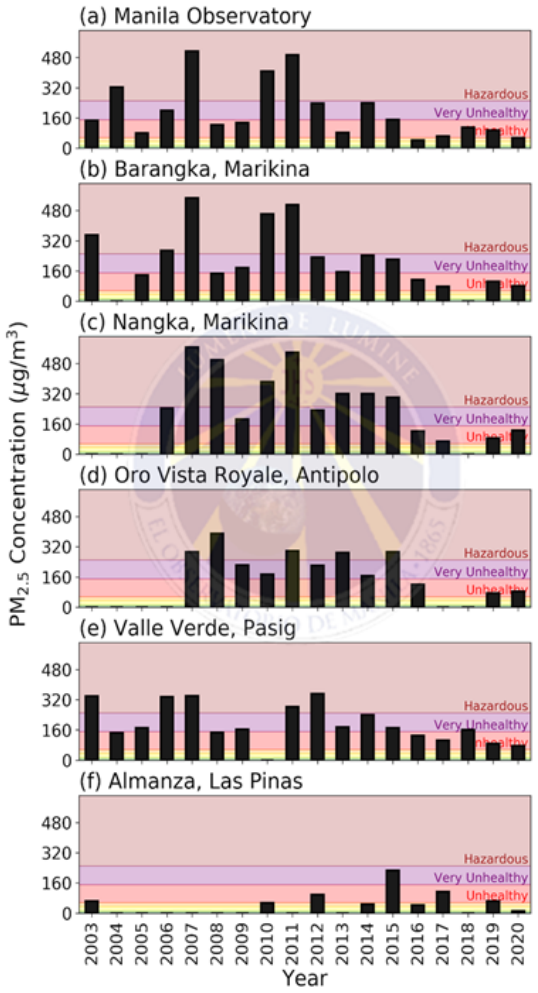
It was found that the Koronadal City Station in South Cotabato measured a maximum of 166 ug/NCM PM_{10} during 12:00 MN to 2:00 AM 1/1/2021 which is above the PM_{10} 24-hour National Ambient Air Quality Guideline Value (NAAQGV) of 150 ug/NCM. The three (3) stations exceeded the 24-hour National Ambient Air Quality Guideline Value (NAAQGV) of 35 ug/NCM for $PM_{2.5}$.

2019 NYE STUDY FROM MANILA OBSERVATORY

The Manila Observatory has been monitoring the air quality during New Year's Eve celebrations since 1998. Before New Year's Eve 2019 (31 Dec 2019), filter-based PM2.5 samplers were deployed in six different sites: (1) Manila Observatory, Quezon City; (2) Barangka, Marikina; (3) Nangka, Marikina; (4) Antipolo; (5) Valle Verde, Pasig; and (6) Almanza, Las Pinas. Moreover, the Micro-Orifice Uniform Deposit Impactor (MOUDI) was installed at the Manila Observatory to analyze relevant changes in the mass size distribution and chemical composition. This year, there were also real-time personal samplers installed in five sites: (1) Manila Observatory, Quezon City; (2) Congressional Avenue, Quezon City; (3) Batasan Hills, Quezon City; (4) Barangka, Marikina; and (5) San Jose del Monte, Bulacan. In the filter-based sampling, particles are deposited on a filter media for a certain number of hours and then analyzed for their mass and chemical composition.

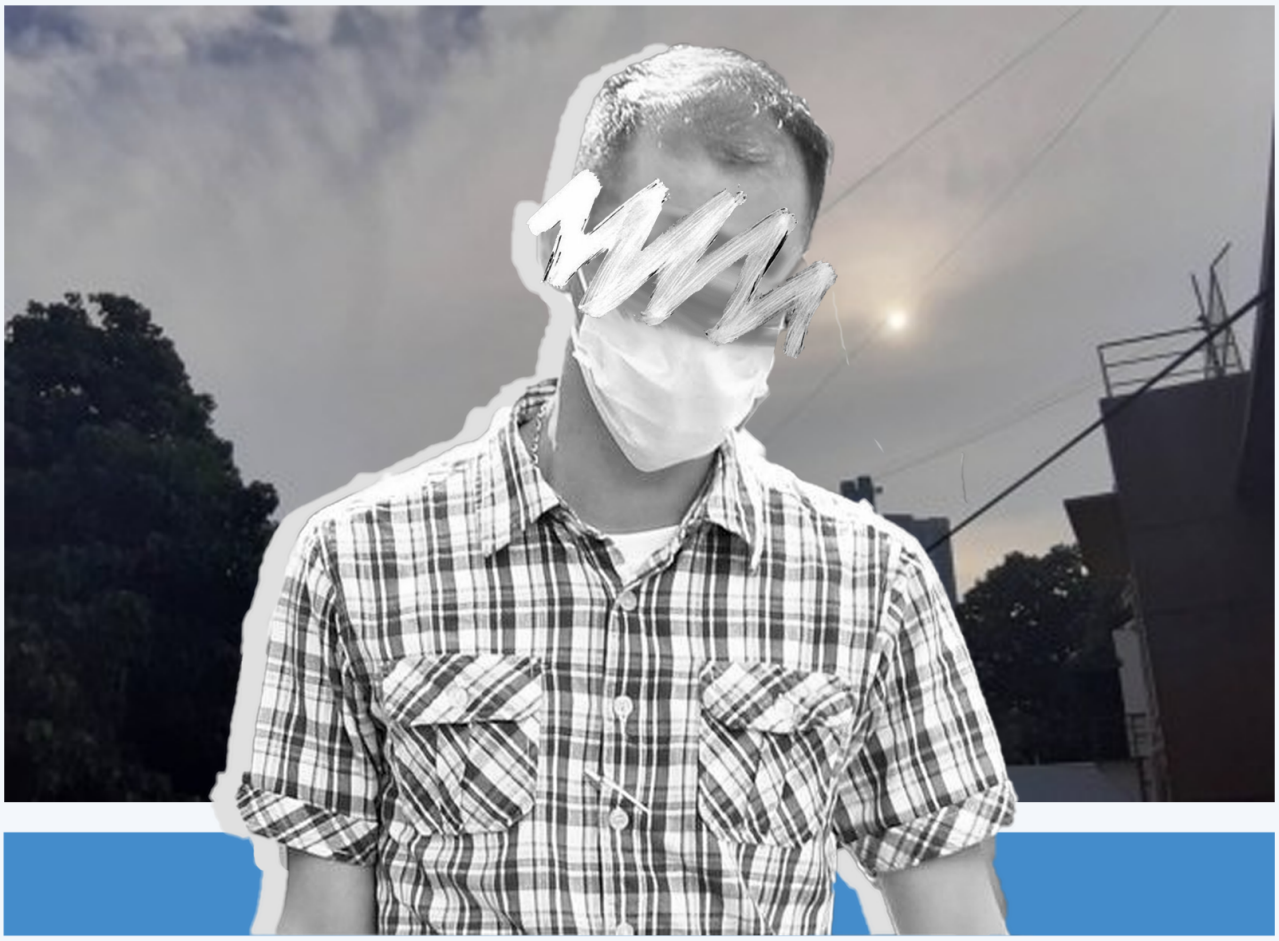
One disadvantage of this sampling method is it can only provide an average value over a given sampling time. On the other hand, real-time PM samplers can provide continuous, real-time data with higher resolution. The drawback of this method is that further chemical composition analysis is not possible. To fully understand the behavior and characteristics of PM, the use of both methods is recommended.





http://www.observatory.ph/2020/02/24/new-years-eve-2020-particle-pollution-measurements-in-metro-manila/

2019 SOUTHEAST ASIAN TRANSBOUNDARY HAZE



The latest episode of the Southeast Asian haze occurred in 2019. This was a long-term problem that happens in variable degrees during the region's dry seasons. It was mostly caused by forest fires caused by illegal slash-and-burn clearance on behalf of the palm oil business in Indonesia, primarily on the islands of Sumatra and Borneo, which spread swiftly during the dry season. On the second and third week of September 2019, the Southern Region of the Philippines have experienced the effect of the Indonesian Forest Fires through the Southeast Asian Transboundary Haze. The affected regions were Region 4b, Region 9, Region 8, Region 13, and ARMM.

2019 Southeast Asian Transboundary Haze

Findings and Reports

In a study that was conducted by K.E. Santos from UP Diliman-IESM in 2021 shows that the prevailing meteorological pattern affected the behavior of the pollutants during the transboundary haze event. The data and other relevant information were obtained from ground-based stations of DENR-EMB stations, NASA-AERONET, PAGASA, and satellite data from ECMWF-CAMS and HIMAWARI-8.

The data gathered were divided into three periods, namely: pre-haze (before), during the haze, and post-haze (after). Backward and forward air trajectories using the NOAA-HYSPLIT and wind vectors from MERRA-2 were plotted to find the sources of biomass burning to the recurring smoke haze in this region. In conclusion, using air trajectory analysis and the results of aerosol sample analysis using ground-based data indicate that the haze event experienced in the Southern Philippines was influenced by the transboundary air pollution from Indonesia.

Furthermore, news outlets have covered this event, as it raises concerns about aviation safety and at the same time possible health risks especially for people with lung problems.

Landrico Dalida Jr., the deputy administrator of the Philippine Atmospheric, Geophysical and Astronomical Services Administration, said light to moderate haze was covering the southern city of Zamboanga, the central cities of Cebu and Dumaguete, and the western province of Palawan. Authorities were verifying other areas that may also have been affected, he also said.

https://www.straitstimes.com/asia/se-asia/haze-reaches-cebu-in-central-philippines
(PDF) Characterizing the Transport and Meteorological Factors in Leading to the 2019 Southeast Asian Transboundary Haze in the Southern Philippines (researchgate.net)
Haze from Indonesian fires now affecting Philippines | Global News (inquirer.net)
Haze detected in CDO but “nothing conclusive yet” | MindaNews

Meanwhile in Region 10, Florencio Dominguez Jr. head of the Environmental Monitoring and Enforcement in Region 10, said their air quality monitoring equipment detected the increase of particles in the air over Cagayan de Oro.

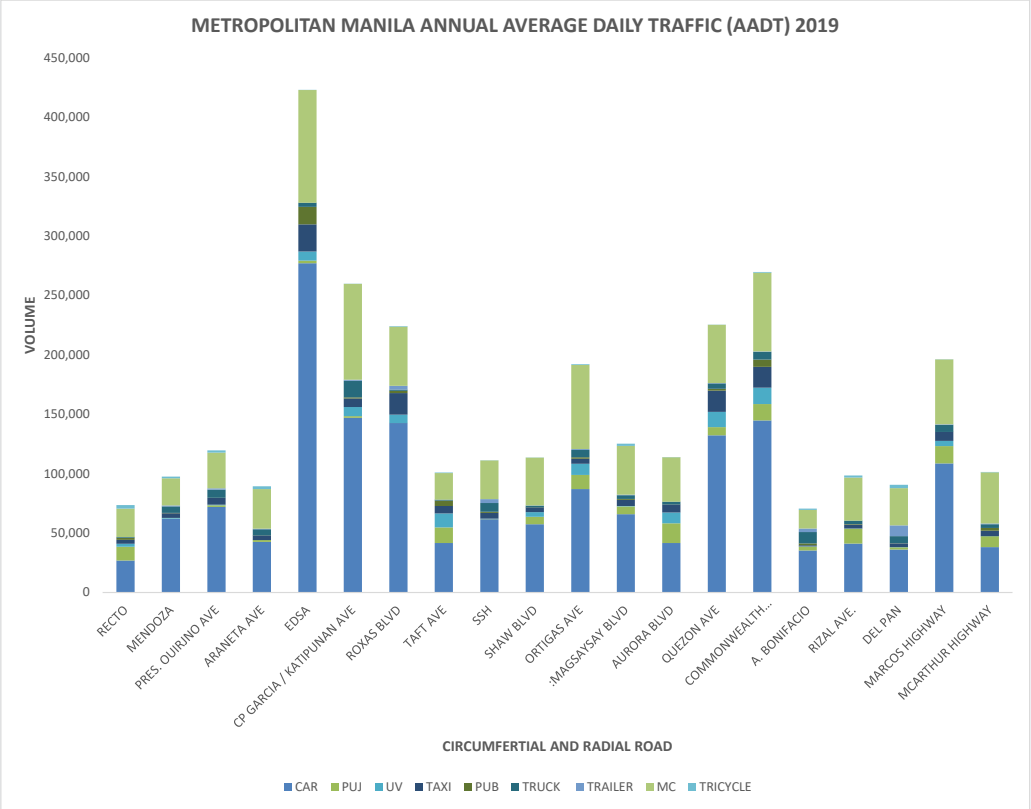
The different EMB ROs have spread their announcements and guidelines during the haze period through different media outlets (news, radios, and social media). For example, Region 7 have posted a public announcement through their EMB Facebook page and in their website. In line with this, DOH have also posted guidelines on how to cope with Haze in partnership with EMB Region 7.

"It's visible, meaning there are particles that are really coming from those areas in Indonesia, and they reach us,"

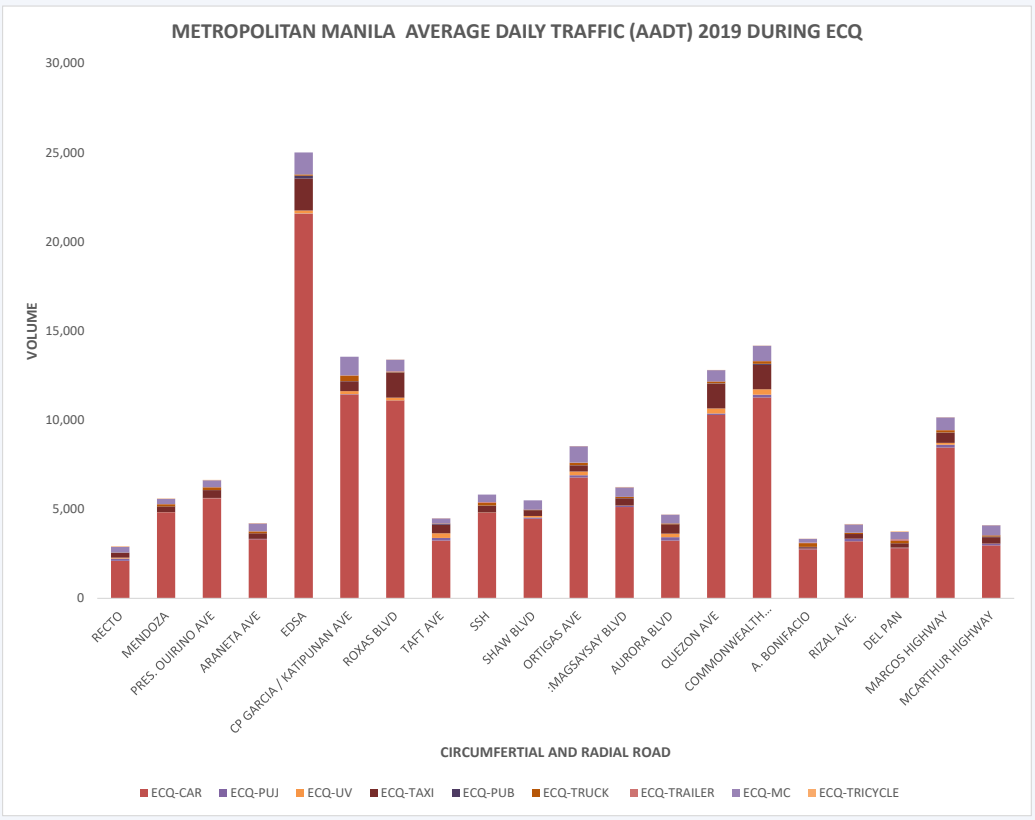
- *Landrico Dalida Jr.*

AIR QUALITY AMID THE PANDEMIC

2019–20 coronavirus pandemic is an ongoing coronavirus disease 2019 (COVID-19) pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The outbreak was first identified in Wuhan, Hubei, China, in December 2019 and was recognized as a pandemic by the World Health Organization (WHO) on 11 March 2020. As of 22 March, more than 306,000 cases of COVID-19 have been reported in over 180 countries and territories, resulting in more than 13,000 deaths and 94,000 recoveries.



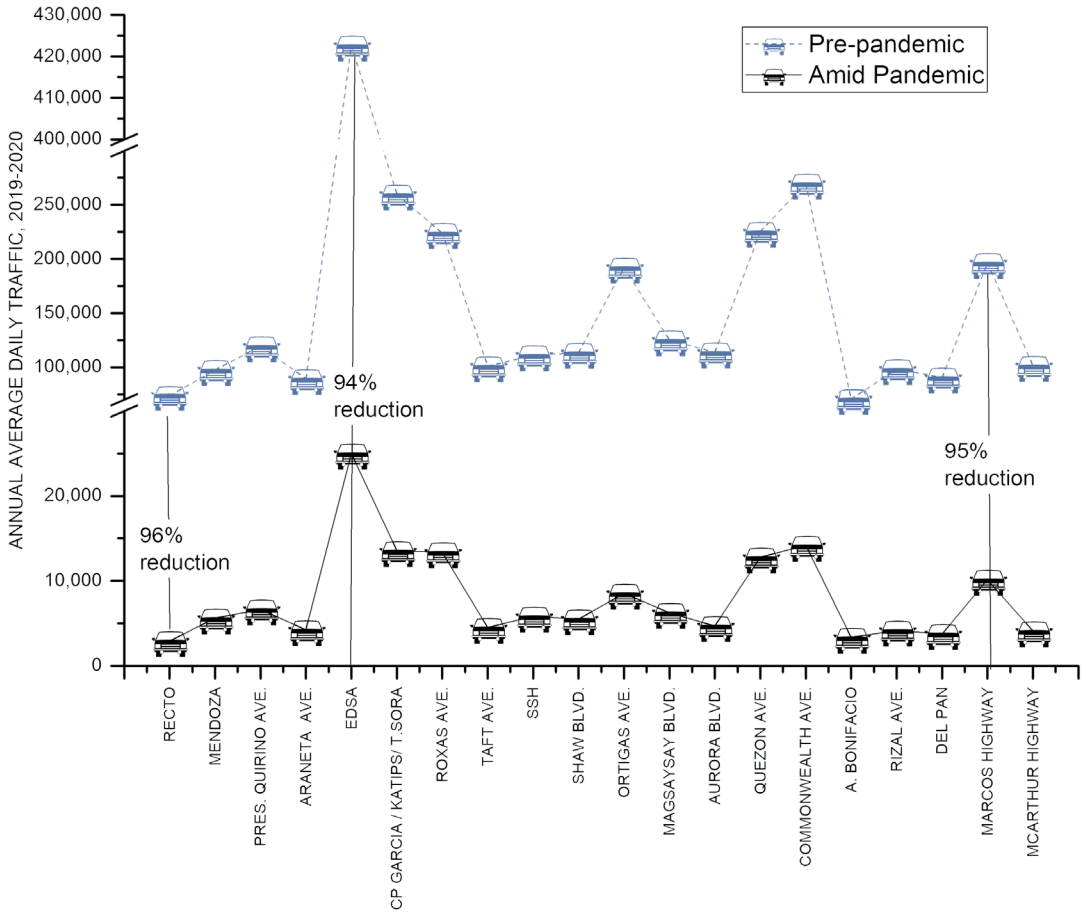
Estimated Annual AADT of Metro Manila



Estimated AADT of Metro Manila during ECQ

http://www.mmda.gov.ph/images/Home/FOI/Annual-Average-Daily-Traffic-AADT/AADT-2018.pdf
http://www.mmda.gov.ph/images/Home/FOI/Annual-Average-Daily-Traffic-AADT/AADT-2018.pdf

Pre- Pandemic vs Pandemic



As reported throughout the world, many countries have experienced a decrease in air pollution due to the 2019 - 2020 coronavirus pandemic.

During the implementation of ECQ, frequent decreases of daily PM_{10} concentration were measured in several Continuous Air Quality Monitoring Stations (CAQMS) of EMB Metro Manila. The decrease is due to less human activities, suspension of public transportation, and reduced number of vehicles plying in major thoroughfares, which are a significant source of air pollution in Metro Manila. Up to 59% of PM_{10} concentration reduction was measured during the implementation of ECQ; Weekday averaged daily comparison was conducted to determine PM_{10} reduction on a specific day of the week before and during the implementation of ECQ.

All the measured daily concentrations of PM_{10} Nationwide are within the 24Hour Guideline Value of 150 ug/Ncm and are categorized as “Good” to “Fair” in terms of Air Quality Index (AQI), respectively.

DATA SOURCE: EMB-CO AQMS & MMDA

Pre- Pandemic vs Pandemic

Assessment of Air Quality Monitoring DataDuring the Implementation of Enhanced Community Quarantine (ECQ) March 16 to May 15, 2020

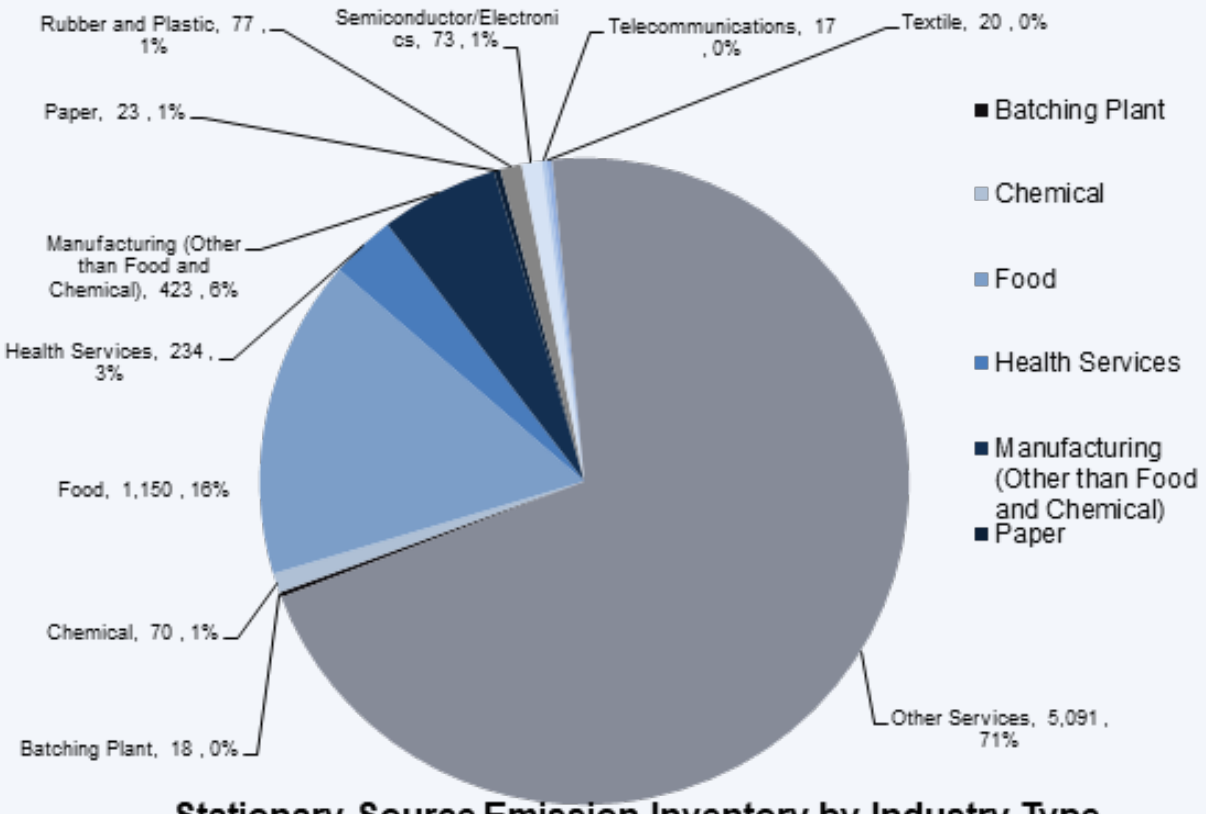
Region	City/Municipality Location	Maximum Average Decrease	Remarks
NCR	Las Piñas City	36%	Baseline Data: January 26 to February 25, 2020 (Before ECQ) compared to March 15 to May 15 2020 (During ECQ) Air Quality Data
	Malabon City	36%	
	Marikina City	59%	
	Parañaque City	47%	

The ambient air quality levels in cities of Metro Manila were significantly reduced by as much as 72% based in the weekday comparative analysis of PM_{10} concentrations. Weekday comparative analysis are conducted by comparing weekdays in different weeks (eg. Monday in 1st week vs Monday 2nd week vs 3rd week etc.). This was attributed to the decrease in fossil fueled vehicles which is approximately 81% of air pollution source in Metro Manila.

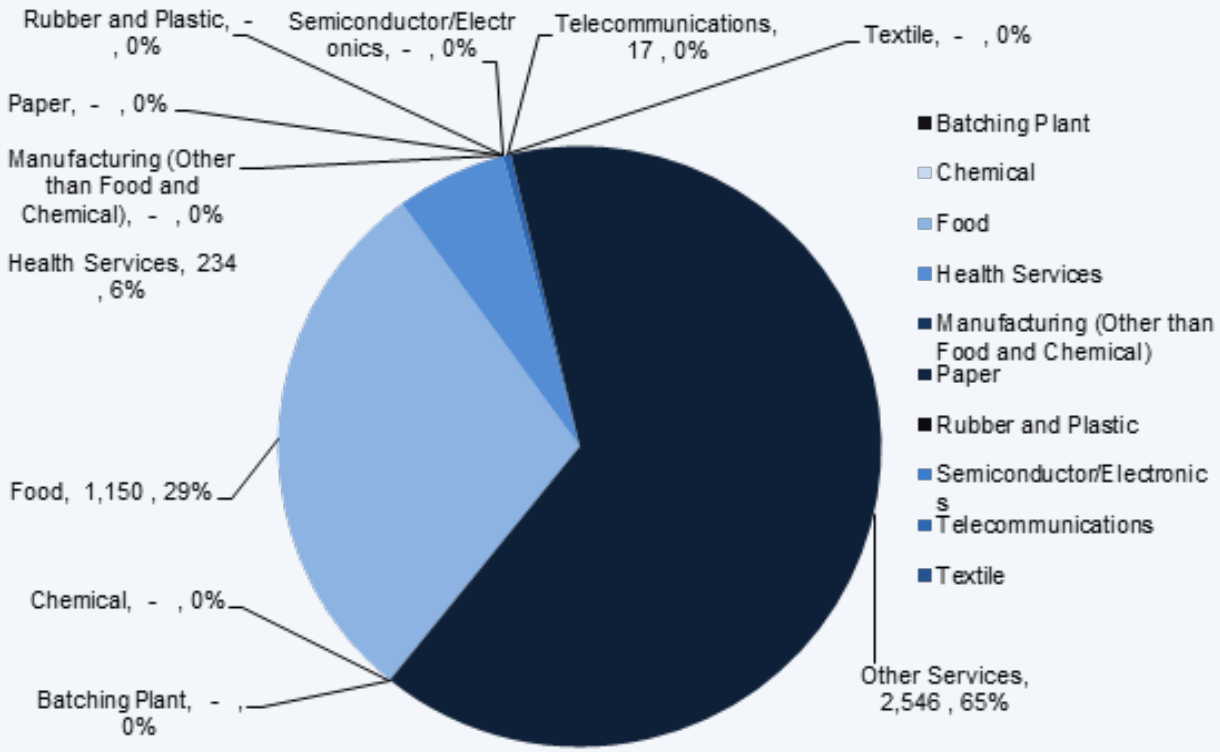
In the 2018 and 2019 Annual Average Daily Traffic (AADT) data from the MMDA, 2.8 to 3 million passing vehicles are counted in major thoroughfares, 18% (40,392 of 227,181 Utility Vehicles) of the smoke-belching diesel fed utility vehicles was apprehended by the Local Government Units (LGU) Anti-Smoke Belching Units (ASBU), 66% (40,392 vehicles) are failing the roadside emission testing. Quezon City alone has the highest failing rate at 96% (4,828 vehicles). The ECQ has halted the above smoke belchers by preventing approximate 96% of the Average Daily Traffic (ADT) to travel in Metro Manila. The partial lockdown on Metro Manila and extending the metropolis' class suspensions up to April 12, 2020, has reduced the ADT only to government vehicles, essential services, skeletal force, and those who use their vehicles to purchase essential commodities. For the above reason, air quality was significantly improved.

In addition to the Emissions Inventory conducted by the EMB, the Metro Manila Development Authority (MMDA) also monitors the Annual Average Daily Traffic (AADT) in the Metro. For 2018, it was found that 2,811,455 vehicles ply the major thoroughfares, C1 to C5 and R1 to R10, of Metro Manila. Based on the Annual Increase of 10.14% for NCR from CY 2018 to CY2019 of the Registered Motor Vehicles reported by the Land Transportation Commission (LTO), the AADT for CY 2019 was estimated to be 5,555,435. Using the above estimate, the ADT of Metro Manila during the ECQ was also estimated to be 159,145.

Stationary Sources During ECQ



Stationary Source Emission Inventory by Industry Type before ECQ



Stationary Source Emission Inventory by Industry Type amid ECQ

DATA SOURCE: EMB-CO AQMS

Comparison of Emissions from Industries Pre-ECQ and Amid ECQ

Type of Industry	Pre-ECQ Emissions (in Tons/Year)					Amid ECQ Emissions (in Tons/Year)				
	PM	CO	NOx	SOx	VOC	PM	CO	NOx	SOx	VOC
Batching Plant	2.33	9.46	31.05	0.18	-	-	-	-	-	-
Chemical	1.33	5.32	6.89	0.09	-	-	-	-	-	-
Food	187.12	461.62	3,643.27	6.27	-	93.56	230.81	1,821.63	3.13	-
Health Services	4.87	15.60	1.53	0.44	-	4.87	15.60	1.53	0.44	-
Manufacturing (Other than Food and Chemical)	-	-	-	-	-	-	-	-	-	-
Paper	71.35	97.19	958.30	25.75	-	-	-	-	-	-
Rubber and Plastic	2.00	8.67	30.10	0.14	-	-	-	-	-	-
Semiconductor / Electronics	-	-	-	-	-	-	-	-	-	-
Telecommunications	4.41	14.11	1.32	0.40	-	4.41	14.11	1.32	0.40	-
Textile	3.54	3.31	4.63	0.90	-	-	-	-	-	-
Other Services	57,517.59	78,307.00	678,478.83	6,882.21	-	28,758.79	39,153.50	339,239.42	3,441.11	-
Total	**57,794.54**	**78,922.28**	**683,155.93**	**6,916.38**	**-**	**28,861.63**	**39,414.02**	**341,063.91**	**3,445.08**	**-**
Percent Decrease (%)						**50.06%**	**50.06%**	**50.08%**	**50.19%**	**-**

DATA SOURCE: EMB-CO AQMS

Industrial facilities in NCR on the other hand, was also limited to essential services such as food, banks, pharmacy, fuel dispensing, health services among others. NCR Emission Inventory shows 7,196 air pollution sources from 10 categories namely Batching Plants, Chemical, Food, Health Services, Manufacturing, Paper, Rubber and Plastic, Semiconductor, Telecommunications and Textile. Majority of Industrial Air Pollution sources are from fuel burning equipment namely Coal and Oil-fired Boiler, Oil Heaters, Oil fired Furnaces and generator sets.

It was monitored before the ECQ, the operation of the following sources: 1. Boiler (401 units); 2. Oil Heaters (20 units) ; 3. Furnace (18 units); 4. Standby generator sets (6,134 units) are standby and was not affected since the DOE has committed adequate energy security during the lock down . Amid the ECQ, significant reduction in operation was noted: 1. Boiler: 88 % reduction (only 47 in operation); 2. Oil Heaters 95 % reduction (only 47 in operation); 3. Furnace 100 % reduction; 4. 100% on standby Generator sets. The halt to operation of the above-mentioned sources resulted to significant reduction in PM, CO. NO_x and SO_x emission

Area Sources during the Enhanced Community Quarantine (ECQ)

Amid the Luzon-wide ECQ, all establishments that are providing non-essential services are not allowed to operate during these times. Moreover, residents are encouraged to practice Stay-at-Home, Work from Home and Self Quarantine to prevent the spread of the disease.

As per the 2018 NCR Emissions Inventory, construction activities contributes most to the PM emissions with 22,841,888 tons/year and 15,856,460 tons/year for residential and non-residential construction, respectively. Among the area sources which were reduced during the ECQ are the following: 1. Aircraft Emission; 2. Automotive Fires: 3. Structural Fires; 4. Dry Cleaning; 5. Adhesive industry; 6. Open Burning: 7. Residential and Non Residential Construction; 8. Residential Cooking. A significant reduction in area sources was noted. Significant source of area source particulate matter was the construction industry, open burning, aircraft emission, structural and automotive fires.

As a result, reduced emissions from these sources contribute greatly to the clean air as seen throughout Metro Manila. Thus, the decrease of use of fossil fueled vehicles and equipment presents positive impacts on the quality of air. Also, activities that produce high amounts of PM should be lessened or controlled so as to avoid the emission of PM to the atmosphere.

In retrospect, the ECQ has contributed greatly in cleaning the air and has opened the eyes of many a Filipino to what clean air can contribute to the welfare of the country. In fact the ECQ has not only cleaned the air, but has also allowed the Metro Manila skyline to be visible to neighboring provinces and allowed the Sierra Madre mountain range to be visible to residents of Metro Manila.

For the purposes of this study, it was assumed that some activities will not ensue during the ECQ.

Reduction of emissions per source per pollutant for PM, NOx, and SOx in metro manila during the implementation of ECQ in 2019 (Pre-ECQ and Amid-ECQ)

Area Sources	PM Emissions (tons/year)			NOx Emissions (tons/year)			SOx Emissions (tons/year)		
	Pre-ECQ	Amid ECQ	% Decrease	Pre-ECQ	Amid ECQ	% Decrease	Pre-ECQ	Amid ECQ	% Decrease
Aircraft Emissions	4.03	-	100%	951.41	-	100%	903.64	-	100%
Automotive Fires	1.75	-	100%	0.07	-	100%	-	-	-
Structural Fires	11.07	-	100%	3.95	-	100%	-	-	-
Dry Cleaning	-	-	-	-	-	-	-	-	-
Adhesive Sealants	-	-	-	-	-	-	-	-	-
Gasoline Dispensing	-	-	-	-	-	-	-	-	-
Open Burning	47.51	-	100%	-	-	-	-	-	-
Residential Construction	22,841,887.84	-	100%	-	-	-	-	-	-
Non-Residential Construction	15,856,459.52	-	100%	-	-	-	-	-	-
Road Construction	2,040.88	-	100%	-	-	-	-	-	-
Residential LPG	0.01	0.01	0%	0.38	0.38	0%	0.00	0.00	0%
Residential Kerosene	-	-	-	-	-	-	0.08	0.08	0%
Total	38,700,452.61	0.01	100%	955.82	0.38	100%	903.64	0.00	100%

Stationary Sources	PM Emissions (tons/year)			NOx Emissions (tons/year)			SOx Emissions (tons/year)		
	Pre-ECQ	Amid ECQ	% Decrease	Pre-ECQ	Amid ECQ	% Decrease	Pre-ECQ	Amid ECQ	% Decrease
Batching Plant	2.33	-	100%	31.05	-	100%	0.18	-	100%
Chemical	1.33	-	100%	6.89	-	100%	0.09	-	100%
Food	187.12	93.56	50%	3,643.27	1,821.63	50%	6.27	3.13	50%
Health Services	4.87	4.87	0%	1.53	1.53	0%	0.44	0.44	0%
Manufacturing (Other than Food and Chemical)	-	-	-	-	-	-	-	-	-
Paper	71.35	-	100%	958.30	-	100%	25.75	-	100%
Rubber and Plastic	2.00	-	100%	30.10	-	100%	0.14	-	100%
Semiconductor/Electronics	-	-	-	-	-	-	-	-	-
Telecommunications	4.41	4.41	0%	1.32	1.32	0%	0.40	0.40	0%
Textile	3.54	-	100%	4.63	-	100%	0.90	-	100%

DATA SOURCE: EMB-CO AQMS

Reduction of emissions per source per pollutant for PM, NOx, and SOx in metro manila during the implementation of ECQ in 2019 (Pre-ECQ and Amid-ECQ)

Mobile Sources		PM Emissions (tons/year)			NOx Emissions (tons/year)			SOx Emissions (tons/year)		
		Pre-ECQ	Amid ECQ	% Decrease	Pre-ECQ	Amid ECQ	% Decrease	Pre-ECQ	Amid ECQ	% Decrease
CARS	Gas	5,277.63	410.60	92%	51,302.87	3991.36	92%	-	-	-
	Diesel	946.69	73.65	92%	1,461.84	113.73	92%	-	-	-
UV	Gas	8,827.82	97.99	99%	81,318.77	902.64	99%	-	-	-
	Diesel	122,818.55	1363.29	99%	93,922.37	1042.54	99%	-	-	-
TRUCKS	Gas	59.23	0.00	100%	755.74	0.00	100%	-	-	-
	Diesel	24,110.85	535.26	98%	140,179.38	3111.98	98%	-	-	-
BUSES	Gas	3.74	0.00	100%	47.75	0.00	100%	-	-	-
	Diesel	3,540.62	39.30	99%	20,585.00	228.49	99%	-	-	-
MC/TC	Gas	119,844.69	1557.98	99%	13,995.44	181.94	99%	-	-	-
Sub Total	Gas	134,013.11	2,066.57	98%	147,420.57	5,075.94	97%	-	-	-
Sub Total	Diesel	151,416.71	2,011.50	99%	256,148.59	4,496.75	98%	-	-	-
Grand Total		285,429.82	4,078.07	99%	403,569.16	9,572.69	98%	-	-	-

DATA SOURCE: EMB-CO AQMS

Reduction of emissions per source per pollutant for CO and VOC/TOG metro manila in 2019 during Pre-ECQ and Amid ECQ (continuation)

Area Sources	CO Emissions (tons/year)			VOC/TOG Emissions (tons/year)		
	Pre-ECQ	Amid ECQ	% Decrease	Pre-ECQ	Amid ECQ	% Decrease
Aircraft Emissions	95.54	-	100%	2,238.57	-	100%
Automotive Fires	2.19	-	100%	0.74	-	100%
Structural Fires	173.91	-	100%	14.23	-	100%
Dry Cleaning	-	-	-	0.06	-	100%
Adhesive Sealants	-	-	-	837.93	-	100%
Gasoline Dispensing	-	-	-	24.69	24.69	0%
Open Burning	264.71	-	100%	-	-	-
Residential Construction	-	-	-	-	-	-
Non-Residential Construction	-	-	-	-	-	-
Road Construction	-	-	-	-	-	-
Residential LPG	0.08	0.08	0%	0.03	0.03	0%
Residential Kerosene	-	-	-	-	-	-
Total	536.43	0.08	100%	3,116.24	24.72	99%
Stationary Sources	**CO Emissions (tons/year)**			**VOC/TOG Emissions (tons/year)**		
	Pre-ECQ	Amid ECQ	% Decrease	Pre-ECQ	Amid ECQ	% Decrease
Batching Plant	9.46	-	100%	-	-	-
Chemical	5.32	-	100%	-	-	-
Food	461.62	230.81	50%	-	-	-
Health Services	15.60	15.60	0%	-	-	-
Manufacturing (Other than Food and Chemical)	-	-	-	-	-	-
Paper	97.19	-	100%	-	-	-
Rubber and Plastic	8.67	-	100%	-	-	-
Semiconductor/Electronics	-	-	-	-	-	-
Telecommunications	14.11	14.11	0%	-	-	-
Textile	3.31	-	100%	-	-	-
Other Services	78,307.00	39,153.50	50%	-	-	-
Total	78,922.28	39,414.02	50%	-	-	-

DATA SOURCE: EMB-CO AQMS

Reduction of emissions per source per pollutant for CO and VOC/TOG metro manila in 2019 during Pre-ECQ and Amid ECQ (continuation)

Mobile Sources		CO Emissions (tons/year)			VOC/TOG Emissions (tons/year)		
		Pre-ECQ	Amid ECQ	% Decrease	Pre-ECQ	Amid ECQ	% Decrease
CARS	Gas	952,092.71	74072.81	92%	134,214.45	10441.88	92%
	Diesel	1,458.84	113.50	92%	482.91	37.57	92%
UV	Gas	1,525,547.75	16933.58	99%	222,656.43	2471.49	99%
	Diesel	172,971.04	1919.98	99%	46,504.11	516.20	99%
TRUCKS	Gas	6,968.95	0.00	100%	341.93	0.00	100%
	Diesel	139,057.94	3087.09	98%	41,493.10	921.15	98%
BUSES	Gas	440.32	0.00	100%	440.32	0.00	100%
	Diesel	20,420.32	226.67	99%	20,420.32	226.67	99%
MC/TC	Gas	835,600.50	10862.81	99%	564,665.83	7340.66	99%
Sub Total	Gas	3,320,650.23	101,869.20	97%	922,318.95	20,254.03	98%
Sub Total	Diesel	333,908.13	5,347.23	98%	108,900.44	1,701.58	98%
Grand Total		3,654,558.36	107,216.43	97%	1,031,219.39	21,955.60	98%

DATA SOURCE: EMB-CO AQMS

STATUS IN OTHER REGIONS

Shown in the table is the summary of percentage decrease/increase of PM_{10} daily concentration nationwide. Though there are recorded days that increased in concentration during the implementation of ECQ, all the measured daily concentration of PM_{10} nationwide are within the 24-Hour Guideline Value of 150 ug/Ncm and are categorized as “Good” to “Fair” in-terms of Air Quality Index (AQI) respectively.

