

# **GHG Management Framework Plan Makati City**

*Prepared by:  
MakatiCity GHG Inventory Team*

*With support from:*

# Contents

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- Contents.....2
- Executive Summary.....1
- 1 Introduction .....4
- Our Changing Climate: The Importance of GHG Management .....4
- Benefits of GHG Management.....5
- 2 Background: Makati City and its GHG Emissions and Existing Reduction Measures.....7
- Overview of Makati City .....7
- Existing GHG Reduction Actions of Makati City .....16
- 3 Low Carbon Community: Vision, Priorities, and Goals .....19
- A Vision for a Low Carbon Community .....19
- GHG Management Priorities.....20
- Reduction Goals and Targets.....20
- 4 Initiatives on Achieving Low Carbon Community Vision, Priorities, Goals .....23
- Establishment of a Sustainable GHG Management Function .....23
- Strengthening Local Governance for GHG Management .....27
- Initiatives Focused on the Community.....31
- 6 Action Plan and Time Frame .....35
- Initiatives for Further Assessment .....35
- Preparation of the Long-term GHG Management Plan.....37
- Implementation of Rapid Launch Initiatives .....37
- GHG Emission Reduction Tools Annex .....42

# Executive Summary

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There is an ongoing call for climate action, internationally and locally, that requires governments to take necessary steps to mitigate the increasing rate of greenhouse gas (GHG) emissions.

As part of the local initiative to contribute to climate change mitigation, the City Government of Makati responded through actions that entail activity data inventory and setting the management framework plan for its entity and community level. The City of Makati first completed inventories of emissions for both government operations (entity level)<sup>1</sup> and the community governed by the city (community level)<sup>2</sup>. Based on the understanding of emissions provided by these inventories, the City Government of Makati then prepared a GHG Management Framework Plan (Framework Plan) that sets the blueprint to reduce future emissions through policy initiatives, projects, and program of activities.

The Framework Plan sets the City's GHG management agenda. Furthermore, it sets forth the Makati's aspiration of becoming a premiere city in the country and in the ASEAN region with regards to GHG governance at the local level.

With reference to the inventory data as detailed in the Inventory Report, the Framework Plan identifies the sectors in which the local government will give particular attention to in order to achieve its reduction goals and targets. The GHG inventory was completed consistent with a number of international guidance and standards. Results of the inventory cover the reporting period from January to December 2011. For the year 2011 the total GHG emission of Makati City is 1,662,017 tonnes of Carbon Dioxide.

Under a business as usual scenario, the City of Makati will continue to experience growth in its local economy and the direct impact is also an exponential growth in its GHG emission.

In response to the call for climate action, the City Government of Makati has committed in reducing its GHG emissions through mitigation initiatives set in the GHG Management Framework Plan. These mitigation initiatives will follow several principles and objectives that will be discussed in detail in the document.

The City Government of Makati committed itself in developing a Framework Plan, led by the Department of Environmental Services aimed at articulating the City's approach to GHG management.

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<sup>1</sup>Entity Level Inventory refers to the inventory of GHG emissions of the organization or for the sake of the LGU, the government-controlled, owned and managed units and jurisdiction

<sup>2</sup>Community Level Inventory refers to the inventory of GHG emissions of sectors (e.g. waste, agriculture, transportation, etc.) that are within the control, jurisdiction and boundary of the LGU

The Makati City's long-term and green visions are as follows:

Long-term Vision:

- Makati shall lead the Philippines into the 21<sup>st</sup> Century, its global and national enterprises, leading to the creation of a new, responsible and sustainable economy; its citizens productive, empowered and God-loving.

Green Vision:

- Makati City will lead its way forward on being a low carbon city through its GHG reduction initiatives

To achieve these visions, Makati's green mission is:

Green Mission:

- Makati City will be the model for GHG Management through the implementation of breakthrough carbon-neutral technologies, practices, and stakeholders' participatory action.

As a rationale, the City Government of Makati perceives the Framework Plan with the following perspectives:

- Frames into perspective the relevance of the GHG inventory report that:
  - Establishes understandable and measurable baseline data to comprehend the impact of Makati City on climate change based from its reported activity data from significant sectors;
  - Develops initial data sets needed to monitor and assess local actions on climate change mitigation ; and
  - Understands current GHG emissions of Makati City and gain insights to project future emissions
- Complements the inventory report by making sense of the inventory data and bringing in a concrete and actionable perspective within the LGU that allows it to manage what it has measured. More specifically, it helps Makati to:
  - Analyze the City's GHG emissions to identify and map out climate change mitigation opportunities and options; and
  - Plan its GHG emissions reduction strategies through various local policy initiatives and projects and program of activities.
- Prepares the City Government and its citizens for regulated or voluntary GHG reduction programs in the future.

- Manage risks brought about by high GHG emissions that aggravate climate change.
- Strengthen environmental advocacy and social responsibility.

The Framework Plan creates a blueprint and sets the direction of Makati with regards to its climate change action, particularly in the aspect of mitigation through GHG emissions reduction strategies. Specifically, the primary objectives of the Framework Plan are following:

- To integrate the GHG management framework plan to the existing development plans of the City Government (e.g. CLUP, CDP, Climate Change Action Plan);
- To develop strategies and mechanisms on how to reduce GHG emissions;
- To implement local policies related to climate change mitigation and GHG reduction; and
- To develop realistic and time bound programs, projects and activities related to GHG emission reduction.

Finally, as it intends to institutionalize these climate change actions into a long-term initiatives, the City Government must establish specific GHG Management organization to will lead City to its pursuit as one of the most environmentally sustainable city not only in the country but in the ASEAN Region.

# 1 Introduction

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## **Our Changing Climate: The Importance of GHG Management**

The effects of climate change are now being felt throughout the world - periods of long drought and floods, and more unpredictable weather conditions. Recent weather-related environmental catastrophes demonstrate the harmful effects of climate change in the Philippines. Overwhelming scientific evidence shows that global warming is altering the earth's normal temperature and climatic shifts. Human activities such as burning of fossil fuel and land use change due to rapid urbanization are considered significant factors which contribute to the increasing amount of GHG emissions in the earth's atmosphere.

The degree and scope of climate change and its consequences now require collective sustainable solutions. At the national level, the Philippine government, as a signatory to the Kyoto Protocol, expressed its commitment in addressing GHG emissions by identifying reduction targets and implementing policies to help mitigate climate change. The role of Local Government Units (LGUs) in climate change mitigation complements the initiatives of national government and plays an important part particularly in planning and implementing policy initiatives at entity and community levels<sup>3</sup>.

As part of its commitment in mitigating climate change, the City Government has completed the bottom-up GHG inventories. Following the completions, Makati has initiated an on-going processes as an approach to monitor, account and manage GHG emissions in both levels.

Makati City emphasizes the importance of preparing and implementing a GHG Management Plan. Overall, the Framework GHG Management Plan allows the City Government to analyze the emissions produced within its geographic boundary and to identify appropriate climate change mitigation options through policies and programs. Using the inventory report as a backbone for a scientific baseline analysis of trends in GHG emissions, the plan serves as the City's blueprint for climate change actions. It lays out the framework for setting targets and goals to reduce emissions, as well as concrete approaches and options that Makati can adopt and implement. It articulates the strategies, policy options, programs and activities - mainstreaming the existing and developing future actions to institutionalize the best practices on climate change mitigation.

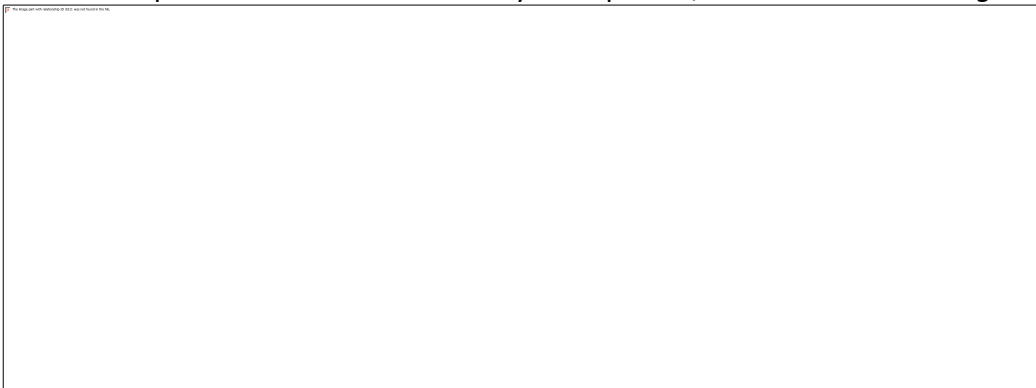
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<sup>3</sup>Entity Level Inventory refers to the inventory of GHG emissions of the organization or for the sake of the LGU, the government-controlled, owned and managed units and jurisdiction. Community Level Inventory refers to the inventory of GHG emissions of sectors (e.g. waste, agriculture, transportation, industry, etc.) that are within the control, jurisdiction and boundary of the LGU

At present, the City has a number of programs, projects, and activities (PPAs) and policies that are being implemented. The Framework Plan will allow the Makati GHG Inventory Team to mainstream these on-going initiatives, with specific attention to mitigation. It can influence the creation of legislative measures influencing a more unified set of mitigation actions and institutionalization in the future.

## Benefits of GHG Management

The GHG Management Framework Plan is the principal document that will guide Makati for further development of the city's Long-Term GHG Management Plan. These plans are the next steps after the completion of the GHG inventory in sequence, as shown below in *Figure 1*.



**Figure 1. GHG Management Process**

The Framework Plan builds on this background and starts the process that will eventually lead to a Long-Term GHG Management Plan for Makati City. In particular, it establishes the vision, strategies and the broad goals and targets that Makati will pursue in its rapid launch initiatives. In determining the City's emission over which the City has influence, the Framework Plan sets the overall priorities in managing what it was able to measure.

