Papua New Guinea
Climate Change and Development Agency

The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Project Completion Report

February 2022

Japan International Cooperation Agency
Mitsubishi UFJ Research and Consulting Co., Ltd.

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Abbreviations

AFOLU	Agriculture, Forestry and. Other Land Use
BTR	Biennial Transparency Report
BUR	Biennial Update Report
CBIT	Capacity Building Initiative for Transparency
CCDA	Climate Change and Development Authority
CEPA	Conservation and Environmental Protection Authority
DAC	Development Assistance Committee
DNPM	Department of National Planning and Monitoring
DPE	Department of Petroleum and Energy
ETF	Enhanced transparency framework
FAO	Food, Agriculture Organization
FAQ	Frequently asked questions
FSV	Facilitative Sharing of Views
GEF	Global Environment Facility
GHG	Greenhouse gas
HFC	Hydrofluorocarbon
ICA	International Consultation and Analysis
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
LULUCF	Land Use, Land-Use Change and Forestry
MM	mon-months
MoU	Memorandum of Understanding
MRV	Measurable, Reportable, Verifiable
MURC	Mitsubishi UFJ Research and Consulting Co., Ltd.
NAMA	Nationally Appropriate Mitigate Action
NC	National Communication
NCDC	National Capital District Commission
NDAL	National Department of Agriculture and Livestock
NDC	National Determined Contribution
NIR	National Inventory Report
NSO	Natioal Statistics Office
PDM	Project Design Matrix
PNG	Papua New Guinea
PO	Plan of Operation
PNGFA	PNG Forest Authority
QA/QC	Quality Assurance / Quality Control
RAC	Refrigeration and air conditioning
R/D	Record of Discussion
TACCC	Transparency, Accuracy, Completeness, Comparability, Consistency
ToR	Terms of Reference
TTE	Team of technical experts
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

Chapter 1. Project overview

1. Country

Papua New Guinea (PNG)

2. Title of the Project:

The Project for enhancing capacity to develop a sustainable greenhouse gas (GHG) inventory system for PNG

3. Duration of the Project

The duration of the Project was originally planned for four years from September 1, 2017 to August 1, 2021 but was later revised to October 4, 2017 to October 4, 2021 to reflect four years since the first Japan International Cooperation Agency (JICA) Project expert team mission to PNG which was October 4, 2017.

4. Background of the Project

Papua New Guinea positioned Environmental Sustainability and Climate Change as one of the pillars of Papua New Guinea Vision 2050, and has worked to mainstream climate change measures with a view to become carbon neutral by 2050. As the country that proposed Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD) in the United Nations Framework Convention on Climate Change (UNFCCC), and as a pilot country of UN-REDD, PNG is active in reducing GHG emissions in the forestry sector. PNG has visions to a complete shift to renewable energy by 2050; improvement of cross-sectorial energy efficiency; and emission reduction in the transport sector.

PNG has prepared the GHG inventory twice, for its First and Second National Communications (NC) under UNFCCC framework.

Issues identified from the past experiences have become the basis for PNG's institutional development. Specifically, in 2015, the Climate Change (Management) Act was enacted, and the Climate Change and Development Authority (CCDA) was designated as the leading agency in charge of climate change policies. By PNG's ratification of the Paris Agreement in 2016, and the enactment of UNFCCC Paris Agreement (Implementation) Act 2016, legally commits PNG to implementing the Paris Agreement. However, the country still faces issues on the design of GHG database and its maintenance, data collection and control, in addition to the lack of GHG inventory experts and managers. CCDA enhanced its human resources in recent years, but still faced capacity challenges in implementing the GHG inventory preparation. As such, in July 2014, the government requested JICA for this project to enhance capacity of CCDA resources.

JICA conducted the First survey for technical cooperation for this project in September 2016 followed by

the Second survey in February 2017. The Surveys summarized the issues of GHG inventory preparation in PNG as the following: (1) the lack of basic capacity necessary to prepare GHG inventory regularly; (2) the lack of capacity among relevant institutions to promote understanding on GHG inventory; and (3) the lack of capacity to technically review the GHG inventory and make improvements in each sector.

This project was designed to address the above-mentioned issues, and to enhance the basic capacity of CCDA to be able to prepare GHG inventories on a regular basis. With the agreement by JICA, CCDA and Department of National Planning and Monitoring (DNPM), the Record of Discussion (R/D) was signed on April 24th, 2017.

5. Overall Goal and Project Purpose

5.1 Overall Goal

TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.

5.2 Project Purpose

The basic capacity of CCDA to periodically prepare TACCC GHG inventories is strengthened.

5.3 Outputs and activities

Table 1 Project Outputs and activities

Output 1 : Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. 1.2: Consider and recommend ways to improve the national GHG inventory arrangements. 1.3: Draft/Update a workplan/ guidebook/ checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). 1.4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. 1.5: Collect data necessary for national GHG inventories from relevant parties. 1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. 1.7: Use 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors. 1.8: Compile national GHG inventories with time series consistency. 1.9: Draft/Update technical document on procedures of inventory compilation and each sector's Quality Assurance / Quality Control (QA/QC) activities (to be part of the NIR).
Output 2 : Capacity to promote understanding of national GHG inventories is enhanced.	2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. 2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.

Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. 3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. 3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories). 3.4: Consider whether/how mitigation actions including Nationally Appropriate Mitigate Actions (NAMAs) can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. 3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC. 3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR). 3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR (Biennial Update Report) /NC.

6. Implementing structure

6.1 Implementing structure of the Project

The implementation structure is shown in Figure 1. The CCDA is the counterpart of the project and the agency responsible for preparing the GHG inventory and relevant reports for submission to the UNFCCC. In preparing the GHG inventory, the CCDA require the support and data from relevant stakeholders, such as the PNG NSO, PNG Customs, National Energy Authority (previously Department of Petroleum and Energy (DPE)), Water PNG, National Capital District Commission (NCDC), Conservation and Environmental Protection Authority (CEPA), PNG Forest Authority (PNGFA), Department of Agriculture and Livestock (NDAL), and others who make up the Joint Coordinating Committee (JCC) members.

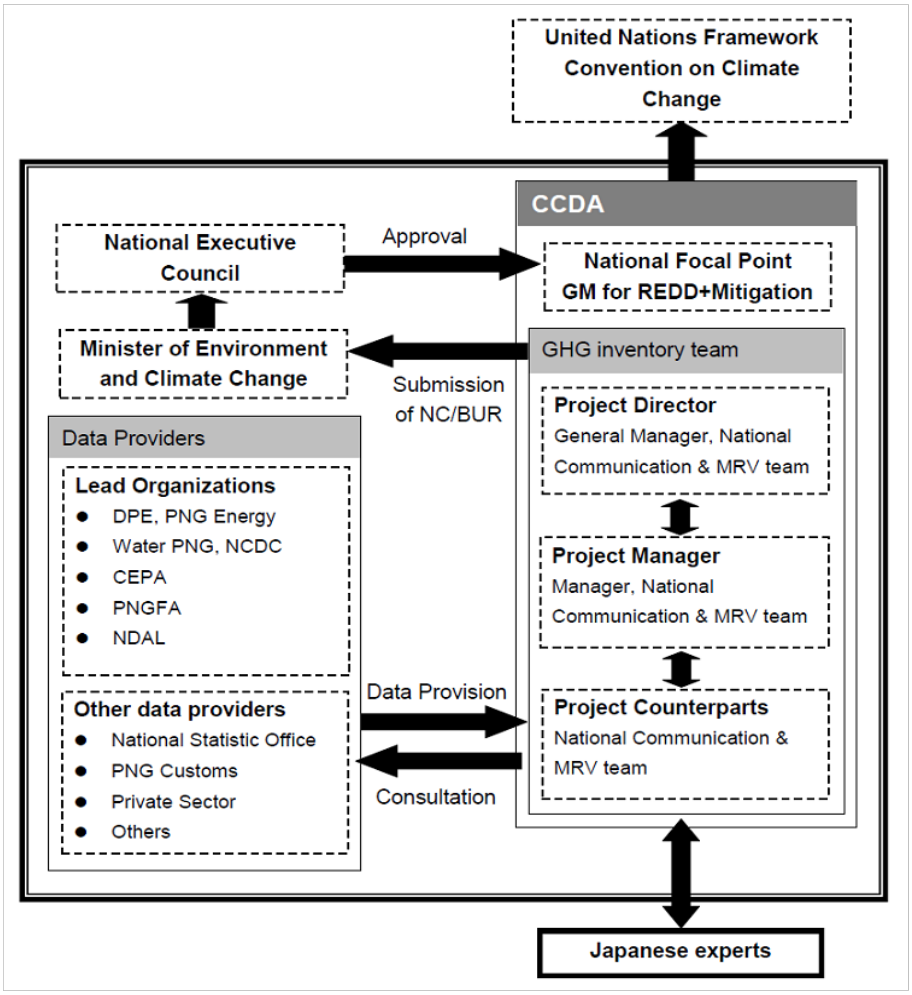

Figure 1 Implementing structure of the Project

Source: Record of Discussions of the Project, 2017

6.2 Project counterpart members

The members of the main counterparts are shown in Table 2.

Table 2 Counterpart members

#	Name	Position	Organization
1	William Lakain	Acting Managing Director	CCDA
2	Gwen Sissiou	General Manager – REDD+ & Mitigation Division	CCDA
3	Alfred Rungol	General Manager Manager – MRV	CCDA
4	Erick Sarut	National Communication Officer	CCDA
5	Larsen Daboyan	National Communication Officer	CCDA
6	Debra Sungi	MRV Officer	CCDA
7	Jason Paniu	Acting MRV Officer	CCDA
8	Morgan Kai	Trainee Officer – National Communication	CCDA
9	Jacinta Kull	Trainee Officer – National Communication	CCDA
10	Priscilla Pep※	Trainee Officer – MRV	CCDA
11	Nathan Sapala※	Trainee Officer – MRV	CCDA

※ member left the CCDA in 2018

The member roles within the Project are as shown in the figure below.

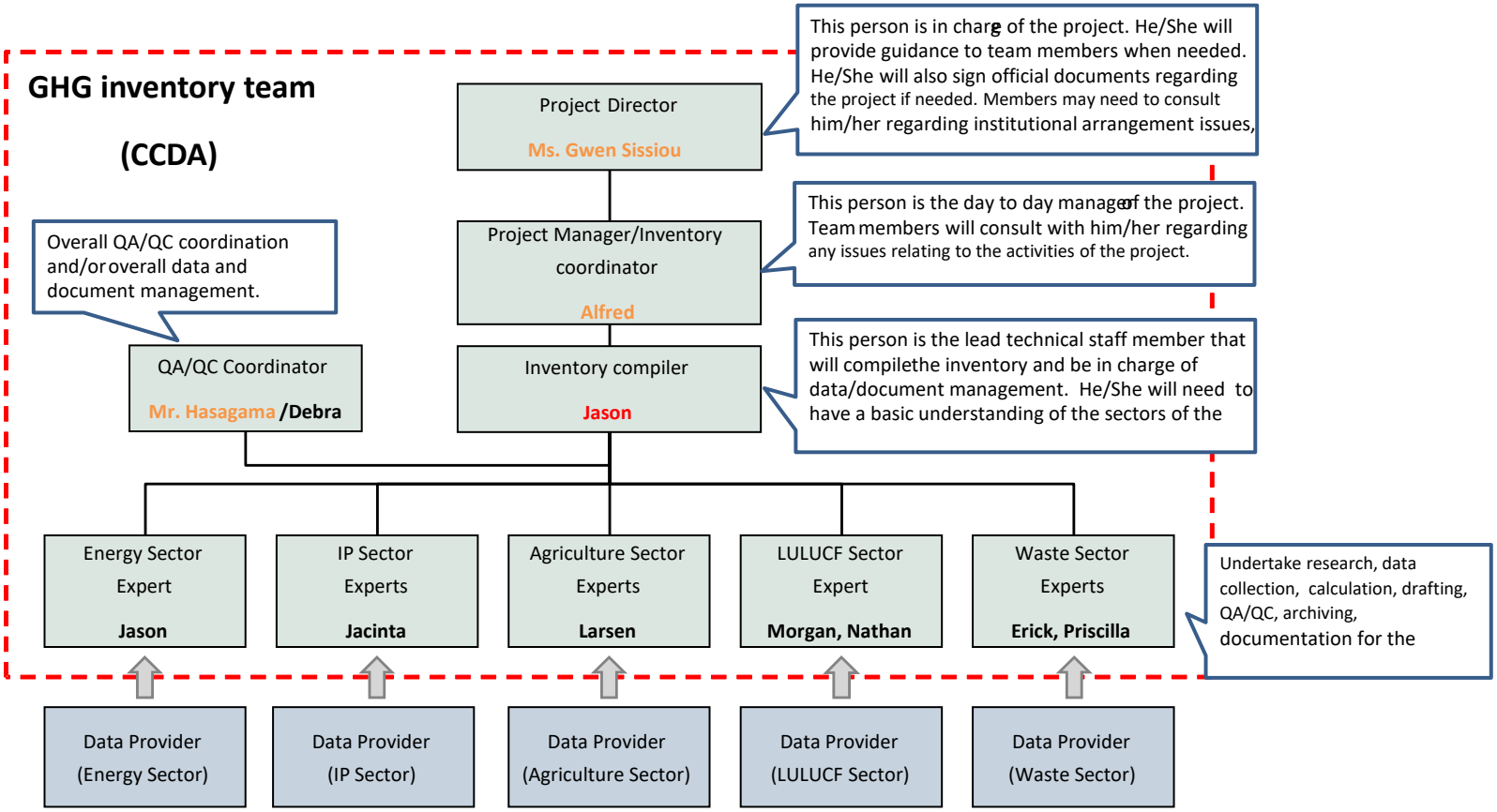

Figure 2 CCDA member roles in preparing GHG inventories

Source: Developed by JICA Project experts

6.3 JICA Project experts

The JICA Project experts are as shown in Table 3 .

Table 3 JICA Project experts

#	Name	Position	Organization
1	Takeshi Enoki	Project leader/ generalist	MURC
2	Tomoki Takahashi Takuji Terakawa	Energy sector	MURC
3	Matthew Dudley	Industrial Processes and Product Use sector	Independent consultant
4	Atsushi Sato	AFOLU sector	MURC
5	Hiroyuki Ueda	Waste sector	MURC
6	Masaaki Nakamura	Mitigation actions	MURC
7	Yui Ogawa	Training Coordination	MURC

6.4 Joint Coordination Committee (JCC) member agencies

The JCC member agencies are as follows:

- Climate Change and Development Authority (JCC Chair)
- PNG Customs
- PNG Power LTD
- Conservation and Environment Protection Authority
- National Energy Authority
- Department of Agriculture & Livestock
- Water PNG
- PNG Forestry Agency

7. Implementation approach and points to note

7.1 Follow PDM/PO

The operation of the Project was based on collaboration with C/P (counterpart) in line with PDM and PO. Although the PDM was never changed during the Project, the PO was amended in February 2018 and approved by the First JCC.

7.2 Flexibility within Project scope

The Project was intended to transfer technology related to the preparation of GHG inventory, but at the request of C/P, the Project supported the preparation and editing of the entire biennial update report (BUR). As a result, the Project supported the preparation of not only inventory but also entire BUR (chapter on

domestic situation, GHG inventory, mitigation behavior, needs). In addition, due to the COVID-19 pandemic and associated restrictions on overseas travel, the JICA project expert team was unable to travel to PNG from March 2020 until the end of the cooperation period. Therefore, the activities that were originally scheduled to be carried out in PNG are conducted remotely from outside PNG for about a year and a half, and training and meetings for C / P were switched to using online meeting tools.

7.3 Enhancing C/P ownership

In order to foster ownership of C/P members, the C/P continued to be front of the meeting and give presentations and address Q&A during conferences and workshops. Before the event and meetings, Project members conducted a presentation and Q&A simulation, to build confidence. Consequently, C/P ownership of the Project improved, and C/P participated and led discussions.

In addition, coordinating the schedule/timeline of activities with all C/P staff took time, and discussions were held several times among the members. As a result, the C/P staff's awareness of the parties increased, and C/P is familiar with the Project contents.

7.4 Cooperation with other donor support

With the support of the Food and Agriculture Organization of the United Nations (FAO), the CCDA implemented the Capacity Building Initiative for Transparency (CBIT) project, a $2 million project aimed at comprehensive support in the AFOLU (Agriculture, Forestry, Other Land Use) sector (GEF/CBIT Project) from 2017 to 2022. The project includes consistent support from data collection in the AFOLU sector of the GHG inventory to preparation of inventory reports. Due to the overlap with the Project, it was agreed that the GEF/CBIT project would be responsible for the AFOLU sector inventory, and the Project the non-AFOLU field (energy, industrial process and product use (IPPU), waste).

7.5 Publicity

In carrying out the Project, in order to ensure that the public of Japan and PNG understand the significance, activities and results of this cooperation correctly, the Project members supported the drafting of the Project website[1], the creation of presentations at international conferences such as COP, addressing domestic media in PNG, and lectures and presentations at international workshops.

[1] https://www.jica.go.jp/project/png/006/index.html（Japanese）、
https://www.jica.go.jp/project/english/png/006/index.html（English）

Chapter 2. Results of the Project

1. Results of the Project

1.1 Input by the Japanese side

A. Amount of input on the Japanese side

Operation cost by year is as shown in the table below.

Table 4 operating cost by year

year	Local operation cost (including international consultant)
2017	¥599,055
2018	¥2,850,152
2019	¥1,112,241
2020	¥120,068
2021	¥6,380,000

B. Experts

The JICA Project expert team consisting eight short term experts were dispatched to Port Moresby approximately four times a year to implement the Project activities. However, due to the spread of COVID-19 and the global travel restrictions, the JICA Project experts were not able to travel to PNG from March 2020 onward, until the end of the cooperation period. Work originally planned in PNG therefore were carried out remotely from outside PNG for approximately a year and a half. By the end of September 2021, the JICA Project expert team spent 12.43 mon-months (MMs) in Port Moresby and 22.45MMs working remotely from outside PNG. The MMs spent in Port Moresby is low compared to the plan due to the travel restrictions in response to the global COVID-19 pandemic.

As shown in Table 5, the MM for actual is under planned for many of the JICA Project experts. This is because, as mentioned in section 3 of this report, although JICA Project cooperation term will conclude in October 2021, the JICA Project experts continued to carry out research until February 2022. The MM for the research during October 2021 to February 2022 was 3.20 in total

Table 5 Input of Japanese experts

Name	Position	Total planned	Total Actual*
Takeshi Enoki	GHG Inventory (General)	12.78	12.88 (1.50)
Tomoki Takahashi Takuji Terakawa	GHG Inventory (Energy)	7.52	7.12 (0.50)
Masaaki Nakamura	GHG Inventory (Energy2)	1.70	1.55 (0.20)
Matthew Dudley	GHG Inventory (IPPU)	7.97	6.97 (0.30)
Atsushi Sato	GHG Inventory (AFOLU)	6.48	4.83 (0.70)
Hiroyuki Ueda	GHG Inventory (Waste)	4.88	2.73 (0.00)
Yui Ogawa	Training Coordination	1.00	0.35 (0.00)

* Numbers in () are the MM for the research on the Pacific Island countries

Table 6 JICA Project experts' missions

name	expertise	rank	mission duration		overview
			start	end	
Takeshi Enoki	GHG inventry (general)	2	2017/10/4	2017/10/18	Kickoff
Tomoki Takahashi	GHG inventry (energy)	5	2017/10/4	2017/10/18	Kickoff
Takeshi Enoki	GHG inventry (general)	2	2017/12/3	2017/12/16	Inception Workshop
Tomoki Takahashi	GHG inventry (energy)	5	2017/12/3	2017/12/16	Inception Workshop
Matthew Dudley	GHG inventry (IPPU)	3	2017/12/9	2017/12/15	Inception Workshop
Atsushi Sato	GHG inventry (AFOLU)	3	2017/12/9	2017/12/16	Supporting the BUR1 GHG inventory
Hiroyuki Ueda	GHG inventry (waste)	3	2017/12/11	2017/12/16	Supporting the BUR1 GHG inventory
Takeshi Enoki	GHG inventry (general)	2	2018/2/4	2018/2/17	Supporting the BUR1 GHG inventory
Tomoki Takahashi	GHG inventry (energy)	5	2018/2/4	2018/2/15	Supporting the BUR1 GHG inventory
Atsushi Sato	GHG inventry (AFOLU)	3	2018/2/11	2018/2/17	Supporting the BUR1 GHG inventory
Tomoki Takahashi	GHG inventry (energy)	5	2018/4/15	2018/4/21	Supporting the BUR1 GHG inventory
Atsushi Sato	GHG inventry (AFOLU)	3	2018/4/14	2018/4/18	Supporting the BUR1 GHG inventory
Takeshi Enoki	GHG inventry (general)	2	2018/5/20	2018/5/26	First JCC
Matthew Dudley	GHG inventry (IPPU)	3	2018/5/19	2018/5/25	Supporting the BUR1 GHG inventory
Takeshi Enoki	GHG inventry (general)	2	2018/7/29	2018/8/9	Supporting the BUR1 GHG inventory
Tomoki Takahashi	GHG inventry (energy)	5	2018/8/9	2018/8/15	Supporting the BUR1 GHG inventory
Matthew Dudley	GHG inventry (IPPU)	3	2018/8/8	2018/8/15	Supporting the BUR1 GHG inventory
Hiroyuki Ueda	GHG inventry (waste)	3	2018/7/29	2018/8/4	BUR2 GHG inventory planning
Atsushi Sato	GHG inventry (AFOLU)	3	2018/8/15	2018/8/22	BUR2 GHG inventory planning
Takeshi Enoki	GHG inventry (general)	2	2018/9/26	2018/10/6	Consultation workshop
Matthew Dudley	GHG inventry (IPPU)	3	2018/10/1	2018/10/6	Consultation workshop
Takeshi Enoki	GHG inventry (general)	2	2018/11/27	2018/12/5	BUR2 GHG inventory planning
Takeshi Enoki	GHG inventry (general)	2	2019/2/16	2019/2/26	BUR2 GHG inventory planning
Matthew Dudley	GHG inventry (IPPU)	3	2019/2/18	2019/2/24	BUR2 GHG inventory planning
Tomoki Takahashi	GHG inventry (energy)	5	2019/3/10	2019/3/16	Supporting the BUR2 GHG inventory
Takeshi Enoki	GHG inventry (general)	2	2019/5/7	2019/5/23	Supporting the BUR2 GHG inventory
Matthew Dudley	GHG inventry (IPPU)	3	2019/5/9	2019/5/17	Supporting the BUR2 GHG inventory
Takeshi Enoki	GHG inventry (general)	2	2019/7/17	2019/7/30	Supporting the BUR2 GHG inventory
Matthew Dudley	GHG inventry (IPPU)	3	2019/7/21	2019/7/30	Second JCC
Tomoki Takahashi	GHG inventry (energy)	5	2019/7/24	2019/8/3	Second JCC
Atsushi Sato	GHG inventry (AFOLU)	3	2019/7/27	2019/8/3	Supporting the BUR2 GHG inventory
Atsushi Sato	GHG inventry (AFOLU)	3	2019/9/21	2019/9/28	Supporting the BUR2 GHG inventory
Takeshi Enoki	GHG inventry (general)	2	2019/10/9	2019/10/23	Supporting the BUR2 GHG inventory
Matthew Dudley	GHG inventry (IPPU)	3	2019/10/9	2019/10/18	Supporting the BUR2 GHG inventory
Tomoki Takahashi	GHG inventry (energy)	5	2019/10/13	2019/10/19	Supporting the BUR2 GHG inventory
Atsushi Sato	GHG inventry (AFOLU)	3	2019/10/22	2019/10/30	Supporting the BUR2 GHG inventory
Takeshi Enoki	GHG inventry (general)	2	2019/11/27	2019/12/11	Supporting the BUR2 GHG inventory
Matthew Dudley	GHG inventry (IPPU)	3	2020/3/2	2020/3/11	F gases workshop

C. Equipment

The following equipment was purchased and used for conducting Project activities as originally planned. These were handed over to the counterpart after the Project completion.

Table 7 Purchased and used equipment

Equipment	Quantity
Desktop computer	1
Laptop computer	1
Printer	1
Windows software	2

1.2 Input by the PNG side

A. Experts

As described in section 6.2, eleven people were assigned as C/P members of the Project.

B. Working environment

The C/P provided access to working space and conference rooms with necessary equipment for JICA Project experts.

C. Project expenses

The C/P provided personnel expenses for the C/P members.

1.3 Activities

A. Project activities according to Plan of Operation

A summary of the Project activities and achievements are shown in the tables below.

For "Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced," all activities were implemented as planned for the two GHG inventories compiled through the JICA Project as shown in Table 8.

Table 8 Achievements of output 1 activities

1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Achieved. The capacity of CCDA and relevant parties involved were assessed through the national system review.
1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	Achieved. GHG improvement plans were developed based on the results of the national system review.
1.3: Draft/Update a workplan/ guidebook/ checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Achieved. A QA/QC plan was developed describing the relevant stakeholders, the inventory preparation process, the QC checks to be carried out by CCDA, and some QA possibilities for the GHG inventory.

1.4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Achieved. Memorandum of Understanding documents were prepared for the GHG inventory preparation and shared with all relevant stakeholders. In addition, terms of reference files were also drafted for the Energy Sub-Technical Working Committee.
1.5: Collect data necessary for national GHG inventories from relevant parties.	Achieved. Data for the 2000-2015 GHG inventory and 2000-2017 GHG inventories were collected.
1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Achieved. A GHG inventory estimation file system was developed for the 2000-2015 and 2000-2017 inventories.
1.7: Use 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Achieved. The national GHG inventory was developed for 2000-2015 and emissions for non AFOLU sectors were estimated for 2000-2017. These were done on spreadsheets rather than software, but databases designed so that data can be used as input data to an inventory software such as the IPCC software.
1.8: Compile national GHG inventories with time series consistency.	Achieved. same as above
1.9: Draft/Update technical document on procedures of inventory compilation and sector Quality Assurance/Quality Control (QA/QC) activities (to be part of NIR).	Achieved. A summary of the 2000-2015 GHG inventory was drafted and included as a chapter in PNG's BUR1. A detailed national inventory report for 2000-2017 was developed.

For "Output 2: Capacity to promote understanding of national GHG inventories is enhanced," the activities were implemented and achieved as shown in Table 9.

Table 9 Achievements of output 2 activities

2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Achieved. The inception workshop for the JICA Project was held to explain the reporting requirements under the UNFCCC, and an overview of GHG inventories.
2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Achieved. A consultation workshop to present the results of the BUR1 and an F gases workshop to initiate discussion on the methods and data needs were held. In addition, the Project supported the presentation on the methodology of the emission estimation for the energy sector for the Sub-Technical Working Committee.

For "Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)," all activities were implemented and achieved as shown in Table 10.

Table 10 Achievements of output 3 activities

3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Achieved. The JICA Project experts trained the CCDA counterparts on the fundamentals of the GHG inventory in addition to the technical elements of inventory preparation.
3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Achieved. The key category analysis was carried out for the 2000-2015 inventory along with a qualitative uncertainty assessment. For the 2000-2017 inventory, preparations for both were carried out for the non AFOLU sector categories.
3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).	Achieved. A simple consideration of country specific emission factors and parameters were conducted. In the case of the waste sector, some country specific data were used in place of default factors in the IPCC Guidelines.
3.4: Consider whether/how mitigation actions including Nationally Appropriate Mitigate Actions (NAMAs) can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Achieved. The link between GHG inventory improvement and mitigation actions or NDCs were carried out. In addition, the JICA Project experts supported CCDA in drafting the mitigation chapter of the BUR.
3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Achieved. The JICA Project experts prepared a power point presentation on the ICA process and the preparation for the ICA process.
3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Achieved. The BUR1 and BUR2 contain information on the necessary improvements of the inventory on the general national system aspects and technical aspects.
3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR (Biennial Update Report) /NC.	Achieved. The JICA Project experts supported the drafting of both the BUR1 and BUR2.

B. JCC meetings

The JCC meetings were held during the Project duration as shown in table below.

Table 11 Overview of JCC meetings

Meeting	Date	Participating Agency	Key Agenda
1st JCC	May 23, 2018	CCDA, PNG Forest Authority, PNG Power, Water PNG, Department of Petroleum and Energy, JICA	● To familiarize JCC members with the GHG inventory and the UNFCCC reporting requirements and guidelines ● To agree on the objectives, activities, timelines, and outputs of the JICA Project

2nd JCC	July 26, 2019	CCDA, Department of National Planning & Monitoring, Water PNG, Embassy of Japan, JICA	● To report to JCC members on the progress of the Project activities, specifically for the GHG inventory for the BUR2 ● To present the plan for strengthening the institutional arrangements to prepare GHG inventories in PNG
3rd JCC	March 10, 2021	CCDA, JICA	● To report to JCC members on the progress of the Project activities, specifically for the GHG inventory for the BUR2 ● To present the plan for the remainder of the Project duration
4th JCC	October 4, 2021	CCDA, Conservation and Environment Protection Authority	● Provide JCC members a comprehensive summary of the BUR2, specifically the GHG inventory and mitigation chapters. ● Reflect on the achievements and challenges of the Project ● Recommend ways to further strengthen the GHG inventory preparation capacity of PNG for the future.

C. Meetings with stakeholders and counterparts

Meetings with stakeholders and counterparts during the JICA Project members' mission in PNG are as shown in the table below.

