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**INSTITUTIONALIZING THE PHILIPPINE GREENHOUSE GAS INVENTORY  
MANAGEMENT AND REPORTING SYSTEM**

by

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# **INSTITUTIONALIZING THE PHILIPPINE GREENHOUSE GAS INVENTORY MANAGEMENT AND REPORTING SYSTEM**

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## **ABSTRACT**

By virtue of Executive Order 174, s. 2014, the Philippine Greenhouse Gas Inventory Management and Reporting System (PGHGIMRS) is institutionalized in relevant government agencies to enable the country to transition towards a climate-resilient pathway for sustainable development.

The Philippines' national GHG inventory identifies and estimates all anthropogenic emissions and removals of greenhouse gases within the country's geopolitical boundaries. As Party to the United Nations Framework Convention on Climate Change (UNFCCC), the Philippines has conveyed its commitment to deliver international reporting requirements which involve dedicated chapters for national GHG inventory.

The institutional mechanism embeds inventory related functions in the identified lead oversight and sectoral agencies. It aims to enable the national government to monitor, track, and manage the Philippines' climate action progress, particularly the country's GHG emissions, in line with the global target of stabilizing anthropogenic GHG concentration in the atmosphere and limiting the increase of global average temperature to a relatively safe level of 2°C, or further down to 1.5°C. The national greenhouse gas inventory serves as a decision support tool for both the public and private sectors to formulate climate change mitigation strategies. Most importantly, the PGHGIMRS serves as a driver for the country's transition to a climate-smart, low-carbon development vis-à-vis creating climate resilience among communities.

This paper presents the institutional structure of GHG inventory management and reporting system in the country, its inherent merits and associated drawbacks, previous experiences prior to institutionalization, and the challenges and opportunities for improvements in the implementation of the said system.

The country's overall experience in implementing the PGHGIMRS, including sectoral strategies and the institutionalized approach to developing the Philippines' national GHG inventory are described in this report, including capacity improvements of national experts in preparing inventories.

## **I. Introduction**

The recent report released by the Intergovernmental Panel on Climate Change (IPCC), Special Report: Global Warming of 1.5°C, comprehensively provides a narrative on the impacts of a 1.5°C-global warming relative to pre-industrial levels, alongside other relevant scenarios defined by various Relative Concentration Pathways (RCP) models of global greenhouse gas emissions.

Presently, anthropogenic, or human, activities have resulted to a global warming<sup>1</sup> of approximately 1.0°C above pre-industrial levels, with the IPCC reporting with high confidence<sup>2</sup> that a 1.5°C-global warming is likely to be reached within the period 2030 to 2052.

A global warming of 1.5°C is projected to increase “climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth.” Vulnerable populations, including indigenous peoples and local communities with livelihoods reliant on agriculture and coastal resources, are at a disproportionately higher risk of being detrimentally affected by the impacts of global warming.<sup>3</sup>

In 2017, the Philippines emitted 128 million metric tons of CO<sub>2</sub> equivalent (Mt CO<sub>2</sub>e)<sup>4</sup>, or approximately 0.33 per cent of the world’s total. While contributing only a small fraction to the global emissions, the Global Climate Risk Index (CRI)<sup>5</sup> developed by Germanwatch ranks the Philippines among the countries most affected (in terms of fatalities and economic losses) by climate risks over a 20-year period (1998-2017).

As a Party to the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, the Philippines must transition to more sustainable patterns of socio-economic development and take part in global concerted efforts to stabilizing concentrations of GHG in the atmosphere, with the ultimate goal of building a climate-smart and climate-resilient society. Such contributions to climate change mitigation, however, must be anchored to the concept of common but differentiated responsibilities—that is, based on the proverbial climate justice, equity, and fair share. The Philippines, as a developing country Party with emissions historically insignificant relative to that of developed nations but with a populace highly vulnerable to the effects of climate change, must strike a balance between the two pillars of climate action: mitigation and adaptation.

In order to manage territorial GHGs, an inventory of emissions and removals alongside their sources must be developed. A GHG inventory can serve as a decision support tool that would enable the Government to understand trends in emissions and removals and develop socially and economically beneficial emissions reduction/avoidance and sink enhancement strategies. Furthermore, a comprehensive database of GHG emissions and removals would facilitate tracking and monitoring the country’s progress on its climate change mitigation policy goals.