Air Quality Status in Other Regions during ECQ

Region	City/Municipality Location	Weekday Percent Increase/Decrease			Remarks
		Min	Max	Average	
NCR	Marikina City	26%	58%	39%	Weekday Air Quality comparison of May 01, 2020, since May 02, 2020. Baseline data: February 9 to March 13, 2020 (Before ECQ) compared to March 29 to May 01, 2020 (During ECQ
	Parañaque City	10%	54%	35%	
	Malabon City	12%	32%	22%	
	Las Piñas	-67%	43%	-7%	
CAR	Baguio City	-27%	22%	-6%	Per EMB CAR, the increase in the results may be attributed to the “dry season” that the city is currently experiencing. Weekday Air Quality comparison of Apr 24, 2020, since May 2, 2020 -Baseline data: February 2 to March 6. 2020 (Before ECQ) compared to March 22 to April 24, 2020 (During ECQ)
Region 1	Batac City	-25%	11%	-5%	Weekday Air Quality comparison as May 1, 2020, since May 2, 2020 -Baseline Data: February 9 to March 13, 2020 (Before ECQ) compared to March 29 to May 01, 2020 (During ECQ)
	San Fernando City. La Union	-1060%	-26%	-401%	
	Urdaneta City	22%	70%	49%	
Region 2	Tuguegarao City	--	--	--	Instrument for maintenance and calibration
Region 3	Meycauayan	-32%	29%	0%	Weekday Air Quality comparison as Apr 30, 2020, since May 2, 2020 -Baseline Data: February 2 to March 6, 2020 (Before ECQ) compared to March 22 to April 30, 2020 (During ECQ)
	San Fernando City, Pampanga	-65%	44%	0%	
	SBMA. Zambales	-71%	-7%	-32%	
	Balanga City	13%	70%	34%	
Region 4A	Antipolo City	9%	50%	37%	Weekday Air Quality comparison as Apr 30, 2020, since May 2, 2020 -Baseline Data: February 9 to March 12, 2020 (Before ECQ) compared to March 29 to April 30, 2020 (During ECQ)
	Biñan City	-40%	29%	5%	
Region 4B	Puerto Princesa City	--	--	--	Instrument for repair and maintenance
Region 5	Naga City	-20%	16%	1%	Weekday Air Quality comparison as May 1, 2020, since May 2, 2020

Air Quality Status in Other Regions during ECQ *(continuation)*

Region	City/Municipality Location	Weekday Percent Increase/Decrease			Remarks
		Min	Max	Average	
Region 5	Naga City	-20%	16%	1%	Weekday Air Quality comparison as May 1, 2020, since May 2, 2020
					-Baseline Data: February 9 to March 13, 2020 (Before ECQ) compared to March 29 to May 01, 2020 (During ECQ)
Region 6	Bacolod City	--	--	--	Instrument for repair and maintenance
Region 7	Talisay City	8%	44%	32%	The station has no internet connection, unable to conduct maintenance and retrieve AQ data due to the strict ECQ implementation in CEBU. Weekday Air Quality comparison as of Apr 27, 2020, since May 2, 2020. -Baseline data: February 7 to February 24, 2020 (Before ECQ) compared to Apr 10 to Apr 27, 2020 (During ECQ)
Region 8	NO CAQM Station Installed				
Region 9	Zamboanga City	5%	20%	14%	Weekday Air Quality comparison as May 1, 2020, since May 2, 2020 -Baseline Data: February 9 to March 13, 2020 (Before ECQ) compared to March 29 to May 01, 2020 (During ECQ)
Region 10	Iligan City	11%	25%	17%	Weekday Air Quality comparison as May 1, 2020, since May 2, 2020 -Baseline Data: February 9 to March 13, 2020 (Before ECQ) compared to March 29 to May 01, 2020 (During ECQ)
Region 11	Buhangin, Davao City	11%	53%	14%	Weekday Air Quality comparison as May 1, 2020, since May 2, 2020 -Baseline Data: February 9 to March 13, 2020 (Before ECQ) compared to March 29 to May 01, 2020 (During ECQ)
	Calinan. Davao City	-18%	36%	14%	
Region 12	Korondal City	No Data			No data submitted from EMB R12, For submission to the EMB memorandum dated April 20, 2020
	General Santos City	No Data			
Region 13	Brgy, Doongan, Butuan City	-23%	40%	17%	Weekday Air Quality comparison as Apr 28, 2020, since May 2, 2020 -Baseline Data: Apr 22 to Apr 28, 2019 (Before ECQ) compared to Apr 22 to Apr 28, 2019 (During ECQ)

ENVIRONMENTAL POLLUTION STUDIES LABORATORY
scire quod sciendum

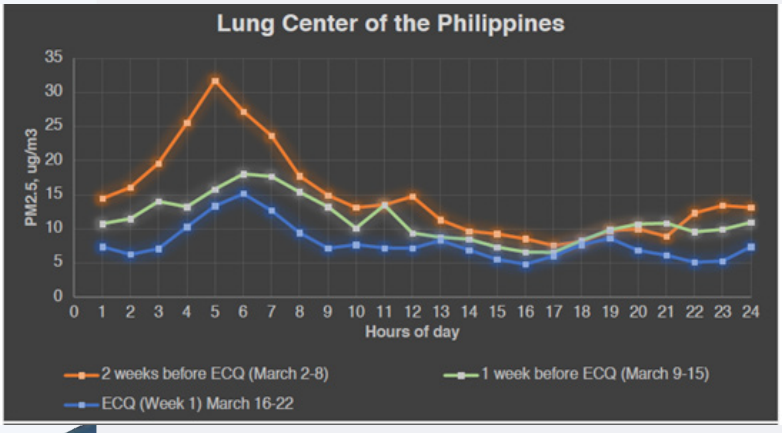
Study From The UP Diliman - EPSL

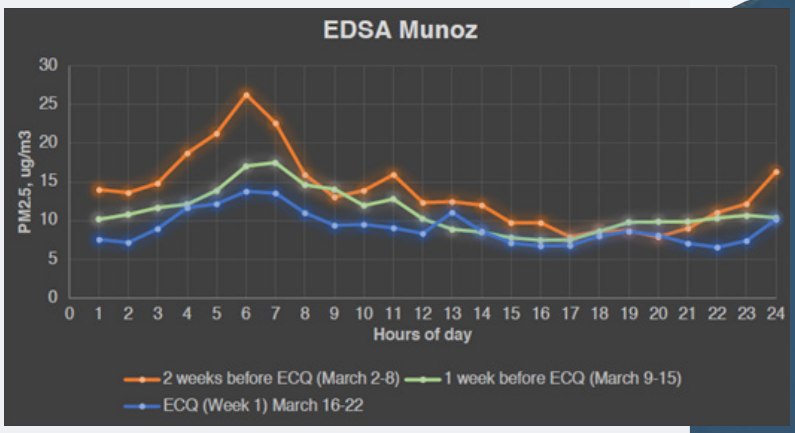
The www.airtoday.ph stations in Quezon City are recording a 180% decrease in $PM_{2.5}$ since the Enhanced Community Quarantine (ECQ) was imposed in Metro Manila on March 16, 2020.

Gathered from www.airtoday.ph station in the Lung Center of the Philippines (LCP) compound, the $PM_{2.5}$ - minute airborne dust that can penetrate the lungs, cause shortness of breath, and aggravate pre-existing respiratory conditions - shows decreasing trends.

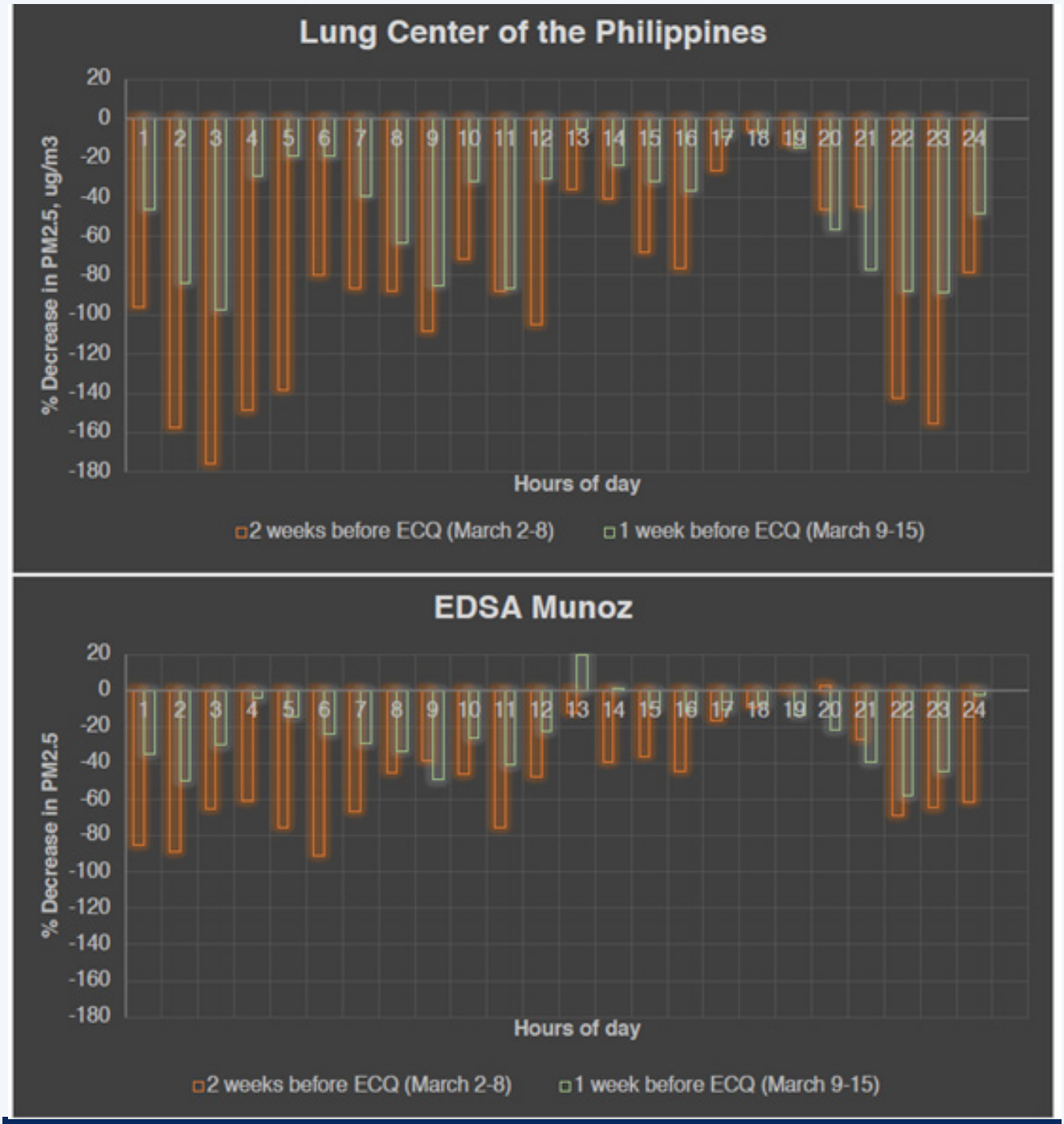
Comparing the levels of $PM_{2.5}$ pre- and while on ECQ, the greatest improvement (% of the decrease in $PM_{2.5}$) happen during the window hours when the atmospheric ventilation is low (evenings and early morning), by a reduction of 80-180% from 9 pm to 4 am in LCP compound.
The same trend was observed in another www.airtoday.ph station along EDSA Munoz, at 70-90% reduction in $PM_{2.5}$ since the ECQ.

'On ordinary Thursdays, the $PM_{2.5}$ would peak to 38 ug/m³ during evening rush hours, which can be unhealthy to sensitive groups', added Dr. Mylene Cayetano, Technical Adviser of www.airtoday.ph, an initiative by the Rotary Club of Makati, in collaboration with LCP and UP Diliman Institute of Environmental Science and Meteorology.

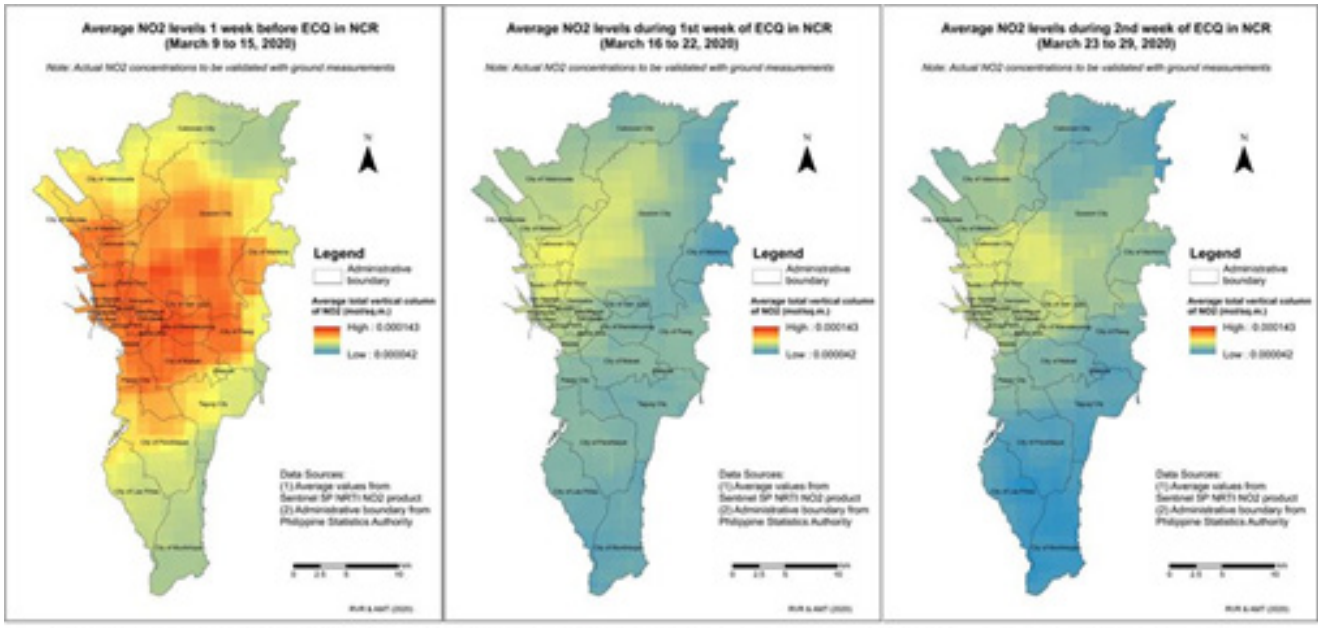




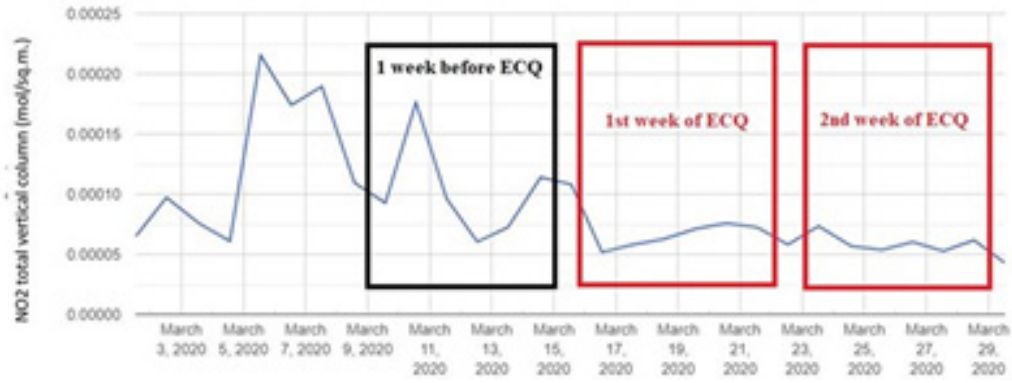
Orange Line is the $PM_{2.5}$ Concentrations Every Hour, Two Weeks Before the ECQ, Green, is a Week Before the ECQ, and Blue is During the First Week of the ECQ



Orange Line is the $PM_{2.5}$ Concentrations Every Hour, Two Weeks Before the ECQ, Green, is a Week Before the ECQ, and Blue is During the First Week of the ECQ



Graph: Average Nitrogen Dioxide (NO2) Levels in NCR from March 1-30,2020 (based on Sentinel 5P NRTI images)



Based on the Air Quality Monitoring Data measured in some stations located in National Capital Region (NCR), there was a huge improvement in Air Quality in terms of PM_{10} (after the implementation of the Enhance Community Quarantine (ECQ) declared by the President. In Marikina City Air Quality Monitoring Station, it was found that after ECQ the decrease in PM_{10} concentration was ranging from 22% to 72%. While, in Parañaque City Air Quality Monitoring Station the decrease in PM_{10} concentration is ranging from 30% to 54% respectively.

Another satellite monitoring of air quality that recorded a decrease in air pollution was Sentinel-5 Precursor (S5P) Satellite. The S5P is a satellite launched on 13 October 2017 by the European Space Agency to monitor air pollution. In a social media post by Roseanne Ramos of the University of the Philippines - Geodetic Engineering, the S5P satellite was used to monitor the NO_2 levels in the NCR and found that NO_2 levels decreased on the onset of the Luzon-wide ECQ.

https://developers.google.com/earth-engine/datasets/catalog/COPERNICUS_S5P_NRTI_L3_O3

OPPORTUNITIES IN AIR QUALITY MANAGEMENT
(BEST PRACTICES IN THE REGIONS)

Best Practices for Stationary and Mobile Source Management

LIST OF RESPONSES

REGION	LOCATION	PRACTICES
NCR	Parañaque	• We also conduct Greening Program po which is ongoing. we have 2 sites po Parañaque conduct the Greening Program. As of 2021, they have 2 sites (PNR Site and Veterans). They also purchased 140 units of E-trikes. The 16 barangays in Parañaque received 2 of each. The remaining e-trikes were distributed to different homeowners' associations.
	Marikina	• Redevelopment of open spaces and parks into green. Means removal of concrete flooring and replacing them with pavers, carabao grass, gravel for rainwater to enter the soil and planting of more trees 10 ft high for carbon sequestration and to filter our air we breathe. • No need to go outside the city or go to mall because within your community or subdivisions green parks are available. • More vertical gardens especially in all public-school buildings • 100% concrete roads to mitigate particulate matters • Anti-Smoke Belching Operation • Cleaning of vacant lots. Around 1000 vacant lots are being maintained by the city as an alternative parking area and to advocate urban greening in the city.
	Las Piñas	Las Piñas has a greening program and cosmos planting along major roads. In enforcement, they have a city ordinance prohibiting the indoor and outdoor open burning of solid waste. They also conduct ng profiling on establishment, to identify whether they are compliant with the provisions of RA 8749 and at the same time, to identify the sources of air pollution.
	Pateros	• Municipality of Pateros has a joint greening program with BPI and shell foundation • Urban gardening.
	Makati	Programs of Makati city in GHG reduction Program and Clean Air Management Initiatives. • GHG Management Training for MACEA and CREAI • Orientation of the GHG Reduction Ordinance to Tricycle Operators • GHG Biggest Loser Contest • Clean Fleet Management Seminar • Urban Greening Program • Updating GHG Management Framework Plan of Makati City • Free Emission Testing Activity • Project H.A.N.G.I.N (Healthy Air in Good Indoor Environment) • Makati Bantay Tambutso (BanTam) • Clean Fleet Management Seminar

Best Practices for Stationary and Mobile Source Management

LIST OF RESPONSES (continuation)

REGION	LOCATION	PRACTICES
	Quezon City	The city has signed its commitment in the C40 Clean Air Cities declaration in 2019 that aims the following: • Establish an air quality monitoring network to enable the development of targeted and effective policies and programs to reduce air pollution in line with national standards and WHO guidelines • Develop a monitoring and information system to allow real-time sharing of air quality data with the public • Develop an air quality management plan through engagement with various government and non-government agencies to integrate and coordinate pollution reducing policies and programs
		The city also joined the breathelife campaign, the TAME BC Project, and C40 Air Quality Technical Assistance Program. The Green recovery Plan was also discussed. Lastly, the city's thrusts: • Aims to contribute to the global movement to reduce and mitigate Greenhouse Gases (GHG) through policies, programs, and activities • Aims to increase the City's climate resiliency through adaptation mechanisms • Aims to improve air and water quality in the City, promote sustainable consumption and production and introduce a circular economy • Aims to create a well-informed citizenry through strategic awareness campaigns, multi-stakeholder participation and inclusive climate action.
	Manila	These are the programs/activities of the city: 1. Asia Blue Skies Program – It Aims to Develop an Action Plan That Is Science Based. 2. Hinga Maynila Task Force 3. Turn-Over of Air Quality Monitoring Station 4. Plan For Green City of Manila: 1,600 Hectares of Green Spaces 5. Manila Green City Initiatives: Revitalization of Parks & Plazas 6. Mehan Garden 7. Anda Circle 8. Hidden Garden 9. Manila Green City Strategies: Vertical Gardening & Roof Gardens 10. Jones Bridge 11. Barangay/Sk - Initiated Vertical Gardening 12. Installation Of Bicycle Racks 13. "Nilad For Maynila" Project 14. Installation Of Solar Panel in Schools 15. Waste Diversion Initiatives

Best Practices for Stationary and Mobile Source Management

LIST OF RESPONSES (continuation)

REGION	LOCATION	PRACTICES
CAR		Private establishments that have stationary sources are being monitored. They are also encouraged to put up a green buffer zone near the pollution source. As for mobile sources, the BLISTT Anti-Smoke Belching Task force is conducting a quarterly operation in the BLISTT Areas to apprehend smoke belching vehicles.
R1		• Quarterly Anti-Smoke Belching Monitoring Campaign within the covered Cities/Municipalities of the NEPA Airshed • Monitoring the compliance of the establishments within the provisions under RA 8749. A total of 711 were issued permit to operate. • A total of 46 Private Emission Testing Center were monitored on CY 2021 • Close Coordination with LTO on the collection of Mobile Source Data for Emission Inventory in the Region.
R2		• Continuous monitoring of firms on their compliance to the provisions of RA 8749 despite of the COVID – 19 restrictions. • Joint operation with the Local Government Units (LGUs), Land Transportation Office (LTO), and other stakeholders in the conduct of roadside emission testing of diesel fed motor vehicles using the Opacimeter machine and Information, Education and Communication campaign on Anti-Smoke Belching. • Regular operations of the established air monitoring stations and maintenance of equipment. • Monitoring of Private Emission Testing Centers (PETC) on the validity of the equipment calibrations and compliance on the emission test guidelines to ensure real results. • Yearly emission testing of government vehicles in coordination with LTO and other National Government Agencies. • Pioneering the establishment of air monitoring stations by LGUs in support of the EMBs “Adopt An Air Quality Monitoring Station” other than private institution/firms/establishment.
R3		• For Stationary Sources, this Office has established the regional data center for Source Emission (CEMS and COMS) since 2020.

Best Practices for Stationary and Mobile Source Management

LIST OF RESPONSES (continuation)

REGION	LOCATION	PRACTICES
R4A	San Pedro, Laguna	• Development projects that are determined to have or may potentially have adverse effects on the quality of the air must observe relevant provisions, regulations, and mitigating measures stated in Republic Act 8749: The Clean Air Act. • As of 2021, ordinance on prohibition of smoke belching is on process and its public hearing was already conducted. Once passed and enacted, an Anti-Smoke Belching Unit (ASBU) will be created to apprehend vehicle owners found to emit smoke. • All motorized vehicles must be governed by existing exhaust emission guidelines of the LTO and other related agencies. • Air quality tests will be regularly conducted by the concerned agencies of the DOH in coordination with the Local Health Office, the DENR, and DA to determine purity and safety. Test results must be disseminated to the concerned and respected agencies to address and respond to any potential problems. Aside from the above-mentioned San Pedro, Laguna also have best practices for air quality in terms of: • **Enactment of Existing Policy** The City Ordinance 1720-2011, otherwise known as the City of Santa Rosa Environment Code, as embodied by its banner campaign, Project Clean ALWAYS (Air, Land and Water are Yours to Save), is a compilation of ordinances that conform to national and local laws relating to land, air and water. The Code serves as instrument for the realization of the City's vision-mission goals in pursuit to attain a balanced and healthful ecology in accord to the rhythm and harmony of nature. The City recognizes the need to implement control measures in the abatement of air and noise pollution, as it reaffirms the certain principles articulated in RA 8749 (The Clean Air Act of 1999). These include vehicle emission control, industrial air pollution measures, noise pollution control, prohibition of smoking in public places, anti-burning of solid wastes, mitigation of offensive odor and promotion of eco-friendly transport systems. To ensure the enforcement of the provisions of the City Environment Code, the deputation of the City Green Army protect and enhance the environment and natural resources whilst protecting the health and safety of the people through the enforcement of environmental related laws and ordinances. They are also involved in public education. • **Integration Of GHG Management and Air Emissions Inventory in the Comprehensive Land Use Planning, Comprehensive Development Planning and The Local Climate Change Action Plan**

Best Practices for Stationary and Mobile Source Management

LIST OF RESPONSES (continuation)

REGION	LOCATION	PRACTICES
		The Greenhouse Gas and Air Emissions Inventory are both relevant to the CLUP, CDP and LCCAP. Programs, plans and activities related to the mitigation of air pollution and climate change are necessary to accelerate Santa Rosa City's spatio-sectoral development. This also constitutes the basis for the formulation of the Investment Program that will be funded within the ten-year planning period, particularly in fulfilling the mandate on environmental protection and sustainability. The Air Emissions Inventory was developed through the technical assistance of Clean Air Asia and National Center for Transportation Studies (NCTS), to determine significant sources of air pollutants from stationary and mobile sources, as well as the incorporation of identifying dominant short-lived climate pollutants (SLCP's) in assessing the City's air quality. The Greenhouse Gas Inventory, on the other hand, shows the category of emission sources considered for community-level and entity-level computation. It is a tool to aid in quantifying and managing data and information on the greenhouse gas emissions and removals of users for community-level. The final draft of the City's Clean Air Action Plan, borne from the conduct of the Air Emissions Inventory has been out for review and approval of the City Council. • **Controlling Emission Related to Transportation** The City is in pursuit of "green" transportation to help promote a sustainable economy. Among the initiatives are as follows: a. Promotion of clean fuels and regulation of public transportation (tricycle) franchises from which priority is given to those utilize eco-friendly motor engines (i.e., shift from 2-stroke to 4-stroke motorcycle engines). b. Enhancement of road networks to increase conveyance capacity and reduce traffic congestion. c. Promotion of E-vehicles, from which are being included in the City Government fleet. d. Roadside apprehension and traffic management activities by the City Traffic Management and Enforcement Unit (CTMEU). e. Formulation of the Road Network Transportation Management Plan in cooperation with Certeza Infosys Corporation • **Waste Management** The approval of the City Solid Waste Management Plan ensures a regular program on collection, diversion, and reduction, in adherence to the provisions of RA 9003 (Solid Waste Management Act of 2000). Programs that support waste diversion at the Barangay level, recycling and source reduction are as follows: a. Composting facility b. Charcoal Briquetting Technology c. Basuranihan Program for diversion of recyclables

Best Practices for Stationary and Mobile Source Management

LIST OF RESPONSES (continuation)

REGION	LOCATION	PRACTICES
		d. Amendment of the Anti-burning ordinance • **Urban Greening and Regulation of Tree Cutting Activities** It is widely understood that an urban green space has the natural ability to filter pollution from air, provide significant health benefits, and carbon sequestration. The city has various programs that promote greening such as the "Adopt-a-Lot" and Urban Agriculture (that also aims to target food security in households). Regulation of tree cutting activities is stated in PD 705 (Revised Forestry Code) from which prohibits indiscriminate cutting of tree species in both public and private lands. Thereby calls for the prior approval or permission from the government, specifically the Bureau of Forest Development whose mandate now rests on the Forest Management Bureau (FMB), one of the four bureaus of the Department of Environment and Natural Resources (DENR). In this regard, the role of the City ENRO and Barangays is to conduct inspection prior to issuance of a certification of no objection to the proponent before endorsement to the nearest DENR office. • **Information, Education and Communication Campaign** Strategies to spread awareness through social media, print ads, and other communication channels are always employed by the City Government to instill a positive behavioral change of target audiences
	Quezon Province	The Provincial Government of Quezon is conducting emission testing for the provincial offices service vehicles. The testing was conducted on June 30, 2017, June 2018 and June 24, 2019 wherein one of the activities was witnessed by EMB Regional Director Noemi A. Paranada. Meanwhile, the LGU is actively participating in the MMTs (i.e. as sectoral member) monitoring activities for stationary sources.

Best Practices for Stationary and Mobile Source Management

LIST OF RESPONSES (continuation)

REGION	LOCATION	PRACTICES
R4B		Despite the COVID-19 pandemic, the EMB MIMAROPA Regional Office and its Field Offices guaranteed the strict implementation of Republic Act No. 8749, otherwise known as the Philippine Clean Air Act of 1999. Technical personnel from all field offices have been tasked to continue their inspection activities and verify the compliance of establishments with the provisions under RA 8749. As of June 2021, a total of 162 Notices of Violation (NOVs) have been issued against firms for violating the relevant environmental laws for this calendar year alone. Aside from this, garage testing activities were also held by field offices as part of the commemoration of Clean Air Month last November 2020. Several vehicles were checked for carbon monoxide, and their owners have been warned on the implications of exceeding the standards set by the government. Such activities prompted drivers / vehicle owners to check their engines to assure their compliance with RA 8749.
R5		The EMB V, in partnership with LGUs and NGAs/NGOs, conducts Anti-Smoke Belching Operation and Information, Education, Communication (IEC) Campaign to the Barangays within the Airshed to raise awareness in maintaining the good quality of air within the region. The Legazpi City implemented the Executive Order No. 17-2018 which aired infomercial audio/video clips of Information and Education Campaign about the Air Quality in Legazpi City, Airshed Programs, and Air Pollution Effects in social media, broadcast media, cinemas, private malls, and private and government-owned outdoor/indoor LED screen.

Best Practices for Stationary and Mobile Source Management

LIST OF RESPONSES (continuation)

REGION	LOCATION	PRACTICES
R6		For stationary sources EMB Region 6 conducts regular compliance monitoring of Industries in compliance to RA 8749 and Issued Permit to Operate. Subsequently establishment with APSI operating without PTO are subject to surveys and are required to comply with the permitting requirements of RA8749. The creation of Metro Iloilo Airshed Anti-Smoke Belching Unit (MIA-ASBU) Enforcement & IEC Team is a proactive approach to achieve and maintain healthful air. The MIA-ASBU Enforcement and IEC Team conducted roadside Inspection and Apprehension with IEC activities. The main objective of the activity is to instill discipline among the members of the transport sector to adhere to the mandate of Clean Air Act and to determine the efficacy of the series of smoke emission testing activities. The Metro Iloilo Airshed Governing Board supports the transition to Euro 4 to lessen the particulate concentration emitted by vehicles. Jeepney driver organizations under the MIAGB have started to transition to Euro 5 engines and established transport cooperatives as compliance to the phase out. Other actions include IEC Campaign to jeepney drivers and operators one engine maintenance and proper fuel use. The Southern Oton Jeepney Operators and Drivers Association (SOJODA) Transport Group based in Brgy. Cabanbanan, Oto, Iloilo is the most active transport group of Metro Iloilo Airshed. The group regularly attends MIAGB meetings. As a MIA-ASB member, they are consistently present during the conduct of Roadside or Garage Smoke Emission Testing, IEC Activities, roadside inspection and apprehension activities. One of the best practices being implemented by the group to lessen air pollution is the mandatory coding wherein 15 units are not plying the usual routes daily. Approximately 9,000 liters in a month is saved and for 12 months, around 108,000 liters of fuel were not utilized and exhausted to the air as pollutants. The EMB Region 6 is conducting regular inspection of Private Emission Testing to ensure validity of their calibration certificates. Continued assistance to the Province of Guimaras on the creation of Guimaras Anti-Smoke Belching Unit (ASBU) Task Force thru MIA Resolution No. 2020-02.
R7		For stationary sources of air pollution, EMB 7 ensures that all industries that may create impact to air quality must have their tedious monitoring and report immediately to Office for any problems that may occur during their operations. Online transmission for CEMS data including real-time CCTV footage is also displayed in the Office for further monitoring.
R8		Submitted City Ordinance prescribing rules and regulations for the prevention, control and abatement of air pollution from motor vehicles in the City of Tacloban with IIS No. R8-2021-008969

Best Practices for Stationary and Mobile Source Management

LIST OF RESPONSES (continuation)

REGION	LOCATION	PRACTICES
R9		Closed coordination with the stake holders specially for LTO on the collection of data for mobile sources. Proper handling and collection of SMR's for the industries and input to the stationary source computation.
R10		• Observation of Source Specific Tests (SSTs) and evaluation of SST reports submitted. • Conduct of monitoring on the operational status of Continuous Emission Monitoring System of concerned industries (i.e., ECPs). • Monitoring of firms' compliance to DAO 2017-14 via quarterly submission of proof of compliance and other relevant information using google forms. Data submitted are then validated on-site during inspection. • Establishment of Regional Air Quality Network Center which serves as a repository of CEMS/COMS data for real-time monitoring of emission from large industries (e.g., coalfired power plants, cement plants, and sintering plants).
R11		EMB XI has the capability to conduct confirmatory stack sampling for PM and SOx on the stationary sources within the region to verify the sampling results by the accredited 3rd party source emission testing firm and investigation purposes. On mobile source management, regular monthly PETC monitoring within the region and monthly Anti Smoke Belching Operation together with Davao City – City Enro ASBU Team.
R12		• For stationary sources, compliance monitoring of industries to ECC conditions and the implementation of MC-2021-03 on the CEMS connection of industries to central DAHS • For mobile sources, periodic monitoring of the private emission testing centers to emission testing procedures, compliances to JAO No. 01 – series of 2007. • Conduct of random roadside emission testing in coordination with the Land Transportation Office (LTO) and Local Government Unit. • Conduct of capacity building with the Local Government Units and other related line agencies on the implementation of RA 8749.
R13		• All stationary sources are being recorded in a database including relevant information on the operation and stack dimensions. Stack sampling results are being recorded in the database upon evaluation. Exceedance recorded thru third party sampling are conducted with confirmatory stack sampling by EMB 13 stack sampling team. • Mobile source inventory is being conducted thru actual vehicle counting. With the assistance from each LGUs, we can collect data for mobile source emission inventory per municipality/city within the Airshed.

Supervision Of NGA / LGU in Transport Regarding Land Use and Transport Planing to Address Air Pollution from the Mobile/Transport Source of Air Pollution

REGION	AREA	RESPONSES
NCR		This Office conducted a meeting with the transport group to solve/minimize the traffic congestion in the Metropolis.
CAR		LGUs that already have their Clean Air Ordinance, like Baguio City and La Trinidad, have their own Anti-Smoke Belching Taskforce, which apprehends smoke-belching vehicles.
R1		• Ordinance on Traffic re-routing in the covered Cities of NEPA Airshed (Cities of Dagupan, Urdaneta, and San Carlos). • Install CCTVs on entry and exit points in Urdaneta City, Dagupan City, and San Carlos City; the recordings are also being used by EMB 1 to quantify mobile emission sources. • Anti-Smoke Belching ordinance implementation for the three covered cities of the NEPA Airshed • Regular Roadside Anti-Smoke Belching Monitoring and Apprehension of the LTO.
R2		Tuguegarao City has installed CCTV on all entry and exits to the city and the major thoroughfares to monitor traffic within the city.
R3		This will be incorporated into the future action plans of the LGU.

Supervision Of NGA / LGU in Transport Regarding Land Use and Transport Planing to Address Air Pollution from the Mobile/Transport Source of Air Pollution

LIST OF RESPONSES (continuation)

<table>
<tr><th>REGION</th><th>AREA</th><th>RESPONSES</th></tr>
<tr><td rowspan="4">R4A</td><td>Quezon Province</td><td>This is under the responsibility and supervision of the Office of the Provincial Engineer and its municipal counterparts.</td></tr>
<tr><td>Biñan, Laguna</td><td>Primary considerations are the enforcement of the Anti-Smoke Belching Program, the intensification of coordination among concerned agencies on the use of unleaded gasoline, and a reduced number of vehicles to ensure the smooth flow of vehicles and the promotion of the mass transport system. A periodical roadside (on-site) anti-smoke belching test shall be conducted with the Land Transportation Office.</td></tr>
<tr><td></td><td>The city of Biñan ensures that vehicles follow the Land Transportation Office (LTO) and RA 8749 or the Clean Air Act regulations on air pollutants, especially on emission testing. The city also has vehicle emission testing equipment donated by Cong. Marlyn Alonte-Naguiat to monitor and apprehend smoke belchers. However, it is not yet operational due to the pandemic.</td></tr>
<tr><td>San Pedro, Laguna</td><td>According to CLUP data, the Majority of daily traffic volume present in the city is likely to be found on the Old National Highway. As of Transportation Regulatory Unit data (2010), PUVs are as follows:

<table><tr><th>Type of Public Utility Vehicle</th><th>Registered Vehicles</th></tr><tr><td>Buses</td><td>270</td></tr><tr><td>Jeepney</td><td>949</td></tr><tr><td>Taxi/FX</td><td>77</td></tr><tr><td>Tricycles</td><td>6,131</td></tr><tr><td>Total</td><td>7, 427</td></tr></table>
As there is no Traffic Engineering Office in the LGU, a Traffic Regulatory Unit supervises the franchise registration of public transport plying within the city. Based on their data, the high number of tricycles can be attributed to the current land use. It can also mean that a large area of San Pedro is not accessible by major roads; thus, only tricycles, not including jeepneys, are available. It can also be an indicator of the preferred mode of travel of the people of San Pedro. The City of San Pedro currently provides sidewalks to encourage walking and lessen its dependence on tricycles to lessen air pollution and emission</td></tr>
</table>

Supervision Of NGA / LGU in Transport Regarding Land Use and Transport Planing to Address Air Pollution from the Mobile/Transport Source of Air Pollution

LIST OF RESPONSES (continuation)

REGION	AREA	RESPONSES
R4B		What could be gained in allowing the supervision of national government agencies and the local government units in transport are the technical expertise and inputs that could be provided for a more efficient transport plan in a particular area. It is also an important consideration that the government strengthens its monitoring efforts on the compliance with fuel specifications by oil companies. Moreover, two-stroke engine tricycles should be phased out because of their engines' ability to produce a lot of pollution because the fuel-air mixture gets contaminated with the engine's lubricating oil.
R5		The Local Government Units (LGUs) have been regularly monitoring the emission of all public and private vehicles by implementing their Anti-Smoke Belching Ordinance. Some of the LGUs have also designated bike lanes within their area of jurisdiction.
R6		• An ongoing plan is to establish a sensor-based monitoring station in an identified transport terminal to be donated by an industry partner in the region. • Sensor-based monitoring may be developed into a full-scale project to be established in a major transport terminal within Region 6.
R7		Cebu City, specifically, has its own Traffic Management Team (Cebu City Transportation Office – CCTO) that manages traffic within Cebu City. Every June and November, EMB 7, in partnership with CCTO, will conduct Random Roadside Emission testing in specific areas within Cebu City to regulate smoke belchers plying in major thoroughfares. Data obtained during this activity is included in our submission of the quarterly/annual Metro Cebu Airshed report
R8		As per City Information Office, using the one-way scheme on many major thoroughfares in Tacloban City was considered a response to air pollution issues. However, there is no EO or other legal document regarding this manner.
R9		• The LGU of Zamboanga City conducted a published Green House Gas (GHG) inventory last CY 2017 with partnership from Building Low Emission Alternatives to Develop Economic Resilience and Sustainability Project (B-LEADERS) • Other USAID Project
R10		EMB Region X has not been directly engaged in activities that supervise or regulate transport activities apart from the regular roadside apprehension and anti-smoke belching campaign initiated by the Office together with partner LGUs in the airshed assisted by their respective Transport/Traffic Management Office and with the presence of DOTr-LTO as the lead agency in the management of the mobile transport sector.

Supervision Of NGA / LGU in Transport Regarding Land Use and Transport Planing to Address Air Pollution from the Mobile/Transport Source of Air Pollution

LIST OF RESPONSES (continuation)

REGION	AREA	RESPONSES
R11		Implementation of the maximum speed limit contributes to the safety of pedestrians and cyclists that encourages Davaoneos to walk-in pedestrian and bike riding activities resulting in a lower mobile emission.
R12		• Law enforcement of traffic policies to commuters and all sectors by local government units/ local • Ordinances; licenses, renewals, and equipment. • Application of engineering solutions for traffic management; road improvements, traffic lights, bridges, • Alternate routes and human traffic aid. • Balancing environmental solutions on transportation management, greening programs, and fuel efficiency. • It will be formed part of the requirements or compliance of each member of the Airshed Governing Board. Replication of best practices of each local government unit that can be copied and enhanced by other LGUs.
R13		• LGU-Butuan City, thru its CENRO, has created an ASBU that conducts regular roadside emission testing Violators are subject to corresponding fines/penalties according to the City Ordinance. • EMB 13 conducts mobile air conditioning (MAC) system inspection simultaneous with roadside emission testing by LGU Butuan. This activity is also in partnership with DoTr-LTO and TESDA. • EMB13 and partner NGAs conduct garage emission testing and mobile air condition system inspection at public utility bus companies.

Management Responses to

Transboundary Haze In 2019-2020

Transboundary haze was observed during the second and third weeks of September 2019. Daily Air Quality Monitoring was conducted by regions 6,7,8,10 and 13 using the Automatic and Manual Stations. The monitoring found that the $PM_{2.5}$ levels reached 100 ug/m³, wherein the safe limit for $PM_{2.5}$ concentrations for 24-hr exposure is only 35-50 ug/m³ in region 7.

In Region 10, the daily monitoring started on September 13, 2019, and ended on October 03, 2019, which showed elevated $PM_{2.5}$ concentration where some results slightly exceeded the National Ambient Air Quality Guideline Value (NAAQGV) of 50 ug/NCM.

In Region 13, the transboundary haze from the Indo-Malay region was observed during the 2nd and 3rd weeks of September 2019 at the CAAQMS-PMS Station located in Brgy. Doongan, Butuan City. It was noted that the concentrations of PM10 and $PM_{2.5}$ had an increase in daily average concentration and were still within the DENR Standard. The AQI in PM_{10} ranges from the Good to Fair category. However, there was one occurrence of exceedance recorded for the 24-hour concentration of $PM_{2.5}$, with a 51 ug/NCM.

EMB R9 was not directly affected by the transboundary haze incident in 2019. However, the Region continues to operate all its available ambient air monitoring stations.

EMB Regions 1,2,3,4B and 5 despites of not being affected by the Transboundary Haze in 2019; they continuously monitored the status of Air Quality from the Open-Path Monitoring Stations to ensure that the level of pollutants is within the threshold that will not pose any risk to the environment.

Natural Phenomena

Among all the regions, only two regions have experienced volcanic eruptions; Region 2 and 5. Region 2 has experienced the direct effect of volcanic eruption on January 12, 2020. During this natural calamity, a directive was given to all RO's to conduct ambient air sampling to monitor the ash tails created by this calamity. Immediately, the EMB Regional Office 2 conducted a continuous sampling for one week during this time, and the ambient air sampling results were within the standard threshold of NAAQGV. There were no ashfalls experienced in the Region due to opposing wind from the north blowing westward of the Philippine Sea.

On the other hand, Region 5 continuously monitors the Air Quality within the Region, especially in the areas affected by the Mt. Mayon eruption, and is subject to air dispersion modeling in 2022 after three (3) years of continuous monitoring.

Moreover, EMB Region X has no recorded natural calamities in CY2019 that affected air quality aside from the occurrence of Transboundary Haze in CY2019 from the Indonesia-Malaysia region believed to be human-induced aggravated rather than a natural phenomenon.

Despite not being affected by the natural calamities, other regional offices' responses to natural include continuously monitoring the status of Air Quality from the Ambient Monitoring Stations, even for manual equipment for any significant deviation with reports being submitted regularly to EMB Central Office.

EMB Central Office Ambient Team together with EMB ROs Ambient team, Hon. Ann Ongjoco of Municipality of Guinobatan, Hon. Maria Ahrdall G. Baldo and Hon. Carlos Baldo Jr., Municipality Mayor and Vice Mayor of Camalig, Albay during the site sampling and response towards the Mt. Mayon Eruption which was considered as a natural phenomena.

CHALLENGES AND OPPORTUNITIES IN AIR QUALITY MANAGEMENT

Challenges in Air Quality Monitoring

The challenges in terms of the air quality monitoring mainly occur in terms of the equipment. Ranking the problems that the Regional Offices have mentioned, the most prevalent answer was that they're having problems in terms of the after sales of equipment itself.

THE PROBLEM

The problem occurs due to the availability of reserved spare parts of AQM Equipment when equipment breaks down has ever since been a problem of the agency, not to mention that most of them are nearly obsolete in the market. At the same time, problems such as the cost of the accessories needed for the equipment and the lack of person available the calibration and operation of the machine arises. Despite of the problem that the ROs have faced for the equipment, the imported equipment is better because they have done much testing to prove their accuracy.

