



**FRIEDRICH NAUMANN  
FOUNDATION** For Freedom.

Philippines



# BIKENOMICS

Assessing the Value of Cycling in the Philippines

CASESTUDY

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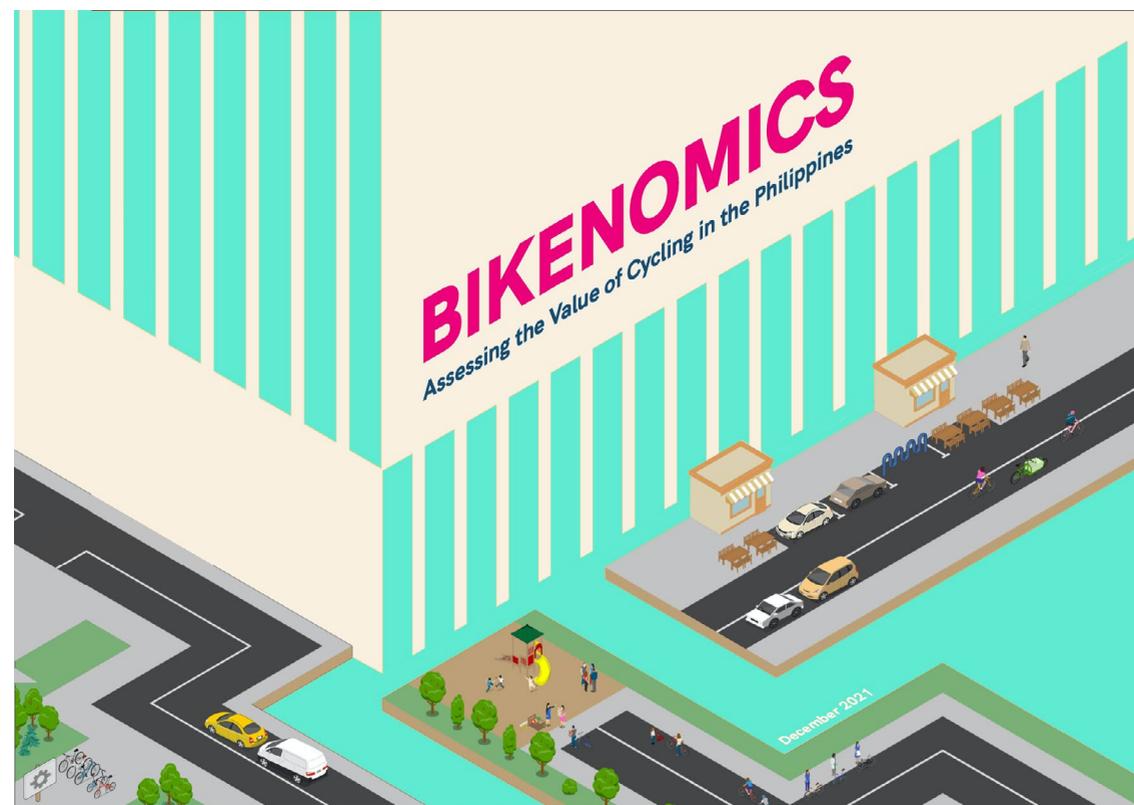
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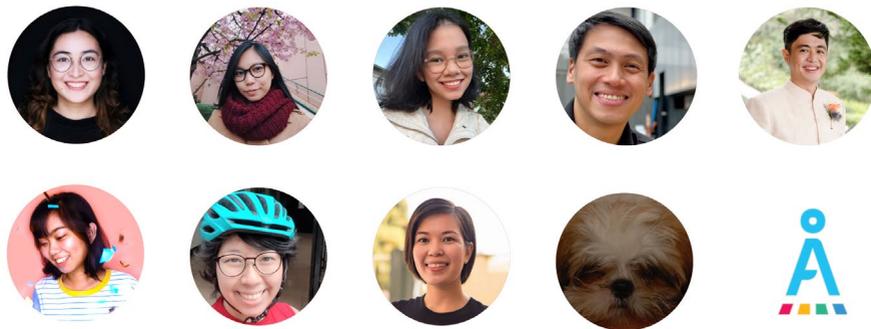
## 1

AltMobility PH would like to first and foremost thank the Friedrich Naumann Foundation For Freedom (FNF) for being one of the strong supporters of safe, humane, and dignified mobility in the Philippines. Through FNF's support, many studies, projects, and activities in the pursuit of better mobility in the country have been possible, such as this research on the economic benefits of cycling.

AltMobility PH would also like to acknowledge especially the mobility advocates, private and public sector groups, and more importantly our cyclists that created our growing cycling culture.



## 2 About the Team



**AltMobility PH** transforms how Filipinos move around their cities by enabling decision-makers in envisioning and building better urban landscapes for every citizen.

As the Philippines pushes forward towards building a globally competitive economy, the need for efficient mobility becomes even more significant.

As a team of transport experts and professionals from various industries as ordinary commuters, we are the bridge between the public and legislators in developing the Philippine urban mobility landscape.

### #CommutersNaman

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## Executive Summary

# 3

Cycling has been on the rise in the Philippines especially during the COVID-19 pandemic. What Filipinos used to view as just a sport or a toy became a viable and essential means of transport for many, especially for healthcare workers and daily wage-earners who had no other safe and affordable means of transport during the lockdown. The cycling boom in the country created opportunities for advocates, cities, businesses, policymakers and national government agencies to build cycling infrastructure and approve cycling-friendly policies to ensure the safety of our 'pandemic cyclists'.

Now that the economy is steadily going back to the 'old normal', the defense for creating cycling-friendly infrastructure and policies has become more challenging. Policymakers and businesses must see that the rise of cycling as a means of transport is not just beneficial during the pandemic, but also in the longer run.

Bikenomics, or the economic analysis of the benefits of cycling, can help give an overview of the benefits that society has gained from investing in cycling. This research is a baseline of the economic benefits of cycling in Metro Manila and can serve as a basis for other similar research to take place. This research categorizes the benefits in four different clusters: Infrastructure and Business, Health, Energy and Environment, and Community Impact.

Infrastructure and Business focuses on the cost benefits of the physical construction of cycling-friendly spaces such as bicycle lanes and bike parking, which may be beneficial for cities and businesses. The construction of a bike lane instead of a new road can save up to PHP26.79 million (EUR478,349) per kilometer on average.

This section also covers the cost from time spent in traffic in Metro Manila and the opportunity cost of an individual owning a car over a bicycle to illustrate the individual benefits of choosing to cycle instead of taking a private vehicle. Based on time spent in traffic and average salary in Metro Manila, the economy at least PHP27 billion (EUR486 million) yearly.

Health discusses the various health benefits of biking and their economic value. In terms of physical health, with just 200 minutes of mid-paced bike commuting per week, adults would be able to meet the minimum level of physical activity required to maintain a healthy lifestyle, as recommended by the World Health Organization (WHO). The incorporation of physical movement in everyday activities such as commuting is becoming increasingly important in light of the growing prevalence of physical inactivity, which is considered as one of the leading risk factors for noncommunicable diseases (NCDs). Increasing one's physical activity through cycling can reduce the risk of contracting NCDs and result in health cost savings. In particular, for every kilometer cycled, society gains at least PHP0.26 (EUR0.0046) worth of health cost savings.

If only 5% of trips within Metro Manila are served by cycling, the annual health cost savings would amount to PHP738 million (EUR13 million)—sufficient to build 246 kilometers of bike lanes every year. Furthermore, cycling promotion reduces not only the risk of developing NCDs, but also the risk of being involved in a road crash. Studies show that as the number of cyclists increases, an individual's risk of getting hit by a motorist decreases—also known as the 'safety in numbers' effect. As such, cycling promotion can also help mitigate the steep economic cost of road crashes in Metro Manila, which amounted to as much as PHP75 billion (EUR1.35 billion) in 2019.

In the Energy and Environment sector, the environmental damage of emissions as well as of noise and air pollution caused by vehicles were presented and compared to the benefits of cycling to the

environment. This includes their cost, effects, and potential benefits on cities. Greenhouse gas (GHG) emissions in Metro Manila for road transport alone costs the country PHP48.25 billion (EUR861.60 million), and this can be countered by cycling, which generates ten times less emissions per kilometer than driving. If 5% of car trips in Metro Manila are converted to cycling trips, 57 thousand tonnes of CO2 emissions can be saved annually, which is equivalent to planting 2.31 million trees in a year. Shifting to cycling can also yield significant fuel savings and increase the quality of life in cities by reducing noise and air pollution.

Lastly, the section on Community Impact works on qualitative data and details the social benefits of cycling in Metro Manila. Cycling has been a critical lifeline for many especially during the months when public transportation was limited starting March 2020 due to the COVID-19 pandemic.

Switching to cycling saves up to PHP800 (EUR14.29) and saves at least 15 minutes of travel time daily. These numbers are important especially for women and LGBTQ+ who take most of the domestic roles in our society. Cycling means independence through movement. Cycling fosters social and cultural cohesion by bringing people together and connecting neighborhoods. Cycling connects people from different backgrounds and social classes.

In summary, while this research is an initial attempt to baseline the economic benefits of cycling, there are still gaps that have yet to be addressed by better and more consistent data that should be readily available to the public. From the figures derived and illuminated in this research, cycling has undoubtedly benefited Metro Manila in many aspects. These findings aim not only to display the positive outcomes of cycling in our society, but they are also geared to inspire our leaders and policymakers to invest more in promoting cycling as a means of transport.

# 4 Introduction

While international research is available to illustrate the benefits of cycling, there is little local research that assesses the economic returns of cycling to the community. Bikenomics provides a cost-benefit analysis of cycling and illustrates the monetary value it contributes to society through saved costs from health, physical space, fuel, travel time, among others.