On the other hand, the Long Term Plan which is to be developed in future initiative, builds upon the GHG Management Framework Plan and analyzes specific initiatives in the priority areas that can be further enhanced and institutionalized to meet the city's targets. The Framework Plan also provides detailed long-term actions for implementation and monitoring.

Makati has identified the following purposes for developing a GHG Management Framework Plan:

- It will provide decision makers the GHG emission projection of the City for the next ten (10) years;

- It serves as an additional tool to strengthen existing development plans of the City (e.g. Comprehensive Land Use Plan) especially in the area of climate change mitigation; and
- It shall guide the City Government to efficiently implement the following sector specific initiatives:
  - Energy: Green Transport Plan and Green Building initiative
  - Solid Waste: Integration of GHG management programs to the 10 Year solid waste Management plan of the City
  - Waste Water: Construction of additional sewage treatment plants (STPs)



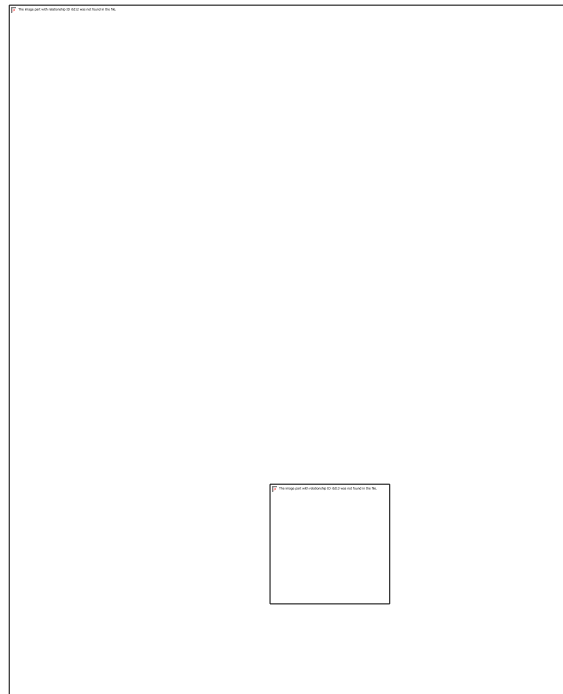
# 2 Background: Makati City and its GHG Emissions and Existing Reduction Measures

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## Overview of Makati City

### Geographical Location

Located at the center of the National Capital Region (NCR), Makati City is bounded on the north by Pasig River facing Mandaluyong City, on the east by the Municipality of Pateros, on the northwest by the City of Manila, on the south and southwest by Pasay City, and on the southeast by Taguig City. Makati is one of the 17 local government units that comprise Metro Manila.

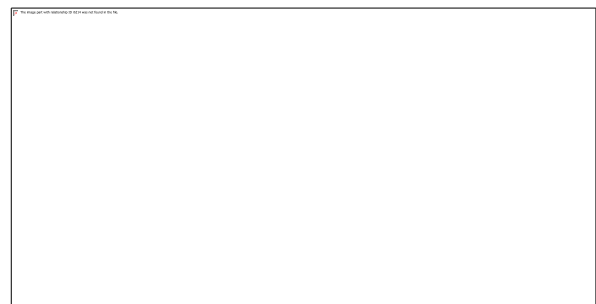


### Land Area

Makati has a total land area of 27.36 square kilometers; it constitutes 4.3% of Metro Manila's total land area.

### Demographics

Based on the 2010 Census of Population and Housing, Makati City has a total population of 529,039. Makati ranks ninth (9<sup>th</sup>) in Metro Manila in terms of population size. This figure represents an increase of 1.16% over the 2000 Census figure; see *Table 1* below. The average population density of the City has estimated at 19 persons per 1,000 square meters as of 2010.



Considered the City’s night-time population is the registered resident population of 548,983 in 2007, and 529,039 in 2010. Makati’s daytime- population ratio has been estimated at a minimum of 3.2 M to a maximum of 4.2 M in 2010 – that is, the population of Makati during daytime on ordinary weekday is 6 to 8 times of its night-time population.

**Table 1. Makati Population and Intercensal Annual Growth Rate, 1903-2007**

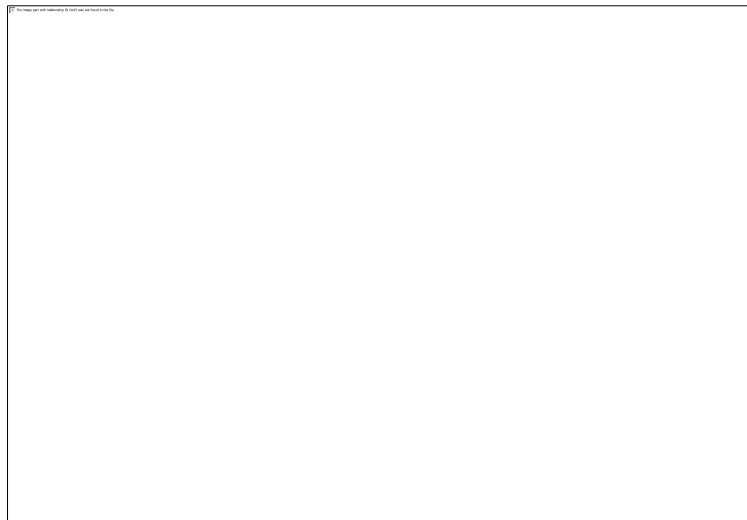
CENSUS DATE	POPULATION	INTERCENSAL INCREASE/DECREASE	PERCENTAGE INCREASE/DECREASE (%)	ANNUAL GROWTH RATE
March 2, 1903	2,700			
December 31, 1918	12,612	9,912	367	10.82
January 1, 1939	33,530	20,918	166	4.77
October 1, 1948	41335	7,805	23	2.35
February 15, 1960	114,540	73,205	177	8.86
May 6, 1970	264,918	150,378	131	8.75
May 1, 1975	334,448	69,530	26	4.77
May 1, 1980	372,631	38,183	11	2.19
May 1, 1990	452,734	80,103	21	1.98
September 1, 1995	484,176	31,442	7	1.25
May 1, 2000	471,379	-12,970	-3	-0.5
August 1, 2007	548,983	77,604	16	2.12
May 1, 2010	529,039	-19,944	-4	-1.34

Source: National Statistics Office ([www.census.gov.ph](http://www.census.gov.ph))

Note: Makati’s Population includes persons residing in the disputed areas with Taguig (PP Northside and PP Southside): 51,320 in 2010, 56,966 in 2007, 26,512 in 2000, and 23,274 in 1995.

**Political Subdivision**

There are two (2) Congressional Districts with a total of thirty-three (33) Barangays.



## Classification and Economy

Makati is a highly urbanized, first class city and is known as the "Premier Financial and Commercial Center of the Philippines". Anchored by Ayala Avenue, Makati is a home of the Philippine Stock Exchange and the Makati Business Club, two of the most important economic hubs in the Philippines.

The total number of registered business establishments in Makati is 56,578 with the breakdown shown in *Table 3*. There are fifty (50) foreign embassies, forty-three (43) consulates and seventeen (17) international organizations.

**Table 2. Registered Business Establishments in Makati, 2011**

NATURE OF BUSINESS	NUMBER
General Merchandise	17,546
Services	19,629
Real Estate	9,703
Convenience Stores, Restaurants & Amusement Places	4,473
Import/Export	2,747
Manufacturing	1,123
Banks & Finance-Related Business	3,594
Special Business Permits	105
<b>Total</b>	<b>58,920</b>

*Source: Makati City Business Permit Office*

The financial district is where most of Makati's financial resources are concentrated. This is an informal district bounded by EDSA, Gil Puyat Ave., Antonio Arnaiz Avenue/Pasay Road, and Chino Roces Avenue. It mainly encompasses Legazpi Village, Salcedo Village, Ayala Center, and parts of Bel-Air. Much of the area is owned by Ayala Land, Inc. and administered through Makati Commercial Estates Authority (MACEA), its subsidiary. The Makati Central Business District (CBD) is considered to be one of the most vibrant commercial districts in Southeast Asia and is considered to be a major metropolis affecting world economies.

#### Makati Central Business District

Makati is noted for its highly cosmopolitan culture, also being a major cultural and entertainment hub in Metro Manila. In fact, the City is declared as the Premiere Urban Tourist Destination of the Country.

#### **Environmental Management**

There are twenty-three (23) parks and open spaces and four (4) plant nurseries within Makati. Garbage collection service, on the other hand, is provided by the City Government to the twenty-seven (27) barangays while the six (6) remaining which are affluent villages provides for their own garbage collection service through a private collection hauler. The disposal site for Makati City is located at Rodriguez, Rizal which is being provided by the Metropolitan Manila Development Authority (MMDA).

#### MakatiPark and Garden

## Infrastructure Development

Since 2004, one hundred percent (100%) of the roads within the City are concreted. As of 2013, these roads are well-lighted with a total number of 6,421 streetlight posts.

## Makati City Climate Change and Disaster Preparedness Profile

Makati is located within the quadrangle of 12° 01' latitude north and 14° 33' longitude east. It is bounded on the north by the Pasig River facing the City of Mandaluyong, on the east by the Municipality of Pateros, on the northwest by the City of Manila, and on the south and southwest by the City of Pasay. It is one of the seventeen (17) LGUs of the National Capital Region.

The slope of the land descends towards west, southwest to southern direction. A network of natural waterways and rivers of various sizes and importance is traversing through the landscape down south to Manila Bay.

Makati City is exposed to three hazards: flood, landslide and earthquake. The western portion of the city is flood prone. The eastern portion of the city is earthquake prone and a portion of the eastern side of the city is also landslide prone.