THE OPPORTUNITIES

The ROs are also open in using local equipment for air quality measurement. However, one of the requirements for them to use it; it should be following the USEPA method of sampling. Hence, if local equipment for air quality measurement were available, the ROs anticipates that it should be much cheaper in terms of the maintenance and operational costs and timely delivery whenever there were broken parts or accessories needed. At the same time, these will be beneficial to our local scientists in developing ambient air sampling equipment.


PRISM

Online Permitting System for Permit to Operate

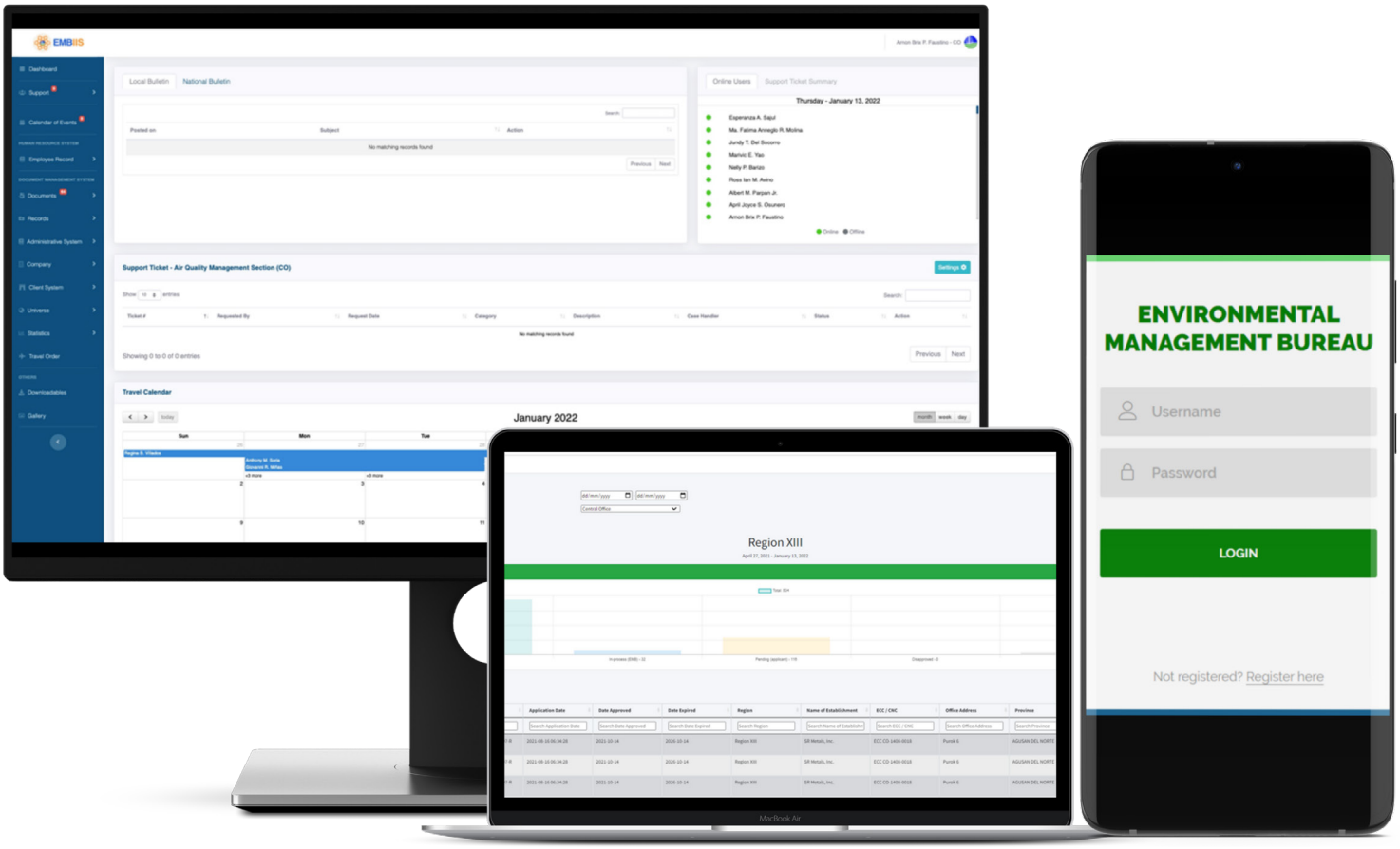
As part of its commitment of promoting environmental protection, particularly addressing air pollution, the DENR-EMB has launched the new and improved Permit to Operate (PTO) Air Pollution Source Equipment and Installation Version 2.0, as part of its Online Permitting and Monitoring Systems (OPMS) on August 18, 2021.

OPMS is a premiere web application developed by the DENR-EMB that offers end-to-end solutions for environmental compliance, especially for Air Pollution Source Installation or Equipment. Likewise, it is also the response of the EMB to the current COVID 19 pandemic, which reduces the needs for applicants to personally visit the Bureau's Regional Offices, and request and apply for their needed clearances and permits.

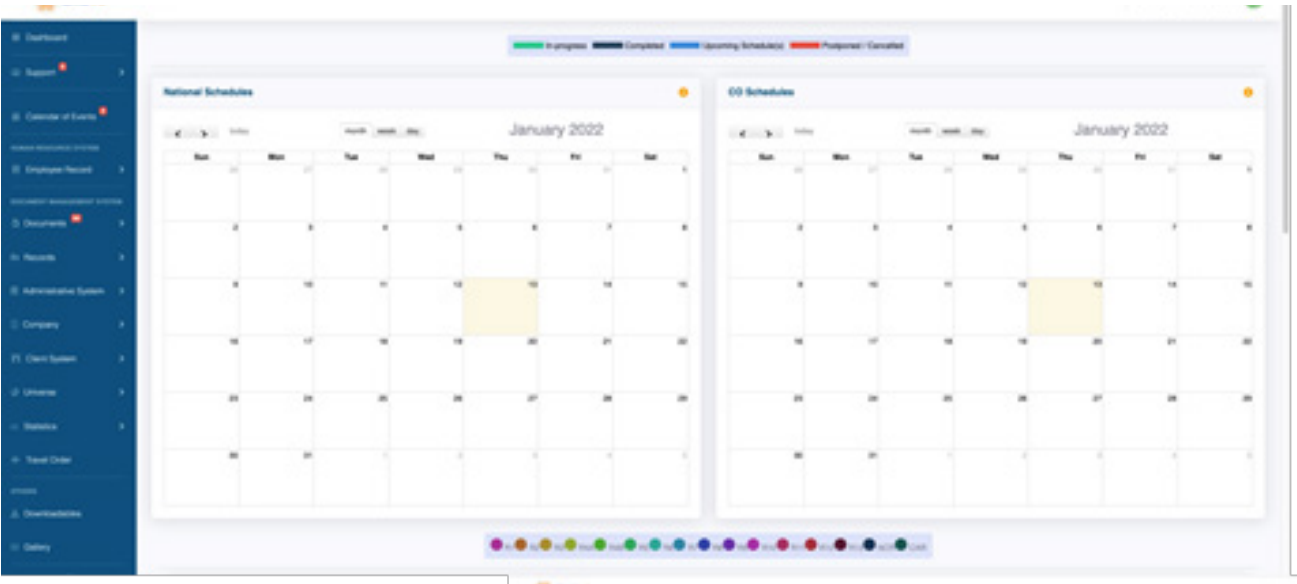
This system is in compliance with the RA 8749 or the Clean Air Act which states that all sources of air pollution subject to implementing rules and regulations must have valid PTO. Any equipment or activity that has the potential to emit regulated pollutants should be covered by a valid PTO. Furthermore, the OPMS was also connected to the EMB Memorandum Circular No. 2020-17 or the Guidelines for the Issuance of Permit to Operate (PTO) for Air Pollution Source Installation or Equipment (APSI/APSE) through the OPMS and EMB Memorandum Circular No. 2007-003 Policy on Compliance and Permitting for Industrial Facilities Relating to Air Quality.

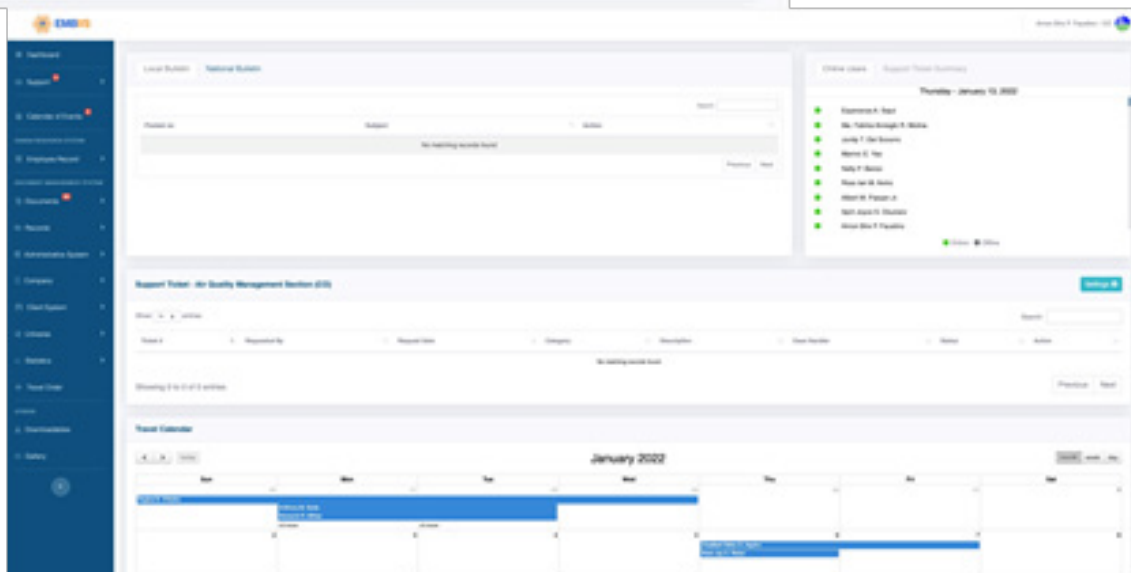
> **"We at the EMB realize the challenges of the current pandemic. By improving and enhancing our online systems, we would like to make the application of the PTO easier and accessible to our stakeholders and regulated industry partners, to achieve environmental compliance. Through this new system, we aim to provide the best service to our stakeholders,"**
>
> ***- Assistant Director Engr. Vizminda A. Osorio***

Integrated Information System (IIS)



The Integrated Information System (IIS) is an online system that enables EMB to process any transactions remotely and serves as database for all the documents going in and out of the EMB, as part of the direction of the management to shift all the manual systems to online systems. This system is used by the Central Offices and the Regional Offices wherein special training were also provided to the Environmental Monitoring Officers (EnMOs) and staff of EMB in order to make sure that each and every employees understands and have knowledge in using the System.





DOCUMENT TRANSACTIONS MODULE

Each transaction has assigned unique QR Code for easy access and document verification. All incoming and outgoing transactions are processed thru this module.

EMPLOYEE RECORD MODULE

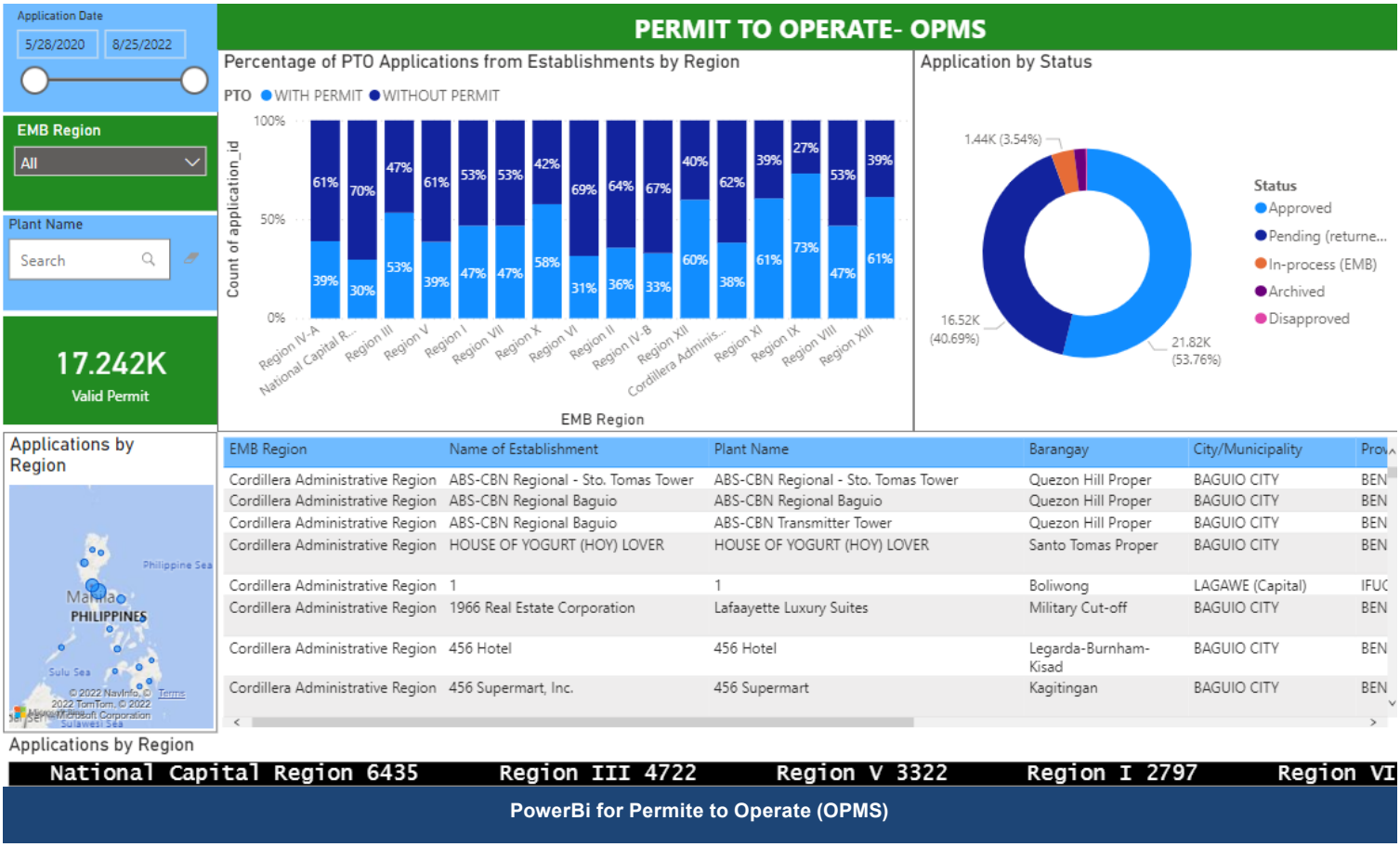
All employees are monitored during their Work-From-Home schedule thru the system's Daily Time Record. The system allows employees to login and logout with real-time photo and GPS location.

CALENDAR OF EVENTS MODULE

All activities conducted such as Official Travels, Trainings and Seminars, Environmental Events, Meetings, among others are monitored thru the calendar of events module.

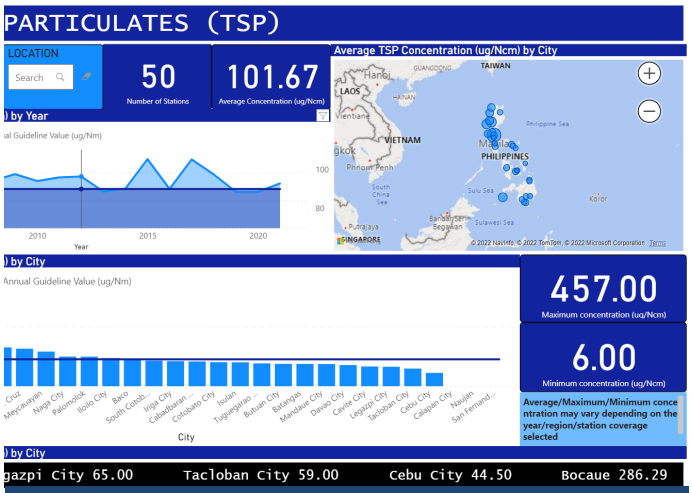
STATISTICS MODULE

The system is connected to the Online Permitting and Monitoring System (OPMS) of the EMB which allows the management to easily access the statistical data of Environmental Clearances issued by the EMB (e.g. Permit to Operate for Air Pollution Sources Installation, Discharged Permits, etc.)

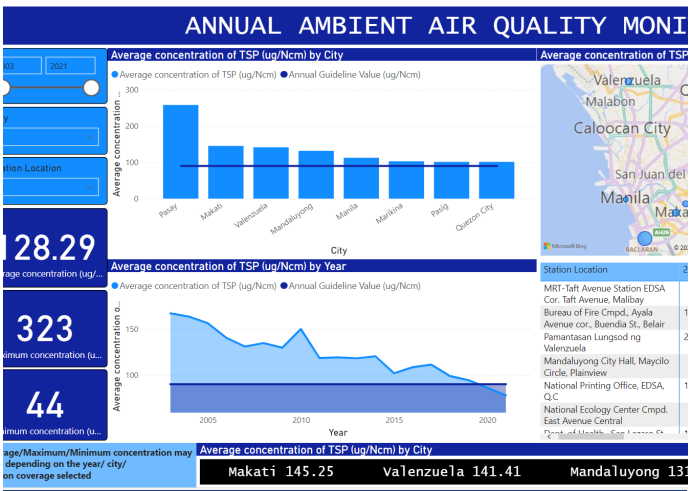


INTERACTIVE AIR QUALITY DATA DASHBOARD (MICROSOFT POWERBI)

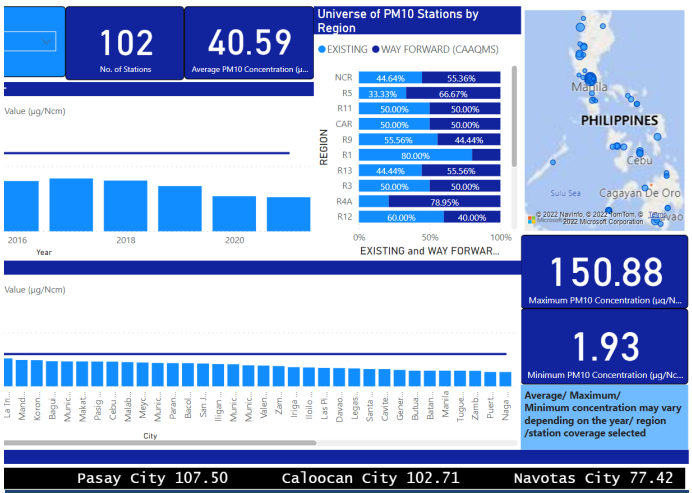
Air Quality Monitoring Data gathered from all the Ambient Air Quality Monitoring Stations of DENR-EMB in the Philippines are readily available in the EMB Official Website thru the Interactive Air Quality Data dashboards. This allows the public to have easy access on Historical and Recent Statistical Air Quality Monitoring Data, Emissions Inventory, Anti-Smoke Belching Apprehension Data, Permit-to-Operate Air Pollution Source Installation issued to Firms, among others, anytime and anywhere as long as they have internet connection and access to the EMB Website. Clients can select/filter specific air quality monitoring station, year, city, among others.



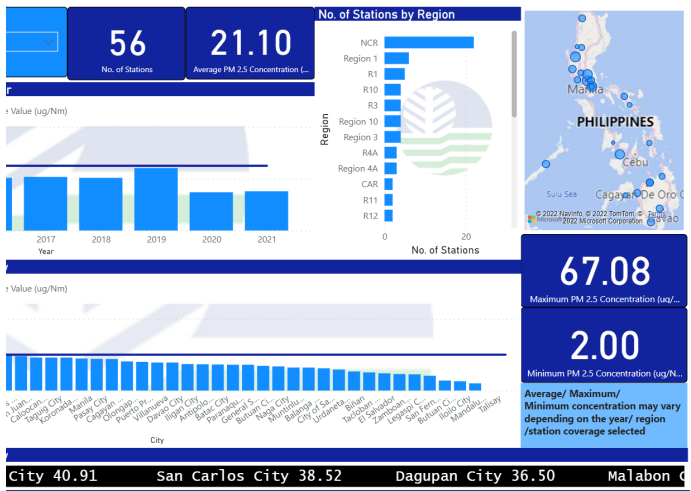
PowerBi for Total Suspended Particulates in Urban Centers



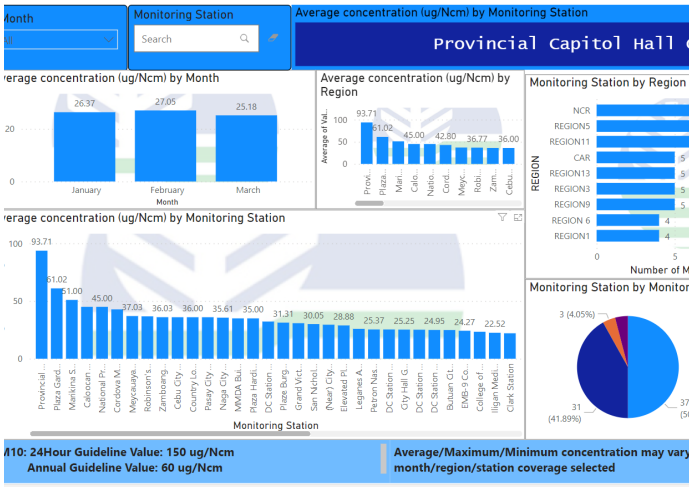
PowerBi for Total Suspended Particulates in Metro Manila



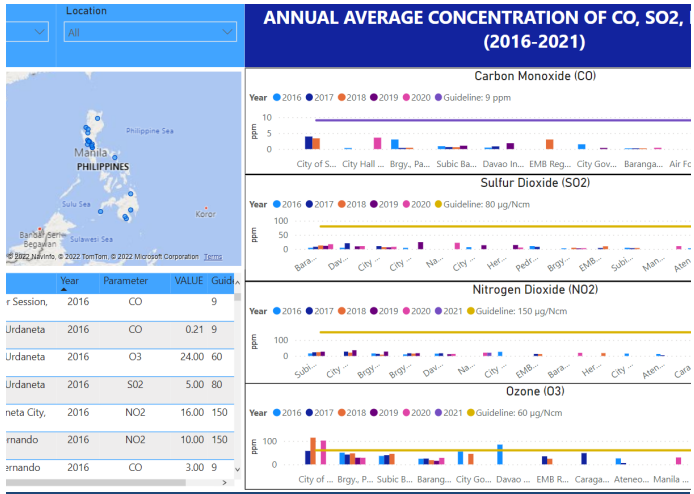
PowerBi for PM10 Historical Annual Data



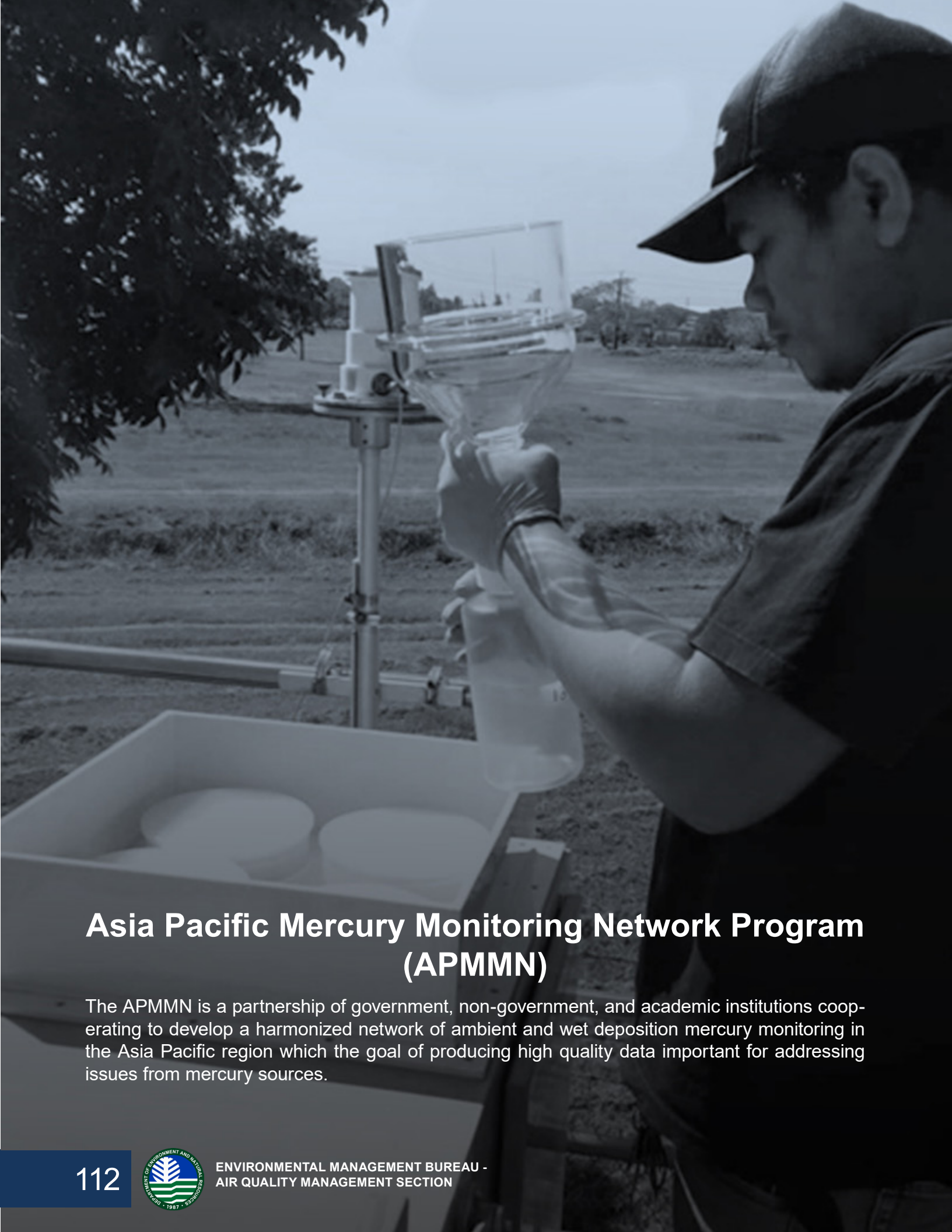
PowerBi for PM2.5 Historical Annual Data



PowerBi for Ambient Air Quality Monitoring



PowerBi for Annual Average Concentration 2016 - 2021



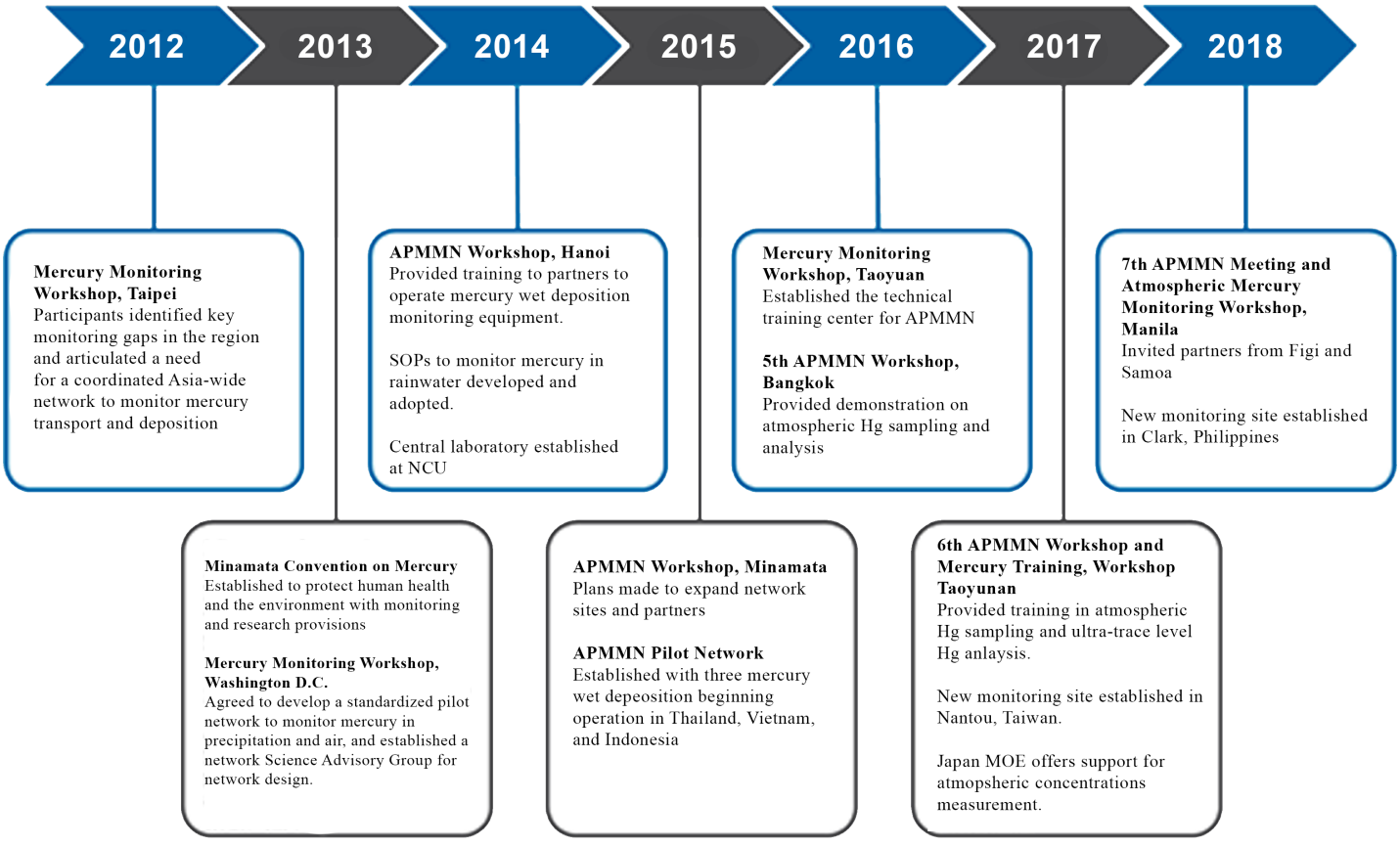
Asia Pacific Mercury Monitoring Network Program (APMMN)

The APMMN is a partnership of government, non-government, and academic institutions cooperating to develop a harmonized network of ambient and wet deposition mercury monitoring in the Asia Pacific region which the goal of producing high quality data important for addressing issues from mercury sources.

Asia Pacific Mercury Monitoring Network Program (APMMN)

The APMMN cooperatively measures mercury in precipitation in a network of sites operating in Asia and the Western Pacific region. The networkaddresses significant data gaps in a region where mercury emission estimates are the highest globally, and available measurement data are limited. Mercury is a global pollutant that can be transported over long distances, across political boundaries and media. The cycling of mercury in the Earth's environment is complex and has many variables and processes occurring over time and space. Many studies have repeatedly shown the impacts of mercury on aquatic and terrestrial systems, including animals, plants, and people as mercury cycles in the environment. Given the global nature of this mercury problem and our limited understanding of these processes, work began on the Minamata Convention on Mercury in 2009.

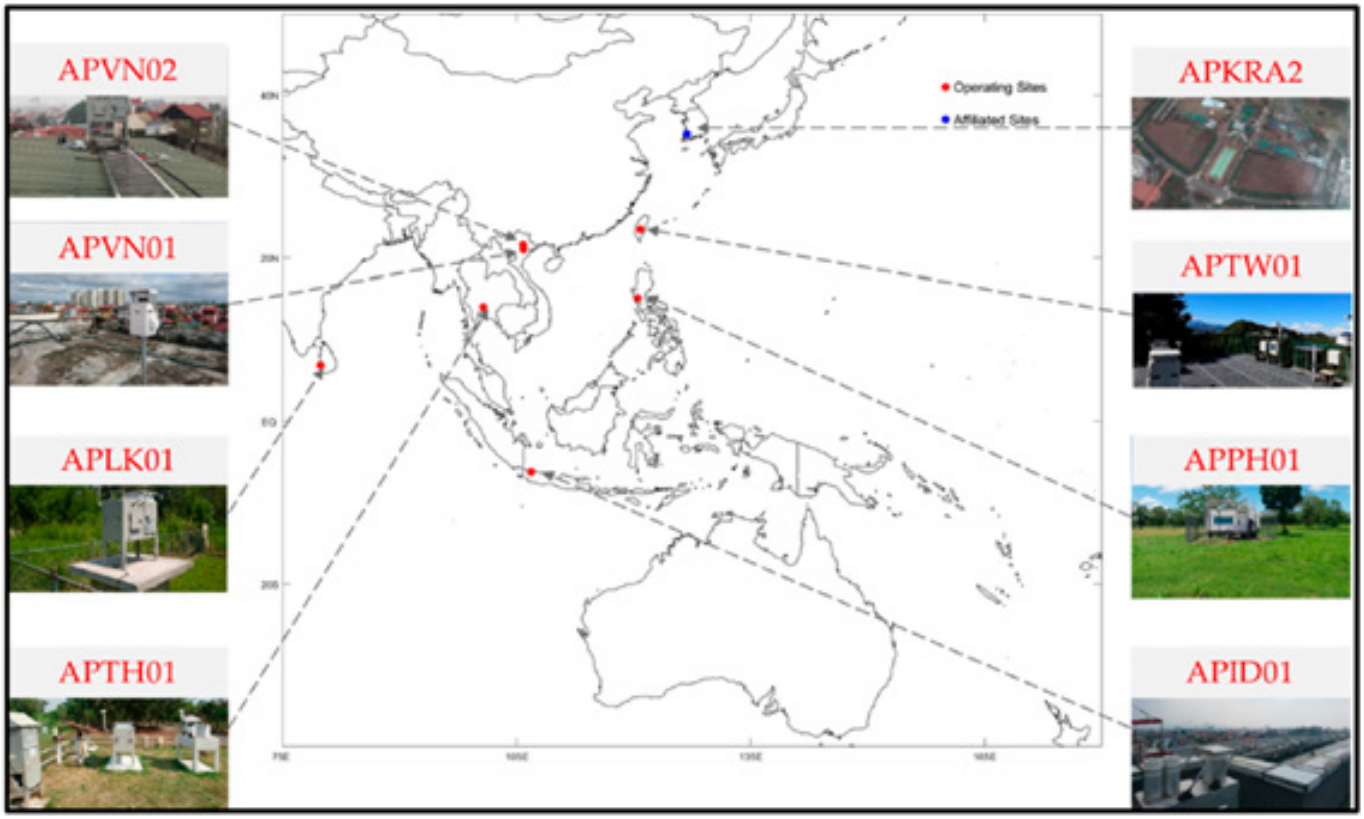
The Convention is an effort to fully understand and reduce anthropogenic mercury from entering the environment to protect human health and the environment. The Convention came into force on 16 August 2017 and currently, 128 countries are signatories to the Convention and 110 have ratified it.



A turnover ceremony was held in cooperation with the Taiwan Environmental Protection Agency (EPAT), Asia Pacific Mercury Monitoring Network (APMMN) on 7 March 2018. This cooperative effort aims to systematically monitor mercury in air and rainwater throughout the Asia-Pacific region. The turnover was facilitated by the Taipei Economic and Cultural Office (TECO) in the Philippines, Deputy Representative Minister James Chu, Deputy Director Jenny Kuo and the Vice Chairman of the Manila Economic and Cultural Office (MECO), Atty. Gilberto Lauengco. To represent the Secretary of the DENR, the Undersecretary for Policy, Planning and International Affairs, Atty. Jonas R. Leones, the EMB Assistant Director, Engr. Vizminda Osorio and the Division and Sections Chiefs of the EMB. Various media partners were also present during the turnover ceremony.

The site of the wet deposition ambient air mercury sampler was determined using the NADP Siting Criteria – Atmoshperic Mercury Network which specifies distances at which the sampler must be placed from possible sources of Hg. The appropriate site was determined to be at Airforce City, Clark, Pampanga above the EU Switch ambient air monitoring station which has ample security, electricity and distance from the Regional Office.

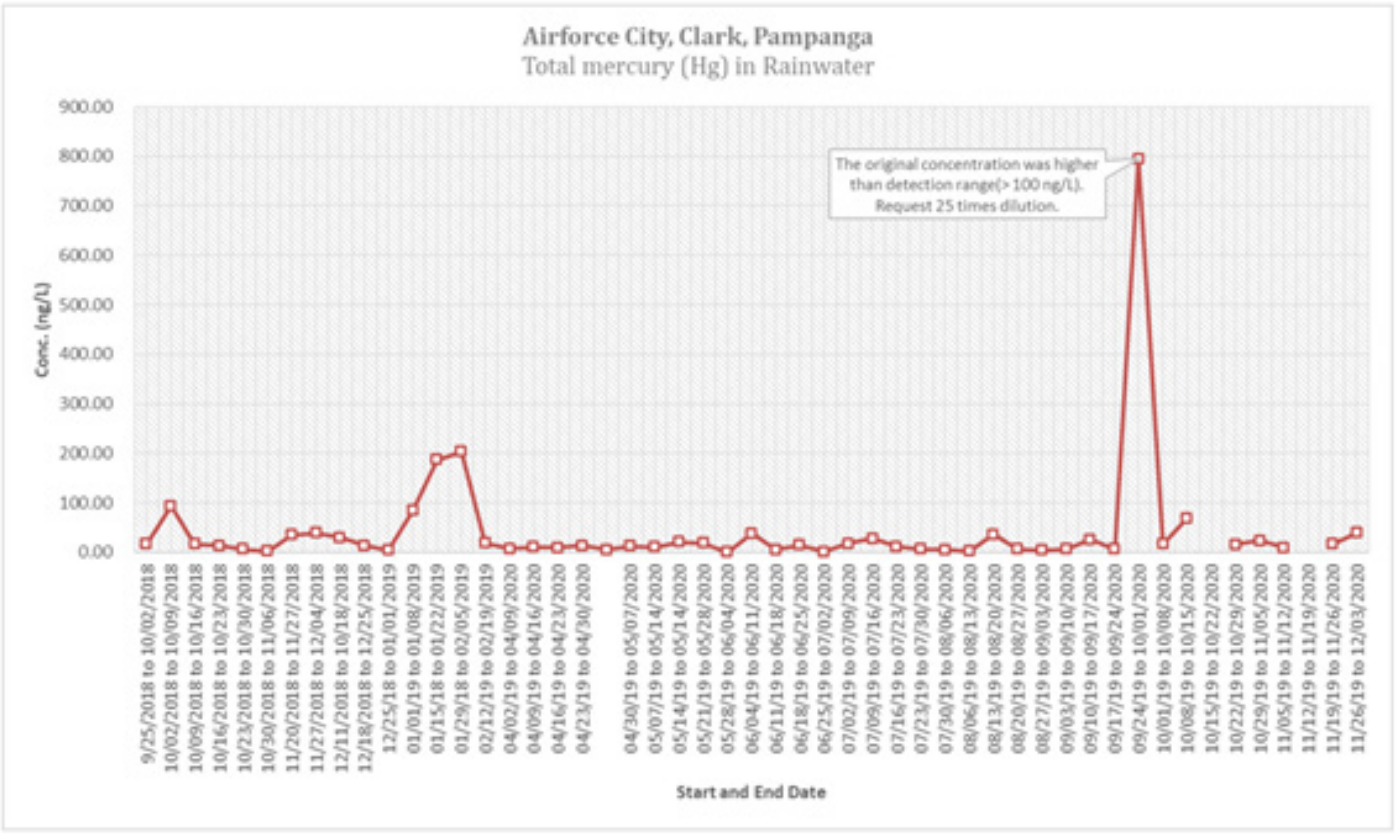
The EMB Region III personnel has been conducting weekly measurements and monthly deliveries to the EMB Central Office as prescribed by the operations and sampling procedures of the wet deposition sampler. All the collected samples are sent to the mercury lab at National Central University (NCU) in Taiwan, which analyzes all forms of mercury in single measurements and reports this as total mercury concentrations.



Status Of Sample Submission During The Pandemic CoVID-19

The last shipment of rain samples to the laboratory of NCU in Taiwan was on October 2020 due to the implemented Enhanced Community Quarantine (ECQ), Modified ECQ and General Community Quarantine (GCQ) in Metro Manila and other Areas of the Philippines from March 15, 2020, to present caused by the Pandemic COVID19. Submission of rain samples were delayed because during this time the logistics company were closed and recently opened in October 2020.

The shipment of the October to November 2020 samples collected from the Mercury Deposition Sample were delayed due to the unavailability of funds for the month of December 2020, hence, the shipment will resume in January 2021.



Graphical presentation of Total Mercury (Hg) concentration in Clark, Philippines Station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Workshops And Trainings Pre And Pandemic Year

LIST OF TRAININGS FROM THE CENTRAL OFFICE

Seven (7) seminar / workshops were conducted for FY 2019 whose main objectives were to capacitate the EMB Regional Offices on stack sampling and air dispersion modelling. One (1) major workshop namely the Revisiting of DAO 2000 – 82 focused on the various functions of all concerned agencies in cleaning the air. One (1) major workshop namely the National Air Quality Training Workshop was instructive wherein a USEPA personnel was invited to speak on their programs and procedures for airshed management. One (1) consultation workshop for the MERS review was conducted to inform the stakeholders and concerned agencies on the possibility of revising the emission standards.