## **II. Philippines’ First and Second National Communications to the UNFCCC**

Parties to the UNFCCC are required to submit National Communications (NCs), which are reports that contain information of the country’s national circumstances, greenhouse gas inventory, vulnerability assessment, financial resources and transfer of technology, and

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<sup>1</sup> Defined as the average over a 30-year period with 2017 as the center point.

<sup>2</sup>

<sup>3</sup> IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

<sup>4</sup> Retrieved from <http://www.globalcarbonatlas.org/en/CO2-emissions> on 30 September 2019.

<sup>5</sup> Global Climate Risk Index 2019 Briefing Paper. Who Suffers Most from Extreme Weather Events? Weather-related Loss Events in 2017 and 1998 to 2017. [David Eckstein, Marie-Lena Hufils and Maik Winges]

education, training and public awareness on climate change. The required contents of the NCs and the timetable for submission are different for Annex I<sup>6</sup> and non-Annex I<sup>7</sup> Parties. For non-Annex I Parties, the required submission of the first National Communication is within three (3) years of entering the Convention, and every four (4) years thereafter for the succeeding NCs. The UNFCCC has also provided standard guidelines for crafting NCs. A chapter specific to national inventory is dedicated for discussions on the formulation of arrangements to collect and manage data for continuous inventory preparation.

The Philippines submitted to the UNFCCC its Initial National Communication (INC) in May 2000, which includes a chapter on the 1994 National Greenhouse Gas Inventory. The development of the 1994 National GHG Inventory was supported through the Enabling Activity Project by the GEF through the UNDP. The Revised 1996 IPCC Guidelines were used in the estimations of the said inventory. Country-specific emission factors were used whenever possible. Furthermore, Global Warming Potential (GWP)<sup>8</sup> values from IPCC's Second Assessment Report (SAR) were used.

The 1994 GHG inventory was comprised of six (6) key emitting sectors in the country: (1) Energy, (2) Transport, (3) Agriculture, (4) Waste, (5) Industrial Processes and Products Use (IPPU), and (6) Forestry and Other Land Uses (FOLU). In 1994, the energy, agriculture, and transport sectors combined for more than 80% of the country's total emissions, as shown in **Figure 1**. In addition, the forestry sector was a net sink (removes carbon dioxide from the atmosphere in the process called carbon sequestration).

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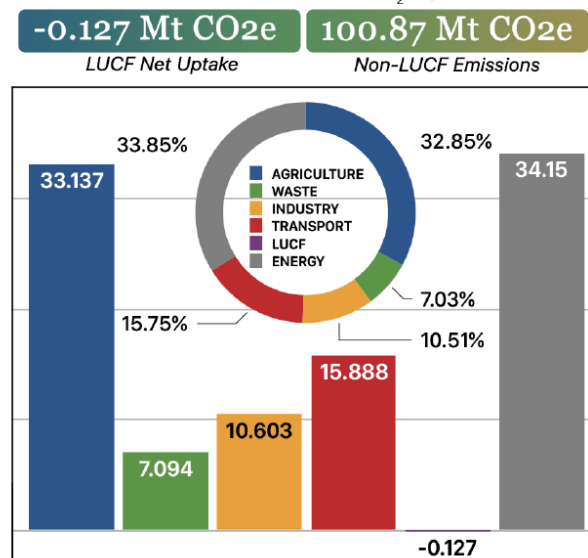
<sup>6</sup> Annex I Parties include the industrialized countries that were members of the OECD (Organisation for Economic Co-operation and Development) in 1992, plus countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States. (Retrieved from <https://unfccc.int/parties-observers> on 30 September 2019.)

<sup>7</sup> Non-Annex I Parties are mostly developing countries. Certain groups of developing countries are recognized by the Convention as being especially vulnerable to the adverse impacts of climate change, including countries with low-lying coastal areas and those prone to desertification and drought. Others (such as countries that rely heavily on income from fossil fuel production and commerce) feel more vulnerable to the potential economic impacts of climate change response measures. The Convention emphasizes activities that promise to answer the special needs and concerns of these vulnerable countries, such as investment, insurance and technology transfer. (Retrieved from <https://unfccc.int/parties-observers> on 30 September 2019.)

<sup>8</sup> An index, based on radiative properties of greenhouse gases (GHGs), measuring the radiative forcing following a pulse emission of a unit mass of a given GHG in the present-day atmosphere integrated over a chosen time horizon, relative to that of carbon dioxide (CO<sub>2</sub>). (IPCC, 2014, Intergovernmental Panel on Climate Change, Fifth Assessment Report (AR5) 'Climate Change 2014: Mitigation of Climate Change')

Figure 1. 1994 National GHG Emissions and Removals  
**1994 NATIONAL GHG INVENTORY<sup>2</sup>**

All values are in million metric tons of CO<sub>2</sub> equivalent (Mt CO<sub>2</sub>e).