The western portion of the city is composed of former tidal flats making it prone to flooding. Areas near waterways are also prone to flooding. There is one major waterway and 16 minor waterways in the city.

The city's climate generally falls under Type I category of the Philippine Climate Corona Classification that has two (2) pronounced seasons, wet and dry season. The months of May to October are considered rainy season period while relatively dry and cool weather pattern begins from November to April.

### Climate Classification based on Philippine Climate Corona

- **Type I** - two pronounced seasons: dry from November to April wet during the rest of the year.
- **Type II** - No Dry seasons with a very pronounced rainfall from November to January.
- **Type III** - Seasons are not very pronounced relatively dry from November to April and wet during the rest of the year.
- **Type IV** - Rainfall is more or less evenly distributed through the year. (SEP 2009)

Extreme weather conditions attributed to climate change affects the country's climate variability. The intensity of typhoons that traverse the city has been observed as increasing. The La Niña and El Niño phenomenon has also affected the country's weather conditions.

### **Demographic, Economic, Social and Cultural Characteristics**

The city is composed of thirty-three (33) barangays which are grouped into six (6) clusters. These are the Central, Westside, Northwest, North Central, Eastside, Northeast Clusters. North Central and Eastside Clusters are the two most densely populated locations in the city.

The most vulnerable settlements are located in the Eastside Cluster. This is based on the vulnerability assessment conducted by the city in its project Makati City Risk-Sensitive Urban Redevelopment Project (MRSURP).

The city administration implements policies and partnerships on vulnerability alleviation thru the MRSURP. It aims to mainstream urban disaster risk reduction in land use planning and disaster management and is funded by the German Federal Foreign Office (FFO) administered through the German Committee for Disaster Reduction (DKKV) and in partnership with the Earthquakes and Megacities Initiatives (EMI), Philippine Institute of Volcanology and Seismology (PHIVOLCS).

Although the communities are not historically well-prepared, they are gradually preparing for potential threats by actively participating in the city's program for disaster preparedness. Moreover, the city incessantly continues its programs on information, education and communication and involves all the communities in its projects concerning disaster.

### **City DRM Policy, Legislation, Plans and Capacities**

The city policies on disaster risk management include the creation of Makati City Disaster Coordinating Council (MCDCC), through City Ordinance No. 97-093 on July 1, 1997. In 2012, MCDCC was renamed and reorganized to Makati Disaster Risk Reduction and Management Council (MDRRMC) through Executive Order No. 003 Series of 2012.

The City also adheres with the policies contained in Republic Act No. 10121, also known as Philippine Disaster Risk Reduction and Management Act of 2010. This law strengthens the Philippine disaster risk reduction and management system, provides the national disaster risk reduction and management framework and institutionalizes the national disaster risk reduction and management plan.

Other policies supporting the City's Disaster Risk Reduction (DRM) initiatives include the Makati Development Agenda for 21<sup>st</sup> Century (Makati 21), Comprehensive Land Use Plan, Makati Zoning Ordinance, Makati Solid Waste Management Plan, Drainage Master Plan and local

ordinances on the creation of Makati Emergency Systems and Makati Rescue, Barangay Disaster Risk Reduction and Management Council.

The city administration is sufficiently equipped with enough personnel and capacity. The Makati Rescue conducts seminars and training on disaster management for barangay personnel and volunteers. The Department of Environmental Services also conducts seminars on climate change. There are also other information, education and communication-related projects which help equip the city government including residents on climate adaptation and disaster risk reduction.

The Makati DRRMC is a multi-sectoral council that implements the Disaster Risk Reduction and Management Plan (DRRMP), disaster preparedness activities and projects and other related tasks.

### **Risk Assessments**

The city started its comprehensive disaster risk assessment in 2008 through the Makati Risk Sensitive Urban Redevelopment Project (MRSURPP) including the mapping of vulnerable barangays. The vulnerability assessment was based on the physical risk, social vulnerability and coping capacity of the barangays. A complete and comprehensive disaster risk assessment has only been done with Barangay Rizal.

Barangay Rizal is the first barangay to be part of the MRSURPP. The barangay together with the City Government conducted a strategic planning workshop, community preparation and advocacy planning workshop, barangay visioning workshop, vulnerability and capacity assessment survey, building and lifeline inventory, disaster town watching and disaster mitigation planning workshop. These activities are for the redevelopment of the barangay in addressing its high risk and vulnerability.

The assessment conducted in Barangay Rizal is multi-sectoral in approach and it identified the different aspects of vulnerability such as social, physical, institutional and economic vulnerability.

The results of the vulnerability, risk assessment and mapping were disseminated to the zone leaders and barangay officials at Barangay Rizal thru barangay consultation. They are tasked to inform all those concerned the result of the said assessment.

The city shared the result with neighboring barangays. However, the city has not yet started addressing trans-city risks.

## **Land Use Planning**

The city's land use plan is integrated with risk sensitive and resilience principles. The Comprehensive Land Use Plan (CLUP)<sup>4</sup> which was approved in 2012, mainstream disaster risk reduction and climate change adaptation. The Eastside Cluster is identified as the most vulnerable cluster in the city. This area is planned to be classified as a danger zone but is still yet to be finalized because of the lack of scientific data on the exact location of the fault zone.

Informal settlements in the city are currently being addressed. These settlements are being tagged for relocation to the nearby provinces of Bulacan and Laguna or for "BalikProbinsya". The relocation site in Bulacan known as the Dreamlandville is a Makati-GK Community Development Project in partnership with BDO Foundation and GawadKalinga.

Makati has a major waterway that borders the north side of the city. The Pasig River has a total of 60 km length of which six (6) kilometers passes through Makati. The city's Zoning Ordinance classifies the area along the river as Riverside Development Zone. This zone has prescribed development that takes into account the possible occurrence of flood and other climate-related disasters.

The Comprehensive Land Use Plan (CLUP) and Zoning Ordinance (ZO) are two of the city's tools in urban planning and development. The creation of these plans is highly participatory which involves the different departments and offices of the city government and consultation with NGOs, civil society organizations and the private sector. The CLUP and ZO both help in the preservation and conservation of the natural environment.

## **Regulatory Measures**

The Philippines has strong environmental laws and mandates that conserve critical natural environments. The following are national mandates that support resilience and conservation of natural environments:

- Republic Act (RA) 10121 (Disaster Risk Reduction and Management Act of 2010)
- RA 9792 (Climate Change Act of 2009)

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<sup>4</sup> The City CLUP is a plan which involves different sectors which are also accountable in the GHG emissions of Makati. It is also a tool that can be used in launching measures on the reduction of GHG emissions.



- RA 9513 (Renewable Energy Act of 2008)
- RA 9367 (Biofuels Act of 2006)
- RA 9275 (Philippine Clean Water Act of 2004)
- RA 9003 (Ecological Solid Waste Management Act of 2000)
- RA 8749 (Philippine Clean Air Act of 1999)
- RA 7279 (Urban Development and Housing Act of 1992)
- RA 7160 (Local Government Code of 1991)
- RA 6541 (Philippine National Building Code)
- Millennium Development Goals
- National Physical Framework Plan
- National Framework Strategy on Climate Change
- National Climate Change Action Plan
- National Disaster Risk Reduction and Management Framework a
- National Greening Program

Makati City has local ordinances and resolutions that support the above mentioned national mandates:

- Makati Development Agenda for the 21<sup>st</sup> Century (Makati 21)
- Comprehensive Land Use Plan
- Makati Zoning Ordinance
- Makati Solid Waste Management Plan
- Financial Management Plan
- Traffic Management
- Hospital Management Information System
- City's Medium-Term and Annual Investment Plan

## **GHG Emission of Makati City**

The 2011 GHG Inventory Report identifies the following sectors as significant contributors to emissions within the Makati's community boundary. Table 3 summarizes the total emissions from the various sectors in the city:

- Stationary Energy
- Transportation
- Waste
- Electricity (Scope 2)

**Table 3. City of Makati GHG Emission per Sector**

SECTOR	EMISSIONS (IN tCO <sub>2</sub> e)	PERCENTAGE SHARE (%)
Stationary Energy	163,444	9.83%
Waste		
Solid Waste	1,647	0.10%
Waste Water	46,172	2.78%
Transportation	252,970	15.22%
Electricity	1,197,784	72.07%
<b>Total</b>	<b>1,662,017</b>	<b>100%</b>

The electricity consumption of business and residential sector tops the list, and constitutes 1,197,784 tCO<sub>2</sub>e(72.07%) of the total emissions. This was followed by transportation sector with 15.22%, waste sector (solid waste and waste water) at 2.88% and generator and boiler set fuel consumption at 9.83%.

In the case of Makati City, being the financial and business capital of the country, emissions will continue to increase due to continuous infrastructure development (e.g. corporate buildings, condominium etc.) being carried out by land developers and business investors.

### Existing GHG Reduction Actions of Makati City

The City of Makati has implemented various GHG emissions reduction programs as part of its initiatives to mitigate climate change. Makati engaged in various initiatives to reduce emissions in all the sectors included in the inventory report. Below is an overview of the City's major programs, projects, and activities which help meet the objectives of the climate action initiatives:

- **SOLID WASTE MANAGEMENT**

The Solid Waste Management Program requires all households to segregate their garbage at source using the following segregation scheme:

- ✓ Biodegradable
- ✓ Non-biodegradable

Likewise, the City Government of Makati in partnership with the association of junkshop owners “Kapisanan ng mga Junkshop Operators sa Makati” (KAJOM), is regularly implementing a program called “Baratilyong Basurasa Barangay”. It is a community-based program aims to make recycling more convenient for the households by having easy access to junk shop operators. A similar garbage diversion program of the City Government is the Weekend Waste Market, which is in partnership with Ayala Foundation. A portion of City’s waste recovery and diversion comes from the public schools which have been tapped to set up Material Recovery Facilities (MRFs) in their respective compounds. In addition, these MRFs benefited not only the schools but also the adjacent communities. Lastly, during the weeks leading to Christmas Season the City Government is organizing a trade fair - “3B sa Pasko” that features products made out of recycled materials. This activity highlights the value of recycling through entrepreneurial skills and ingenuity of partner organizations and communities.