YEARS	TRAININGS AND WORKSHOPS CONDUCTED	DATE CONDUCTED
2019	Stack Sampling Workshop Cluster 1	2 – 6 December 2019
	Stack Sampling Workshop Cluster 2	4 – 8 March 2019
	Stack Sampling Workshop Cluster 3	1 – 5 July 2019
	Air Dispersion Modelling Workshop Cluster 1	4 – 8 November 2019
	Revisiting the Integrated Air Quality Improvement Framework – Air Quality Control Action Plan (DAO 2000 – 82)	20 November 2019
	National Air Quality Training Workshop for Policy Formulation in Airshed Management, Permitting and Monitoring	19 – 23 August 2019
	Consultation Workshop on Best Available Control Technologies for the Policy Review of the Mass Emission Rate Standards (MERS) for Stationary Sources	31 May 2019
2020	Consultation on the Draft National Air Quality Status Report (NAQSR) 2016 - 2018	5 June 2020
	Consultation on the Online Permitting Management System (OPMS) - Permit to Operate (PTO)	02-06 March 2020
	Clustered Online Workshop on Continuous Emission Monitoring System (CEMS) / Continuous Opacity Monitoring System (COMS) Relative Accuracy Test Audit (Luzon and National)	September 4 and 10, 2020
	Online Workshop Dispersion Modelling and Emissions Inventory –	December 14-15, 2020
	Virtual Dialogue with Coal-Fired Power Plants and Cements Plants regarding the implementation of MC 2020-003 –	September 15, 2020
	Clustered Consultation Workshop on SLCPs for Airshed Governing Boards (Luzon, Visayas and Mindanao): Introduction of Short-lived Climate Pollutants, Visayas Cluster	September 17, 2020
	Clustered Consultation Workshop on SLCPs for Airshed Governing Boards (Luzon, Visayas and Mindanao): Introduction of Short-lived Climate Pollutants (Mindanao Cluster) –	October 14, 2020
	Clustered Consultation Workshop on SLCPs for Airshed Governing Boards (Luzon, Visayas and Mindanao): Introduction of Short-lived Climate Pollutants (Mindanao Cluster	August 29, 2020


National Clean Air Month
Celebration


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DEPARTMENT OF ENVIRONMENT
& NATURAL RESOURCES - EMB
Pollution Awareness
& Empowerment
NOVEMBER 27-29, 2019
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Workshops And Trainings Pre And Pandemic Year

LIST OF TRAININGS FROM THE REGIONAL OFFICES

REGION	YEARS	TRAININGS AND WORKSHOPS CONDUCTED	DATE CONDUCTED
CAR	2019	Smoke Belching Task Force Training	August 28-30, 2019
	2020	Smoke Belching Taskforce Deputation Training	September 29, 2020 - October 02, 2020
		Carbon Footprint Training	November 11, 2020
NCR	2019	1st Airshed Governing Board General Assembly 2019	August 28-29, 2019
		Training / Workshop to update & review the existing Action Plan Towards Designation of Attainment and Non-Attainment Areas	October 21-22, 2019
		1st Metro Manila Airshed Summit held at The Blue Leaf Filipinas, Parañaque City	November 27, 2019
	2020	NCR Airshed Governing Board (GB) General Assembly.	December 18, 2020

Workshops And Trainings Pre And Pandemic Year

LIST OF TRAININGS FROM THE REGIONAL OFFICES

REGION	YEARS	TRAININGS AND WORKSHOPS CONDUCTED	DATE CONDUCTED
R1	2019	Orientation/Seminar for the Transport Group on the Provisions of the Philippine Clean Air Act, Motor Vehicle Emission Control System and Roadside Motor Vehicle Emission Control Inspection Operation	March 21, 2019
		Capacity Building on Emission Inventory, Air Dispersion Modelling, and Carrying Capacity	June 13-14, 2019
		Capacity Building on Air Quality Monitoring	September 3, 2019
	2020	Training-Workshop on Airshed Emission Inventory project orientation and planning cum bottom-up data	February 27-28, 2020
		Reorientation workshop on Airshed Emission Inventory project orientation and planning cum bottom-up data (San Carlos, Mangaldan, Laoacm Pozorrubio, Sison, Urdaneta San Fabian and Binmaley) (Manaoag, Lingayen and Binalonan)	June-July various dates (San Carlos, Mangaldan, Laoacm Pozorrubio, Sison, Urdaneta San Fabian August and September various dates (Manaoag, Lingayen and Binalonan)
R2	2019	Capacity Building Of Governing Board Members On Ambient Air Monitoring Equipment	April 04, 2019
		Oplan Buhay: Capacity Building And Restoration Of Ambient Air Quality Monitoring Equipment With The Joint Operation Of Emb Central Office And Emb Region 02	April 29, 2019
		National Air Training Workshop	August 23, 2019
		Capacity Building For Lgus/ Stakeholders Within The Airshed On Emission Testing Using Equipment	November 04-06, 2019
		Training On Dispersion Modeling	November 26, 2019
	2020	Capacity building on repair and maintenance of ambient air monitoring equipment	June 26, 2020
		Capacity building on calibration of ambient air monitoring equipment	November 23, 2020
		Training on anti-smoke belching operations and emission testing of government vehicles for emb personnel, ngas, goccs and lgus	June 24-25, 2020
		Capacity building in the conduct of emission inventory within piestta airshed	December 17, 2020

Workshops And Trainings Pre And Pandemic Year

LIST OF TRAININGS FROM THE REGIONAL OFFICES

REGION	YEARS	TRAININGS AND WORKSHOPS CONDUCTED	DATE CONDUCTED
R3	2019	1st Semester Strategic Planning and Meeting for the Airshed Governing Board (ASGB)	May 29, 2019
		Training on Ambient Air Testing/Monitoring	September 24-25, 2019
		Quality Assurance Activities for CEMS, Stack Testing Seminar	October 16-18, 2019
		2nd Semester Airshed Governing Board meeting and Emission Inventory Training workshop	November 27, 2019
	2020	1st Semester Airshed Governing Board Meeting (ASGB) and Strategic Planning/Preparation for the Designation of Attainment and Non-Attainment Areas in the Bulacan-Pampanga-Bataan (BPB) Airshed	September 4, 2020
		"Know more about Air Quality Index" (Via Zoom Platform)	May 14, 2020
		"Particulate Matter – Why does it matter?" (Via Zoom Platform)	May 28, 2020
		"CEMS Regulations and Data Center" (Via Zoom Platform)	June 18, 2020
		2nd Semester Bulacan-Pampanga-Bataan Airshed Governing Board Meeting (ASGB) and Designation of Attainment & Non-Attainment Areas (Via Zoom Platform)	November 27, 2020
R4a	2019	No conducted training, webinars, and capacity building	
	2020		
R4b	2019	Lecture on Greenhouse gas inventory and euro emission standards	February 19, 2019
		Airshed Forum	November 12, 2019
		The Baco-Calapan City-Naujan Airshed Environmental Quiz Bee	November 29, 2019
		Smoke Belching Unit Deputation Training	December 10-11, 2019
	2020	Coal's role in sustainable development which was presented by Ms. Letty Abella of DOE the types and composition of coal, global Primary Energy consumption by fuel, the 2018 World Electricity Generation, uses of coal and findings.	March 10, 2020
		DENR-DTI-DOTC Joint Administrative Order No. 1 Series of 2007 or the Amended Guidelines and Procedures for the Monitoring of Accredited and Authorized Private Emission Testing Centers and LTO Emission Testing Activities	July 29, 2020
		The importance of coal in the energy mix, operations of coal- fired power plants and mitigation measures, and public health and environment effects	September 28, 2020

Workshops And Trainings Pre And Pandemic Year

LIST OF TRAININGS FROM THE REGIONAL OFFICES

REGION	YEARS	TRAININGS AND WORKSHOPS CONDUCTED	DATE CONDUCTED
R5	2019	Training On Servicing Emission Control System	March 13-15, 2019
		Legazpi City Airshed Executive Committee And Technical Working Group Meeting	April 22, 2019
		Naga City Airshed Executive Committee And Technical Working Group Meeting	April 24, 2019
		Bacon-Manito Geothermal Airshed Executive Committee And Technical Working Group Meeting	April 30, 2019
		Training On Air Dispersion Modelling	July 09-11, 2019
		Orientation On Attainment And Non-Attainment Areas	July 12, 2019
		Legazpi City Airshed Executive Committee And Technical Working Group Meeting	July 26, 2019
		Naga City Airshed Executive Committee And Technical Working Group Meeting	September 26, 2019
		Naga City Airshed Governing Board Meeting	November 21, 2019
		Bacon-Manito Geothermal Airshed Governing Board Meeting	November 27, 2019
	2020	Training On Servicing Emission Control System	March 13-15, 2019
		Legazpi City Airshed Executive Committee And Technical Working Group Meeting	February 26, 2020
		Bacon-Manito Geothermal Airshed Executive Committee And Technical Working Group Meeting	February 28, 2020
		Naga City Airshed Executive Committee And Technical Working Group Virtual Meeting	June 23, 2020
		Legazpi City Airshed Executive Committee And Technical Working Group Meeting	June 24, 2020
		Bacon-Manito Geothermal Airshed Executive Committee And Technical Working Group Meeting	June 25, 2020
		Legazpi City Airshed Governing Board Meeting	July 28, 2020
		Bacon-Manito Geothermal Airshed Governing Board Meeting	July 29, 2020
		Naga City Airshed Executive Committee And Technical Working Group Virtual Meeting	August 07, 2020
		Legazpi City Airshed Executive Committee And Technical Working Group Meeting	October 27, 2020
		Naga City Airshed Governing Board Virtual Meeting	September 22, 2020
		Orientation On The Designation Of Attainment And Non-Attainment Areas	September 23, 2020
		Capacity Building On Ambient Air Quality Monitoring	November 19, 2020
		Bacon-Manito Geothermal Airshed Executive Committee And Technical Working Group Meeting	November 24, 2020
		Naga City Airshed Executive Committee And Technical Working Group Virtual Meeting	November 25, 2020

Workshops And Trainings Pre And Pandemic Year

LIST OF TRAININGS FROM THE REGIONAL OFFICES

REGION	YEARS	TRAININGS AND WORKSHOPS CONDUCTED	DATE CONDUCTED
R6	2019	Bisita Barangay at Brgy. Buntatala, Jaro, Iloilo City	August 23, 2019
		Students' Forum on Ozone-Depleting Substances (ODS) at Iloilo National High School, Lapaz, Iloilo City	September 11, 2019
		Training on Basic Geographic Information System (GIS) Mapping of Emission Inventory (EI)Team	October 23-24, 2019
		Clean Air Act Orientation at Oton, Iloilo	November 5-6, 2019
		Bisita Barangay at Brgy. Sto. Niño, Arevalo, Iloilo City	November 8, 2019
		Training/Workshop on the Calibration and Maintenance of Ambient Air Quality Monitoring Equipment	November 27-29, 2019
	2020	Orientation on Philippine Clean Air Act (RA 8749) to LGU-PENRO Guimaras Employees, Orientation/Training of Guimaras Anti-Smoke Belching Unit (GASBU)	November 4-6, 2020
		Training on Air Quality Dispersion Modeling	December 2-5, 2020
		Workshop for LGU-Oton Municipal Environment and Natural Resources Office (MENRO) Employees on Data Gathering, Monitoring and Operation of Ambient Air Quality Monitoring Station	December 14, 2020

REGION	YEARS	TRAININGS AND WORKSHOPS CONDUCTED	DATE CONDUCTED
R7	2019	Stack Emission Testing of Air Pollution Source Installations Training Workshop	February 2019
		1st Metro Cebu Airshed TWG Meeting at DepEd-Applied Nutrition Center, Gov M. Cuenco Ave, Cebu City	March 21, 2019
		Simultaneous Random Roadside Vehicular Emission Testing	Every Fridays of June
		2nd Metro Cebu Airshed Governing Board Meeting at MJ Hotel and Suites, Camputhaw, Cebu City	June 27, 2019
		National Air Quality Training Workshop for Policy Formulation in Airshed Management, Permitting, and Monitoring	August 19-23, 2019
		3rd Metro Cebu Airshed TWG Meeting at Applied Nutrition, Gov Cuenco Avenue, Cebu City	August 16, 2019
		Metro Cebu Airshed Governing Board Emergency Meeting at DENR EMB 7 Bldg. Banilad, Mandaue City	October 1, 2019
		Training Workshop for Metro Cebu Airshed Stakeholders in relation to Air Quality Management at Castle Peak Hotel	November 21-22, 2019
		Clean Air Month Culminating Activity	November 22, 2019
	2020	1st Metro Cebu Airshed Governing Board Meeting via Zoom	May 29, 2020
		2ND Metro Cebu Airshed Governing Board Meeting via zoom	December 2, 2020
		Random Roadside Emission Testing	November 2020 Every Wednesday
		Workshop-Seminar for Youth Leaders in Camotes Island	November 19-20, 2020

Workshops And Trainings Pre And Pandemic Year

LIST OF TRAININGS FROM THE REGIONAL OFFICES

REGION	YEARS	TRAININGS AND WORKSHOPS CONDUCTED	DATE CONDUCTED
R8	2019	Tacloban City Airshed Training/Workshop on Air Dispersion Modelling and Emission Inventory	March 13-14, 2019
		Orientation Workshop on Entity-Level GHG Accounting for ECPs & Write-shop on Integrated Management using EbA Approach for LGU and other Stakeholders	June 10-12, 2019
		Capacity Building on Emission Inventory, Air Quality Monitoring & Developing Communication Plan on Climate/EbA/ECODRR with GAD Perspective for PENROs/CENROs in Region 8	Nov 28-29, 2019
	2020	Training Workshop for EMB R8 Stack Sampling Team	November 13-15, 2020
		Training Workshop for EMB R8 Stack Sampling Team	December 17-18, 2020
R9	2019	Capability Building For EMB –9 For Technical Staff On Air Quality Management	June 07, 2019
	2020	Webinar On Emission Inventory And Air Dispersion Modelling Using AERMOD Software	December 22, 2020

Workshops And Trainings Pre And Pandemic Year

LIST OF TRAININGS FROM THE REGIONAL OFFICES

REGION	YEARS	TRAININGS AND WORKSHOPS CONDUCTED	DATE CONDUCTED
R10	2019	Environmental Management Seminar for Barangay LGUs from the Municipality of Tagoloan of the Metro Cagayan de Oro Airshed	April 10, 2019
		Capacity Development Orientation Seminar for Air Emission Inventory of Area Sources in the Airshed	August 09, 2019
		Motor Vehicle Enumerators Orientation Seminar for Mobile Emission Inventory in the Airshed	August 13, 2019
		Anti-Smoke Belching Campaign	Feb. 21, 2019 March 21, 2019 April 29, 2019 June 13, 2019 July 31, 2019 August 14, 2019 Sept. 18, 2019 Oct. 30, 2019 Nov. 22, 2019 Dec. 06, 2019
	2020	Updating of the Metro Cagayan de Oro Airshed LGUs 5-Year Air Quality Management Action Plan	February 28, 2020
		Cluster Consultation Workshop on Short-lived Climate Pollutants (SLCPs) for Airshed Governing Boards Virtual Workshop sanctioned by EMB Central	October 14, 2021
		Anti-Smoke Belching Campaign	Jan. 31, 2020 Feb 19, 2020

Workshops And Trainings Pre And Pandemic Year

LIST OF TRAININGS FROM THE REGIONAL OFFICES

REGION	YEARS	TRAININGS AND WORKSHOPS CONDUCTED	DATE CONDUCTED
R11	2019	Capacity Building On Air Quality Management Of Personnel In The Ambient Management Section (AMS), Water & Permitting Section (WAPS) And Water & Air Monitoring Section (WAMS)	June 20-23, 2019
		Capacity Building Target Setting For The 3rd And 4th Quarter 2019	July 18, 2019
		Visioning Workshop And Culmination Activity In Celebration Of The National Clean Air Month And National Environmental Awareness Month	November 29, 2019
		Training Of The Technical Administrative Secretariat (TAS) Davao City Airshed	December 3-4, 2019
	2020	2-Day Capacity Building On Air Quality Management	February 3-4, 2020
		2-Day Webinar On Entity-Level Greenhouse Gas (GHG) Inventory And Management	September 15-16, 2020
R12	2019	Ken's Grill And Restaurant Anti-Smoke Belching	September 6, 13, 20 & 27, 2019
		Environmental Trade Fair	June 21-28, 2019
		Mobile Air Conditioning Testing	June 14, 21 & 28, 2019
		Roadside Anti-Smoke Belching	June 7, 14, 21, 28, 2019
		Random Emission Testing For Buses	April 22, 2019
	2020	WAQMS & AAQMU Reprogramming Activity	November 12-13, 2020
		Greeneducation Batch 2 Webinar Series	November 10-11 & 17, 2020
		Conduct For The Orientation Workshop For The Participants Of General Santos Emission Inventory	November 16-17, 2020
R13	2019	Agusan del Norte -Butuan City Airshed Governing Board Meeting	August 15, 20219
		Roadside MAC and Vehicle Emission Testing	September 27, 2019
		Capacity Building of Agusan del Norte – Butuan City Airshed Governing Board and Technical Administrative Secretariat	November 27-28, 2019
		Clean Air Month Celebration Greeneducation Quiz Bowl	November 29, 2019
	2020	Agusan del Norte – Butuan City Airshed Governing Board Meeting	March 6, 2020
		Agusan del Norte – Butuan City Airshed Governing Board Meeting (virtual)	November 24, 2020
		Clean Air Month Celebration Greeneducation Quiz Bowl	November 25, 2020
		Clean Air Month Activity (Padyak)	November 26, 2020

Opportunities Amid The Pandemic
Bus Rapid Transit

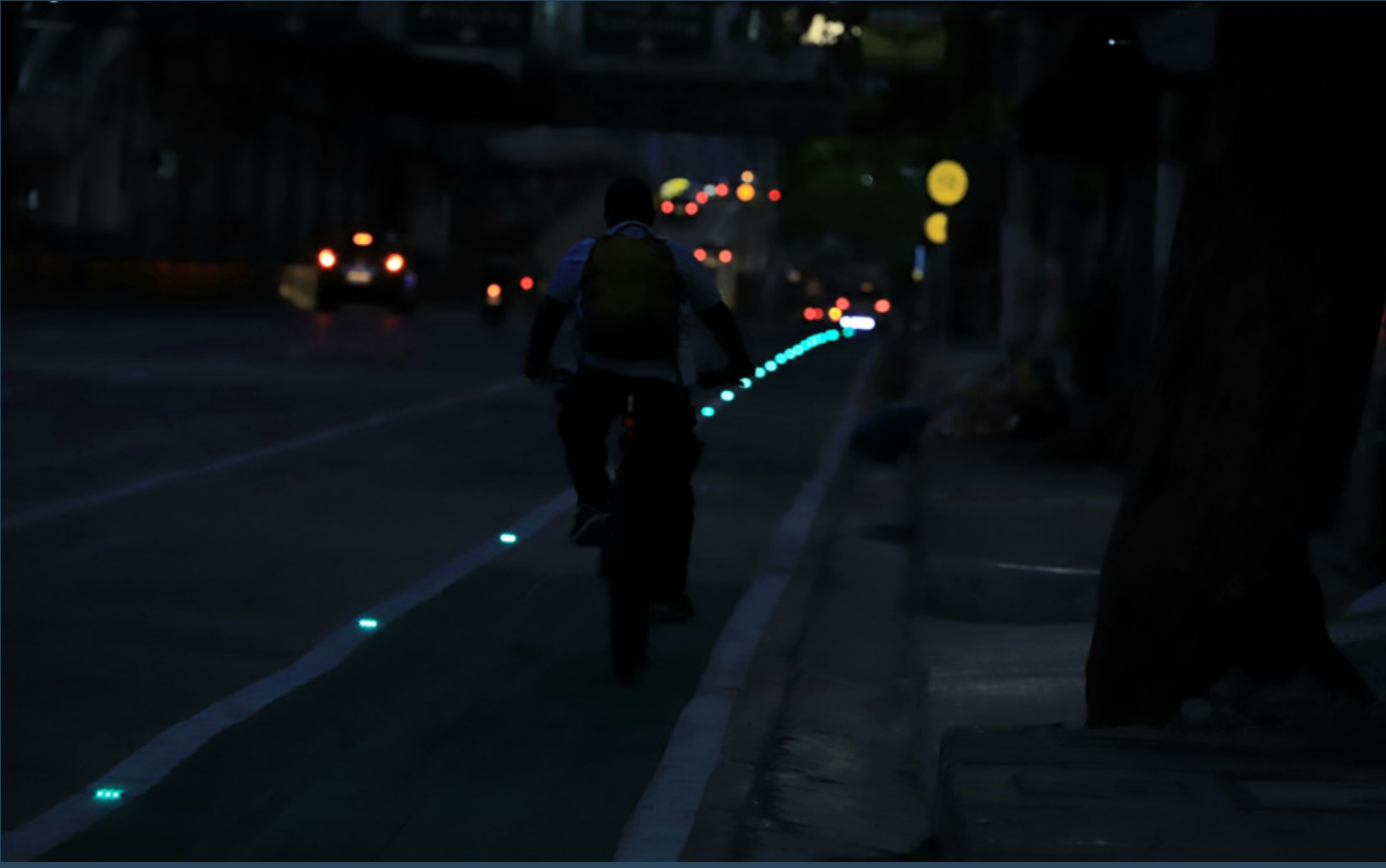
Image Source: https://www.theurbanroamer.com/edsa-carousel-experience/

In 2018, a proposal for a Bus Rapid Transit system using World Bank financing was accepted. Following Quezon Avenue, EDSA was supposed to be the second phase of the development of the bus rapid transit system. Line 2, dubbed the Central Corridor, would eventually become the **EDSA Carousel.**

The Inter-Agency Task Force for the Management of Emerging Infectious Diseases (IATF-EID) issued a community quarantine on March 16, 2020, in response to the COVID-19 pandemic, which suspended practically all public and private transit along EDSA. This opened the path for the EDSA Busway to be built right away. The EDSA Busway is only open to authorized buses and emergency vehicles like as ambulances.

The changes brought about by COVID-19, such as the increase in cashless transactions, the pandemic provided a chance to make some significant improvements to the EDSA commuting experience. The EDSA Carousel was more than simply a new way to manage traffic on EDSA. It was also about regulating the flow of people, especially in the middle of a pandemic, where the movement of people and their interaction with one another should be regulated more carefully than usual.

Another benefit of the EDSA Bus Carousel is that it alleviates the heavy traffic that has plagued EDSA for many years already. The heavy traffic in EDSA has been one of the biggest sources of air pollution in the Philippines. Hence, the use of the EDSA Carousel is highly promoted as it is beneficial for the Filipinos because its usage not only saves time for the commuters but also can contribute to a cleaner air.



A man seen riding bicycle along EDSA during night time. The road markings (green lights) improve sight of the lanes at night, making biking safer. Photo by: Robert Oswald P. Alfiler (PNA)

Opportunities Amidst The Pandemic

Strengthening the Use of Bike Lanes in EDSA

The DoTR, DPWH, and MMDA will work on the installation of bollards, lightings on bicycle paths, and painting of lanes, as part of the government's bicycle lane project to ensure the safety of the cyclists. These improvements to be instuted have been agreed upon during an inspection of bicycle lanes in Metro Manila roads led by MMDA Chairman Benhur Abalos, Mark Steven C. Pastor, DoTr Assistant Secretary for Road Transport and Infrastructure Eric Ayapana, DPWH NCR Regional Director.

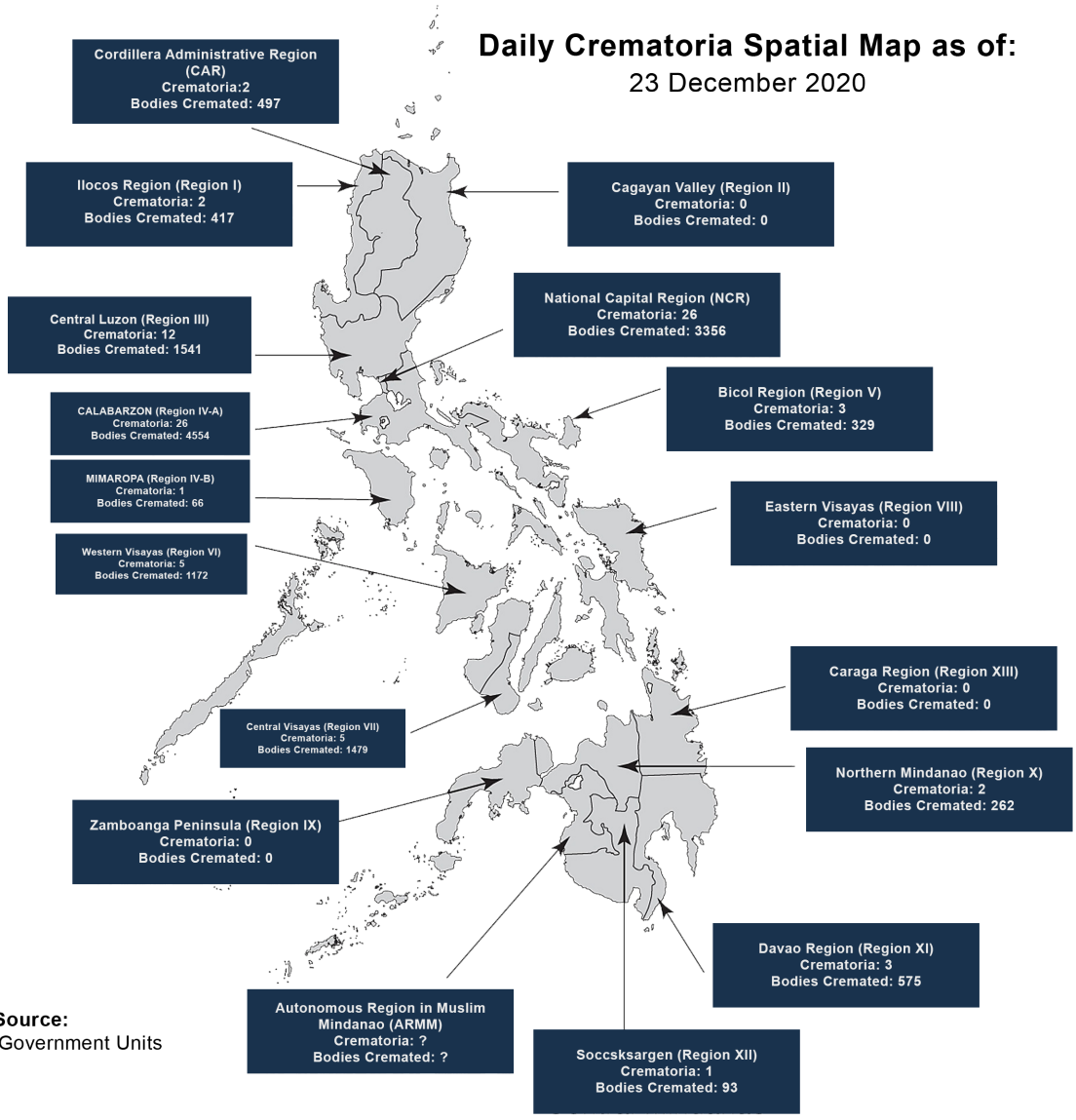
The promotion of the usage of bike has been helpful not only for the physical wellbeing of the Filipinos but also in lessening the air pollution in Metro Manila. Bikes do not emit hazardous pollutants into the atmosphere, nor do they emit carbon dioxide, which contributes to climate change. It is estimated that the modest increase in bicycle use each year might save 6 to 14 million tons of CO_2.

Crematoria Management

Regions 2, 8, 9, and 13 have no crematoria located within their jurisdiction. However, the remaining regions were conducting continuous data gathering and daily reporting on the operations of the crematories in compliance with RA 8749, and the results were sent to the Central Office. Following the protocol, those who failed to comply with the environmental laws and policies were issued Notices of Violation and required to rectify their violations committed and abide by the Environmental Laws.

In Region 10, two (2) crematoria are operating within region 10, one from Divine Shepherd Memorial Gardens, Inc., and the other one from Cosmopolitan Memorial Chapel (CMC). Permit to Operate (PTOs) were checked for the said installations, and a Notice of Violation was issued to CMC for operating their crematorium without a valid PTO.

Overall for 2020, there are 88 crematorias and 17,265 cremated bodies due to COVID-19.



Data Source:
Local Government Units
DENR
DOH

Response to the Pandemic that has affected Air Quality Management

As mentioned in the previous sections, during the year of 2019 to 2020, the Philippines was also affected by the COVID19 pandemic. As quarantine restrictions were announced in March, swift action was taken to establish alternative work arrangements that allowed employees to stay at home and do their jobs. The work-from-home setup was also implemented in DENR-EMB. However, this doesn't stopped the employees in delivering the reports and connection with the stakeholders and their clients.

Furthermore, work proceeded at both the central and regional offices, where a skeleton crew was put in place to ensure that service was not disrupted despite the epidemic. Shuttle services were made available to individuals who were requested to report to work in order to decrease the amount of danger and money that critical workers would incur.

Lastly, the online services of EMB were fully utilized in order to continue the transaction with the clients and accomodate them despite the implemented quarantine restrictions. The EMB was also there to support its employees, offering support in each and every possible way they can during these tough times.


Measures to Ensure Good Health
and Safety Against COVID-19
BIDA SOLUSYON
Source: https://doh.gov.ph/
neDENR
@DENROfficial|www.denr.gov.ph

EMB Regional Offices' Response to the Pandemic that has Affected Air Quality Management

REGION	RESPONSES
R1	EMB Region 1 conducted an Emission Inventory comparing the air quality status before and during the Enhanced Community Quarantine and Modified General Quarantine.
R2	Work procedures and schedules adjustment are the only feasible means of response that the EMB Regional Office can make in the light of the pandemic. Resultant of this, despite the pandemic, the Regional Office 02 was still able to conduct ambient air sampling continuously within a six-day sampling interval. With the results gathered, the office established that the air quality index is within the level of GOOD air quality with lower concentrations which may be attributed to the decreased operations of mobile and stationary sources.
R3	No related activities on this aspect
R4A	EMB 4A has conducted continuous air quality monitoring using our three (3) ambient air quality monitoring stations and compared the difference in air quality during different restrictions (ECQ, GCQ, etc.) submitted to EMB AQMS CO.
R4B	The COVID-19 pandemic posed to be one of the biggest challenges for EMB MIMAROPA in air quality management in years. It pushed this office to exhaust all available efforts and resources to monitor the region's air quality regarding the existing health protocols imposed by the Inter-Agency Task Force for the Management of Emerging Infectious Diseases. A significant rise in the frequency of crematoria operations in the country as part of efforts to combat the spread of COVID-19 compelled the EMB MIMAROPA Region to conduct daily monitoring of the number of bodies cremated within its administrative area of jurisdiction.
R5	The EMB V has implemented carpooling and provided a service vehicle to reduce mobile emissions and keep the employees safe. Most of the activities were also conducted via online video conference to communicate with different stakeholders, especially with the Airshed Governing members, in monitoring and keeping the good quality of air in the region
R6	Daily air quality monitoring and emission inventory were conducted to assess their impact on air quality within the Airshed. The data was submitted to EMB Central Office for consolidation, and it was also presented to the Airshed Governing Board for information. A significant decrease in concentration for criteria pollutants can be attributed to the strict quarantine protocols being implemented wherein public transportation was suspended, industries/establishments operating with a limited time, and the movement of people was lessened.
R7	Amid the pandemic, EMB 7 continued to monitor ambient air quality in the region to determine the impact of limited movement and operations of industries, transportation, and other activities that may create environmental issues. Based on the gathered data, it was observed that there was a significant decrease of Particular Matter in the air. When restrictions were lightly lifted from ECQ to MECQ, industries and other agencies could provide carpools for their employees.
R8	The Regional Office has always observed strict compliance with the health protocols relevant to the COVID-19 pandemic.

EMB Regional Offices' Response to the Pandemic that has Affected Air Quality Management

REGION	RESPONSES
R9	During Enhance Community Quarantines (ECQ) enforcement, manual sampling stations for TSP were not operated due to strict travel restrictions. Also, inspection and monitoring of industries were limited to table monitoring. However, the pandemic helps us realize the need for real-time monitoring. We are continuously improving the ambient monitoring and enhancing the monitoring from the sources thru online Continuous Emission Monitoring Systems (CEMS). The office is constantly improving the Environmental Quality Monitoring Center to monitor real-time emissions from Industries with CEMS and access real-time ambient air and water quality monitoring data.
R10	Ambient air quality monitoring was temporarily affected at the pandemic onset, especially in manual air sampling after strict travel restrictions across LGU borders. A few weeks after the suspension, air sampling activities were reinstated, strictly observing the health protocols during travels. The air sampling concentration for particulate monitoring showed a considerable reduction compared to the previous year's data before the pandemic. The implementation of community quarantine reduced the mobility of the populace, including the operation of businesses, manufacturing, and industrial facilities. It also suspended the operation of the public transport system. It imposed strict requirements for nonessential travel, which reduced traffic volume in major thoroughfares and helped curb particulate pollution resulting in improved air quality. In terms of Industrial Monitoring, most firms have decreased their operation due to unavailability/delayed delivery of raw materials. Others have requested to move the conduct of Source-Specific Test (SST) and other Quality Assurance/Control Tests due to strict quarantine protocols.
R11	The ECQ affected the manual air sampling for PM_{10}. The scheduled sampling was suspended due to the total lockdown of the city which affected the data capture rate that will be used in the designation for attainment and non-attainment areas. However, EMB R11 adopted the manual on "Data Handling Protocols for Criteria Air Pollutants Data Substitution" as prescribed in MC 2021-007; in order to fill the missing sampling data and to be able to compare the collected data to the NAAQGV. There was a decrease in the average concentration measured during the pandemic compared to the pre-pandemic period.
R12	Based on the implemented EO wherein the subsequent lockdowns the LGUs implemented had affected the air quality monitoring activities in R12. For compliance and target accomplishments, the EMB R12 continuously monitors the air quality status by conducting ambient air quality sampling and gathering data on CAAQMS, provided with proper and legal documents and following the IATFs and DOH minimum protocols.

Intra-National, International Networks Collaborations

LIST OF COLLABORATIONS FOR 2019-2020

REGION	COLLABORATIONS
CAR	Collaboration with the EANET
NCR	• The region is a member of the Breathe-Life Project, in partnership with World Health Organization (WHO), UN Environment Programme (UNEP) and the Climate & Clean Air Coalition (CCAC) thru CAI- Asia. • The region continuously supports the project "Clean Air for Sustainable Future: A Transdisciplinary Approach to Mitigate Emissions Of Black Carbon In Metro Manila, Philippines (TAME-BC) as stated in the NCR Airshed Governing Board Resolution No. 2018-01, Implementation April 2019. In partnership with German Government.
R1	• As members of the Northeastern Pangasinan (NEPA) Airshed Governing Board, EMB Region 1 and Pangasinan State University (PSU) agreed to conduct Air Quality profiling of the whole NEPA Airshed in CY 2018. • Continuous coordination with the Land Transportation Office (LTO) for Roadside Anti-Smoke Belching, Monitoring, and Apprehension. • EMB Region 1 entered into an Agreement with TESDA Region 1 to train NEPA Airshed Governing Board Members as Motor Vehicle Emission Control Technicians in 2018. • Coordination with LTO and Transport Groups/ Operators in Dagupan City for the "TRAVEL GREEN" Program, all Environmental Policy compliance was monitored (CY 2017). • Coordination with LTO and TESDA for the conduct of Orientation/ Seminar-Workshop for the Transport Operators and Drivers on the Philippine Clean Air Act of 1999 and Roadside Motor Vehicle Emission Control System and Operation (CY 2017- CY 2019).
R2	• Collaboration with academe and LGU to monitor the air quality trends and disseminate related information on air quality status. • Memorandum of Agreement (MOA) to St. Paul University, Buntun Elementary School, and LGU of Santiago to install additional air quality sampling stations to measure air quality that could represent the region's air quality. • Collaboration with the provincial government of Isabela and Cagayan for Anti-smoke belching operations within the region. This collaboration provided one opacimeter to strengthen the Anti-Smoke Belching Operation.
R3	• Member of Asia-Pacific Mercury Monitoring Network (APMMN) through the EMB-Central Office.
R4A	• This Office has not yet entered intra-national and international networks.

Intra-National, International Networks Collaborations

LIST OF COLLABORATIONS FOR 2019-2020 (continuation)

REGION	COLLABORATIONS
R4B	One notable local collaboration the EMB MIMAROPA Region made relevant to air quality management is the establishment of the BCN Airshed in the province of Oriental Mindoro. Through BCN Airshed, the EMB MIMAROPA Region was able to form an interagency committee composed of the following LGUs, National Government Agencies, Civil Society Organizations (CSOs), and the private sector companies: **Government Agencies** Department of Environment and Natural Resources MIMAROPA Region • Department of Transportation – LTO MIMAROPA Region • Department of Health MIMAROPA Region • Department of Trade and Industry MIMAROPA Region • Department of the Interior and Local Government MIMAROPA Region • Department of Science and Technology MIMAROPA Region • Department of Energy • Department of Education MIMAROPA Region • National Power Corporation **Local Government Units** Provincial Government of Oriental Mindoro • Municipality of Baco • City Government of Calapan • Municipality of Naujan **Civil Society Organizations / Academe / NGOs** • Roxas Operators, Drivers, and Allied Workers Service Transport Cooperative (RODASTCO) • Kaunsayan Formation for Community Development (KAFCODE) • Divine Word College of Calapan • First Oriental Mindoro Rice and Corn Association (FORMIRCA) • Rotary Club of Downtown Calapan • Calapan City Vendors Multi-Purpose Cooperative • Adrialuna Farmers Association • Calapan City Tricycle Operator Driver Allied Services Cooperative **Private Sector** • Pilipinas Shell Corporation – Calapan Depot • Power-One Corporation Meanwhile, no noted international collaboration was established by this Office recently.

Intra-National, International Networks Collaborations

LIST OF COLLABORATIONS FOR 2019-2020 (continuation)

REGION	COLLABORATIONS
R5	• Collaboration with the City Government of Legazpi, City Government of Naga, and Land Transportation Office (LTO V) in the conduct of Anti-Smoke Belching Operations within the Legazpi City and Naga City. • Memorandum of Agreement (MOA) with the City Government of Legazpi, City Government of Sorsogon, City Government of Iriga, Local Government Unit of Masbate, and Local Government of Daet for the installation of additional air quality monitoring stations to measure the air quality that could represent the region's air quality. • Collaboration with the Academe, LGUs, National Government Agencies (NGAs), and Non-Government Organizations (NGOs) as members of the airsheds to formulate policies, programs, and activities to manage the air quality within the region.
R6	• Air Quality Monitoring Stations within schools. • Anti-Smoke Belching Unit within municipalities and provinces.
R7	• EMB 7, in partnership with Asian Development Bank (ADB), had a Capacity Development Technical Assistance project (CDTA) in compliance with the requirement of granting ADB a development loan of KEPCO SPC – coal-fired power plant (KSPC) for their enhancement and upgrading of the plant. Part of the project is to conduct emissions inventory in Naga City, where KSPC is located, and install two (2) ambient air quality monitoring stations (CAAQMS-DOAS) to validate the compliance of KSPC in terms of their emissions. Both parties work hand in hand in gathering data, conducting air dispersion modeling, and presenting results to the LGU and other stakeholders for the benefit of the project.
R8	• EMB-R8 has not yet collaborated with any international networks. However, the Office has an existing collaboration with the local academe and university.
R9	• The Office coordinated with other academes thru the Zamboanga City Airshed Governing Board meeting in terms of IECs and ambient air quality data dissemination.
R10	No Collaborations.
R11	No Collaborations.
R12	No Collaborations.
R13	• As of the moment, there has been no collaboration yet, but the Office is willing to engage in the collaboration related to the Air Quality Management.

SECTORAL AGENCIES ACTIONS TOWARDS AIR QUALITY MANAGEMENT

Other Agencies Actions Towards Air Quality

LIST OF ACTIONS RELEVANT TO AIR QUALITY

GOVERNMENT AGENCY	PROJECT AND PROGRAMS	STATUS AND REMARKS
Department of Transportation	Shift to other modes of transport thereby reducing traffic congestion, and subsequently, air pollution. • Construction of Active Transport Facilities, including Establishment of Bike Lane Networks, EDSA Greenways	• Establishment of Bike Lanes Completed last June 2021 • EDSA Greenways – Ongoing Procurement and Detailed Engineering Design
	Mass Transportation Development, including railways, Bus Rapid Transit (BRT) and High Priority Bus System (HPBS) Projects under the Build, Build, Build Program, which are currently ongoing: *Rail Projects* • MRT-3 Rehabilitation Project • Metro Manila Subway • LRT-2 West Extension • PNR Clark Phase 1 (Tutuban – Malolos) • PNR Clark Phase 2 (Malolos – Clark) • PNR Calamba • PNR Bicol • MRT Line 7 • MRT Line 4 • LRT-1 Cavite Extension • Mindanao Railways Project *BRT and HPBS Projects* • Cebu and Metro Manila BRT	**Rail Projects** *MRT-3 Rehabilitation Project:* Overall completion as of October 2021: 83.05% Rehabilitation Completion: 4Q 2021 Project Completion: 2Q 2023 *Metro Manila Subway:* Overall completion as of October 2021: 34.83% Partial Operations: 4Q 2026 Full Operations: 3Q 2027 *LRT-2 West Extension:* Overall completion as of October 2021: 5.69% Project Completion: 4Q 2024 *PNR Clark Phase 1 (Tutuban – Malolos)* Overall completion as of October 2021: 51.30% Partial Operations: 2Q 2023 Full Operations: 2Q 2024 *PNR Clark Phase 2 (Malolos – Clark)* Overall completion as of October 2021: 32.51% Partial Operations: 3Q 2023 Full Operations: 4Q 2024 *PNR Calamba* Overall completion as of October 2021: 26.91% Partial Operations: 4Q 2025 Full Operations: 2Q 2028

GOVERNMENT AGENCY	PROJECT AND PROGRAMS	STATUS AND REMARKS
	• Davao HPBS	*PNR Bicol* Overall completion as of October 2021: 10.73% Partial Operations: 1Q-2Q 2022 Full Operations: 3Q 2025 *MRT Line 7* Overall completion as of October 2021: 62.10% Partial Operations: April 2022 Full Operations: 4Q 2022 *MRT Line 4* On-going contract negotiation. Project Completion: 2025 *LRT-1 Cavite Extension* Overall completion as of October 2021: 60.18% Partial Operations: 1Q 2024 Full Operations: 2Q 2027 *Mindanao Railways Project Phase 1* Overall completion as of October 2021: 6.57% Full Operations: 2Q 2023 **BRT and HPBS Projects** *Cebu Bus Rapid Transit* Ongoing Procurement Full Operations: 2025 *Metro Manila BRT* Ongoing Procurement, Preliminary Engineering Design Operations: 2024 *Davao High Priority Bus System* For procurement of civil works packages Operations: 3Q 2023
	Ensuring air quality in road transport motor vehicles Projects/activities included are as follows: • Private Motor Vehicle Inspection Centers • Roadside inspection of Motor Vehicles	Ongoing
	Public Utility Vehicle Modernization Program Components under the PUVMP are as follows: • Policy Reforms • Route Rationalization • Local Public Transport Plan • Industry Consolidation • Fleet Modernization - new jeepney design standards; promoting use of EuroIV diesel engines and other alternative sources of energy, including e-jeepneys. • Financing • Vehicle Useful Life • Stakeholder Support • Communications	
	Digital Transformation interventions, which lessens human interventions and reduce travel • Electronic Toll Collections • Land Transportation Management Systems, LTO Public Portal • LTFRB Public Transport Online Processing System	Ongoing

Other Agencies Actions Towards Air Quality

LIST OF ACTIONS RELEVANT TO AIR QUALITY (continuation)

AGENCY	ACTIVITY	BRIEF DESCRIPTION
Department of Science and Technology (ITDI)	Future Developments	ITDI initiated research on Air Biofilter for Ammonia Reduction on Poultry Houses. Currently, there are two on-going projects on Air Emission testing, control, and reduction of pollutants.
	Other Activities	The Industrial Technology Development Institute (DOST-ITDI) did not have any projects or engagements regarding Air Quality Control and Monitoring for CY 2019-2020.
Department of Science and Technology (ITTD)	Development of the National Air Quality Action Plan Other activities (includes committee involvement, conduct of webinars and trainings and partnerships) Development and assessment of the Sustainable S&T Clean Air Roadmap 2019- 2023	

Other Agencies Actions Towards Air Quality

LIST OF ACTIONS RELEVANT TO AIR QUALITY (continuation)

PROJECT TITLE	DESCRIPTION
Development of upcoming planned programs and projects	
Project 1 : AdVICE: Ad-hoc Vehicle Infrastructure Cooperative Environment AdVICE	Consists of 1) a collection of ride-hailing algorithms 2) data harvesting of evehicles, and 3) ride-hailing application. AdVICE aims to make e-trikes more efficient for use as a transportation option in small communities.
Project 2 : EmoCION: Electric Mobility and Charing Infrastructure Operating as a Network	A smart network of energy-aware electric vehicles and charging stations. There will be cooperation between the electric vehicles and infrastructure. Operations such as scheduling of vehicles, route to take, charging designation, and charging time will all be coordinated such that the overall energy demand of the system will be optimized.
Project 3. E-trike Deployment and Utilization Study Saving the environment	Project 3. E-trike Deployment and Utilization Study Saving the environment through minimal emission of engines is the focus of this on-going study. The utilization and deployment of the e-Trike will create awareness and acceptability to stakeholders in Tuguegarao City. It shall provide information on the performance of the e-Trike in terms of mileage, and battery performance.
Optimal Placement Of Electric Vehicle Charging Stations In A Local Public (Charm Doe)	A methodology to strategically place fast charging stations within a local transportation system. This methodology will be used to pilot a network of charging infrastructure to be located in a city with electric tricycles. The project envisions that the existing e-trikes from DOE can be used to cater as transport service.
Design, Development, Demonstration And Business Planning Of A Flexible Electric Van (Flev) For Logistics And Passenger Transport Use (9081)	This project in collaboration with DLSU and Valeo, a European company engaged in electric vehicle drive train development, through the EU funded SOLUTIONS Plus project of the Urban Electric Mobility Initiative. Partnering with Tojo Motors (Santa Rosa, Laguna) aims to accelerate the wider transition to sustainable urban electric mobility. The vehicle can be used as a dedicated logistics or public transport vehicle, or both ways. A prototype will be built and tested on the road and in the laboratory. Five (5) units will be adopted for demonstration by the Philippine Postal Corporation.
Safe, Efficient, and Sustainable Solar-Assisted Plug-In Electric Boat (Sessy E-Boat)	The project aims to create solar-assisted electric boats to serve as the first step into implementing a mode of transport that utilizes clean energy. In the future, the technology can be implemented on all applicable maritime spots in the country. This study will involve the prototyping of two (2) units of electric motor boats with solar panels. The design and implementation of the power and control system for efficient and sustainable electric boats will be the primary scope of the project. Project will use locally developed automatic identification system or AIS as safety feature.