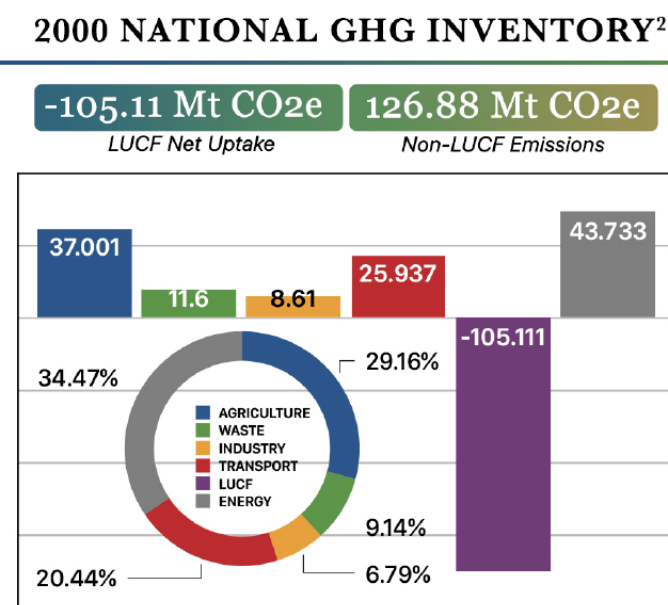


The Philippines then submitted its Second National Communication (SNC) to the UNFCCC in December 2014, which includes the country's 2000 National GHG Inventory. Both the 1996 and 2006 IPCC Guidelines for National GHG Inventories were used in the accounting process and the choice of emission factors.

Similar to the 1994 results, the energy, agriculture, and transport sectors were the three (3) largest emitters, accounting for approximately 84 per cent of the country's total emissions in 2000 (**Figure 2**).

Estimating GHG emissions requires two sets of data: activity data and emission factors. Activity data is the data on the magnitude of the human activity resulting in emissions or removals taking place during a given period of time. On the other hand, emission factors are average emission rates of a greenhouse gas for a given source, per unit activity data. Sources of activity data for both the 1994 and 2000 national GHG inventories were national statistics, government agencies, and the private sector. Most of the emission factors used were IPCC default values, but some country-specific emission factors were used whenever available.

Figure 2. 2000 National GHG Emissions and Removals



### III. Towards the Institutionalization of the GHG Inventory Management and Reporting System

Almost two decades prior to the enactment of the Climate Change Act of 2009 (R.A. 9729), the Philippines was among the first set of countries to institutionally respond to the challenge of climate change. On 08 May 1991, the Government created the Inter-agency Committee on Climate Change (IACCC) through Administrative Order (AO) No. 220. The IACCC is constituted by 15 national government agencies (NGAs) and non-government organization (NGO) representatives.

Chaired and co-chaired by the Secretaries of the Department of Environment and Natural Resources (DENR) and Department of Science and Technology (DOST), respectively, the IACCC was established as a coordinating body on climate change-related activities. The IACCC was also tasked to propose relevant domestic policies and prepare country positions in the international negotiations.

As mentioned earlier in this paper, the Philippines prepared its INC through an enabling activity project funded by the Global Environment Facility (GEF) via the United Nations Development Programme (UNDP). The Second National Communication (SNC), on the other hand, came after the enactment of R.A. 9729, but the preparatory process of the report overlapped with the passage of the landmark legislation.

Previous accounts of national emissions were carried out by experts external to the government. Given the nature of international reports, the Philippine Government took into account the iterative process of such reporting requirements under the Convention and initiated the process of institutionalizing the conduct of GHG inventory at the national level. More importantly, GHG inventories can support better planning for climate change adaptation and mitigation action towards a low-carbon pathway for sustainable development.

On 24 November 2014, by virtue of Executive Order (E.O.) 174, the Philippine Greenhouse Gas Inventory Management and Reporting System (PGHGIMRS) was institutionalized in relevant government agencies. The Executive Order is envisioned to be an enabling mechanism for the country to transition towards a climate-resilient, low-carbon pathway for sustainable development.