Plastic regulation is another front line measure in reducing the City’s GHG emission. With the enactment of Executive Order 007, plastic regulation is implemented to lessen the volume of plastic being used which will then prevent the incineration of such material.

Given all these initiatives, the City of Makati has managed to reach the diversion rate of solid waste (45.64%), much higher from the target value of 38% for 2012. The success of the city’s Waste Reduction and Recovery Program can be credited to the partnerships between the City Government and the private sectors.

- **ENERGY: TRANSPORT AND ELECTRICITY CONSUMPTION OF COMMERCIAL ESTABLISHMENTS AND RESIDENTIAL HOUSES**

The energy sector of the City has the highest contribution in GHG emissions amounting to 72.07%, while the transportation sector has the second highest contribution in the emission amounting to 15.22%. The City Government of Makati has been strongly encouraging the “Engine Shift” to all tricycles owners/operators to change their two-stroke engines to four-stroke. Likewise, as part of its climate change mitigation program, Makati regularly conducts tree planting activities within and outside of its geographical boundaries to counter the effects of emissions coming from the transportation sector. Such activity also increase the carbon sequestration capability of the city. As of 2013, the total tree inventory of the City is 99,798 and continuously partnering with the private sector to increase the number of trees planted.

For electricity consumption, the “Palitlaw Program” of the City aims to educate residents on the advantage of using energy efficient bulbs. In partnership with the Department of Energy (DOE) and Philips under the Philippine Efficient Lighting Market

Transformation Program (PELMATP), the City Government of Makati distributed energy efficient bulbs to residential houses and commercial establishments. Last 2006, the city was given citation by the DOE for its Citywide Streetlighting Program using Energy Efficient Lighting Systems (EELS).

A City Ordinance on the use of biofuels was also passed to lessen the ill effects of gaseous elements in the atmosphere. This was supported by the Makati's membership on International Council for Local Environmental Initiatives (ICLEI) –Local Governments for Sustainability which strengthens the knowledge and capability of the city in attaining sustainable development. At the local level, Makati City established the Clean Cities Makati Coalition (CCMC) in order to further improve its environmental programs and status.

Makati is also a consistent partaker of the Earth Hour event since 2008. The City Government even passed the City Resolution No. 2008-056 wherein 8:00 to 9:00 in the evening everyday was declared as the "Earth Hour" of the City. With this initiative, Makati is anticipating that in every "Earth Hour" time, around two (2) million watts of energy will be saved, assuming that there will be full participation from the 119,270 households of Makati City. This will then account to 1,416.9 kilograms of CO<sub>2</sub> emission prevented every day.

Recently, Makati City directed a transport summit which has the main focus on green mobility. Along with the process of formulating a transport plan, the city also set environmentally sustainable transport goals which are attainable by the year 2023.

- **WASTE WATER**

The Manila Water and Maynilad in partnership with the City Government of Makati regularly implement septic dislodging activities to its consumers. Likewise, commercial establishments in Makati Central Business District and several residential houses in Makati are currently connected to existing sewerage treatment plants (STP) directly manage by Maynilad and Manila Water.

# 3 Low Carbon Community: Vision, Priorities, and Goals

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## A Vision for a Low Carbon Community

The GHG Management Framework Plan of the city sets forth Makati's low carbon community vision/s that will serve as an anchor to all future programs and projects related to GHG management:

Long-term Vision:

- Makati shall lead the Philippines into the 21<sup>st</sup> Century, its global and national enterprises, leading to the creation of a new, responsible and sustainable economy; its citizens productive, empowered and God-loving.

Green Vision:

- Makati City will lead its way forward on being a low carbon city through its GHG reduction initiatives

To achieve these visions, Makati's green mission is:

Green Mission:

- Makati City will be the model for GHG Management through the implementation of breakthrough carbon-neutral technologies, practices, and stakeholders' participatory action.

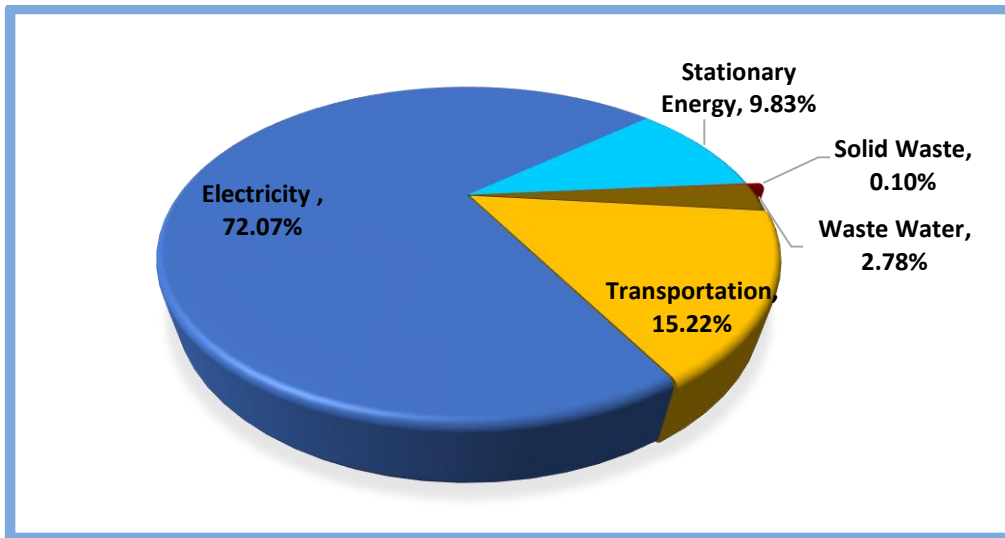
## GHG Management Priorities

Table 3. GHG Management Priorities

ITEM	OUTPUT
Institutionalization of GHG Inventory and Management	<ul style="list-style-type: none"> <li>• Enactment of GHG Management Code</li> <li>• Formulation of GHG Management Plan</li> <li>• Establishment of GHG Management Committee</li> <li>• Identification of potential funding and revenue sources</li> </ul>
Establishment of an efficient GHG Database System	<ul style="list-style-type: none"> <li>• Acquisition of database software</li> <li>• Collection of GHG related data will be included in the renewal of pertinent permits of business establishments</li> </ul>
Community Awareness Program	<ul style="list-style-type: none"> <li>• Conduct of GHG and climate change orientation to the different stakeholders of the city</li> <li>• Development of effective climate change/GHG management communication tool</li> </ul>
Implementation of GHG Reduction programs, projects and activities (PPAs)	(Please see details in the succeeding chapters)
New Leadership by Example Initiative	<ul style="list-style-type: none"> <li>• Enactment of Green Building Ordinance</li> <li>• Improvement of New Makati City Hall Building in compliance to the Green Building standards</li> </ul>

## Reduction Goals and Targets

As mentioned in previous sections, the GHG emissions of Makati City in its base year 2011 amounts to a total of **1,662,017tCO<sub>2</sub>e**.



**Figure 2. GHG Emissions of Makati City per Sector (Percentage Distribution)**

Based on Makati CLUP, the City will continue to experience economic growth in the next ten (10) years. However, along with economic growth is the significant increase on GHG emission. Henceforth, the purpose of the GHG Management Framework Plan and Long-Term GHG Management Plan is to identify realistic, responsive and attainable programs and projects that will mitigate the adverse effects of climate change through GHG Management. Moreover, GHG Management Plan also aims to position the City of Makati as one of the environmentally sustainable cities not only in the country but also in the ASEAN Region. Having the proposed programs and projects, Makati targets to reduce its GHG emission by at least seven percent (7%) (which is equivalent to 115,000 tonnes of CO<sub>2</sub> savings) of its base year emission by the year 2024.

The seven percent (7%) reduction in the city's GHG emission will be largely accounted from the GHG Biggest Loser (52%), creation of elevated pathways (42%) and carbon sequestered over time through urban greening (13%). *Table 5* and *Figure 4* show the distribution of the reduction potential of the said initiatives.

**Table 4. GHG Emission Reduction Target of Makati City**

SECTOR	REDUCTION EFFORT (CO <sub>2</sub> SAVINGS IN TONNES) IN 10 YEARS' TIME
Transportation (Pedestrian Improvement): Creation of Elevated Pathways	48,000
Urban Greening	7,000
GHG Biggest Loser	60,000
<b>TOTAL</b>	<b>115,000</b>



**Figure 3. GHG Emission Reduction Target of Makati City**

A major emission reduction initiative of Makati City will be the GHG Biggest Loser that will cater reduction contribution from the electricity sector. GHG Biggest Loser will involve the participation of different commercial establishments and offices in compliance with the GHG emission limits which will be set in the future through the GHG Management Code.

Another identified reduction potential which has a great impact on GHG emission reduction is the creation of elevated pathways within the city. This will be part of the pedestrian improvement initiative of Makati City under its transportation sector.

Lastly, due to the fact that trees are emission reduction agents with an average of eight (8) kilograms carbon sequestered per tree annually, the city also intends its Urban Greening Program to be one of its major GHG reduction initiative. The reduction potential of tree planting activity would considerably be high in terms of total carbon sequestered every year. This initiative will engage the participation of schools, commercial establishments and households within the city.