Other Agencies Actions Towards Air Quality

LIST OF ACTIONS RELEVANT TO AIR QUALITY (continuation)

PROJECT TITLE	DESCRIPTION
Project 1: Design, Development and Fabrication of the Different Parts and Assembly of E-Trike (9332)	Project 1 will design, develop, and fabricate different parts of an electric tricycle (e-Trike). Different possibilities in improving the energy efficiency of the e-Trike will be considered. Studies will focus on the reduction of overall weight by improving body shell design and choosing lightweight materials; redesigning a lightweight chassis; improving mechanical energy transmission systems, and determining optimal electronic/electrical systems with respect to the mechanical design fo the tricycle
Project 2. Design, Fabrication And Testing Of Electrical And Electronic Systems Of A Locally Developed E-Trike (9333)	This project is in partnership with UP Diliman Power Electronics Laboratory and CSU. Difficulty in requesting for timely repair and/or replacement of damaged parts as most of the time there are no local offices of foreign suppliers. Lack of actual testing of components in local operating conditions. Easily affected by global supply and global events (special mention: COVID-19). Aside from designing the components to suit the desired application of CSU, knowledge transfer will be conducted by hosting researchers from CSU in UP Diliman and setting up a power electronics laboratory in CSU to be able to sustain the NICER for EV in Region 2. Power Electronics Laboratory
Project 3. Viability Study Of Conversion Of Conventional Tricycle To E-Trike (9455)	For this study, the tricycle models available in the region are the target units to be converted to e-Trike. There are two (2) prevalent models in the region and they are locally known as: “sidecar” and “center car”. These 2 models differ in many ways but the distinction and where the local name was derived is based on the position of the motorcycle. For “sidecar", the motorcycle is located at the left side of the unit while for the “center car”, the motor cycle is located at the center of the unit. Lithium Ion battery will be used and a BMS will also be incorporated to protect the battery and prolonged its service life

Other Agencies Actions Towards Air Quality

LIST OF ACTIONS RELEVANT TO AIR QUALITY (continuation)

AGENCY	ACTIVITY

Department of Energy (DOE)	• **PNS 2020:2003 / DOE 002:2003(B100)** - Coconut Methyl Ester (B100) - this was developed and made to ensure the quality and effectiveness of coconut methyl ester (CME) for blending with diesel
	• **FPNS/DOE QS 002:2021- Biofuels -Coconut Methyl Ester (B100)** – Specification This is a revision/update of PNS/DOE QS 002:2015. In this edition, the following changes/improvements were made:
	  • Inclusion of new property, the Cold Soak Filterability Test (CSFT) – a limit set adopting the ASTM D 6751 at 360 seconds maximum • Improvement of Monoglyceride content (from 0.8 to 0.7%, max.);
	  • Inclusion of provisions on good housekeeping; and
	  • Updating/review of test methods
	• **FDPNS/DOE QS 015:2021** - CME-blended automotive diesel oil (ADOB3) - Specification
	• **FDPNS/DOE QS 016:2021** - CME-blended industrial diesel oil (IDOB3) – Specification
	• **FDPNS/DOE QS 017:2021** - CME-blended automotive diesel oil (ADOB4) - Specification
	• FDPNS/DOE QS 018:2021 - CME-blended industrial diesel oil (IDOB4) – Specification

Department of Works and Highways (DPWH)	A Summary of the Extent of air pollution in the country, per type of pollutant and source An analysis and evaluation of the current state, trends, and projections of air Pollution; Identification of critical areas, activities, or projects which will need closer monitoring or regulation; Recommendation for necessary executive and legislative action; and. Other pertinent and qualitative and quantitative information concerning the extent of air pollution and the air quality performance rating of industries in the country **Department Order No. 88 Series of 2020 (Prescribing Guidelines on the Design of Bicycle Facilities along National Roads)** All projects of DPWH that involve new road and bridge construction or future expansion to relieve traffic congestion, such as road/bridge widening, diversion/bypass roads, among others, shall include in its design the provision of a bicycle facility, if feasible. Encouraging bicycles, a uniform design of bicycle facilities shall be included to achieve a consistent approach that will meet bicyclists' needs and safe access and other road users.

Other Agencies Actions Towards Air Quality

LIST OF ACTIONS RELEVANT TO AIR QUALITY (continuation)

AGENCY	ACTIVITY
Metropolitan Manila Development Authority (MMDA)	Continuous operation of the Anti-Smoke Belching Unit (ASBU) to implement and enforce the Clean Air Act (RA 8749) through roadside inspection and apprehension, improving the “ambient air quality” of Metro Manila.
	Implement a comprehensive Anti-Smoke Belching Program (Article 2, Section 5.d of RA 8749).
Department of Health (DOH)	The DOH - Disease Prevention and Control Bureau, as Secretariat head of the Inter-agency Committee on Environmental Health (IACEH), facilitated the conduct of the Air Quality and Health Sector meetings, such as on the development of National Ambient Air Guidelines for Hazardous Air Pollutants, and Health Risk Assessment of Taal Volcano Eruption
	The DOH, in collaboration with WHO, has developed a Public Health Risk Communication Plan and Materials for Municipalities Affected by the Taal Volcanic Eruption. Such materials include the Taal Risk Communications Playbook, which outlines the key actions to be undertaken by the communities and LGUs to protect the people's health from contaminated drinking water. Considering air pollutants were deposited in the water supply, this is part of the messages in the risk communication.

Sectoral Initiatives

PROJECTS FROM THE HEALTH SECTOR

INSTITUTION	NAME OF PROJECT	ACTIVITY	PERIOD COVERED AND LOCATION OF IMPLEMENTATION
Lung Center of the Philippines	Anti-Air Pollution Program	The early findings of air pollution in the two cities mentioned warrant a genomic study by the DOH and the DOST among the jeepney drivers, commuters, sidewalk vendors, and other individuals exposed to air particulate pollutants, and this study should be done at the LCP to determine the risk of people to cancer, cardiovascular diseases, etc., and to determine other genetic defects that will affect future generations.	2020 Lung Center of the Philippines

List of Scientific Publication

PUBLICATIONS FROM THE ACADEMIC SECTOR

Title of Publication	First Author, (Year), Universities Involved	Period Covered and Location of Implementation	Type of Manuscript
PM10 and Surface dust source characterization in Baguio City-Central Business District Philippines	Hagad and Cayetano, 2019 University of the Philippines-Diliman Gwangju Institute of Science and Technology, South Korea	2015-2017 Baguio City	Journal Article
Aerosol Particle article and Black Carbon Emission factors of the vehicular fleet in Manila, Philippines	Madueño, L., et al. (2019) Ateneo de Manila De Lasalle University Taft Leibniz Institute for Tropospheric Research University of the Philippines-Diliman	2015 Manila City	Journal Article
Long-range transport of aerosols from East and Southeast Asia to the northern Philippines and its direct radiative forcing effect	Bagtasa, G. et al. 2019 University of the Philippines-Diliman National Sun-Yat Sen University, Kaoshiung, Taiwan	2017 Burgos, Ilocos Norte	Journal Article
An annual time series of weekly size-resolved aerosol properties in the megacity of Metro Manila, Philippines	Stahl, et al. 2020 Ateneo de Manila Manila Observatory	2018-2019, Quezon City	Journal Article
Low-Cost Air Quality Monitoring Sensor (AQMS) for Particulate Matter Measurement of Light Emitting Diode LiDAR System	Galvez, MCD, et al., 2019 De Lasalle University Taft	2016-2017, Manila City	Journal Article
Investigating the Effect of Urbanization on Weather Using the Weather Research and Forecasting (WRF) Model: A Case of Metro Manila, Philippines	Oliveros, j. 2019 De Lasalle University Taft	2016-2017 Metro Manila	Journal Article
Application of the WRF/Chem v. 3.6.1 on the reanalysis of criteria pollutants over Metro Manila	Garcia, J.A., et al., 2019 De Lasalle University Taft University of the Philippines-Diliman	2016-2018, Metro Manila	Journal Article

List of Scientific Publication

PUBLICATIONS FROM THE ACADEMIC SECTOR (continuation)

Title of Publication	First Author, (Year), Universities Involved	Period Covered and Location of Implementation	Type of Manuscript
Air Particulate Matter, Black Carbon, and Elemental Concentrations and Source Apportionment in Calaca, Batangas	Tuso, C. et al.,	2018-2019, Calaca, Batangas	Journal Article
Influence of local meteorology on the chemical characteristics of fine particulates in Metropolitan Manila in the Philippines	Bagtasa and Chung-Shin, (2020), University of the Philippines-Diliman National Sun Yat-Sen University	May and October 2018, Metro Manila	Journal Article
Inter-correlation of Chemical Compositions, Transport Routes, and Source Apportionment Results of Atmospheric PM2.5 in Southern Taiwan and the Northern Philippines	Yu-Lun et.al, (2019) National Sun-Yat Sen University University of the Philippines-Diliman	Northern Philippines, 2019	Journal Article
Airborne Observations of Aerosol Properties in Southeast Asia: Overview of Emissions, Cloud Processing, and Long-Range Transport during NASA CAMP2Ex	Ziemba, L.D. et.al, (2020) Manila Observatory NASA Langley Research Center	August to October 2019, Philippines	Journal Article
Spatial Distributions of Trace Gases and Aerosol Particles over the Coastal Megacity of Metro Manila, Philippines during the CAMP2Ex Aircraft Campaign	Topacio, X.G.V. et.al, (2020) Manila Observatory NASA Langley Research Center	October 2019, Metro manila	Journal Article
Characterizing the Transport and Meteorological Factors in Leading to the 2019 Southeast Asian Transboundary Haze in the Southern Philippines	Santos, K.E. et.al, 2021 University of the Philippines-Diliman	August to October 2019, Southern Philippines Regions	Thesis Manuscript
The Transport Process and Deposition of Ashfall Over CALABARZON and National Capital Region During The January 2020 Eruption of Taal Volcano, Philippines	Lagman, A.S. et.al;, 2021 University of the Philippines-Diliman	January 2020	Thesis Manuscript

List of Scientific Publication

PUBLICATIONS FROM THE NON-GOVERNMENT ORGANIZATION

Title of Publication	First Author, (Year), Universities Involved	Period Covered and Location of Implementation	Type of Manuscript
Coal Facts and Figures (2019)	Clean Air Asia, 2019		Publication
From Transfer to Knowledge Co-Production: A Transdisciplinary Research Approach to Reduce Black Carbon Emissions in Metro Manila, Philippines (2020)	Tõnisson, L, et.al, 2020. From Transfer to Knowledge Co-Production: A Transdisciplinary Research Approach to Reduce Black Carbon Emissions in Metro Manila, Philippines. Sustainability 12, no. 23: 10043. https://doi.org/10.3390/su122310043 Clean Air Asia	2020	Publication
Coal-Fired Power Plant (CFP) Emission Standards in South and Southeast Asia Policy Analysis (2020)	Clean Air Asia, 2020. Coal-Fired Power Plant Emission Standards in South and Southeast Asian Countries Policy Analysis. Pasig City, Philippines.	2020	Publication
Size_ resolved composition and morphology of particulate matter during the southwest monsoon in Metro Manila, Philippines. Atmospheric Chemistry and Physics	Cruz, M. T., et.al, 2019 Atmospheric Chemistry and Physics, 19(16), 10,675–10,696. https://doi.org/10.5194/acp-19-10675-201 Manila Observatory	2019	Publication
On the nature of sea salt aerosol at a coastal megacity: Insights from Manila, Philippines in Southeast Asia.	AzadiAghdam, M., et.al, 2019 Manila Observatory	2019	Publication
On the nature of sea salt aerosol at a coastal megacity: Insights from Manila, Philippines in Southeast Asia.	Simpas, J. B., Stahl, C., and Sorooshian, A., 2019 Atmospheric Environment 216: 116922. Manila Observatory	2019	Publication
Sources and characteristics of size-resolved particulate organic acids and methanesulfonate in a coastal megacity: Manila, Philippines	Stahl, C., et.al, 2019 *Atmospheric Chemistry and Physics*, *20*(24), 15907-15935. Manila Observatory	2020	Publication
Longrange aerosol transport and impacts on size-resolved aerosol composition in Metro Manila, Philippines	Braun, R. A., et. al, 2020 Atmos. Chem. Phys., 20, 2387 – 2405.	2020	Publication
Characterizing weekly cycles of particulate matter in a coastal megacity: The importance of a seasonal, size-resolved, and chemically-speciated analysis.	Hilario, M. R. A., et. al, 2020 J. Geophys. Res. – Atmospheres, accepted, doi: 10.1029/2020JD032614.	2020	Publication
Investigating size-segregated sources of elemental composition of particulate matter in the South China Sea during the 2011 *Vasco* Cruise.	Hilario, M. R. A., et.al, 2020 Atmospheric Chemistry and Physics, 20, 1255–1276.	2020	Publication

Sectoral Initiatives

PROJECTS FROM THE NON-GOVERNMENTAL ORGANIZATIONS

ORGANIZATION	NAME OF PROJECT	PERIOD COVERED	ACTIVITY
Clean Air Asia	"Integrated Better Air Quality Programme in Asia" (IBAQ Programme) funded by the Ministry of Environment of Japan and implemented by Clean Air Asia in collaboration with Marikina City Environmental Management Office	2016-2019 Marikina City	The project implementation in Marikina City involved short-term air quality monitoring, bottom-up emissions inventory, spatial mapping of air pollution-related incidences, and stakeholder engagement workshops in developing a "Clean Air Action Plan for Marikina City, Philippines."
		2019-2021 Manila City	• A five-year partnership with 3M Global was launched during the UN Climate Action Summit in New York in September 2019. The "Asia Blue Skies Program" supported the development of a science-based Clean Air Action Plan for Manila City, the capital of the Philippines. • The project covered the establishment of an air quality monitoring network in the City of Manila, through sensors deployed in representative sites in the city, and collocated with the DENR EMB NCR reference instrument for performance evaluation. The network is serving as source of supplementary air quality monitoring data for the city. • A comprehensive emissions inventory for the city was developed, covering stationary, area, and mobile sources of emissions. • Health mapping of the air pollution-related mortality and morbidity cases in the city have been performed using incidence data records and PhilHealth claims. • Several capacity building sessions were organized and delivered for the various offices of the Manila City Government since 2019, to ensure sustainability of efforts.

Sectoral Initiatives

PROJECTS FROM THE NON-GOVERNMENTAL ORGANIZATIONS (continuation)

Clean Air for Sustainable Future: A Transdisciplinary Approach to Mitigate Emissions of Black Carbon in Metro Manila, Philippines (TAME-BC) project	Metro Manila	• The Clean Air for a Sustainable Future: A Transdisciplinary Approach to Mitigate Emissions of Black Carbon in Metro Manila, Philippines (TAME-BC) project is implemented from 2019 to 2021 under the frame of the BMBF-call “Sustainable development of urban regions” program. TAMEBC offers a transdisciplinary approach to develop and empirically test strategies towards a more sustainable management of air quality standards and emission control frameworks in Metro Manila. • The project, which is supported by German Federal Ministry of Education and Research, is implemented by German institutions (Leibniz Institute for Tropospheric Research [TROPOS], German Development Institute, and the Leibniz Research Institute for Environmental Medicine) together with Philippine partners: Ateneo de Manila University (ADMU), Manila Observatory (MO), De La Salle University (DLSU) Manila, University of the Philippines Diliman (UPD), Lung Center of the Philippines (LCP), Quezon City Government (QCG), Philippine Port Authority (PPA), Manila North Harbor Port, Inc. (MNHPI), Pasig Mandaluyong Quiapo Operators And Drivers Alliance Transport Service Cooperative (PAMAQODA), Partner Jeepney Drivers Associations (ACCIJODAI and UP Ikot), and Clean Air Asia. • Together with the project partners Several round-table discussions were organized with various national and local government agencies, as well as stakeholders from the transport sector. o TAME-BC Kick-Off workshop – August 6-7, 2019 ○ TAME-BC Transdisciplinary Workshop II: Project Implementation Updates, Key Findings, and Way Forward – February 11-12, 2020 ○ TAME-BC ‘Talakayan’ Transport Forum: A Focused Group Discussion with Jeepney

Sectoral Initiatives

PROJECTS FROM THE NON-GOVERNMENTAL ORGANIZATIONS (continuation)

ORGANIZATION	NAME OF PROJECT	PERIOD COVERED	ACTIVITY
	Electric 2&3-Wheelers Pilot Demonstration in Pasig, Philippines		• The United Nations Environment Program (UNEP), PHLPost, TailG, the Pasig Government and Clean Air Asia partnered to promote electric mobility through the use of electric 2&3-wheelers by the Pasig PHLPost in the delivery of parcels and other postal items. During the pandemic, the e-trikes were used to distribute relief/grocery items for the residents. • In support of our implementation of the electric 2&3-wheeler pilot demonstration project in Pasig City, three videos were produced to promote the project and raise awareness about electric mobility: One that provided an overview of the project and why it was needed; one focused on Pasig City and how and why it was adopting electric mobility; and one focused on PHLPost and how it was transitioning its postal fleet and why such a transition was important.
	Technical support to the DENR-EMB on review of emission standards for coal-fired power plants (CFPs)		• In support of the DENR EMB's goal to review the emission standards, continuous technical support through consultations and meetings with former US EPA regulators and other field experts were facilitated, together with support in technical working group (TWG) meetings. • A method on the review and analysis has been proposed. The data collection template has also been co-developed with AQMS. Clean Air Asia also provided EMB a review of related literature on emission standards from other countries, and the compilation and mapping of CFPs in the Philippines. • An exceedance analysis has been performed on existing available emissions data to determine the proportion of facilities exceeding the existing standards. The report has been submitted to AQMS for reference on similar analysis that can be done once more data becomes available. • In May 2019, the "**Consultation Workshop on Best Available Control Technologies for the Policy Review of the Mass Emission Rate Standards (MERS) for**

Sectoral Initiatives

PROJECTS FROM THE NON-GOVERNMENTAL ORGANIZATIONS (continuation)

ORGANIZATION	NAME OF PROJECT	PERIOD COVERED	ACTIVITY
			Plaza, Pasig, which focused on focuses on industries utilizing air pollution source installation, specifically fuel burning equipment and emission sources that are significant in number and size. The event was attended by 58 participants, and was able to discuss best available control technologies (BACT) and mitigation strategies for emissions from industry sources, as well as insights of stakeholders on the planned review process for emission standards.
	Interagency Workshop on the Integrated Air Quality Improvement Framework – National Air Quality Control Action Plan		• In November 2019, the "Interagency Workshop on the Integrated Air Quality Improvement Framework – National Air Quality Control Action Plan" consultation meeting was co-organized with the DENR EMB. It covered discussions on what has been achieved so far by each national agency and other stakeholders, in fulfilling roles identified in the Philippine Clean Air Act. The workshop was instrumental in the review and revision of the NAQCAP, to ensure an efficient and up-to-date air quality management approach. A total of 75 participants attended the workshop, with representatives coming from various government agencies, private companies and organizations, academic institutions, and NGOs.
	Implementation plan: Nationally Determined Contributions (NDC) of the Philippines		• With support from the United Nations Development Programme (UNDP), Clean Air Asia developed the implementation plan for the Philippines' Nationally Determined Contributions (NDC). The activities included a scoping study, series of consultation meetings, gap analysis, capacity building of stakeholders, and the finalization of the draft NDC Implementation Plan.
	ADB Strengthening Knowledge and Actions for Air Quality Improvement		• Technical assistance in the development and implementation of Clean Air Action Plans was provided by the Asian Development Bank, focusing on building the capacities of seven cities in Asia: Erdenet, Mongolia; La Trinidad, Philippines; Faridpur, Bangladesh; Sialkot and Peshawar, Pakistan; and Ho Chi Minh City and Vinh Yen, Vietnam. In October Clean Air Asia co-organized a regional inception

ORGANIZATION	NAME OF PROJECT	PERIOD COVERED	ACTIVITY
			workshop for national and city-level government representatives on Clean Air Action Planning, and facilitated experience and knowledge-sharing on air pollution abatement from key emission source sectors. • Implementation of the project in Philippines focused on La Trinidad, Benguet. Similar to the other focus cities, air quality monitors have been deployed in the city. An emissions inventory, air quality dispersion modelling, and health impact assessment are also project components started in 2020 and are being finalized.
	Regional focal point: BreatheLife Campaign		• Clean Air Asia was designated as the regional focal point of the global BreatheLife Campaign, a Climate and Clean Air Coalition initiative led by the World Health Organization and the United Nations Environment Programme. The focus was on the expansion of the BreatheLife network by engaging partner cities and local governments that are undertaking air quality initiatives. • Throughout 2019 to 2020, we welcomed to the network San Juan City, Manila City, Quezon City, Parañaque City, Pasig City, the Bataan Provincial Government, the Environment Management Bureau - National Capital Region, and the National Capital Region Airshed Governing Board in the Philippines. • Clean Air Asia also supported the development of a roadmap to strengthen air quality communication for Baguio City in the Philippines. • To improve stakeholder engagement, BreatheLife materials were also translated to Filipino for use in local campaigns.
	C40 Quezon City Air Quality Monitoring Network and Management Plan Development Project		• In 2020, Clean Air Asia, the C40 Cities Climate Leadership Group and the Quezon City Government have been partners in the "Quezon City Air Quality Monitoring Network and Management Plan Development Project." The project supports the Quezon City Government in delivering on its Clean Air Cities Declaration commitments by producing a roadmap for the development of an air quality monitoring

ORGANIZATION	NAME OF PROJECT	PERIOD COVERED	ACTIVITY
			network, building the city's monitoring and evaluation capacity, and providing guidance in the development of the city's Air Quality Management Plan. • Clean Air Asia also embarked on the project "Quezon City Baseline Air Quality Study" to build the city's capacity in establishing and sustaining its own air quality monitoring network and laying the foundation for air quality management planning.
	Pathways to Clean Air and Clean Energy Project in Bataan		• In line with the use of science-based revision of emission standards at the national level, a pilot study was started in the Bataan Province in 2019 to understand the impact of coal-fired power plants to air quality and health of the residents. • In partnership with the Bataan Provincial Government Environment and Natural Resources Office (PGENRO), the DENR EMB Region III, and the municipal government of Limay, an emissions inventory, air quality dispersion modelling, and health benefits mapping was performed for Limay.
	Santa Rosa Emissions Inventory and Clean Air and Climate Action Plan		• In Santa Rosa, an emissions inventory was developed in 2019, in partnership with the University of the Philippines National Center for Transportation Studies, in close collaboration with the Santa Rosa City Environment and Natural Resources Office (CENRO). Funding support has been provided by the Santa Rosa CENRO and Mitsubishi Motors Philippines, while the Polytechnic University of the Philippines helped in the data collection process. • Clean Air Asia also developed the city's Clean Air and Climate Action Plan focused on the identification of priority measures to reduce air pollutants, greenhouse gases, and short-lived climate pollutants, and demonstrate the co-benefits of mitigation measures.
	Integrating SLCP Reductions into Policies and Practices in Cities in Asia		• The project completed its aim of building local government capacity to integrate short-lived climate pollutants (SLCPs) into existing policies and plans with the goal of harnessing cobenefits to control air quality and climate change in Asian cities. This included the completion of an assessment

ORGANIZATION	NAME OF PROJECT	PERIOD COVERED	ACTIVITY
			of cities' capacity building needs to mainstream clean air and climate action in local policy and planning processes, with emphasis on realizing co-benefits of measures. The activities also comprised of the delivery of training to focus cities, in this case Santa Rosa City in the Philippines, on the fundamental concepts and applications of integrated planning. • In October 2019, a regional workshop was organized on the co-benefits approach in air and climate action planning for nine cities from the National Capital Region. This determined levels of awareness about co-benefits and the cities' short-lived climate pollutants (SLCPs), current practices in the integration of air pollution and climate change policies and plans, and their capacity building needs.
	Emissions Inventory Training with the UP National Center for Transportation Studies (NCTS)		• In partnership with the University of the Philippines National Center for Transportation Studies, the "Emission Inventory for Smaller Cities" training was held from November 25-29, 2019. • The 5-day course covered the following: Emission Inventory as a Foundation of Air Quality • Management; How to Identify Air Pollution Emission Sources: Point, Line (mobile), Area Sources; • Emissions Inventory of Point, Area, and Mobile Sources, Emissions Inventory of Area Sources, Emissions Inventory of Mobile Sources, QA/QC, Emissions Inventory Work Plan; and the Presentation of EI Work Plan.
	"Hangarin para sa Hangin: Malinis at Ligtas, Para Sa'yo at sa Ating Lahat"		• In Metro Manila, we continued to bolster the capacity of local communities to address air pollution in the second of a series of workshops aimed at raising public awareness, promoting behavioral change, and paving the way for long-term solutions that result in cleaner air. The "Hangarin para sa Hangin: Malinis at Ligtas, Para Sa'yo at sa Ating Lahat" (Our Dream: Clean and Safe Air for You and Everyone) workshop in Parañaque City in March is part of our Environmental Experiential Learning Program, which seeks to improve climate and air quality literacy in communities, and

ORGANIZATION	NAME OF PROJECT	PERIOD COVERED	ACTIVITY
			motivate and empower local stakeholders in launching their own air quality management initiatives. • More than 90 representatives from the community and local government agencies took part in the activity, which resulted in pledges being made on sustainable actions to reduce emissions. The success of the workshop was demonstrated in a series of monitoring and evaluation activities that highlighted the lifestyle changes that had been undertaken as part of their sustainability pledges.
	IBAQ City Solutions Toolkit		• Clean Air Asia launched the IBAQ Programme's City Solutions Toolkit, comprised of modules on key components of air quality management. The toolkit supports the implementation of our Guidance Framework for Better Air Quality in Asian Cities' roadmaps, and provides step-by-step guidance for cities on the formulation of Clean Air Action Plans, including how to identify actionable air pollution solutions and estimating their contribution to air pollution, climate change, and improved health. • The toolkit It creates an integrated platform for air quality in the region, with a focus on the fundamental components of air quality management, including air quality monitoring, emissions inventory and modeling, health impacts assessment, air quality communication, clean air action planning, air quality governance, and co-benefits, and will be further expanded to include topics on financing, technology transfer, and integrated air quality and climate action planning. • The City Solutions Toolkit can be accessed here: https://learning-cleanairasia.org/citysolutions-toolkit/
	Lectures and talks in DENR EMB workshops and trainings		• Delivered a lecture on the "**Health and Economic Benefits of Air Quality Improvement – Overview of the BenMAP analysis and Case Studies in Asia**" in April 2019 as part of the DENR EMB DENR Training for Pollution Control Officers. • Delivered a talk in the DENR National Air Quality Training Workshop for Policy Formulation in August 2019 on the "**Manila Aerosol Characterization Experiment (MACE 2015) Emission Factor for Black Carbon from Motor Vehicles in Taft, Manila**."

Sectoral Initiatives

PROJECTS FROM THE NON-GOVERNMENTAL ORGANIZATIONS (continuation)

ORGANIZATION	NAME OF PROJECT	PERIOD COVERED	ACTIVITY
Rotary Club of Makati	Air Quality Monitoring & Reporting System Project (RCM-AQMS Project)	2016-present Ayala Ave., Makati City UST, Manila City EDSA Muñoz, Quezon City	Installation and operation of PM10 and PM2.5 analyzers (near-equivalent method as per US EPA CFR Part 58 Appendix E) with meteorological sensors for continuous monitoring of air pollution
UNIDO	Development of the HPAP Technical Assistance in the development of the Implementing Guidelines for EO 51 (IACEH)	2017-2019	Technical assistance in the drafting and Consultations for the development of HPAP for the Philippines
Philippine Clean Air	11th Annual Clean Air Forum & PCA Gen. Assembly 2019	July 30-31, 2019	Mobility for Clean Air and Health Impacts of Short-Lived Climate Pollutant
	12th Annual Clean Air Forum Webinar & PCA Gen Assembly 2020	July 10, 2020	Online (Zoom) Forum: "Updates of Air quality Management in this Pandemic Time"
	2021 Clean Air Virtual Forum & PCA Gen. Assembly	November 26, 2021	Engendering Air Quality Management and Sustainable Clean Air Initiatives in the New Normal
	Commissioning of the Designation of Attainment and Non-Attainment Areas in NCR	December 2020	
	Commissioning of the Source Apportionment Study in Selected Areas in Metro Manila	February 2021	

Sectoral Initiatives

PROJECTS FROM THE NON-GOVERNMENTAL ORGANIZATIONS (continuation)

	NAME OF PROJECT	PERIOD COVERED	ACTIVITY
	Consultancy Services in the Conduct of Source Apportionment Studies for DENR EMB-CAR Air Quality Monitoring Stations	October 2021	
	Consultancy Services for the Study on Air Particulate Matter Filters for Black Carbon (BC)	October 2021	
	A Transdisciplinary Approach to Mitigate Emissions of Black Carbon in Metro Manila, Philippines (TAME BC)	January 2020	
	Consultancy Services in the Conduct of Air Dispersion Modelling for NCR Airshed Governing Board		
	Commissioning of Scientific Advisory/Technical Assistance for Emission Inventory of Cities of Makati, Pasay and Mandaluyong		

WAYFORWARD


Thermo

Plans of Including Black Carbon or SLCPs in the Future Monitoring Activities

As part of the Climate Change Activities, Region 8 has already planned the inclusion of SLCPs in its monitoring activities. Meanwhile, Region 10 has already conducted an open-path station capable of measuring ozone (O_3) and HFC monitoring through refrigerants used in air-conditioning of mobile vehicles and service shops.

The other regions were open to including the Black Carbon and SLCPs (such as HFCs, Ozone, and Methane) in the future monitoring. However, this would only be possible if there is an availability of personnel who have enough knowledge of the process, equipment, and funds that the EMB Central can grant.

Plans of Including Other Parameters In Ambient Air Monitoring (HAZAP, BTX, Ozone, PAHs.)

Regions 1, 5, 6, and 13 have already monitored the Ozone and BTX. The machine that Region 5 was using is Differential Optical Absorption Spectroscopy (DOAS). HAZAP and PAHs are not yet included in the parameters being monitored.

Region 4a continuous to Monitoring of Hydrogen Sulfide, which is considered HAZAP were also considered in the monitoring of Geothermal Plants and the monitoring of Hydrogen Sulfide for the designation of attainment and non-attainment area in MakBan Geothermal Airshed.

Region 6 has also managed to measure the parameters; however, the installed open-path station was severely damaged during typhoon Frank in CY 2008 and was considered unserviceable during an audit from central office personnel.

According to Region 10, the procurement of the air sampling equipment will be proposed through the Air Quality Management Fund (AQMF), subject to approval by the EMB Central Office.

Region 13 mentioned developing the DENR standards for STX parameters and procuring manual samplers for measuring the same. The EMS can then monitor emissions from gasoline stations' dispensing pumps and other potential VOC sources.

Overall, all the other regional offices would like to implement the measurement of the parameters. However, they encountered problems regarding the availability of the equipment, budget, and personnel.

Plans On Source Apportionment Studies

As part of conducting source apportionment in the future, Region 1 preserves the sample filters for further analyses by EMB Central Office. Meanwhile, Region 10 mentioned that source apportionment study is considered an essential aspect in the attainment/nonattainment designation in future budget proposals. Region 2, despite its active submission of filter paper for source apportionment, noted that it still must fully develop data on other areas. Lastly, for region 5, the emission inventory is conducted every year for a specific Local Government Unit and updated every three (3) years for the Bicol Region.

The only regions conducting source apportionment as of 2020 were Regions 3 and 9 through the help of the Central EMB and the academe through the University of the Philippines – Diliman as their third-party service provider.

Regions 4a, 4b, 6, and 13 showed some interest in the source apportionment studies for the remaining regions. It is needed to assess and identify the prevailing air pollution sources monitored by the AQM stations. It can also assist airshed governing bodies in crafting resolutions and policies more precisely.

DENR also plans to allocate funds for this project in the next year to prioritize and expedite the implementation of the Source Apportionment studies for all of the regions.

Actions In Managing the Open Burning of Wastes

All the regions have responded that they have been enacting the ordinances and related policies of the LGUs to prohibit open burning activities. The violators will receive penalties as mandated under RA 9003 and RA 8749. DENR also implemented the continuous monitoring of the Airshed GB through LGUs (MENROs and CENROs).

The field-based Environmental Monitoring Officers (EnMOs) have been tasked to regularly monitor relevant activities in the municipalities all over the region. Local Government Units have also enacted local ordinances that prohibit open burning within their jurisdictions. Furthermore, these officers would conduct regular monitoring and ocular inspection in various cities and municipalities and the EMB's Environmental Monitoring Officers (ENMOs) to report open dumping and open burning of garbage in the LGU's jurisdiction.

DENR also conducts continuous dissemination of information regarding the effects and impacts of open burning of waste, and during meetings with the stakeholders and LGU, the strict monitoring and reminders regarding the prohibition of open burning of waste and steps to take to lessen the occurrence of such illegal practices were always brought up during meetings.

In Region 10, only a few LGUs regulate this kind of activity; the three 0'clock habits of burning yard waste to drive away mosquitoes are still being brought up as an acceptable practice. The issue of open burning has also been included as a key result area in implementing their respective 5-year Air Quality Management Action Plan with EIC components for public information.

Ongoing Projects of DENR-EMB AQMS

For the upcoming years, DENR-EMB has been aiming in producing publications and studies in order to know more about the current status of the air quality in the Philippines. Furthermore, EMB also aims to enhance its system of operations to make the data more accessible and ready for the public to use and also to deliver towards the databases.

Two of the projects which were currently under progress by the DENR-EMB that would greatly benefit the general public is the study of the **Public Utility Jeepney Modernization** in partnership with the De La Salle University (DLSU) wherein it would focus on the topic of the **Health Impact and Benefit Assessment**.

Additionally the **Emission Charge System** also known as the Environmental User Fee System / Market-Based Mechanism thru Incentive / Trading Mechanism would be reflected in the NAQSR 2021.


OEXIAR
AZPI CITY • DARAGA

Significant Contribution of the Airshed Governing Board

(STATUS OF DESIGNATION OF ATTAINMENT/NON-ATTAINMENT 2021-2022)

REGION	RESPONSES
CAR	• Implementation of Green Buffer Zone among respective offices • Implementation of Carless day (Before Pandemic) • Creation of the BLISIT Airshed Anti Smoke Belching Taskforce (every quarter monitoring between the BLISIT Area).
NCR	The region is on pre-designation activities for attainment and non-attainment area, the commissioning of technical services for Attainment and non-attainment areas is scheduled on 2021
R1	Increase in awareness and continuous implementation of Air Quality Programs to maintain the excellent air quality status of the Airshed
R2	• Regular PIESTTA (Pefiablanca, Iguig, Enrile, Solana, Tuao, Tuguegarao, and Amulung) Airshed Governing Board meeting is conducted. This is because being mandated by law to be the essential body to monitor and regulate the implementation of the provisions of R.A. 8749. And under such a provision of law, the board is empowered to regulate the emissions of all possible sources of air pollution. • Resolution No. 05 Series Of 2020: A Resolution Urging the Environmental Management Bureau to Allocate Funds for The Procurement of Air Quality Monitoring Equipment to Be Installed in Municipalities Covered by The Piestta Airshed. • Resolution No. 04 Series Of 2020: A Resolution Recommending the Conduct of Air Dispersion Modeling of Tuguegarao City as Basis for Designation of Attainment or Nonattainment Areas. • Resolution No. 05 Series Of 2019: A Resolution Urging All Local Government Units Within Piestta Airshed to Pass an Ordinance to Prohibit Ne Plying of Improvised Motor-Propelled Cart (Kuugug) On Al I Major Thoroughfares Within The Piestta Airshed. • Resolution No. 04 Series Of 2019: A Resolution Authorizing the Airshed Governing Board, Technical Working Groups, and Anti-Smoke Belching Task Force of Tuguegarao City to Undergo A Training On Emission Standards And Regulations

Significant Contribution of the Airshed Governing Board

(STATUS OF DESIGNATION OF ATTAINMENT/NON-ATTAINMENT 2021-2022)

REGION	RESPONSES
R3	• BPB Airshed will be given more attention starting in 2022. Review and reassignment of the ASGB, Execom, and TWG will be done. The involvement of the ASGB members will be incorporated into its planning and future direction. • For 2022, a review of the Clark station as a potential candidate for SO2 attainment will be done.
R4A	Implementation of Airshed Action Plan, especially in their respective city/municipality.
R4B	• The BCN Airshed Governing Board dedicated its time, efforts, and resources to implementing activities specified in its formulated action plan. They treated crafted resolutions as the backbone of their campaign towards preventing any source of air pollution within its area of jurisdiction. • The governing board also aimed at capacitating its stakeholders on air quality management through environmental forums on air monitoring and permitting protocols. Most of the participants are owners / official representatives of fuel refilling stations and rice mills. • The Technical Education Skills and Development Authority (TESDA) had the important role of capacitating the BCN Airshed Anti-Smoke Belching Unit (ASBU) in monitoring vehicles that are not compliant with the DENR's emission standards.
R5	The Airshed Governing Board members collect and provide data to prepare emission inventory and air dispersion modeling of air quality within the established airsheds.
R6	Formulation of Board resolution creating the Emission Inventory Team that will be responsible for the data gathering within Metro Iloilo Airshed to be used in Dispersion modeling and carrying capacity study
R7	Currently, EMB 7 is in the process of collecting and interpreting data. Air dispersion modeling also hampers the activity since the previous procurement of the software did not pursue due to time constraints during the procurement process.
R8	• Data collection from Dispersion Modelling Project and Emission Inventory by Tacloban Airshed GB. • Information dissemination by Tacloban Airshed GB.

Significant Contribution of the Airshed Governing Board

(STATUS OF DESIGNATION OF ATTAINMENT/NON-ATTAINMENT 2021-2022)

REGION	RESPONSES
R9	• During its quarterly meetings, the Zamboanga City Airshed Governing Board (ZCAGB) members fully support designating the attainment/nonattainment area. • More studies will be conducted, including the data captured and air dispersion modeling, to develop an analysis and data for the designation.
R10	• The airshed governing board is open and supportive of the designation of attainment area. They are well informed on the ambient air monitoring that our Office is conducting, where results are primarily within the guideline value. • Currently, the airshed board is yet to undertake the needed air dispersion modeling, carrying capacity, and source apportionment studies to support the desired attainment designation with science-based data.
R11	• The Airshed GB formulate resolutions and reviews the proposal for the designation as the attainment of Davao City for pm10 during GB Meeting and reviews other required submissions of the designation activities. GB also formulates an action plan to help establish Davao City as an attainment area.
R12	• The Airshed Governing Board and its programs were significantly affected by the pandemic events. Still, they sincerely pushed through its programs to address issues and concerns regarding implementing activities and alike concerns. • Both South Cotabato and North Cotabato Airshed.
R13	• Board resolution in recommending LGUs to create an Anti-Smoke belching. • LGUs data on area source (open burning) to be used in the emission inventory for dispersion modeling. • Airshed GB has fully supported the designation of attainment/non-attainment area by crafting a resolution recommending LGUs purchase air quality monitoring equipment to expand the air quality monitoring network within the airshed.

Detailed Airshed Management

FOR THE OVERALL AIR QUALITY IN THE REGIONS

REGION	RESPONSES
CAR	Thru the GB, accomplishments of BLISTT LGUs were thoroughly discussed, and efforts such as the ordinance on Clean Air were already issued by the two LGUs, Baguio and La Trinidad. In contrast, others are still an ongoing process. Baguio has successfully implemented its smoke-belching apprehension. Four LGUs were already given Opacimeters and, currently coordinating with DOTR, created an interagency Task Force to apprehend smoke-belching areas.
NCR	• Implementation of Airshed Management Programs per LGU (within their respective cities/municipality) based on the NCR Airshed GB Action Plan. • All LGUs in the NCR as members of the ASGB conduct Anti – Smoke Belching operations. • Meetings for updates of LGUs and other stakeholders were held. Conduct of Emission Inventory and Air Dispersion Modeling will be the next steps to complete the activities on the designation of attainment and non-attainment areas. • All other projects are enumerated in detail are cited in the Best Practices for Stationary and Mobile Source Management.
R1	• Regular presentations of Air Quality Monitoring Data and Policy updates on Air Quality Management during the Airshed Governing Board Meetings, the concerned Provincial Government, and Local Government Units. • Local Ordinances and related policies that ultimately address the possible sources of Air Pollution (Mobile and Nonpoint Sources) are well regulated.
R2	• Conducting Air Dispersion Modelling to measure the impact of airshed management. • The stakeholders will implement and develop ordinances and activities (not limited to tree planting and waste management).
R3	• It is expected that upon the restructuring of the airshed governing board, the region may implement more actions on clean air through the LGUs and other stakeholders.
R4A	• Since this is our first year of implementing the 5-year action plan for the MakBan Airshed, we are still capacitating the airshed GB regarding airshed management. • Implementation of Airshed Action Plan, especially in their respective city/municipality.