E.O. 174 defined the roles and functions of the agencies involved in its implementation. The CCC serves as the overall lead in the execution of the provisions of the Order. On a specific note, the CCC shall:

1. Provide direction and guidance in the accounting and reporting of GHG emissions from identified key source sectors in order to develop and maintain centralized, comprehensive, and integrated data on GHGs;
2. Develop a system for the archiving, reporting, monitoring, and evaluating GHG inventories in all key sectors; and
3. Provide and facilitate continuous capacity building initiatives in the conduct of GHG inventories to ensure application of updated methodologies.

Further, the Executive Order identified the lead agencies tasked to conduct, document, archive, and monitor sector specific GHG inventories and report to the CCC:

1. The Department of Agriculture and the Philippine Statistics Authority are the lead agencies for the Agriculture sector.
2. The Department of Energy is the lead agency for the energy sector.
3. The Department of Environment and Natural Resources is the lead agency for the waste, industrial processes, and forestry and other land-use sectors; and
4. The Department of Transportation is the lead agency for the transportation sector.

#### **IV. Implementation of the Executive Order 174 and the Development of the 2010 National GHG Inventory**

In service to E.O. 174, lead sectoral agencies established their GHG teams internal to their respective institutions through Department/Special Orders (DO/SO). This is summarized in **Table 1** below.

*Table 1. Department and Special Orders Establishing GHG Teams of E.O. 174 Agencies*

<b>Agency</b>	<b>Sector</b>	<b>DO/SO</b>	<b>Description</b>	<b>Approval Date</b>
DENR- EMB	Waste, Industry	SO No. 2016- 297	Creation of the EMB GHGI Team for the Implementation of EO 174 Institutionalizing the PGHGIMRS	14 July 2016
DENR- FMB	Forestry and Other Land Use	SO No. 2016- 154	Creation of a TWG Integrating Work in the Preparation of Technical and Reporting Requirements to all Forest-related UNFCCC- COP Decisions and Agreements	27 May 2016

DOE	Energy	DO No. 2018-03-005	Institutionalization of the GHG Inventory Team of the Energy Sector	27 March 2018
DOTr	Transport	DO No. 2018-001	Institutionalization of the GHG Inventory Team of the Transport Sector (Air, Rail, Water, and Road)	10 January 2018
PSA	Agriculture	SO No. 2017-10NS-1499	Reconstitution of the GHG Inventory Team	04 October 2017

The sectoral reports were officially transmitted by the lead agencies to the CCC (refer to **Table 2**), which were then pending quality assurance procedures to be conducted by external experts.

*Table 2. Submissions of the 2010 Sectoral GHG Inventories*

<b>GHG Sector</b>	<b>Prepared by</b>	<b>Date of Submission</b>
Agriculture	PSA	December 2017
Waste	DENR	September 2018
Industrial Processes and Products Use (IPPU)	DENR	September 2018
Forestry and Other Land Uses (FOLU)	DENR	February 2018
Energy and Transport <sup>9</sup>	DOE	October 2018

On 14-18 May 2019, the UNFCCC Secretariat in collaboration with the Food and Agriculture Organization of the United Nations (FAO), conducted the Quality Assurance Workshop for the National Greenhouse Gas Inventory Management System and National Greenhouse Gas Inventories of the Philippines. Critical findings were then identified and prioritized. Thus, the 2010 Sectoral GHG Inventories must be updated and revised by the lead agencies and re-submitted to the CCC.

### **Preliminary Results of the 2010 National GHG Inventory**

**Figure 3** shows the initial results of the 2010 National GHG Inventory.

In 2010, Emissions from the energy, agriculture, and transport sectors were the biggest contributing sectors, accounting for about 82% of the total non-LUCF emissions. Note that GWP values from IPCC's Fifth Assessment Report (AR5) were used in expressing the total GHG emissions in terms of CO<sub>2</sub>-equivalent