This research aims to localize Bikenomics studies done abroad by contextualizing similar studies in Metro Manila and by analyzing the results based on local factors. This research can be used as a baseline for conducting similar studies in cities with available data for better decision making in cities where such study may be replicable.

## OBJECTIVES

- To assess the real transportation cost of the current car-centric system and compare this with the monetary returns and savings from shifting to active transport
- To compile and analyze initial baseline data on factors affecting the cost-benefit analysis of cycling in Metro Manila
- To create awareness with local government units, legislators, developers and private sector groups on the economic benefits of cycling to encourage bicycle friendly policy and infrastructure in the Philippines

## INDICATORS

- Creating a baseline data bank from the local data sourced from Metro Manila such as cycling infrastructure, emission volumes, cycling population, impact on health, travel efficiency among others.
- Analyzing the real transport cost of our mobility systems in the Philippines and comparing these monetary benefits of cycling in the Philippines.
- Spreading awareness about the different benefits of cycling in Metro Manila.

## 5 Methodology, Scope, Limitations

The timeline of the research took place from September 2021 to December 2021. The researchers chose Metro Manila as the focus area of the analysis since it is the biggest metropolitan area in the Philippines and because there is more available data compared to other areas.

The research group first analyzed different methods and presentations of bikenomics from international examples, such as the European Cyclists' Federation's analysis on the economic benefits of cycling<sup>1</sup> and Cycling UK's data on the different benefits of cycling.<sup>2</sup> From the analyzed methods, the research was divided into four clusters: Infrastructure and Business, Health, Energy and Environment, and Community Impact.

The researchers first made an initial scoping of available cycling-related data and created a growing data bank<sup>3</sup> for reference. Because of the lack of open and consistent data available and the short time frame, the researchers were limited in conducting more in-depth research methods such as conducting surveys, computing for modal share, bike counting, and other methods.

Despite this lack of data, the research was able to gather sufficient baseline data to illustrate the clear economic benefits of cycling to Philippine society. Each factor computed used methodologies based on international practices and available data.

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<sup>1</sup> European Cyclists' Federation, "The Benefits of Cycling," ECF, 2018, <https://ecf.com/sites/ecf.com/files/TheBenefitsOfCycling2018.pdf>. <sup>2</sup> "Six Reasons to Build Cycle Lanes," accessed December 20, 2021, <https://www.cyclinguk.org/article/six-reasons-build-cycle-lanes>.

<sup>3</sup> Data bank can be accessed through <https://bit.ly/AMPBikeData2021>

# 6 Sectors

## BIKES BRING BUSINESS!

Businesses can generate as much as **25%** in revenue by investing in bike parking/outdoor dining.

**PHP 648,000.00**

Businesses can save as much as Php 648,000 by investing in bike parking instead.

## BIKES ARE BETTER FOR YOUR BUDGET



Owning a bike saves around **PHP 281,461.92 / year** compared to owning a car.



That's **6,119 kg** of rice in a year!

## THE COST OF TRAFFIC

Metro Manila commuters spend **188 hours** in traffic per year, costing the city **PHP 26,787,580.43**

**188 hours** = **23.5 days** of vacation leaves

## THE COST OF LANE CONSTRUCTION

For every km of a car lane we can construct **9.7 km** of bike lanes.

Each km of a bike lane can save us up to **PHP 26,787,580.43!**



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# bikenomics: INFRASTRUCTURE AND BUSINESS

## bikenomics: INFRASTRUCTURE AND BUSINESS

Physical space is an important aspect of transportation, especially since it defines the space in which people can move freely and safely. Investing in physical infrastructure such as bicycle lanes and bike parking have significant savings compared to creating and allocating structures for private motor vehicles. For businesses, investing in cycling infrastructure doesn't only save costs, but it could potentially generate additional revenue. This section talks about the benefits of building cycling infrastructure for businesses, developers and cities.

### Spend Less with Bike Lanes

Building a new bike lane on an existing road instead of creating a new car lane would save the government PHP26,787,580.43 (EUR478,349.65) per kilometer on average. The study referred to publicly available documents and data released by the Philippine Department of Public Works and Highways (DPWH) to compare the construction cost per kilometer of building new roads for motor vehicles and new bike lanes. Comparing the average<sup>4</sup> cost of new road construction<sup>5</sup> and the cost of constructing a part of the Bayanihan II Bike Lane Network<sup>6</sup>, a whopping average of PHP29,100,819.50 (EUR519,657.49) per kilometer of building new roads compared to PHP3,069,860.37 (EUR54,818.93) per kilometer of new bike lane constructed on an existing road.

4 Full computations can be found here: [https://bit.ly/AMPBikenomics\\_InfraBiz](https://bit.ly/AMPBikenomics_InfraBiz)

5 DPWH, "DPWH Atlas 2019 - COST ESTIMATES FOR WORK ITEM OF PROJECTS," DPWH Atlas 2019, 2020, [https://www.dpwh.gov.ph/dpwh/2019%20DPWH%20ATLAS/Tables%20%20Graphs%20\(Roads\)/Road%20Data%202016/ATLAS%202016/Table%201.4.htm](https://www.dpwh.gov.ph/dpwh/2019%20DPWH%20ATLAS/Tables%20%20Graphs%20(Roads)/Road%20Data%202016/ATLAS%202016/Table%201.4.htm).

6 DPWH, "Notice To Proceed Bidding Documents for Metropolitan Bikelane Networks," DPWH, 2020, [https://www.dpwh.gov.ph/dpwh/sites/default/files/webform/civil\\_works/notice\\_of\\_award/20000104.pdf](https://www.dpwh.gov.ph/dpwh/sites/default/files/webform/civil_works/notice_of_award/20000104.pdf).

Considering the great majority of households that do not own private vehicles, building bike lanes is more cost-effective and quite literally leads to and can further increase savings on other factors identified in this section.

### Save Time, Save Money

On the average, a person driving in Metro Manila spends 188 hours stuck in traffic congestion.<sup>7</sup> Using average figures on monthly salary,<sup>8</sup> the number of employed people in Metro Manila,<sup>9</sup> the number of working days and hours, and car modal share based on previous research,<sup>10</sup> the study estimates PHP27,221,749,561.10 (EUR486,102,670.73) in losses to the economy based on average hourly salary in Metro Manila.

### Bikes are Better for Your Budget

Motor vehicle ownership brings additional costs to your budget - from basic expenses such as vehicle registration (computed monthly) fuel

7 "Manila Traffic," accessed December 20, 2021, [https://www.tomtom.com/en\\_gb/traffic-index/manila-traffic/](https://www.tomtom.com/en_gb/traffic-index/manila-traffic/).

8 "Philippine: Monthly Average Salary 2020," accessed December 20, 2021, <https://www.statista.com/statistics/1048636/philippines-monthly-average-salary/>.

9 "Philippine Statistics Authority," accessed December 20, 2021, <https://psa.gov.ph/statistics/survey/labor-and-employment/labor-force-survey/title/Unemployment%20Rate%20in%20July%202021%20is%20Estimated%20at%206.9%20percent>.

10 Japan International Cooperation Agency, "The Project for Capacity Development on Transportation Planning and Database Management in the Republic of the Philippines MMUTIS Update and Capacity Enhancement Project (MUCEP): Technical Report" (JICA, 2015), <https://openjicareport.jica.go.jp/pdf/12247623.pdf>.

expense, parking fees, and regular maintenance.<sup>11</sup> Adding all of these up and comparing it to bike ownership, biking can save an average of PHP281,461.92 (EUR5,026.10) annually. For some office buildings that offer bike parking, the minimal monthly cost still pales in comparison against car parking and ownership.

## Bikes Bring Business

Assuming that parking provided to customers is at no additional cost to the business and other factors such as average customer spend, number of additional customers, customer turnover, and opening hours, a restaurant can receive more customers by either converting parking space to additional dining area or bicycle parking.<sup>12</sup> By allocating more space for customers, the study estimates potential additional sales of PHP648,000 (EUR11,571) per month or

PHP7,776,000 (EUR138,857) annually. Coupling this with the current COVID-19 pandemic, people are opting to dine in open-air settings - presenting an additional opportunity for restaurants. Some businesses that were interviewed for this study stated that up to 25% of their customers were cyclists who were encouraged to dine in because of the allocation of cycling-friendly infrastructure such as safe and secure bike parking.

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<sup>11</sup> Roy Robles, "5 Steps to Calculate The Monthly Expense of Car Ownership in The Philippines," Philkotse, August 21, 2019, <https://philkotse.com/car-buying-and-selling/calculating-the-cost-of-car-ownership-in-the-philippines-5193>.

<sup>12</sup> Full computations can be found here: [https://bit.ly/AMPBikenomics\\_InfraBiz](https://bit.ly/AMPBikenomics_InfraBiz)

**ROAD CRASHES HAVE HIGH ECONOMIC COSTS**

In 2019, the economic cost of road crashes in Metro Manila amounted to **PHP 75,322,700,927.67**.

**Costs per type of road crash:**

-  **PHP 12,734,402.10**  
fatal road crash
-  **PHP 3,092,640.51**  
non-fatal road crash
-  **PHP 72,241.22**  
DTP (damage to property)

**BIKING GENERATES HEALTH COST SAVINGS**

 If only **5%** of trips within Metro Manila are made on a bicycle, society gains **PHP 738,323,677.92** worth of health cost savings annually.

bikenomics:  
**HEALTH**



**MORE CYCLISTS MEAN SAFER ROADS**

The **SAFETY IN NUMBERS EFFECT** is when an individual's risk of being involved in a road crash decreases as more choose to cycle.



A bike commuter in Metro Manila travels around 200 mins./week for 55km.

## bikenomics: HEALTH

Cycling is undoubtedly a healthy form of exercise and has been a safe option for transport especially during the COVID-19 pandemic. This section illustrates the real economic benefits of cycling in the perspective of health cost savings, as well as the benefits of having more cyclists for increased road safety.