Detailed Airshed Management

FOR THE OVERALL AIR QUALITY IN THE REGIONS (continuation)

REGION	RESPONSES
R4B	• The creation of airshed management in the MIMAROPA Region enabled the pooling of knowledge, resources, and capacities to improve the overall air quality within its jurisdiction. The BCN Airshed created a platform for various agencies, LGUs, CSOs, and the private sector to formulate air quality policies, action plans, coordination of functions, and implementation of relevant activities in accordance with RA 8749. • Initiatives on air quality management have been introduced to the airshed governing board, paving the way for the LGUs and other members to adapt such initiatives in their administrations. Available technologies have also been presented during multi-stakeholder meetings, which helped participants broaden their horizons on the possible efforts and platforms toward effective air quality management. • Since the formulation of BCN Airshed in 2006 through the DENR Administrative Order (DAO) 2006-02, its governing board has come a long way to help prevent air pollution. With all the available data from EMB MIMAROPA Region's efforts to monitor air quality in the area, it can be said that the airshed helped a lot in maintaining healthy air quality in the municipalities of Baco, Calapan City, and Naujan.
R5	• The Information, Education, and Communication (IEC) Campaign have improved the public's awareness in helping maintain the good quality of air in the Region. The activities and programs under the airshed management help monitor the air quality in the Region through the formulation and implementation of resolutions. • The Airshed GB members help in providing data needed for the preparation of emission inventory and air dispersion modeling of air quality within the established airsheds
R6	Based on Ambient Air Quality Monitoring Results, ambient air quality within Metro Iloilo Airshed is within GOOD to FAIR based on its AQI for TSP and PM_{10} parameter for CY 2019. Numerous programs and Information Education Campaigns (IEC) by the Metro Iloilo Airshed have a significant impact on the improvement of air quality such as. • Approved board resolutions adopted by member LGUs for management of area sources and other related aspects within their jurisdiction (e.g., No Open-Burning Ordinance and regulation on dust emissions from area sources, specifically for roads and building construction activities) • Strict monitoring of Mobile Emissions monitored through the Metro Iloilo Airshed Anti-Smoke Belching Unit and PETC monitoring. • Conduct roadside inspection and garage testing with IEC. • Information Education Campaigns like Bisita Barangay, Capacity Building, Tree planting activities, and other related activities

REGION	RESPONSES
R7	As of now, Metro Cebu Airshed focuses on designation activities for the attainment and non-attainment areas
R8	The impact of Airshed management could still not be felt on the overall Air Quality since the operation of the Airshed is still pre-designation.
R9	Airshed management will be the EMB's partner in managing the air quality. It will be focused on the airshed alone, and it will be easier to implement programs to lower air pollution.
R10	The engagement of the various stakeholders and the local government units in airshed management has raised their consciousness of the importance of air quality management and its impact on people's health and economy. The LGU-members of the airshed board has approved their respective 5-year Air Quality Management Action Plan, which details the various activities that the LGUs have to undertake to maintain the air quality in their respective jurisdiction. The action plan covered issues from stationary, mobile, and areas sources of air pollution. The airshed governing board raised issues on air quality management; for instance, an exceedance in PM2.5 concentration was observed in one of the air quality monitoring stations in the airshed caused by open burning near the monitoring station. The LGU concerned was informed of the said exceedance and conducted monitoring and apprehension immediately. Mobile sources of air pollution were also addressed by enacting the local ordinance on strict anti-smoke bleching and its implementation through roadside apprehension and emission testing. In support of the LGUs, the EMB Regional Office lent opacimeters to LGUs with the approved ordinance on anti-smoke belching to engage them in implementing their ordinance and discourage irresponsible smoke belchers.
R11	Airshed Management resulted in "good to fair" air quality of Davao City Airshed. The programs, action plans, and resolutions developed greatly helped in the reservation of the air quality in the city. The airshed management will continually be operationalized for a sustainable and healthy environment for the entire area.
R12	The engagement of the various stakeholders and the local government units in airshed management has raised their consciousness of the importance of air quality management and its impact on people's health and economy. The LGU-members of the airshed board has approved their respective 5-year Air Quality Management Action Plan, which details the various activities that the LGUs have to undertake to maintain the air quality in their respective jurisdiction. The action plan covered issues from stationary, mobile, and areas sources of air pollution. Through the airshed governing board, issues on air quality management were raised. For instance, an exceedance in PM2.5 concentration was observed in one of the air quality monitoring stations in the airshed caused by open burning near the monitoring station. The LGU concerned was informed of the said exceedance and conducted monitoring and apprehension immediately. Mobile sources of air pollution were also addressed by enacting the local ordinance on strict anti-smoke belching and its implementation through roadside apprehension and emission testing. In support of the LGUs, the EMB Regional Office lent opacimeters to LGUs with the approved ordinance on anti-smoke belching to engage them in implementing their ordinance and discourage irresponsible smoke belchers.
R13	• Through board resolutions and regular monitoring, air quality within the airsheds within GOOD to a FAIR category for PM_{10}. • Mobile vehicles are strictly monitored through the Anti-Smoke Belching Unit and PETC monitoring. • Stationary sources are monitored by monitoring EMB personnel in the actual conduct and observation of stack sampling.

Response to Transportation Emissions

BUS RAPID TRANSIT, TRANSPORT OPTIONS DURING PANDEMIC

REGION	RESPONSES
CAR	• Resolution for the closure of Session Road during Sundays. • Green Buffer Zones, especially in traffic-congested areas.
NCR	During the pandemic, ambient air concentration dropped by almost 50% due to the minimal means of transportation operating.
R1	EMB Region 1 continuously conducts the Anti-Smoke Belching Campaign/ Roadside Inspection and Monitoring in collaboration with LGUs and LTO.
R2	• Due to the pandemic, almost 70% of mobile sources gradually stopped operation on roads, especially public vehicles such as tricycles, during Enhance Community Quarantine. Nevertheless, with the Modified General Community Quarantine (MGCQ) scheme, there is a slight increase in the operation of mobile vehicles, which can increase the concentrations of air pollutants as expected. • The increased frequency of conducting ASBU in collaboration with LTO and LGU will substantially impact the control of emitting air pollutants brought about by mobile sources.
R3	The Regional Office provided a service vehicle for "carpooling in transportation." Several pick-ups and drop-off points were identified for employees.
R4A	The monitoring of Private Emission Testing Centers was conducted by the Provincial Offices of EMB 4A using the prescribed format of AQMS CO.
R4B	The pandemic reduced the total volume of transportation activities due to the limitations/restrictions imposed by the national government. It somehow paved the way for reducing emissions from mobile sources during the strict lockdowns.
R5	The EMB V has conducted an Anti-Smoke Belching Operation Roadside Apprehension during the National Clean Air Month celebration. The EMB V has conducted an Anti-Smoke Belching Operation Roadside Apprehension during the National Clean Air Month celebration. No tickets and penalties were issued. Instead, the activity was conducted to raise awareness that, even during these times, it is crucial to maintain the good quality of air through a proper engine and vehicle upkeep

Response to Transportation Emissions

BUS RAPID TRANSIT, TRANSPORT OPTIONS DURING PANDEMIC (continuation)

REGION	RESPONSES
R6	• Limited public utility vehicles could operate during the quarantine period. • Comparing the average concentration recorded for manual and automatic stations, there is a significant decrease in TSP and PM_{10} concentration for both Manual and Automatic Stations after the implementation of the enhanced community quarantine in the Region
R7	Amid the pandemic, EMB 7 continued to monitor ambient air quality in the region to determine the impact of limited movement and operations of industries, transportation, and other activities that may create environmental issues. Based on the gathered data, it was observed that there was a significant decrease in Particulate Matter in the air. When restrictions were lightly lifted from ECQ to MECQ, industries and other agencies could provide carpools for their employees.
R8	Due to the pandemic, the local transport & travel within the Region significantly decreased, and some even halted because of a series of city/municipal lockdowns and stringent travel restrictions. With these, there is a significant decrease in transportation/mobile emissions.
R9	One of the joint coordination with the Zamboanga City Airshed Governing Board (ZCAGB) members and other agencies is continuous support, especially the roadside emission testing in enforcing the Anti-smoke Belching Operations together with the Local Government Unit (LGU).
R10	• Ambient air quality monitoring was temporarily affected at the pandemic onset, especially in manual air sampling after strict travel restrictions across LGU borders. A few weeks after the suspension, air sampling activities were reinstated, and the health protocols were strictly observed during travels. • The air sampling concentration for particulate monitoring showed a considerable reduction compared to the previous year's data before the pandemic. The implementation of community quarantine reduced the mobility of the populace, including the operation of businesses, manufacturing, and industrial facilities. It also suspended the operation of the public transport system. It imposed strict requirements for nonessential travels, resulting in reduced traffic volume on major thoroughfares, which helped curb the particulate pollution, resulting in improved air quality. • In terms of Industrial Monitoring, most firms have decreased their operation due to unavailability/delayed delivery of raw materials. Others have requested to move the conduct of Source-Specific Test (SST) and other Quality Assurance/Control Tests due to strict quarantine protocols.

Response to Transportation Emissions

BUS RAPID TRANSIT, TRANSPORT OPTIONS DURING PANDEMIC (continua-

REGION	RESPONSES
R11	Transportation sectors are one of the factors in the region's air quality; during the pandemic, it was observed that the air quality improved as vehicles on the major roads were lessened at the time of community lockdown. Regular monitoring of air quality and PETC and ASBU Operation ensures a healthy vehicle running around the Airshed.
R12	• To have continuous monitoring regarding transportation emissions during the pandemic, the EMB XII inspected the different Private Emission Testing Centers (PETCs) in the region in coordination with other line agencies such as DTI and DOTr (LTO). • Quarterly submission of lists of vehicles tested from PETCs was also implemented for compliance.
R13	Public transportation was suspended, and vehicle counting was performed to develop an emission inventory comparison of pre-and during- the Covid-19 pandemic.

JEEPNEY MODERNIZATION

IDENTIFICATION OF TRANSPORTATION MODE AND ROUTE RATIONALIZATION

REGION	RESPONSES
CAR	• In coordination with the recently signed JAO between DENR and DOTr, the Office is awaiting further instruction for the implementation and actions.
NCR	• Jeepneys are one of the most popular means of transportation in NCR, in line with this, most LGUs such as Pasig, Manila, Muntinlupa, Valenzuela, and Mandaluyong had been using e-vehicles in their cities.
R1	• Airshed-covered LGUs were informed of the benefits of air quality of the traffic rerouting schemes and the creation of by-pass roads by the DPWH.
R2	• Modernization in jeepneys in region 02 is not yet started as its primary use is long-distance transportation. • Compared to HUBs, where jeepneys are the usual means of transportation, tricycles are used as the transportation mode used in the Region.
R3	• For jeepney modernization, there are a few routes within Region three that are using modernized jeepneys. Among these are the green fleet of e-jeepneys with routes to and from the Regional Government Center to the City of San Fernando Downtown and SM Pampanga.
R4A	• None as of the moment.
R4B	• The EMB MIMAROPA Region supports the Department of Transportation's campaign to modernize public utility vehicles for a more efficient and eco-friendly public transportation system. A gradual phase-out of old model jeepneys should also be pushed towards reducing air pollution sources.
R5	• The Regional Office of the Land Transportation Franchising and Regulatory Board (LTFRB) — Region V has already introduced the new modernized PUV jeepneys to the Bicolanos last July 11, 2019, at the Peñaranda Park, Legazpi City. It is still in the process of implementation. • Based on the emission inventories conducted by EMB Region V, it was found that almost 75% of emissions come from mobile sources, and once the Jeepney Modernization's implementation is completed, these emissions will gradually decrease
R6	• Iloilo City has responded to the jeepney modernization program. • The City Loop Integrated Alliance of Jeepney Owners and Drivers' Association (CLIAJODA) and Iloilo City Alliance Operators and Drivers Transport Cooperative (ICAODTC) initially deployed four units to ply the route from the Iloilo Terminal and General Services, Inc. (ITGSI) terminal in Barangay Ungka, Jaro district going to the City Proper via Jaro CPU (Central Philippine University) and vice versa; two units from Arevalo district to City Proper and vice versa; and one unit for the route from the ITGSI terminal to the City Proper via Diversion Road and vice versa.

JEEPNEY MODERNIZATION

IDENTIFICATION OF TRANSPORTATION MODE AND ROUTE RATIONALIZATION

REGION	RESPONSES
R7	• Public transport was also shifted to new buses and minibusses instead of old jeepneys that contribute to black emission
R8	• The deployment of solar-powered jeepneys and tricycles is still ongoing. • The Regional Office also installed video clips shown on the onboard television of the e-jeepneys. The e-jeepneys cover the route to the northern barangays of Tacloban City, wherein development is focused.
R9	• The Office conducts mobile source emission inventory that will be the source of data on the future studies for the said modernization of jeepneys.
R10	• Being a highly urbanized city, the City Government of Cagayan de Oro City submitted their Local Public Transport Route Plan (LPTRP) to the Land Franchising and Regulatory Board (LTFRB) for evaluation. This is part of the city's commitment to supporting the PUV Modernization Program of the national government. The adoption of the LPTRP had a positive impact on emerging transport cooperatives to invest in modern transportation and gradually replace the old and pollutive jeepneys that still dominate the public thoroughfares. • A limited number of modern jeepney (minibus) fleets were given franchises to operate in designated road networks in Cagayan de Oro City. The modern jeepneys are said to be Euro 4 compliant and fuel-efficient. With the continuing public acceptance and positive feedback, it is expected that more of these modern jeeps will be seen on the road.
R11	• Buses were started to travel in the routes covered by the Jeepneys routes to address the lack of public transportation (Catalunan Grande, Toril) as part of the PUJ/PUV Modernization Programs preparation.
R12	• In effect of the Jeepney modernization, electric jeeps and city buses can now be observed in Koronadal City and General Santos City, replacing old jeepney cars for public transport. • Identifying and application of routing schemes for public transport to prevent traffic and congestion along roads; farm to market roads, traffic lights, and traffic management officers
R13	• Butuan City has responded to the jeepney modernization since 2019. There are three-(3) cooperatives operating modernized jeepneys in compliance with PRRD's directive to jeepney modernization program.

Action Plan to Strengthen Land-Use Planning to Address Air Pollution

Region	Location	Action to strengthen Land Use Planning	Status of Implementation
CAR		• Establishment of Green Buffer Zones in traffic-congested areas • Establishment of Forest Pockets	For Updating
R3		• This will be incorporated into the future action plans of the LGU.	For Updating
R4A	San Pedro, Laguna	• Development projects determined to have or may potentially have adverse effects on the air quality must observe relevant provisions, regulations, and mitigating measures stated in Republic Act 8749: The Clean Air Act. • As of 2021, the ordinance on smoking-belching prohibition is underway, and its public hearing was already conducted. Once passed and enacted, an Anti-Smoke Belching Unit (ASBU) will be created to apprehend vehicle owners found to emit smoke. • All motorized vehicles must be governed by existing exhaust emission guidelines of the LTO and other related agencies. • The concerned agencies of the DOH will regularly conduct air quality tests in coordination with the Local Health Office, the DENR, and DA to determine purity and safety. Test results must be disseminated to the concerned and respected agencies to address and respond to any potential problems.	For Updating
	Biñan, Laguna	The city of Biñan maintains urban parks and lines walkways with trees and plants to keep the good air quality of the city. Establishing a new Urban Forest Park within the city is highly considered.	For Updating
	Quezon Province	The Provincial Land Use Committee (PLUC), where the PG-ENRO-Quezon is one of the members, thoroughly reviews the draft CLUP of the cities and municipalities. Moreover, technical assistance is provided to the LGUs.	For Updating
		Eight (8) municipalities namely Dolores, General Nakar, Jomalig, Macalelon, Patnanungan, Pitogo, Quezon and San Francisco are on the process of formulation/updating of their CLUP.	
R4B		• Carefully crafted land-use plans could help beat air pollution. The EMB MIMAROPA Region could introduce air pollution control strategies to local government units, which can be incorporated into land-use planning. Responsible land use can potentially reduce air pollution in an area and introduce sustainable approaches toward a better quality of life for the people.	For Updating
	LGU of Baco	• Ordinance No. 04-2017 An ordinance enacting the Baco Environmental Management Code Section 67: Zoning Clearance and Building Permits	2017-2022 Comprehensive Development Plan of the Municipality of Baco Environmental Management Program
	LGU of Calapan City	• City Ordinance No. 132004 Prohibiting Smoking in Specified Places	OMNHS Mangrove Eco Park Tree Planting and Parenting Activities Penalty for every offense
	LGU of Naujan	• Municipal Ordinance No. 68 series of 2014 An Ordinance Mandating the Planting of Trees as a Requirement for the Issuance of Marriage License	Tree Planting Activity did every Monday
R5		Local Government Units are continuously monitoring the ongoing development in their area of jurisdiction to help mitigate the adverse impact of fugitive dust. The LGUs are mandating continuous air quality monitoring and prohibition of backyard waste burning within their community. Some LGUs also establish urban green space development areas and promote community-based waste reduction, recycling, and reuse. Further, LGUs undertake forest restoration and upland stabilization measures on degraded and open lands.	For Updating

Action Plan to Strengthen Land-Use Planning to Address Air Pollution

Region	Location	Action to strengthen Land Use Planning	Status of Implementation
	Legazpi City [29] *	• Planning and Infrastructure policies address how the city will integrate land use and infrastructure planning to support economic development. • Maintain and update integrated land use and transportation plans to guide the future of the city's major agricultural and commercial areas and help them respond to change. • Continue to identify, construct, and maintain climate-resilient infrastructure systems and facilities required to promote and sustain a positive economic climate. • Anticipate needs and coordinate city infrastructure investments with economic development opportunities. • Maintain and improve communications, electric utility, and other infrastructure needed to support the city's economic needs and growth. • Facilitate private sector efforts to implement state-of-the-art technology in agriculture and commerce, including communication technology, throughout the community. • Walkable distances must be observed, e.g., the longest distance a person needs to walk to reach a collector road (which logically is a public transport route) should ideally be 250 meters. • The road right-of-way should follow DPWH standards.	For Updating
	Naga City	• City Ordinance No. 99-084: The "Anti Smoke Belching Ordinance"	Aggressive and regular efforts to monitor emissions of all public and private vehicles are conducted monthly
		• City Ordinance No. 2021-010: Land Filling Regulation Ordinance	Monitoring of ongoing development in the city to mitigate the adverse impact of fugitive dust

Indicated policies were part of the Greenhouse Gas (GHG) Management Plan. Since the action plan is still not available as of January 6, 2021.

Action Plan to Strengthen Land-Use Planning to Address Air Pollution

REGION	LOCATION	ACTION TO STRENGTHEN LAND-USE PLANNING	STATUS OF IMPLEMENTATION
R6	Iloilo City	• Resolution Ordinance No. 2013-348 An Ordinance Amending Regulation Ordinance, 2006-150, Otherwise Known as an Ordinance Providing for a Comprehensive Anti-Smoking Campaign in the City of Iloilo City and Other Purpose	On-going
		• 2020-2025 Iloilo City Comprehensive Development Plan	On-going
		• Iloilo City Comprehensive Land Use Plan (CLUP) and Zoning Ordinance (ZO) 2021-2029	Endorsed by the Regional Land Use Committee (RLUC) VI on August 10, 2021, to the Sangguniang Panlungsod for adoption and enactment
		• Establishment of Eco-Parks/ Green zones 2 MOAs were signed on February 17, 2021, between DENR R6 and Iloilo City Government for Iloilo Botanical Garden and Biodiversity Conservation Park Project, known as “Iloilo City Park" and Eco-Park Development and Mangrove Management Rehabilitation, Protection and Enhancement Project or to be known as “Eco-Park 2.”	On-going
	Oton, Iloilo	• Municipal Ordinance 2009-12: “An Ordinance Prescribing the Preservation, Development, and Management of the Environment and Natural Resources of the Municipality of Oton, Iloilo” • Municipal Ordinance 2018-326: “Prohibition of Open-Burning in the Municipality of Oton” • Municipal Ordinance 2017-297: "Anti-Smoking and Vaping Ordinance" • Ordinance No. 2018-05: "Ordinance Regulating Emissions from Road Construction/Demolition Activities, Transportation of Construction Materials and Quarry Supplies and Prescribing Penalties Thereof'	On-going
	Pavia, Iloilo	Municipal Ordinance 2015-03: "An Ordinance Prohibiting Open- Burning & Prescribing Penalties Thereof''	For Updating

Action Plan to Strengthen Land-Use Planning to Address Air Pollution

REGION	LOCATION	ACTION TO STRENGTHEN LAND-USE PLANNING	STATUS OF IMPLEMENTATION
R7		Function of LGUs	For Updating
R8	Tacloban City	New Zoning of Industrial Zone, Residential Zone, and Commercial Center	With approved Comprehensive Land Use Plan
	Tacloban City Traffic Operations, Management, Enforcement, and Control Office (TOMECO/ City Government of Tacloban)	Facilities and Solar Farm	With approved Comprehensive Land Use Plan No specific timeframe
		Executive Order Implementing a Temporary Traffic Scheme for Real Street and Old Road Street	
		Ordinance granting Pinoyako Corporation Franchise to operate sixty (60) units of Electric Trike Cab for hire (ETCH) within the City of Tacloban	No specific timeframe
	Environmental Protection and Control Unit (EPCU) & Tacloban City PNP	Anti-Smoke Belching	No specific timeframe
R9	Zamboanga City LGU	• City Development Council Resolution No. 2019-007 • A resolution adopting and endorsing the forest land use plan of Zamboanga City to the Sangguniang Panglungsod and Mainstreaming with the Comprehensive Land Use Plan	On-going
	Zamboanga City LGU	• Sannguniang Panglungsod Resolution No. 1389 dated October 6, 2020: Approval of Forest Land Use Plan (FLUP) of Zamboanga City 2019-2027	For Updating

REGION	LOCATION	ACTION TO STRENGTHEN LAND-USE PLANNING	STATUS OF IMPLEMENTATION
R10		EMB Region X will be actively involved in reviewing and updating the LGUs comprehensive action plan (CLUP), ensuring that important environmental management provisions are captured and incorporated in the updated version of the CLUP, and recommending implementation and monitoring mechanisms for assessment and evaluation purposes.	For Updating
	Cagayan De Oro City	• Sangguniang Panglungsond Resolution No. 1395 dated October 15, 2019: Adopting the Comprehensive Land Use Plan (CLUP)	Provision of the City Master Plan is regularly visited for enforcement
		Implementation and Updating of the Cagayan de Oro City Master Plan	
	El Salvador City	• Enactment of City Ordinance No. 13032 Zoning Ordinance (Updated from previous zoning ordinances)	Ongoing implementation
		Conversion of old city open dumpsite to an Eco- Park	Ongoing civil works since CY 2019
		Closure of the Lumbia Airport in Lumbia, Cagayan de Oro City for commercial flights, thereby decongesting the uptown area	Closed for commercial flight and currently being used for aviation purposes by the government
		City Ordinance No. 02-S. 2013 Chapter 2 Alt. B, Sec. 23, Sec. 24, sec. 25, and sec. 28 regarding the Land Use Plan of LGU-El Salvador City dated March 26, 2013.	The newly approved Comprehensive Land Use Plan (CLUP) of the LGU identified three urban barangays as an industrial zone with a total land area of about 045 hectares as a commercial zone, and nine urban barangays with a total land area of about 3,260 hectares as a residential zone Activities/projects are expected to increase in these areas, so air pollution is expected to increase. Ordinances to address air pollution have been implemented by the city, especially in granting zoning clearances, building permits, and environmental clearance. Brgy. Quibonbon, which is identified as an industrial zone, is located away from the national highway and city proper and located at a high elevation to properly disperse the emitted smoke from the industries/factories
	LGU of Villanueva	Ordinance No. 600 series 2018: An Ordinance Approving and adopting the Integrated zoning regulation of the Municipality of Villanueva and providing for the Administration and Enforcement Thereof and other purposes	Ongoing implementation
	LGU of Jasaan	• Resolution No. 121-2016: Regarding the Land Use Plan of Jasaan	Updated Comprehensive Land Use Plan of Jasaan and is still under review
			of Sangguniang Bayan of Jasaan and PLUC Misamis Oriental
		Crafted and Ordinance Enacting the Environment Code of Jasaan Misamis Oriental regarding its Land Use Plan in addressing Air Pollution [30]	For Updating

Action Plan to Strengthen Land-Use Planning to Address Air Pollution

REGION	LOCATION	ACTION TO STRENGTHEN LAND-USE PLANNING	STATUS OF IMPLEMENTATION
R11	`Davao City, NEDA	Enhance and maintain good ambient air quality, safeguard public health by promoting a clean and healthy urban environment, and ensure the safety of communities from natural hazards.	For Updating
		Davao City Infrastructure Development Plan and Capacity Building Project	For Updating
		Infrastructure Modernization for Davao City, which includes Road and Road Traffic Management, Public transport, Gateways, Wastewater management, Solid Waste, and Industrial Development Support	For Updating
		• Comprehensive Land Use Plan • Incorporate emerging initiatives to provide parameters and guidelines for land use, transport, parking, economic development, infrastructure, and transit and guide future public and private improvements in the current zoning ordinance. This will also create a sustainable city by integrating land use planning, transport planning, water planning, energy provision, and infrastructure planning.	For Updating
		Davao City Coastal Bypass Road	For Updating
R12		Strengthening coordination with different local government units on the implementation of RA 8749 and application of solutions to air quality improvements.	For Updating
		Coordination meetings and planning with the Local Government Units (LGUs) in crafting a Comprehensive Land-Use Plan (CLUP), also highlighting the importance of the current air quality status to improve transport planning in every City and Municipality especially those that are covered by the Airshed.	For Updating
R13		LGUs will be informed to incorporate air quality concerns in land-use planning in their jurisdiction.	For Updating

Action Plan to Strengthen Transport Planning to Address Air Pollution

REGION	CITY	ACTION TO STRENGTHEN TRANSPORT PLANNING	STATUS OF IMPLEMENTATION
CAR		• Inclusion of the Green Buffer Zone and carless day (before pandemic)	For Updating
R3		• This will be incorporated in the future action plans of the LGU.	For Updating
R4A	Biñan, Laguna	The revision of the City Environmental Code is being considered for it to be in line with the current environmental needs. The City Land Use Plan (CLUP) was updated in 2018.	For Updating
R4B		• When carefully and efficiently crafted, a land use plan and a transport plan could potentially aid in implementing air quality management. Thus, the EMB MIMAROPA Region, through its BCN Airshed and other platforms, highly encouraged local government units to consider air quality management aspects during the crafting of the land use plan and transport plan.	For Updating
	LGU of Baco	• Ordinance No. 04-2017 Article VII: Air and Noise Pollution Management Section 65: Vehicle Emission Control	9000-001-3-2-04-2.2.4 – Enforce LGU and quarry operator's agreement for road development/maintenance
	LGU of Calapan	• None since the City LGU has received negative feedback from the transport group	No update yet on the number of existing 2-stroke motorcycles operating in Calapan City
R5	Legazpi City	• Implementation of rules and regulations of R.A. No. 8794-2021: Utilizing the Motor Vehicle Inspection System (MVIS) wherein, four (4) Private Motor Vehicle Inspection Centers (PMVICs) were granted to operate in Bicol Region. Two (2) authorized PMVICs were authorized in Camarines Sur. • Enforcement of R.A. No. 7394: Consumer Act of the Philippines	Last quarter of 2020
	Naga City	• City Ordinance No. 99-084: The "Anti Smoke Belching Ordinance"	Phase out and non-renewal of PUV franchise under the City Government for vehicle standard requirement of the City in Air Quality Emission Standard
		• Promotion of E-trike as the new mode of transportation in the city	Establishment of 19 km Bicycle Lane on significant roads of Naga City and bike support infrastructure
		• City Ordinance No. 2017-030 Bicycle Ordinance	Construction of the Almeda Extension Highway and Balatas – Jimenez Park Road will start in 2020 to address traffic and air pollution
		• Allocation of Fund for the establishment of an additional road network in Naga City	For Project Bidding
		• Establishment of Green Space and Walk Street in CBD	For Updating

Action Plan To Strengthen Transport Planning to Address Air Pollution

REGION	CITY	ACTION TO STRENGTHEN TRANSPORT PLANNING	STATUS OF IMPLEMENTATION
R6	Iloilo City	• Iloilo City Regulation Ordinance No. 2013-344: "The 2013 Perimeter Boundary Ordinance of the City of Iloilo" and its amendment through Iloilo City Regulation Ordinance No. 2016-291, which limit the entry of provincial jeepneys in the city • Closure and removal of Molo PUV Terminal and transfer to Mohon Terminal in Arevalo as per Executive Order No. 95 series of 2020 • Construction of 11-kilometer bike lanes at the Diversion Road and selected roads of Iloilo City	Ongoing
	Iloilo City Alliance of Operators and Drivers Transport Cooperative (ICAODTC	28 units of modernized vehicles started operating in November 2019 for Ungka Terminal, Jaro to Iloilo City via the Central Philippine University route and vice versa	Operational
	Alliance of Provincial Operators and Drivers Transport Cooperative (APODTC)	15 units of modernized vehicles started operating in December 2020 for Ungka Terminal, Jaro to Cabatuan route, and vice-versa	Operational
	Metro Iloilo Transit Service Cooperative (MITSCOOP)	27 units of modernized vehicles started operating in January 2021 for San Miguel – Iloilo City route and vice versa	Operational
	EMB R6 MIAGB	Trainors' Training on Motor Vehicle Maintenance for MIA Transport Groups members	Scheduled on the three consecutive weekends of November 2021
	Trainors' Training on Motor Vehicle Maintenance for MIA Transport Groups members	• Free Garage Smoke Emission Testing (SET) and IEC Forum (Barangay, Drivers & Operators of Transport Group) every other month • Roadside Inspection/Apprehension w/ IEC	Suspended due to the COVID-19 pandemic

Action Plan To Strengthen Transport Planning to Address Air Pollution

REGION	CITY	ACTION TO STRENGTHEN TRANSPORT PLANNING	STATUS OF IMPLEMENTATION
R7		Function of LGUs	For Updating
R8	Tacloban	Utilizing Real and Old Road Sagkahan Street as one way during morning and afternoon rush hours.	Ongoing study
		Operation of E-Jeepneys and acquisition of additional units	Currently operating in the Northern Barangays and V&G subdivision (biggest subdivision in Tacloban City)
		Opening of Tacloban City Bypass Road	Reduced traffic congestion in Maharlika -Apitong - Abucay - Nulatula - Diit Road
		Road Widening	Decongested choke points and is still ongoing
		Operation of Private Motor Vehicle Inspection Center (PMVIC)	Operation Pending
	Palo	Anti-Smoke Belching Operation	Regular conduct of Interagency Anti-Smoke Belching Operation Activity
R9	Zamboanga City	• Executive Order No. BC 329-2018, dated January 26, 2017 An Act creating the Local Public Transport Route Plan (LPTRP) Team. Defining its Composition, Functions and for Other Related Purposes.	Ongoing
		• Administrative Order No. BC 37-2018 And Act Amending Administrative Order No. BC 33-2019 dated February 14, 2019. Consulting the Creation of the Technical Working Group (TWG) for the formulation of the Local Public Transport Router Plan (LPTRP) for Zamboanga City and Defining their Duties and Responsibilities for the other purposes	LTFRB issued Notice of Compliance of the Local Public Transport Route Plan

Action Plan To Strengthen Transport Planning to Address Air Pollution

REGION	CITY	ACTION TO STRENGTHEN TRANSPORT PLANNING	STATUS OF IMPLEMENTATION
R10	Cagayan De Oro City	Implementation and Updating of the Cagayan de Oro City Master Plan	45% of projected road networks are established.
		Enactment of City Ordinance No. 13032 Zoning Ordinance (Updated from previous zoning ordinances)	24% has been accomplished according to Comparative Urban Land Use (2000 and 2012) Cagayan de Oro City
		Creation of the Cagayan de Oro City Local Public Transport Route Plan (LPTRP) as approved by LTFRB	CdeO LPTRP still in the updating and revision stage
		Proposed CdeO Bikeable and Walkable (Pedestrian Network) Lane as part of the LPTRP	Initial Implementation last March 2021
		Construction of Flyovers, Traffic Management, Taskforce Hapsay Dalan	Existing infrastructure and traffic management program
	LGU of Villanueva	Ordinance No. 600 series of 2018: An Ordinance Approving and adopting the Integrated zoning regulation of the Municipality of Villanueva and providing for the Administration and Enforcement Thereof and for other purposes	29.46% of concrete road network has been accomplished
		Propose Bike Lane Area	For Further Study
	LGU of Jasaan	The proposed local public transport route plan (LPTROP) of Jassan is on its 4th revision and will incorporate the LTFRB-MC-2020-076 in addressing air pollution	30% of projected farm to market road are established based on the network map of Jasaan Opening of new national highway bypass road (endorsement of the PHIVIDEC-iA bypass road was submitted to consultant for review. (Resolution of No Objection No. 20-2021)
	El Salvador	No entry	To be updated on the next submissions
	Opol		
	Tagoloan		

Action Plan To Strengthen Transport Planning to Address Air Pollution

REGION	CITY	ACTION TO STRENGTHEN TRANSPORT PLANNING	STATUS OF IMPLEMENTATION
R11		• Davao Transport Road Map Prioritize walking and cycling over other modes and provide infrastructure that will make them more enjoyable. Establish data for walking and bike riding. Crafting of a non-motorized transport plan. Adoption of policy to prioritize non-motorized transport	For Updating
		• Develop and implement a public transport plan, provide integrated infrastructure, and support the development of modern intermediate transport services. • Implement the Interim Bus Project, HPBS and railway system	For Updating
		• Develop a traffic system that prioritizes modes according to their community benefit and economic impact, and managed the road space efficiently wherein public space for driving and parking is price / rented Make public transport more efficient and reliable. Improve facilities and infrastructure on accessing public transportation.	For Updating
		• Identify appropriate routes for freight, managed them to have efficient operations and minimal impact on the community Identification of truck routes Traffic enforcement	For Updating
R12	LGU of General Santos City	• Draft City Ordinance No. / Resolution No. / etc. regarding the Land Use Plan of General Santos LGU in addressing Air Pollution dated or “Anti-Smoke Belching Ordinance of the City of General Santos”.	For Updating
R13		Advise LGUs to incorporate concerns on air pollution during land-use and transport planning	For Updating

Review of NESSAP

All stationary sources of air emissions must comply with National Emission Standards for Sources Specific Air Pollution (NESSAP) and Ambient Air Quality Standard (AAQS) pertaining to the source. The responses below presented the current status of the NESSAP in their regions.

REGION	RESPONSES
CAR	• CAR has a plan in partaking in the review of NESSAP.
NCR	• This Office joined EMB-CO in reviewing NESSAP
R4B	• The National Emission Standards for Source-Specific Air Pollutants (NESSAP) are useful for assessing air pollution sources in the region. Thus, compliance should be highly considered to assure responsible air quality management.
R6	• Local Emission Standards or Emission Factors will be considered once sufficient data is collected from the universe of APSIs • The Region is utilizing current NESSAP
R7	• The function of the EMB Central Office in coordination with EMB ROs
R8	• To be discussed in CY 2022
R9	• Submitted City Ordinance prescribed rules and regulations for preventing, controlling, and reducing air pollution from motor vehicles in the City of Tacloban with IIS No. R8-2021-008969
R10	• EMB Region X will provide technical support to any plans that the EMB Central Office will initiate on the review and updating of the National Emission Standard for Source-Specific Air Pollutants (NESSAP)
R11	• Review of NESSAP and other Emission-related factors such as emission factors that fit the country's current situation.
R12	• Continues monitoring of all stationary sources, ensuring they are within the standard, and issuing Notice of Violation to exceed the standard.
R13	• Continuous review of NESSAP as necessary to cope with changing environment, increasing air pollution sources, and population.

Policies For Aviation And Maritime Air Emissions

THAT HAVE IMPLICATIONS ON AIR QUALITY OF THE LGU

REGION	RESPONSES
R4B	The EMB MIMAROPA Region recorded no existing policies from the city governments of Puerto Princesa City, Palawan, Calapan City, Oriental Mindoro, nor of any other LGUs in the region relevant to aviation and maritime air emissions.
R6	Regional Offices of CAAP and Coast Guard implements policies for aviation and maritime air emissions in Region 6. Furthermore, the Maritime Industry Authority (MIA) thru the Marina Circular No. SR 2020-06 mandates the use of a 0.50% M/M Sulphur limit on fuel oil for all Philippine registered ships.
R7	During our 2nd Metro Cebu Airshed Governing Board meeting, EMB 7 Regional Director Lormelyn E. Claudio invited agencies regulating marine vehicles (CPA, PCG, and MARINA) to tackle issues on maritime emissions. As discussed by MARINA, maritime emissions (quantity of pollutants emitted) does not include in their regulations as long as the activities bound on maritime industries follows the regulations stipulated in MARPOL 73/73 (International Convention for the Prevention of Pollution from Ships). On the other hand, marine emissions do not belong under RA 8749. Hence, the Board is still in the process of creating an agreement between maritime agencies on how to regulate such emissions.
R9	Attended the Maritime Law Seminar
R10	The grey area in aviation and maritime air emissions regulation remains a challenge that national legislation has yet to address. However, local initiatives and policies have been recommended to monitor emissions from the said sources. In the airshed, LGUs, where maritime ports are situated, have been encouraged to monitor the number and frequency of trips of marine vessels as a primary initiative to assess the management strategies that will be implemented in the future. Other suggestions to regulate maritime emissions include the onshore docking electrification strategy currently implemented in other countries to discourage the use of marine vessel diesel engine generators while docked in ports.
R11	Aviation and Maritime emissions must be monitored by establishing an emission standard that will be the basis of their compliance.
R12	Continued capacity building for aviation and maritime air emissions must be conducted to improve and create policies to regulate them.
R13	Coordinate with MARINA for the determination of standards for emissions of motor vessels and pump boats and implementation of emission testing and monitoring. At the same time, Region 13 have also coordinated with the aviation regulators to determine the standards and emission monitoring of aircraft services.

Outsourcing of Air Quality Monitoring Station

REGION	RESPONSES
CAR	Encouraging other industries and LGUs in monitoring ambient air quality not included in the first batch of the adopt an ambient air quality monitoring station
R1	Propose a budget for the source apportionment studies of San Carlos City and Dagupan City, Pangasinan PM Stations.
R3	EMB Region 3 is exploring the possibility of implementing the proposed outsourcing of ambient air quality monitoring under the Public-Private Partnership (PPP) Project through the NEDA Region 3 and PPP Center. Region 3 is also looking forward to the pilot network of $PM_{2.5}$ sensors. We have already done a co-location, and the results are quite promising.
R4A	The region is currently outsourcing the maintenance of the Tekran "Mercury" Station based on the recommendation of EMB CO. If there is a budget allocated for this activity, we will outsource another station.
R4B	The EMB MIMAROPA Region supports the Memorandum Circular establishing a mechanism to monitor ambient air quality in every airshed and acquire representative data required for the designation of attainment and nonattainment airshed areas through outsourcing.
R6	Regional Offices are open for outsourcing air quality given the additional budget from the EMB Central Office, considering the AQMF is fully utilized for other priority activities like data gathering for Emission Inventory, Dispersion Modeling, and Preventive maintenance of Ambient Air Monitoring Equipment.
R7	Currently, the Office does not have plans to outsource air quality monitoring. The Office is just waiting for a piece of advice from the EMB Central Office for venturing into such kind of activity
R8	On-going development on the outsourcing of air quality
R9	Approved resolution during the airshed meeting for additional smoke opacity meter.
R10	EMB Region X will support any plans that EMB Central Office will initiate on outsourcing ambient air quality monitoring.
R11	It is an excellent idea to outsource the air quality data as long as the QA/QC of the data is implemented according to the USEPA Standard and the budget is available for outsourcing.
R12	Outsourcing potential donors for the program, from private firms to local government units.
R13	This will help EMB to have 75% data capture as it will be one of the conditions in the contract between the third-party contractor of the outsourced air quality monitoring station. Also, immediate repairs and replacement of defective parts can be performed. EMB will be the ones to audit the contractor to ensure accurate and reliable air quality data is being provided.

Adopt-An-Ambient Air Quality Monitoring Station

REGION	RESPONSES
CAR	The Regional Office tapped the big companies namely: • SM • Camp John Hay Management Corp.„ • Lepanto Consolidated Mining Co., • Philex Mining Corp., • PEZA. They are willing to adopt an ambient air monitoring station. MOA signing between EMB-CAR and CJHMC will already commence. The LGU Baguio will be included next.
NCR	This office send a request letter to adopt an Ambient Monitoring Station to Filinvest Corporation but until now For submission.
R1	To invite potential industries on the “Adopt Air Quality Monitoring”” in the region.
R2	To aid the representation of ambient air quality monitoring data and in bridging data gaps needed to fully evaluate the air quality across the entire region, the EMB Region 2 is currently communicating to municipalities and industries to support the "Adopt an Ambient Air Quality Monitoring Program”
R3	Ongoing communication with the potential partners. Identified partners are the following: • Republic Cement Corporation (Norzagaray • and Bulacan Plants) • Eagle Cement Corporation • Holcim Philippines (Bulacan Plant) • SMC Consolidated Power Corp. – Limay Plant • Petron Bataan Refinery • GNPower Mariveles Energy Centre • GNPower Dinginin • Masinloc Power Partners Co. Ltd.
R4A	We are in the process of looking for prospective adopters that are willing to adopt and operate an air quality station.

Adopt-An-Ambient Air Quality Monitoring Station

REGION	RESPONSES
R4B	The EMB MIMAROPA Region had identified an area in Rio Tuba, Bataraza, Palawan as a potential ambient air quality monitoring station for adoption. Possible donors for the Adopt-an-Ambient Air Quality Monitoring Station are Rio Tuba Nickel Mining Corporation, Coral Bay Nickel Corporation, and Graymont Philippines. On 17 February 2021, the EMB MIMAROPA Region introduced the fundamentals of the program during a meeting conducted with the three possible sponsors. A second meeting was held last 25 March 2021 which was also attended by the Mine Rehabilitation Fund Committee (MRFC). Mines and Geosciences Bureau MIMAROPA Regional Director expressed their support of the program. However, they claimed that their calendar year (CY) 2021 fund has already been allocated for the vaccine of the people in the community. In the most recent meeting held on 26 August 2021, a Memorandum of Agreement (MOA) was introduced to the potential sponsors. Provisions of the MOA was discussed and clarified relevant to the site specifications, and the procurement and maintenance of equipment for the program. As of press time, the EMB MIMAROPA Region has yet to receive the inputs of the sponsors on the content of the MOA.
R5	The EMB Region 5 have coordinated with the various industries to establish a Continuous Ambient Air Quality Monitoring Station within the Province of Albay. Currently, there is one approved donor and the others are still awaiting approval from the upper management for their CY 2022 Budget Proposal. Some of the industry did not approve their contribution to the said project due to the effects of pandemic, calamities, and economic crisis to their businesses.
R6	The Regional Office have already identified willing partners to implement the Adopt and Ambient Air Quality Monitoring Station program by EMB Central Office. Currently finalizing the MOA between EMB Region 6 and identified willing partners from the industry.
R7	Luckily, Region 7 is the first in the Philippines to have a donor partner in Adopt an Ambient Air Quality monitoring station Program. Therma Visayas Inc. (TVI), a coal fired power plant located in Toledo City, Cebu, owned by the Aboitiz Group of Companies, extend their intent to be a partner of such program. Last November 19, 2020, the inauguration of the monitoring station was launched with the presence of EMB Director Engr. William P, Cuñado, EMB Assistant Director Engr. Minda Osorio, DENR 7 Regional Executive Director Engr. Paquito Melicor Jr., DENR EMB 7 Regional Director Lormelyn E. Claudio, Toledo City Mayor, and other stakeholders. Hopefully by mid-2022, the Global Business Power Corporation (GBPC), also a coal fired power plant in Toledo City, will pursue their intent to be our donor partner for the program.
R8	Memorandum of Agreement signed by adoptor waiting for the DAHS.
R9	Coordination with the donor partners

Adopt-An-Ambient Air Quality Monitoring Station

REGION	RESPONSES
R10	The Regional Office has identified Partner Industries [Donors engaged in cement production, coalfired power generation, smelting and other industries classified as large and environmentally significant sources for the Adopt-A-CAAQMS Program. Further coordination activities will be conducted to facilitate the implementation of the program such as the review of the program's financial mechanism and identification of fund manager, execution of Memorandum of Agreement, and the purchase of ambient air sampler.
R11	The program will greatly help to expand the monitoring of the region, however due to COVID 19, bigger companies focus on the COVID 19 situation and cannot commit to adopt millions for this monitoring stations.
R12	Region 12 have implemented the Adopt-an-Air Quality Monitoring Station by outsourcing potential donors for the program, from private firms to local government units. This project was conducted in order to identify potential donors from local government units and to identify expansion of air quality monitoring.
R13	EMB 13 has signed a MOA together with Therma Marine, Inc., Agata Mining Ventures, Inc. and Philsaga Mining Corporation for the realization of the Adopt an Ambient Air Quality Monitoring Station Program on November 5, 2021. The companies will donate a Continuous Ambient Air Quality Monitoring Station (CAAQMS) which will be operationalized by year 1st semester of CY 2022. The station is set to be placed in Cabadbaran City which is located within the Agusan del Norte - Butuan City Airshed. EMB 13 will identify for more potential donors for the realization of the Adopt a CAAQMS program and look forward to having a CAAQMS installed in Surigao City by CY 2022.