Though the reduction effort of Makati City will immensely relies on GHG Biggest Loser, creation of elevated pathways urban greening, the other support reduction potentials will still be noted and implemented by the city. The other reduction potentials aside from those discussed are still part of the management plan and will be given adequate actions for quality implementation. The said potentials are under the sectors of energy, environment, health, economic and social. These initiatives aim to reduce the GHG reduction over time which can lead the Makati City on being the model LGU in GHG Management in the future. The particulars of the reduction measures are presented on Chapter 4 of this plan.



## 4 Initiatives on Achieving Low Carbon Community Vision, Priorities, Goals

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### **Establishment of a Sustainable GHG Management Function**

At present, the responsibility of developing the Framework Plan resides with the Makati GHG Team, an interim group which was organized during the conduct of Entity and Community–Level GHG Inventory. To this date, no legal mandate (e.g. ordinance, resolution) has been instituted yet to bind members of the Ad Hoc group to perform specific duties and function with regards to GHG-related activities. Operationally, all activities undertaken by the group has been cascaded from the Department of Environmental Services (DES).

The Makati GHG Inventory Team, which is headed by the DES Department Head, is composed of representatives from following departments of the City Government:

- 1. Department of Environmental Services**
  - Act as an overall secretariat of the GHG Team
  - Manage and consolidate data and prepare reports pertaining to GHG Accounting and Inventory and GHG Management Plan
  - Responsible on Solid Waste Sector
- 2. Office of the Mayor**
  - Responsible on Energy Sector
- 3. General Services Department**
  - Responsible on Energy Sector

- 4. Urban Development Department**
  - Responsible onSolid Waste Sector
- 5. Department of Engineering and Public Works**
  - Responsible onTransportation Sector
- 6. Economic Enterprise Management Office**
  - Responsible onTransportation Sector

As the primary steward and facilitator of GHG reduction initiatives in Makati City, it is essential that a GHG Management Committee will be established as a regular function within the citygovernment. Strong, on-going institutions with appropriate capacities and adequate resources (i.e. manpower and budget) are critical elements for an effective and sustainable GHG management. The sections below discuss the Makati's way forward to establish this sustainable GHG management function. Given the present status of the Makati GHG Team, several policy option highlighted below will be presented to City Council and Office of the Mayor for deliberation and approval:

- **FORMAL CREATION OF GHG MANAGEMENT COMMITTEE OF MAKATI CITY**

To be able to sustain the GHG initiative of the City, there is a need for the enactment ofan ordinance or resolution formally creating the GHG Management Committee. In order to efficiently implement programs and projects related to GHG management,it is also necessary to augment the existing personnel of the Makati GHG Team. *Figure 5* illustrates the proposed organizational structure of the GHG Management Committee.



**Figure 4. Organizational Structure of the GHG Management Committee**

- i. Resources Needed.* An estimated amount of PHP 2,100,000.00 is proposed to implement the immediate next steps and initiatives in the Framework Plan. This estimate will be used to hire additional staff to perform new duties and responsibilities in the Makati GHG Team, to fund the implementation of actual activities and projects, and to engage third party advisors and service providers that may be needed. The table below presents a breakdown of the estimated resources needed.

**Table 5. Estimated Proposed Budget**

RESOURCE	BUDGET (IN PHP)
Staff	500,000
Technical Experts and Consultants	100,000
GHG Inventory Software Development Program	1,000,000
Overhead Costs	300,000
Training/ Capacity Building	100,000
<b>TOTAL</b>	<b>2,100,000</b>

- ii. *Potential Funding Sources.* To support the resources necessary for the implementation of the city’s GHG reduction initiatives, several potential funding sources have been identified and will be explored by the city government. These are categorized as follows:

**Table 6. Potential Funding Sources**

TYPE	SOURCE
Internal/Local Revenue Sources	Annual Investment Plan (AIP)
Special Funds and Grants	Special funds from multilateral development banks and donor agencies, and national government agencies (e.g. Climate Change Commission, DOTC, DOE, ADB, World Bank etc.)
Counterpart Sources	Ayala Group of Companies, MERALCO, Philips

- iii. *Capacity Development Needs.* Equally important to the commencement of plan implementation is the continuous capacity development of Makati City in the area of climate change and GHG management. In the first few years of implementation, the GHG Management Team will develop and strengthen its internal capacity, particularly in the following fields:

- *Project-level Greenhouse Gas Accounting*
- *Climate Change Mitigation Planning and Co-benefits*
- *Monitoring and assessment of projects and overall progress of plan implementation*
- *Sectoral GHG Management for local governments*
- *Project Management*
- *Integrated adaptation and mitigation planning*

- *Multi-stakeholder engagement*
- *Clean technologies*
- *Benchmarking*
- *Basic Organization on Green House Gas Accounting*
- *Fundamentals in the Formulation of GHG Management Plan*

For other organizational units, as well as the City Council and other stakeholders involved in the operations of the City Government, continuous capacity development on the science of climate change and basics of GHG accounting and GHG management will be conducted.

Makati will capacitate other stakeholders for them to participate more actively and effectively in the management of the community's GHG emission. For private sector emitters – capacity development on GHG accounting and management is essential. For the community as a whole, initial efforts to create and raise awareness on climate change impacts, mitigation, and co-benefits are also vital concerns. To gather support for city's initiatives, there is a need to intensify and expand the capacities of the stakeholders to achieve optimum success. In particular, build the capacity of the community on:

- Understanding GHG mitigation opportunities and clean technology options
- Program implementation
  - Building energy efficiency
  - Transportation mitigation and management
  - General orientation on renewable energy initiatives
  - Waste management

## **Strengthening Local Governance for GHG Management**

Mitigating the impacts of climate change require both national and local action. While national policies and programs exist, strategies and plans at the local level are necessary as the effects of climate change is largely a localized concern and requires specific approaches tailored to fit local characteristics and environment. The responsibility on knowledge management, planning and regulation, implementation, and awareness building fit squarely into the mandates and authorities of LGUs and highlights the importance of local governance in climate change mitigation.

The City of Makati prioritizes four (4) major categories of initiatives to support and strengthen climate change mitigation governance at the local level.

- i. *GHG Management and Climate Change Integration into Planning Processes and Administrative Procedures.* Opportunities to integrate GHG management into regular

planning processes of the City Government aside from the annual conduct of GHG inventories plays a vital role in climate change mitigation. Among the plans to be coordinated for GHG management are the local development plans, annual investment plans, and the local climate change action plan. Establishing GHG management and climate change mitigation as critical elements in the city's development and planning processes ensures that these will be well-integrated into ongoing governance processes. This guarantees that the implementation of GHG management initiatives will be efficient and effective.

The City of Makati shall develop and/or update the following local plans to include GHG management and climate change mitigation in the City's various initiatives which are proposed in these plans:

- ***Comprehensive Land Use Plan***

Legal Mandate: Local Government Code, Urban and Development Housing Act

Sectors Affected: Land use, buildings and residential

In 2012, Makati City's Comprehensive Land Use Plan (CLUP) 2013-2023 was updated and approved by Housing and Land Use Regulatory Board (HLURB) which mainstream climate change adaptation. The updating of the CLUP is a perfect opportunity to integrate the GHG management initiative in the allocation of resources. CLUP is a critical planning document for Makati as it influences the development of the city in the area of environmental stability, spatial integration, food security, and access to physical and natural resources. The management of the GHG emissions from its key source sectors – stationary energy, transportation, waste and electricity – will be significantly affected by programs and projects that are included in the CLUP.

Among the important revisions in the CLUP that are related to GHG management and climate change mitigation includes the full integration of the GHG Management Plan initiatives (e.g program, plans and activities). In the area of institutional development, there is a need also to integrate GHG plans more specifically the conduct of GHG Entity and Community Inventory into the existing processes of the City Government.

- ***Climate Change Action Plan***

Legal Mandate: Climate Change Act

The City of Makati is in the process of formulating its local climate change action plan as mandated by the Climate Change Act. The inclusion of the different programs and projects listed in the GHG Management Framework Plan is strategically important

since carbon reduction is also one of the priorities of National Climate Change Action Plan 2011-2028.

ii. *Data Collection and Management.* Effective climate change planning relies largely on data availability and quality. Vigorous data collection and management systems are foundation of GHG inventory accounting, which is crucial in ensuring GHG management processes that are responsive to climate change challenges. The planned initiatives of the city government to improve data management include:

- Improved data collection procedures for existing services by integrating collection of GHG data on the following permit documents:
  1. Renewal of business permits
  2. Application of building permits
  3. Application to install generator and boiler sets (Office of the Building Permits)
  4. Payment of real estate tax
- Partnership with Mapua Institute of Technology (Makati) in creating a website or online portal for GHG and other climate change-related information
- Partnership with the University of Makati and Ateneo School of Government for assistance in research and data gathering (i.e. surveys and interviews relevant to periodic conduct of GHG inventories)
- Development or acquisition of data management system to facilitate submission and storage of GHG and other climate change information from stakeholders in the community.

iii. *Leadership by Example.* The total GHG emission of Makati City Government operations is **12,448** tCO<sub>2</sub>e. To reduce its emissions and to set an example for the whole community, the city government identified several initiatives in line with Makati City's low carbon vision. Some of these initiatives are also considered as rapid launch initiatives of the city.