### Cycling is Good for Your Health

Cycling for transport provides regular opportunities for adults to meet the minimum level of physical activity required to maintain a healthy lifestyle, as recommended by the WHO.<sup>13</sup> With just 200 minutes of mid-paced cycling per week, adults are able to meet said requirement and burn anywhere between 1,190 to 1,760 calories, depending on one's weight class.<sup>14</sup>

### Biking Generates Significant Health Cost Savings

Noncommunicable diseases (NCDs) such as coronary heart disease, type 2 diabetes, breast cancer, colon cancer, and stroke are responsible for 68% of all deaths in the Philippines.<sup>15</sup> The lack of

<sup>13</sup> "Physical Activity," accessed December 29, 2021, <https://www.who.int/news-room/fact-sheets/detail/physical-activity>.

<sup>14</sup> Jenny Eriksson et al., "An Analysis of Cyclists' Speed at Combined Pedestrian and Cycle Paths," *Traffic Injury Prevention* 20, no. sup3 (September 27, 2019): 56–61.

<sup>15</sup> World Health Organization, "Prevention and Control of Noncommunicable Diseases in the Philippines," World Health Organization, 2019, <https://www.who.int/philippines/news/detail/29-10-2019-investment-in-noncommunicable-diseases-prevention-and-control-will-save-lives-and-contribute-to-the-philippines-saving-up-to-4.8-of-annual-gdp>.

physical activity is considered as one of the leading risk factors for NCDs. In the Philippines, 2 in 5 adults (40%) do not meet the minimum level of physical activity required to maintain a healthy lifestyle.<sup>16</sup> In light of the growing prevalence of physical inactivity, incorporating physical movement in everyday activities such as commuting is becoming increasingly important.

Because bike commuting can help adults meet the minimum required level of physical activity, cycling can generate significant health cost savings in terms of reducing one's risk of contracting NCDs.

Considering both direct and indirect costs of contracting NCDs, biking generates PHP0.26 (EUR0.0046) worth of health cost savings for every kilometer cycled.<sup>17</sup> If only 5% of Metro Manila trips are served by cycling, the annual health cost savings would amount to PHP738,323,677.92 (EUR13,184,351.39), which is equivalent to the amount required to build 246 kilometers of bike lanes. The yearly health cost savings from cycling is sufficient to justify annual investments in bike infrastructure improvements.

### More Cyclists Mean Safer Roads

Cycling promotion reduces not only the risk of developing NCDs, but also the risk of being involved in a road crash. Studies show that as the number of cyclists increases, an individual's risk of getting hit by

<sup>16</sup> World Health Organization, "Prevalence of Insufficient Physical Activity among Adults Aged 18+ Years (age-Standardized Estimate) (%)," World Health Organization, 2016, [https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-insufficient-physical-activity-among-adults-aged-18-years-\(age-standardized-estimate\)-\(-\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-insufficient-physical-activity-among-adults-aged-18-years-(age-standardized-estimate)-(-)).

<sup>17</sup> Full computations can be found here: [https://bit.ly/AMPBikenomics\\_Health](https://bit.ly/AMPBikenomics_Health)

a motorist decreases.<sup>18</sup> This is also known as the ‘safety in numbers’ effect. As such, cycling promotion can also help mitigate the steep economic cost of road crashes in Metro Manila, which amounted to as much as PHP75,322,700,927.67 (EUR1,345,048,230.85) in 2019.<sup>19</sup>

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18P. L. Jacobsen, “Safety in Numbers: More Walkers and Bicyclists, Safer Walking and Bicycling,” *Injury Prevention: Journal of the International Society for Child and Adolescent Injury Prevention* 9, no. 3 (September 1, 2003): 205–9.

19 Full computations can be found here: [https://bit.ly/AMPBikenomics\\_Health](https://bit.ly/AMPBikenomics_Health)

bikenomics:

# ENERGY AND ENVIRONMENT

### THE COST OF EMISSIONS

By 2025, emissions in Metro Manila can amount to **19,300 kt of CO<sub>2</sub>e** per year, costing us **PHP 48.25 billion** or **PHP 3,578 per capita**.

### CYCLING FIGHTS CLIMATE CHANGE

Shifting to cycling from driving can save around **2.7kg of CO<sub>2</sub>e/day** for the average bicycle trip of **11km** in Metro Manila.

### CYCLING IS LIKE PLANTING TREES

Converting **5% of car trips** in Metro Manila\* to cycling can save **57,000 tonnes of CO<sub>2</sub>** emissions annually, equivalent to planting **2.31 million trees** in a year.

\*with an average trip distance of 11km

271g CO<sub>2</sub> per km

26g CO<sub>2</sub> per km

### LOUD STREETS AFFECT OUR WELL-BEING

Noise around residences reaches **90dB** — versus the recommended **30dB - 55dB**.

**15%** of Filipinos suffer from hearing loss.

**BEEP!  
BEEP!**

### NO NEED FOR GAS MONEY

Shifting from driving a sedan to cycling saves about

**2.8L**

of gasoline per work week.

One can save at least **PHP 6,000** each year!

## bikenomics:

# ENERGY AND ENVIRONMENT

The effects of pollution caused by congestion are felt in our lived experience of our cities: noise levels are high, temperatures continue to rise, and air quality levels remain poor. All these affect our quality of life, with emissions costing society billions every year. Shifting to cycling can reverse the negative effects of driving to the environment, lessen noise and air pollution, and even save money in the form of fuel savings. This section delves into the effects of cycling on our cities, as well as the benefits and savings we can get from it.

## The Cost of Emissions

In the Philippines, transport is the largest source of air pollution and energy-related GHG emissions at 34%, with road transport accounting for 80% of those emissions.<sup>20</sup>

Under a business-as-usual scenario for road transport, GHG emissions in Metro Manila for 2025 can amount to 19,300 kilotonnes of CO<sub>2</sub> equivalent (CO<sub>2</sub>e).<sup>21</sup> This amounts to PHP48,250,000,000.00 (EUR861,607,142.86) in current prices,<sup>22</sup> or PHP3,578.19 (EUR63.90) per capita.<sup>23</sup>

<sup>20</sup>Philippines-TRANSfer, "Philippines: Jeepney+ NAMA," September 14, 2015, <http://www.transferproject.org/projects/transfer-partner-countries/philippines/>.

<sup>21</sup>"Energy Demand, Emissions Forecasts and Mitigation Strategies Modeled over a Medium-Range Horizon: The Case of the Land Transportation Sector in Metro Manila," Energy Policy 66 (March 1, 2014): 615–29.

<sup>22</sup>Based on a carbon price of USD 50/ton of CO<sub>2</sub> Coren M J & Diaz, "The Era of Polluting the Atmosphere for Free Is Coming to a Close," Quartz, 2021, <https://qz.com/2028724/to-address-climate-change-fix-the-global-carbon-price/>.

<sup>23</sup>Philippine Statistics Authority, "Total Population by Province, City, and Municipality (As of May 1, 2021)," Philippine Statistics Authority, 2021, <https://psa.gov.ph/sites/default/files/attachments/ird/pressrelease/NCR.xlsx>.

## Cycling Fights Climate Change

Cycling emits 10 times less emissions per kilometer than driving. Considering the production and operation of a car, driving emits about 271g CO<sub>2</sub>e per passenger-km,<sup>24</sup> or PHP0.68 (EUR0.01) per km.

Meanwhile, riding a bike only produces 26g of CO<sub>2</sub>e/km,<sup>25</sup> which is just about PHP0.065 (EUR0.001) per km. This already includes the emissions from the production and maintenance of a bike.

A shift to cycling from driving saves around 245g of CO<sub>2</sub> for every kilometer cycled. This means that an average bicycle trip in Metro Manila<sup>26</sup> saves about 2.7kg of CO<sub>2</sub> emissions in a day, or PHP6.73 (EUR0.12).<sup>27</sup>

## Cycling is like Planting Trees

Given that shifting to cycling saves 2.7kg of CO<sub>2</sub> emissions in a day, 57 thousand tonnes of CO<sub>2</sub> emissions can be saved annually if just 5% or 82.5 thousand of car trips in Metro Manila traveling at an average

<sup>24</sup>Blondel, B., Mispelon, C., & Ferguson, J., "Cycle More Often 2 Cool Down the Planet! Quantifying CO<sub>2</sub> Savings of Cycling (European Cyclists' Federation)," 2011, [https://ecf.com/files/wp-content/uploads/ECF\\_BROCHURE\\_EN\\_planche.pdf](https://ecf.com/files/wp-content/uploads/ECF_BROCHURE_EN_planche.pdf).

<sup>25</sup>Ibid., with adjusted CO<sub>2</sub> emissions for the average Filipino diet of 2,580 kilocalories. Food and Agriculture Organization, "Food Consumption Nutrients Statistics," Food and Agriculture Organization, accessed December 20, 2021, [http://www.fao.org/fileadmin/templates/ess/documents/food\\_security\\_statistics/FoodConsumptionNutrients\\_en.xls](http://www.fao.org/fileadmin/templates/ess/documents/food_security_statistics/FoodConsumptionNutrients_en.xls).

<sup>26</sup>11 kilometers

<sup>27</sup>USD 1 = PHP50

of 11 kilometers are converted to cycling trips.<sup>28</sup> This is equivalent to planting 2.31 million trees in a year.<sup>29</sup>

## No Need for Gas Money

For a Toyota Vios user traveling at an average of 11 kilometers a day, shifting to cycling saves about 2.8L of gasoline per work week, given that the average fuel consumption of the vehicle is 19.57 km/L at 60 km/hr.<sup>30</sup> If this person bikes to work all-year round, this can amount to at least PHP6,000 (EUR107.14) savings a year<sup>31</sup>—and that's on fuel alone!