Other Way Forward And Future Policies

Ambient Air Monitoring

1. Guideline Values for Hazardous Ambient Air Pollutants (e.g., PAHs-BC, As) - Phase 3
2. Guidelines for Outsourcing Airshed Ambient Air Quality Monitoring
3. Guidelines for the approval of other equivalent air quality monitoring instruments
4. Adopt-an-Ambient Air Quality Monitoring Stations Program
5. Partnership for Geospatial Air Pollution Information (PAPGAPI) Project and the Pandora Asia Network (PAN)
6. - Air Quality Monitoring thru Satellite
7. Pilot Study of Air Quality Monitoring Sensors (5 units) collocated to EMB AQM Stations

Mobile Sources

1. Noise Standards for Motor Vehicles
2. Airshed Assessment Traffic Engineering and Land-Use Planning for Abatement of Pollution from Mobile Sources
3. Inspection of Protocol for COC Applications of EVs and HEVs
4. Philippine Roadmap for Euro Emission and Fuel Standards

Stationary Sources

1. Allowing QA/QC Manager to Observe Virtually in Areas Declared under ECQ and MECQ
2. Emission Charge System
3. Policy on Market-Based Instruments
4. Emission Averaging of Existing Sources
5. Manual of Air Pollution Source Installation in Preparation for OPMS - PTO v3
6. Updating of Best Available Control Technologies (BACT) and MC 2008 - 005: Air Pollution Control Facilities
7. Guidelines for Accreditation of CEMS/COMS Audit Service Providers
8. Updating of National Emission Standards for Source-Specific Air Pollutants to Mass Emission Rate Standards
9. Guidelines on Emission Averaging of Facilities Using Non-Burn Technologies
10. Guidelines on Industrial / Commercial Establishment Inspection and Monitoring (Checklist for CEMS/COMS)

General

1. Updating of DAO 2016-28: Prescribed Fees of EMB Services
2. Online Emission Inventory System
3. Online Self-Monitoring Report System
4. Online Stack Sampling, Ambient Monitoring, CEMS/COMS Audit
5. Establishment of Locally Developed Emission Factor
6. Updating 10-Year Road Map / DAO 2000-82

APPENDICES

APPENDIX 1. National Air Quality Guideline Values, Air Quality Index Breakpoints and precautionary Advise

<table>
<tr><th>Caution</th><th colspan="2">TSP, PM_{10}, SO_2, Ozone, and NO_2</th><th colspan="2">CO</th></tr>
<tr><td>None</td><td>GOOD</td><td>FAIR</td><td>GOOD</td><td>FAIR</td></tr>
<tr><td>People with respiratory diseases, such as asthma should limit outdoor exertion.</td><td colspan="2">Unhealthy for sensitive groups</td><td colspan="2"></td></tr>
<tr><td>Pedestrians should avoid heavy traffic areas.</td><td colspan="2">Very unhealthy</td><td colspan="2" rowspan="2">Very unhealthy</td></tr>
<tr><td>People with heart or respiratory disease, such as asthma, should stay indoors and rest as much as possible.</td><td rowspan="4">Very unhealthy</td><td rowspan="4">Acutely unhealthy</td></tr>
<tr><td>Unnecessary trips should be postponed.</td><td rowspan="2">Very unhealthy</td><td>Acutely unhealthy</td></tr>
<tr><td>People should voluntarily restrict the use of vehicles.</td><td></td></tr>
<tr><td>People should limit outdoor exertion.</td><td colspan="2" rowspan="2"></td></tr>
<tr><td>People with heart or respiratory disease, such as asthma, should stay indoors and rest as much as possible.</td></tr>
<tr><td>Motor vehicle use may be restricted</td><td colspan="2" rowspan="2">Acutely unhealthy</td><td colspan="2" rowspan="2">Acutely unhealthy</td></tr>
<tr><td>Industrial activities may be curtailed.</td></tr>
<tr><td>Everyone should remain indoors (keeping windows and doors closed unless heat stress is possible).</td><td colspan="2" rowspan="3">Emergency</td><td colspan="2" rowspan="3"></td></tr>
<tr><td>Motor vehicle use should be prohibited except for emergency situations.</td></tr>
<tr><td>Industrial activities, except those that are vital for public safety and health, should be curtailed.</td></tr>
<tr><td>People with cardiovascular disease, such as angina, should limit heavy exertion and avoid sources of CO, such as heavy traffic.</td><td colspan="2" rowspan="3"></td><td>Unhealthy for sensitive groups</td><td>Acutely unhealthy</td></tr>
<tr><td>Smokers should refrain from smoking.</td><td colspan="2">Very unhealthy</td></tr>
<tr><td>Everyone should avoid exertion and sources of CO, such as heavy traffic, and should stay indoors and rest as much as possible.</td><td colspan="2">Emergency</td></tr>
</table>

Notes:

*NCM stands for 'normal cubic meter', assuming that the samples were collected under 'normal' conditions or at standard temperature and pressure

-SO2 and Suspended Particulate matter (TSP and PM) are sampled once every six days when using the manual methods. A minimum of twelve sampling days per quarter or forty-eight sampling days each year is required for these methods. Daily sampling may be done in the future once continuous analyzers are procured and become available.

-For short term values, maximum limits represented by ninety-eight percentile (98%) values not to exceed more than once a year.

-Annual values of TSP and PM10 are reported as Geometric Mean.

**Geometric mean is used because the annual mean pollutant level in a year is dependent of the pollutant level from the previous year.*

-Evaluation of the guideline for Lead is carried out for 24-hour averaging time and averaged over three moving calendar months. The monitored average value for any three months shall not exceed the guideline value.

APPENDIX 1. National Air Quality Guideline Values and Air Quality Index Breakpoints

Pollutant	Unit, Averaging Time	Good	Fair	Unhealthy for sensitive groups	Very unhealthy	Acutely unhealthy	Emergency
TSP	µg/Nm^3, 24-hr	0 – 80	81 – 230	231 – 349	350 – 599	600 – 899	900 and greater
PM_{10}	µg/Nm^3, 24-hr	0 – 54	55 – 154	155 – 254	255 – 354	355 – 424	425 – 504
SO_2	ppm, 24-hr	0.000 – 0.034	0.035 – 0.144	0.145 – 0.224	0.225 – 0.304	0.305 – 0.604	0.605 – 0.804
O_3	ppm, 8-hr	0.000 – 0.064	0.065 – 0.084	0.085 – 0.104	0.105 – 0.124	0.125 – 0.374	[a]
	ppm, 1-hr	-	-	0.125 – 0.164	0.165 – 0.204	0.205 – 0.404	0.405 – 0.504
CO	ppm, 8-hr	0.0 – 4.4	4.5 – 9.4	9.5 – 12.4	12.5 – 15.4	15.5 – 30.4	30.5 – 40.4
NO_2	ppm, 1-hr	[b]	[b]	[b]	[b]	0.65 – 1.24	1.25 – 1.64

'hen 8-hour O_3 concentrations exceed 0.374 ppm, AQI values of 301 or higher must be calculated with 1-hour O_3 concentrations.
O_2 has no 1-hour term NAAQG

Parameter	Averaging Time	NAAQGV (ug/NCM)
TSP	Annual	90
	24-hour	230
PM_{10}	Annual	60
	24-hour	150
$PM_{2.5}$	Annual	35 (Dec 2015) 25 (By 1 January 2016)
	24-hour	75 (31 Dec 2015) 50 (1 January 2016) 35 (November 2020)
Sulfur Dioxide (SO_2)	Annual	80
	24-hour	180
Nitrogen Dioxide	Annual	
	1-hour	
	24-hour	150
Ozone (O_3)	8-hour	60
	1-hour	140
Carbon Monoxide (CO)	8-hour	10
	1-hour	35
Lead (Pb)	Annual	1
	3 Months	1.5

NOTES:
*NCM stands for 'normal cubic meter', assuming that the samples were collected under 'normal' conditions or at standard temperature and pressure

- SO2 and Suspended Particulate matter (TSP and PM) are sampled once every six days when using the manual methods. A minimum of twelve sampling days per quarter or forty-eight sampling days each year is required for these methods. Daily sampling may be done in the future once continuous analyzers are procured and become available.
- For short term values, maximum limits represented by ninety-eight percentile (98%) values not to exceed more than once a year.
- Annual values of TSP and PM10 are reported as Geometric Mean.

*Geometric mean is used because the annual mean pollutant level in a year is dependent of the pollutant level from the previous year.

Evaluation of the guideline for Lead is carried out for 24-hour averaging time and averaged over three moving calendar months. The monitored average value for any three months shall not exceed the guideline value.

APPENDIX 2. Compilation of DAOs linked to RA 8749

Department (s)/Agencies	Type	Series (Year)	Order No.	Title/Description	Reference Articles/Section in RA 8749
DENR	DAO	2000	81	Implementing Rules and regulations for RA 8749	C2A1S6
DENR	DAO	2000	82	Integrated Air Quality Improvement Framework- Air Quality Control Action Plan	C2A1S7
DOTC	DO	2001	31	Authorization of Private Emission Testing Centers	C2A2S23
DTI-DOTC	JAO	2001	01	Guidelines for Accreditation and Authorization of Motor Vehicle Emission Testing Centers	C2A2S23
DENR	MC	2002	03	Interim Guidelines for the Designation of an Airshed	C2A1S9
DTI-DOTC	JAO	2002	01	Clarification on the Implementation of the Procedure on the Accreditation and Authorization of Motor Vehicle Emission Testing Center (PETC)	C2A2S23 (mobile sources)
DENR	DAO	2003	52	Revised Emission Standards for In-Use Motor Vehicles equipped with Spark Ignition and Compression Ignition Engines	
DENR	DAO	2003	47	Designation of the Members of the Zamboanga City Airshed and its Governing Board	airshed
DENR	DAO	2003	45	Designation of Members of the Governing Board for Metro Cagayan De Oro Airshed, Province of Misamis Oriental Region X	
DENR	DAO	2003	33	Designation of the Members of the Naga City Airshed Governing Board Located in the Province of Camarines Sur, Bicol Region	
DENR	DAO	2003	27	Amending DAO 26, DAO 29, and DAO 2000-81, among others, on the preparation and submission of the Self Monitoring Report (SMR)	
DENR	DAO	2003	25	Hydrocarbon Standards for Motorcycle	
DENR	DAO	2003	16	Designation of the members of Agusan del Norte Airshed Governing Board	
DENR	DAO	2003	04	Initial Designation of BLIST Airshed and the Creation of its Interim Governing Board	
DENR-PAB	Resolution	2003	04	establishing the fine rating system for stationary sources for exceedance of any pollution or air quality standards set under RA 8749 and its IRR	
DENR	DAO	2004	26	Amending Rule XIX of DAO 2000-81 (Implementing Rules and Regulations of RA 8749), which integrates the Authority to Construct requirement and extends the validity period of Permit to Operate for five years, regarding air pollution permits/clearances	
DENR	DAO	2004	53	Guidelines to implement the Tax Incentives provision under Section 13 of RA 8749	
DENR	DAO	2004	13	Designation of North Cotabato Geothermal Airshed and its Governing Board	
DENR	DAO	2004	12	Designation of Leyte Geothermal Airshed and its Governing Board	
DENR	DAO	2004	11	Designation of Bacon-Manito Geothermal Airshed and its Governing Board	
DENR	DAO	2004	07	Establishment of Northeastern Pangasinan Airshed and its Governing Board	
DENR	DAO	2004	05	Establishment of Metro Tuguegarao (PIESTTA) Airshed and its Governing Board	
DENR	SO	2004	867	**Creating a Special Review Committee within EMB to review project proposals for eligible funding to the AQMF**	
DENR-DBM	Joint MC	2004	01	Implementing Guidelines on Operationalization of the Air Quality Management Fund under the Republic Act 8749	

APPENDIX 2. Compilation of DAOs linked to RA 8749

Department (s)/Agencies	Type	Series (Year)	Order No.	Title/Description	Reference Articles/Section in RA 8749
DOTC	DO	2004	01	Rules and Regulations Concerning the Issuance of DOTC/LTO Authorization of Motor Vehicle Private Emission Testing Centers (PETCs)	
DOTC	DO	2004	34	An Order Promoting the Operation of Compressed Natural Gas (CNG) Buses in the Country	directs the LTFRB to issue franchises exclusive to CNG bus operation
DENR	MC	2005	13	Guidelines for designation of Attainment & Non-Attainment Areas	
DENR	MC	2005	10	Guidelines on the selection of qualified projects and activities eligible for funding under the AQMF	
DOTC	DO	2005		Amendment of Section 7.5 (IT Requirement) of Department Order No. 2004-01 Prescribing the Rules and Regulations Concerning the Issuance of DOTC/LTO Authorization of Motor Vehicle Private Emission Testing Centers (PETCs)	
DENR	DAO	2006	03	Guidelines for DENR Accreditation of Third Party Source Emission Testing Firms	
DENR-DOST	Joint MC	2006	01	Adopting Environmental Technology Verification Protocol (ETVP)	
DENR	DAO	2007	25	(revision of DAO-2006-03)Guidelines for DENR Accreditation of Third Party Source Emission Testing Firms	
DENR	DAO	2007	22	Guidelines on the installation of Continuous Emission Monitoring Systems (CEMS) Guidelines on the Requirements for Continuous Emission Monitoring Systems (CEMS) and other Acceptable Protocols, Thereby Modifying and Clarifying Certain Provisions of Sections 5, Rule X of DAO 2000-81 and other related Provisions	
DENR	DAO	2007	27	Revised Emission Standards for Motor Vehicles Equipped with Compression-Ignition and Spark-	
DENR	MC	2007	03	ANNEX 1: Policy on Compliance and Permitting for Industrial Facilities Relating to Air Quality	
DENR-DTI-DOTC	JAO	2007	01	Amended Guidelines and Procedures for the Monitoring of Accredited and Authorized Private Emission Testing Centers (PETCs) and LTO Emission Testing Activities	
DENR	DAO	2010	23	Revised Emission Standards for Motor Vehicles Equipped with Spark Ignition and Compression Engine Excluding Motorcycles/Tricycles	
DENR	DAO	2010	24	Revised Emission Standards for Motorcycles/Three-Wheeled Vehicles and Mopeds	
DENR	MC	2011	04	Clarificatory Guideline o DAO 2000-81, Part VI, Rule XIX, Section 13 (IRR of RA 8749)	
DENR	DAO	2013	13	Establishing the Provisional National Ambient Air Quality Guideline Values for $PM_{2.5}$	
DENR	DAO	2013	26	Revised Guidelines for DENR Accreditation of Third Party Source Emission Testing firms	
DOTC	DO	2013	03	Reconstitution of the Vehicle Control Fund Committee (VPCFC)	
DENR	DAO	2014	14	Designation of Southern Negros Geothermal Airshed and its Governing Board	
DOE	DC (Department Circular)	--	--		
DAO	DAO	2016	23	EURO 4	

APPENDIX 2. Compilation of DAOs linked to RA 8749

- The DENR, in coordination with appropriate agencies, shall formulate and establish the necessary standards for all mobile sources other than those referred to in Section 21 of this Act. The imposition of the appropriate fines and penalties from these sources for any violation of emission standards shall be under the jurisdiction of the DOTr.

Section 46- Violation of Standards for Motor Vehicles

- Establish a roadside inspection system
- All law enforcement officials and deputized agents accredited to conduct vehicle emissions testing and apprehensions shall undergo a mandatory training on emission standards and regulations. For this purpose, the Department, together with the DOTr, DTI, DOST, Philippine National Police (PNP) and other concerned agencies and private entities shall design a training program.

Department of Trade and Industry – Bureau of Philippine Standards (DTI-BPS) and Board of Investors (DTI-BOI)

Section 21- Pollution from Motor Vehicles

- Participate in the formulation of an Action Plan for the control and management of air pollution from motor vehicles
- Contribute towards the establishment of procedures for inspection of motor vehicles, assist in the formulation and implementation of the National Motor Vehicle Inspection and Maintenance Program
- Accredit private emission testing centers (duly authorized by the DOTr)
- Develop and implement standards and procedures for the certification of training institutions, instructors and facilities and licensing of qualified private service centers and their technicians
- Prescribe regulations requiring the disclosure of odometer readings and use of tamper-resistant odometers, including tamper resistant fuel management systems

Section 22- Regulation of All Motor Vehicles and Engines

- The DTI shall promulgate the necessary regulations prescribing the useful life of vehicles and engines including devices in order to ensure that such vehicles will conform to the emissions which they were certified to meet. These regulations shall include provisions for ensuring the durability of emission devices.

APPENDIX 2. Compilation of DAOs linked to RA 8749

Section 26- Fuels and Additives

- Pursuant to the Air Quality Framework to be established under Section 7 of this Act, the DOE, co-chaired by the DENR, in consultation with the Bureau of Product Standards (BPS) of the DTI, the DOST, the representatives of the fuel and automotive industries, academe and the consumers shall set specifications for all types of fuel and fuel-related products, to improve fuel composition for increased efficiency and reduced emissions: Provided, however, That the specifications for all types of fuel and fuel-related products set-forth pursuant to this section shall be adopted by the BPS as Philippine National Standards (PNS).

Section 46- Violation of Standards for Motor Vehicles

- All law enforcement officials and deputized agents accredited to conduct vehicle emissions testing and apprehensions shall undergo a mandatory training on emission standards and regulations. For this purpose, the Department, together with the DOTr, DTI, DOST, Philippine National Police (PNP) and other concerned agencies and private entities shall design a training program.

IRR, Rule XXXII, Sec 2

- The DTI through the Bureau of Import Services (BIS) shall formulate regulations and guidelines that will ensure rebuilt and imported second hand motor vehicles and engines will satisfy the emission standards for rebuilt and imported second hand motor vehicles as provided in these Implementing Rules and Regulations.

Department of Energy

Section 26- Fuels and Additives

- Pursuant to the Air Quality Framework to be established under Section 7 of this Act, the DOE, co-chaired by the DENR, in consultation with the Bureau of Product Standards (BPS) of the DTI, the DOST, the representatives of the fuel and automotive industries, academe and the consumers shall set specifications for all types of fuel and fuel-related products, to improve fuel composition for increased efficiency and reduced emissions: Provided, however, That the specifications for all types of fuel and fuel related products set-forth pursuant to this section shall be adopted by the BPS as Philippine National Standards (PNS).

APPENDIX 3. Detailed Roles and Responsibilities in the Air Quality Management Administration

Department of Environment and Natural Resources

Act as overall of the lead agencies; prepare a National Air Quality Status Report which shall be used as a basis in formulating the Integrated Air Quality Improvement Framework; issue rules and regulations in the implementation of the Act.

Lead agency in the implementation of RA 8749: Environmental Management Bureau (EMB)

Functions of the EMB:

- To oversee ambient air quality monitoring and to prepare annual National Air Quality Status Reports pursuant to Section 6 of the CAA
- To design and develop, in cooperation with the National Statistical Coordination Board (NCSB), an information network for data storage, retrieval and exchange, which will serve as the central depositary of all data and information related to air quality;
- To issue and, from time to time, revise information on air pollution control techniques upon consultation with the appropriate committees, government agencies and local government units (LGUs)
- To, in coordination with other concerned agencies, review and/or revise and publish annually a list of hazardous air pollutants with corresponding ambient guidelines values and/or standards necessary to protect public health and safety, and general welfare;
- To design, impose on and collect regular emission fees from industrial dischargers as part of the emissions permitting system based on environmental techniques;
- To review, or as the need therefore arises, and revise and publish emission standards to further improve the emission standards for stationary sources of air pollution as well as emission standards for motor vehicles
- To develop, implement and monitor the functioning of [L SEP] permitting system as it may determine necessary for the prevention and abatement of air pollution by stationary sources, which amongst other addresses the need for program and project proponents to put up financial guarantee mechanisms to finance the needs for emergency response, clean-up or rehabilitation of areas that may be damaged during the program or project's actual implementation

APPENDIX 3. Detailed Roles and Responsibilities in the Air Quality Management Administration

- To monitor compliance with emission standards for stationary sources. EMB has the right of entry or access to any premises including documents and relevant materials; to inspect any pollution or waste source, control device monitoring equipment or method required; and to test any emission;
- To require any person who owns or operates any emission source or who is subject to any requirement of the CAA to (i) establish and maintain relevant records; (ii) make relevant reports; (iii) install, use and maintain monitoring equipment or methods; (iv) sample emission, in accordance with the methods, locations, intervals, and manner prescribed by the DENR; and (v) keep records
- To exercise such other powers and functions as provided by the law, the CAA and its IRR

Department of Transportation

Section 15- Air Pollution Research and Development Program

- The Department, in coordination with the Department of Science and Technology (DOST), other agencies, the private sector, the academe, NGOs and POs, shall establish a National Research and Development Program for the prevention and control of air pollution. The Department shall give special emphasis to research on and the development of improved methods having industry-wide application for the prevention and control of air pollution. Such a research and development program shall develop air quality guideline values and standards in addition to internationally-accepted standards. It shall also consider the socio-cultural, political and economic implications of air quality management and pollution control.

Section 21- Pollution from Motor Vehicles

- Implement the emission standards for motor vehicles pursuant to and as provided in the Act
- Participate in the formulation of an Action Plan for the control and management of air pollution from motor vehicles
- Contribute towards the establishment of procedures for inspection of motor vehicles, assist in the formulation and implementation of the National Motor Vehicle Inspection and Maintenance Program
- Authorize private emission testing centers (duly accredited by DTI)

APPENDIX 3. Detailed Roles and Responsibilities in the Air Quality Management Administration

Section 25- Pollution from Other Mobile Sources

- The DENR, in coordination with appropriate agencies, shall formulate and establish the necessary standards for all mobile sources other than those referred to in Section 21 of this Act. The imposition of the appropriate fines and penalties from these sources for any violation of emission standards shall be under the jurisdiction of the DOTr.

Section 46- Violation of Standards for Motor Vehicles

- Establish a roadside inspection system
- All law enforcement officials and deputized agents accredited to conduct vehicle emissions testing and apprehensions shall undergo a mandatory training on emission standards and regulations. For this purpose, the Department, together with the DOTr, DTI, DOST, Philippine National Police (PNP) and other concerned agencies and private entities shall design a training program.

Department of Trade and Industry – Bureau of Philippine Standards (DTI-BPS) and Board of Investors (DTI-BOI)

Section 21- Pollution from Motor Vehicles

- Participate in the formulation of an Action Plan for the control and management of air pollution from motor vehicles
- Contribute towards the establishment of procedures for inspection of motor vehicles, assist in the formulation and implementation of the National Motor Vehicle Inspection and Maintenance Program
- Accredit private emission testing centers (duly authorized by the DOTr)
- Develop and implement standards and procedures for the certification of training institutions, instructors and facilities and licensing of qualified private service centers and their technicians
- Prescribe regulations requiring the disclosure of odometer readings and use of tamper-resistant odometers, including tamper resistant fuel management systems

Section 22- Regulation of All Motor Vehicles and Engines

- The DTI shall promulgate the necessary regulations prescribing the useful life of vehicles and engines including devices in order to ensure that such vehicles will conform to the emissions which they were certified to meet. These regulations shall include provisions for ensuring the durability of emission devices.

APPENDIX 3. Detailed Roles and Responsibilities in the Air Quality Management Administration

Section 26- Fuels and Additives

- Pursuant to the Air Quality Framework to be established under Section 7 of this Act, the DOE, co-chaired by the DENR, in consultation with the Bureau of Product Standards (BPS) of the DTI, the DOST, the representatives of the fuel and automotive industries, academe and the consumers shall set specifications for all types of fuel and fuel-related products, to improve fuel composition for increased efficiency and reduced emissions: Provided, however, That the specifications for all types of fuel and fuel-related products set-forth pursuant to this section shall be adopted by the BPS as Philippine National Standards (PNS).

Section 46- Violation of Standards for Motor Vehicles

- All law enforcement officials and deputized agents accredited to conduct vehicle emissions testing and apprehensions shall undergo a mandatory training on emission standards and regulations. For this purpose, the Department, together with the DOTr, DTI, DOST, Philippine National Police (PNP) and other concerned agencies and private entities shall design a training program.

IRR, Rule XXXII, Sec 2

- The DTI through the Bureau of Import Services (BIS) shall formulate regulations and guidelines that will ensure rebuilt and imported second hand motor vehicles and engines will satisfy the emission standards for rebuilt and imported second hand motor vehicles as provided in these Implementing Rules and Regulations.

Department of Energy

Section 26- Fuels and Additives

- Pursuant to the Air Quality Framework to be established under Section 7 of this Act, the DOE, co-chaired by the DENR, in consultation with the Bureau of Product Standards (BPS) of the DTI, the DOST, the representatives of the fuel and automotive industries, academe and the consumers shall set specifications for all types of fuel and fuel-related products, to improve fuel composition for increased efficiency and reduced emissions: Provided, however, That the specifications for all types of fuel and fuel related products set-forth pursuant to this section shall be adopted by the BPS as Philippine National Standards (PNS).

APPENDIX 3. Detailed Roles and Responsibilities in the Air Quality Management Administration

- The DOE, shall also specify the allowable content of additives in all types of fuels and fuel-related products. Such standards shall be based primarily on threshold levels of health and research studies. On the basis of such specifications, the DOE shall likewise limit the content or begin the phase-out of additives in all types of fuels and fuel-related products as it may deem necessary. Other agencies involved in the performance of this function shall be required to coordinate with the DOE and transfer all documents and information necessary for the implementation of this provision.

Department of Interior and Local Government

Section 39- Public Education and Information Campaign

- A continuing air quality information and education campaign shall be promoted by the DENR, the Department of Education, Culture and Sports (DECS), the Department of the Interior and Local Government (DILG), the Department of Agriculture (DA) and the Philippine Information Agency (PIA). Consistent with Section 7 of this Act, such campaign shall encourage the participation of other government agencies and the private sector including NGOs, POs, the academe, environmental groups and other private entities in a multi-sectoral information campaign.

Department of Science and Technology – *(PNRI)*

Section 26- Fuels and Additives

- Pursuant to the Air Quality Framework to be established under Section 7 of this Act, the DOE, co-chaired by the DENR, in consultation with the Bureau of Product Standards (BPS) of the DTI, the DOST, the representatives of the fuel and automotive industries, academe and the consumers shall set specifications for all types of fuel and fuel-related products, to improve fuel composition for increased efficiency and reduced emissions: Provided, however, That the specifications for all types of fuel and fuelrelated products set-forth pursuant to this section shall be adopted by the BPS as Philippine National Standards (PNS).

Section 33- Radioactive Emissions

- All projects which will involve the use of atomic and/or nuclear energy, and will entail release and emission of radioactive substances into the environment, incident to the establishment or possession of nuclear energy facilities and

APPENDIX 3. Detailed Roles and Responsibilities in the Air Quality Management Administration

radioactive materials, handling, transport, production, storage, and use of radioactive materials, shall be regulated in the interest of public health and welfare by the PNRI, in coordination with the DENR and other appropriate government agencies.

PAGASA

Section 31- Greenhouse Gases

- shall regularly monitor meteorological factors affecting environmental conditions including ozone depletion and greenhouse gases and coordinate with the DENR in order to effectively guide air pollution monitoring and standard- setting activities.

Implementing Rules and Regulations
IRR section 22 (Air Quality Research)

Philippine Statistics Authority

IRR, Part V, Section 3

Air Quality Database. - The Bureau and the National Statistical Coordination Board (now PSA) shall design the Air Quality Database which shall be computerized and stored in a manner accessible to the public and shall contain data collected from the Ambient Air Monitoring Network and the Emissions Inventory.

Local Government Units

Section 8. Air Quality Control Action Plan

- To prepare and develop, with the assistance from the Department, an action plan consistent with the Integrated Air Quality Framework to attain and maintain the ambient of air quality standards within their respective airsheds as provided in Section 9 of the Act

Section 10- Designation of Non-attainment Areas

- To prepare and implement a program and other measures including relocation, whenever necessary, to protect the health and welfare of residents in the area
- To develop and submit to the DENR through the Bureau a procedure for carrying out the action plan for their jurisdiction, provided that the Department through the Bureau shall maintain its authority to independently inspect the enforcement procedure adopted

APPENDIX 3. Detailed Roles and Responsibilities in the Air Quality Management Administration

Section 24- Pollution from Smoking

- Smoking inside a public building or an enclosed public place including public vehicles and other means of transport or in any enclosed area outside of one's private residence, private place of work or any duly designated smoking area is hereby prohibited under this Act. This provision shall be implemented by the LGUs.

Section 36- Role of Local Government Units

- Local government units (LGUs) shall share the responsibility in the management and maintenance of air quality within their territorial jurisdiction. Consistent with Sections 7, 8 and 9 of this Act, LGUs shall implement air quality standards set by the Board in areas within their jurisdiction; Provided, however, That in case where the Board has not been duly constituted and has not promulgated its standards, the standards set forth in this Act shall apply.

Section 37- Environment and Natural Resources Office

- To establish an Environment and Natural Resources Office (ENRO) in every province, city, or municipality which shall be headed by the environment and natural resources officer appointed by the chief executive of every province, city or municipality in accordance with the provisions of Section 484 of the R. A. 7160

Philippine Information Agency

Section 39- Public Education and Information Campaign

- A continuing air quality information and education campaign shall be promoted by the DENR, the Department of Education, Culture and Sports (DECS), the Department of the Interior and Local Government (DILG), the Department of Agriculture (DA) and the Philippine Information Agency (PIA). Consistent with Section 7 of this Act, such campaign shall encourage the participation of other government agencies and the private sector including NGOs, POs, the academe, environmental groups and other private entities in a multi-sectoral information campaign.

APPENDIX 4. National Ambient Air Quality Guideline Values for Particulate Matter 2.5 (PM2.5)

CATEGORY	COLOR	RGB COLOR CODE	HEX COLOR CODE	PM2.5 (UG/M3)	CAUTIONARY STATEMENTS
Good	Green	(0,228,0)	#00E400	0 - 25	None
Fair	Yellow	(255,255,0)	#FFFF00	25.1 - 35.0	None
Unhealthy for sensitive groups	Orange	(255,126,0)	#FF7E00	35.1 - 45	People with respiratory diseases, such as asthma should limit outdoor exertion.
Very Unhealthy	Red	(255,0,0)	#FF0000	45.1 - 55	Pedestrians should avoid heavy traffic areas. People with heart or respiratory disease, such as asthma, should stay indoors and rest as much as possible. Unnecessary trips should be postponed. People should voluntarily restrict the use of vehicles.
Acutely Unhealthy	Purple	(143,63,151)	#8F3F97	55.1 - 90	People should limit outdoor exertion. People with heart or respiratory disease, such as asthma, should stay indoors and rest as much as possible. Unnecessary trips should be postponed. People should voluntarily restrict the use of vehicles.
Emergency	Maroon	(126,0,35)	#7E0023	Above 91	Everyone should remain indoors (keeping windows and doors closed unless heat is possible); Motor vehicle use should be prohibited except for emergencies. Industrial activities, except those that which is vital for public safety and health, should be curtailed.

APPENDIX 5. 2013-2020 Total Suspended Particulates from the AAQMS

REGION	MONITORING STATION LOCATION	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NATIONAL CAPITAL REGION (NCR)	Makati Bureau of Fire Cmpd., Ayala Avenue cor., Buendia St., Belair, Makati City	211	183	153	146	134	145	160	128	135		130	111	122	140	125	103	*
	Manila Observatory Ateneo De Manila University Katipunan Road Q. C.																52	*
	Valenzuela Municipal Hall, Pamantasan ng Lungsod ng Valenzuela, Valenzuela City	206	152	157	146	156	164	162	121	123	143	122	86	97	127	93		
	EDSA EAST Avenue BFD Compound East Avenue Q. C.	170	129	104	102	107	90	105	74	72	92	96	97	138	136	120		
	NCR-EDSA NPO Q.C	164	163	138	125	144	89	152	103	96	112	97						

REGION	MONITORING STATION LOCATION	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NATIONAL CAPITAL REGION (NCR)	ATENEO Manila Observatory, Ateneo University	105	87	72	65	74	62	79	58	62	70	50	48	44	55	57		
	Mandaluyong City Hall, Maycilo Circle, Plainview, Mandaluyong City	133	124	121	134	125	104	138	136	148		143	158	144	126	110		
	National Ecology Center Cmpd. East Avenue Central, Quezon City																122	*
	Dept. of Health, San Lazaro St., Rizal Avenue	134	138	111	110	103	103	132	101	114	115	105	109	107	99	95	92	*
	Pamantasan Lungsod ng Valenzuela, Maysan Road Poblacion, Valenzuela City																102	*

APPENDIX 5. 2004-2020 Total Suspended Particulates from the AAQMS

REGION	MONITORING STATION LOCATION	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NATIONAL CAPITAL REGION (NCR)	LLDA Compound Pasig, City Hall	109	106	90	92	85	126											
	Marikina Sports Complex, Sumulong Highway, Sto. Niño, Marikina City							125	125	108	97	81	104	107	95	92	95	*
	MRT-Taft Avenue Station EDSA Cor. Taft Avenue, Malibay, Pasay City	236	323	316	257	282	283	294	219	213	197	216						

REGION	MONITORING STATION LOCATION	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cordillera Administrative Region (CAR)	CAR-Plaza Garden	229	170	155	201													
REGION 1	Alaminos City, Province of Pangasinan, Infront of Nepo Mart	312	179	153	159	133	132	125										
	Vigan City, Ilocos Sur											127	145					
	San Fernando City, Beside Francisco Ortega Monument, Province of La Union	183		155	148			130	117									
REGION 2	EMB R2, Regional Government Center, Carig Sur, Tuguegarao City																60	35
	St. Paul University Philippines, Mabini Street, Tuguegarao City																57	40
	Tug. Sation Brgy. 10, Tufuegarao City	59	102	84	98		77	94	108	87								

APPENDIX 5. 2004-2020 Total Suspended Particulates from the AAQMS

REGION	MONITORING STATION LOCATION	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
REGION 3	Saluysoy Station, Meycauyan, Bulacan	190	309	186	116	106	124	61	21	14	6	41						
	Mel-Vi Bldg., OG Road, Dolores, City of San Fernando, Pampanga				215				128	243		202	180	316	217	106	--	38*
	Biay Station-Sta.Cruz, Zambales				457								68	70	41	44	--	70*
	Intercity Station, Intercity, Wakas, Bocaue, Bulacan								344	277		482	244	396	412	293	--	218*
Region 4-A	Batangas Station	144	140	46	49	50	19	22										
	Cavite Station	84	62	59	46													
REGION 4-B	Capitol Site, PGENRO, Capitol Site, Calapan City, Oriental Mindoro	217	86	110					159									
	Calapan City Public Market, Calapan City, Oriental Mindoro												67					
	Municipal Hall, Municipality of Baco, Oriental Mindoro												46			20	21	20
	Municipal Environment and Natural Resources Office (MENRO), Naujan, Oriental Mindoro												6					

APPENDIX 5. 2004-2020 Total Suspended Particulates from the AAQMS

REGION	MONITORING STATION LOCATION	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
REGION 5	Barriada, Legaspi City	72	72	125	84	46	80	48	34	40	35	40	37	41	105	71		
	San Nicolas, Iriga City	108	88	95	76	72	164	57	52	108	78	55	50	57	112	60		
	Panganiban Drive, Diversion Road, Naga City	84	83	101	105	84	157	102	69	101	96	72	72	78	108	124		
REGION 6	Jaro Police Station Cmpd., Iloilo City	182	141	68	67	80	78	51										
	Lapaz Plaza, Iloilo City	104	81	87	110	135	66	50	88		56	40	232	115	83	90	66	34
	Oton, Iloilo City								100		65	54	213					
REGION 7	DENR-7, Greenplains Subd., Banilad, Mandaue City		88	87	80				69	75	71	78	94	61	60	59		
	Cornilla Lao Residence Boundary of Barangays Inuburan & Langtad, City of Naga			159	137				110	124	121	106	94	64	75	84	59*	--
	Cebu Business Park, Cebu City								32								138*	73*
Region 8	P&M Bldg. DENR Cpd., Sto. Niño Extn., Tacloban City	73	45															
REGION 9	Zamboanga City Medical Center, Dr. Evangelista St., Zamboanga City	220	154	155	128	135	165	141	137									
	Barangay Sto. Nino, San Jose Road, Zamboanga City	209	161	149	105	119	135	113	124									
	Phil. Int. Dev't Inc. (PHIDCO), Baliwasan Seaside Zamboanga City	218	170	126	110	140	181	174	139									
REGION 11	Davao memorial park, phase II, Mc Arthur Highway, Davao City.	56	44	44	87	81	99	44	41	40								
	Las Palmeras Apartelle Open Compound, Quimpo Blvd., Davao City			63	63	56	60	83		61								
	Dacoville Subdivision, phase II, McArthur highway, dumoy, Toril, Davao city	64	63	66	36	31	58	65	44	35								
	Toril Open Park Area, Agton St., Toril Poblacion, Davao City	91	66	66	40	34	58	150		92								
REGION 12	Reg 12- Station 1Infront of Palomolog South Cotobato	135	81	86	90	86	75	73	58									
	Reg 12-Station 2 Infront of Mun. Hall Suralla Cotobato City	92	80	86	87	83	75	73	55									
	Reg 12-Station 3 Infron t of Mun. Hall, Isulan Sultan Kudarat	91	78	85	87	83	75	73	53									
REGION 13	New Asia, Butuan city	83	81	70	71	63	63	49	55	54								
	Station Petron Nasipit Depot, Nasipit Agusan Del Norte, Butuan City										68	68	93	76	84	115	95	112*
	Central Butuan, District 1 Ground, Butuan City								50	43	61	71	94					
	Cabadbaran City Hall, Cabadbaran City														65	93	92	82*

APPENDIX 6. 2013-2020 $PM_{2.5}$ from the AAQMS

REGION	TYPE OF STATION	LOCATION	2013	2014	2015	2016	2017	2018	2019	2020
NCR	Continuous Monitoring	Commonwealth Ave, Q.C		50						
	Continuous Monitoring	Pamantasan ng Lungsod ng Valenzuela, Valenzuela City	29	29	27	20	30			
	Continuous Monitoring	DLSU, 2401 Taft Ave., Manila	21	19	17	29	29			
	Continuous Monitoring	Andrews Avenue, Pasay City			31	22			*	--
	Continuous Monitoring	DPWH, Edsa, Nia Road	36	43	26	46	67			
	Continuous Monitoring	Navotas City Hall, M. Naval St. Navotas City			43	45	46		*	--
	Continuous Monitoring	Rohm and Hass Property, Las Piñas City			29	19			*	--
	Continuous Monitoring	Polytechnic Institute, City of Malabon			34				*	--
	Continuous Monitoring	North Caloocan City Hall – Zapote Street, Caloocan City			32				*	--
	Continuous Monitoring	Don Bosco Barangay Hall, Better Living Subdivision, Paranaque City			16	20			*	--
	Continuous Monitoring	Makati Park, Dr. Jose P. Rizal Extension, East Rembo, Makati City			26				*	--
	Continuous Monitoring	Pateros Elementary School, Pateros City			32				27	--
	Continuous Monitoring	Pinaglabanan Shrine, San Juan City			7		22	24	*	--
	Continuous Monitoring	Bureau of Corrections, New Bilibid Prison Reservation, Muntinlupa City			17	15			*	--
	Continuous Monitoring	Technological University of the Philippines-Taguig Campus, Taguig City			32				*	--
	Continuous Monitoring	Hardin ng Pagasa, Mandaluyong City Hall, Plainview, Mandaluyong City			31				*	--
	Continuous Monitoring	Brgy. Oranbo, Pasig			50	34	24	22	19	--
		Hospital ng Muntinlupa Cpd., Civic Dr., Filinvest Ave. Corporate City, Alabang, Muntinlupa City							*	--
	Continuous Monitoring	Parking Area of Marikina Justice Hall, Marikina City			33	31			*	--
	Continuous Monitoring	UE-Caloocan Campus, Samson Road, Caloocan City						14	*	--
	Continuous Monitoring	Manila Observatory, Ateneo de Manila University, Quezon City				18			*	--
	Continuous Monitoring	NAMRIA, Lawton Avenue, Fort Andres Bonifacio, Taguig				23			*	--
CAR	Continuous Monitoring	Burnham Park, Baguio City			23		15	16	14*	27*
		Plaza Garden, Central Business District, Lower Session Road, Baguio City							53*	--
	Continuous Monitoring	Mariano Marcos State University, Batac, Ilocos Norte			17	16	21	16	--	--
	Continuous Monitoring	Barangay. Anonas, Urdaneta City, Pangasinan			42	2	12	14	15	--
	Continuous Monitoring	Brgy., Parian, San Fernando City, La Union				12	8	2	0.49	--
		CSI Lucao, Dagupan City, Pangasinan							63	--
	Manual/Reference Method	City Plaza, San Carlos City, Pangasinan						49	67	--
	Manual/Reference Method	Dagupan City, Province of Pangasinan, western Central Elementary School				31	38	37	37	37
REGION3	Continuous Monitoring	Heroes' hall, San Fernando, City of San Fernando, Pampanga			24	6		15	14*	--
	Continuous Monitoring	City Government of Balanga, Balangay City Hall, Poblacion, Balanga City, Bataan				5	22	37	*	26
	Continuous Monitoring	Subic Bay Metropolitan Authority Bldg., 229, Waterfront Road, Subic Free port zone				11	5		20	20*
	Continuous Monitoring	Meycauayan City Hall, Meycauayan, Bulacan			28	26		28	*	--