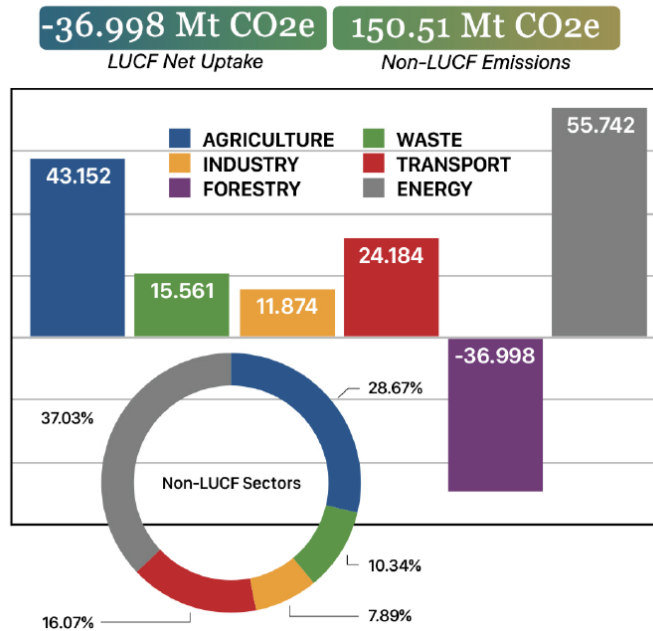
<sup>9</sup> In line with the 2006 IPCC Guidelines for National GHG Inventories classifying transportation as a subcategory under the energy sector, and in light of the varying institutional capacities of the sectoral agencies at the time, the DOE accounted for 2010 emissions from both the energy and transport sectors.



Figure 3. 2010 National GHG Emissions and Removals

### 2010 NATIONAL GHG INVENTORY<sup>1</sup>

All values are in million metric tons of CO<sub>2</sub> equivalent (Mt CO<sub>2</sub>e).



## V. Data Sources

Developing a comprehensive national inventory in line with the following inventory principles: transparent, accurate, complete, consistent, and comparable, is highly contingent on robust institutional arrangements, availability and quality of data, proper understanding of the calculation approaches, and the capacity to compile a national report. Therefore, the participation of relevant agencies as data providers consistent with their respective mandates is crucial to the success of continuous GHG inventory development. Executive Order 174 aims to address these contingencies at the institutional level. Activity data needs are identified and discussed in the 2006 IPCC Guidelines for National GHG Inventories. Majority of the activity data requirements are already being collected by the lead agencies, or can be outsourced from key stakeholders, i.e. private sector.

Based on the sectoral frameworks set out in the 2006 IPCC Guidelines, existing and potential data sources have been identified to facilitate data collection and processing. Data gaps have also been initially outlined and possible workarounds identified for the next inventory cycle. IPCC's data tree for the agriculture sector is depicted in **Figure 4**.

Figure 4. Data tree diagram for the Agriculture, Forestry, and Other Land Use (AFOLU) Sector (derived from 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4: Agriculture, Forestry and Other Land Use p 1.16)