**GHG Management of Emissions from the City Government Operations.**

This type of initiatives open new perspectives, encourages learning, and demonstrates doable actions that transform City employees as leaders at the forefront of GHG management. Below are the Makati's initiatives designed to directly lessen the GHG emissions from its own operations and present models for wider and broader initiatives for the community:

<p><b>Case Study 1: Greening of the City Hall Building</b></p> <p>Makati City has built a new city hall with double glazed windows and high efficiency air conditioning units. In comparison to conventional single pane windows and started air conditioning, these high performance characteristics reduce greenhouse gas emissions by over 300 tCO<sub>2</sub>e per year. An additional plan to replace the new building's 20% CFL lighting with high efficiency LED lighting will result in an additional potential savings of 7.09 tCO<sub>2</sub>e per year.</p> <p><i>(This case study is based on calculations using the GHG Reduction Calculator for Green Buildings developed by USAID. The calculator is discussed in the Annex to this</i></p>
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- Reducing the electricity consumption (in kWh) of all city-owned buildings and facilities should be prioritized by the City Government leadership. The following items are the propose intervention plan to reduce the electricity consumption:
  1. Formulation of Makati City Government Energy Saving Plan
  2. Creation of monthly electricity consumption target spearheaded by General Services Department
  3. Installation of LED to all existing streetlights and public buildings and facilities
  4. Creation of incentive scheme
- Reducing the volume of solid waste collected from city-owned buildings and facilities by conducting a monthly used paper collection activity spearheaded by the Department of Environmental Services, banning the use of plastics and styrofoam, implementing garbage segregation policies in all offices, etc.

**New Initiatives for Rapid Launch and Further Assessment.** While the city’s Long-Term GHG Management Plan is being prepared, Makati can act on certain key opportunities to be able to manage GHG emissions from local government operations. (For better appreciation please see list of activities in Chapter 6).

- iv. Building Community Awareness.* Residents, business organizations, and transportation sectors are key players in recognizing the city’s low carbon vision. GHG emission from energy use and waste generation of residential and commercial buildings, as well as from fuel consumption of the public and private transportation sector directly affects the different stakeholders of the city. The active involvement and contribution of these sectors is critical for the GHG emission reduction initiatives of the City Government of Makati. Community awareness on climate change and GHG mitigation and its benefits are essential in developing the commitment and support necessary to move these plans forward. In addition, various sectors in the community must understand the necessary steps and their role in attaining the low carbon vision.

The City of Makati has identified the following actions to build community awareness on GHG management and climate change mitigation opportunities:

- Creation of audio visual presentations related to GHG management and climate change that will be shown in key strategic locations such as cinema houses, electronic billboards, city hall lobby, MRT stations (Guadalupe, Ayala and Magallanes)
- Development of a Climate Change Action portal in the city’s website
- Partnership with the University of Makati, Mapua Institute of Technology and Ateneo School of Government to bring the academic sector, business sector, and



the local government together for the creation of a formal groups dealing with GHG management-related activities (e.g. BAQ, LEDS). These groups can also serve as funding support for incentive programs for barangays who are implementing community-based GHG reduction initiatives

- Development of basic climate change modules for local public and private schools in the community.
- Conduct of town hall meetings in private villages with homeowners' associations, barangay halls, churches, local transportation terminals and public markets to cascade the awareness campaign to the grass roots

## Initiatives Focused on the Community

The City's low carbon path rests on reducing the GHG emissions of the broader community. For Makati, the potentials are in the sectors of electricity consumption (residential and commercial), transportation, solid waste, water waste and stationary energy. Existing initiatives that work for the community will be continued and improved, while a more comprehensive list of initiatives and policies will be extensively studied and developed for long-term implementation.

The City Government will implement initiatives that have GHG reduction potentials and will serve as preparations for the Long-Term GHG Management Plan. The long-term plan will be prepared by June 2016 and is a multi-year action plan which identifies in a more detailed manner the mitigation policies and initiatives of the Makati to achieve its goals and targets, aligned with its vision of being a low carbon city. Along with the long-term plan, a systematic review will be undertaken to define policies priorities, timelines, and short and medium-term emission reduction goals. The Department of Environmental Services, as the lead office of the Makati GHG Inventory Team, will spearhead the consultations and studies in determining the viability of the proposed programs and projects.

As such, the proposed initiatives which will involve the community, are enlisted in a per sector method and aim to assess the impact of each of the existing or newly proposed projects to the community's carbon footprint.

### *i.* Energy Sector

For the energy sector, the City Government will require establishments to reassess and develop energy conservation plans through a city ordinance. This will also be supported by the development and passage of a local GHG Management Code and local Green Building Code.

### *ii.* Transportation Sector

The initiatives of the city for its transportation sector are the acquisition of additional e-vehicles and construction of elevated pathways and underpasses. The said initiatives will be led by the Office of the Mayor. The construction of elevated pathways and underpasses in the city was proposed to be part of the city's traffic management. Furthermore, the creation of elevated pathways will be the second (2<sup>nd</sup>) best contributor on the GHG emission reduction of the city, as per based on the **TEEMP modelit totals to 48,000 tCO2e** reduced. Makati will adopt the result from the TEEMP model of Clean Air Asia which is categorically set for three (3) years' time; the city modified its time period and set it to ten (10) years considering the different factors which can hinder the implementation of such project.

**Case Study 2: Conversion of 2-stroke Tricycle/Motorcycle Engines to 4-stroke Engines**

Makati City has been strongly supporting the conversion of 2-stroke tricycles and motorcycles to 4-stroke. This effort has been successful in converting 91.5% of the existing motorcycles registered in the city to 4-stroke. This conversion effort has already generated emission reduction of 1,059.84 tCO<sub>2</sub>e per year. If future efforts increase this to a 100% conversion rate, the reductions in greenhouse gas emissions would increase to approximately 1,149.90 tCO<sub>2</sub>e reductions per year.

*(This case study is based on calculations using the GHG Reduction Calculator for Transportation developed by USAID. The calculator is discussed in the Annex to this plan).*

*iii.* Environment Sector

Environment is an important sector for Makati City with different programs, projects and activities (PPAs) being implemented annually for the improvement and maintenance of the city's environment. As for the GHG Management, the city explores the possibility of establishing more E-vehicle routes and emission-free zones to be led by the Public Safety Department in coordination with the GHG Management Committee.

On the other hand, construction of additional Sewage Treatment Plans (STPs) within the city is also proposed as specific initiative for the waste water.

A notable project of Makati City that has a direct impact in reducing GHG emission is the urban greening, a flagship program of the City Government within and outside its political jurisdiction. As of the year 2012, Makati City, through the Department of Environmental Services already planted a total of 95,559 trees within the jurisdiction of the city. The said figure has a carbon reduction equivalent to 764,472 kilograms of Carbon Dioxide having eight (8) kilograms carbon sequestered for each tree. The city has a target of 2,000 trees planted every year. The carbon sequestered from the tree

planting activity will be heighten up every year, assuming that the city will add 2,000 number of trees for every following year.

To further strengthen the tree planting initiative of the city, there is a need to significantly increase the total number of trees to be planted within and outside the city. As such, the initiative inurban greening will consider an innovative approach of involving the students (Elementary, High School and College)<sup>5</sup> from the different schools located within Makati City to donate at least one tree at the start of the school year, the commercial establishments<sup>6</sup> within Makati City to donate 10 trees yearly and the households<sup>7</sup> in the city to donate one (1) tree per year. The possible sequestration from urban greening is presented in Table7.The initiative will also strengthen the relationship between the City Government and the community.

**Table7. Expected Amount of Carbon Sequestered of Urban Greening by the Year 2023**

YEAR	NUMBER OF TREES	REDUCTION EFFORT (CO2 SAVINGS IN TONS) IN 10 YEARS' TIME
2014	936,149	629,745
2015	954,799	642,651
2016	973,832	655,560
2017	993,258	668,472
2018	1,013,085	681,386
2019	1,033,326	694,303
2020	1,053,989	707,222
2021	1,075,085	720,144
2022	1,096,626	733,069
2023	1,118,623	745,997

<sup>5</sup>Involvement of students refers to those students of any level who are studying in schools located within Makati. The sequestered CO2 was computed having the assumption that the enrolment rate of Makati City will remain constant.

<sup>6</sup> The assumption for the carbon sequestered by the commercial establishments was assumed to have a growth rate of 2% every year.

<sup>7</sup> The sequestered CO2 was computed having the assumption that the growth rate of the household population in Makati City remains constant.

*iv.* Health Sector

The existing Air Quality Management (AQM) programs like Project HANGIN and BantayTambutso are regularly implemented in Makati City to ensure good quality of air. In line with this, it is crucial to mainstream GHG Management programs with the existing AQM programs because the data and result from both programs are beneficial in sustaining the environmental stability and quality of life in the City. This will be primarily handled by DES and Makati Health Department.

*v.* Economic Sector

The conduct of impact assessment regarding the effects of GHG Management on economic development of the City, specifically in terms of job creation and investment opportunities will be under the Economic Development Sector.

*vi.* Social Sector

Initiatives for social sector aim to involve the community in the GHG Management of the city as well as to improve the quality of life of Makati citizens. To realize this, it is proposed to develop an incentive-based program, basically a competition for private corporations and barangays which will assess their GHG reduction measures. This program will be named as GHG Biggest Loser and will be under the management of DES and the GHG Management Committee. Said program is a good opportunity on strengthening the relationship of the local government with the private sector and the community, and raise awareness on the GHG Accounting and Management. The program will include entity-level GHG training for the private corporations and barangays to reassess and develop their own conservation plans. It also aims to reduce the electric consumption of the city by 100,000 MWh which is five percent (5%) of the current consumption (1,900,000 MWh). As a result, Makati can reduce GHG emission by 60,000 tCO<sub>2</sub>e in 10 years' time which will create cross-sectoral benefits for the city.

Another initiative is the Low Carbon Housing Project for Makati City employees and citizens. This project will be both environmentally and socially beneficial in terms of low

carbon emission and affordable housing. This project will be headed by the Office of the Mayor.

Lastly, a project on the creation of Climate Change Portal in Makati's website will be proposed to increase community awareness on climate change mitigation and GHG management.