APPENDIX 6. 2013-2020 $PM_{2.5}$ from the AAQMS

REGION	TYPE OF STATION	LOCATION	2013	2014	2015	2016	2017	2018	2019	2020
REGION 4A	Continuous Monitoring	City of Biñan, Biñan, Laguna			11	17		9	15	11
	Continuous Monitoring	Ynares Center Compound, Antipolo City						17	18*	19
	Continuous Monitoring	(Near) City Hall of Santa Rosa, City Government Center, J.P. Rizal Blvd. Santa Rosa, Laguna				19.0	29.6	27	*	--
REGION 4B	Continuous Monitoring	Palawan State University, Tiniguiban Heights, Puerto Princesa, Palawan			14				24	--
REGION 5	Continuous Monitoring	Naga City PENRO, Naga City			18	14	17	16	--	--
	Continuous Monitoring	EMB Region 5 Office, Regional Center Office, Rawis, Legaspi City				10	13	9	10*	--
REGION 6	Continuous Monitoring	City Hall of Bacolod, New Government Center, Bacolod City			14			40	--	--
	Manual/Reference Method	University of San Agustin, General Luna Street, Iloilo City			26	21	5	9	--	--
REGION 7	Continuous Monitoring	City Hall of Talisay, Tabunok, Talisay, Cebu							*	25*
REGION 9	Continuous Monitoring	Western Mindanao State University, Normal Road, Zamboanga City			4	10.57	10	14	15*	--
	Continuous Monitoring	Ateneo De Zamboanga University, La Purisima Street, Zamboanga City			17	14.82	5	5	11	9.0
	Continuous Monitoring	Iligan Medical Center College, San Miguel Village, Pala-o, Iligan City, Lanao del Norte			21	26	22		23*	15
REGION 10	Manual/Reference Method	El Salvador City School, Zone 2, Tuburan Brgy. Poblacion, Misamis Oriental						17	--	*
	Manual/Reference Method	DENR Compound, Brgy. Macabalan, Cagayan De Oro						24	22	18
	Manual/Reference Method	Balacanas Elementary School, Balacanas, Villanueva, Misamis Oriental						17		
REGION 11	Continuous Monitoring	DC Station 16: Calinan National High School, Quirino Avenue, Davao City			21	26	21	21	27	8
	Continuous Monitoring	DC Station 15: Davao International Airport, Catitipan, Buhangin District, Davao City			33	32	23	23	16	14
REGION 12	Continuous Monitoring	Pedro Acharon Sports Complex, Brgy. Calumpang, General Santos City			17	17	16		19*	--
	Continuous Monitoring	City of Koronadal, General Santos Drive, Koronadal City			31	19	18	22	22*	--
REGION 13	Continuous Monitoring	Butuan City Local Government Unit (Compound of City Environment Office), Barangay Doongan, Butuan City, Agusan Del Norte			19	15	16	15	17	19
	Continuous Monitoring	Caraga State University, Ampayon, Butuan City			20		10	3	--	*

APPENDIX 7. 2012-2020 PM_{10} from the AAQMS

REGION	TYPE OF STATION	LOCATION	2012	2013	2014	2015	2016	2017	2018	2019	2020
CAR	Manual/Reference Method	Plaza Garden Park, Central Business District, Lower Session Road, Baguio City	72	69				79	66	59*	48
	Continuous Monitoring	Burnham Park, Baguio City	35					40	27	40	27
		Benguet State University (BSU) Forestry Compound Trinidad Benguet								8*	20
		Philippine Economic Zone (PEZA), Loakan Road, Baguio City								10*	25
		Provincial Capital Ground, KM. 6, La Trinidad, Benguet								82	71

REGION	TYPE OF STATION	LOCATION	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Continuous Monitoring	Valenzuela - Radio ng Bayan, Valenzuela City	58	74	53						
	Continuous Monitoring	NAMRIA, Lawton Avenue, Fort Andres Bonifacio, Taguig City	43	54						*	--
	Continuous Monitoring	Andrews Avenue, Pasay City				78		66	75	--	--
	Continuous Monitoring	Navotas City Hall, M. Naval St. Navotas City				72	66	94	54	*	--
	Continuous Monitoring	Rohm and Hass Property, Las Piñas City				35	27	41	27	*	--
	Continuous Monitoring	Polytechnic Institute, City of Malabon				45			41	--	--
	Continuous Monitoring	North Caloocan City Hall – Zapote Street, Barangay 177, Caloocan City				54			56	*	--
	Continuous Monitoring	Don Bosco Barangay Hall, Better Living Subdivision, Paranaque City				52	33		45	*	--
	Continuous Monitoring	Makati Park, Dr. Jose P. Rizal Extension, East Rembo, Makati City								--	--
	Continuous Monitoring	Pateros Elementary School, Pateros City				52		66	55	61	--
	Continuous Monitoring	Pinaglabanan Shrine, San Juan City				18	48	46	33	*	--

APPENDIX 7. 2012-2020 PM_{10} from the AAQMS

REGION	TYPE OF STATION	LOCATION	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Continuous Monitoring	Bureau of Corrections, New Bilibid Prison Reservation, Muntinlupa City				31	24			*	--
	Continuous Monitoring	Technological University of the Philippines-Taguig Campus, Taguig City				66	45		53	*	--
	Continuous Monitoring	Hardin ng Pagasa, Mandaluyong City Hall, Plainview, Mandaluyong City				63		49	47	*	--
	Continuous Monitoring	Brgy. Oranbo, Pasig				69	50	42	40	*	--
		UE-Caloocan Campus, Samson Road, Caloocan City								*	--
		Marikina City Environmental Management Office (CEMO), Gil Fernando Ave., Brgy. Sto Niño, Marikina City								*	--
	Continuous Monitoring	Parking Area of Marikina Justice Hall, Marikina City				56	55	51	45	*	--

REGION	TYPE OF STATION	LOCATION	2012	2013	2014	2015	2016	2017	2018	2019	2020
R1	Manual/Reference Method	City Hall Compound Urdaneta City, Pangasinan		40							
	Manual/Reference Method	West Central Elementary School, Dagupan City, Pangasinan	46	47	59	68					
	Manual/Reference Method	City Plaza San Fernando City, Launion			81	73					
	Manual/Reference Method	City Plaza San Carlos City, Pangasinan			83	75	72	46			
	Manual/Reference Method	Plaze Burgos, Ilocos Sur, Vigan City					75	51	63	87	62
	Continuous Monitoring	Brgy., Parian, San Fernando City, La Union					28	12	3		
	Continuous Monitoring	Barangay. Anonas, Urdaneta City, Pangasinan				47	17	12	23		
	Continuous Monitoring	Mariano Marcos State University, Batac, Ilocos Norte				24	23	24	22		
R2	Manual/Reference Method	Tuguegarao City Monitoring, St. Paul University Philippines, Mabini Street, Tuguegarao City			29				27		
	Manual/Reference Method	City Hall Grounds, Santiago City							11		

APPENDIX 7. 2012-2020 PM_{10} from the AAQMS

REGION	TYPE OF STATION	LOCATION	2012	2013	2014	2015	2016	2017	2018	2019	2020
R1	Manual/Reference Method	City Hall Compound Urdaneta City, Pangasinan		40							
	Manual/Reference Method	West Central Elementary School, Dagupan City, Pangasinan	46	47	59	68					
	Manual/Reference Method	City Plaza San Fernando City, Launion			81	73					
	Manual/Reference Method	City Plaza San Carlos City, Pangasinan			83	75	72	46			
	Manual/Reference Method	Plaze Burgos, Ilocos Sur, Vigan City					75	51	63	87	62
	Continuous Monitoring	Brgy., Parian, San Fernando City, La Union					28	12	3		
	Continuous Monitoring	Barangay. Anonas, Urdaneta City, Pangasinan				47	17	12	23		
	Continuous Monitoring	Mariano Marcos State University, Batac, Ilocos Norte				24	23	24	22		
R2	Manual/Reference Method	Tuguegarao City Monitoring, St. Paul University Philippines, Mabini Street, Tuguegarao City			29				27		
R3	Continuous Monitoring	Meycauayan City Hall, Meycauayan, Bulacan				45	42	38	43	49	50
	Continuous Monitoring	City Government of Balanga, Balangay City Hall, Poblacion, Balanga City, Bataan					8	36	34	--	34
	Continuous Monitoring	Subic Bay Metropolitan Authority Bldg., 229, Waterfront Road, Subic Free port zone					7			29	24*
		Airforce City, CSEZ, Angeles, Pampanga								--	23*
	Continuous Monitoring	Heroes' hall, San Fernando, City of San Fernando, Pampanga				29	10		11	18	14
R4A		Ynares Center Compound, Antipolo City							22	22*	21
	Continuous Monitoring	City of Biñan, San Pablo St., Biñan City, Laguna				22*	30		14	17	12
	Continuous Monitoring	Cavite State University, Indang Cavite		32							
	Continuous Monitoring	Brgy. Bolbok, Batangas City		29							
	Continuous Monitoring	(Near) City Hall of Santa Rosa, City Government Center, J.P. Rizal Blvd. Santa Rosa, Laguna						30	34	5*	--

APPENDIX 7. 2012-2020 PM_{10} from the AAQMS

REGION	TYPE OF STATION	LOCATION	2012	2013	2014	2015	2016	2017	2018	2019	2020
R4B	Continuous Monitoring	Palawan State University, Tiniguiban Heights, Puerto Princesa, Palawan				26	20	22		34	--
	Manual/Reference Method	Municipal Hall, Municipality of Baco, Oriental Mindoro	41			60			6		
	Manual/Reference Method	Provincial Capitol Complex, Oriental Mindoro, Calapan City							15	22	59*
	Manual/Reference Method	Naujan, Oreintal Mindoro							14	21	41*
R5	Manual/Reference Method	Barraida, Legaspi City		32	39	38	36	39	36	35	25*
	Manual/Reference Method	San Nicholas, Iriga City								36	44*
	Manual/Reference Method	Sorsogon City Hall Compound, Diversion Road, Sorsogon City								31*	31*
	Manual/Reference Method	Elevated Plaza, Daet, Camarines Norte								37*	37*
	Manual/Reference Method	Masbate Terminal Road, Masbate City								9*	20*
	Continuous Monitoring	Naga City PENRO, Naga City				29	25	26	26	24*	26*
R6	Continuous Monitoring Manual/Reference Method	EMB Region 5 Office, Regional Central Philippine University campus, Jaro, iloilo city	21		19		21	26	35	*	--
	Manual/Reference Method	University of San Agustin, General Luna Street, Iloilo City				43	28	7	22		
	Manual/Reference Method	Leganes Municipal Grounds, Poblacion, leganes, Iloilo City				51					
	Manual/Reference Method	Oton National Elementary School, Oton, Iloilo City					38	57	81	42	20
	Continuous Monitoring	City Hall of Bacolod, New Government Center, Bacolod City				28			58	71*	--
R7	Manual/Reference Method	Mabolo, Cebu City	77	73	58	52	50				
	Manual/Reference Method	Cebu Business Park, Cebu city	36	33	20	34	26				
	Continuous Monitoring	City Hall of Talisay, Tabunok, Talisay, Cebu								*	35*
	Manual/Reference Method	Consolacion Municipal Hall, Consolacion, Cebu						49	47	55*	--
	Manual/Reference Method	Cordova Municipal Hall, Cordova, Cebu						41	39	40*	47*
R8	Manual/Reference Method	Robinsons Place, Tacloban				64	61	54	45	47	16*

APPENDIX 7. 2012-2020 PM_{10} from the AAQMS

REGION	TYPE OF STATION	LOCATION	2012	2013	2014	2015	2016	2017	2018	2019	2020
R9	Continuous Monitoring	Western Mindanao State University, Normal Road, Zamboanga City				11	12	10	21	28*	--
	Continuous Monitoring	Ateneo De Zamboanga University, La Purisima Street, Zamboanga City				20	17	5		13	10
	Manual/Reference Method	Zamboanga City Medical Center. Compound, Dr. Evangelista Street Corners Veterans Ave., & Gov. Lim Ave., Zamboanga City		52	52	32	57	59	52	29*	14*
	Manual/Reference Method	EMB - 9 Compound, Lantawan, Pasonanca, Zamboanga City (Started 2013)		34	41	45	39	38	39	14*	12
	Manual/Reference Method	Philippine International Development Incorporated (PHIDCO), Baliwasan Seaside Zamboanga City Zamboanga del Sur		44	52	60	51	71	47	40*	14*
R10	Continuous Monitoring	Iligan Medical Center College, San Miguel Village, Pala-o, Iligan City, Lanao del Norte				49	50			57*	37
R11	Manual/Reference Method	Approx. 70m from Amparo St. And 300m from Davao-Agusan National Highway		19	16	35		49	48	25	16
	Manual/Reference Method	Brgy. 12-B, Mapa St. Corner J.P Laurel Ave., Davao City (Fronting Brgy. Hall)		21	21	45		56	42	28	15
	Manual/Reference Method	Approx. 800m DMPI main gate, Davao Memorial Park Phase2, McArthur Highway, Matina, Davao City		14	15	34	33	36	31	19	14
	Manual/Reference Method	Approximately 50m from Agton St. Open Park in front of Toril District Hall, Agton St., Davao City		27	30	57	57	57	63	41	21
	Continuous Monitoring	Calinan National High School, Quirino Avenue, Davao City				36	61	57	34	34	24
	Continuous Monitoring	Davao International Airport, Catitipan, Buhangin District, Davao City				73	54	40	46	35	26

APPENDIX 7. 2012-2020 PM_{10} from the AAQMS

REGION	TYPE OF STATION	LOCATION	2012	2013	2014	2015	2016	2017	2018	2019	2020
R12	Manual/Reference Method	Infront of Municipal Hall Tupi, South Cotabato	54	50	56		25	24		30	41
	Continuous Monitoring	**City of Koronadal, General Santos Drive, Koronadal City	57	51	64	49	39	31	42	19*	32*
	Manual/Reference Method	Municipal Hall of Midsayap	51	63	75						
	Continuous Monitoring	Pedro Acharon Sports Complex, Brgy. Calumpang, General Santos City				35	38	19		38*	57*
R13	Manual/Reference Method	Central Butuan, District 1 Ground, Butuan City				58					
		Cabadbaran City Hall, Cabadbaran City						22	30	40*	26*
	Manual/Reference Method	Petron Nasipit Depot, Nasipit Agusan Del Norte, Butuan City				55	17	17		44*	25*
	Continuous Monitoring	Caraga State University, Ampayon, Butuan City				37		19	6	--	*
	Continuous Monitoring	Butuan City Local Government Unit (Compound of City Environment Office)				35	29	28	28	32	27

APPENDIX 8. Pertinent Policies on Air Quality

DOCUMENT NO.	TITLE	DATE APPROVED
DAO 2020-14[31]	**Establishing the Breakpoints for Particulate Matter 2.5 (PM2.5) Air Quality Index (AQI) and Amending Section 5 (a) of DAO 2013-13 "Establishing the Provisional National Ambient Air Quality Guideline Values for Particulate Matter 2.5 (PM2.5)"**	**October 21, 2020**
EMB MC 2020-003[32]	Mandating All EMB Regional Offices (EMB-ROs) to Establish an Air Quality Network Center using a Uniform Data Acquisition and Handling System (DAHS), which shall act as Repository of Industrial Emission of Firms Required to install Continuous Emission Monitoring Systems (CEMS) / Continuous Opacity Monitoring System (COMS)	January 27, 2020
EMB MC 2020-17[33]	Guidelines on the Issuance of Permit to Operate (PTO) for Air Pollution Source Installation or Equipment (APSI/APSE) through the Online Permitting and Monitoring System (OPMS)	May 11, 2020

DAO-2020-14
https://emb.gov.ph/wp-content/uploads/2020/05/MC-2020-003-MANDATING-ALL-EMB-REGIONAL-OFFICES-TOESTABLISH-AN-AQ-NETWORK-CENTER.pdf
https://emb.gov.ph/wp-content/uploads/2020/05/MC-2020-17-Guidelines-with-the-issuance-of-PTO-withAnnex_May-11-2020-signed.pdf

APPENDIX 9. Mt. Mayon Air Quality Monitoring

LOCATION	DATE	TSP (ug/NCM)
LEGAZPI CITY, ALBAY	December 31, 2019-January 1, 2020(T-W)	30
	January 10-11, 2020(F-Sa)	32
	January 16-17, 2020(Th-F)	30
	January 22-23, 2020(W-Th)	51
	January 28-29, 2020(T-W)	38
	February 03-04, 2020 (M-Tu)	54
	February 09-10, 2020 (Su-M)	39
	February 15-16, 2020 (Sa-Su)	66
	February 21-22, 2020 (F-Sa)	46
	February 27-28, 2020 (Th-F)	48
	March 4-5, 2020(w-Th)	61
	March 10-11, 2020(T-W)	30
	June 18-19, 2020(Th-F)	43
	June 24-25, 2020(W-Th)	30
	June 30-July 1, 2020(T-W)	55
	July 6-7, 2020(M-T)	28
	July 12-13, 2020(Su-M)	102
	July 18-19, 2020(Sa-Su)	12
	July 24-25, 2020(F-Sa)	35
	August 5-6, 2020(W-Th)	31
	August 11-12, 2020(T-W)	36
	August 17-18, 2020(M-T)	93
	August 23-24, 2020(Su-M)	63
	August 29-30,2020(Sa-Su)	60
	September 4-5, 2020(F-Sa)	96
	September 10-11, 2020(Th-F)	62
	September 16-17, 2020(W-Th)	54
	September 22-23, 2020(T-W)	46
	September 28-29, 2020(M-T)	81
	October 4-5,2020(Su-M)	29
	October10-11, 2020(Sa-Su)	51
	October 16-17, 2020(F-Sa)	70
	October 22-23, 2020(Th-F)	77
	October 28-29, 2020(W-Th)	54
	November 18-19. 2020(W-Th)	14
	November 24-25, 2020(T-W)	34
	*December 1-2, 2020(T-W)	42
	*December 7-8, 2020(M-T)	12
	*December 13-14. 2020(Su-M)	12
	*December 19-20, 2020(Sa-Su)	15

LOCATION	DATE	TSP (ug/NCM)
MALILIPOT, ALBAY	December 31, 2019-January 1, 2020(T-W)	31
	January 10-11, 2020(F-Sa)	38
	January 16-17, 2020(Th-F)	5
	January 22-23, 2020(W-Th)	12
	January 28-29, 2020(T-W)	52
	February 03-04, 2020 (M-Tu)	29
	February 09-10, 2020 (Su-M)	48
	February 15-16, 2020 (Sa-Su)	10
	February 21-22, 2020 (F-Sa)	38
	February 27-28, 2020 (Th-F)	18
	March 4-5, 2020(w-Th)	31
	March 10-11, 2020(T-W)	32
	June 18-19, 2020(Th-F)	30
	June 24-25, 2020(W-Th)	6
	June 30-July 1, 2020(T-W)	28
	July 6-7, 2020(M-T)	22
	July 12-13, 2020(Su-M)	58
	July 18-19, 2020(Sa-Su)	17
	July 24-25, 2020(F-Sa)	29
	September 4-5, 2020(F-Sa)	39
	September 10-11, 2020(Th-F)	34
	September 16-17, 2020(W-Th)	14
	September 22-23, 2020(T-W)	41
	September 28-29, 2020(M-T)	29
	October 4-5,2020(Su-M)	14
	October10-11, 2020(Sa-Su)	29
	October 16-17, 2020(F-Sa)	37
	October 22-23, 2020(Th-F)	68
	*December 7-8, 2020(M-T)	19
	December 19-20, 2020(Sa-Su)	30

APPENDIX 9. Mt. Mayon Air Quality Monitoring

LOCATION	DATE	TSP (ug/NCM)
LIGAO CITY, ALBAY	December 31, 2019-January 1, 2020(T-W)	29
	January 10-11, 2020(F-Sa)	131
	January 16-17, 2020(Th-F)	184
	January 22-23, 2020(W-Th)	104
	January 28-29, 2020(T-W)	86
	February 03-04, 2020 (M-Tu)	87
	February 09-10, 2020 (Su-M)	69
	February 15-16, 2020 (Sa-Su)	77
	February 21-22, 2020 (F-Sa)	45
	February 27-28, 2020 (Th-F)	66
	March 4-5, 2020(w-Th)	56
	March 10-11, 2020(T-W)	77
	June 18-19, 2020(Th-F)	42
	June 24-25, 2020(W-Th)	46
	June 30-July 1, 2020(T-W)	55
	July 6-7, 2020(M-T)	40
	July 12-13, 2020(Su-M)	54
	July 18-19, 2020(Sa-Su)	34
	July 24-25, 2020(F-Sa)	26
	September 4-5, 2020(F-Sa)	81
	September 10-11, 2020(Th-F)	83
	September 16-17, 2020(W-Th)	33
	September 22-23, 2020(T-W)	63
	September 28-29, 2020(M-T)	34
	October 4-5,2020(Su-M)	38
	October10-11, 2020(Sa-Su)	34
	October 16-17, 2020(F-Sa)	50
	October 22-23, 2020(Th-F)	128
	October 28-29, 2020(W-Th)	79
	November 18-19. 2020(W-Th)	56
	November 24-25, 2020(T-W)	27
	*December 1-2, 2020(T-W)	34
	*December 7-8, 2020(M-T)	31
	*December 13-14. 2020(Su-M)	70
	*December 19-20, 2020(Sa-Su)	27

LOCATION	DATE	TSP (ug/NCM)
GUINOBATAN, ALBAY	December 31, 2019-January 1, 2020(T-W)	40
	January 10-11, 2020(F-Sa)	30
	January 16-17, 2020(Th-F)	3
	January 22-23, 2020(W-Th)	61
	January 28-29, 2020(T-W)	91
	February 03-04, 2020 (M-Tu)	110
	February 09-10, 2020 (Su-M)	70
	February 15-16, 2020 (Sa-Su)	96
	February 21-22, 2020 (F-Sa)	43
	February 27-28, 2020 (Th-F)	202
	March 4-5, 2020(w-Th)	80
	March 10-11, 2020(T-W)	81
	June 18-19, 2020(Th-F)	51
	June 24-25, 2020(W-Th)	61
	June 30-July 1, 2020(T-W)	66
	July 6-7, 2020(M-T)	52
	July 12-13, 2020(Su-M)	73
	July 18-19, 2020(Sa-Su)	42
	July 24-25, 2020(F-Sa)	82
	September 16-17, 2020(W-Th)	41
	September 22-23, 2020(T-W)	47
	September 28-29, 2020(M-T)	33
	October 4-5,2020(Su-M)	20
	October10-11, 2020(Sa-Su)	29
	October 16-17, 2020(F-Sa)	40
	October 22-23, 2020(Th-F)	63
	October 28-29, 2020(W-Th)	44
	November 18-19. 2020(W-Th)	55
	November 24-25, 2020(T-W)	54
	December 1-2, 2020(T-W)	28
	December 7-8, 2020(M-T)	13
	December 13-14. 2020(Su-M)	47
	December 19-20, 2020(Sa-Su)	21

APPENDIX 10. Clean Air Initiatives from other Agencies

Department of Public Works and Highways

DEPARTMENT ORDER	OBJECTIVE
Department Order No. 88 Series of 2020 (Prescribing Guidelines on the Design of Bicycle Facilities along National Roads)	All projects of DPWH that involve new road and bridge construction or future expansion to relieve traffic congestions such as road/bridge widening, diversion/bypass roads, among others, shall include in its design the provision of bicycle facility, if feasible. Encouraging the use of bicycle, a uniform design of bicycle facilities shall be included in in order to achieve a consistent appræch that will meet the needs and safe access of bi clists and other road users.
Department Order No. 05 Series of 2018 (Preventive Maintenance Manual for DPWH •Most Commonly Used Equipment and Service Vehicles	Directs and orients all the heaw equipment operators and drivers to ensure that all equipment and service vehicles are properly serviced and maintained followin the D.O. 5 s.
Department Order No. 05 Series of 2018 (Preventive Maintenance Manual for DPWH Most Commonly Used Equipment and Service Vehicles	2018 (Preventive Maintenance Manual) and the D.O. 11 s. 2016 (Routine Maintenance for Sewjce Vehjdes and Most Commonly Used E ui ment Manual .
Department Order No. 57 Series of 2016 (Environmental Impact Assessment (EIA) for the DPWH Infrastructure Projects and Tree Cutting Permit Application)	Which requires all the Implementing Offices of the Department to prepare an environmental document and secure ECC from the DENR for infrastructure projects that can significantly affect the Environment (e.g. degradation of air uali durin Construction hase .
Department Order No. 224 Series of 2003 (Creation of Regional Environmental Impact Assessment Offices	The creation of REIOA's aims to strengthen the capability of the regional offices in carrying out Department's environmental and social commitments.
Department Order No. 245 Series of 2003 (Implementation of the Social and Environment System Operations Manual	It contains a manual that is use by the Department as a guide for the preparation and implementation of social and environmental impact assessment, environmental monitoring of infrastructure projects and other environmentalrelated activities of the Department such as the determination of the impact of construdion/operations on concentrations of dust and vehicular emissions (Sulphur dioxide and nitrogen dioxide) used for the preparation of Ambient Air ualí Measurement Re rt.
Department Order No. 220 series of 1999 (Strengthening the Environmental Impact Assessment Project Office (EIAPO)	The Department creates the Environmental Office of the Department in the Central Office and Regional Offices Nationwide which is responsible to conduct EIA, prepare environmental repots and conduct environmental monitoring. Further, an Environmental Focal Person (EFP) is designated in the District Engineering Offices Nationwide to act as the counterpatt of the environmental officers from the central and the regional offices.
Department Order No. 58 Series of 2004 (Renaming of Environmental Impact Assessment Project Office to the Environmental and Social Services Office	
Department Order No. 02 series of 2014 (Renaming of Environmental and Social Services Office to Environmental and Social Saf uards Division	

APPENDIX 10. Clean Air Initiatives from other Agencies

Relevant policies of the Department in connection with the Air Quality are being strictly applied as follow:

DEPARTMENT ORDER	OBJECTIVE
Department Order No. 88 Series of 2020 (Prescribing Guidelines on the Design of Bicycle Facilities along National Roads)	All projects of DPWH that involve new road and bridge construction or future expansion to relieve traffic congestions such as road/bridge widening, diversion/bypass roads, among others, shall include in its design the provision of bicycle facility, if feasible. Encouraging the use of bicycle, a uniform design of bicycle facilities shall be included in in order to achieve a consistent approach that will meet the needs and safe access of bi lists and other road users.
Department Order No. 05 Series of 2018 (Preventive Maintenance Manual for DPWH Most Commonly Used Equipment and Service Vehides	Directs and orients all the heavy equipment operators and drivers to ensure that all equipment and service vehides are properly serviced and maintained followin the D.O. 5 s.
Department Order No. 05 Series of 2018 (Preventive Maintenance Manual for DPWH Most Commonly Used Equipment and Service Vehicles	2018 (Preventive Maintenance Manual) and the D.O. 11 s. 2016 (Routine Maintenance for Service Vehicles- and Most Commonly Used E ui ment Manual .
Department Order No. 57 Series of 2016 (Environmental Impact Assessment (EIA) for the DPWH Infrastructure Project and Tree Cutting Permit Application)	Which requires all the Implementing Offices of the Department to prepare an environmental document and secure ECC from the DENR for infrastructure projects that can significantly affect the Environment (e.g. degradation of air uali durin Construction hase .
Department Order No. 224 Series of 2003 (Creation of Regional Environmental Impact Assessment Offices	The creation of REIOA's aims to strengthen the capability of the regional offices in carrying out Department's environmental and social commitments.
Department Order No. 254 Series of 2003 (Implementation of the Social and Environment System Operations Manual	It contains a manual that is use by the Department as a guide for the preparation and implementation of social and environmental impact assessment, environmental monitoring of infrastructure projects and other environmentalrelated activities of the Department such as the determination of the impact of construdion/operations on concentrations of dust and vehicular emissions (Sulphur dioxide and nitrogen dioxide) used for the preparation of Ambient Air ↄuali Measurement Re ort.
Department Order No. 220 series of 1999 (Strengthening the Environmental Impact Assessment Project Office (EIAPO))	The Department creates the Environmental Office of the Department in the Central Office and Regional Offices Nationwide which is responsible to conduct EIA, prepare environmental reports and conduct environmental monitoring. Further, an Environmental Focal Person (EFP) is designated in the District Engineering Offices Nationwide to act as the counterpart of the environmental officers from the central and the regional offices.
Department Order No. 58 Series of 2004 (Renaming of Environmental Impact Assessment Project Office to the Environmental and Social Services Office	
Department Order No. 02 series of 2014 (Renaming of Environmental and Social Services Office to Environmental and Social Safe uards Division	

APPENDIX 10. Clean Air Initiatives from other Agencies
Department of Energy (DOE)

A. Clean Air Act –Fuel Quality Requirement		
Unleaded Gasoline	▪ **PNS 1131:2000 – Unleaded Premium Motor Gasoline (single grade ULG 95RON)** Aromatics 45% max. Jan. 1, 2000 Benzene 4% max. Jan. 1, 2000	*ULG complying to CAA for 2000 specs fuel quality requirements*
	▪ **PNS 1131:2001 - Unleaded Motor Gasoline (Introduced ULG multigrade - (95, 93, 87 & 81 RON)** revision/update of ULG 2000 specs AKI 87.5% min. Jan. 1, 2001 RVP 9 psi max. Jan. 1, 2001	*ULG complying to CAA for 2001 specs fuel quality requirements*
	▪ **PNS 1131: 2002/ DOE 001:2002 – Unleaded Motor Gasoline** revision/update of ULG 2001 specs Aromatics 35% max. Jan. 1, 2003 Benzene 2% max. Jan. 1, 2003	*ULG complying to CAA for 2003 specs fuel quality requirements and the last CAA fuel quality requirements ULG*
Diesel Oil	✦ **PNS 20:2000 - Diesel Oils** O *Automotive Diesel Oil (ADO)* Sulfur 0.2% max. Jan. 1, 2001 Cetane No./Index 48 min Jan. 1, 2001 O *Industrial Diesel Oil (IDO)* ✦ Sulfur 0.3% max. Jan. 1, 2001	*Complying to CAA 2001 specs for Automotive Diesel Oil (ADO) & Industrial Diesel Oil (IDO)*
	▪ **PNS/DOE QS 004:2003 – Diesel Oil** - revision/update of Diesel Oil 2001 specs ➢ *Automotive Diesel Oil (ADO)* ▪ **Sulfur 0.05% Jan. 1, 2004**	*ADO complying to CAA 2004 specs and the last CAA mandated fuel quality requirements*
B. Post Clean Air Act		
Unleaded Gasoline	▪ **PNS/DOE QS 001:2005 – Unleaded Motor Gasoline** - revision/update of ULG 2002 specs	*ULG complying to the EURO 2 level at 0.05% sulfur limit*
	- ULG (set Sulfur limit to EURO 2 level)	*maximum*
	▪ **PNS/DOE QS 001:2009 - Unleaded Motor Gasoline** - revision/update of ULG 2005 specs - ULG (pure petrol, distinct from E-10)	*The last PNS for conventional gasoline developed or phasing out the pure petrol and mandating the biofuels blend.*
C. Petroleum and other Petroleum Related Products		
2T lubricating oil	▪ **PNS/DOE QS 003:2003 - Two-stroke (2T) lubricating oil** - revision/update of 1992 specs Consider CME as a possible feedstock	
LPG	▪ **PNS/DOE QS 005:2016 - Liquefied Petroleum Gases (LPG) as Non-Motor Fuel** - revision/update of LPG 2005 specs highlight of the revision is the improvement in the use odorant for health and safety consideration	
	▪ **PNS/DOE QS 0012:2016 - Liquefied Petroleum Gases (LPG) as Motor Fuel** - revision/update of LPG 2005 specs This new edition, a new PNS number was created to separate the application of LPG as motor fuel from LPG as non-motor fuel (domestic, commercial and industrial fuel) for more effective implementation and monitoring	

APPENDIX 10. Clean Air Initiatives from other Agencies
Department of Energy (DOE)

C. Petroleum and other Petroleum Related Products		
Industrial Fuel Oil (IFO)	✦ **PNS/DOE QS 006:2018 – Industrial Fuel Oils (IFO)** - This standard is a revision/update of PNS/DOE QS 006:2005 with minor revision made particularly the ✦ deletion of the word "bunker" and referred only as industrial fuel oil as well as updating of test methods.	
Kerosene	▪ **PNS/DOE QS 09:2019 - Kerosene** - This standard is a revision/update of PNS /DOE QS 009:2007 with minor revision made only in the property of color and updating of test methods.	
Aviation Gasoline Grade 100LL	▪ **PNS/DOE ASTM D 910:2010 - Aviation Gasoline – Grade 100LL** The standard is derived from ASTM D 910-07A Standard Specification for Aviation Gasoline and is limited only for Grade 100LL all other grades are excluded for the purpose of complying with the Clean Air Act of the Phils.	
Residual Marine Fuel (RMF)	▪ **PNS/DOE QS 014:2018 - Residual Marine Fuel Specification** - This is a new standard developed/formulated as a new and separate PNS for Residual Marine Fuel Specification, using ISO 8217:2017 (E) Petroleum Products – Fuels (class F)Specifications of marine fuels as reference standard, specifically the residual marine fuel category ISO-F-RMG 180 and ISO-F-RMK 380. - In this standard, the statutory requirement for the sulfur content is set at 3.0%, mass, maximum based on PNS for Fuel Oils (PNS/DOE QS 006). - Some changes were also made on the following properties (e.g. Hydrogen sulfide, Aluminum plus silicon, Pour point and Used Lubricating Oil (ULO).	*This standard intends to adopt the program/ guidelines of International Maritime Organization (IMO) for the requirement of sulfur content subject to statutory requirements set by MARINA.*

Fuel Products	Philippine National Standard (PNS)	Remarks
A. Pre-Biofuel Act		
B100	▪ **PNS 2020:2003 / DOE 002:2003(B100) - Cocunut Methyl Ester (B_{100})** - this was developed and made to ensure the quality and effectiveness of coconut methyl ester (CME) for blending with diesel	Jumpstarting the coco-diesel program

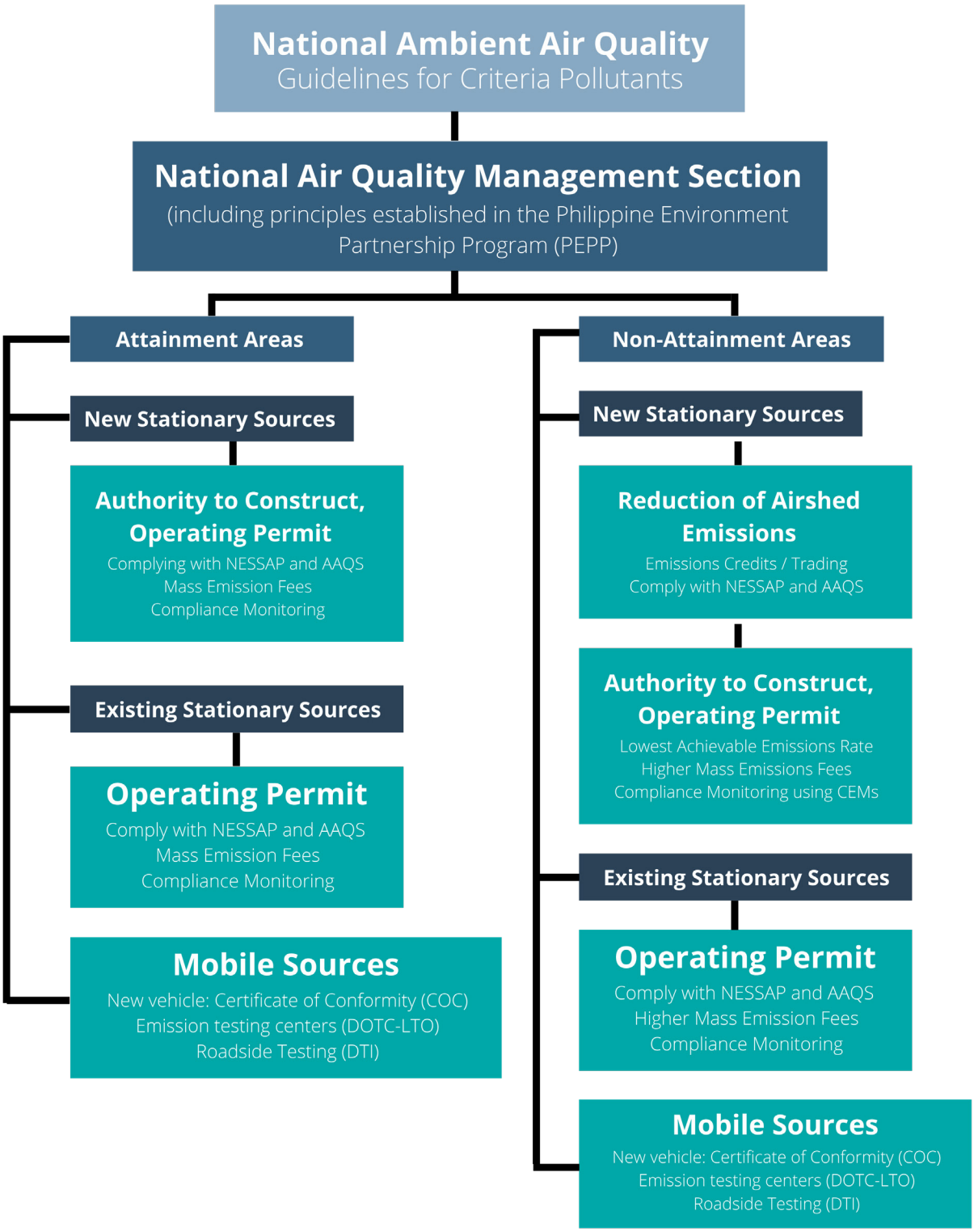
APPENDIX 10. Clean Air Initiatives from other Agencies
Department of Energy (DOE)

*B. Biofuel Act - (*Biofuels & Biofuels Blended Fuel		
E-Gasoline (E10)	**PNS/DOE QS 008:2018 - Petroleum Products - *E-Gasoline Fuel – Specification (E10*)** This standard is revision/update of PNS/DOE QS 008:2012 specs. ✦ In this edition, the PNS provided and limits the coverage only for Euro 4-PH **(50 ppm, max. Sulfur content)** to align with the emission requirement of DENR under DAO No 2015-04 & 2016-23. ✦ Improvement was also made on several specs, incorporated other properties and its limits as well as updating of test methods.	*Complying the E10 mandate or 10% bioethanol blend under the Biofuels Act 2009 (RA9367)* *Complying the 50 ppm, maximum Sulfur content*
Automotive diesel oil (ADOB2)	**PNS/DOE QS 004:2017 - Petroleum Products – *CME-blended automotive diesel oil –Specification (ADOB2)*** This standard is a revision/update of PNS.DOE QS 004:2012. ✦ In this edition, the PNS provided and limits PNS coverage only for Euro IV-PH (50 ppm, max. Sulfur content) to align with the emission requirement of DENR under DAO No 2015-04 & 2016-23. ✦ Further the PNS provided only the requirements for automotive diesel oil (ADO) separate from industrial diesel oil (IDO) for effective implementation and monitoring.	*Complying the B2 mandate or 2% biodiesel blend under the Biofuels Act 2009 (RA9367)* *Complying the 50 ppm, maximum Sulfur content for automotive diesel oil (ADO)*
Industrial diesel oil (IDOB2)	**PNS/DOE QS 013:2017 - Petroleum Products - *CME-blended industrial diesel oil –Specification (IDOB2)*** This standard is a revision/update of PNS/DOE QS 004:2012. ▪ In this edition, a new PNS number was created to separate the requirements of industrial diesel oil (IDO) from automotive diesel oil (ADO) which carried the original designation of PNS/DOE QS 004.	*Complying the B2 mandate or 2% biodiesel blend under the Biofuels Act 2009 (RA9367)*
B100	**PNS/DOE QS 002:2015** **Biofuels -*Coconut Methyl Ester (B100)* – Specification** This standard is a revision/update of PNS/DOE QS 002:2007. • In this edition, the following improvements were made: a) Inclusion of Iodine number as new property b) Increased the minimum limit of oxidation property and ▪ Reduced the maximum sulfur content	*PNS specifies the requirements for biodiesel (B100) for blending to diesel oil in the production of B2.*
B5	**PNS/DOE QS 010:2015 – Petroleum Products – High FAME-Blended Diesel Oil (B5) - Specification** ▪ This is a new standard developed/formulated to addresses the technical requirements of high FAME-blended diesel oil or 5% v/v blend (B5) and suitable test methods.	*This standard support future energy policy towards the integration of higher biodiesel blends in the petroleum/fuel sector.*
E100	**PNS/DOE QS 007:2014 - Biofuels - Anhydrous *Bioethanol &*** ***Bioethanol Fuel – Specifications (E100 & E98)*** This standard is a revision/update of PNS.DOE QS 007:2005. ▪ In this edition, the following improvements were made: a) Changes in color, inorganic chloride content, denaturant b) electrical conductivity as new property and c) Updating of test methods	*PNS specifies the requirements for biofuel grade ethanol in pure form and denature for use as blending component in the production of E10.*

APPENDIX 11. Summary of Estimated Annual Average Daily Traffic during Enhanced Community Quarantine

CIRCUMFERTIAL AND RADIAL ROAD		TOTAL VOLUME		
		Pre-ECQ	Amid ECQ	% Decrease
C:1	RECTO	73,589	2,923	96.03%
C:2	MENDOZA	97,633	5,599	94.27%
	PRES. QUIRINO AVE	119,603	6,649	94.44%
C:3	ARANETA AVE	89,455	4,224	95.28%
C:4	EDSA	422,748	25,013	94.08%
C:5	CP GARCIA / KATIPUNAN AVE / TANDANG SORA	259,648	13,557	94.78%
R:1	ROXAS BLVD	224,121	13,388	94.03%
R:2	TAFT AVE	101,071	4,495	95.55%
R:3	SSH	111,141	5,827	94.76%
R:4	SHAW BLVD	113,529	5,495	95.16%
R:5	ORTIGAS AVE	192,172	8,542	95.55%
R:6	MAGSAYSAY BLVD	125,259	6,250	95.01%
	AURORA BLVD	113,954	4,690	95.88%
R:7	QUEZON AVE	225,351	12,801	94.32%
	COMMONWEALTH AVE	269,750	14,174	94.75%
R:8	A. BONIFACIO	70,573	3,347	95.26%
R:9	RIZAL AVE.	98,546	4,168	95.77%
R:10	DEL PAN	90,598	3,758	95.85%
	MARCOS HIGHWAY	196,285	10,147	94.83%
	MCARTHUR HIGHWAY	101,511	4,099	95.96%
TOTAL		**3,096,537**	**159,145**	**94.86%**

APPENDIX 12. Air Pollution Control / Management Program



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Philippine News Agency
Department of Health
jcgellidon

In loving memory of

Engr. Arturo B. Bongco

09.06.1949 - 06.11.2020

Engr. Bongco has served the Department of Environment and Natural Resources (DENR) from 1981 up until 1988 under the National Pollution Control Commission (NPCC) and from 1985 up until 2013 in the Environmental Management Bureau (EMB).

Though you are no longer with us, you will never be forgotten. May your memory be forever held in the pages of this book.

Department of Environment and Natural Resources
Environmental Management Bureau
DENR Compound, Visayas Avenue, Quezon City
Tel. No. (632) 928 4674 and (632) 376 5610
Hotline No. (02) 376 5541 / emb_ecac@gmail.com
www.emb.gov.ph / www. denr.gov.ph

/DENREnviBureau
/emb.eeid

@DENR_EnviBureau