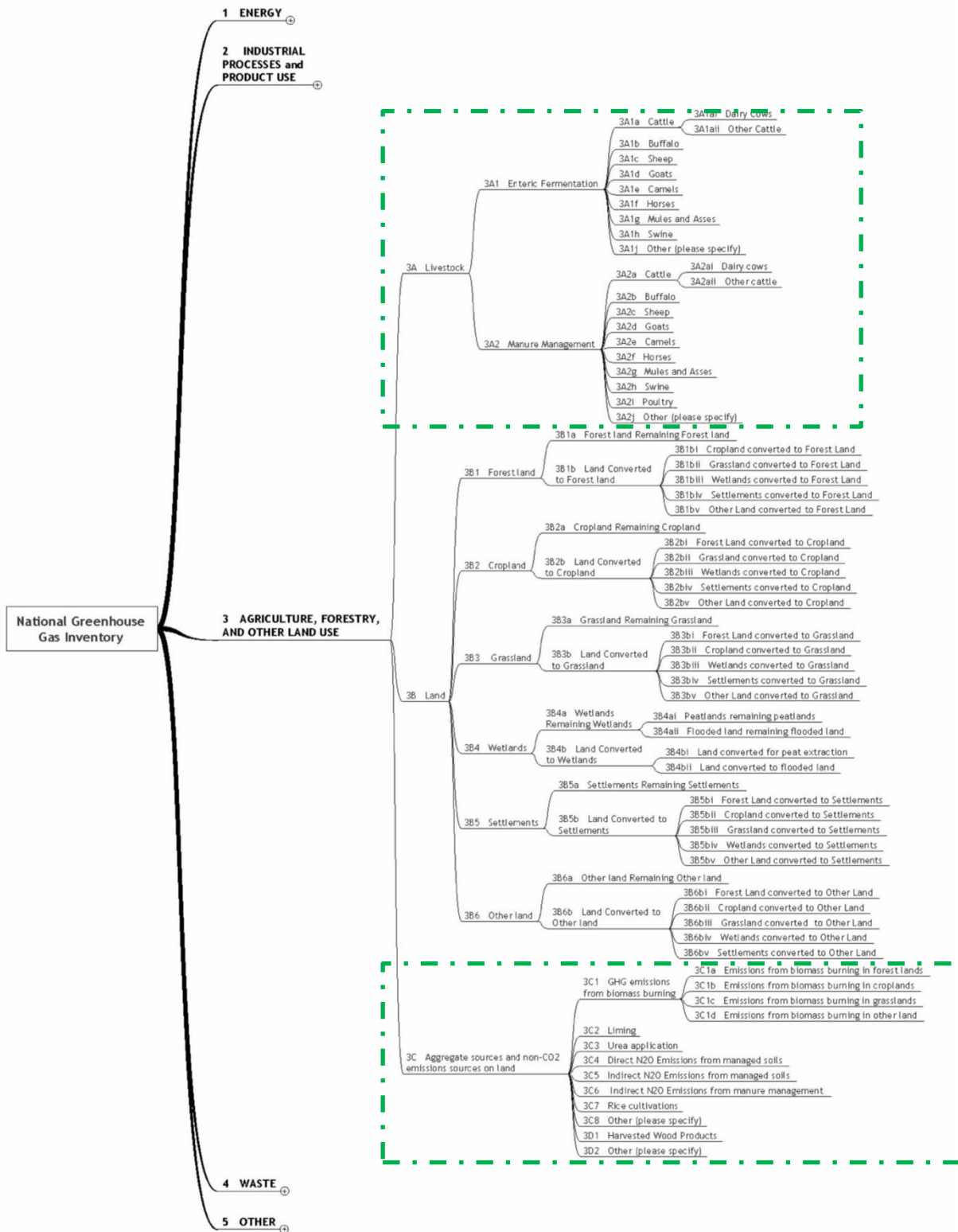


Table 3. Agriculture sector emissions and data sources

Categories	Activity Data	Possible Data Sources
<b>3 - Agriculture, Forestry, and Other Land Use</b>		
<b>3.A - Livestock</b>		
3.A.1 - Enteric Fermentation		
3.A.1.a - Cattle	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
3.A.1.b - Buffalo	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
3.A.1.c - Sheep	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
3.A.1.d - Goats	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
3.A.1.e - Camels	N/A	-
3.A.1.f - Horses	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
3.A.1.g - Mules and Asses	N/A	-
3.A.1.h - Swine	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
3.A.2 - Manure Management (1)		
3.A.2.a - Cattle	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
3.A.2.b - Buffalo	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
3.A.2.c - Sheep	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
3.A.2.d - Goats	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat

Categories	Activity Data	Possible Data Sources
3.A.2.e - Camels	N/A	-
3.A.2.f - Horses	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
3.A.2.g - Mules and Asses	N/A	-
3.A.2.h - Swine	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
3.A.2.i - Poultry	Animal Population	PSA, BAI, PCC, DA-Livestock Development Council, FAOStat
<b>3.C - Aggregate sources and non-CO2 emissions sources on land (2)</b>		
3.C.1 - Emissions from biomass burning		
3.C.1.b - Biomass burning in croplands	Area and mass burnt	Crops Statistics Division - PSA, SRA
3.C.1.c - Biomass burning in grasslands	Area and mass burnt	Crops Statistics Division - PSA, SRA
3.C.2 - Liming	Amount of limestone and dolomite applied to soils	Crops Statistics Division - PSA, MGB - DENR, DTI, PFPA
3.C.3 - Urea application	Amount of urea fertilizer applied to soils	BPI-DA, PFPA, Crops Statistics Division - PSA
3.C.4 - Direct N2O Emissions from managed soils (3)	Amount of synthetic and organic fertilizers applied to soils, urine and dung deposited on pasture, area of managed organic soils	CSD-PSA, BAI, PCC, DA-Livestock Development Council, FAOStat, SRA, MGB-DENR, DTI, PFPA, PhilRice, BSWM, BMB
3.C.5 - Indirect N2O Emissions from managed soils		
3.C.6 - Indirect N2O Emissions from manure management		
3.C.7 - Rice cultivations	Harvested Area	Crops Statistics Division - PSA, PhilRice