## 6 Action Plan and Time Frame

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Following the creation of Framework Plan, the Makati City Government will focus on the 1) implementation of the Rapid Launch Initiatives that have been identified to set the foundation for GHG management in the community, and 2) preparation of a Long-Term GHG Management Plan. Thus, the Makati GHG Inventory Team is hereby proposing to the City Council the approval of the GHG Management Code to be able to implement all listed initiatives in Framework Plan.

### **Initiatives for Further Assessment**

***Timeframe:*** Year 2014-Year 2023

***Lead Department/Unit/Agency:*** Department of Environmental Services and GHG Management Committee

The Makati City Government will have its initiatives in conducting GHG reduction potentials. While these actions were primarily conceptualized and conducted for specific sectoral goals, assessing the impacts on the community's carbon footprint and documenting the co-benefits in the City are important to better align these actions to the community's vision and goals.

**Table 8. Initiatives for Further Assessment**

<b>SECTOR</b>	<b>INITIATIVES</b>	<b>LEAD DEPARTMENT/OFFICE/ INSTITUTION</b>	<b>BUDGET REQUIREMENTS (PHP)</b>
<b>ENERGY</b>	Development and passage of a Local Green Building Ordinance	Office of the Building Official, DES, Office of the Mayor, Urban Development Department/Makati City Council	300,000
<b>TRANSPORTATION</b>	Acquisition of additional E-vehicles	Office of the Mayor	100,000,000
	Construction of elevated pathways and underpasses	Private Developers in coordination with the DEPW	TBD
<b>ENVIRONMENT</b>	Establishment of more E-Vehicle Routes and Emission Free Zones	Public Safety Department/GHG Management Committee	300,000
	Construction of additional Sewerage Treatment Plants (STPs)	DEPW/DES/Water Concessionaires	TBD
<b>ECONOMIC</b>	Conduct of Impact Assessment on the positive effects of GHG Management on the economic development of the City (e.g. Job creation, increase of investors etc.)	Economic Development Sector/GHG Management Committee	TBD
<b>SOCIAL</b>	Low Carbon Housing Project for Makati City employees and citizens	Office of the Mayor	1,000,000,000
	Creation of Climate Change Portal in Makati City website	Urban Development Department	TBD
	Development of climate change audio visual materials to be released and shown in key areas such as cinema house, electronic billboard	DES/InfCRD/Advertising Agency	5,000,000

### Case Study 3: Bus Rapid Transit

Makati City Government has an existing commitment to a bus rapid transit initiative as part of its transportation sector goals. Implementation of bus rapid transit to replace conventional vehicles would lead to reductions in GHG emissions also. For every 10,000 passenger trips shifted to BRT, emission reduction on a per kilometer basis would be in the range of the following:

Passenger Car to BRT	Jeepney to BRT	Tricycle/Motorcycle to BRT	Gasoline Minibus to BRT	Diesel Bus to BRT
tCO <sub>2</sub> e per year	3300.45 tCO <sub>2</sub> e per year	2900 tCO <sub>2</sub> e per year	1500.00 tCO <sub>2</sub> e per year	800 tCO <sub>2</sub> e per year

*(This case study is based on calculations using the GHG Reduction Calculator for Transportation developed by USAID. The calculator is discussed in the Annex to this plan)*

## Preparation of the Long-term GHG Management Plan

**Timeframe:** January – December 2016

**Lead Department/Unit/Agency:** Department of Environmental Services and GHG Management Committee

The Long-Term GHG Management Plan which will be prepared by the year 2014, is a multi-year action plan that identifies detailed mitigation policies and initiatives that will be implemented by Makati to achieve its goals and targets, aligned with its vision of being a low carbon city. It also includes a systematic review to define policy priorities, timelines, and short- and medium-term emission reduction goals.

## Implementation of Rapid Launch Initiatives

In simultaneous with the preparation of the Long-Term GHG Management Plan, several initiatives will be regularly implemented or started/continued to ensure the city's continuous approach in reducing GHG emissions. These are summarized in the table below.

**Table 9. Rapid Launch Initiatives**

RAPID LAUNCH CATEGORY	INITIATIVES	SECTORS AFFECTED	IMPLEMENTING PARTNERS	BUDGET REQUIREMENT (PHP)	TIMEFRAME
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RAPID LAUNCH CATEGORY	INITIATIVES	SECTORS AFFECTED	IMPLEMENTING PARTNERS	BUDGET REQUIREMENT (PHP)	TIMEFRAME
<b>LEADERSHIP BY EXAMPLE</b>	Formulation of GHG Management Code	Cross-sectoral	DES/GHG Management Committee/Makati City Council	300,000 (Budget Source: City Council)	On-going
	Formulation of Makati City Government Energy Saving Plan	Energy	Office of the Mayor DEPW	3,000,000	January-December 2015
	Conduct of annual GHG entity- and community-level inventory	Cross-sectoral	DES/GHG Management Committee	300,000	Annually
	Improvement of New Makati City Hall Building (Green Building Initiative)	Energy	Office of the Mayor	405,000,000	On-going
	Urban Greening (To be included in the BalikKalikasan Program)	Environment	DES	7,000,000	Regular Activity
<b>COMMUNITY INITIATIVES</b>	Conversion of tricycles from 2 strokes to 4 strokes	Transportation	Tricycle Operators/ Association/MAPSA	No fund requirement	On-going
	Increase awareness of PCOs, building administrators, building owners on implications of energy use on climate change and build capacity on conducting entity-level inventory of their GHG emissions (Entity-Level GHG	Energy	DES/GHG Management Committee/Business Owners, Building Administrator and Pollution Control Officers	100,000	January-December 2015



RAPID LAUNCH CATEGORY	INITIATIVES	SECTORS AFFECTED	IMPLEMENTING PARTNERS	BUDGET REQUIREMENT (PHP)	TIMEFRAME
	Inventory Training)				
	Continuous Improvement of Traffic Management	Transportation	PSD- MAPSA	TBD	On-going
	Formulation of Transport Plan	Transportation	Office of the Mayor	6,500,000	On-going
	Inclusion of Climate Change mitigation and GHG Management to regular IEC programs and activities	Cross-sectoral	DES/ICRD	3,200,000	Regular Activity
	Development of incentive-based programs for Barangays and Business Establishments (GHG Biggest Loser, GHG category to be included in Clean and Green Awards)	Cross-sectoral	DES/GHG Management Committee	2,700,000	January-December 2014
	Creation of Climate Change Modules for Public and Private schools in the city	Cross-sectoral	DES/DepEd-Makati, Education Department/ICRD/ UDD/ GHG Management Team/Teachers	TBD	TBD

RAPID LAUNCH CATEGORY	INITIATIVES	SECTORS AFFECTED	IMPLEMENTING PARTNERS	BUDGET REQUIREMENT (PHP)	TIMEFRAME
	Mainstreaming GHG Management initiatives to the existing Air Quality Management programs of the City Government (Project Hangin and BantayTambutso)	Cross-sectoral	DES/Makati Pollution Control Office/Makati Health Department	147,000	Regular Activity

## Time Frame for Rapid Launch Initiatives

RAPID LAUNCH CATEGORY	INITIATIVE	IMPLEMENTATION SCHEDULE
<b>LEADERSHIP BY EXAMPLE</b>	Formulation of GHG Management Code	ON-GOING
	Formulation of Makati City Government Energy Saving Plan	JANUARY - DECEMBER 2014
	Conduct of annual GHG entity- and community-level inventory	ANNUALLY
	Improvement of New Makati City Hall Building (Green Building Initiative)	ON-GOING
	Urban Greening (To be included in the BalikKalikasan Program)	REGULAR ACTIVITY
<b>COMMUNITY INITIATIVES</b>	Conversion of tricycles from 2 strokes to 4 strokes	ON-GOING
	Increase awareness of PCOs, building administrators, building owners on implications of energy use on climate change and build capacity on conducting entity-level inventory of their GHG emissions (Entity-Level GHG Inventory Training)	JANUARY - DECEMBER 2014
	Continuous Improvement of Traffic Management	ON-GOING
	Formulation of Transport Plan	ON-GOING
	Inclusion of Climate Change mitigation and GHG Management to regular IEC programs and activities	REGULAR ACTIVITY
	Development of incentive based programs for Barangays and Business Establishments (GHG Biggest Loser, GHG category to be included in Clean and Green Awards)	JANUARY - DECEMBER 2014
	Creation of Climate Change Modules for Public and Private schools in the city	NO SCHEDULE YET
	Mainstreaming GHG Management initiatives to the existing Air Quality Management programs of the City Government (Project Hangin and BantayTambutso)	REGULAR ACTIVITY

# GHG Emission Reduction Tools Annex

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This annex introduces the GHG emission reduction screening tools developed by USAID. The tools allow LGUs to perform simple and effective analyses of their proposed GHG emission reduction initiatives outlined in their Climate Framework Plans by providing estimates of potential GHG emission reductions that can be achieved by implementing specific initiatives at both the community and local government level. The objective is to facilitate the LGU's progress in moving forward with the GHG Framework Plan by identifying those activities and measures that are most beneficial and effective in achieving GHG emission reductions. The application of the tools will result in a better understanding of the impact of reduction initiatives on the GHG inventory and help identify the initiatives with the greatest potential. By allowing the LGUs to estimate the effects of individual initiatives under various scenarios, the tools facilitate the decision process on the most effective allocation of resources.

The tools were developed to assist the LGUs in the development of Climate Action Plans, which is the next step in the development of the LGU's GHG mitigation strategies. The tools bridge the gap between the Framework Plans which provide a broad overview of the climate change initiatives and the Climate Action Planes which will provide the specifics and details of the initiatives.