Table 12 Meetings with counterparts and stakeholders

Year	Date	Schedule
2017	6 October	meeting on Energy and Waste sectors
	9 October	Kickoff meeting with CCDA, discussed ・Work Plan ・JCC/Workshop ・Equipment purchase and Excel training timing
	10 October	meeting on Industrial Processes and Product Use (IPPU), Agriculture and Land Use, Land-Use Change and Forestry (LULUCF) sectors
	11 October	Discussed about ・Work Plan ・Equipment purchase
	12 October	Courtesy call Department of Petroleum and Energy to explain Project
		Courtesy call CEPA to explain Project
	13 October	Courtesy call Department of Agriculture and Livestock to explain Project
		Courtesy call Water PNG to explain Project
	16 October	NCDC courtesy call to explain Project
		Discussed about PNGFA and Food, Agriculture Organization (FAO) on the treatment of AFOLU sector
	17 October	Wrap up with CCDA
		Meeting with JPRISM Experts on solid waste in Port Moresby and PNG
	4 December	Visit JICA Office to discuss progress
	6 December	kickoff workshop
2018	6 February	Group meeting to discuss timeline for BURs and NCs
		Meeting with Alfred
	12 February	Jacinta, waste preparation

Year	Date	Schedule
		Jason, energy fuel combustion
	13 February	Meeting with J Prism Project on solid waste
	15 February	Jason, IPCC Guidelines
		Wrap up with CCDA
	16 February	AFOLU meeting for IPCC guidelines lecture and data collection
	16 April	Meeting with CCDA for IPCC guidelines lecture and data collection
		CCDA for IPCC guidelines lecture and data collection
		Meeting with CCDA FAO meeting on progress of AFOLU sector emissions/removals estimate
	17 April	Group meeting for IPCC guidelines lecture and data collection
		Meeting with Alfred
	18 April	Meeting at CCDA for IPCC guidelines lecture and data collection
		Meeting at CCDA for IPCC guidelines lecture and data collection
	19 April	Meeting at CCDA for IPCC guidelines lecture and data collection
		Meeting at CCDA for IPCC guidelines lecture and data collection
	20 April	Meeting at CCDA for IPCC guidelines lecture and data collection
		Meeting at CCDA for IPCC guidelines lecture and data collection
	21 May	CCDA Meeting at Stanley for group work to finalize BUR
		CCDA Meeting at Stanley for group work to finalize BUR
	22 May	CCDA Meeting at Stanley for group work to finalize BUR
		CCDA Meeting at Stanley for group work to finalize BUR
	23 May	First JCC to present the Project overview, activities, expected results, etc.
	24 May	CCDA Meeting at Stanley for group work to finalize BUR
		CCDA Meeting at Stanley for group work to finalize BUR
	30 July	CCDA kickoff
	31 July	CCDA kickoff/Alfred
	1 August	group meeting to finalize first GHG inventory
	2 August	group meeting to finalize first GHG inventory
	3 August	group meeting to finalize first GHG inventory
	6 August	Jacinta Prescilla meeting (logistics)
		PNG JICA meeting to discuss progress Erick meeting to discuss solid waste methodology FOD
	7 August	Generalist review
		CCDA MD meeting
	17 August	Visit JICA Office to discuss progress
	21 August	Visit JICA Office to discuss progress
	27 September	group meeting to finalize BUR2 report
	28 September	group meeting to finalize BUR2 report
	1 October	Erick meeting on solid waste
		Jacinta meeting on IPPU
	2 October	Generalist review of BUR1 inventory
		CCDA MD meeting
	4 October	Consultation workshop to approve the BUR1
	5 October	Consultation workshop to approve the BUR1
	28 November	CCDA to prepare for consultation workshop
	29 November	CCDA to prepare for consultation workshop
		Grand Papua Hotel for consultation workshop
	30 November	CCDA prep
		Grand Papua Hotel for consultation workshop
	3 December	CCDA prep

Year	Date	Schedule
		Grand Papua Hotel for consultation workshop
	4 December	CCDA wrap up
2019	18 February	CCDA meeting planning for BUR2 GHG inventory
		Matthew
	19 February	CCDA meeting planning for BUR2 GHG inventory
	20 February	CCDA meeting planning for BUR2 GHG inventory
		Alfred meeting to discuss progress
	21 February	CCDA meeting planning for BUR2 GHG inventory
		HFC (Hydrofluorocarbon) consultants meeting
		JICA meeting to discuss progress
	22 February	Alfred meeting to discuss progress
		CEPA meeting on HFCs
	25 February	CCDA wrap up
	12 March	meeting with concerned government ministries（DPE）for fuel statistics
	13 March	meeting with concerned government ministries（NMSA）for fuel statistics
	14 March	meeting with concerned government ministries（CASA）for fuel statistics
	9 May	CCDA kickoff
	10 May	CCDA kickoff
		Erick waste, medical incineration
		Jacinta IPPU kickoff
	12 May	Erick waste, medical incineration
	13 May	Department of Health, medical incineration
		Meeting with Alfred to discuss progress
	14 May	Jason Energy Working Group ToR
		Jason private company on fugitive emissions in 2015
	15 May	CEPA on industrial permits
		NSO on industry statistics, population statistics
	16 May	Jacinta wrap up
		Jacinta preparation
	17 May	PNG Customs on import/export data for fuels and commodities for IPPU
		Erick wastewater meeting
	21 May	QA/QC Plan, Archiving/Documentation, data storage
		Private company on fugitive emissions in 2015 JICA
	22 May	Wrap up
	22 July	Alfred JCC
		Meeting with Mr.Shimizu of JICA
	24 July	CCDA
	26 July	2nd JCC to discuss progress and reporting of the BUR1 submission to the UNFCCC
	29 July	CCDA to discuss spreadsheet/data management
		CCDA to discuss spreadsheet/data management
		Alfred wrap up (follow up of JCC)
	30 July	PNG Power on Power industry fuel consumption statistics
		CCDA to discuss spreadsheet/data management
		CCDA to discuss spreadsheet/data management
	31 July	Water PNG wastewater data provision
		ICCC, energy sector. Fuel consumption statistics
		DoT, energy sector. Fuel consumption statistics
		REDD+ TA discussion

Year	Date	Schedule
	26 September	meeting with Eda Ranu for waste water
	10 October	kickoff
	11 October	kickoff
	15 October	DPE meeting on energy statistics
		Econoler meeting for follow up on F gas research paper
	16 October	Energy and IPPU sector meeting
		Energy and IPPU sector meeting
		CEPA meeting on F gases
	17 October	Energy and IPPU sector meeting
		Energy and IPPU sector meeting
		Jacinta wrap up
	18 October	Jason wrap up
	21 October	DPE meeting
	24 October	IPPU sector meeting, Alfred meeting
		IPPU sector meeting
	25 October	IPPU sector meeting
		IPPU sector meeting
	29 October	Visit JICA Office
2020	3 March	CCDA office. Preparatory meetings on workshop. Worked with Jason on his presentation.
	4 March	CCDA office. Review of workshop presentations. Meeting with Jacinta on 2006 IPCC Guidelines. Meeting with Alfred (GM).
	10 March	CCDA office. Finalize workshop report and sent to workshop participants for review. Meeting with Jacinta on homework.
		Meeting with PNG Refrigeration and air conditioning (RAC) in the afternoon.
2020 to 2021	March to September	Meetings with CCDA held weekly, biweekly via online meeting platforms to discuss BUR2 GHG inventory progress, mitigation chapter, progress, etc.

D. In country training

Initially, an in-country training was planned for CCDA and relevant stakeholders to visit the relevant Ministries and Agencies in Japan to learn about the GHG inventory preparation process and the institutional arrangements in place. However, as preparation of the BUR1, which initially was planned for submission before the JICA Project launching, had faced several delays, the CCDA and JICA Project experts agreed that they prioritize the available time to work on the BUR1 GHG inventory.

E. Out of country training

BURs submitted to the UNFCCC by developing countries is subject to a process called International Consultation and Analysis (ICA). As part of this process, a public presentation and question-and-answer session called Facilitative Sharing of Views (FSV) is held. The FSV is also related to improving the quality of the GHG inventory and contributes to the achievement of the results of this Project. Therefore, JICA was originally planning to conduct a third-country training program in one of the countries where JICA implemented the GHG inventory capacity enhancement projects (Vietnam, Indonesia, Mongolia), but

instead, JICA planned to send a CCDA inventory staff to the FSV to give a presentation on GHG inventory, mitigation actions, support needs, etc. shown in BUR1. Regarding changes to third country training, both sides agreed and confirmed it in minutes of meeting.

The FSV for PNG's first BUR submitted in April 2019 was to be held at Conference of the Parties (COP) in Chile in December 2019, but due to the COVID-19, it was held remotely on November 24, 2020. Therefore, the CCDA staff was not dispatched overseas. JICA project experts supported the creation of FSV presentations for the CCDA, prepared potential question and answers, and conducted question-and-answer simulations with the staff.

2. Achievements of the Project

2.1 Outputs and indicators

A. Output 1

Three objectively verifiable indicators were set for Output 1: 1-1) General inventory compilation procedure (work plan) is documented; 1-2) Data for national GHG inventories are collected, archived and maintained; and 1-3) Technical document on procedures of inventory compilation is drafted. The means for verification were as the following: 1-1) Work plan; 1-2) Set of databases/spread sheet files for national GHG inventories; 1-3) National GHG inventory report. The level of achievement of the three indicators is high, especially for the second GHG inventory.

The indicators were completed twice for the two GHG inventories compiled by the Project as described below.

Work plan

Two work plans were drafted in the course of the Project, one for each GHG inventory. The first workplan was drafted before inception of the Project under the assumption that the first BUR was completed in 2017 (see Figure 3). However, as the first BUR preparation process was still ongoing at the inception of the Project, the JICA Project experts and CCDA prioritized the completion of the inventory which was in progress.

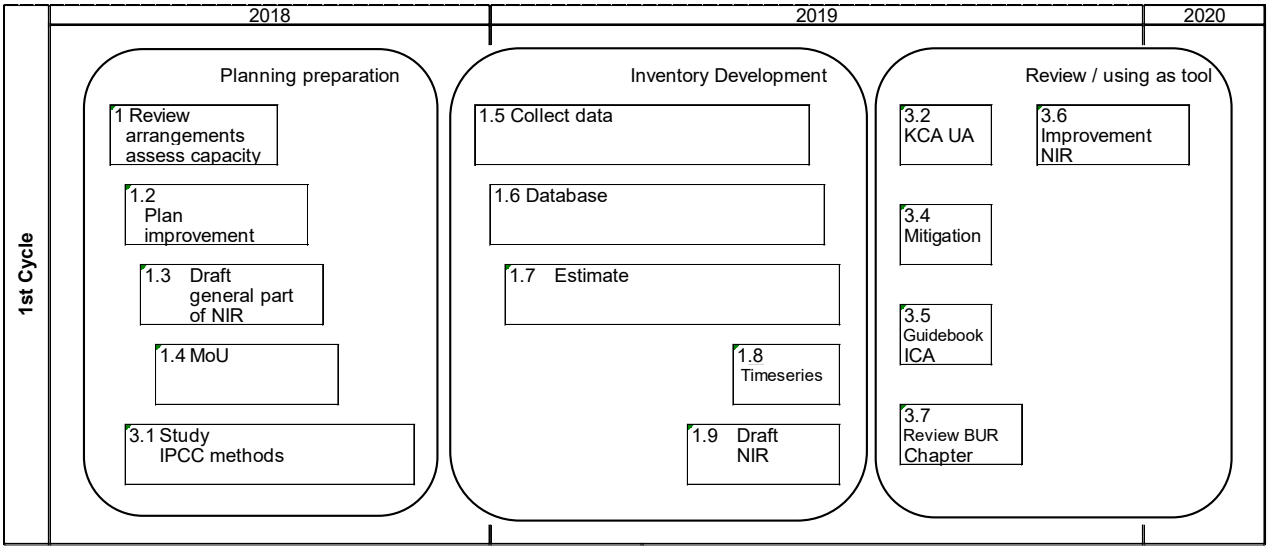

Figure 3 Original workplan for the 1st GHG inventory cycle

The second workplan was prepared by each CCDA sector expert with the support of JICA Project experts. The sector workplans were based on the results of the review of the BUR1 GHG inventory completed in the summer of 2018. Excerpt of the plans is shown in the following tables.

Table 13 Workplan for the second GHG inventory (Energy sector)

Data provider	Request data	Category	TACCC	Priority	Purpose	Schedule
PNG Power	Energy consumption data in energy industries. In addition, Country specific Calorific Values and carbon content	1A1 Energy Industries category.	Completeness and Accuracy	medium	Activity Data for Energy Industry and Emission Factor for fuel combustion.	OCTOBER/November, 2018
Independent Consumer and Competition Commission	Energy consumption data in energy industries especially for IPPs.	1A1 Energy Industries category.	Completeness and Accuracy	medium	Activity Data for Energy Industry .	OCTOBER/November, 2018
Chamber of Mines and Petroleum (Check for list of companies operating in PNG)	Energy consumtion data in Mining and Petoleum category and by fuel type. Check for country specific EF for fugitives. In addtion Calorific Values and carbon content for Oil and Gas produced in the country	1A1b Petroleum Refining. 1A1cii Other Energy Industries, 1A2i Mining and Quarrying, 1B2 Oil and Natural Gas	Completeness and Accuracy	High	Activity data for Petroleum Refining, Other Energy Industries, Mining and Quarrying and fugitive emissions from Oil and Natural Gas. Emission Factors from fugitive emission from Oil and Natural Gas and fuel combustion	OCTOBER/November, 2018
Industry and Construction Associations (check if there is)	Energy consumption data in Industry and Construction caterogy and by fuel type	1A2 Manufacturing Industry and Construction category	Completeness and Accuracy	medium	Activity data for Manufacturing Industry and Construction	February/March, 2019
Conservation and Environment Protection Authority (CEPA)	Energy consumption data in Industry and Construction caterogy and by fuel type	1A2 Manufacturing Industry and Construction category	Completeness and Accuracy	High	Activity data for Manufacturing Industry and Construction	OCTOBER/November, 2018
Department of Transport (Check what data they have)	Energy consumption data by the transport category	1A3 Transport Category	Completeness and Accuracy	High	Activity data for the Transport (Land, Aviation, Marine) Category	OCTOBER/November, 2018
Airline Companies (still need clarification of which companies/association)	Total Fuel consumption from civil aviation. Then the fuel consumtion by aircraft type number of LTOs by aircraft type	1A3a Civil Aviation category	Completeness and Accuracy	medium	Activity data for Aviation category	February/March, 2019

Table 14 Workplan for the second GHG inventory (IPPU sector)

ID	Data provider	Request data	Category	TACCC	Priority	Purpose	Schedule
2A Mineral Industry	1) Customs; 2) National Statistics Office; 3) Industry associations.	Quantity of carbonates (by type) used in domestic lime production process by type (high calcium, dolomite, hydraulic)	2A2 Lime production	Completeness	High	The purpose is to confirm the occurrence of the activity, and then to obtain activity data.	Oct-18
	1) Customs; 2) National Statistics Office; 3) Industry associations.	Quantity of glass as feedstock (by type of glass) used in PNG to manufacture glass	2A3 Glass production	Completeness	High	The purpose is to confirm the occurrence of the activity, and then to obtain activity data (ie.e quantity of glass as feedstock).	Oct-18
	1) Customs; 2) National Statistics Office; 3) Industry associations.	Quantity of soda ash used in other process uses of carbonates	2A4 Other process uses of carbonates	Completeness	High	Need to confirm if soda ash is imported in PNG and w here it is being used (i.e. glass production; paper and pulp; soap and detergents; solvents; etc).	Oct-18
	1) Customs; 2) National Statistics Office; 3) Industry associations.	Quantity of magnesia produced	2A4c Non Metallurgical Magnesia Production	Completeness	High	Need to confirm if there is production domestically to determine for emission reporting	Oct-18

Table 15 Workplan for the second GHG inventory (Waste sector)

Data provider	Request data	Category	TACCC	Priority	Purpose	Schedule
NCDC	Amount of waste goes to SWDS in POM from 1950 to 2017	Solid waste disposal	Accuracy	Medium	Activity data for Solid Waste Disposal Site (to update current estimation method)	October/ November, 2018
	Waste composition data in POM from 1950 to 2017	Solid waste disposal	Accuracy	Medium	Activity data for Solid Waste Disposal Site (to update current estimation method)	
	Waste generation ratio in POM from 1950 to 2017	Solid waste disposal	Accuracy	Medium	To estimate amount of generated waste by using population data in POM and waste generation ratio	
	Waste generation ratio in provinces from 1950 to 2017	Solid waste disposal	Accuracy	Medium	To estimate amount of generated waste by using population data in provinces and waste generation ratio	
	Waste treatment method in POM from 1950 to 2017	Solid waste disposal Biological treatment	Accuracy	Medium	To estimate amount of waste which goes to SWDS or other methods	
	Type of SWDS in POM from 1950 to 2017	Solid waste disposal	Accuracy	Medium	To apply appropriate MCF value	
	amount of industrial solid waste goes to SWDS	Solid waste disposal	Completeness	High	Activity data for Solid Waste Disposal Site	
	amount of industrial waste water	Wastewater treatment and discharge	Completeness	High	Activity data for industrial wastewater treatment and discharge	
	Inlet industrial wastewater concentration	Wastewater treatment and discharge	Completeness	High	Activity data for industrial wastewater treatment and discharge	
Town Authorities (22 provinces)	Amount of waste goes to SWDS in provinces from 1950 to 2017	Solid waste disposal	Accuracy	Medium	Activity data for Solid Waste Disposal Site (to update current estimation method)	November & December, 2018
	Waste composition data in provinces from 1950 to 2017	Solid waste disposal	Accuracy	Medium	Activity data for Solid Waste Disposal Site (to update current estimation method)	
	Waste generation ratio in provinces from 1950 to 2017	Solid waste disposal	Accuracy	Medium	To estimate amount of generated waste by using population data in provinces and waste generation ratio	
	Waste treatment method in provinces from 1950 to 2017	Solid waste disposal Biological treatment	Accuracy	Medium	To estimate amount of waste which goes to SWDS or other methods	
	Type of SWDS in provinces from 1950 to 2017	Solid waste disposal	Accuracy	Medium	To apply appropriate MCF value	
National Statistical Office	Population data by region from 1950 to 2017	Solid waste disposal	Accuracy	High	To estimate amount of generated waste by using population data in POM and provinces and waste generation ratio	October/ November, 2018
Water PNG	amount of industrial waste water	Wastewater treatment and discharge	Completeness	High	Activity data for industrial wastewater treatment and discharge	October, 2018
	Inlet industrial wastewater concentration	Wastewater treatment and discharge	Completeness	High	Activity data for industrial wastewater treatment and discharge	
	ratio for wastewater treatment system in Port Moresby	Wastewater treatment and discharge	Accuracy	High	To apply appropriate important parameter of "Wastewater treatment system"	
	ratio for wastewater treatment system in provinces	Wastewater treatment and discharge	Accuracy	High		

Databases/spreadsheet files for national GHG inventories

A series of spreadsheet files were developed for each GHG inventory. The first set of estimation files were based on existing files prepared by CCDA. The first set of files were prepared by sector experts without a consistent approach and lacked some quality control checks in the files.

The second set, developed by the JICA Project experts and CCDA, improved the consistency between sectors, introduced a hierarch of files, and improved the user friendliness of the files so that any new expert could update the files with minimal support in case there was turnover in staff.

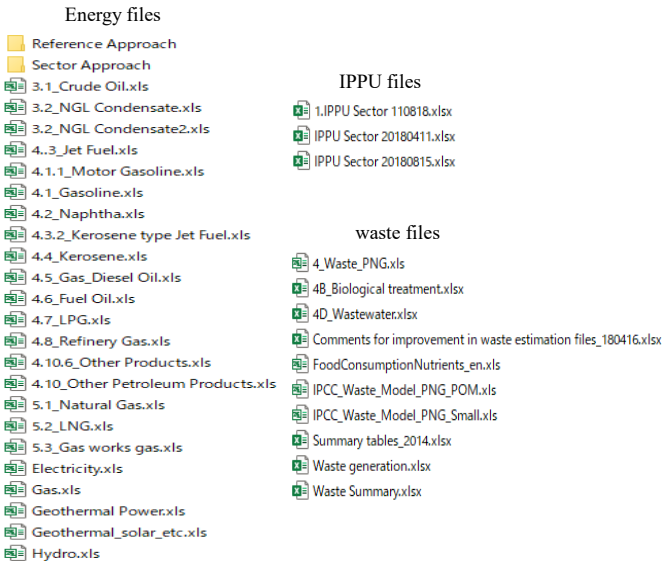

Figure 4 GHG inventory estimation files for first set of GHG inventory files

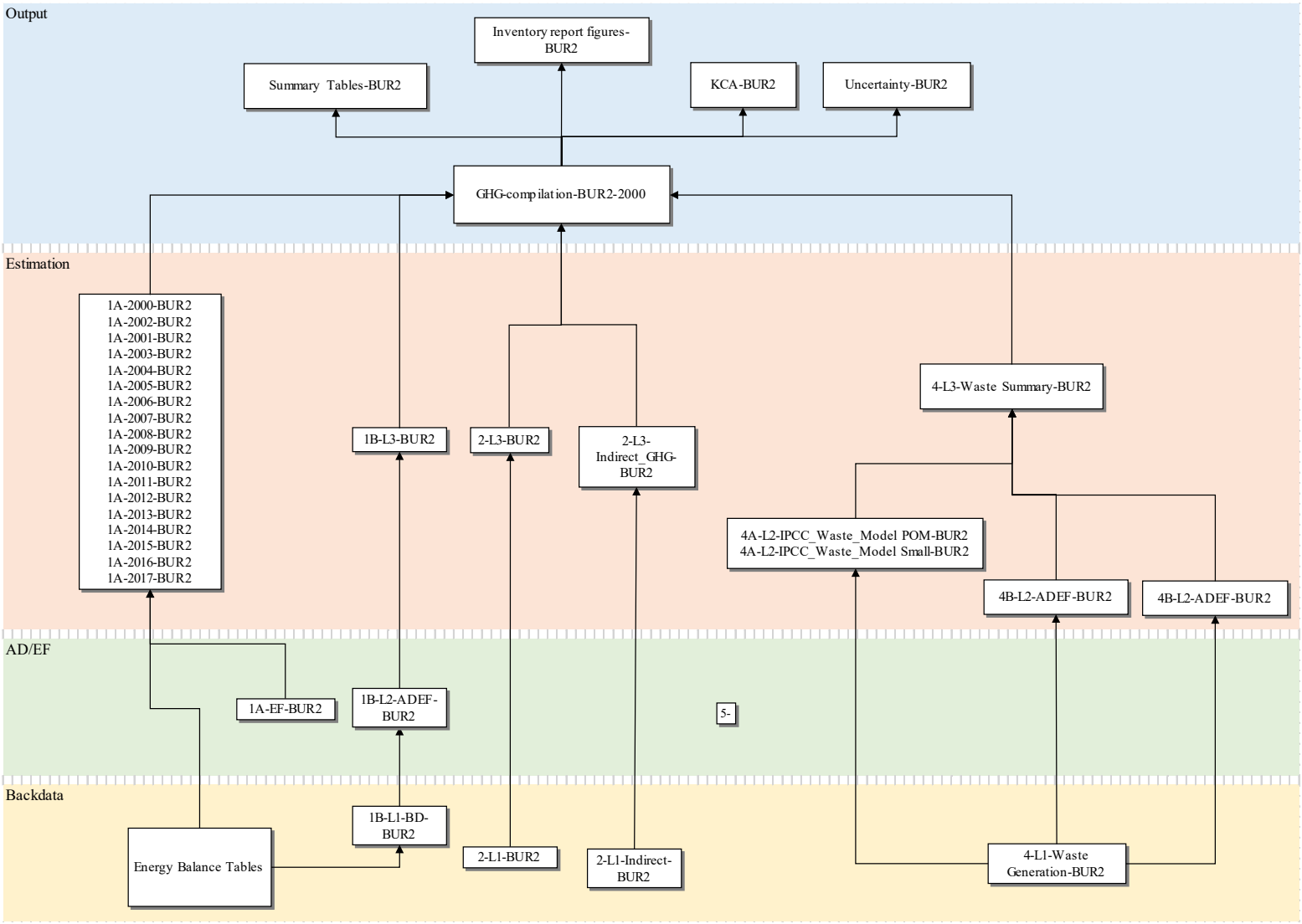

Figure 5 GHG inventory file system for the second GHG inventory

National GHG inventory report

Two GHG inventory reports were prepared by CCDA and the JICA Project experts. Due to the time constraints of the first GHG inventory, the CCDA and JICA Project experts drafted an overview inventory report which was also chapter part of the BUR1. The report described the overall trends of emission and removals, general methodology, followed by some sector specific information on methods, data sources, emission/removal results, and necessary improvements.

The second GHG inventory report, drafted by the CCDA and JICA Project experts together, go into more detail, describing the emission/sink category, methods, data used, results, the improvements made, and necessary improvements for the future. This inventory report not only describes the GHG inventory but will serve as a manual for future inventory compilers in PNG. A synthesis of the second inventory report will be the GHG inventory chapter of the BUR2. In addition to the national inventory report, the CCDA and JICA Project experts drafted a QA/QC Plan for PNG, which describes the inventory preparation processes, the stakeholders and expected roles and responsibilities, in addition to technical information on how to carry out the key category assessment and the uncertainty analysis. These documents are not required under the current Measurable, Reportable, Verifiable (MRV) Framework, but is a requirement under the Enhanced transparency framework (ETF) under the Paris Agreement.

B. Output 2

One objectively verifiable indicator was set for Output 2: 2-1) The average level of understanding of workshops: 70% or above. The means for verification were as the following: 2-1) results of the questionnaire. The level of achievement of the indicator is high.

The JICA Project expert team conducted an online questionnaire to the participants to evaluate the three of its workshops, the inception workshop, the consultation workshop, and the workshop on fluorinated substitutes for ozone depleting substances. The overall rating of the workshops by participants was high for the inception workshop which provided background information on the UNFCCC, the GHG inventory, and requirements for preparing GHG inventories. In the consultation workshop, which presented the results of the BUR1, all participants replied that the workshop met expectations, and the level of satisfaction for the individual sessions were well over 75%. For the workshop on the F gases, the overall satisfaction rate was 67% but each of the sessions in the workshop were rated above 80%.

The inception workshop

A half day inception workshop for the Project was held in December 2017. A questionnaire was handed out to the participants at the end of the workshop asking the following questions:

- How would you rate this training workshop?
- How satisfied were you with these sessions?
- How useful/relevant were the individual sessions for your work?

The level of understanding/satisfaction of each of the sessions is shown in the figure below.

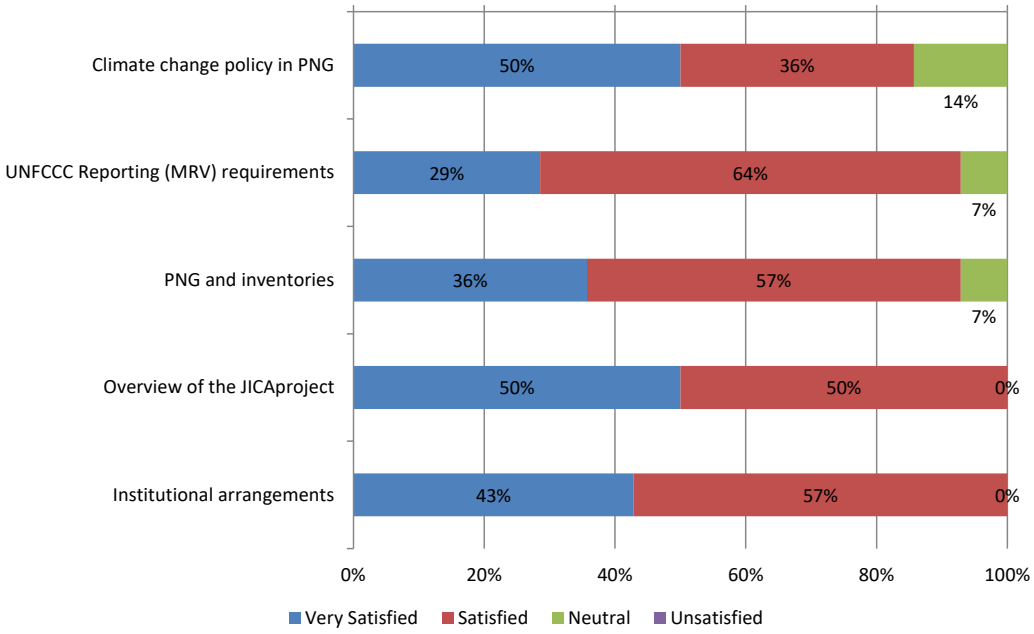

Figure 6 Level of satisfaction of each session

Assuming that the level of satisfaction reflects the level of understanding of the workshop, most participants had a good level of understanding of the workshop. Specifically, 86% of participants were either very satisfied or satisfied with the "climate change policy in PNG" session, 93% very satisfied or satisfied with the "UNFCCC Reporting (MRV) requirements" and "PNG and inventories" sessions, and 100% for "Overview of the JICA Project" and "Institutional arrangements" sessions. Details of the questionnaire are included in Annex I: inception workshop report.

Consultation workshop

A consultation workshop for the Project was held in October 2018 to verify the results of the BUR1. The JICA Project expert team conducted an online questionnaire to the participants to evaluate the consultation workshop, specifically asking the following questions:

- How would you rate this workshop?
- How satisfied were you with each of the 5 sessions?

All participants responded to the first question that the workshop met expectations.

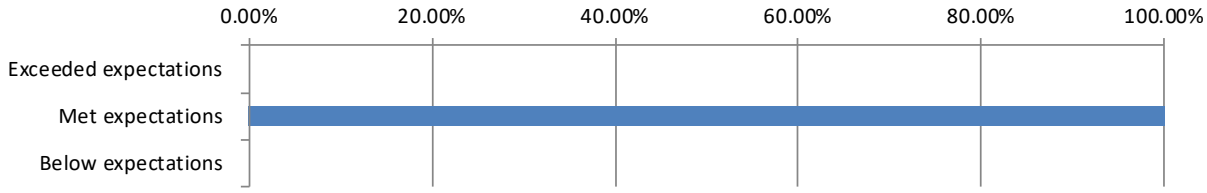

Figure 7 Overall level of satisfaction of the consultation workshop

Assuming that the level of satisfaction reflects the level of understanding of the workshop, most participants had a good level of understanding of the workshop. Specifically, 92% of participants were

either very satisfied or satisfied with the "national circumstances of PNG" session, 100% were very satisfied or satisfied with the "GHG inventories," 83% were very satisfied or satisfied with "mitigation actions" sessions, and 100% for "support" session. The level of understanding/satisfaction of each of the sessions is shown in the figure below.