Categories	Activity Data	Possible Data Sources
<b>1 - Energy</b>		
<b>1.A - Fuel Combustion Activities</b>		
<b>1.A.1 - Energy Industries</b>		
1.A.1.a - Main Activity Electricity and Heat Production		
1.A.1.a.i - Electricity Generation	Types, totals of fuel used	DOE-EPIMB, NPC
1.A.1.a.ii - Combined Heat and Power Generation (CHP)	Types, totals of fuel used	DOE-EPIMB, NPC
1.A.1.a.iii - Heat Plants	Types, totals of fuel used	DOE-EPIMB, NPC
1.A.1.b - Petroleum Refining	Types, totals of fuel used	DOE-OIMB
1.A.1.c - Manufacture of Solid Fuels and Other Energy Industries		
1.A.1.c.i - Manufacture of Solid Fuels	Types, totals of fuel used	DOE-OIMB
1.A.1.c.ii - Other Energy Industries	Types, totals of fuel used	DOE-OIMB
<b>1.A.2 - Manufacturing Industries and Construction</b>		
1.A.2.a - Iron and Steel	Types, totals of fuel used	DOE, DTI
1.A.2.b - Non-Ferrous Metals	Types, totals of fuel used	DOE, DTI
1.A.2.c - Chemicals	Types, totals of fuel used	DOE, DTI
1.A.2.d - Pulp, Paper and Print	Types, totals of fuel used	DOE, DTI

Categories	Activity Data	Possible Data Sources
1.A.2.e - Food Processing, Beverages and Tobacco	Types, totals of fuel used	DOE, DTI
1.A.2.f - Non-Metallic Minerals	Types, totals of fuel used	DOE, DTI
1.A.2.g - Transport Equipment	Types, totals of fuel used	DOE, DTI
1.A.2.h - Machinery	Types, totals of fuel used	DOE, DTI
1.A.2.i - Mining (excluding fuels) and Quarrying	Types, totals of fuel used	DOE, DTI
1.A.2.j - Wood and wood products	Types, totals of fuel used	DOE, DTI
1.A.2.k - Construction	Types, totals of fuel used	DOE, DTI
1.A.2.l - Textile and Leather	Types, totals of fuel used	DOE, DTI
1.A.2.m - Non-specified Industry	Types, totals of fuel used	DOE, DTI
<b>1.A.3 - Transport</b>		
1.A.3.a - Civil Aviation		
1.A.3.a.i - International Aviation (International Bunkers) (1)	Types, totals of fuel used; VKT; Types of aircraft, Number of aircraft	DOTr-CAAP, CAB, MIAA
1.A.3.a.ii - Domestic Aviation	Types, totals of fuel used; VKT; Types of aircraft, Number of aircraft	DOTr-CAAP, CAB, MIAA
1.A.3.b - Road Transportation		
1.A.3.b.i - Cars		
1.A.3.b.i.1 - Passenger cars with 3-way catalysts	Types, totals of fuel used; VKT;	DOTr-MIS, LTO, LTFRB, TRB

Categories	Activity Data	Possible Data Sources
	Types of cars, Number of cars	
1.A.3.b.i.2 - Passenger cars without 3-way catalysts	Types, totals of fuel used; VKT; Types of cars, Number of cars	DOTr-MIS, LTO, LTFRB, TRB
1.A.3.b.ii - Light-duty trucks		
1.A.3.b.ii.1 - Light-duty trucks with 3-way catalysts	Types, totals of fuel used; VKT; Types of LD trucks, Number of LD trucks	DOTr-MIS, LTO, LTFRB, TRB
1.A.3.b.ii.2 - Light-duty trucks without 3-way catalysts	Types, totals of fuel used; VKT; Types of LD trucks, Number of LD trucks	DOTr-MIS, LTO, LTFRB, TRB
1.A.3.b.iii - Heavy-duty trucks and buses	Types, totals of fuel used; VKT; Types of HD trucks and buses, Number of HD trucks and buses	DOTr-MIS, LTO, LTFRB, TRB
1.A.3.b.iv - Motorcycles	Types, totals of fuel used; VKT; Types of motorcycles, Number of motorcycles	DOTr-MIS, LTO, LTFRB, TRB
1.A.3.c - Railways	Types, totals of fuel used; VKT; Types of trains, Number of trains	DOTr, PNR, LRTA