The tools help overcome a major obstacle to performing an effective selection process; the difficulty in estimating the future reductions associate with an initiative. The effort required to evaluate and compare the benefits of a series of potential initiatives can be onerous due to the absence of readily available data and the time requirements for detailed engineering assessments. The tools were designed to be applicable to proposed projects and initiatives without requiring an extensive amount of data. Therefore the tools only provide a screening level capability and are not intended to produce a detailed engineering assessment.

## Tool Overview

A total of four tools were developed to assess potential GHG Reductions. These include:

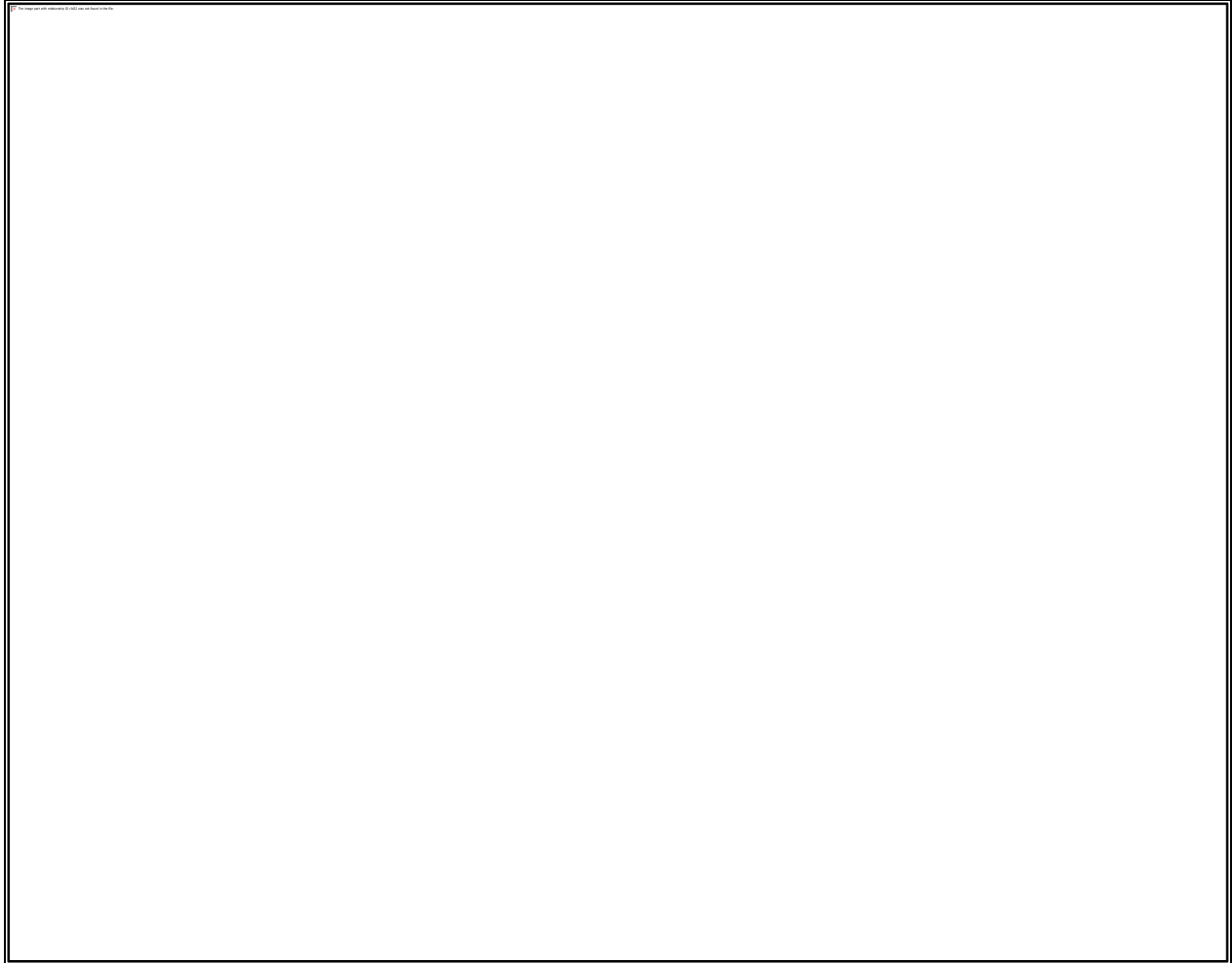
- The Energy Efficiency Tool which addresses energy use in buildings and households
- The Renewable Energy Tool which addresses renewable energy production
- The Waste Tool which addresses solid waste and wastewater management practices
- The Transportation Tool that addresses transportation technology and mode shifts

A fifth tool, the Business-as-Usual (BAU) Tool provides projections of emissions in future years if no initiatives are undertaken.

## Tool Structure

Each tool is set up as an individual workbook with tabs for the various types of initiatives that fit within the tool category. Additional tabs provide background information and data used in the calculation.

Each tool has an Introduction tab that allows the user to select the LGU of reference. It also provides basic information on the setup of the tool.



Each tool also includes a summary tab that aggregates the GHG emission reduction from the multiple initiatives included within each tool.



For the calculator sheets, the data used to calculate the emission reductions includes user supplied activity data (or estimates). In some cases default activity data has been supplied which the user can override if better data is available. The default activity data was developed from generally accepted sources and to the extent possible relies on Southeast Asia and Philippines data sources. The emission calculation formulas and the emission factors are specific to each initiative and are based on best practices standards or, where available, have been adapted from the LGU's base year GHG inventory.



Besides activity specific tabs, each worksheet includes reference tabs providing calculation factors, LGU specific GHG and background data, and activity specific data and default factors.

## Transportation Tool

The transportation tool includes a set of GHG emission reduction calculators for several initiatives or programs aiming at reducing the use or improving the efficiency of public and private transportation. The set of calculators include conversion of conventional vehicles to hybrid, electric or CNG fuel; carpooling and increase in public vehicles occupancy (traffic zoning); Bus Rapid Transit (BRT); bicycle and pedestrian mode shift; and conversion from 2 strokes to 4 strokes engine for motorcycles/tricycles. Each calculator requires inputting the number of either the vehicle or the passenger trips per day, while other applicable inputs, such as trip distance, vehicle occupancy, are provided as optional defaults. The calculator provide estimates of the GHG emission reduction on per year basis and multiple calculators can be used to evaluate the benefits from a combination of different transportation measures which are then shown on the Summary tab.

## Waste Management Tool

The waste management tool provides estimates of the GHG emission reductions that can be achieved by implementing initiatives improving the management and disposal of municipal solid waste, wastewater treatment and bio-digestion of livestock waste. The waste management tool estimates the GHG emission from waste management scenarios including a combination of landfilling, composting, recycling, open burning and unmanaged disposal processes. The user can input the percentage of waste assigned to each process as well as the waste composition. The quantity of waste disposed is input by the user, or estimated according to the population served. The tool compares the business as usual activities with the proposed waste management initiatives estimating the variation in GHG emissions between the two scenarios, including the option of collecting landfill gas for either destruction in a flare or power generation.

The wastewater tool has a similar structure regarding the selection of different collection and treatment processes including septic tanks, latrine, open or stagnant sewer, aerobic and anaerobic treatment. The volume of effluent to be treated is calculated as a function of the population served.

The bio-digester tool calculates the GHG emission reduction associated with treating manure in an anaerobic process with gas collection and the option of generating electricity. Eight categories of livestock are included and the user is only required to enter the number of animals for each one of them.

## Renewable Energy Tool

The renewable energy tool provides an estimate of the GHG emission reductions that can be achieved by implementing solar energy (photovoltaic or thermal), wind or mini hydro energy projects, producing energy that displaces either grid electricity or fossil fuel consumption.

Each calculator requires the user to input the number of units/devices installed and provides optional defaults that can be overridden for capacity and installation type. The user can select the type of baseline source displaced, such as electricity grid or diesel fuel for electricity and three different fossil fuels for the heat generation.

## Buildings Tool

The buildings tool provides an estimate of the GHG emission reductions that can be achieved by implementing energy efficiency retrofits and improvements to residential and office buildings.

The tool includes a calculator evaluating the energy and emission reduction benefits of implementing energy efficiency measures and building envelope improvements for office and commercial buildings. Efficiency measures included are lighting improvements (occupancy sensors and efficient fixtures), efficient office equipment, efficient air condition system, including upgrades of ventilation motors and drives, and optimization of the temperature settings.

The building envelope calculator estimates the GHG emission reduction and energy savings achieved by implementing retrofits and upgrades to an office or commercial building exterior, such as window replacement and shading, wall and roof insulation, and daylight harvesting.

The building energy efficiency and envelope calculators require the user to input the number of buildings, the floor area of the building, and the baseline energy use intensity. Defaults are provided for the floor area and the energy use intensity. The user then selects the efficiency improvements that are applicable to the proposed initiative.

The other calculators included in the tool calculate the emissions reductions associated with the adoption of efficient household/office equipment or appliances. These include specific calculators for the GHG emission reductions generated by implementing replacement of efficient lighting devices (CFL, LED, and fluorescent fixtures), refrigerators and air conditioning equipment. Also, the tool includes a calculator estimating the benefits of adopting efficient wood fired cooking stoves to replace fossil fuels or inefficient wood fired cooking devices. These specific tools require the input of the estimated number of devices being replaced and provide optional defaults for the device typical capacity, power load or wattage. The results



provide the user with the estimated GHG emission reduction on annual basis, as well as the associated energy savings.

## BAU Tool

The BAU Tool allows the user to contrast its overall GHG inventory with reductions and without reductions in future years. The user selects the year for the projection, the reduction goal by that year and the expected yearly growth rate in emissions if nothing is done. The tool generates a bar chart which shows the current inventory, growth under the BAU scenario, and growth/reductions if reductions goals are achieved.