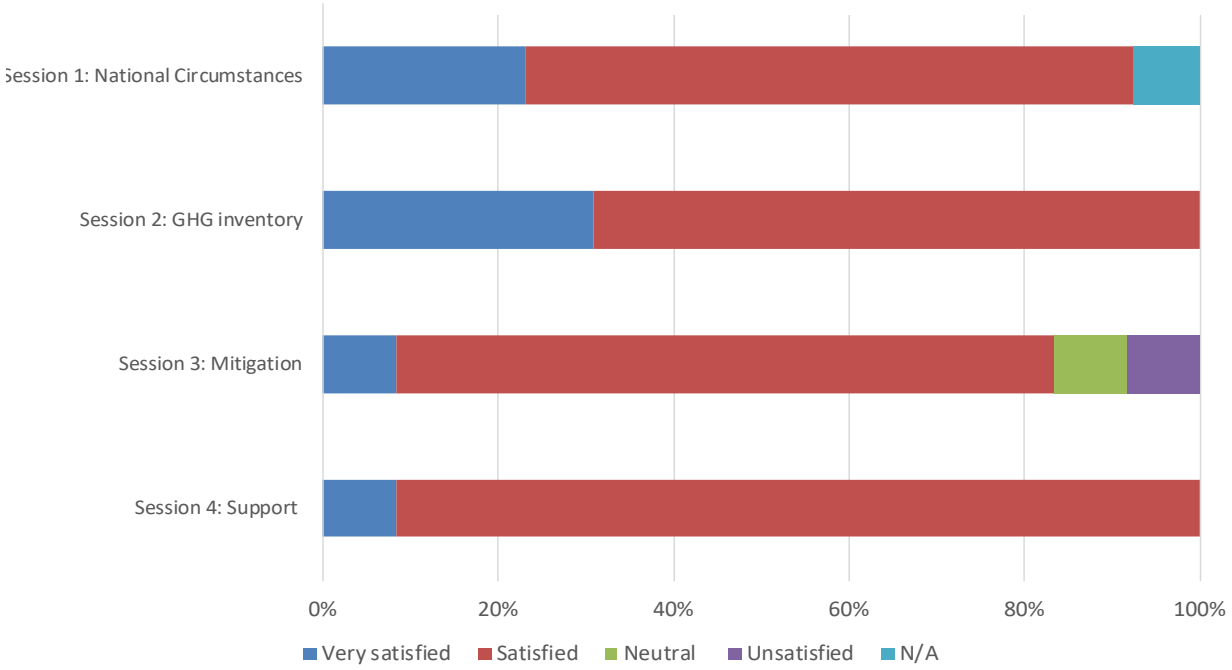

Figure 8 Level of satisfaction of each session

The workshop on F gases

The JICA Project held an F gases workshop in March 2020. The JICA Project expert team conducted an online questionnaire to the participants to evaluate the workshop on fluorinated substitutes for ozone depleting substances, specifically asking the following questions:

- How would you rate this workshop?
- How satisfied were you with each of the 5 sessions?

Out of the thirteen participants, six responded to the questionnaire. Assuming that the level of satisfaction reflects the level of understanding of the workshop, only 67% of participants had a good level of understanding of the workshop.

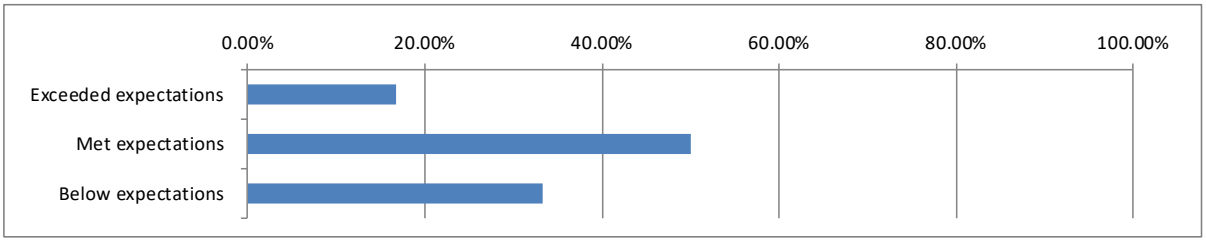

Figure 9 Level of satisfaction of the workshop

However, the level of understanding of the specific sessions were high. Specifically, 100% of participants were either very satisfied or satisfied with the "UNFCCC reporting obligations" session, 83% were very satisfied or satisfied with the other three sessions. The level of understanding/satisfaction of each of the sessions is shown in the figure below.

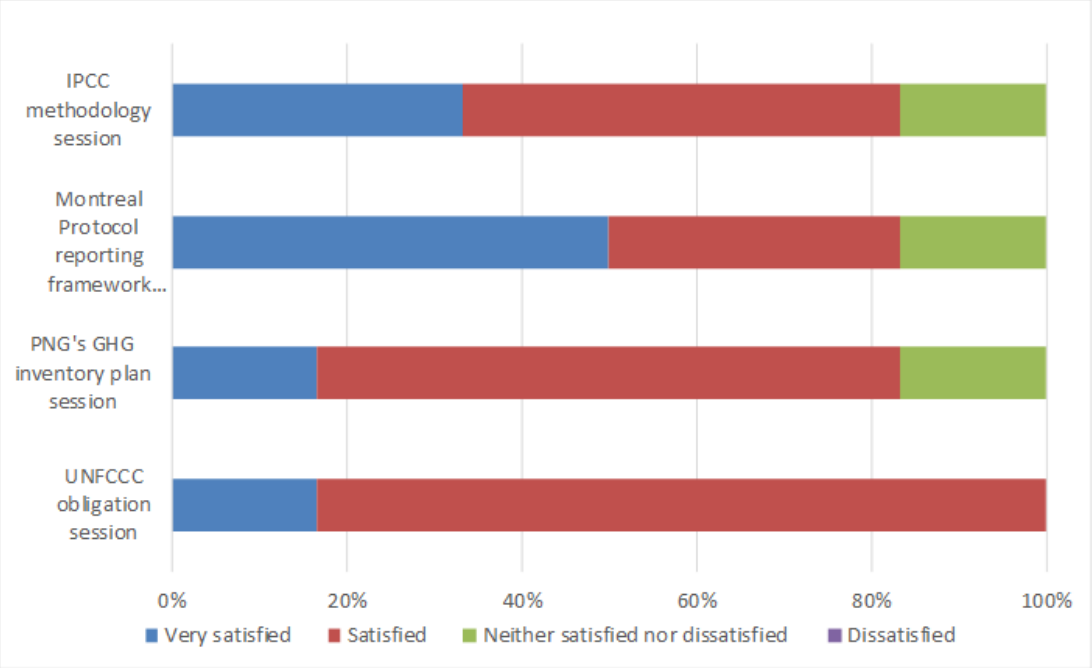

Figure 10 Level of satisfaction of each session of the workshop

C. Output 3

The objectively verifiable indicators set for Output 3 are the following: 3-1) Results of key category analysis and uncertainty assessment are documented; and 3-2) Improvements made and necessary improvements for the future are documented. The national GHG inventory report has been identified as a means of verification. The level of achievement of the indicator is moderately high.

As described in section A above, the national inventory report was drafted for both GHG inventories.

Key category analysis and uncertainty analysis

A full key category analysis was conducted for the first GHG inventory. The assessment was carried out in accordance with the 2006 IPCC Guidelines for with and without the LULUCF sector. The results of the first key category analysis for the year 2015 is shown in Table 16 and Table 17 below.

Table 16 Key category assessment results without LULUCF

crf code	category name	gas	2015 emissions	absolute value of 2015 emissions	Level assessment	cumulative total
1.A.1:	1A1 Energy Industries	CO2	4,119.87	4,119.87	30.57%	30.57%
1.B.2.b.iii.2	Gas Production	CH4	2,394.52	2,394.52	17.77%	48.34%
1.A.3	1A3 Transport	CO2	1,937.59	1,937.59	14.38%	62.71%
1.A.2:	1A2 Manufacturing Industries and Construction	CO2	1,444.99	1,444.99	10.72%	73.44%
1.B.2.a.iii2	Production and Upgrading	CH4	555.61	555.61	4.12%	77.56%
4D	Wastewater Treatment and Discharge	CH4	487.68	487.68	3.62%	81.18%
1.A.4:	1A4 Other Sectors	CO2	456.73	456.73	3.39%	84.57%
3C4	Direct N2O Emissions from Managed Soils	N2O	411.00	411.00	3.05%	87.62%
1.B.2.b.iii.5	Gas Distribution	CH4	353.58	353.58	2.62%	90.24%
4A	Solid Waste Disposal	CH4	250.26	250.26	1.86%	92.10%
3A1	Enteric Fermentation	CH_4	168.30	168.30	1.25%	93.35%
1.B.2.b.iii.3	Gas Processing	CH4	155.18	155.18	1.15%	94.50%
3A2	Manure Management	CH_4	144.83	144.83	1.07%	95.57%
1.B.2.b.iii.4	Total Gas Transmission and Storage	CH4	131.06	131.06	0.97%	96.54%
4D	Wastewater Treatment and Discharge	N2O	128.21	128.21	0.95%	97.50%
1.B.2.b.i	Gas Venting	CH4	77.00	77.00	0.57%	98.07%
1.B.2.a.ii	Oil Flaring	CO2	42.77	42.77	0.32%	98.38%
3C5	Indirect N2O Emissions from Managed Soils	N2O	41.96	41.96	0.31%	98.70%
1.B.2.b.ii	Gas Flaring	CO2	33.21	33.21	0.25%	98.94%
1.A.3	1A3 Transport	N2O	27.61	27.61	0.20%	99.15%
1.B.2.b.iii.3	Gas Processing	CO2	20.11	20.11	0.15%	99.30%
3A2	Manure Management	N2O	18.99	18.99	0.14%	99.44%
1.A.2	1A2 Manufacturing Industries and Construction	N2O	17.85	17.85	0.13%	99.57%
1.B.2.a.i	Oil Venting	CH4	15.83	15.83	0.12%	99.69%
3C6	Indirect N2O Emissions from Manure Management	N2O	8.69	8.69	0.06%	99.75%
1.A.1	1A1 Energy Industries	N2O	6.09	6.09	0.05%	99.80%
1.A.3	1A3 Transport	CH4	5.06	5.06	0.04%	99.83%
4B	Biological Treatment of Solid Waste	N2O	3.31	3.31	0.02%	99.86%
4B	Biological Treatment of Solid Waste	CH4	2.99	2.99	0.02%	99.88%
1.A.1:	1A1 Energy Industries	CH4	2.45	2.45	0.02%	99.90%
1.B.2.a.iii2	Production and Upgrading	CO2	1.90	1.90	0.01%	99.91%
3C1	Biomass Burning	CH_4	1.46	1.46	0.01%	99.92%
2D1	Lubricants Use	CO2	1.40	1.40	0.01%	99.94%
1.A.4:	1A4 Other Sectors	CH4	1.30	1.30	0.01%	99.94%
1.A.2:	1A2 Manufacturing Industries and Construction	CH4	1.21	1.21	0.01%	99.95%
1.A.4	1A4 Other Sectors	N2O	1.14	1.14	0.01%	99.96%
1.B.2.b.iii.2	Gas Production	CO2	0.91	0.91	0.01%	99.97%
1.B.2.b.iii.5	Gas Distribution	CO2	0.89	0.89	0.01%	99.98%
2G3	N20 From Medical Use	N2O	0.80	0.80	0.01%	99.98%
3C1	Biomass Burning	N2O	0.71	0.71	0.01%	99.99%
1.B.2.a.ii	Oil Flaring	CH4	0.55	0.55	0.00%	99.99%
1.B.2.b.ii	Gas Flaring	CH4	0.45	0.45	0.00%	99.99%
1.B.2.a.ii	Oil Flaring	N2O	0.21	0.21	0.00%	100.00%
1.B.2.a.iii.3	Oil Transport	CH4	0.18	0.18	0.00%	100.00%
1.B.2.b.ii	Gas Flaring	N2O	0.16	0.16	0.00%	100.00%
1.B.2.a.i	Oil Venting	CO2	0.10	0.10	0.00%	100.00%
1.B.2.a.iii.3	Oil Transport	CO2	0.09	0.09	0.00%	100.00%
1.B.2.b.i	Gas Venting	CO2	0.05	0.05	0.00%	100.00%
1.B.2.b.iii.4	Total Gas Transmission and Storage	CO2	0.01	0.01	0.00%	100.00%
1.B.2.a.i	Oil Venting	N2O	0.00	0.00	0.00%	100.00%
1.B.2.a.iii2	Production and Upgrading	N2O	0.00	0.00	0.00%	100.00%
1.B.2.a.iii.3	Oil Transport	N2O	0.00	0.00	0.00%	100.00%
1.B.2.b.i	Gas Venting	N2O	0.00	0.00	0.00%	100.00%
1.B.2.b.iii.2	Gas Production	N2O	0.00	0.00	0.00%	100.00%
1.B.2.b.iii.3	Gas Processing	N2O	0.00	0.00	0.00%	100.00%
1.B.2.b.iii.4	Total Gas Transmission and Storage	N2O	0.00	0.00	0.00%	100.00%
1.B.2.b.iii.5	Gas Distribution	N2O	0.00	0.00	0.00%	100.00%

Table 17 Key category assessment results with LULUCF

crf code	category name	gas	2015 emissions	absolute value of 2015 emissions	Level assessment	cumulative total
3B2	Cropland	CO2	12,648	12,647.58	32.510%	32.510%
3B1	Forest land	CO2	-11,855	11,855.41	30.473%	62.983%
1.A.1:	1A1 Energy Industries	CO2	4,120	4,119.9	10.590%	73.573%
1.B.2.b.iii.2	Gas Production	CH4	2,395	2,394.5	6.155%	79.728%
1.A.3	1A3 Transport	CO2	1,938	1,937.6	4.980%	84.708%
1.A.2:	1A2 Manufacturing Industries and Construction	CO2	1,445	1,445.0	3.714%	88.422%
1.B.2.a.iii2	Production and Upgrading	CH4	556	555.6	1.428%	89.851%
4D	Wastewater Treatment and Discharge	CH4	488	487.68	1.254%	91.104%
1.A.4:	1A4 Other Sectors	CO2	457	456.7	1.174%	92.278%
3C4	Direct N2O Emissions from Managed Soils	N2O	411	411.0	1.056%	93.335%
3C1	Biomass burning - FL	CH4	395	394.89	1.015%	94.350%
1.B.2.b.iii.5	Gas Distribution	CH4	354	353.6	0.909%	95.258%
3B3	Grassland	CO2	323	323.36	0.831%	96.090%
4A	Solid Waste Disposal	CH4	250	250.26	0.643%	96.733%
3C1	Biomass burning - FL	N2O	171	171.45	0.441%	97.174%
3A1	Enteric Fermentation	CH_4	168	168.3	0.433%	97.606%
1.B.2.b.iii.3	Gas Processing	CH4	155	155.2	0.399%	98.005%
3A2	Manure Management	CH_4	145	144.8	0.372%	98.377%
1.B.2.b.iii.4	Total Gas Transmission and Storage	CH4	131	131.1	0.337%	98.714%
4D	Wastewater Treatment and Discharge	N2O	128	128.21	0.330%	99.044%
1.B.2.b.i	Gas Venting	CH4	77	77.0	0.198%	99.242%
1.B.2.a.ii	Oil Flaring	CO2	43	42.8	0.110%	99.352%
3C5	Indirect N2O Emissions from Managed Soils	N2O	42	41.96	0.108%	99.459%
3B5	Settlements	CO2	35	34.59	0.089%	99.548%
1.B.2.b.ii	Gas Flaring	CO2	33	33.2	0.085%	99.634%
1.A.3	1A3 Transport	N2O	28	27.6	0.071%	99.705%
1.B.2.b.iii.3	Gas Processing	CO2	20	20.1	0.052%	99.756%
3A2	Manure Management	N2O	19	19.0	0.049%	99.805%
1.A.2	1A2 Manufacturing Industries and Construction	N2O	18	17.8	0.046%	99.851%
1.B.2.a.i	Oil Venting	CH4	16	15.8	0.041%	99.892%
3C6	Indirect N2O Emissions from Manure Management	N2O	9	8.69	0.022%	99.914%
1.A.1	1A1 Energy Industries	N2O	6	6.1	0.016%	99.930%
1.A.3	1A3 Transport	CH4	5	5.1	0.013%	99.943%
4B	Biological Treatment of Solid Waste	N2O	3	3.31	0.008%	99.951%
4B	Biological Treatment of Solid Waste	CH4	3	2.99	0.008%	99.959%
1.A.1:	1A1 Energy Industries	CH4	2	2.5	0.006%	99.965%
1.B.2.a.iii2	Production and Upgrading	CO2	2	1.9	0.005%	99.970%
3C1	Biomass Burning	CH_4	1	1.5	0.004%	99.974%
2D1	Lubricants Use	CO2	1	1.4	0.004%	99.978%
1.A.4:	1A4 Other Sectors	CH4	1	1.3	0.003%	99.981%
1.A.2:	1A2 Manufacturing Industries and Construction	CH4	1	1.2	0.003%	99.984%
1.A.4	1A4 Other Sectors	N2O	1	1.1	0.003%	99.987%
1.B.2.b.iii.2	Gas Production	CO2	1	0.9	0.002%	99.989%
1.B.2.b.iii.5	Gas Distribution	CO2	1	0.9	0.002%	99.992%
2G3	N20 From Medical Use	N2O	1	0.8	0.002%	99.994%
3C1	Biomass Burning	N2O	1	0.7	0.002%	99.995%
1.B.2.a.ii	Oil Flaring	CH4	1	0.5	0.001%	99.997%
1.B.2.b.ii	Gas Flaring	CH4	0	0.4	0.001%	99.998%
1.B.2.a.ii	Oil Flaring	N2O	0	0.2	0.001%	99.998%
1.B.2.a.iii.3	Oil Transport	CH4	0	0.2	0.000%	99.999%
1.B.2.b.ii	Gas Flaring	N2O	0	0.2	0.000%	99.999%
1.B.2.a.i	Oil Venting	CO2	0	0.1	0.000%	100.000%
1.B.2.a.iii.3	Oil Transport	CO2	0	0.1	0.000%	100.000%
1.B.2.b.i	Gas Venting	CO2	0	0.0	0.000%	100.000%
1.B.2.b.iii.4	Total Gas Transmission and Storage	CO2	0	0.0	0.000%	100.000%
1.B.2.a.i	Oil Venting	N2O	0	0.0	0.000%	100.000%
1.B.2.a.iii2	Production and Upgrading	N2O	0	0.0	0.000%	100.000%
1.B.2.a.iii.3	Oil Transport	N2O	0	0.0	0.000%	100.000%
1.B.2.b.i	Gas Venting	N2O	0	0.0	0.000%	100.000%
1.B.2.b.iii.2	Gas Production	N2O	0	0.0	0.000%	100.000%
1.B.2.b.iii.3	Gas Processing	N2O	0	0.0	0.000%	100.000%
1.B.2.b.iii.4	Total Gas Transmission and Storage	N2O	0	0.0	0.000%	100.000%
1.B.2.b.iii.5	Gas Distribution	N2O	0	0.0	0.000%	100.000%
3B4	Wetlands	CO2	0	0.00	0.000%	100.000%
3B6	Other land	CO2	0	0.00	0.000%	100.000%
3D1	HWP	CO2	0	0.00	0.000%	100.000%
3C1	Biomass burning - GL	CH4	0	0.00	0.000%	100.000%
3C1	Biomass burning - crop residue	CH4	0	0.00	0.000%	100.000%
3C1	Biomass burning - GL	N2O	0	0.00	0.000%	100.000%

For the uncertainty analysis, only a qualitative discussion was made in the BUR1 GHG inventory process. The main cause of uncertainty in the PNG inventory is due to the lack of data, in particular activity

data for all sectors. As an example, there is no official energy statistics in PNG, therefore the CCDA and JICA Project experts used the energy balance table compiled by the APEC as the activity data in the energy sector emissions.

A qualitative uncertainty analysis was conducted for categories in the energy, IPPU, and waste sectors for the BUR2 GHG inventory. The key category assessment and the uncertainty analysis will be carried out in full by CCDA for the BUR2 GHG inventory when the AFOLU sectors are complete. As of October 4, 2021, the AFOLU estimates are still being carried out by CCDA, PNG FA with the support of other stakeholders.

Improvements made and improvements for the future

The improvements made and improvements for the future were drafted for both GHG inventories. For the first inventory, the information was summarized by sector, and for the second GHG inventory, the information is presented by category.

Table 18 Summary of improvements made and necessary improvements for the future

Energy	The Second National Communication (OCCD, 2015) aggregated emission estimates for the energy sector that were based on fuel import statistics, but not disaggregated into categories. Further, estimates were only made for the year 2000. BUR1 has made significant improvements in the coverage of categories and years in the estimate of energy sector emissions, primarily based on improved energy consumption data from the APERC that includes all years between 2000 and 2015. However, the lack of a national energy balance table, inability to disaggregate some data into categories; and lack of country specific emission factors are general challenges for the future.
IPPU	It has been reported in the SNC that the most important category from the IPPU sector was CO_2 from cement production. However, from data collection exercises for the BUR1, the CCDA discovered that clinker is not produced in PNG but it is being imported. Therefore, in accordance with the 2006 IPCC Guidelines, emission from cement production was not estimated. The category is now reported as NO. The two categories (Lubricant use and N_2O medical use) estimated for the BUR1 were not included in the SNC. All emissions have not been estimated for all categories except those that are not occurring in PNG or are not estimated due to data limitations.
Agriculture	Some emitting categories not reported before have been considered for the estimation and others improved (managed soils, burning crop residues and rice cultivation) and the whole time series from 2000 to 2015 has been calculated. Big effort should be dedicated to the collection of all data related to managed soils such as synthetic or organic fertilizers that for this inventory have been taken from FAOSTAT.

LULUCF	The SNC used the revised 1996 IPCC GL but this inventory uses the IPCC 2006 GL. The SNC included aggregate emission and removal estimates from the LUCF sector. In this report more disaggregated information is provided on activity data, coverage of categories and years in the estimate of GHG compared to the SNC. However, to the currently used data, checks with ground data from institutions such as UPNGRSC, OPRA and CCRI are necessary to further improve the activity data. This GHG inventory did not include estimations of GHG emissions from high carbon organic soils and carbon stock changes in mineral soils. In order to accurately estimate the amount of GHG emission from organic soils, including peatlands, areas of drained and rewetted soils are required. To obtain this information the country needs to collect more information on the location of the soils and the historical and current land use of those soils. In order to estimate mineral soils, the country would also need more information on historical land use. Continuous capacity building is necessary for PNG to further sustain and build on the current dataset and, in particular to enable to move from an approach 1 to an approach 2, in order to track converted and managed lands over time (20 years default or less).
Waste	The SNC only captured CH_4 emissions from the SWDS and domestic wastewater of the year 2008 only, but in this inventory, GHG emissions estimates from the waste sector comprised of CH_4 emissions from the SWDS both CH_4 and N_2O emissions from biological treatment of solid waste (composting) and domestic wastewater treatment and discharge. GHG emissions are estimated from 2000 to 2015 time series. A major constraint faced in conducting this inventory has been the lack of activity data, specifically the lack of data on land filled waste, composted waste, incinerated/open burned waste, waste composition, parameters for methane estimation for landfills, industrial waste data, population data by domestic wastewater treatment method, industrial wastewater data, a lack of country specific emission factors and limited information on waste management systems in PNG.

For the BUR2 GHG inventory, the improvements made and necessary improvements for the future have been identified by category for each sector for the non AFOLU sectors. Many of the necessary improvements for the future as described in the BUR1 remain, but the following are the improvements made to the BUR2 GHG inventory. For more detailed information, refer to the National Inventory Report 2000-2017.

Table 19 Summary of improvements made and necessary improvements for the future (BUR2)

Energy	Improvements include: (all categories) updated APEC energy balance table for 2000-2017 used; (mostly manufacturing and construction category) Non energy use of fuels have been reflected; (manufacturing and construction category) emissions from auto production have been correctly allocated to manufacturing industries, (fugitive emission categories) NMVOC emissions have been estimated
IPPU	New estimation of fluorinated substitutes for ozone depleting substances (mix HFCs) in refrigeration and air conditioning category.
Waste	CH_4 emissions from open burning of waste estimated for first time For CH_4 from wastewater, lagoon treatment (anaerobic shallow lagoon) was added as a wastewater treatment type in addition to septic tank, river lake sea discharge, pit toilet. Population for each type of wastewater treatment improved. N_2O from wastewater, the amount of protein in industrial wastewater was taken into account.

2.2 Project Purpose and indicators

The two objectively verifiable indicators of the project are a national GHG inventory report is developed for 2015 and 2017 and items on TACCC checklist, which are verified by reports of national GHG inventory

(2015 and 2017) and the TACCC assessment results of the checklist.

The national GHG inventory reports for 2000-2015 and 2000-2017 have been described in section A above and is attached as an annex to this report. The TACCC assessment was carried out in 2018 to review the results of the first GHG inventory and is part of the improvement plan as described in section A above.

3. History of Project Design Matrix (PDM) and PO Modification

During the Survey for technical cooperation for this Project carried out in Sept. 2016 and Feb. 2017, JICA was informed by CCDA that PNG was aiming to submit its BUR1 in December 2017. The timelines and plans of the Project were designed based on this deadline/assumption, with some flexibility built in in case there were minor delays.

However, at the start of the JICA Project, the JICA Project experts were notified that significant delays in the BUR 1 inventory process occurred. Given the delay of the BUR 1 inventory preparation, the PO was revised in February 2018 to reflect the revised plan for submitting the BUR1. This was approved at the first JCC meeting in May 2018. There have been no changes to the PO since the first JCC.