## Cycling Means Less Air Pollution

As recorded by the DENR in 2018, 74% of air pollutants come from mobile sources (e.g., cars, motorcycles, trucks, buses), specifically accounting for 83.09% of NOx (0.40M tonnes) and 37.73% of PM (0.29M tonnes) of pollutants in Metro Manila.<sup>32</sup> Shifting from private

28 Full computations can be found here: [https://bit.ly/AMPBikenomics\\_EnergyEnvi](https://bit.ly/AMPBikenomics_EnergyEnvi)

29 Derived based on data from Y. Chen, "Assessing Climate Value of Cycling Under Different Urban Forms of Dutch Cities" (University of Twente, 2012), [https://webapps.itc.utwente.nl/librarywww/papers\\_2012/msc/upm/yangchen.pdf](https://webapps.itc.utwente.nl/librarywww/papers_2012/msc/upm/yangchen.pdf).

30 "Value for Money – Fuel Efficient Toyota Cars," accessed December 20, 2021, <http://www.toyota-myanmar.com/toyotabeyondtoyota/2-2>.

31 Based on the average fuel price of PHP45.78 in 2020 and savings for 260 working days in a year <https://bit.ly/AMPBikenomics>

32 DENR Emissions Inventory, 2018, <https://air.emb.gov.ph/emission-inventory-2018/>.

car use into cycling or walking can lower pollution levels by 1.42%.<sup>33</sup> Looking at a ten-year period and other highly urbanized cities across the country, this shift into active transport modes can result in a PM decrease between 2.9-7.7 thousand tonnes and a NOx decrease between 19.1-53.5 thousand tonnes.<sup>34</sup>

## Continuous Exposure to Loud Noises

### Harms Our Health

Fifteen percent of Filipinos suffer from moderate to profound hearing impairments.<sup>35</sup> The recommended environmental noise ranges from 30 dB (nighttime) to 55 dB (daytime) to avoid stress, sleep disturbance, and irreversible hearing loss.

Samples taken from streets near residential areas and parks in Metro Manila average 65 dB and reach as high as 90 dB.<sup>36</sup> Encouraging quieter streets with less cars and more cyclists can significantly reduce the noise levels of our cities.

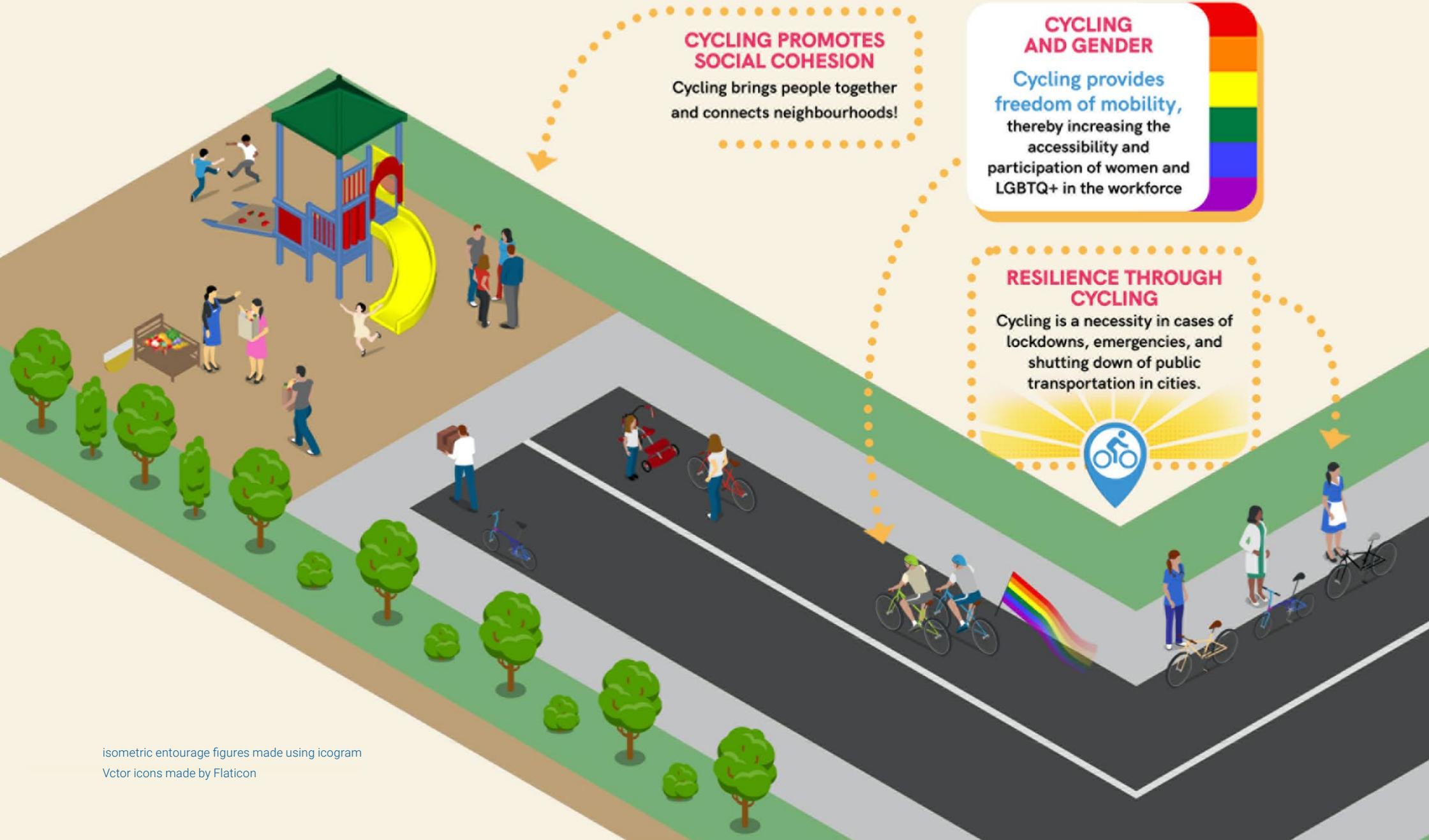
33 Decreases consider HC (-1.72%), CO (-1.75%), PM (-1.24%), NOx (-0.02%), SOx (-0.02%). Vergel, K.B.N. & Tiglao, N.C., "Estimation of Emissions and Fuel Consumption of Sustainable Transport Measures in Metro Manila", 2013, <https://journals.upd.edu.ph/index.php/pej/article/view/3797>.

34 Calculations from Clean Air Asia as cited by Mettke, C., Kaenzig, R. & Mariano, P., "Philippine Urban Mobility Programme", 2019, <https://changing-transport.org/publication/philippine-urban-mobility-programme/>.

35 "Nearly One in Six in the Philippines Has Serious Hearing Problems," accessed December 20, 2021, <https://www.hear-it.org/nearly-one-six-philippines-has-serious-hearing-problems>.

36 "What Noises Cause Hearing Loss?" October 7, 2019, [https://www.cdc.gov/nceh/hearing\\_loss/what\\_noises\\_cause\\_hearing\\_loss.html](https://www.cdc.gov/nceh/hearing_loss/what_noises_cause_hearing_loss.html).

# bikenomics: COMMUNITY IMPACT



### CYCLING PROMOTES SOCIAL COHESION

Cycling brings people together and connects neighbourhoods!

### CYCLING AND GENDER

Cycling provides freedom of mobility, thereby increasing the accessibility and participation of women and LGBTQ+ in the workforce

### RESILIENCE THROUGH CYCLING

Cycling is a necessity in cases of lockdowns, emergencies, and shutting down of public transportation in cities.



## bikenomics: COMMUNITY IMPACT

### Resilience through Cycling

The Inter-Agency Task Force for the Management of Emerging Infectious Diseases (IATF) through Resolution No. 12 imposed a strict blanket suspension on all public transport services as part of its COVID-19 measures on 13 March 2020.<sup>37</sup> In Metro Manila where 70% of its trips are made via public transport mode, this unprecedented act left many scrambling for modes of transportation to get work.<sup>38</sup> Cycling was a critical lifeline for the metro, ensuring that employees and service providers were able to reach their places of work.

Marielle Belmonte works as a Pathology resident at Makati Medical Center (MMC). She started biking to work during the lockdown because she had no other option. It saves her PHP250 (EUR4.46) per trip. Cycling unburdened her from the mental load of thinking how to get to work.

She says: “The fact that I had to worry about finding ways to get to work brought a lot of stress. And I didn’t want that stress anymore.” This experience was similar to Mansy Abesamis’, a creative (potter, a jewelry designer, a papercut artist). She switched to biking during the pandemic. She notes that cycling made her mind stronger in the sense that she got to know and experience her city in different ways than when she would take a ride-hailing service to work. “I feel like I’m a better entrepreneur because of this. I can make better decisions.”

Lastly, Boboy<sup>39</sup> an informal coconut juice seller narrated that cycling

ensured he could bring his wares to work. Before, he would ride public transportation and had a huge bag with him in an overcrowded bus. Aside from monetary savings, he feels safer from contracting COVID when he bikes.

Cycling is a reliable option that was able to fill the gap during the pandemic and can continue to provide valuable benefits that go beyond mobility in the future too.

### Cycling Promotes Social Cohesion

Cycling brings people together. It’s not just about networks of grids, lanes and roads but involves social connectedness. This pandemic saw the rise of bike groups as social clubs in Metro Manila.

Wheel 2 Live is an all women and LGBTQ+ bike group that started with 10 friends adding each other on a Telegram group chat. The group now has 50 members and has built a community on Discord, not just planning rides but discussing topics such as dealing with harassment, where to get deals, etc.<sup>40</sup>

Life Cycles PH has donated over 1100 bikes to over 50 hospitals and other frontliner institutions. With its lend-a-bike program, the group ushered more than 400 connections through social media.