Categories	Activity Data	Possible Data Sources
1.A.3.d - Water-borne Navigation		
1.A.3.d.i - International water-borne navigation (International bunkers) (1)	Types, totals of fuel used; VKT; Types of marine vehicles, Number of marine vehicles	DOTr, PPA, MARINA
1.A.3.d.ii - Domestic Water-borne Navigation	Types, totals of fuel used; VKT; Types of marine vehicles, Number of marine vehicles	DOTr, PPA, MARINA
<b>1.A.4 - Other Sectors</b>		
1.A.4.a - Commercial/Institutional	Types, totals of fuel used	DOE, DTI, PSA
1.A.4.b - Residential	Types, totals of fuel used	DOE, PSA
1.A.4.c - Agriculture/Forestry/Fishing/Fish Farms	Types, totals of fuel used	DOE, DENR, DA, PSA
<b>1.B - Fugitive emissions from fuels</b>		
<b>1.B.1 - Solid Fuels</b>		
1.B.1.a - Coal mining and handling		
1.B.1.a.i - Underground mines	Coal production	DOE-ERDB, DENR-EMB, PNOC
1.B.1.a.ii - Surface mines	Coal production	DOE-ERDB, DENR-EMB, PNOC
<b>1.B.2 - Oil and Natural Gas</b>		
1.B.2.a - Oil	Oil production	DOE-ERDB, DOE-OIMB
1.B.2.b - Natural Gas	Natural Gas production	DOE-ERDB, DOE-OIMB



## **VI. Continuous National GHG Inventory Preparation: Challenges and Opportunities**

The policy instrument established to put in place a system for national GHG inventory reporting and management employs a decentralized approach to data collection and emissions accounting. While the CCC serves as the lead agency and maintains a certain degree of control over GHG inventory preparation, other E.O. 174 agencies have their own internal processes as regards the conduct of GHG inventory.

One of the challenges in an institutional, decentralized GHG inventory setup is the time required to fully internalize the implementation of the inventory system. While it serves a practical purpose in the long-term, some of the existing challenges include (1) a relatively high turnover rate of technical personnel within relevant national authorities, (2) limited financial capacity to undertake continuous in-depth training sessions on the use of the 2006 IPCC Guidelines and its associated software, (3) relatively limited technical capacity to fully understand the intricacies of the Guidelines, (4) lack of a coherent operationalization document for E.O. 174, or proper enforcement thereof, for a reporting process that is responsive to the overarching national policy and planning frameworks and international reporting timelines (5) unavailability of some activity datasets, or lack of data collection, processing, and/or management approaches, (6) limited extent to which activity data needs are aligned to the IPCC's comprehensive sectoral data frameworks, and (7) lack/limited data sharing arrangements within and among implementing institutions, especially the private sector.

On the other hand, such challenges also present opportunities for improvement to further reinforce the country's institutional arrangements on GHG inventory. The Philippine Statistical Development Program (PDSP), for one, will be used as an avenue to expand the institutional reach of the CCC and the lead sectoral agencies.

Under the Interagency Committee on Environmental and Natural Resources Statistics (IACENRS), a Technical Working Group on Climate Change-Related Statistics (TWG-CCS) will also be created to explicitly identify and involve government agencies and academic institutions in the process of collecting, processing, managing, and archiving data and information on climate change.

The development of country-specific emission factors will also be undertaken, which will be informed by key category analysis of major emission sources. Country-specific emission factors will aid in the advance characterization of emissions sources and removals.

Lastly, CCC's National Integrated Climate Change Database and Information and Exchange System (NICCDIES) can be used as an enabling online platform for data and information sharing and exchange—that is, the NICCDIES will translate GHG inventory data and workflow requirements into functional specifications that would streamline and automate, to an extent, the entire GHG inventory reporting and management system.

## References

*Global Climate Risk Index 2019 Briefing Paper. Who Suffers Most from Extreme Weather Events? Weather-related Loss Events in 2017 and 1998 to 2017.* David Eckstein, Marie-Lena Hutfils and Maik Winges

*Institutionalizing the Philippine Greenhouse Gas Inventory Management and Reporting System* Office of the President of the Philippines, 2014. Executive Order No. 174 (2014, November 24).

Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.* 2018. Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.). In Press.

*The 2006 IPCC Guidelines for National Greenhouse Gas Inventories.* 2006. Intergovernmental Panel on Climate Change.

*The Philippines' Initial National Communication on Climate Change.* 1999. Inter-Agency Committee on Climate Change.

*The Philippines' Second National Communication to the United Nations Framework Convention on Climate Change,* 2014.

*The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.* 1997. Intergovernmental Panel on Climate Change.

<http://www.globalcarbonatlas.org/en/CO2-emissions>

<https://unfccc.int/process-and-meetings/transparency-and-reporting/support-for-developing-countries/overview>