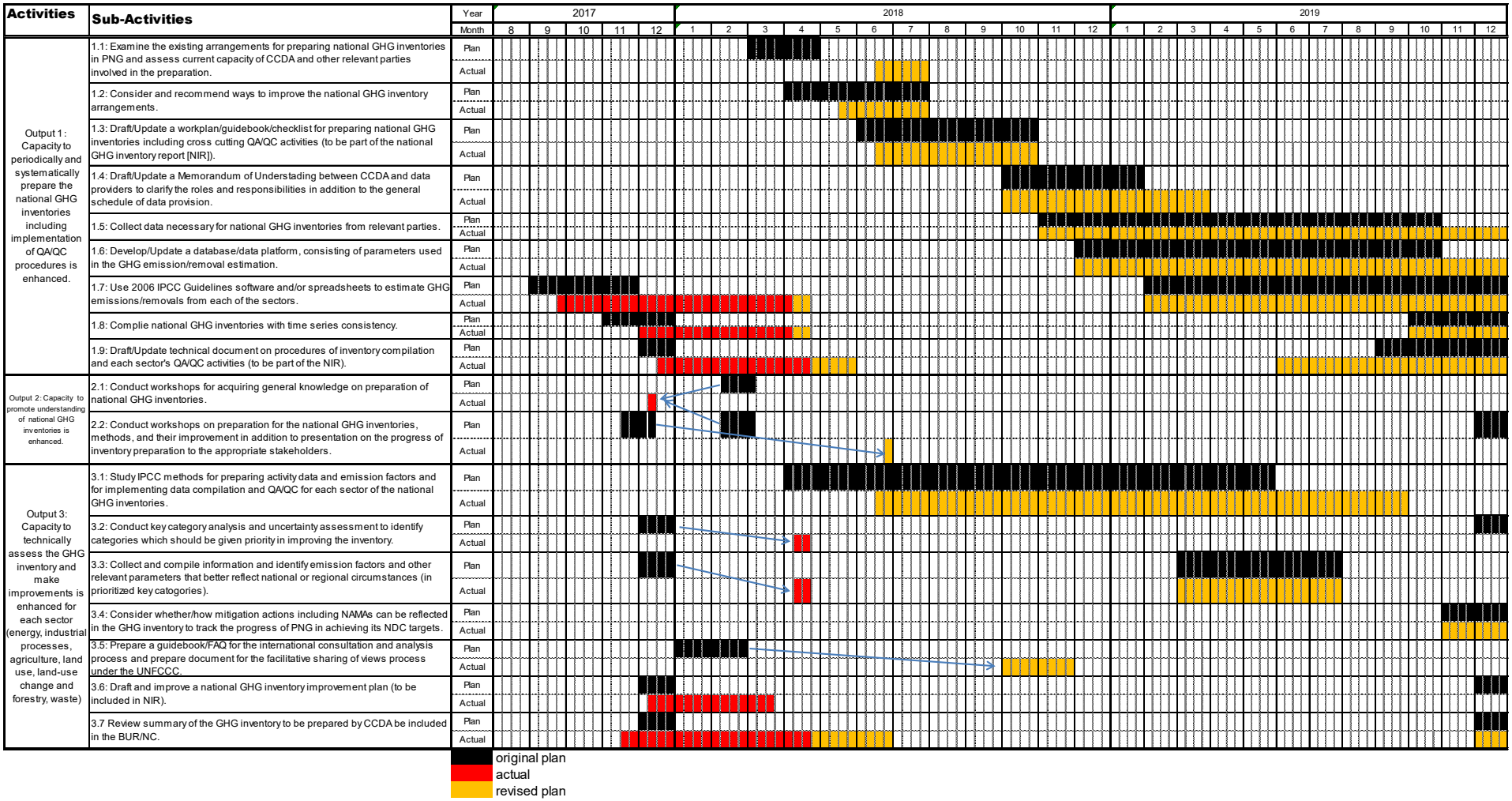

Figure 11 Revised PO for 2017-2019

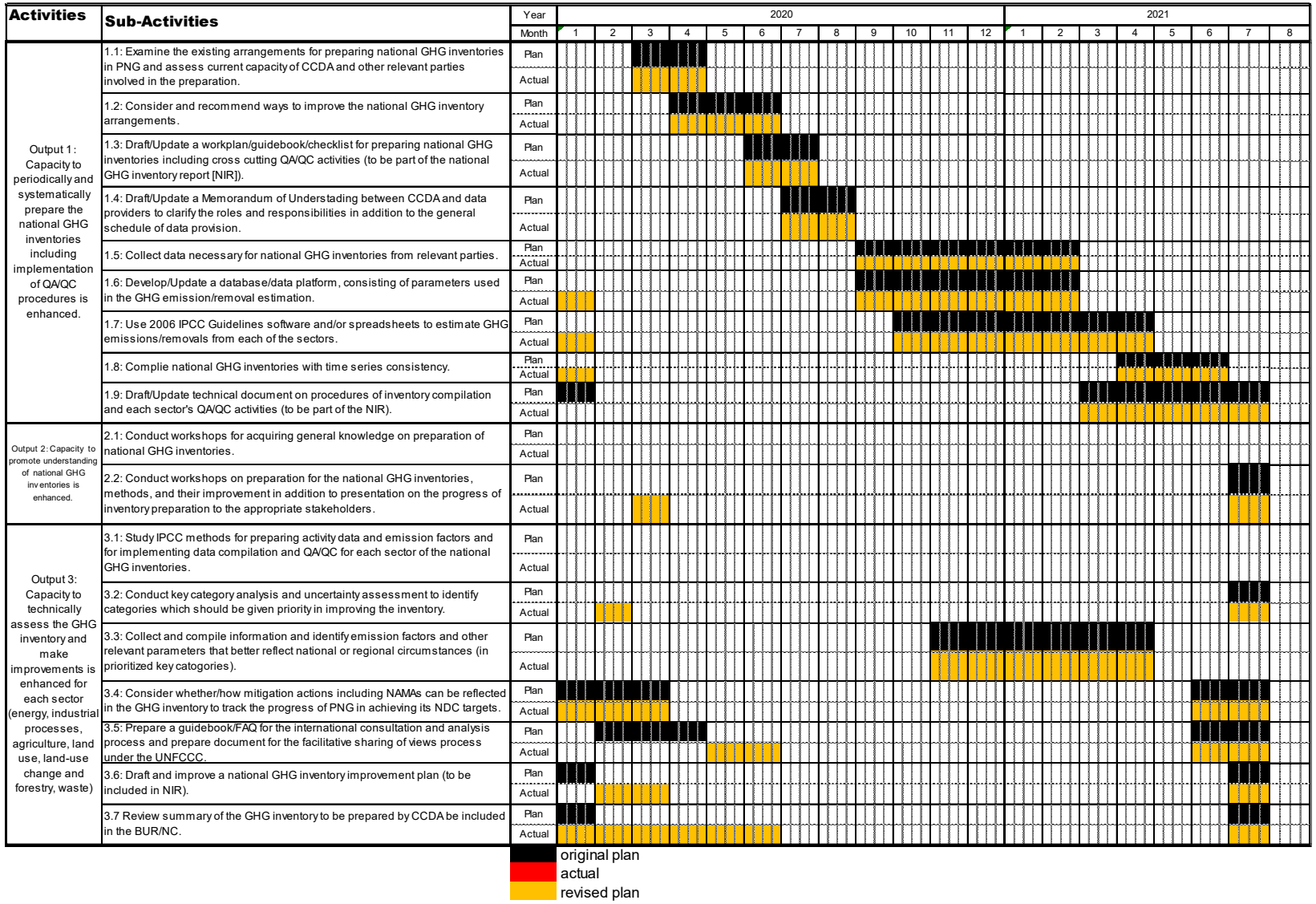

Figure 12 Revised PO for 2020 to 2021

Chapter 3. Results of Joint Review

1. Results of Review based on Development Assistance Committee (DAC) Evaluation Criteria

The JICA Project experts and CCDA conducted joint review on the results of the Project, applying DAC evaluation criteria, which was prepared by DAC of the Organization for Economic Co-operation and Development (OECD). These criteria contain five perspectives, namely relevance, effectiveness, efficiency, impact and sustainability as shown in Table 20. For each criterion, the project was evaluated on a scale of "very high", "high", "average", and "low".

Table 20 DAC criteria

Relevance	Relevance is reviewed by the validity of the Project Purpose and Overall Goal in connection with the government's development policy and the needs of the target group and/or ultimate beneficiaries in Papua New Guinea.
Effectiveness	Effectiveness is assessed in terms of the extent the Project has achieved its Project Purpose, clarifying the relationship between Project Purpose and Outputs.
Efficiency	Efficiency of project implementation is analyzed with emphasis on the relationship between Outputs and Inputs in terms of timing, quality, and quantity.
Impact	Impact of the Project is assessed in terms of positive/negative and intended/unintended influence it caused.
Sustainability	Sustainability of the Project is assessed in terms of (1) policy and institutional, (2) organizational, (3) financial, and (4) technical aspects by examining the extent to which the achievements of the Project will be sustained after the Project is completed.

1.1 Relevance

The JICA Project experts and CCDA agree that relevance is very high.

GHG inventories are the core component of the national communications and the BURs. They allow policymakers to assess the GHG emission/removal trend of the country to plan mitigation actions and monitor those actions. This is the reason the GHG inventories are again a core reporting element of the Biennial Transparency Report (BTR), to be submitted by all Parties to the Paris Agreement, from 2024. Under the ETF, the submitted GHG inventories will undergo a review by international experts to assess the TACCC of the GHG inventory. The Project purpose is that "the basic capacity of CCDA to periodically prepare TACCC GHG inventories is strengthened." Therefore, the Project purpose is not only in line with the current reporting requirements under the UNFCCC, but also in line with the reporting requirement under the ETF.

In the PNG context, The PNG vision 2050 sets targets for PNG to achieve by 2050, including a 90% of GHG emissions reduction to 1990 levels and a providing 100 percent power generation from renewable energy sources. The Medium-Term Development Plans (2010, 2015, 2018) and National Strategy for Responsible Sustainable Development for Papua New Guinea (2014) has developed a road map by

prescribing an economic growth strategy that is built on the principles of green growth and sustainable development. National Climate Compatible Development Management Policy (2014) defines PNG's approach to sustainable development, identifies and describes key policy areas for climate change mitigation and adaptation, and outlines the institutions, instruments, roles and responsibilities for implementing climate activities. Climate Change (Management) Act (2015) provides a framework for the development and implementation of measures in PNG to combat climate change in accordance with the Kyoto Protocol and other international agreements and programs. Most recently, United Nations Paris Agreement (Implementation) Act (2016) addresses climate change issues in PNG and implements the country's obligations under the Paris Agreement. Climate change and the agreements under the UNFCCC such as the Kyoto Protocol or Paris Agreement is a priority issue for PNG. GHG inventories are the policy tool used in climate change policy and in the UNFCCC context, therefore, the relevance of this Project to PNG is very high.

1.2 Effectiveness

The JICA Project experts and CCDA agree that effectiveness was very high.

The Project goal is that the basic capacity of CCDA to periodically prepare TACCC GHG inventories is strengthened. Two sets of work plans, databases, inventory reports, and results of a questionnaire have been set as means of verification. As described in this report above, the means of verification have been developed by the CCDA and JICA Project experts. An important consideration in assessing the capacity to regularly prepare GHG inventories is whether improvements have been made to the inventory products such as the estimation files and report templates so that CCDA can routinely carry out the activities rather than approach the new GHG inventory cycle as a new project every time. A user-friendly estimation file system and report template are critical to CCDA, as there is the risk of staff turnover, or staff changing positions within the CCDA, and a new staff member may be tasked to update the next GHG inventory.

For the work plan, the CCDA used the generic work plan drafted by the JICA experts but for the second work plan, the JICA Project experts and CCDA drafted sector specific work plans based on the results of the TACCC check that the JICA Project experts and CCDA filled out together. The database has also been updated to make the files more consistent with each other and easy to understand. The second inventory report contains category specific information on the methods and data used, the improvements made compared to the previous inventory, and necessary improvements for the future. These improvements in the deliverable products will make inventory compilation easier in future cycles. User friendliness has been a key consideration in developing the workplan, database, and inventory reports so that in case a new CCDA staff takes over the sector the following cycle, he/she can still update the material with even little to no expertise.

1.3 Efficiency

The JICA Project experts and CCDA agree that efficiency was low.

The JICA Project was planned as an efficient project, but due to some unforeseen circumstances and other challenges, the implementation of the Project was not as efficient as planned.

The JICA Project was designed for two GHG inventory cycles, whereby in the first cycle, the CCDA and JICA Project experts would work side by side with the JICA Project experts guiding the CCDA every step, and in the second cycle, the JICA Project experts would take a step back to allow CCDA to carry out the activities on their own to the best of their abilities. As previously explained, the assumption of the Project was that CCDA would have completed and submitted their first BUR prior to the initiation of the Project. However, as there were delays in the BUR1 work, the JICA Project experts came on board in the middle of the BUR1 process, which presented challenges in guiding CCDA step by step from the beginning to the completion of the GHG inventory. In addition, the second cycle activities were not fully carried out due to the spread of the COVID-19 pandemic causing lockdowns and making travel to PNG impossible for the JICA Project experts. The approach for the second cycle therefore had to be revised, with the JICA Project experts taking the lead to update the GHG inventory while the CCDA would be reviewing and learning from the JICA Project experts' work. While in terms of producing an inventory report and database, the hands-on approach the JICA Project experts took could be considered efficient in terms of compiling a GHG inventory, it was not efficient in the context of this capacity building Project.

The JICA Project scope of the inventory was all sectors including the AFOLU sector, but as there were other donors that were supporting the CCDA with the AFOLU sector, the JICA Project focused on the non AFOLU sectors. Coordinating the work by the AFOLU team and the JICA Project expert team was a challenge as CCDA was not able to sufficiently manage the process or lead the coordination with donors. For the first cycle, the JICA Project team actively managed the inventory process for all sector to compile a complete national GHG inventory, but for the second, the JICA Project experts focused on the non AFOLU sectors and allowed CCDA to coordinate with its donors to produce the AFOLU inventory. Improved coordination may have allowed the complete GHG inventory to be completed by the end of the JICA Project.

In the beginning of the Project, the JICA Project hired an excel specialist to train the CCDA staff with fundamentals of using excel spreadsheets and basic excel functions. While this was an efficient approach to the technical GHG inventory capacity building, some CCDA staff struggled through the training, and continued to struggle to understand the basic equations and methods to estimate GHG emissions. There may have been a need to set higher requirements for leading a sector prior to the Project.

1.4 Impact

The JICA Project experts and CCDA agree that impact was high

Regardless of the level of engagement by the CCDA staff in the second cycle, the staff have undergone two cycles of GHG inventory preparation and have a better understanding of the steps and the necessary approaches to prepare and compile an inventory. This learning by doing approach has installed some

confidence in the staff and some ownership of their sector of the inventory. Growth in CCDA staff was evident especially during the consolation meeting whereby the CCDA staff delivered all presentation on the BUR1 results. The CCDA staff has also learned through the Project of the importance of professionalism, planning, and communication in not only the GHG inventory process but in any project environment. The Project has been mostly a positive growing experience for the young staff at CCDA growing their confidence to continue the challenging work of producing TACCC GHG inventories on a regular basis.

The Project has had a positive impact on other relevant stakeholders as well, as described previously, the level of understanding of GHG inventories and the UNFCCC by relevant authorities has enhanced, and even actors who hadn't been identified by the Project have approached CCDA with questions on the GHG inventory. This improved presence of CCDA and the GHG inventory work has had a positive impact on PNG.

For GHG inventories, it is a requirement to calculate the number of emissions and removals using consistent estimation methods and data for the entire time series. Therefore, when improving the GHG inventory, it is necessary to recalculate the GHG emissions and removals back in time. Recalculations were made in PNG's BUR2 inventory for the energy, IPPU and waste sectors, resulting in a significant 2015 reduction in emissions in the energy sector (approximately 8,500 kt CO_2 eq from approximately 11,800 kt CO_2 eq), an increase in emissions in the IPPU sector in 2015 (from about 0 kt CO_2 eq to about 140 kt CO_2 eq), emissions in the waste sector increased in 2015 (from 870 kt CO_2 eq to 950 kt CO_2 eq). These recalculations have changed emissions trends and added new sources of emissions, which JICA Project experts have informed in the final JCC as important messages that recalculations should be taken into account when considering update of mitigation actions in PNG and NDC as they have an impact on climate change policy planning and development. In response, the JCC Chair expressed his gratitude to JICA for supporting the policy informing tool that is the GHG inventory, saying that the GHG inventory data of PNG's BUR1 has was used as base data for the NDC update work, and that the NDC will be updated based on improved GHG inventory data in the future.

1.5 Sustainability

The JICA Project experts and CCDA agree that sustainability is high

The CCDA and JICA Project experts assessed the sustainability of the Project outputs from policy and institutional aspect, structure of the implementing agency, financial, and technical aspects to which the achievements of the Project will be sustained after the Project is completed.

Policy and institutional aspect

As described in section 1.1, the GHG inventory and the BTR will need to continue to be compiled and submitted to the UNFCCC under the Paris agreement. This international agreement will continue and PNG's commitment to the UNFCCC requirements is expected to continue in the future. As PNG develops and fleshes out the Paris Agreement Implementation Act and the NDC Regulation, institutions in PNG will be required to regularly support CCDA in preparing the GHG inventory and the BTR.

In terms of the institutional arrangements, these are expected to be sustained as the Paris Agreement EFT begins its cycles starting with the submission of updated NDCs, monitoring progress with the BTRs, and the global stocktake under the UNFCCC.

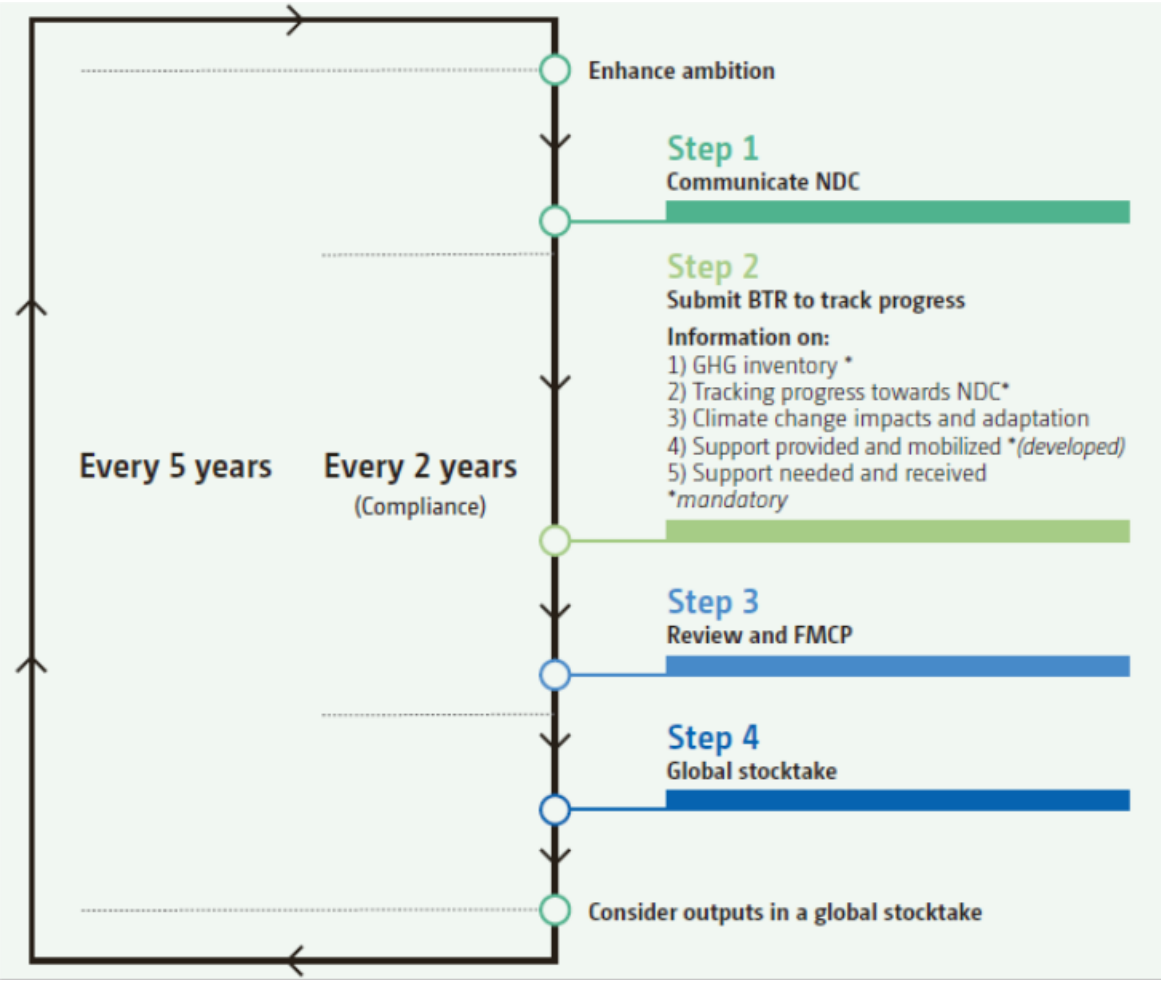

Figure 13 The NDC cycle

Source: Reference Manual for the Enhanced Transparency Framework under the Paris Agreement, UNFCCC, 2020

PNG has in place arrangements which will consider NDC implementation and GHG inventory preparation such as the Sub Technical Working Committees and any new institutions to be formed as part of the NDC Regulation. The CCDA also has many donors such as the GGGI and GIZ supporting these efforts. Therefore, sustainability from the policy and institutional aspect is very high.

Structure of the implementing agency

The CCDA structure has weakened since the initiation of the Project. The manager position of the NC and MRV division was vacated at the start of the Project and two staff members left the CCDA in 2018, but no replacements were hired. The General Manager of CCDA was tasked to be both the overseer of the Project and the day-to-day manager, with five staff members each tasked with a sector of the GHG inventory. This structure changed some in 2020 with a promotion to the generalist/compiler/energy expert becoming the leader of the GHG inventory.

While this structure within CCDA is more than seen in most developing countries where one or two staff are charged with overseeing the GHG inventory process, the CCDA staff are relatively young and are not closely supervised by a middle manager. Without the Project, the planning of work and monitoring of progress is a concern even though some staff have risen to the occasion to actively manage the process. Therefore, sustainability from an organizational aspect is low.

Financial

As explained above, PNG has an advantage over many other developing countries as it has a team of staff dedicated to the preparation of NCs and BURs. Staff has decreased since the JICA Project began, but there is no reason to believe that the budget for the division will be taken away in the future, taking into consideration the importance of climate change and the Paris Agreement to PNG. At the same time, the CCDA does rely on the GEF and other donors to support the budget for some activities, and this dynamic is unlikely to change in the future. Therefore, sustainability from a financial aspect is high.

Technical

Through on the job training of the CCDA staff, they were able to grow as their respective sector leads and understand the process of the GHG inventory preparation. The level of growth by CCDA staff depends on the staff members, as the level of commitment was different between staff, and decreased while the JICA Project experts were no on the ground. Furthermore, due to the spread of COVID-19 restrictions, the level of training was limited during the second cycle of the GHG inventory project. However, as described in section A, inventory preparation tools were developed through the Project such as the GHG inventory TACCC review tool, the estimation files, and the national inventory report. These are fundamental tools also serve as manuals for CCDA staff and should support the sustainability of the bottom-line technical competence of the GHG inventory compilers at CCDA. Therefore, sustainability from the technical aspect is low.

2. Key Factors Affecting Implementation and Outcomes

The following factors affected the implementation of the Project implementation.

2.1 Delays in the work

During the Survey for technical cooperation for this Project carried out in Sept. 2016 and Feb. 2017, JICA was informed by CCDA that PNG was aiming to submit its BUR1 in December 2017 and so the activities of the Project are designed under this assumption, with some flexibility built in in case there were minor delays. However, at the start of the Project in October 2017, the JICA Project experts were informed that CCDA no longer considered the end of 2017 as a deadline and had not assessed how long the delay will be or developed a plan for submission of BUR1. This uncertainty and lack of urgency affected implications on the Project activities.

2.2 Project Management

The Project Director and Project Manager positions were vacant at the time of the signing of the Record of Discussions in April 2017. The two positions were tentatively filled by the General Manager of REDD+ and Mitigation, and the Manager of MRV, respectively. However, this is an unfair burden on both managers who are not responsible for NC preparation, and the Project requires full time commitment from the top in order to properly coordinate with JICA and other donors, and other stakeholders relevant to the preparation of GHG inventories.

In 2020, the General Manager of National Communications and MRV division in CCDA was also serving as the manager of the GHG inventory team. This limited the involvement of the CCDA manager in the technical work of the GHG inventory.

2.3 Coordination with other donor work

The FAO has been supporting CCDA with the AFOLU inventory as part of the UN-REDD support to CCDA. In addition, the CCDA requested further support from the Capacity Building Initiative for Transparency (CBIT)/GEF and The Coalition for Rainforest Nations (CfRN) to estimate GHG emissions and removals from the AFOLU sector. With many donors supporting CCDA with the AFOLU sector of the GHG inventory, the coordination of projects in critical for timely and efficient GHG inventory process.

2.4 COVID-19

Global pandemic of the COVID-19 caused a serious impact on the project implementation, especially preventing Japanese experts from working in Port Moresby.

3. Evaluation on the results of the Project Risk Management

3.1 Delays in the work

JICA Headquarters sent a concern letter to CCDA in January 2018, addressing the issue of the BUR1 timeline. In response, CCDA replied that it would try to finalize and submit the BUR1 in June 2018 and CCDA would do a better job to coordinate with all donors in the MRV field. The PO of the Project was revised in February 2018 to reflect the revised deadline for BUR1. This was approved at the first JCC meeting in May 2018.

In 2020, in addition to delays due to COVID-19, Project activities temporarily stalled as C/P focused on work to update the NDC.

3.2 Management

In the concern letter mentioned above, JICA Headquarters requested that CCDA appoint relevant managers to the Project Director and Project Manager positions. In response, CCDA appointed the General Manager of REDD+ and Mitigation, and the Manager of NC and MRV (later promoted to General Manager of NC and MRV) would fill the Project Director and Project Manager positions, respectively.

In 2020, the CCDA informed the JICA Project expert team that the General Manager of NC and MRV will delegate the JICA Project management to one of the officers of the division (the generalist/compiler/energy sector expert at the time).

During the Project, two C/P staff members retired in 2018 (one in charge of LULUCF and one in charge of waste). In 2020, one person (in charge of waste) was assigned to focus on the NDC project, making one-on-one training of staff challenging. Since 2018, CCDA continued to recruit new staff, but since inventory staff was not replenished until the end of the Project, the Project activities were carried out by a few members on the CCDA side.

In this Project, if an expert with knowledge of data collection was identified in PNG, it was planned to improve the efficiency of operations by hiring the expert for a short period of time. The Project consulted PNG's NC2 consultant and the project manager of this Project about potential collaborators such as consultants and academia, but experts with knowledge and experience could not be identified.

3.3 Coordination with other donors

In the concern letter mentioned above, JICA Headquarters requested that CCDA coordinate with donors in order to avoid confusion with Project experts and CCDA staff. The FAO has already been supporting CCDA in the AFOLU sector, and the creation of the land use matrix necessary for calculating land use relations was also carried out by the FAO from the aspect of technical support of REDD+. As such, the JICA Project experts and CCDA agreed that the JICA Project experts would prioritize the energy, IPPU, and waste sectors under the Project and let CCDA coordinate with the forestry donors to ensure the timely completion of the AFOLU sector inventory in time for the BUR1 and BUR2 submissions.

For preparing the GHG inventory for the AFOLU sector of the BUR1, the necessary activities are (1) understanding the methodology of the IPCC Guidelines, (2) creating a land-use matrix, and (3) conducting estimates as a GHG inventory. At the start of the Project, the Project members confirmed that, for activity (1), FAO headquarters and CCDA personnel was working remotely once a week. For activity (2), the FAO consultant was directly working on PNG FA and CCDA, and was almost completed, and for activity (3), the agricultural sector advanced to some extent, but LULUCF was almost untouched. Although the person in charge of the LULUCF sector of CCDA has a understanding of the development of the land matrix and its contents, the level of understanding of the methodology of the IPCC guidelines was only at the basic stage, and there was no proficiency to develop the calculation file by themselves or by using a software. Therefore, it is judged that it is difficult to complete the BUR1, which is the premise of JICA project implementation, so the JICA Project experts developed the estimation files for the LULUCF sector based on the land use matrix created so far, establish a method of estimating GHG emissions and sinks, and lectured the contents to CCDA personnel. In this way, JICA Project experts fully supported CCDA to finalize GHG inventory. This includes responses to questions directly from CCDA on the agriculture sector, and the content of the technical annex related to REDD+ also includes cross-checking at CCDA's request as appropriate.

In the AFOLU sector of BUR1, based on the files created by JICA Project experts, FAO experts have made mall corrections, and drafted an inventory report and provided it to the CCDA. As the work for BUR2

could be based on BUR1 experience, the JICA Project did not work with CCDA.

3.4 COVID-19

As the JICA Project experts were not able to visit PNG since March 2020, online meetings were held to ensure continuation of Project activities. At times, the online meetings facilitated some decision making, but in general, the online meeting tools cannot replace the in-person training that can be carried out on the ground.

4. Lessons Learned

4.1 Sustainable file development

Inventory files should be as simple, easy to understand, flexible, and flexible as possible. The GHG emission and removal estimation file system developed by the Project is composed of Excel files, and the emission and removals are automatically calculated by updating the database. Even after the end of the Project, the C/P would use them as a basis for calculation continuously, and the Project members kept in mind a versatile design that satisfies the above requirements.

4.2 Fostering ownership

In order to foster ownership of C/P members, the C/P continued to be front of the meeting and give presentations and address Q&A during conferences and workshops. Before the event and meetings, Project members conducted a presentation and Q&A simulation, to build confidence. Consequently, C/P ownership of the Project improved, and C/P participated and led discussions.

In addition, coordinating the schedule/timeline of activities with all C/P staff took time, and discussions were held several times among the members. As a result, the C/P staff's awareness of the parties increased, and C/P is familiar with the Project contents.

4.3 The importance of a direct technology transfer approach

The output of the Project is the completion of the GHG inventory, but the change of the consciousness of C/P in the creation process was viewed as being more important.

For example, in this Project, the OJT format was taken where the C/P collected data, prepared materials for meetings, making appointments, summarizes the meeting discussions, and simulated asking questions, how to follow up discussions. This created a virtuous cycle in which a sense of ownership was strengthened within C/P, and this in turn made the C/P more active in data utilization. By repeating such a process, it is thought that C/P's awareness of the progress of the entire Project improved, and it has led to the improvement of their capacity to carry out basic work.

4.4 Development of a format for periodic monitoring

In order to standardize the monitoring, recording, and storage of the management status of GHG inventory work, a monitoring template was developed in consultation with C/P. The work progress of the person in charge in each sector was made visible to all people at a glance, and by confirming and monitoring each other's progress, the Project was able to promote a competitive spirit and sense of urgency within the team.

4.5 Public relations

Since the start of the Project, the members have taken advantage of various public relations opportunities. Members presented the efforts of the Project and provided information by taking advantage of as many opportunities as possible, such as participating in events, participation in international conferences such as COP, and responding to domestic media.

4.6 Responding to COVID-19

Due to the spread of COVID-19, the Project was unable to travel to PNG for the second half of the Project period, one year and eight months, and the schedule for meetings with stakeholders, workshops, training changed significantly. The OJT was implemented only half of the planned implementation period, and the planned one-on-one training has become limited.

In order to continue the Project in this situation, the CCDA and JICA expert team were forced to conduct online development activities using remote conferencing tools and social media interactions. This was a major challenge when building spreadsheets, preparing meetings, and meeting and interviewing with stakeholders. On the other hand, in some respects, such as when decision-making is required in a hurry or when a technical question-and-answer session regarding inventory files is required, the advantage of an online format that can respond in a timely manner and make decisions was effective. In this sense, good internet connection environment is required for both sides, but this was not always the case.

In preparation for such a situation, in order for the other country's C/P institutions to maintain a stable Internet connection environment throughout the Project period, and to facilitate activities, it should be confirmed in advance that remote conferencing tools are actively used.

4.7 Planning for future changes

In the UNFCCC context, the Paris Agreement was adopted in 2015 and entered into force in 2016. The modalities, procedures and guidelines for the ETF was agreed in December 2018. JICA Project experts were aware of the general concepts of the ETF before the Project began and was also able to take into consideration some of the future reporting requirements in planning for the GHG inventory prepared in the Project, especially for the second cycle. Although the format of the GHG inventory emission/removal estimation data tables and NDC reporting tables are still being negotiated in 2021, the Project experts did make efforts to design the estimation files in order to comply with possible future reporting requirements. The JICA Project was a timely one and designed with some flexibility built in to incorporate the future changes in rules of reporting under the UNFCCC, and this is a noteworthy point which should enhance the

sustainability of the outputs delivered by the Project.

5. Other remarkable/considerable issues related/affect to the project

None

Chapter 4. For the Achievement of Overall Goals after the Project Completion

1. Prospects to achieve Overall Goal

The overall goal of the Project is, "TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically," which is evaluated by the indicators of "National GHG inventory report" and "TACCC assessment results of the checklist." These two indicators are also the Project Purpose indicators, and also part of the indicators in Outputs 1 and 3. As described in 2.1 of Chapter 2, these indicators were developed twice by the CCDA and the JICA Project experts. These indicators have been developed as a living document that needs to be prepared every GHG inventory cycle. As the GHG inventory is central to the ETF under the Paris Agreement, CCDA can be expected to update and compile the two indicators in the near future and periodically so. At the same time, some concerns with regards to the organizational aspect of sustainability of the Project achievements do exist as described in section 1.5 of Chapter 3, therefore the prospects to achieve the overall goal is assumed to be moderately high.