Mobile in MNL organized volunteers on bikes to haul donations to community pantries across the metro. From its hub in Pasig, it would reach barangay pantries as far as Valenzuela. Bikers United Movement saw an uptick of membership during the pandemic and

<sup>37</sup> IATF Resolution No. 12 series of 2020, IATF, 13 March 2020, <https://doh.gov.ph/sites/default/files/health-update/IATF-RESO-12.pdf>

<sup>38</sup> “Transportation Demand Characteristics Based on MUCEP Person Trip Survey”, Japan International Cooperation Agency, December 2015, <https://openjicareport.jica.go.jp/pdf/12247615.pdf>

<sup>39</sup> Boboy has requested anonymity.

<sup>40</sup> The link to the Discord channel is <https://discord.gg/uRjvvaFb>.

organized a community bike shop with the motto: Magbigay ng hindi mo na kailangan, kumuha ng ayon sa kailangan upang makarating sa paroroonan. (translation: Donate what you do not need, get as much as you need so you may reach your destination.)<sup>41</sup>

Cycling connects neighborhoods and cities in many ways such as fostering friendships or new relationships and advocacies.

## Cycling and Gender

Gender affects patterns of movement, distance traveled, options used, monetary share and safety perceptions. Mobility is different for women and LGBTQ+ compared to men in terms of time and reasons for travel, preferred mode of transportation and cost. Women and LGBTQ+ normally undertake most of the domestic roles responsibilities and most often form trip chains.

Cycling provides an option for women without relying on other people. It saves time and effort as it lessens hours stuck in traffic or waiting for public transportation.

Harassment in public areas and in using public transportation are an unfortunate reality. Cycling provides a secure, safe and comfortable mobility option. It facilitates economic empowerment of women by providing savings in cost but also because it gets them to work.

Corrina Pettyjohn of Two Wheels, Three Hearts documents her urban life in a mamachari with her 2 daughters as passengers. They bond as a family by going on bicycle trips around the metro. Her post on her daily life as a mother, “about how the ability to pick up efficiently

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41 Bikers United Movement on Facebook is <https://www.facebook.com/bikersunited-movement>.

and make quick stops is crucial for certain sectors to participate in the economy” became viral in April and is used as a reference by many advocacy groups in pushing for inclusive access especially for cyclists.<sup>42</sup>

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42 Pettyjohn, Corrina. 2021. Blog. Two Wheels, Three Hearts. <https://www.facebook.com/2wheels3hearts/posts/264718502029468>.

# 7 Conclusions and Recommendations

For several years now, cycling advocates have talked about the benefits of cycling to cities and its people: From a better way to allocate limited city space, a more sustainable transportation option, to a solution to the worsening traffic congestion. While based on solid principles and resonating with the experience of other cities around the world, the arguments on the financial benefits of cycling have largely been anecdotal. This study is an initial attempt at presenting a concrete accounting of the benefits. In the future, it hopes to offer an updated computation in a better data environment, a more comprehensive discussion of the initial sectors, and expansion to other sectors that benefit from a cycling city.

Hands down, cycling is beneficial to society as seen in figures presented per sector:

- Favoring bike infrastructure over new roads offer savings on government expenditure to the tune of PHP26.7 million (EUR478,349.65) per kilometer. To individuals shifting from driving to cycling, an average savings of PHP281,461.92 (EUR5,026.10) annually from fuel, parking, and maintenance;
- An increase in the number of cyclists on the road can lower the economic costs of road crashes by decreasing the risk of getting hit by a motor vehicle. The study also sees a conservative yearly savings of PHP738 million (EUR13 million) in health expenses on non-communicable diseases such as chronic heart disease, type 2 diabetes, breast and colon cancer, and stroke through an increase in calories burned from commuting approximately 11 kilometers per day. It can help lower hearing impairments due to road noise currently affecting 15% of Filipinos;
- Continued car dependence will continue to contribute to road congestion that will cost the economy PHP20 billion (EUR357 million) annually; The reversal in car dependence will also translate to a reduction of CO2 emissions and is equivalent to planting 2.31 million trees a year;

- The focus on cycling can bring several opportunities. For bike-friendly business, a new customer base that can account for as much as 25% of sales and a potential additional revenue of PHP648,000 (EUR11,571) per parking slot reallocated to customer dining or bicycle parking;
- Cycling has also changed Metro Manila culture in ways that cannot necessarily be quantified. The cycling community has grown significantly since the start of the pandemic and has slowly become popular across all age groups and genders. This wave of enthusiasm for cycling should be an opportunity to continue promoting the bicycle as a viable mode of transportation in Metro Manila even beyond the pandemic.

While findings showcased in this study are based on available data from desk research and interviews, it sufficiently provides a glimpse of the tangible and intangible benefits of turning the focus on biking as a form of transportation - for several people today and more in the future. The authors and researchers of this study look forward to the opportunity to update this study under a better environment where data is properly and consistently collected, and readily-available to the public.

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# 9 Annex

## INFRASTRUCTURE AND BUSINESS

### BIKE LANE OPPORTUNITY COST

| BIKE LANE OPPORTUNITY COST  |   |                             |      |  |
|---|---|-----------------------------|------|--|
| Item  | Average cost in Peso (Euros)            | Unit                        | Year | Source/Computation   |
| R-3 Road Network Cost (22.1km)  | PHP 67,843,914.26<br>(EUR 1,211,498.47) | Pesos (Euros)               | 2020 | DPWH Bayanihan II Bike Lanes Bidding Documents <sup>43</sup>                                   |
| Average cost of bike lane per kilometer in Metro Manila (Materials and construction)  | PHP 3,069,860.37<br>(EUR 54,818.94)     | Pesos (Euros) per kilometer | 2020 | Derived:<br>Total cost of R3 divided by 22.1 km built  |
| Cost of new road per kilometer in Metro Manila (Materials and construction):<br>Concrete PCC 230M (cheapest)                  | PHP 25,096,334.56<br>(EUR 448,148.83)   | Pesos (Euros) per kilometer | 2019 | DPWH Atlas 2019 <sup>44</sup>  |
| Cost of new road per kilometer in Metro Manila (Materials and construction):<br>AC 50mm, w/ slope protection (most expensive) | PHP 33,105,304.44<br>(EUR 591,166.15)   | Pesos (Euros) per kilometer | 2019 | DPWH Atlas 2019  |
| Average cost of new road per kilometer in Metro Manila (ave cheapest and most expensive materials)                            | PHP 29,100,819.50<br>(EUR 519,657.49)   | Pesos (Euros) per kilometer | 2019 | DPWH Atlas 2019  |
| Inflation rate adjustment for average cost of new road per km (2.6%)  | PHP 29,857,440.81<br>(EUR 533,168.59)   | Pesos (Euros) per kilometer | 2020 | PSA <sup>45</sup>  |
| Savings from constructing bike lanes on existing roads vs. new road for cars  | PHP 26,787,580.43<br>(EUR 478,349.65)   | Pesos (Euros) per kilometer | 2020 | Derived:<br>Adjusted average cost of of new road per km minus average cost of bike lane per km |

43 DPWH, "Notice To Proceed Bidding Documents for Metropolitan Bikelane Networks," DPWH, 2020, [https://www.dpwh.gov.ph/dpwh/sites/default/files/webform/civil\\_works/notice\\_of\\_award/20000104.pdf](https://www.dpwh.gov.ph/dpwh/sites/default/files/webform/civil_works/notice_of_award/20000104.pdf)

44 DPWH, "DPWH Atlas 2019 - COST ESTIMATES FOR WORK ITEM OF PROJECTS," DPWH Atlas 2019, 2020, [https://www.dpwh.gov.ph/dpwh/2019%20DPWH%20ATLAS/Tables%20%20Graphs%20\(Roads\)/Road%20Data%202016/ATLAS%202016/Table%201.4.htm](https://www.dpwh.gov.ph/dpwh/2019%20DPWH%20ATLAS/Tables%20%20Graphs%20(Roads)/Road%20Data%202016/ATLAS%202016/Table%201.4.htm).

45 PSA, "Consumer Price Index (CPI) and Inflation Rate" PSA, 2020, <https://psa.gov.ph/price-indices/cpi-ir>

## INFRASTRUCTURE AND BUSINESS

### TIME SAVINGS

| TIME SAVINGS  |   |                            |           |   |
|---|---|----------------------------|-----------|---|
| Item  | Average Figure                                  | Unit                       | Year      | Source/Computation  |
| NCR Average Monthly Salary  | PHP 44,600.00<br>(EUR 796.43)                   | Pesos (Euros)<br>per month | 2020      | Statista <sup>46</sup>  |
| NCR working population  | 4,968,647                                       | people                     | July 2020 | PSA <sup>47</sup>   |
| NCR average time spent in traffic (car)                                   | 188   | Hours per<br>year          | 2020      | Tomtom <sup>48</sup>  |
| Car ownership at 11.5% (assumption<br>carried over to working population) | 571,394   | People                     | 2020      | Derived based on MUCEP<br>study <sup>49</sup> of 11.5% car<br>ownership in Metro Manila<br>x NCR working population   |
| Economic loss if basis is on hourly salary<br>cost per employee           | PHP 27,221,749,561.10<br>(EUR 486,102,670.73)   | Pesos (Euros)<br>per year  | 2020      | Derived:<br>[Monthly salary / 22 days /<br>8 hours] x<br>[average time spent in<br>traffic] x [NCR working<br>population x 11.5% car<br>ownership factor based on<br>MUCEP] |
| Registered cars in NCR (Consolidated Cars<br>+ SUVs)                      | 1,474,561                                       | Cars and<br>SUVs           | 2019      | LTO Annual Report <sup>50</sup>   |
| Economic loss if basis is on registered cars<br>in NCR                    | PHP 70,249,426,550.00<br>(EUR 1,254,454,045.54) | Pesos (Euros)<br>per year  | 2020      | Derived:<br>[Monthly salary / 22 days /<br>8 hours] x Average time<br>spent in traffic x Registered<br>cars in NCR as of 2020   |

<sup>46</sup>Philippine: Monthly Average Salary 2020," accessed December 20, 2021, <https://www.statista.com/statistics/1048636/philippines-monthly-average-salary/>.