2. Plan of Operation and Implementation Structure of the PNG side to achieve Overall Goal

As described section 1.5 of Chapter 3, PNG has the policy and institutional arrangements in place to prepare GHG inventories periodically, namely the Paris Agreement Implementation Act, the Sub Technical Working Committees, and the NDC Regulation. These arrangements will continue after conclusion of the Project and the institutional setup of CCDA as the GHG inventory agency with relevant stakeholders providing information and data will remain the same.

At the fourth JCC, CCDA mentioned that it will submit its second and final BUR in 2021, and then begin preparation for its first BTR, to be submitted in 2024. If CCDA can provide the necessary leadership to leverage the existing policies and arrangements to enhance the cooperation with relevant stakeholders, and plan, manage, and monitor progress of the GHG inventory processes, PNG is in a good position to fully comply with the reporting requirements under the Paris Agreement and achieve the Overall Goal of preparing TACCC GHG inventories periodically.

3. Recommendations for the PNG side

Some recommendations for PNG to ensure that the overall goal of the Project is achieved is of the following:

<u>Leverage opportunities and maximize benefits from Sub Technical Working Committees</u>

CCDA established the Energy Sub Technical Working Committee after a series of discussions with stakeholders and drafting terms of reference and Memorandum of Understanding drafts with the support of the JICA Project experts. This is a major accomplishment in terms of arrangements, but this Committee will need to be guided and led by the CCDA in order to effectively facilitate the data sharing

and improvement of the GHG inventory. In order to do this, CCDA should develop its long-term vision for improving the GHG inventory and get the necessary buy in from the Committee members in order to gain momentum which was lost due to COVID19 related lockdowns and restrictions. In addition, CCDA should use the blueprint for establishing a Sub Technical Working Committee to expand the coverage of sectors to IPPU and waste, or subsectors of those sectors.

Strengthen current arrangements to ensure effective collaboration

CCDA has established informal networks with stakeholders through the Project but is mainly on staff-to-staff basis. This should be expanded to ensure organizational coordination for preparing the GHG inventory. There are different approaches to accomplish this, through more MoUs and/or contracts, or a top-down approach through regulations or the Sub Technical Working Committees. The engagement process is often a time consuming one, but it should focus on education, not a stick in dealing with collaborators.

Long term vision/planning

As mentioned previously, CCDA is in a good position with a division dedicated to the development of NCs, BURs, and in the future, BTRs, and this division is likely to stay intact for the Paris Agreement enabling the managers to prepare long term visions and plans rather than taking a project-based approach to preparing GHG inventories. CCDA needs to develop its own long term structured plan and prepare and manage a GHG inventory and support the plan through more short term annual/biennial business plans.

4. Monitoring Plan from the end of the Project to Ex-post Evaluation

Based on the international criteria DAC evaluation criteria, JICA assesses each Project in terms of relevance, effectiveness, efficiency, impact, and sustainability. While the assessment results are summarized in Chapter 3 of this report, the Project will be evaluated again as an ex-post evaluation. In general, the ex-post evaluation will be conducted three years after the project.

Chapter 5. Research on Pacific Island countries

The JICA Project experts carried out research on the GHG inventories and NDCs in the Pacific Island countries whose national circumstances are similar to that of PNG to identify any common challenges and necessary support moving forward.

1. GHG emission and removal estimation in Pacific Island countries

1.1 Background

Greenhouse gas inventories prepared by each country in accordance with Article 4.1 and Article 12.1 of the UNFCCC are extremely important fundamental statistics for understanding the actual state of GHG emissions and removals in each country and considering which emission and sink sources are effective in promoting emission reduction. Therefore, it is required to accurately and comprehensively estimate them in accordance with the guidelines established by the UNFCCC (guidelines for the preparation of national communications, IPCC guidelines estimating emissions and removals, etc.).

However, for many developing countries, it is not easy to understand the relevant guidelines, choose an estimation method suitable for their own country, and even collect and calculate activity data and parameter data. In fact, due to lack of data and insufficient capacity for inventory preparation, only a few countries estimate annual emissions and removals for a wide range of categories.

On the other hand, some international organizations independently calculate the amount of GHG emissions and removals of each country and publish the results. The European Commission's Joint Research Centre independently estimates anthropogenic air pollutants and GHG emissions across the world across a time-series and grid data called EDGAR (Emissions Database for Global Research). EDGAR calculates GHG emissions based on categories in accordance with the 2006 IPCC Guidelines, and although not all categories are covered in all countries, most Pacific island countries are also included.

Also, the Food and Agriculture Organization of the United Nations (FAO) calculates emissions and removals for the agricultural and LULUCF sectors using data submitted to the FAO by each country in accordance with the IPCC Guideline's Tier 1 calculation method (the simplest method).

The individual circumstances of each country are not sufficiently considered in these calculations, and therefore, the accuracy is not necessarily high. However, considering that GHG inventory creation is not a temporary but a continuous improvement process, it is important data that can be a starting point for that process. In addition, by analyzing these data, it is possible to grasp which emission and removal sources contribute greatly to total emissions, how the amount of emissions and removal has been transitioning from the past to the present, etc., and it will be useful information for identifying emission and removal sources that should be intensively examined in the future.

Based on the above background, an approach to improve the accuracy of GHG inventory estimation of Pacific island countries in Oceania was considered, utilizing the GHG emission and removal data of international organizations.

1.2 Methodology

By investigating examples of GHG emissions for Pacific island countries and the various activity data

and emission factors that can be used to calculate emissions, which have been published by external organizations such as various international organizations and research institutes, the contents of the posted data and target countries were arranged so that they could be used as information sources as the first step for Pacific island countries to build their own GHG inventory. In addition, from some of these materials, GHG emissions by inventory category of each country surveyed were extracted or estimated using published data as time-series data as possible and constructed as original GHG inventory data.

In addition, this study compares the latest inventory (NC, BUR) submitted by each country to the UNFCCC with the GHG emission and removal data of published data, and summarizes the issues faced by each country's inventory. On top of that, while examining the room for improvement of the calculation method using existing data, mainly for non-estimated emission and sink categories in the inventory of each country, which is calculated by third party sources, which is calculated as an emission and absorption source that has a significant difference in GHG emissions and removals, guidance for expanding the scope of calculation targets and improving accuracy was compiled.

A. Target countries

The following fourteen countries were covered in this study (all non-Annex I Parties to the UNFCCC).

- Cook Islands
- Fiji
- Kiribati
- Marshall Islands
- Micronesia, Federated States of
- Nauru
- Niue
- Palau
- Papua New Guinea
- Samoa
- Solomon Islands
- Tonga
- Tuvalu
- Vanuatu

B. Reports analyzed

Non-Annex I Parties to the UNFCCC are required to submit NC every four years and the BUR every two years according to the capabilities of each country and the level of support provided (although island states are allowed to submit BUR at their sole discretion).

All countries under review have already submitted NC multiple times and include GHG inventories.

Papua New Guinea has also submitted a BUR in addition to the NC and reports updated GHG inventory. In this study, the GHG inventory described in the latest report of each country was used.

	1st	2nd	3rd
Cook Islands	NC1 30/10/1999	NC2 12/04/2012	**NC3 07/08/2020**
Fiji	NC1 18/05/2006	NC2 31/07/2014	**NC3 28/04/2020**
Kiribati	NC1 30/10/1999	**NC2 27/06/2013**	–
Marshall Islands	NC1 24/11/2000	**NC2 11/12/2015**	–
Micronesia	NC1 04/12/1997	**NC2 12/11/2015**	–
Nauru	NC1 30/10/1999	**NC2 01/04/2015**	–
Niue	NC1 02/10/2001	**NC2 17/09/2016**	–
Palau	NC1 18/06/2003	**NC2 26/08/2019**	–
PNG	NC1 27/02/2002	NC2 15/12/2015	**BUR1 17/04/2019**
Samoa	NC1 30/10/1999	**NC2 14/06/2010**	–
Solomon Islands	NC1 29/09/2004	**NC2 14/09/2017**	–
Tonga	NC1 21/07/2005	NC2 02/05/2012	**NC3 12/02/2020**
Tuvalu	NC1 30/10/1999	**NC2 19/03/2018**	–
Vanuatu	NC1 30/10/1999	NC2 30/08/2016	**NC3 22/03/2021**

source） developed by MURC based on UNFCCC website

C. Comparative Analysis Perspectives

Comparison of the categories covered

- Are GHG emissions and removals comprehensively calculated in the GHG inventory of each country?
- Are the GHG emissions and removals calculated over time in the GHG inventory of each country?
- Are the key emission and removal categories identified by third party database included in the national GHG inventory calculation?

Comparison of the estimates

- Are there any differences in the calculation values of the national inventory and the third-party database for comparable emission and absorption classifications?
- If there is a big difference, why?

1.3 Summary of findings

A. Availability of data

The table below shows the results of confirmation of the existence of data that can be used in the GHG inventory for Pacific Island countries at external organizations such as various international organizations and research institutes surveyed this time. It should be noted that emissions and categories indicate whether the materials are subject to publication, and that even if gas and categories are eligible, there may be no data in some countries.

Table 21 GHG inventory data by international organizations and research institutes

institution			European Commission	US EIA	UN
source			EDGAR	the International Energy Statistics	UN Comtrade Database
URL			https://edgar.jrc.ec.europa.eu/report_2021#data_download	https://www.eia.gov/beta/international/	https://comtrade.un.org/data/
activity data			×	○	○
emission factor			×	○	×
emissions	CO2		○	×	×
	CH4		○	×	×
	N2O		○	×	×
	Fgas		×	×	×
sector	1. Energy	A. Fuel combustion	○	○	×
		B. Fugitive	○	○	×
	2. Industrial processes	A. Mineral industry	○	×	×
		B. Chemical industry	○	×	×
		C. Metal industry	○	×	×
		D. Non-energy products from fuels and solvent use	○	×	×
		E. Electronics industry	○	×	×
		F. Product uses as substitutes for ODS	○	×	○
		G. Other product manufacture and use	○	×	×
		H. Other	○	×	×
	3.Agriculture		○	×	×
	4.Total LULUCF		×	×	×
	5. waste		○	×	×
countries	Cook Islands		○	○	
	Federated States of Micronesia		○	○	
	Fiji		○	○	
	Kiribati		○	○	
	Marshall Islands		×	×	
	Nauru		○	○	
	Niue		×	○	
	Palau		○	×	
	Papua New Guinea		○	○	
	Samoa		○	○	
	Solomon Islands		○	○	
	Tonga		○	○	
	Tuvalu		○	○	
	Vanuatu		○	○	
note			emission data available	fuel consumption available	Import Export of HFCs available

institution			BP	UN	UN
source			bp's Statistical Review of World Energy	Industrial Commodity Statistics Database	Environment Statistics Database
URL			https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html	http://data.un.org/Explorer.aspx?d=ICS	http://data.un.org/Explorer.aspx?d=ESD
activity data			○	○	○
emission factor			×	×	×
emissions	CO2		×	×	×
	CH4		×	×	×
	N2O		×	×	×
	Fgas		×	×	×
sector	1. Energy	A. Fuel combustion	○	×	×
		B. Fugitive	○	×	×
	2. Industrial processes	A. Mineral industry	×	○	×
		B. Chemical industry	×	×	×
		C. Metal industry	×	×	×
		D. Non-energy products from fuels and solvent use	×	×	×
		E. Electronics industry	×	×	×
		F. Product uses as substitutes for ODS	×	×	×
		G. Other product manufacture and use	×	×	×
		H. Other	×	×	×
	3.Agriculture		×	×	×
	4.Total LULUCF		×	×	×
	5. waste		×	×	○
countries	Cook Islands		×	×	×
	Federated States of Micronesia		×	×	×
	Fiji		×	○	×
	Kiribati		×	×	×
	Marshall Islands		×	×	○
	Nauru		×	×	×
	Niue		×	×	×
	Palau		×	×	×
	Papua New Guinea		×	×	×
	Samoa		×	×	○
	Solomon Islands		×	×	×
	Tonga		×	×	×
	Tuvalu		×	×	×
	Vanuatu		×	×	×
note			Pacific Islands not available	Cement production for Fiji only	Amount of MSW for Samoa and Marshal Islands only

institution			UNEP	IEA	The Global Carbon Project	FAO
source			Data Centre	Greenhouse Gas Emissions from Energy	Global Carbon Budget	FAOSTAT
URL			https://ozone.unep.org/countries/data-table	https://www.iea.org/reports/greenhouse-gas-emissions-from-energy-overview	Data supplement to the Global Carbon Budget 2021 | ICOS (icos-cp.eu)	https://www.fao.org/faostat/en/#data/GT
activity data			○	×	×	×
emission factor			×	×	×	×
emissions	CO2		×	○	○	○
	CH4		×	○	×	○
	N2O		×	○	×	○
	Fgas		△	○	×	×
sector	1. Energy	A. Fuel combustion	×	○	○	×
		B. Fugitive	×	○	○	×
	2. Industrial processes	A. Mineral industry	×	○	○	×
		B. Chemical industry	×	○	×	×
		C. Metal industry	×	○	×	×
		D. Non-energy products from fuels and solvent use	×	○	×	×
		E. Electronics industry	×	○	×	×
		F. Product uses as substitutes for ODS	○	○	×	×
		G. Other product manufacture and use	×	○	×	×
		H. Other	×	○	×	×
	3.Agriculture		×	×	○	○
	4.Total LULUCF		×	×	○	○
	5. waste		×	×	×	×
countries	Cook Islands		○	×	○	○
	Federated States of Micronesia		○	×	○	○
	Fiji		○	×	○	○
	Kiribati		○	×	○	○
	Marshall Islands		○	×	○	○
	Nauru		×	×	○	○
	Niue		×	×	○	○
	Palau		○	×	○	○
	Papua New Guinea		×	×	○	○
	Samoa		○	×	○	○
	Solomon Islands		×	×	○	○
	Tonga		○	×	○	○
	Tuvalu		○	×	○	○
	Vanuatu		○	×	○	○
note			HFC consumption	Aggregated as Oceania. Gases other than CO2 from energy are aggregated	no category specific emissions	

※ links to datasets

EDGAR: https://edgar.jrc.ec.europa.eu/report_2021#data_download

the International Energy Statistics: https://www.eia.gov/beta/international/

UN Comtrade Database: https://comtrade.un.org/data/

bp's Statistical Review of World Energy: https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

Industrial Commodity Statistics Database: http://data.un.org/Explorer.aspx?d=ICS

Environment Statistics Database: http://data.un.org/Explorer.aspx?d=ESD

Data Centre: https://ozone.unep.org/countries/data-table

Greenhouse Gas Emissions from Energy: https://www.iea.org/reports/greenhouse-gas-emissions-from-energy-overview

Global Carbon Budget: Data supplement to the Global Carbon Budget 2021 | ICOS (icos-cp.eu)

FAOSTAT: https://www.fao.org/faostat/en/#data/GT

B. Data used this time

In order to compare and verify GHG inventory data reported by Pacific island countries in NC, etc., the materials collected and organized in this business are as follows.

EDGAR

Global anthropogenic air pollutants and GHG emissions independently estimated and published by the European Commission's Joint Research Centre the database, and the data by grid and country of time series are published as CSV files so that the report on the estimated results can be published every year and can be used for academic research. The latest version of EDGAR calculates GHG emissions based on categories that comply with the 2006 IPCC Guidelines, consistent with the inventory. As of this survey (January 24, 2022), CO_2, CH_4, and N_2O emissions data has been made public and fluorinated gases such as HFCs are expected to be released soon.

FAOSTAT

FAOSTAT's emissions database provided by the FAO was used to compare national inventory (https://www.fao.org/faostat/en/#data/GT).

From the database, emissions and absorption by country in the agricultural and LULUCF sectors (CH_4/N_2O emissions associated with crop and livestock production, CO_2 emissions and removal amounts associated with land and land use changes, and CO_2 associated with fuel consumption) emissions, etc.) can be obtained.

At the UNFCCC GHG inventory Lead Reviewer's Meeting, the usefulness of the FAOSTAT database as a data source to support GHG inventory reviews was emphasized, and the UNFCCC Secretariat has asked reviewers to consider how to incorporate it as support data for the review. In this way, the use of FAOSTAT database is being sought at UNFCCC.

C. Overview of GHG emissions and removals

Figures 13 to 26 show the GHG emission and removal data by sector of Pacific island countries collected for this project. Note that these emissions data only cover those that can be identified in the database and may not cover all categories in each country.

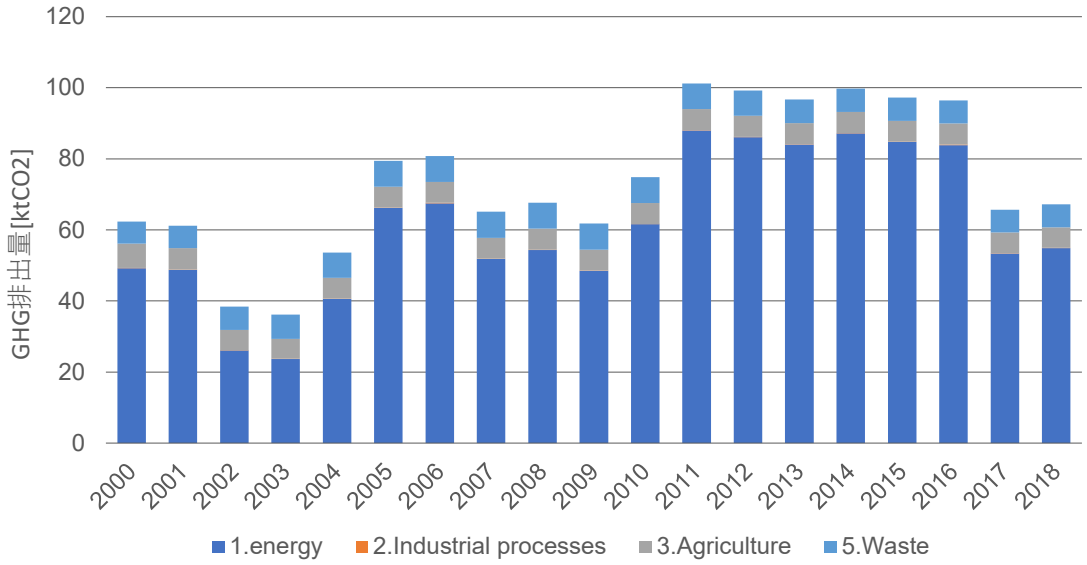

Figure 14 GHG emission/removal trends (Cook Islands)

source：EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

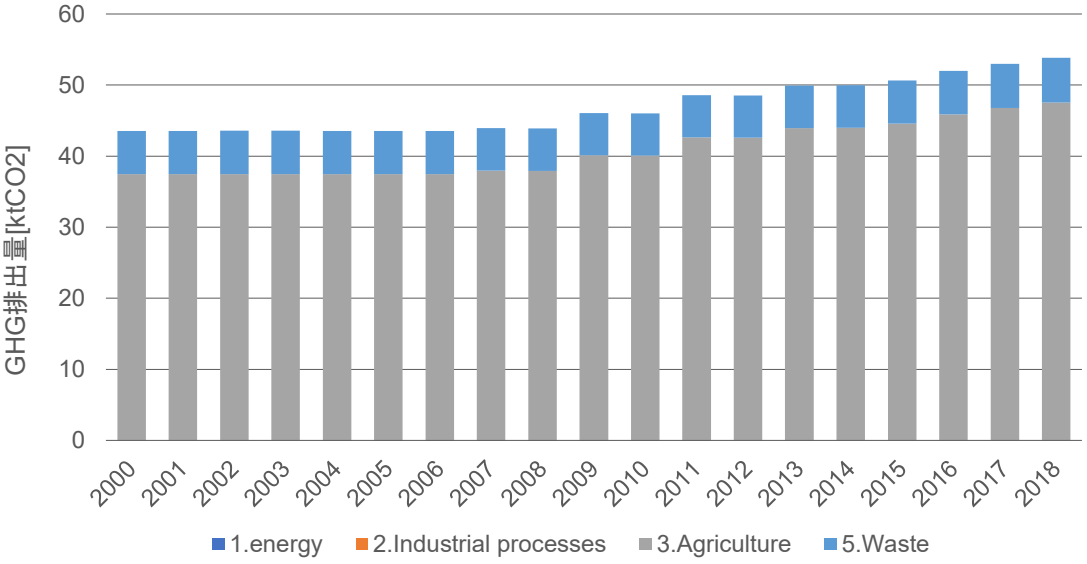

Figure 15 GHG emission/removal trends (Micronesia)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

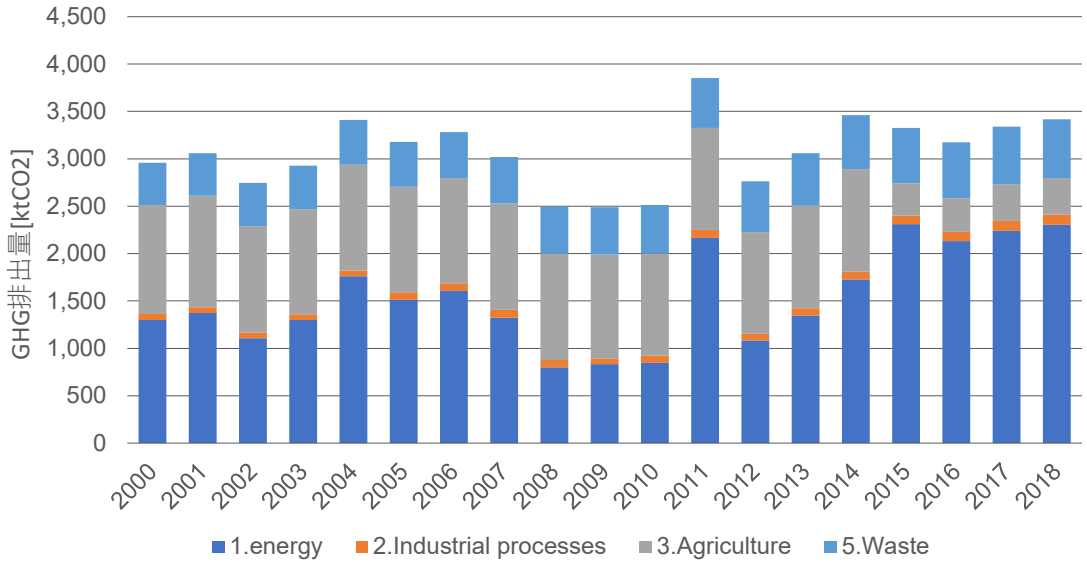

Figure 16 GHG emission/removal trends (Fiji)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

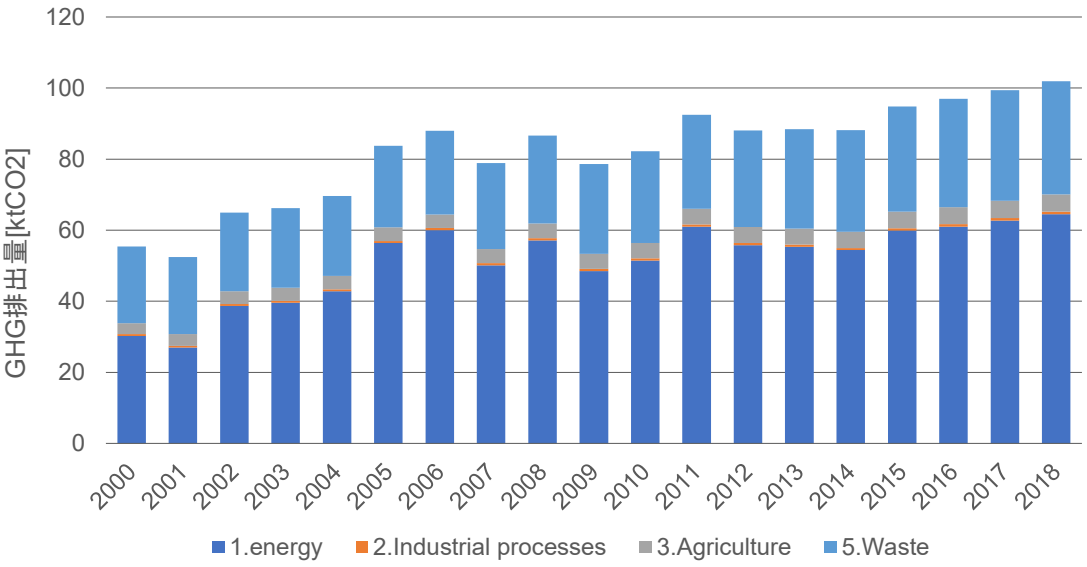

Figure 17 GHG emission/removal trends (Kiribati)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

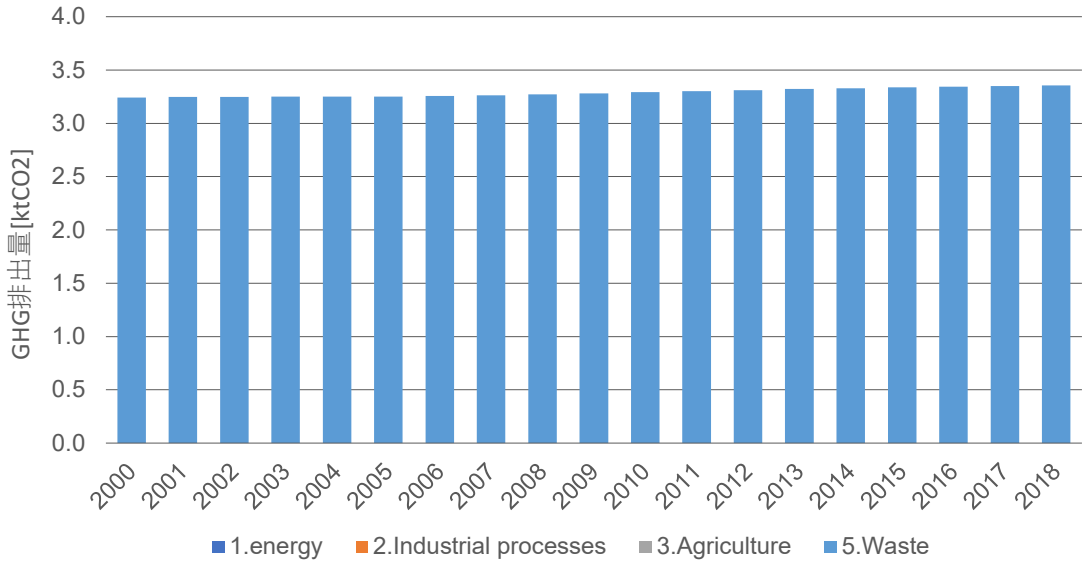

Figure 18 GHG emission/removal trends (Marshall Islands)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

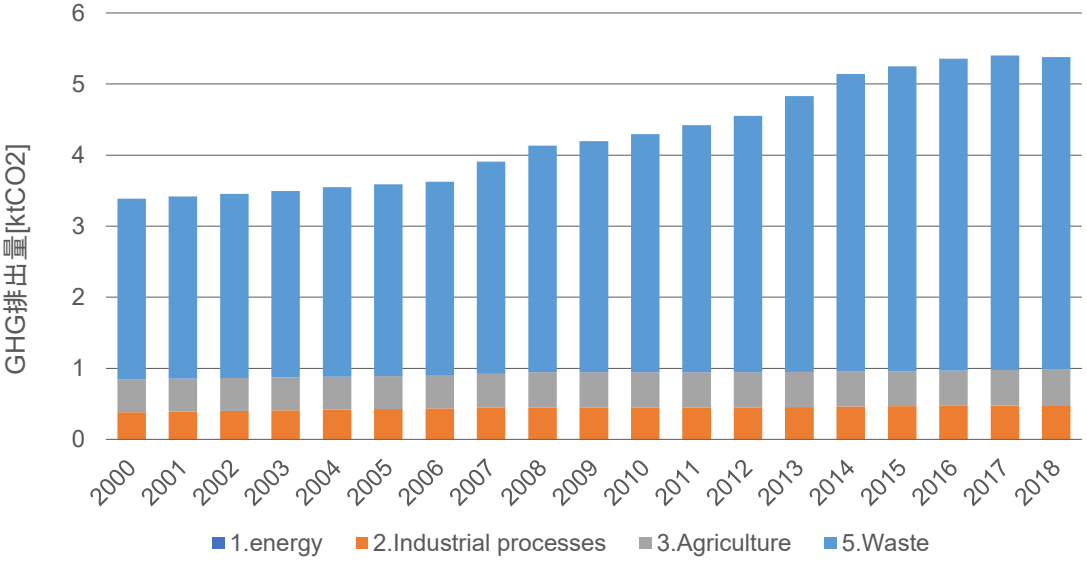

Figure 19 GHG emission/removal trends (Nauru)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

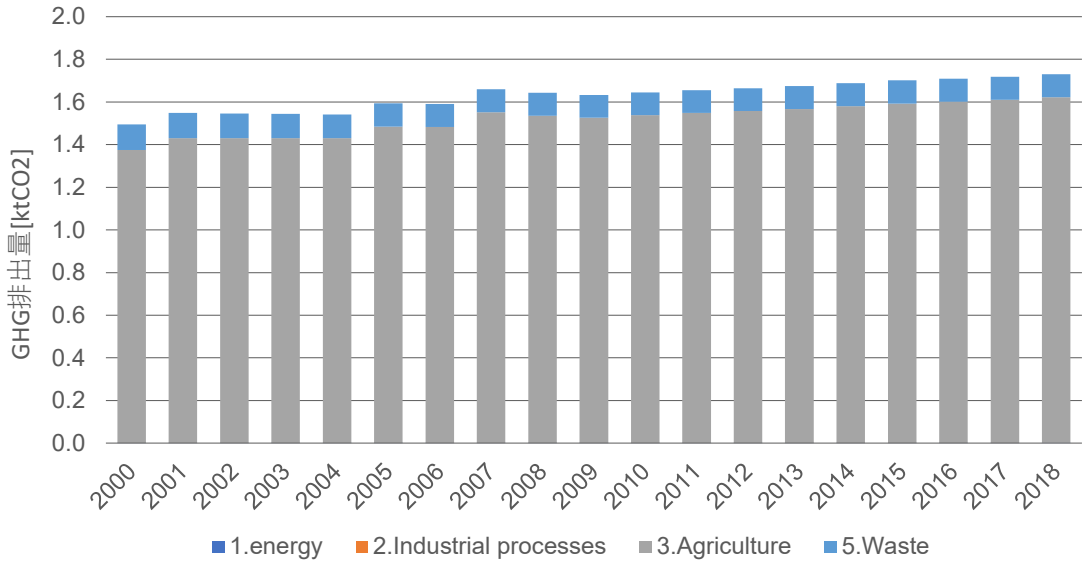

Figure 20 GHG emission/removal trends (Niue)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

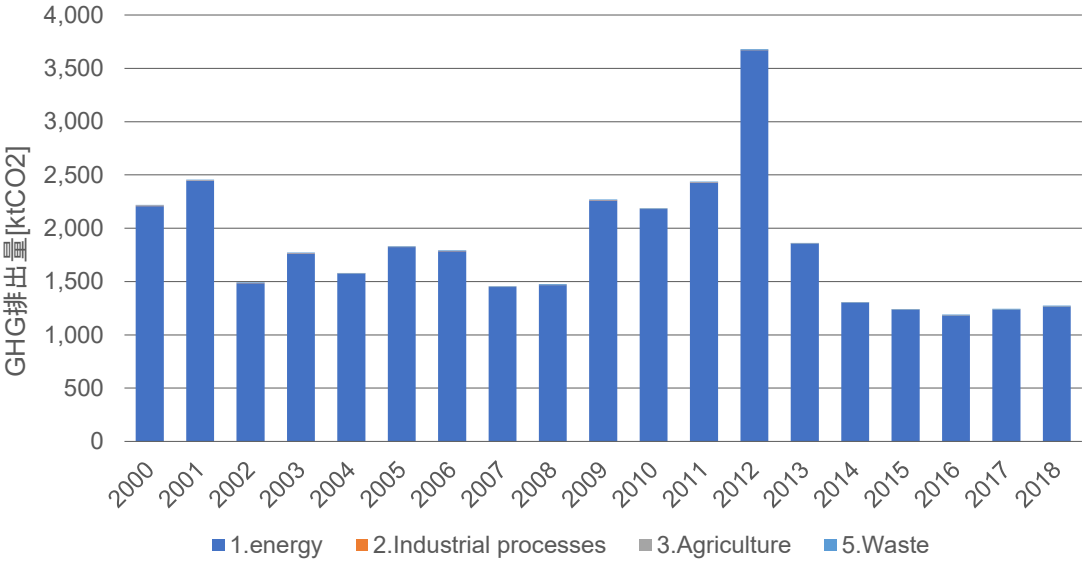

Figure 21 GHG emission/removal trends (Palau)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

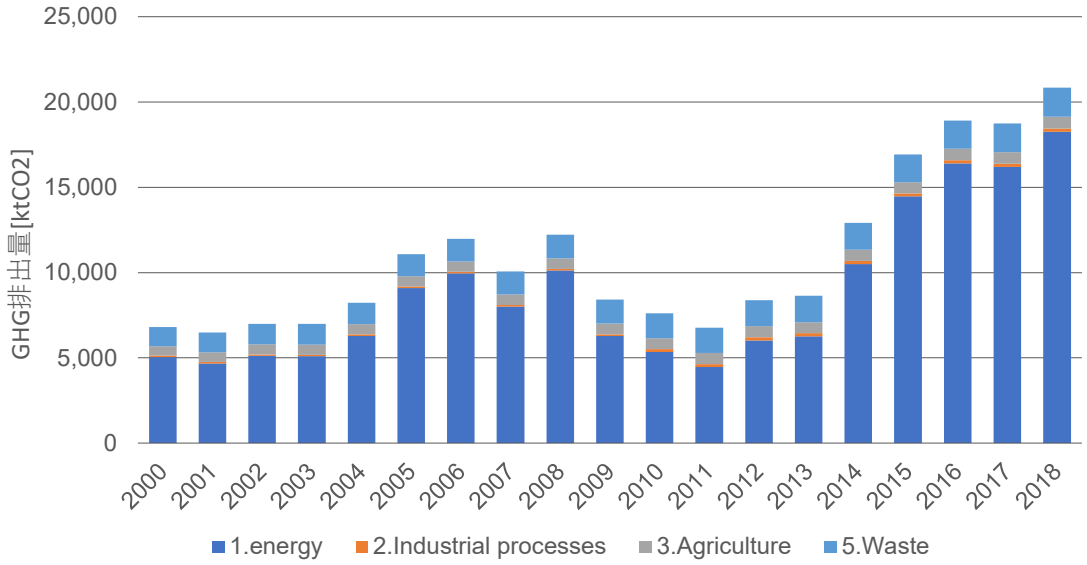

Figure 22 GHG emission/removal trends (PNG)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

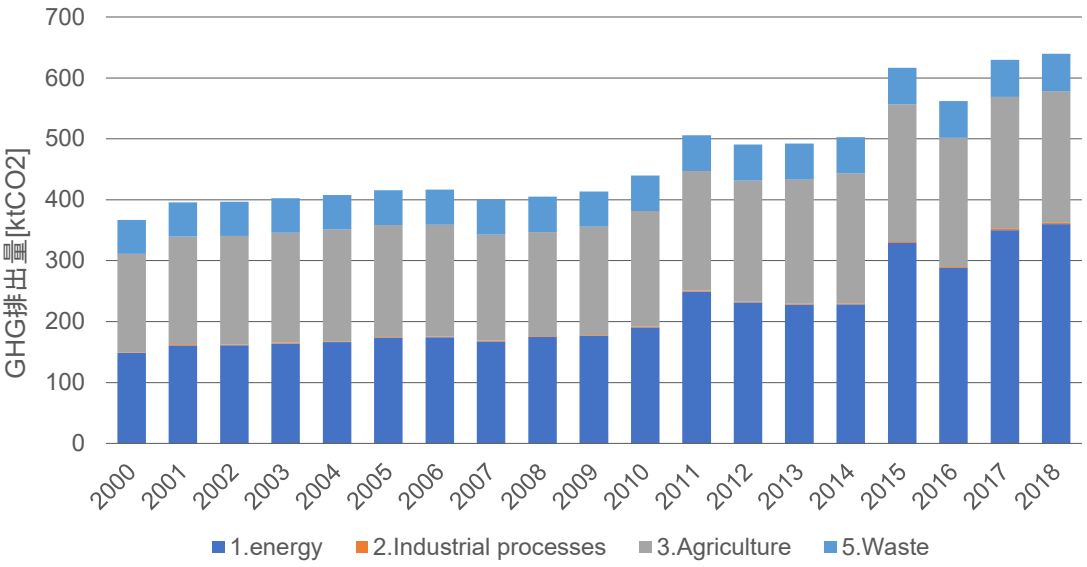

Figure 23 GHG emission/removal trends (Samoa)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

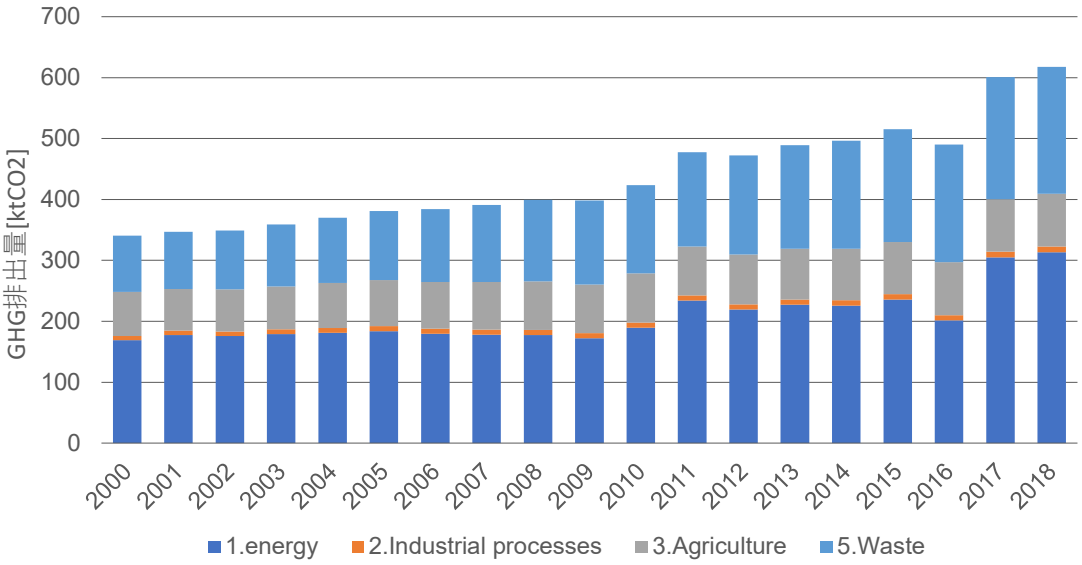

Figure 24 GHG emission/removal trends (Solomon Islands)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

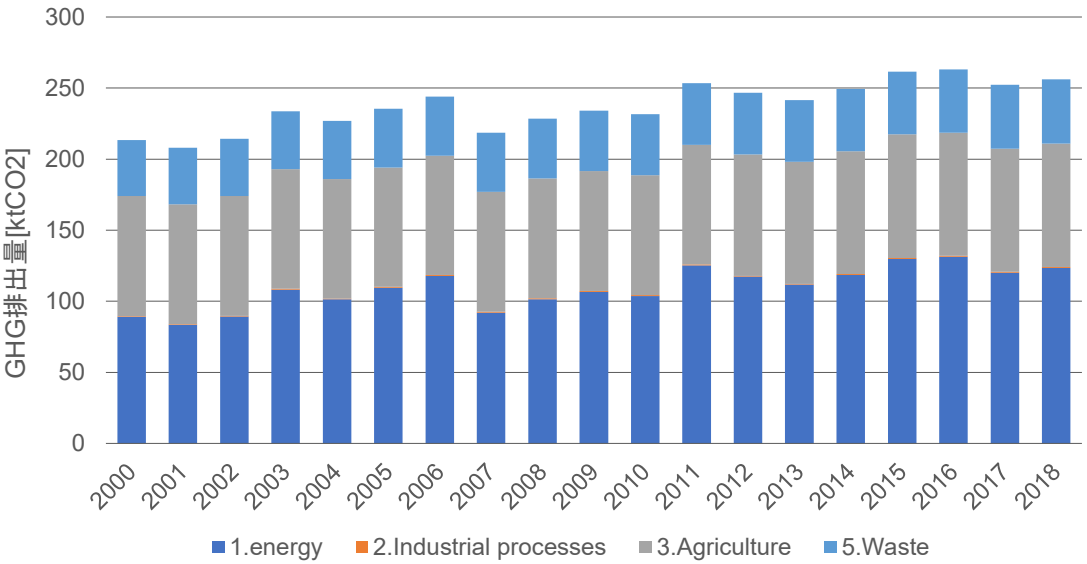

Figure 25 GHG emission/removal trends (Tonga)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

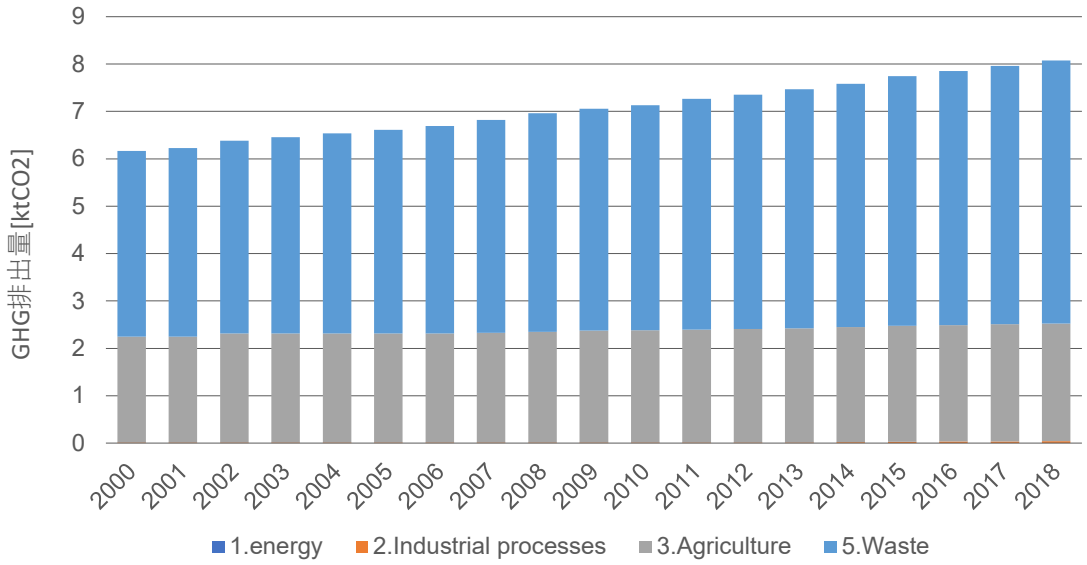

Figure 26 GHG emission/removal trends (Tuvalu)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

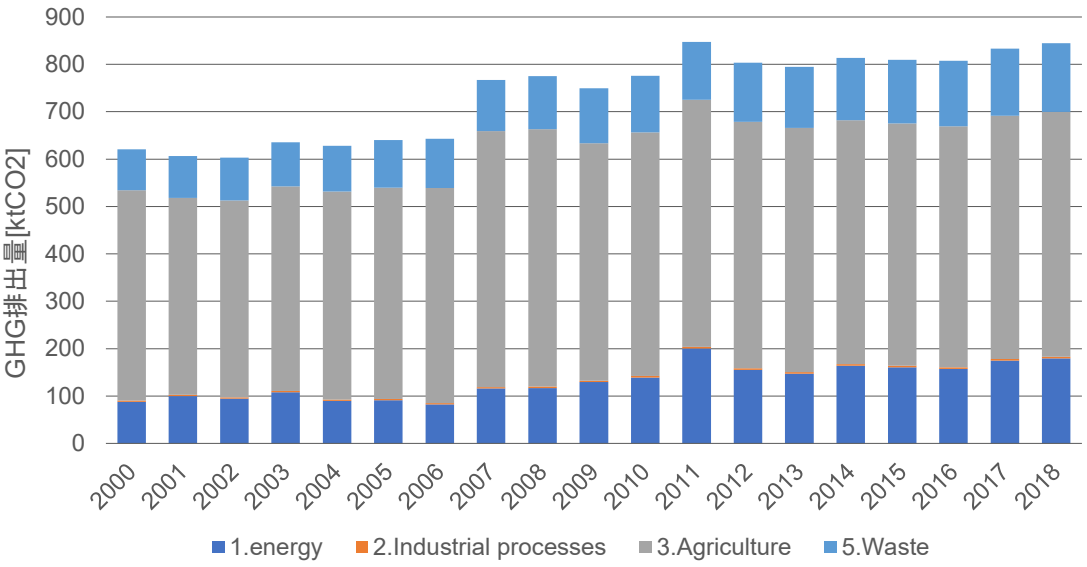

Figure 27 GHG emission/removal trends (Vanuatu)

Source: EC-JRC / PBL., EDGAR v6.0_GHG (1970 - 2018) of May 2021.

D. Overview of comparative analysis

Comparison of collected GHG emissions and removal data with the latest inventory (NC, BUR) submitted by each country to the UNFCCC. The results are as shown below (results in Japanese only).

クック諸島

■ 算定対象の比較

- インベントリでは、エネルギー分野は業務部門以外からのCO_2・CH_4・N_2O、IPPU分野では冷媒からのFガスのみ、廃棄物分野では固形廃棄物の処分、排水の処理と放出および廃棄物の焼却と野焼きからのCH_4が算定対象となっている。
- EDGARではIPPU分野ではガラス製造、潤滑油の使用の算定値も示されているため、これらの排出源についてTier 1での算定が可能であると考えられる。

分野	算定対象	
エネルギー	年	2006年～2014年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	2006年～2014年
	排出源／ガス	Fgas
廃棄物	年	2006年～2014年
	排出源／ガス	CH_4

■ 算定値の比較

- 比較可能な排出区分ではIPPU分野の合計排出量の差異が大きく、インベントリではFガスのみが計上されている一方、EDGARではFガスが計上されていないことによる。
- エネルギー分野も差異が大きく、インベントリのの方が各ガスとも排出量が小さい。これは、排出係数などの違い以外にも、燃料種や対象部門の差異が影響している可能性がある。

Cook Islands 2014 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	66	87	-24.1%
	CH_4	0.01	0.09	-93.2%
	N_2O	0.16	0.72	-78.6%
	Total	**66.16**	**87.81**	**-24.7%**
2.Industrial processes	CO_2	-	0.09	-
	CH_4	-	-	-
	N_2O	-	0.11	-
	Fgas	2.5	-	-
	Total	**2.50**	**0.20**	**1151.4%**
5.Waste	CO_2	-	-	-
	CH_4	-	3.27	-
	N_2O	-	-	-
	Total	**3.70**	**3.27**	**13.1%**

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■ 算定対象の比較

- インベントリで算定されているのは、農業分野のうち消化管内発酵と家畜排せつ物管理のみ。LULUCF分野は算定されていない。
- FAOSTATでは無機質肥料からの排出（農業分野）と森林吸収（LULUCF分野）の算定値も示されているため、これらの排出源についてTier 1での算定が可能であると考えられる。

■ 算定値の比較

- 比較可能な排出区分のうち、家畜排せつ物管理の差が大きく、インベントリの排出量はFAOSTATの10%以下の値となっている。
- 大きな相違が生じている理由は不明であるが、活動量データの範囲が異なっている（FAOSTATの方が対象が広範である）可能性が高い。

分野	算定対象	
農業	年	2006年～2014年
	排出源／ガス	CH_4/N_2O
LULUCF	年	算定していない
	排出・吸収源／ガス	算定していない

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	4,642	Total	16,710	-72.2%
	Enteric fermentation	1,030	Enteric fermentation	1,436	-28.3%
	Manure management	1,348	Manure management	13,789	-90.2%
	Rice cultivation	-	Rice cultivation	-	-
	Agricultural soils	2,264	Synthetic fertilizers	41	-59.2%
			Manure applied to soils	1,228	
			Manure left on pasture	216	
			Crop residues	-	
			Drained organic soils	-	
	Prescribed burning of savannahs	-	Savanna fires	0	-
	Field burning of agricultural residues	-	Burning-crop residues	-	-
LULUCF	Total	-	Total	-2,757	-
	Changes in forest and other woody biomass stocks	-	Forestland	-2,757	-
			Forest fires	0	
			Fires in organic soils	0	
	Forest and grassland conversion	-	Net forest conversion	0	-
	CO2 emissions and removals from soil	-	Drained organic soils	-	-

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フィジー

■算定対象の比較

- インベントリでは、エネルギー分野は全部門からのCO_2・CH_4・N_2O、廃棄物分野では固形廃棄物の処分、汚泥処理および生活排水の処理と放出からのCH_4が算定対象となっており、IPPU分野は未推計となっている。
- EDGARでは、IPPU分野ではセメント製造、生石灰製造、ガラス製造からのCO_2、その他製品の製造および使用からのN_2O、廃棄物分野では排水の処理と放出からのN_2Oの算定値も示されているため、これらの排出源についてTier 1での算定が可能であると考えられる。

■算定値の比較

- 比較可能な排出区分ではエネルギー分野のCH_4・N_2Oの差異が大きく、インベントリの方が各ガスとも排出量が小さい。また廃棄物分野のCH_4もインベントリの方が排出量が小さく、排出係数などの違い以外にも、燃料種や活動量の対象範囲の差異が影響している可能性がある。

分野	算定対象	
エネルギー	年	2006年～2011年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	算定していない
	排出源／ガス	算定していない
廃棄物	年	2006年～2011年
	排出源／ガス	CH_4

Fiji 2011 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	1474	2,147	-31.3%
	CH_4	1	10	-90.3%
	N_2O	3	26	-88.5%
	Total	**1,478**	**2,183**	**-32.3%**
2.Industrial processes	CO_2		83	-100.0%
	CH_4		-	-
	N_2O		5	-100.0%
	Fgas		-	-
	Total	**0.00**	**88**	**-100.0%**
5.Waste	CO_2		-	-
	CH_4	92	262	-64.9%
	N_2O		12	-100.0%
	Total	**92**	**275**	**-66.5%**

■算定対象の比較

- インベントリでは比較的広範な排出・吸収源を対象に算定が行われている。一方、FAOSTATではインベントリで算定済みの排出・吸収源に加え、作物残渣、作物残渣の焼却、有機質土壌の排水が算定されている。なかでも有機質土壌の排水は比較的排出量が大きいため、FAOSTATのデータを参考に算定に向けて検討することが求められる。

■算定値の比較

- 比較可能な排出源のうち、森林バイオマス（LULUCF分野）の差が大きい。FAOSTATでは吸収であるにもかかわらず、インベントリは森林転用等の要因により排出になるとされている。
- 差が生じる要因として、インベントリにおいて木材収穫に伴う排出が240万トンCO_2計上されていることが挙げられる。

分野	算定対象	
農業	年	2006年～2011年
	排出源／ガス	CH_4/N_2O
LULUCF	年	2006年～2011年
	排出・吸収源／ガス	CO_2

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	551,985	Total	999,768	-44.8%
	Enteric fermentation	314,440	Enteric fermentation	608,525	-48.3%
	Manure management	81,200	Manure management	128,809	-37.0%
	Rice cultivation	9,800	Rice cultivation	10,878	-9.9%
	Agricultural soils	146,545	Synthetic fertilizers	19,494	-41.0%
			Manure applied to soils	24,002	
			Manure left on pasture	204,487	
			Crop residues	605	
			Drained organic soils	-	
	Prescribed burning of savannahs	-	Savanna fires	0	-
	Field burning of agricultural residues	-	Burning-crop residues	2,968	-
LULUCF	Total	560,000	Total	-2,537,730	122.1%
	Changes in forest and other woody biomass stocks	-170,000	Forestland	-2,654,328	93.6%
			Forest fires	0	
			Fires in organic soils	0	
	Forest and grassland conversion	730,000	Net forest conversion	0	-
	CO2 emissions and removals from soil	-	Drained organic soils	116,598	-

キリバス

■算定対象の比較

- インベントリでは、エネルギー分野は発電、運輸、家庭、農林水産業からのCO_2のみが算定対象となっており、エネルギー分野からのCH_4・N_2O、 IPPU分野、廃棄物分野は未推計となっている。
- EDGARでは、エネルギー分野からのCH_4・N_2O 、IPPU分野ではその他製品の製造および使用からのN_2O、廃棄物分野では固形廃棄物の処分、廃棄物の野焼きからのCH_4、および排水の処理と放出からのCH_4・N_2Oの算定値も示されているため、これらの排出源についてTier 1での算定が可能であると考えられる。

■算定値の比較

- 比較可能な排出区分ではエネルギー分野のCO_2については、インベントリの方が排出量が大きい。時系列のデータによると、インベントリの排出量は2006年に急増しており、データ精度に疑義があるとのことで、時系列の一貫性も含めデータの精査が必要であると考えられる。

分野	算定対象	
エネルギー	年	2006年～2008年
	排出源／ガス	CO_2
IPPU	年	算定していない
	排出源／ガス	算定していない
廃棄物	年	算定していない
	排出源／ガス	算定していない

Kiribati 2008 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	63.8	55.7	14.6%
	CH_4		0.7	-100.0%
	N_2O		0.4	-100.0%
	Total	**63.8**	**57**	**12.3%**
2.Industrial processes	CO_2		0.6	-100.0%
	CH_4		-	-
	N_2O		0.6	-100.0%
	Fgas		-	-
	Total	**0.00**	**1.3**	**-100.0%**
5.Waste	CO_2		-	-
	CH_4		12.4	-100.0%
	N_2O		1.4	-100.0%
	Total	**0.00**	**14**	**-100.0%**

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■算定対象の比較

- インベントリで算定されているのは、農業分野のうち消化管内発酵と家畜排せつ物管理のみ。LULUCF分野は算定されていない。
- FAOSTATでは有機質肥料からの排出（農業分野）の算定値も示されているため、これらの排出源についてTier 1での算定が可能であると考えられる。

■算定値の比較

- 消化管内発酵と家畜排せつ物管理について、インベントリの方がそれぞれ約3倍、約16倍大きく見積もられている。大きな相違が生じている理由として、活動量データの把握方法が大きく異なる可能性が指摘される。インベントリでは豚と家禽が対象とされており、NC2にはそれぞれの飼養頭数も記載されていることから、これら活動量データが妥当かどうかを精査する必要がある。

分野	算定対象	
農業	年	2006年～2008年
	排出源／ガス	CH_4/N_2O
LULUCF	年	算定していない
	排出・吸収源／ガス	算定していない

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	102,897	Total	8,263	1145.2%
	Enteric fermentation	1,008	Enteric fermentation	353	185.7%
	Manure management	101,888	Manure management	6,117	1565.7%
	Rice cultivation	-	Rice cultivation	-	-
	Agricultural soils	-	Synthetic fertilizers	-	-
			Manure applied to soils	1,727	
			Manure left on pasture	67	
			Crop residues	-	
			Drained organic soils	-	
	Prescribed burning of savannahs	-	Savanna fires	0	-
	Field burning of agricultural residues	-	Burning-crop residues	-	-
LULUCF	Total	0	Total	0	-
	Changes in forest and other woody biomass stocks	-	Forestland	-	-
			Forest fires	0	
			Fires in organic soils	0	
	Forest and grassland conversion	-	Net forest conversion	-	-
	CO2 emissions and removals from soil	-	Drained organic soils	-	-

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マーシャル諸島

■算定対象の比較

- インベントリでは、エネルギー分野は製造業以外からのCO_2・CH_4・N_2O、廃棄物分野では固形廃棄物の処分および排水の処理と放出からのCH_4・N_2Oが算定対象となっており、エネルギー分野の製造業とIPPU分野は排出源が存在しないとされている。
- EDGARでは、廃棄物分野では廃棄物の野焼きからのCH_4の算定値も示されているため、Tier 1での算定が可能であると考えられる。

■算定値の比較

- 比較可能な排出区分では廃棄物分野のCH_4の差異が大きく、インベントリの方が排出量が大きい。EDGARでは、廃棄物分野の排水の処理と放出および廃棄物の野焼きからのCH_4のみが算定対象となっており、固形廃棄物の処分からのCH_4が含まれていないことが影響している可能性がある。

分野	算定対象	
エネルギー	年	2000年～2010年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	算定していない
	排出源／ガス	算定していない
廃棄物	年	2000年～2010年
	排出源／ガス	CO_2/CH_4/N_2O

Marshall Islands 2010 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	124.9	-	-
	CH_4	6.9	-	-
	N_2O	1.6	-	-
	Total	**133.5**	-	-
2.Industrial processes	CO_2		-	-
	CH_4		-	-
	N_2O		-	-
	Fgas		-	-
	Total	**0.00**	-	-
5.Waste	CO_2	0	-	-
	CH_4	35.2	1.6	2036.0%
	N_2O	1.2	-	-
	Total	**36.3**	**1.6**	**2107.6%**

■算定対象・算定値の比較

- インベントリでは農業分野、LULUCF分野とも排出・吸収量の報告が行われていない。一部の排出区分（稲作、サバンナの計画的な燃焼）については同国内において活動が実施されておらず、したがって活動なし（NO：Not Occurring）であるが、それ以外の区分については未推計（NE）となっている。
- 一方、FAOSTATでもマーシャル諸島の農業分野、LULUCF分野における排出・吸収量は報告されていない。
- 同国では排出・吸収量を算定する上での基礎データである活動量データが整備されていない状況であり、当面の作業として活動量データの整備を進める必要がある。

分野	算定対象	
農業	年	算定していない
	排出源／ガス	算定していない
LULUCF	年	算定していない
	排出・吸収源／ガス	算定していない

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	0	Total	0	-
	Enteric fermentation	-	Enteric fermentation	-	-
	Manure management	-	Manure management	-	-
	Rice cultivation	0	Rice cultivation	-	-
	Agricultural soils	-	Synthetic fertilizers	-	-
			Manure applied to soils	-	
			Manure left on pasture	-	
			Crop residues	-	
			Drained organic soils	-	
	Prescribed burning of savannahs	0	Savanna fires	-	-
	Field burning of agricultural residues	-	Burning-crop residues	-	-
LULUCF	Total	0	Total	0	-
	Changes in forest and other woody biomass stocks	-	Forestland	-	-
			Forest fires	-	
			Fires in organic soils	-	
	Forest and grassland conversion	-	Net forest conversion	-	-
	CO2 emissions and removals from soil	-	Drained organic soils	-	-

ミクロネシア

■算定対象の比較

- インベントリでは、エネルギー分野は全部門からのCO_2・CH_4・N_2O 、 IPPU分野では生石灰製造からのCO_2および冷凍空調機器・消火剤からのHFCs、廃棄物分野では固形廃棄物の処分からのCH_4、排水の処理と放出からのCH_4 ・N_2Oが算定対象となっている。
- EDGARでは、廃棄物分野では廃棄物の野焼きからのCH_4の算定値も示されているため、Tier 1での算定が可能であると考えられる。
- なお、インベントリでは2000年単年の排出量算定となっているが、 US EIAの「the International Energy Statistics」などでは2000年以降の時系列でのエネルギー消費量なども掲載されており、こうした外部のデータの活用も考えられる。