<sup>47</sup> "Philippine Statistics Authority," accessed December 20, 2021, <https://psa.gov.ph/statistics/survey/labor-and-employment/labor-force-survey/title/Unemployment%20Rate%20in%20July%202021%20is%20Estimated%20at%206.9%20percent>

<sup>48</sup> "Manila Traffic," accessed December 20, 2021, [https://www.tomtom.com/en\\_gb/traffic-index/manila-traffic/](https://www.tomtom.com/en_gb/traffic-index/manila-traffic/). ii <sup>49</sup> Japan International Cooperation Agency, "The Project for Capacity Development on Transportation Planning and Database Management in the Republic of the Philippines MMUTIS Update and Capacity Enhancement Project (MUCEP): Technical Report" (JICA, 2015), <https://openjicareport.jica.go.jp/pdf/12247623.pdf>.

<sup>50</sup> LTO, "LTO Annual Report 2020", LTO, 2020, Accessed December 20, 2021, <https://lto.gov.ph/transparency-seal/annual-reports/file/1167-annual-report-2020-as-of-december-2020.html>

## INFRASTRUCTURE AND BUSINESS

### RESTAURANT PARKING OPPORTUNITY COST

| <b>RESTAURANT PARKING OPPORTUNITY COST</b>  |  |  |
|---|--|--|
|   | <b>Figures in PHP<br/>Philippine Pesos</b> | <b>Figures in EUR<br/>(EUR = PHP 56)</b> |
| <b>Average Customer Spend</b>   | 750  | 13.39                                    |
| <b>Average Revenue from Car Owners (i.)</b><br><i>Assumption: Ave. of two passengers per vehicle</i>  | 1,500                                      | 26.79                                    |
| <b>Average Revenue from Cyclists (ii.)</b><br><i>Assumption: One parking slot can accommodate eight (8) bicycles</i>  | 6,000                                      | 107.14                                   |
| <b>Average Opportunity Cost of Allocating Space for Car Parking vs. Bicycle Parking (iii.)</b><br><i>Computed as the difference between ii. and i.</i>  | 4,500                                      | 80.36                                    |
| <b>Average Opportunity Cost per Day vis-a-vis Average Restaurant Turnover (iv.)</b><br><i>Two (2) hour turnover for a 12-hour operation (11:00AM-11:00PM)<br/>Computed as figure iii. multiplied by 6 (batches)</i> | 27,000                                     | 482.14                                   |
| <b>Average Weekly Opportunity Cost vis-a-vis Average Restaurant Operations (v.)</b><br><i>Assuming a six (6) day operation per week<br/>Computed as figure iv. multiplied by 6 (days)</i>                           | 162,000                                    | 2,892.86                                 |
| <b>Average Monthly Opportunity Cost (vi.)</b><br><i>Computed as figure v. multiplied by 4 (weeks)</i>   | 648,000                                    | 2,892.86                                 |
| <b>Average Annual Opportunity Cost</b><br><i>Computed as figure vi. multiplied by 12 (months)</i>   | 7,776,000                                  | 138,857.14                               |

## INFRASTRUCTURE AND BUSINESS

### BIKES ARE BETTER FOR YOUR BUDGET

| <b>BIKES ARE BETTER FOR YOUR BUDGET<sup>51</sup></b> |  |  |
|--|--|--|
| <b>Annual Car Ownership Expenses</b>                 | <b>Figures in PHP<br/>Philippine Pesos</b> | <b>Figures in EUR<br/>(EUR = PHP 56)</b> |
| Car Amortization                                     | 173,825.60                                 | 3,104.03                                 |
| Car Registration                                     | 4,000.00                                   | 71.43                                    |
| Motor Vehicle Insurance                              | 15,000.00                                  | 267.86                                   |
| Fuel Costs   | 43,636.36                                  | 779.22                                   |
| Parking Fees   | 36,000.00                                  | 642.86                                   |
| Car Maintenance                                      | 9,000.00                                   | 160.71                                   |
| <b>Average Annual Car Expense</b>                    | <b>281,461.96</b>                          | <b>5,026.11</b>                          |
| <b>Average Monthly Car Expense</b>                   | <b>23,455.16</b>                           | <b>418.84</b>                            |

<sup>51</sup> Roy Robles, "5 Steps to Calculate The Monthly Expense of Car Ownership in The Philippines," Philkotse, August 21, 2019, <https://philkotse.com/car-buying-and-selling/calculating-the-cost-of-car-ownership-in-the-philippines-5193>.

## HEALTH

### CALORIES BURNED THROUGH CYCLING

| CALORIES BURNED THROUGH CYCLING <sup>52</sup> |                      |                                |  |  |   |
|---|----------------------|--------------------------------|--|--|---|
| Weight Class                                  | Cycling Speed (km/h) | MET Value<br>(2011 Compendium) | Calories Burned<br>(1 minute of cycling) | Calories Burned<br>(40 minutes of cycling) | Calories Burned<br>(200 minutes of cycling) |
| 125 lbs. / 57 kg                              | 18                   | 6.8                            | 6.8                                      | 272  | 1,360                                       |
| 155 lbs. / 70 kg                              | 18                   | 6.8                            | 8.3                                      | 332  | 1,660                                       |
| 185 lbs. / 84 kg                              | 18                   | 6.8                            | 6.8                                      | 400  | 2,000                                       |

### HEALTH COST SAVINGS

| COST OF PHYSICAL INACTIVITY            |                   |      |                                 |
|--|-------------------|------|---------------------------------|
| Item                                   | Figure            | Year | Source                          |
| Adult Population (18+ year)            | 60,141,831        | 2013 | PSA <sup>53</sup>               |
| Prevalence of physical inactivity      | 39.66%            | 2016 | WHO <sup>54</sup>               |
| Insufficiently active population       | 23,852,250        | 2013 |                                 |
| Annual cost of physical inactivity     | \$102,838,000.00  | 2013 | Ding et.al., 2013 <sup>55</sup> |
| Annual cost of physical inactivity*    | P4,365,061,748.00 | 2013 |                                 |
| Per capita cost of physical inactivity | P183.00           | 2013 |                                 |
| Per capita cost of physical inactivity | P220.17           | 2020 |                                 |

<sup>52</sup>\*Calories burned in 30 minutes of leisure and routine activities - Harvard Health\*. Harvard Health.

<sup>53</sup>Projected Population by Age Group, Sex, and by Single-Calendar Year Interval, Philippines: 2010-2020 (Medium Assumptions), Philippines Statistics Authority, [https://psa.gov.ph/sites/default/files/ attachments/hsd/pressrelease/Table4\\_9.pdf](https://psa.gov.ph/sites/default/files/attachments/hsd/pressrelease/Table4_9.pdf)

<sup>54</sup> Prevalence of insufficient physical activity among adults aged 18+ years, World Health Organization, 2016, [https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-insufficient-physical-activity-among-adults-aged-18-years-\(age-standardized-estimate\)-\(-\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-insufficient-physical-activity-among-adults-aged-18-years-(age-standardized-estimate)-(-))

<sup>55</sup> Ding, Ding, Kenny Lawson, Tracy Kolbe-Alexander, Eric Finkelstein, Peter Katzmarzyk, Willem van Mechelen, Michael Pratt, "The economic burden of physical inactivity: a global analysis of major non-communicable diseases", The Lancet, vol. 388, no. 10051 (2016), [https://doi.org/10.1016/ S0140-6736\(16\)30383-X](https://doi.org/10.1016/ S0140-6736(16)30383-X)

## HEALTH

### PER-KM HEALTH BENEFIT OF CYCLING (IN PHP AND EUR)

| PER-KM HEALTH BENEFIT OF CYCLING (in PHP and EUR) |                 |        |  |
|---|-----------------|--------|--|
| Scenario of annual health benefits                | Activity Status |        | Weighted sum = annual benefit per person |
|   | Inactive        | Active |  |
|   | Benefit Weight  |        |  |
|   | 0.85            | 0.15   |  |
|   | Prevalence      |        |  |
|   | 39.66%          | 60.34% |  |
| P220.17   | P74.22          | P19.93 | P94.15                                   |
| KM over which benefits are received               | 900             | 620    | Weighted per-km benefit                  |
|   | P0.105          | P0.15  | P0.26   €0.0046                          |

Sources: Genter et al., 2009<sup>56</sup>  
 Mulley et al., 2013<sup>57</sup>

56 Genter, J.A., Stuart Donovan, B. Petrenas, McCormick Rankin Cagney, Hannah. Badland, "Valuing the health benefits of active transport modes", NZ Transport Agency Research Report 359, 72.pp, (2009), <https://www.semanticscholar.org/paper/Valuing-the-Health-Benefits-of-Active-Transport-Genter-Donovan/445392e1b4e65d6bb4c26f1e9a74223e00fb2331>

57 Mulley, Corinne, Rob Tyson, Peter Mccue, Chris Rissel, Cameron Munro, "Valuing active travel: Including the health benefits of sustainable transport in transportation appraisal frameworks", Research in Transportation Business and Management, Vol. 7, 27-34, (2013), <https://doi.org/10.1016/j.rtbm.2013.01.001>

## HEALTH

### ANNUAL PHYSICAL HEALTH BENEFITS FROM CYCLING

| ANNUAL PHYSICAL HEALTH BENEFITS FROM CYCLING |                 |      |   |
|--|-----------------|------|---|
| Item   | Figure          | Year | Source  |
| Daily no. of trips (Greater Manila Area)     | 46,818,000      | 2015 | JICA MUCEP Study                                    |
| Share of Metro Manila trips                  | 43.00%          | 2015 | JICA MUCEP Study                                    |
| Assumed cycling mode share*                  | 5.00%           |      |   |
| Ave. cycling trip distance (km)              | 11              | 2019 | ICSC, MNL Moves, University of Twente <sup>58</sup> |
| Annual KM cycled                             | 2,878,838,820   |      |   |
| Annual health benefits from cycling          | P738,323,677.92 |      |   |
| Annual health benefits from cycling          | €13,184,351.39  |      |   |

NOTE:\*Further studies are needed to estimate the actual share of trips served by cycling in Metro Manila.