■算定値の比較

- 比較可能な排出区分では、廃棄物分野のCH_4は、インベントリの方が排出量が小さく、廃棄物の野焼きからのCH_4が計上されていないことが影響している可能性がある。

分野	算定対象	
エネルギー	年	2000年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	2000年
	排出源／ガス	CO_2/HFCs
廃棄物	年	2000年
	排出源／ガス	CH_4/N_2O

Micronesia, Federated States of　2000　[$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	151.9	-	-
	CH_4	0.2	-	-
	N_2O	0.004	-	-
	Total	**152.1**	-	-
2.Industrial processes	CO_2	0.07	-	-
	CH_4		-	-
	N_2O		-	-
	Fgas	0.00051	-	-
	Total	**0.07**	-	-
5.Waste	CO_2		-	-
	CH_4	0.06	3.05	-98.0%
	N_2O	0.05	-	-
	Total	**0.11**	**3.05**	**-96.4%**

■算定対象の比較

- 算定対象年は2000年の1ヵ年に限られるものの、比較的幅広い排出・吸収区分を対象に算定が行われている。
- ただし、家畜排せつ物管理や農地土壌等については、排出・吸収量について十分に検討した上でゼロなのか、それとも未推計（NE）なのかの見分けがつかない。実際、FAOSTATではこれらの区分において排出量が報告されていることから、ゼロではなくNEの可能性が高い。

■算定値の比較

- 算定値の比較が可能な排出・吸収区分のうち、消化管内発酵と森林・草地の転用において大きな差異が認められた。
- 差異が生じている理由として、インベントリにおける単位表記ミスの可能性が指摘される。示された数値がガス別重量なのか、GWPを用いてCO_2換算された重量なのか等について精査する必要がある。

分野	算定対象	
農業	年	2000年
	排出源／ガス	CH_4/N_2O
LULUCF	年	2000年
	排出・吸収源／ガス	CO_2/CH_4

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	690	Total	54,486	-98.7%
	Enteric fermentation	671	Enteric fermentation	26,676	-97.5%
	Manure management	0	Manure management	16,984	-100.0%
	Rice cultivation	0	Rice cultivation	553	-100.0%
	Agricultural soils	0	Synthetic fertilizers	-	-100.0%
			Manure applied to soils	1,979	
			Manure left on pasture	8,270	
			Crop residues	16	
			Drained organic soils	-	
	Prescribed burning of savannahs	19	Savanna fires	0	-
	Field burning of agricultural residues	0	Burning-crop residues	8	-100.0%
LULUCF	Total	-481,999	Total	-29,122	-1555.1%
	Changes in forest and other woody biomass stocks	-506,950	Forestland	-381,110	-33.0%
			Forest fires	0	
			Fires in organic soils	0	
	Forest and grassland conversion	831	Net forest conversion	351,988	-99.8%
	CO2 emissions and removals from soil	24,119	Drained organic soils	-	-

ナウル

■算定対象の比較

- インベントリでは、エネルギー分野は全部門からのCO_2・CH_4・N_2O、廃棄物分野では固形廃棄物の処分からのCH_4および排水の処理と放出からのCH_4・N_2Oが算定対象となっており、IPPU分野は未推計となっている。
- EDGARでは、IPPU分野ではその他製品の製造および使用からのN_2O、廃棄物分野では廃棄物の野焼きからのCH_4の算定値も示されているため、Tier 1での算定が可能であると考えられる。

■算定値の比較

- 比較可能な排出区分では、廃棄物分野のCH_4は、インベントリの方が排出量が大きくなっている。両者とも人口等により活動量を推計しているとみられるが、インベントリでは地域固有の原単位などを使用しており、より実態を反映している可能性がある（EDGARについては未確認であるが、より一般的なデータに基づいている可能性が高いとみられる）。

分野	算定対象	
エネルギー	年	1994年、2000年、2003年、2007年、2010年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	算定していない
	排出源／ガス	算定していない
廃棄物	年	1994年、2000年、2003年、2007年、2010年
	排出源／ガス	CH_4/N_2O

Nauru 2000 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	13.29	-	-
	CH_4	0.021	-	-
	N_2O	0.03	-	-
	Total	**13.34**	-	-
2.Industrial processes	CO_2		0.38	-100.0%
	CH_4		-	-
	N_2O		0.06	-100.0%
	Fgas		-	-
	Total	**0.00**	**0.45**	**-100.0%**
5.Waste	CO_2		-	-
	CH_4	4.34	1.27	241.2%
	N_2O	0.21	-	-
	Total	**4.55**	**1.27**	**257.7%**

MUFG

■算定対象の比較

- 算定対象は2000年の1ヵ年に限られており、排出・吸収区分も農業分野のうち家畜飼養と農地土壌のみである。LULUCF分野については算定されていない。
- FAOSTATと比較すると、排出・吸収区分の名称が必ずしも一致していないものの、概ね同じ区分を対象に排出・吸収量の算定が行われている。
- 以上より、技術的に算定可能な区分についてはインベントリにおいて報告が行われており、今後は活動量データを整備しつつ、算定対象を拡大していくことが求められる。

■算定値の比較

- インベントリとFAOSTATの算定値（農業分野の合計排出量）の差異は15.2%と、他の国の差異と比べて小さく、概ね適切に算定が行われていると考えられる。

分野	算定対象	
農業	年	2000年
	排出源／ガス	CH_4/N_2O
LULUCF	年	算定していない
	排出・吸収源／ガス	算定していない

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	1,608	Total	1,396	15.2%
	Enteric fermentation	1,371	Enteric fermentation	78	1648.7%
	Manure management	-	Manure management	1,200	-
	Rice cultivation	-	Rice cultivation	-	-
	Agricultural soils	237	Synthetic fertilizers	-	101.5%
			Manure applied to soils	117	
			Manure left on pasture	1	
			Crop residues	-	
			Drained organic soils	-	
	Prescribed burning of savannahs	-	Savanna fires	0	-
	Field burning of agricultural residues	-	Burning-crop residues	-	-
LULUCF	Total	0	Total	0	-
	Changes in forest and other woody biomass stocks	-	Forestland	0	-
			Forest fires	0	
			Fires in organic soils	0	
	Forest and grassland conversion	-	Net forest conversion	0	-
	CO2 emissions and removals from soil	-	Drained organic soils	-	-

MUFG

ニウエ

■算定対象の比較

- インベントリでは、エネルギー分野は全部門からのCO_2・CH_4・N_2Oが算定対象となっている。廃棄物分野では固形廃棄物の処分、排水の処理と放出および廃棄物の焼却が排出源として確認されているが、いずれも排出量はわずかであるとして、算定は行われていない。また、IPPU分野は未推計となっている。
- EDGARでは、廃棄物分野では排水の処理と放出および廃棄物の野焼きからのCH_4の算定値も示されており、排出量はわずかではあるものの、これらの排出源については、Tier 1での算定が可能であると考えられる。

■算定値の比較

- 比較可能な排出区分ではエネルギー分野のCH_4・N_2Oの差異が大きく、インベントリの方が各ガスとも排出量が大きい。CH_4・N_2Oについては、使用施設や燃料種によって排出係数が大きく異なる可能性があり、両者で使用している排出係数の差異が影響している可能性がある。

分野	算定対象	
エネルギー	年	2000年、2005年～2009年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	算定していない
	排出源／ガス	算定していない
廃棄物	年	算定していない
	排出源／ガス	算定していない

Niue 2009 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	5.03	-	-
	CH_4	0.004	0.00037	976.1%
	N_2O	0.002	0.00003	7190.0%
	Total	**5.04**	**0.00040**	########
2.Industrial processes	CO_2		-	-
	CH_4		-	-
	N_2O		-	-
	Fgas		-	-
	Total	**0.00**	-	-
5.Waste	CO_2		-	-
	CH_4	0.00	0.053	-100.0%
	N_2O	0.00	-	-
	Total	**0.00**	**0.053**	**-100.0%**

■算定対象の比較

- インベントリで算定されているのは、LULUCF分野のうち森林・草地の転用のみ。農業分野は算定されていない。
- FAOSTATでは消化管内発酵、家畜排せつ物管理、農地土壌等の排出・吸収量が示されているため、これらの排出・吸収源についてTier 1での算定が可能であると考えられる。

■算定値の比較

- 算定値の比較が可能な森林・草地の転用において大きな差異が認められた。インベントリが吸収である一方、FAOSTATでは排出と算定されており、そもそも算定対象あるいは算定方法が大きく異なっている可能性が指摘される。
- インベントリにおいて具体的にどのような活動が含まれ、どのように算定されたのかを明らかにしつつ、必要に応じて改善を加えていくことが求められる。

分野	算定対象	
農業	年	算定していない
	排出源／ガス	算定していない
LULUCF	年	2000年
	排出・吸収源／ガス	CO_2

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	0	Total	1,315	-100.0%
	Enteric fermentation	-	Enteric fermentation	300	-
	Manure management	-	Manure management	849	-
	Rice cultivation	-	Rice cultivation	-	-
	Agricultural soils	-	Synthetic fertilizers	-	-
			Manure applied to soils	98	
			Manure left on pasture	69	
			Crop residues	-	
			Drained organic soils	-	
	Prescribed burning of savannahs	-	Savanna fires	0	-
	Field burning of agricultural residues	-	Burning-crop residues	-	-
LULUCF	Total	-144,000	Total	2,248	-6504.8%
	Changes in forest and other woody biomass stocks	-	Forestland	-69	-
			Forest fires	0	
			Fires in organic soils	0	
	Forest and grassland conversion	-144,000	Net forest conversion	2,317	-6314.1%
	CO2 emissions and removals from soil	-	Drained organic soils	-	-

パラオ

■ 算定対象の比較

- インベントリでは、エネルギー分野は業務部門以外の部門からのCO_2、IPPU分野では生石灰製造とソーダ灰製造からのCO_2、廃棄物分野では固形廃棄物の処分からのCH_4、排水の処理と放出からのCH_4・N_2O、および廃棄物の焼却からのCO_2が算定対象となっている。エネルギー分野のCH_4・N_2Oが算定対象となっているかは確認できない。
- EDGARでは、エネルギー分野からのCH_4・N_2O、IPPU分野ではガラス製造からのCO_2およびその他製品の製造および使用からのN_2O、廃棄物分野では廃棄物の焼却からのCH_4の算定値も示されているため、これらの排出源についてTier 1での算定が可能であると考えられる。

■ 算定値の比較

- 比較可能な排出区分では、対象排出源が異なっているIPPU分野を除くと、エネルギー分野のCO_2の差異が大きく、インベントリの方が排出量が小さい。排出係数などの違い以外に、活動量の対象範囲の差異が影響している可能性が高いと思われる。

分野	算定対象	
エネルギー	年	1994年～2005年
	排出源／ガス	CO_2 /(CH_4/N_2O)
IPPU	年	1994年～2005年
	排出源／ガス	CO_2
廃棄物	年	1994年～2005年
	排出源／ガス	CH_4/N_2O

Palau 2005 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	332	1,731	-80.8%
	CH_4		46	-100.0%
	N_2O		10	-100.0%
	Total	**332**	**1,787**	**-81.4%**
2.Industrial processes	CO_2	0.09	2.7	-96.6%
	CH_4		-	-
	N_2O		0.1	-100.0%
	Fgas		-	-
	Total	**0.09**	**2.8**	**-96.7%**
5.Waste	CO_2	0.007	-	-
	CH_4	3.99	3.2	25.4%
	N_2O	0.47	-	-
	Total	**4.46**	**3.2**	**40.2%**

■ 算定対象の比較

- インベントリで算定されているのは、農業分野のうち消化管内発酵、家畜排せつ物管理、農地土壌、LULUCF分野のうち森林吸収である。
- FAOSTATでは農業、LULUCF分野とも算定が行われておらず、したがってインベントリの方が算定・報告が進んでいる状況である。

■ 算定値の比較

- FAOSTATに算定値が示されていないため、これと比較することは困難である。
- ただし、国土面積や人口、土地利用、産業構造等が比較的近い国の算定値（インベントリ、FAOSTATデータベース）と比較し、差異を分析することで、今後のインベントリ改善に向けた検討の糸口を見つけることが可能かもしれない。

分野	算定対象	
農業	年	2000年～2005年
	排出源／ガス	CH_4/N_2O
LULUCF	年	2000年～2005年
	排出・吸収源／ガス	CO_2

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	9,918	Total	0	-
	Enteric fermentation	55	Enteric fermentation	-	-
	Manure management	625	Manure management	-	-
	Rice cultivation	-	Rice cultivation	-	-
	Agricultural soils	9,238	Synthetic fertilizers	-	-
			Manure applied to soils	-	
			Manure left on pasture	-	
			Crop residues	-	
			Drained organic soils	-	
	Prescribed burning of savannahs	-	Savanna fires	0	-
	Field burning of agricultural residues	-	Burning-crop residues	-	-
LULUCF	Total	98,570	Total	0	-
	Changes in forest and other woody biomass stocks	98,570	Forestland	-	-
			Forest fires	0	
			Fires in organic soils	0	
	Forest and grassland conversion	-	Net forest conversion	-	-
	CO2 emissions and removals from soil	-	Drained organic soils	-	-

パプアニューギニア

■算定対象の比較

- インベントリでは、エネルギー分野は全部門からのCO_2・CH_4・N_2O、IPPU分野では潤滑油の使用からのCO_2、廃棄物分野では固形廃棄物の処分からのCH_4、固形廃棄物の生物処理、排水の処理と放出からのCH_4・N_2Oが算定対象となっている。
- EDGARでは、IPPU分野ではセメント製造、生石灰製造、ガラス製造、その他プロセスでの炭酸塩の使用からのCO_2、その他製品の製造および使用からのN_2O、廃棄物分野では廃棄物の焼却と野焼きからのCO_2・CH_4・N_2Oの算定値も示されているため、これらの排出源についてTier 1での算定が可能であると考えられる。なお燃料からの漏出の固体燃料からのCH_4・N_2Oも算定されているが、インベントリでは当該排出源は国内に存在しないとされており、EDGAR側のデータについて確認が必要である。

■算定値の比較

- 比較可能な排出区分ではエネルギー分野の燃料の燃焼のエネルギー産業や製造業におけるCO_2の差異が大きく、インベントリの方が排出量が大きい。燃料種や活動量の対象範囲の差異が影響している可能性がある。

分野	算定対象	
エネルギー	年	2000年～2015年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	2000年～2015年
	排出源／ガス	CO_2
廃棄物	年	2000年～2015年
	排出源／ガス	CH_4/N_2O

Papua New Guinea 2015 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	8,059	6,184	30.3%
	CH_4	3,694	4,141	-10.8%
	N_2O	53	97	-45.4%
	Total	**11,806**	**10,421**	**13.3%**
2.Industrial processes	CO_2	1.4	182	-99.2%
	CH_4	0	-	-
	N_2O	0	0.004	-100.0%
	Fgas	0	-	-
	Total	**1.4**	**182**	**-99.2%**
5.Waste	CO_2	0	1	-100.0%
	CH_4	741	810	-8.5%
	N_2O	130	18	640.0%
	Total	**871**	**828**	**5.2%**

■算定対象の比較

- インベントリで算定されているのは、農業分野のうち消化管内発酵、家畜排せつ物管理、農地土壌、LULUCF分野のうち森林、農地、草地、開発地、バイオマスの燃焼である。
- FAOSTATにはサバンナの計画的な燃焼、稲作等の算定値も示されているため、これらの排出区分についてTier 1での算定が可能であると考えられる。また、FAOSTATでは、排水された有機質土壌において3,000万トンCO_2を超える排出量が示されている。同排出区分の算定は容易ではないものの、インベントリでも算定に向けて検討を進める必要がある。

■算定値の比較

- 算定値の比較が可能な排出・吸収区分ではいずれも大きな差異が認められた。特に森林吸収の差異が大きく、優先的に改善する必要がある。

分野	算定対象	
農業	年	2015年
	排出源／ガス	CH_4/N_2O
LULUCF	年	2015年
	排出・吸収源／ガス	CO_2/CH_4/N_2O

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	796,710	Total	1,698,065	-53.1%
	Enteric fermentation	168,210	Enteric fermentation	216,198	-22.2%
	Manure management	163,500	Manure management	871,811	-81.2%
	Rice cultivation	-	Rice cultivation	2,697	-
	Agricultural soils	465,000	Synthetic fertilizers	114,120	82.8%
			Manure applied to soils	86,250	
			Manure left on pasture	53,206	
			Crop residues	862	
			Drained organic soils	-	
	Prescribed burning of savannahs	-	Savanna fires	352,228	-
	Field burning of agricultural residues	-	Burning-crop residues	694	-
LULUCF	Total	1,721,460	Total	43,877,968	-96.1%
	Changes in forest and other woody biomass stocks	-11,284,070	Forestland	0	-1204.2%
			Forest fires	1,021,961	
			Fires in organic soils	0	
	Forest and grassland conversion	13,005,530	Net forest conversion	10,500,491	23.9%
	CO2 emissions and removals from soil	-	Drained organic soils	32,355,516	-

サモア

■算定対象の比較

- インベントリでは、エネルギー分野は全部門からのCO_2・CH_4・N_2O、IPPU分野では潤滑油の使用からのCO_2、その他製品の製造および使用からのN_2O、および冷蔵庫及び空調機器からのHFCs・PFCs、廃棄物分野では固形廃棄物の処分からのCH_4、廃棄物の焼却と野焼きからのCO_2・CH_4・N_2O、排水の処理と放出からのCH_4が算定対象となっている。
- EDGARでは、IPPU分野ではガラス製造からのCO_2、廃棄物分野では排水の処理と放出からのN_2Oの算定値も示されているため、これらの排出源についてTier 1での算定が可能であると考えられる。

■算定値の比較

- 比較可能な排出区分ではIPPU分野のその他製品の製造および使用からのN_2Oの差異が大きく、インベントリの方が排出量が小さい。当該排出源では活動量がそのまま排出量として計上されていると考えられ、データの桁間違い等が生じている可能性がある。

分野	算定対象	
エネルギー	年	1994年～2007年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	1994年～2007年
	排出源／ガス	CO_2/N_2O/HFCs/PFCs
廃棄物	年	1994年～2007年
	排出源／ガス	CO_2/CH_4/N_2O

Samoa 2007 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	171	158	8.0%
	CH_4	1.1	4.6	-77.0%
	N_2O	2.2	1.6	32.6%
	Total	**174**	**165**	**5.9%**
2.Industrial processes	CO_2	4	1.5	182.4%
	CH_4	0	-	-
	N_2O	0.11	1.2	-90.0%
	Fgas	5,253	-	-
	Total	**5,257**	**3**	**200901.2%**
5.Waste	CO_2	2.4	-	-
	CH_4	30	29	3.5%
	N_2O	0.6	2.7	-77.3%
	Total	**33**	**32**	**4.2%**

MUFG

■算定対象の比較

- インベントリで算定されているのは、農業分野のうち消化管内発酵、家畜排せつ物管理、農地土壌、LULUCF分野のうち森林吸収、森林・草地の転用である。
- FAOSTATと比較すると、インベントリと概ね同じ区分を対象に排出・吸収量の算定が行われている。
- 以上より、技術的に算定可能な区分についてはインベントリにおいて報告が行われており、今後は活動量データを整備しつつ、算定対象を拡大していくことが求められる。

■算定値の比較

- 特にLULUCF分野において大きな差異が認められた。具体的にどのような活動が含まれ、どのように算定されたのかを明らかにしつつ、必要に応じてインベントリに改善を加えていくことが求められる。

分野	算定対象	
農業	年	2000年～2007年
	排出源／ガス	CO_2/CH_4/N_2O
LULUCF	年	2000年～2007年
	排出・吸収源／ガス	CO_2

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	149,450	Total	169,039	-11.6%
	Enteric fermentation	90,500	Enteric fermentation	59,606	51.8%
	Manure management	14,250	Manure management	83,352	-82.9%
	Rice cultivation	-	Rice cultivation	-	-
	Agricultural soils	44,700	Synthetic fertilizers	88	71.4%
			Manure applied to soils	8,363	
			Manure left on pasture	17,630	
			Crop residues	-	
			Drained organic soils	-	
	Prescribed burning of savannahs	-	Savanna fires	0	-
	Field burning of agricultural residues	-	Burning-crop residues	0	-
LULUCF	Total	-785,070	Total	106,634	-836.2%
	Changes in forest and other woody biomass stocks	-777,470	Forestland	1,831	-42552.2%
			Forest fires	0	
			Fires in organic soils	0	
	Forest and grassland conversion	-7,600	Net forest conversion	104,803	-107.3%
	CO2 emissions and removals from soil	-	Drained organic soils	-	-

MUFG

ソロモン諸島

■算定対象の比較

- インベントリでは、エネルギー分野は全部門からのCO_2・CH_4・N_2O、廃棄物分野では固形廃棄物の処分からのCH_4、排水の処理と放出からのCH_4・N_2Oが算定対象となっている。IPPU分野では食品飲料製造からのNMVOCは算定対象となっているが、その他のGHGは算定対象となっていない。また、エネルギー分野からのガス別排出量は確認できなかった。
- EDGARでは、IPPU分野ではガラス製造からのCO_2、その他製品の製造および使用からのN_2O、廃棄物分野では廃棄物の焼却と野焼きからのCH_4の算定値も示されているため、Tier 1での算定が可能であると考えられる。

■算定値の比較

- 比較可能な排出区分では廃棄物分野の固形廃棄物の処分からのCH_4の差異が大きく、インベントリの方が排出量が3倍以上大きい。活動量の推計に用いている廃棄物の組成や発生率等の差異が影響している可能性がある。

分野	算定対象	
エネルギー	年	1994年、2000年、2005年、2010年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	算定していない
	排出源／ガス	算定していない
廃棄物	年	1994年、2000年、2005年、2010年
	排出源／ガス	CH_4/N_2O

Solomon Islands 2010 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	-	172	-
	CH_4	-	9	-
	N_2O	-	3	-
	Total	**351**	**183**	**91.2%**
2.Industrial processes	CO_2	-	9	-
	CH_4	-	-	-
	N_2O	-	3	-
	Fgas	-	-	-
	Total	**0.00**	**12**	**-100.0%**
5.Waste	CO_2	-	-	-
	CH_4	182.7	72	152.3%
	N_2O	9.9	6	76.9%
	Total	**192.6**	**78**	**146.9%**

■算定対象の比較

- インベントリで算定されているのは、農業分野のうち消化管内発酵、家畜排せつ物管理、農地土壌である。LULUCF分野は算定されていない。
- FAOSTATでは、稲作等のほか、LULUCF分野の排出・吸収量が示されているため、これらの排出・吸収源についてTier 1での算定が可能であると考えられる。

■算定値の比較

- 算定値の比較が可能な農業分野を見ると、合計排出量は概ね一致しているものの、個別の排出区分毎にみると差異が認められた。こうした差異は使用されているデータの相違に由来するほか、計上する排出区分が異なる可能性も指摘される。例えばFAOSTATにおいて農地土壌に分類されている土壌への家畜排せつ物の施用等は、インベントリにおいて家畜排せつ物の管理に含まれている可能性もある。

分野	算定対象	
農業	年	2000年、2005年、2010年
	排出源／ガス	CH_4/N_2O
LULUCF	年	算定していない
	排出・吸収源／ガス	算定していない

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	76,390	Total	74,175	3.0%
	Enteric fermentation	20,960	Enteric fermentation	27,796	-24.6%
	Manure management	35,360	Manure management	26,650	32.7%
	Rice cultivation	-	Rice cultivation	8,229	-
	Agricultural soils	20,070	Synthetic fertilizers	-	75.5%
			Manure applied to soils	2,989	
			Manure left on pasture	8,222	
			Crop residues	225	
			Drained organic soils	-	
	Prescribed burning of savannahs	-	Savanna fires	0	-
	Field burning of agricultural residues	-	Burning-crop residues	65	-
LULUCF	Total	0	Total	1,692,756	-100.0%
	Changes in forest and other woody biomass stocks	-	Forestland	1,502,986	-
			Forest fires	0	
			Fires in organic soils	0	
	Forest and grassland conversion	-	Net forest conversion	188,927	-
	CO2 emissions and removals from soil	-	Drained organic soils	843	-

トンガ

■算定対象の比較

- インベントリでは、エネルギー分野は全部門からのCO_2・CH_4・N_2O、廃棄物分野では固形廃棄物の処分からのCH_4、廃棄物の焼却と野焼きからのCO_2・CH_4・N_2O、排水の処理と放出からのCH_4および尿処理施設からのN_2Oが算定対象となっている。また、IPPU分野は未推計となっている。
- EDGARでは、IPPU分野ではガラス製造および潤滑油の使用からのCO_2、廃棄物分野では排水の処理と放出からのN_2Oおよび廃棄物の焼却と野焼きからのCH_4の算定値も示されているため、これらの排出源についてTier 1での算定が可能であると考えられる。

■算定値の比較

- 比較可能な排出区分ではエネルギー分野や廃棄物分野のCH_4の差異が大きい。同一の対象排出源ながら桁が異なるほどの差異が生じているため、データ精度に加え、CO_2換算の誤りや桁間違い等が生じている可能性がある。

分野	算定対象	
エネルギー	年	1994年、2000年、2006年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	算定していない
	排出源／ガス	算定していない
廃棄物	年	1994年、2000年、2006年
	排出源／ガス	CH_4/N_2O

Tonga 2006 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	113.1	117	-2.9%
	CH_4	3.0	0.7	328.9%
	N_2O	0.9	0.7	36.0%
	Total	**117.1**	**118**	**-0.7%**
2.Industrial processes	CO_2	-	0.6	-
	CH_4	-	-	-
	N_2O	-	0.6	-
	Fgas	-	-	-
	Total	**0.00**	**1.3**	**-100.0%**
5.Waste	CO_2	-	-	-
	CH_4	0.795	21	-96.2%
	N_2O	0.095	-	-
	Total	**0.890**	**21**	**-95.7%**

MUFG

■算定対象の比較

- インベントリで算定されているのは、農業分野のうち消化管内発酵、農地土壌、サバンナの計画的な焼却、LULUCF分野のうち森林吸収、森林・草地の転用である。
- FAOSTATでは家畜排せつ物の管理の排出・吸収量が示されていることから、この区分についてはTier 1での算定が可能であると考えられる。
- FAOSTATでは、LULUCF分野のほか、サバンナの計画的な焼却（農業分野）の算定が行われておらず、これらについてはインベントリの方が算定・報告が進んでいる状況である。

■算定値の比較

- 算定値の比較が可能な排出区分を見ると、消化管内発酵で比較的大きな差異が認められた。活動量データを精査した上で、必要に応じて改善を加える必要がある。

分野	算定対象	
農業	年	2006年
	排出源／ガス	CO_2/CH_4/N_2O
LULUCF	年	2006年
	排出・吸収源／ガス	CO_2

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	31,670	Total	78,756	-59.8%
	Enteric fermentation	19,000	Enteric fermentation	28,832	-34.1%
	Manure management	-	Manure management	36,848	-
	Rice cultivation	-	Rice cultivation	-	-
	Agricultural soils	11,920	Synthetic fertilizers	0	-8.8%
			Manure applied to soils	3,884	
			Manure left on pasture	9,192	
			Crop residues	-	
			Drained organic soils	-	
	Prescribed burning of savannahs	750	Savanna fires	0	-
	Field burning of agricultural residues	-	Burning-crop residues	-	-
LULUCF	Total	-1,250,140	Total	0	-
	Changes in forest and other woody biomass stocks	-1,437,540	Forestland	0	-
			Forest fires	0	
			Fires in organic soils	0	
	Forest and grassland conversion	187,400	Net forest conversion	0	-
	CO2 emissions and removals from soil	-	Drained organic soils	-	-

MUFG

ツバル

■算定対象の比較

- インベントリでは、エネルギー分野は全部門からのCO_2・CH_4・N_2O、廃棄物分野では固形廃棄物の処分からのCH_4、排水の処理と放出からのCH_4・N_2Oが算定対象となっている。また、IPPU分野は未推計となっている。
- EDGARでは、IPPU分野では潤滑油の使用からのCO_2、その他製品の製造および使用からのN_2O、廃棄物分野では排水の処理と放出からのN_2Oおよび廃棄物の焼却と野焼きからのCH_4の算定値も示されているため、これらの排出源についてTier 1での算定が可能であると考えられる。
- なお、インベントリではほとんどの算定結果が2002年値の据え置きとなっており、EDGARのデータのトレンドなども確認して必要に応じて何らか補正を加えることも考えられる。

■算定値の比較

- 比較可能な排出区分では廃棄物分野では固形廃棄物の処分からのCH_4において、インベントリの方が排出量が小さく、10分の1未満となっている。排出係数や活動量の対象範囲の差異に加え、データや算定過程での誤りなども生じている可能性がある。

分野	算定対象	
エネルギー	年	2014年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	算定していない
	排出源／ガス	算定していない
廃棄物	年	2014年
	排出源／ガス	CH_4/N_2O

Tuvalu 2014 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	11.168	-	-
	CH_4	0.01	-	-
	N_2O	0.03	-	-
	Total	**11.21**	-	-
2.Industrial processes	CO_2	-	0.02	-
	CH_4	-	-	-
	N_2O	-	0.07	-
	Fgas	-	-	-
	Total	**0.00**	**0.09**	**-100.0%**
5.Waste	CO_2	-	-	-
	CH_4	1.70	2.6	-33.8%
	N_2O	0.43	-	-
	Total	**2.13**	**2.6**	**-16.9%**

■算定対象の比較

- インベントリで算定されているのは、農業分野のうち消化管内発酵、家畜排せつ物の管理、農地土壌、LULUCF分野のうち森林吸収である。
- FAOSTATと比較すると、インベントリと概ね同じ区分を対象に排出・吸収量の算定が行われている。
- 以上より、技術的に算定可能な区分についてはインベントリにおいて報告が行われており、今後は活動量データを整備しつつ、算定対象を拡大していくことが求められる。