<sup>58</sup> "Active Mobility Survey in Metro Manila", ICSC, MNL Moves, University of Twente, 2019, [https://icsc.ngo/wp-content/uploads/2020/06/ActiveMobilityBriefer\\_09June2020\\_A4\\_WEB.pdf](https://icsc.ngo/wp-content/uploads/2020/06/ActiveMobilityBriefer_09June2020_A4_WEB.pdf).

## HEALTH

## COST OF ROAD CRASHES

| COST OF ROAD CRASHES IN METRO MANILA (2019) |              |                |                                 |                     |   |
|---|--------------|----------------|---------------------------------|---------------------|---|
| Severity                                    | iRap Factors | GDP per capita | Cost per Crash in PHP (Euro)    | No. of Road Crashes | Annual Cost in PHP (Euro)                         |
| Damage to Property                          | --           | --             | P72,241.22<br>(€1,290.02)       | 100,933             | P7,291,522,668.81<br>(€130,205,761.94)            |
| Non-fatal                                   | 17           | P181,920.03    | P3,092,640.51<br>(€55,225.72)   | 20,466              | P63,293,980,677.66<br>(€1,130,249,654.96)         |
| Fatal                                       | 70           |                | P12,734,402.10<br>(€227,400.04) | 372                 | P4,737,197,581.20<br>(€84,592,813.95)             |
|   |              |                |                                 | <b>TOTAL</b>        | <b>P75,322,700,927.67<br/>(€1,345,048,230.85)</b> |

Sources: International Road Assessment Programme (iRap) <sup>59</sup>  
 Metropolitan Manila Development Authority <sup>60</sup>  
 De Leon et al., 2005 <sup>61</sup>  
 EUR-PHP exchange rate: ₱56.00

59 McMahon, Kate, and Said Dahdah. Rep. The True Cost of Road Crashes: Valuing Life and the Cost of a Serious Injury. International Road Assessment Programme, n.d. [https://resources.irap.org/Research/iRAP\\_report\\_the\\_true\\_cost\\_of\\_road\\_crashes\\_EN.pdf?\\_ga=2.188046817.813589981.1639987540-778531737.1639050860](https://resources.irap.org/Research/iRAP_report_the_true_cost_of_road_crashes_EN.pdf?_ga=2.188046817.813589981.1639987540-778531737.1639050860)

60 Rep. Metro Manila Accident Recording and Analysis System 2009-2019. Metropolitan Manila Development Authority. Metropolitan Manila Development Authority. Accessed January 3, 2022. <https://mmda.gov.ph/2-uncategorised/3345-freedom-of-information-foi.html>.

61 De Leon, Mark Richmond M, Primitivo C Cal, and Ricardo G Sigua. "Estimation of Socio-Economic Cost of Road Accidents in Metro Manila." *Journal of the Eastern Asia Society for Transportation Studies*, 6 (2005): 3183-98. [https://www.researchgate.net/publication/229007757\\_Estimation\\_of\\_socio-economic\\_cost\\_of\\_road\\_accidents\\_in\\_Metro\\_Manila](https://www.researchgate.net/publication/229007757_Estimation_of_socio-economic_cost_of_road_accidents_in_Metro_Manila).

## HEALTH

### AVERAGE CYCLING COMMUTE IN METRO MANILA

| AVERAGE CYCLING COMMUTE IN METRO MANILA |                      |                            |   |
|---|----------------------|----------------------------|---|
| Average Distance (km)                   | Average Speed (km/h) | Average Time Spent (mins.) | Average Time Spent (mins.; w/in a 5-day period) |
| 11                                      | 18                   | 40                         | 200   |

Sources: #PHmobility: Active Mobility Survey in Metro Manila <sup>62</sup>

WHO Fact Sheet on Physical Activity <sup>63</sup>

Eriksson et.al, 2019 <sup>64</sup>

<sup>62</sup> #PHmobility: Active Mobility Survey in Metro Manila". ICSC | Institute for Climate and Sustainable Cities. <https://icsc.ngo/active-mobility-survey/>.

<sup>63</sup> World Health Organization, "Prevalence of Insufficient Physical Activity among Adults Aged 18+ Years (age-Standardized Estimate) (%)," World Health Organization, 2016, [https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-insufficient-physical-activity-among-adults-aged-18-years-\(age-standardized-estimate\)-\(-\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-insufficient-physical-activity-among-adults-aged-18-years-(age-standardized-estimate)-(-)).

<sup>64</sup> Jenny Eriksson et al., "An Analysis of Cyclists' Speed at Combined Pedestrian and Cycle Paths," Traffic Injury Prevention 20, no. sup3 (September 27, 2019): 56–61.

## ENERGY AND ENVIRONMENT

### THE COST OF EMISSIONS

| BASELINE DATA                                  |               |                                  |      |       |  |
|--|---------------|----------------------------------|------|-------|--|
| Item   | Figure        | Unit                             | Year | Scale | Source   |
| CO <sub>2</sub> emissions (BAU scenario)       | 19,300.00     | kt of CO <sub>2</sub> equivalent | 2025 | NCR   | Ahanchian and Biona, 2013 <sup>65</sup><br>PSA <sup>66</sup> |
| Population of Metro Manila (as of 01 May 2020) | 13,484,462.00 | persons                          | 2020 | NCR   |  |

| ASSUMPTIONS                       |        |      |                      |
|-----------------------------------|--------|------|----------------------|
| Item                              | Figure | Unit | Source               |
| Cost per ton of CO <sub>2</sub> e | 50     | USD  | Quartz <sup>67</sup> |

| CALCULATIONS                                 |                   |                                      |
|--|-------------------|--------------------------------------|
| Item   | Figure            | Unit                                 |
| CO <sub>2</sub> emissions (BAU scenario)     | 19,300,000.00     | tonnes of CO <sub>2</sub> equivalent |
| Cost of CO <sub>2</sub> emissions            | 965,000,000.00    | USD                                  |
|  | 48,250,000,000.00 | PHP                                  |
|  | 861,607,142.86    | EUR                                  |
| Per capita cost of CO <sub>2</sub> emissions | 3,578.19          | PHP                                  |
|  | 63.90             | EUR                                  |

Note: USD 1 = PHP 50; EUR 1 = PHP 56

<sup>65</sup> Ahanchian, M. and Biona, JBM., "Energy Demand, Emissions Forecasts and Mitigation Strategies Modeled over a Medium-Range Horizon: The Case of the Land Transportation Sector in Metro Manila," Energy Policy 66 (March 1, 2014): 615–29. <sup>66</sup> Philippine Statistics Authority, "Total Population by Province, City, and Municipality (As of May 1, 2021)," Philippine Statistics Authority, 2021, <https://psa.gov.ph/sites/default/files/attachments/ird/pressrelease/NCR.xlsx>.

<sup>67</sup> "The Era of Polluting the Atmosphere for Free Is Coming to a Close," Quartz, 2021, <https://qz.com/2028724/to-address-climate-change-fix-the-global-carbon-price/>.

## ENERGY AND ENVIRONMENT

### CYCLING FIGHTS CLIMATE CHANGE

#### CO<sub>2</sub> EMISSIONS OF DRIVING A CAR

| Item                | Figure        | Unit                                     | Source            |
|---------------------|---------------|--|-------------------|
| Production of a car | 42.00         | g of CO <sub>2</sub> e/km                | ECF <sup>68</sup> |
| Driving a car       | 229.00        | g of CO <sub>2</sub> e/passenger-km      |                   |
| <b>TOTAL</b>        | <b>271.00</b> | <b>g of CO<sub>2</sub>e/passenger-km</b> |                   |

#### CO<sub>2</sub> EMISSIONS OF RIDING A BIKE

| Item                                  | Figure        | Unit                           | Source                                |
|---------------------------------------|---------------|--------------------------------|---------------------------------------|
| Production and maintenance of a bike  | 5.00          | g of CO <sub>2</sub> e/km      | ECF <sup>68</sup>                     |
| "Fuel" of an average Filipino cyclist | 229.00        | g of CO <sub>2</sub> e/km      | EDF <sup>70</sup> , FAO <sup>71</sup> |
| <b>TOTAL</b>                          | <b>271.00</b> | <b>g of CO<sub>2</sub>e/km</b> |                                       |

68 Blondel, B., Mispelon, C., & Ferguson, J., "Cycle More Often 2 Cool Down the Planet! Quantifying CO2 Savings of Cycling (European Cyclists' Federation)," 2011, [https://ecf.com/files/wp-content/uploads/ECF\\_BROCHURE\\_EN\\_planche.pdf](https://ecf.com/files/wp-content/uploads/ECF_BROCHURE_EN_planche.pdf).

69 Ibid.

70 Ibid.

71 Food and Agriculture Organization, "Food Consumption Nutrients Statistics," Food and Agriculture Organization, accessed December 20, 2021, [http://www.fao.org/fileadmin/templates/ess/documents/food\\_security\\_statistics/FoodConsumptionNutrients\\_en.xls](http://www.fao.org/fileadmin/templates/ess/documents/food_security_statistics/FoodConsumptionNutrients_en.xls).

## ENERGY AND ENVIRONMENT

### CYCLING FIGHTS CLIMATE CHANGE

| ASSUMPTIONS                                   |        |            |                                    |
|---|--------|------------|------------------------------------|
| Item  | Figure | Unit       | Source                             |
| Cost per ton of CO <sub>2</sub> e             | 50     | USD        | Quartz <sup>72</sup>               |
| Average cycling trip distance in Metro Manila | 11     | kilometers | University of Twente <sup>73</sup> |

<sup>72</sup> "The Era of Polluting the Atmosphere for Free Is Coming to a Close," Quartz, 2021, <https://qz.com/2028724/to-address-climate-change-fix-the-global-carbon-price/>.

<sup>73</sup> "Active Mobility Survey in Metro Manila", ICSC, MNL Moves, University of Twente, 2019, [https://icsc.ngo/wp-content/uploads/2020/06/ActiveMobilityBriefer\\_09June2020\\_A4\\_WEB.pdf](https://icsc.ngo/wp-content/uploads/2020/06/ActiveMobilityBriefer_09June2020_A4_WEB.pdf).

## ENERGY AND ENVIRONMENT

### CYCLING FIGHTS CLIMATE CHANGE

| CALCULATIONS   |          |                           |
|--|----------|---------------------------|
| Item   | Figure   | Unit                      |
| Cost of driving emissions                                    | 0.0136   | USD                       |
|  | 0.6775   | PHP                       |
|  | 0.0121   | EUR                       |
| Cost of cycling emissions                                    | 0.0013   | USD                       |
|  | 0.0659   | PHP                       |
|  | 0.0012   | EUR                       |
| Emissions saved from shifting to cycling                     | 244.6600 | g of CO <sub>2</sub> e/km |
| Emissions saved for the average cycling trip in Metro Manila | 2.6913   | kg of CO <sub>2</sub> e   |
|  | 0.1346   | USD                       |
|  | 6.7282   | PHP                       |
|  | 0.1201   | EUR                       |

65 Ahanchian, M. and Biona, JBM., "Energy Demand, Emissions Forecasts and Mitigation Strategies Modeled over a Medium-Range Horizon: The Case of the Land Transportation Sector in Metro Manila," Energy Policy 66 (March 1, 2014): 615–29. 66 Philippine Statistics Authority, "Total Population by Province, City, and Municipality (As of May 1, 2021)," Philippine Statistics Authority, 2021, <https://psa.gov.ph/sites/default/files/attachments/ird/pressrelease/NCR.xlsx>.

67 "The Era of Polluting the Atmosphere for Free Is Coming to a Close," Quartz, 2021, <https://qz.com/2028724/to-address-climate-change-fix-the-global-carbon-price/>.

## ENERGY AND ENVIRONMENT

### CYCLING IS LIKE PLANTING TREES

| BASELINE DATA                            |               |            |      |       |                    |
|--|---------------|------------|------|-------|--------------------|
| Item                                     | Figure        | Units      | Year | Scale | Source             |
| Daily no. of trips (MUCEP Area)          | 46,818,000.00 | Trips      | 2015 | NCR   | JICA <sup>74</sup> |
| Share of intra-city trips (Metro Manila) | 43.00         | Percentage | 2015 | NCR   |                    |
| Daily no. of trips (Metro Manila)        | 20,131,740.00 | Trips      | 2015 | NCR   |                    |
| Mode share of private cars               | 8.2           | Percentage | 2015 | NCR   |                    |

| ASSUMPTIONS   |            |            |   |
|---|------------|------------|---|
| Item  | Figure     | Unit       | Source  |
| Mode shift  | 5.00       | Percentage |   |
| Average cycling trip distance in Metro Manila                                     | 11         | kilometers | ICSC, MNL Moves, University of Twente <sup>75</sup> |
| CO <sub>2</sub> savings from cycling  | 245        | grams      | Computed in "Cycling Fights Climate Change"         |
| Number of working days in a week  | 5          | days       |   |
| Number of weeks in a year   | 52         | weeks      |   |
| Equivalent of trees saved per 1.36 million tonnes of CO <sub>2</sub> savings/year | 54,400,000 |            | Chen, 2012 <sup>76</sup>                            |

74 Japan International Cooperation Agency. "The Project for Capacity Development on Transportation Planning and Database Management in the Republic of the Philippines MMUTIS Update and Capacity Enhancement Project (MUCEP): Technical Report." JICA, 2015. <https://openjicareport.jica.go.jp/pdf/12247623.pdf>.

75 "Active Mobility Survey in Metro Manila", ICSC, MNL Moves, University of Twente, 2019, [https://icsc.ngo/wp-content/uploads/2020/06/ActiveMobilityBriefer\\_09June2020\\_A4\\_WEB.pdf](https://icsc.ngo/wp-content/uploads/2020/06/ActiveMobilityBriefer_09June2020_A4_WEB.pdf).

76 Chen Y., "Assessing Climate Value of Cycling Under Different Urban Forms of Dutch Cities" (University of Twente, 2012), [https://webapps.itc.utwente.nl/librarywww/papers\\_2012/msc/upm/yangchen.pdf](https://webapps.itc.utwente.nl/librarywww/papers_2012/msc/upm/yangchen.pdf).

## ENERGY AND ENVIRONMENT

### CYCLING IS LIKE PLANTING TREES

| CALCULATIONS   |                |            |
|--|----------------|------------|
| Item   | Figure         | Units      |
| Trips made by private cars in Metro Manila                                     | 1,650,802.68   | Trips      |
| 5% of car trips in Metro Manila  | 82,540.13      | Trips      |
| Total distance of car trips  | 907,941.47     | kilometers |
| CO <sub>2</sub> savings in a day   | 222,445,661.13 | grams      |
|  | 222.45         | tonnes     |
| CO <sub>2</sub> savings in a year  | 57,835.87      | tonnes     |
| Equivalent of trees saved per 57,835.87 tonnes of CO <sub>2</sub> savings/year | 2,313,434.88   | trees      |

### NO NEED FOR GAS MONEY

| FUEL CONSUMPTION OF A TOYOTA VIOS 1.3-LITRE DOHC DUAL VVT-i ENGINE |        |      |                      |
|--|--------|------|----------------------|
| Item   | Figure | Unit | Source               |
| Fuel consumption (at 60kph)  | 19.57  | km/L | Toyota <sup>77</sup> |

<sup>77</sup> Toyota, "Value for Money – Fuel Efficient Toyota Cars," Toyota Myanmar, accessed December 20, 2021, <http://www.toyota-myanmar.com/toyotabeyondtoyota/2-2>.

## ENERGY AND ENVIRONMENT

### NO NEED FOR GAS MONEY

| <b>NO NEED GAS PRICES IN METRO MANILA (2020)</b> |  |  |   |                       |
|--|--|--|---|-----------------------|
|  | <b>Ave gas prices in the PH in USD (2020)<sup>78</sup></b> | <b>Ave PHP-USD Exchange Rate (2020)<sup>79</sup></b> | <b>Ave gas prices in the PH in PHP (2020)</b> | <b>EUR Equivalent</b> |
| Jan  | 1  | 50.84  | 50.84   | 0.91                  |
| Feb  | 0.98   | 50.74  | 49.73   | 0.89                  |
| Mar  | 0.82   | 50.9   | 41.74   | 0.75                  |
| April  | 0.75   | 50.73  | 38.05   | 0.68                  |
| May  | 0.82   | 50.56  | 41.46   | 0.74                  |
| June   | 0.94   | 50.1   | 47.09   | 0.84                  |
| July   | 0.97   | 49.47  | 47.98   | 0.86                  |
| Aug  | 1.01   | 48.84  | 49.33   | 0.88                  |
| Sept   | 0.97   | 48.51  | 47.05   | 0.84                  |
| Oct  | 0.89   | 48.48  | 43.15   | 0.77                  |
| Nov  | 0.96   | 48.25  | 46.32   | 0.83                  |
| Dec  | 0.97   | 48.06  | 46.62   | 0.83                  |
| <b>AVERAGE</b>                                   | <b>0.92</b>  | <b>49.62</b>   | <b>45.78</b>                                  | <b>0.82</b>           |

<sup>78</sup> "Philippine Gasoline Prices," Trading Economics, accessed December 20, 2021, <https://tradingeconomics.com/philippines/gasoline-prices>.

<sup>79</sup> "Statistics - Exchange Rate," Bangko Sentral ng Pilipinas, accessed December 20, 2021, <https://www.bsp.gov.ph/SitePages/Statistics/ExchangeRate.aspx>.

## ENERGY AND ENVIRONMENT

### NO NEED FOR GAS MONEY

| ASSUMPTIONS                      |        |            |
|----------------------------------|--------|------------|
| Item                             | Figure | Unit       |
| Average trip distance            | 11.00  | kilometers |
| Average fuel price (2020)        | 45.78  | PHP        |
| Number of working days in a week | 5.00   | days       |
| Number of weeks in a year        | 52.00  | weeks      |

| CALCULATIONS                |          |        |
|-----------------------------|----------|--------|
| Item                        | Figure   | Unit   |
| Gasoline consumed for 11 km | 0.56     | liters |
| Gasoline saved per year     | 146.14   | liters |
|                             | 6,690.38 | PHP    |
|                             | 119.47   | EUR    |

Note: EUR 1 = PHP 56

## COMMUNITY IMPACT

### TNVS COMPUTATION

| <b>TNVS COMPUTATION</b> |           |        |                      |                                 |                                  |
|-------------------------|-----------|--------|----------------------|---------------------------------|----------------------------------|
| Car Type                | Base Fare | Per Km | Per Minute Surcharge | Cost of 5-km ride at 30 minutes | Cost of 10-km ride at 30 minutes |
| Taxi                    | P40.00    | 13.5   | P2.00                | P167.50                         | P235.00                          |
| 2- Seater               | P40.00    | 15     | P2.00                | P175.00                         | P250.00                          |
| 4- Seater               | P60.00    | 19     | P2.00                | P215.00                         | P310.00                          |