■算定値の比較

- 算定値の比較が可能な排出・吸収区分を見ると、家畜排せつ物の管理と農地土壌において大きな差異が認められた。活動量データを精査した上で、必要に応じて改善を加える必要がある。

分野	算定対象	
農業	年	2002年
	排出源／ガス	CH_4/N_2O
LULUCF	年	2002年
	排出・吸収源／ガス	CO_2

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	4,617	Total	6,794	-32.1%
	Enteric fermentation	246	Enteric fermentation	378	-34.8%
	Manure management	501	Manure management	5,810	-91.4%
	Rice cultivation	-	Rice cultivation	-	-
	Agricultural soils	3,869	Synthetic fertilizers	-	538.6%
			Manure applied to soils	600	
			Manure left on pasture	6	
			Crop residues	-	
			Drained organic soils	-	
	Prescribed burning of savannahs	-	Savanna fires	0	-
	Field burning of agricultural residues	-	Burning-crop residues	-	-
LULUCF	Total	-33	Total	-198	83.1%
	Changes in forest and other woody biomass stocks	-33	Forestland	-198	83.1%
			Forest fires	0	
			Fires in organic soils	0	
	Forest and grassland conversion	-	Net forest conversion	0	-
	CO2 emissions and removals from soil	-	Drained organic soils	-	-

バヌアツ

■算定対象の比較

- インベントリでは、エネルギー分野は全部門からのCO_2・CH_4・N_2O、廃棄物分野では固形廃棄物の処分からのCH_4、排水の処理と放出からのCH_4・N_2Oが算定対象となっている。また、IPPU分野は未推計となっている。
- EDGARでは、IPPU分野ではガラス製造および潤滑油の使用からのCO_2、廃棄物分野では廃棄物の焼却と野焼きからのCH_4の算定値も示されているため、これらの排出源についてTier 1での算定が可能であると考えられる。

■算定値の比較

- 比較可能な排出区分ではエネルギー分野のCH_4の差異が大きく、インベントリの方が排出量が小さい。EDGARでは、その他部門においてバイオマス由来のCH_4が計上されているのに対し、インベントリでは化石燃料のみとなっており、差異の原因の一つとなっている可能性がある。

分野	算定対象	
エネルギー	年	2007年～2015年
	排出源／ガス	CO_2/CH_4/N_2O
IPPU	年	算定していない
	排出源／ガス	算定していない
廃棄物	年	2007年～2015年
	排出源／ガス	CH_4/N_2O

Vanuatu 2015 [$ktCO_2eq.$]

sector	gas	Inventory	EDGAR	difference
1.Energy	CO_2	128	149	-14.2%
	CH_4	0.17	7.7	-97.8%
	N_2O	1.1	1.9	-44.0%
	Total	**129.43**	**157**	**-17.8%**
2.Industrial processes	CO_2	-	3	-
	CH_4	-	-	-
	N_2O	-	2	-
	Fgas	-	-	-
	Total	**0.00**	**5**	**-100.0%**
5.Waste	CO_2	-	-	-
	CH_4	34.02	89.73	-62.1%
	N_2O	3.18	2.97	7.2%
	Total	**37.20**	**70.77**	**-47.4%**

※バヌアツのインベントリでは、GWPとしてAR5の値（CH_4：28、N_2O：265）が使用されているため、EDGARも同様のGWPにてCO_2換算している。

■算定対象の比較

- インベントリで算定されているのは、農業分野のうち消化管内発酵、家畜排せつ物の管理、農地土壌、LULUCF分野のうち森林である。
- FAOSTATでは農業残渣の焼却、サバンナの計画的な焼却の算定値が示されていることから、これらの区分についてはTier 1での算定が可能であると考えられる。

■算定値の比較

- 算定値の比較が可能な排出・吸収区分を見ると、森林吸収においてきわめて大きな差異が認められた。活動量データを精査した上で、必要に応じて改善を加える必要がある。
- ソロモン諸島でも指摘したように、FAOSTATにおいて農地土壌に分類されている土壌への家畜排せつ物の施用等は、インベントリにおいて家畜排せつ物の管理に含まれている可能性もある。

分野	算定対象	
農業	年	2007年～2015年
	排出源／ガス	CH_4/N_2O
LULUCF	年	2007年～2015年
	排出・吸収源／ガス	CO_2

Category	Inventory	Emission (t-CO2)	FAOSTAT	Emission (t-CO2)	Difference
Agriculture	Total	443,400	Total	504,360	-12.1%
	Enteric fermentation	306,600	Enteric fermentation	319,786	-4.1%
	Manure management	121,500	Manure management	72,832	66.8%
	Rice cultivation	-	Rice cultivation	-	-
	Agricultural soils	15,300	Synthetic fertilizers	-	-86.3%
			Manure applied to soils	9,211	
			Manure left on pasture	102,314	
			Crop residues	65	
			Drained organic soils	-	
	Prescribed burning of savannahs	-	Savanna fires	15	-
	Field burning of agricultural residues	-	Burning-crop residues	137	-
LULUCF	Total	-6,973,700	Total	4,011	-173981.7%
	Changes in forest and other woody biomass stocks	-6,973,700	Forestland	-	-173981.7%
			Forest fires	4,011	
			Fires in organic soils	0	
	Forest and grassland conversion	-	Net forest conversion	-	-
	CO2 emissions and removals from soil	-	Drained organic soils	-	-

1.4 Guidance to Pacific Island countries

Reducing non estimated categories

- The third-party database provides the GHG emissions and removals, and therefore, there are categories which are technically possible to calculate in Tier 1, but not estimated in Parties GHG inventories.

GHG emission/removal trends

- In GHG inventories, it is necessary to estimate the GHG emissions and removals not only for a certain year, but also over time. However, in the GHG inventories of many countries, the target year is limited, and it is difficult to grasp the trend.

Explanation/Documentation of estimation methodologies

- Many countries have reported GHG emissions and removal estimates, but do not explain sufficiently how to estimate them, and it is unclear what kind of data were specifically used for the estimation. Therefore, even if there is a difference from the estimation value of the third-party database, it is not possible to identify what the difference is derived from, and it is difficult to analyze the discrepancies.
- Some countries report some categories as zero, but it is indistinguishable whether they are zero or not estimated (NE: Not estimated) as a result of calculating the amount of emissions and removals. Notation keys must be used appropriately to clarify inventory improvements.
- Since the units of emissions and removals are not properly listed, it is difficult to understand whether it is the amount of gas or amount converted to CO_2 using the global warming potentials (GWP).

2. Factor decomposition of CO_2 emissions from fuel combustion

2.1 Overview

A factor decomposition analysis was carried out to understand the drivers of CO_2 emission trends in the Pacific Island countries. Specifically, CO_2 emissions are represented as the product of several factors, and the amount of emission changes given by the changes in each factor was quantitatively calculated.

2.2 Methodology

Methodology for factor decomposition

Carbon dioxide emissions from the energy sector are typically derived as a product of the activity data (fuel consumption) and an emission factor.

$$CO_{2_t} = AD_t \cdot EF_t$$

Here, the AD is activity data, EF is emission factor, t is the year. The difference between CO2 emissions for year t and year t+1 can be estimated by the equation below.

$$CO_{2_{t+1}} - CO_{2_t} = (AD_{t+1} - AD_t) \cdot (EF_{t+1} - EF_t)$$

When the difference of emissions for year t and t+1 is shown as Δ, the equation above can be expressed by the equation below.

$$\Delta CO_2 = \Delta AD \cdot EF_{t+1} + AD_{t+1} \cdot \Delta EF + \varepsilon$$

The first product shows the impact of the activity data on the CO_2 emissions (activity data factor), and the second product shows the impact of emission factor on the CO_2 emissions (emission factor factor). By decomposing the CO_2 emissions difference between a certain time period into factors, a quantitative analysis of the drivers of the CO_2 emission increase/decrease can be carried out. This is called the factor decomposition analysis.

Kaya identity

The Kaya identity breaks down emissions into four factors: carbon intensity, energy intensity, factor of GDP per capita, and factor of population, and qualitatively analyzes the impact of each of the factors on the emission trend.

In addition, among the factors of the Kaya identity formula, the factor terms that can be reduced by global warming countermeasures are "emission intensity factor" and "energy consumption intensity factor". Specific examples of mitigation measures for these two factor terms include switching to low-carbon energy such as renewable energy and nuclear power in emission intensity factors, introduction of high-efficiency equipment and promotion of energy-saving behavior in energy consumption intensity factors, etc. As a result of the factor decomposition, by arranging the contribution of each factor term, it is possible to organize what measures are particularly necessary and what measures are decreasing emissions.

$$CO_2 = \frac{CO_2}{E} \cdot \frac{E}{G} \cdot \frac{G}{P} \cdot P$$

$$\Delta CO_2 = \Delta\frac{CO_2}{E} \cdot \frac{E}{G} \cdot \frac{G}{P} \cdot P + \frac{CO_2}{E} \cdot \Delta\frac{E}{G} \cdot \frac{G}{P} \cdot P + \frac{CO_2}{E} \cdot \frac{E}{G} \cdot \Delta\frac{G}{P} \cdot P + \frac{CO_2}{E} \cdot \frac{E}{G} \cdot \frac{G}{P} \cdot \Delta P + \varepsilon$$

Carbon intensity　Energy intensity　GDP per capita　Population factor

CO_2: CO_2 emissions
E: Energy consumption
G: GDP
P: population

Figure 28 Factor decomposition using the Kaya identity

2.3 Overview of analysis results

In order to perform factor decomposition using the Kaya identity formula, data on CO_2 emissions, energy consumption, GDP, and population are necessary. From the analysis of the survey from 2000 to 2018, available data on CO_2 emissions, energy consumption, GDP, and population data of the target countries was taken from international statistics during this period. As a result of the survey, the analysis was conducted in eight out of 14 countries (table below). If national statistics are included in the survey, it is highly likely that the number of countries to be analyzed will increase.

Table 22 Data availability in the Pacific SIDS region

	CO2 from fuel combustion	Energy consumption	GDP	Population	Kaya identity
Cook Islands	✓	✓	✓	✓	✓
Micronesia, Federated States of				✓	
Fiji	✓	✓	✓	✓	✓
Kiribati	✓	✓	✓	✓	✓
Marshall Islands			✓	✓	
Nauru		✓	✓	✓	
Niue		✓	✓	✓	
Palau	✓		✓	✓	
Papua New Guinea	✓	✓	✓	✓	✓
Samoa	✓	✓	✓	✓	✓
Solomon Islands	✓	✓	✓	✓	✓
Tonga	✓	✓	✓	✓	✓
Tuvalu			✓	✓	
Vanuatu	✓	✓	✓	✓	✓

（source） National Accounts Analysis of Main Aggregates (UN） , World population prospects (UN) data compiled by MURC

The result of factor decomposition by the Kaya identity formula is shown in Table below. All eight countries analyzed show increased emissions during that period 2000 to 2018. However, emissions increase varies from country to country, with emissions intensity the biggest increase in Fiji, Papua New Guinea, Samoa and the

Solomon Islands. This may be due to an increased dependence on high carbon fuels such as cheap coal. For this reason, in these countries, it is possible to effectively reduce emissions by converting to gas fuel and introducing renewable energy. On the other hand, in Kiribati, Tonga, and Vanuatu, the "energy consumption intensity factor" is the biggest factor, which is considered to be due to an increase in per capita energy consumption accompanying economic development. In such a case, the introduction of high-efficiency equipment and enlightenment of energy-saving behavior can be effective measures. See Fig. 28 onvwards for the results of the increase and decrease factor decomposition by country.

Table 23 Summary results of factor analysis in the Pacific SIDS region

kt CO2

	CO2 changes from 2000 to 2018	Factor of carbon intensity	Factor of energy intensity	Factor of GDP per capita	Factor of Population	Not classifiable
Cook Islands	6	**-33**	8	36	-4	-1
Micronesia, Federated States of	-	-	-	-	-	-
Fiji	1,000	980	**-310**	580	130	-380
Kiribati	33	**-3**	22	-0.4	16	-2
Marshall Islands	-	-	-	-	-	-
Nauru	-	-	-	-	-	-
Niue	-	-	-	-	-	-
Palau	-890	-	-	-	-	-
Papua New Guinea	4,480	1,960	**-500**	1,770	1,710	-470
Samoa	210	120	10	50	20	5
Solomon Islands	140	100	**-90**	60	90	-10
Tonga	30	2	20	20	10	-10
Tuvalu	-	-	-	-	-	-
Vanuatu	92	**-21**	59	2	55	-4

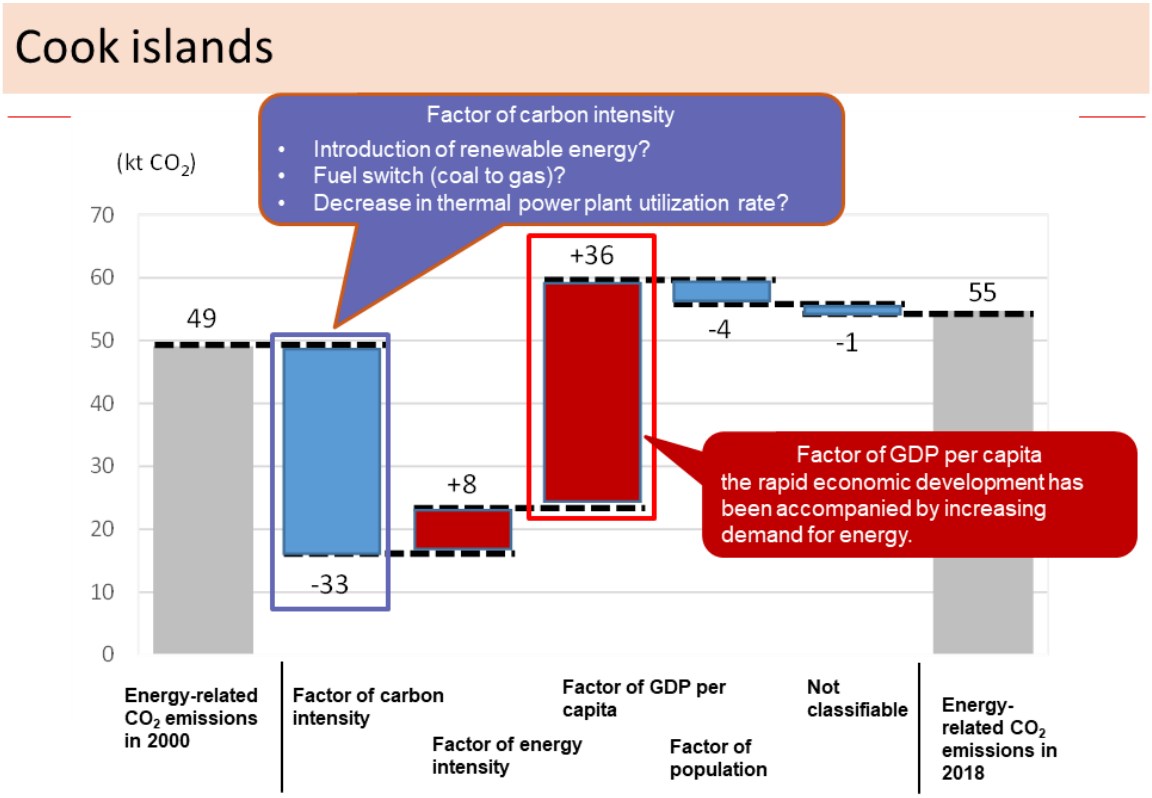


Figure 29 Factor analysis results (Cook islands)

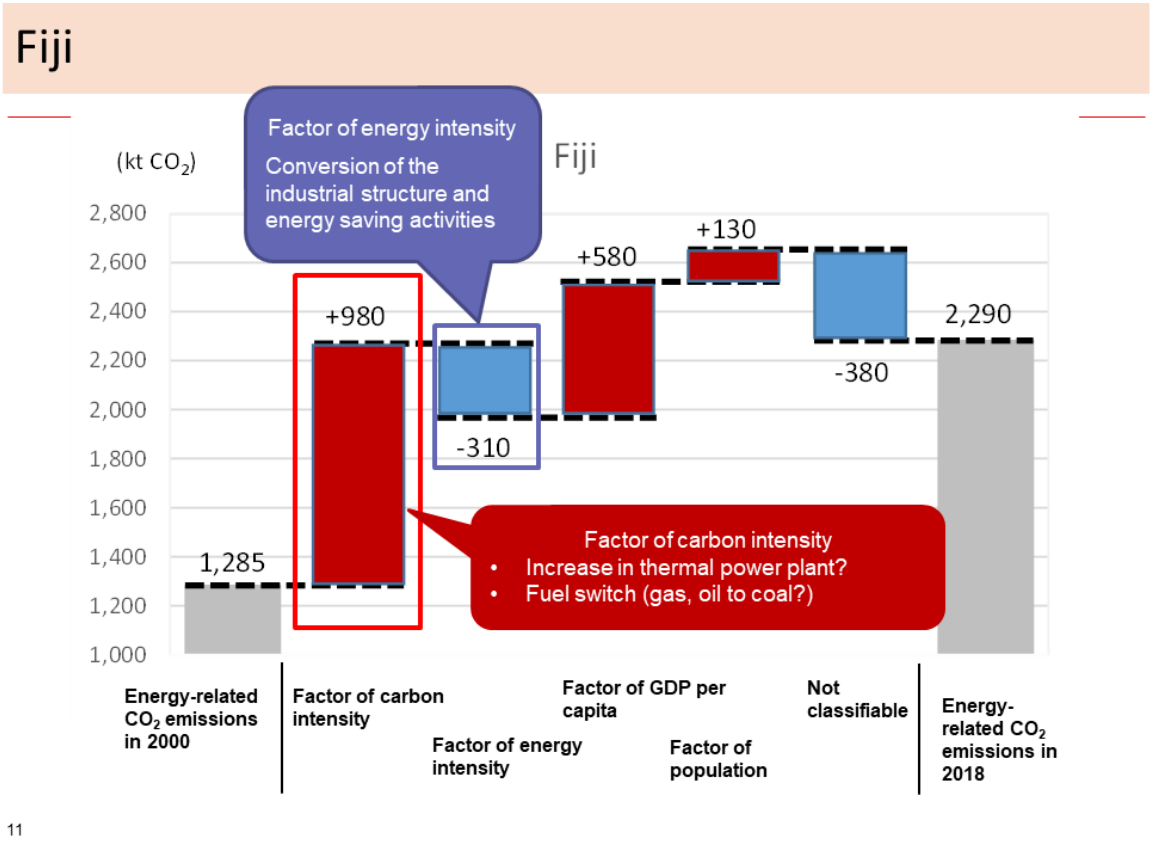
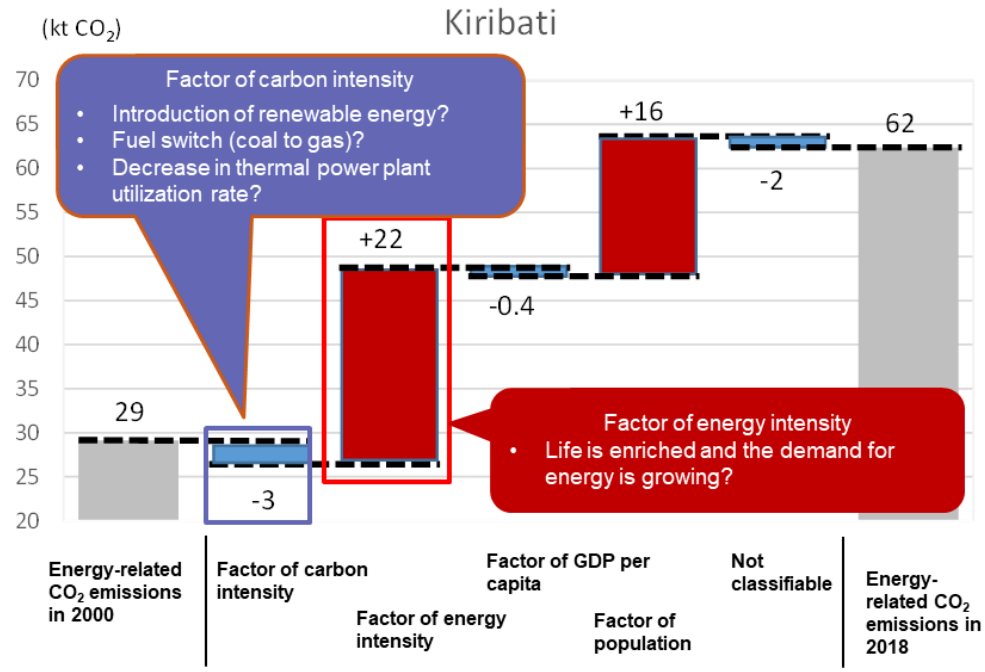


Figure 30 Factor analysis results (Fiji)

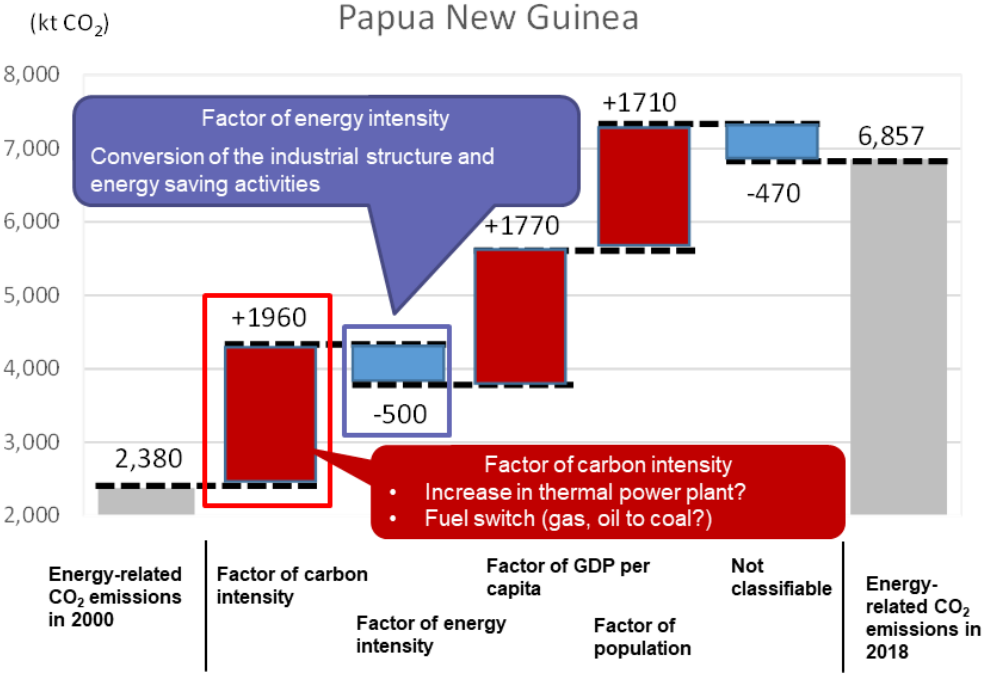
Kiribati



12

Figure 31 Factor analysis results (Kiribati)

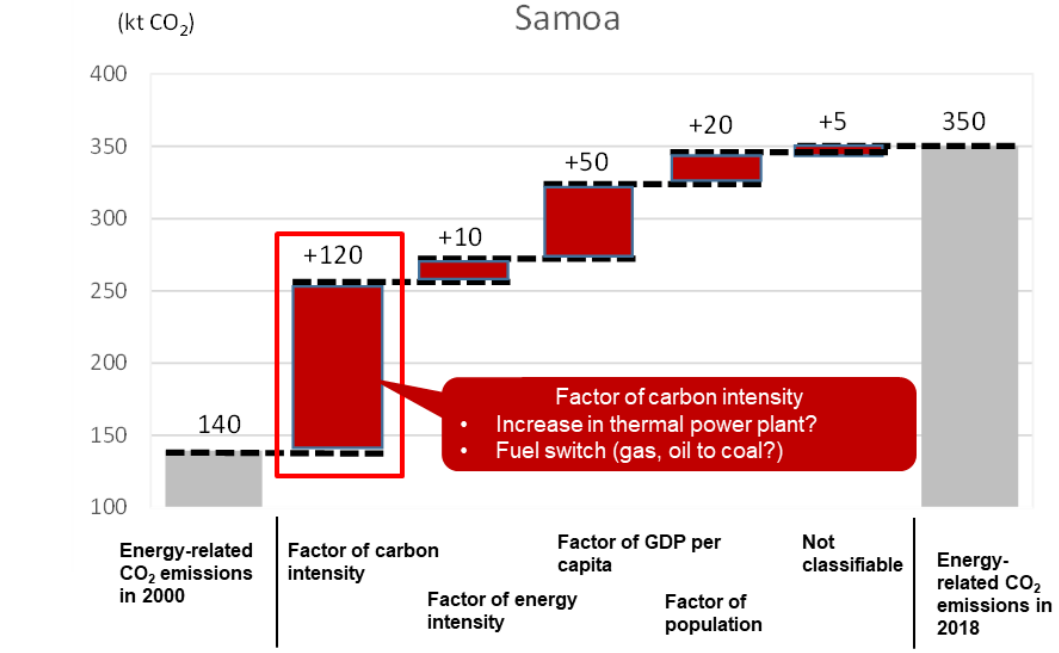
Papua New Guinea



13

Figure 32 Factor analysis results (PNG)

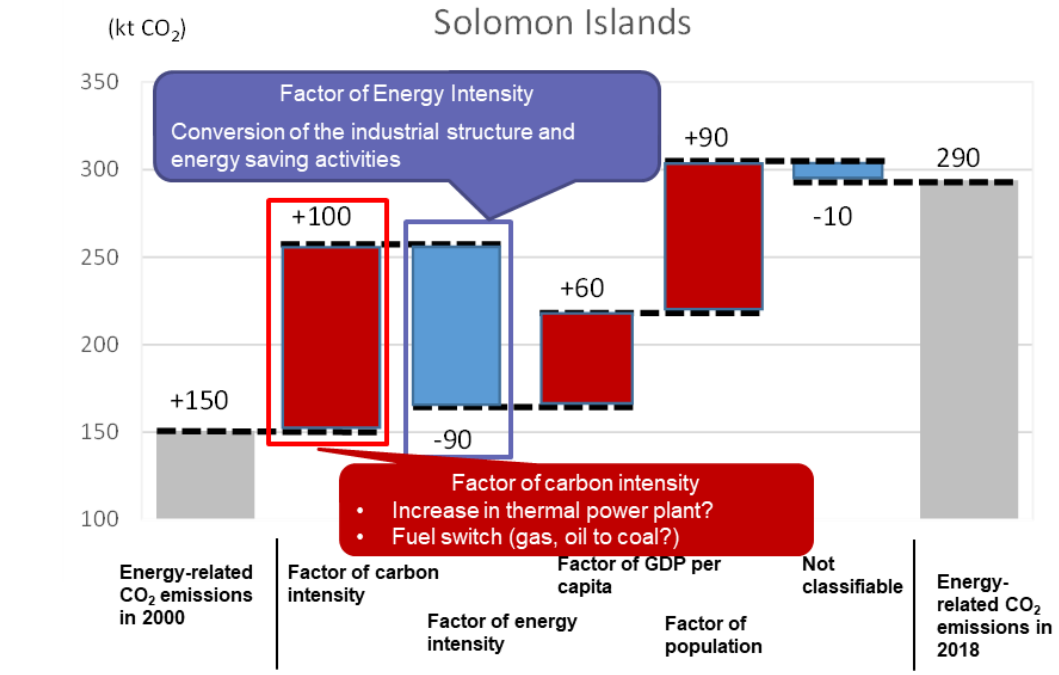
Samoa



14

Figure 33 Factor analysis results (Samoa)

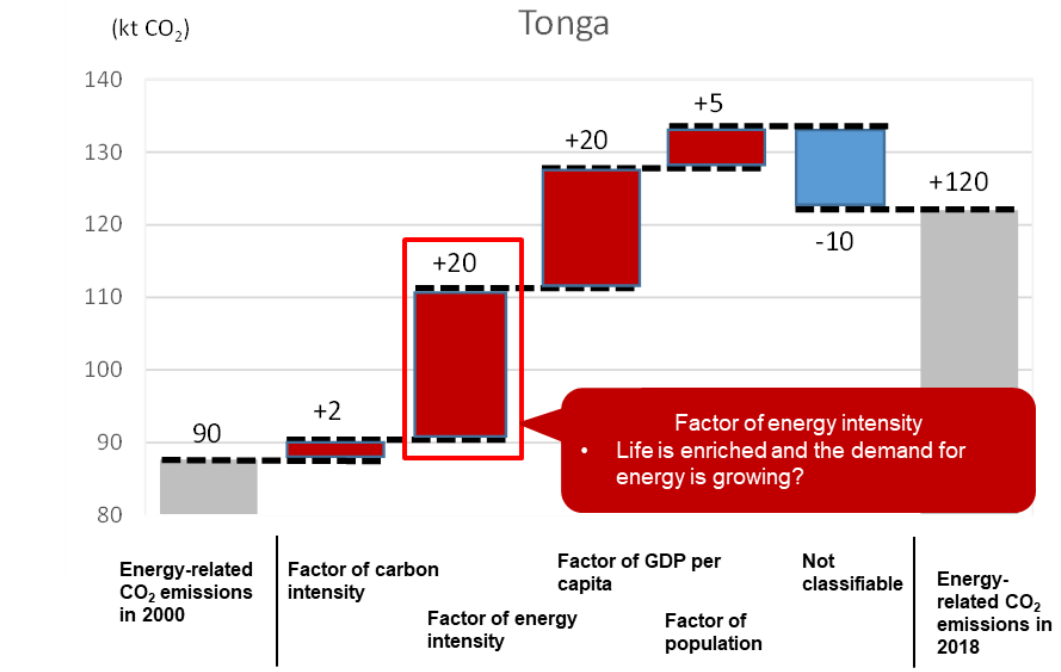
Solomon islands



15

Figure 34 Factor analysis results (Solomon islands)

Tonga



16

Figure 35 Factor analysis results (Tonga)

Vanuatu

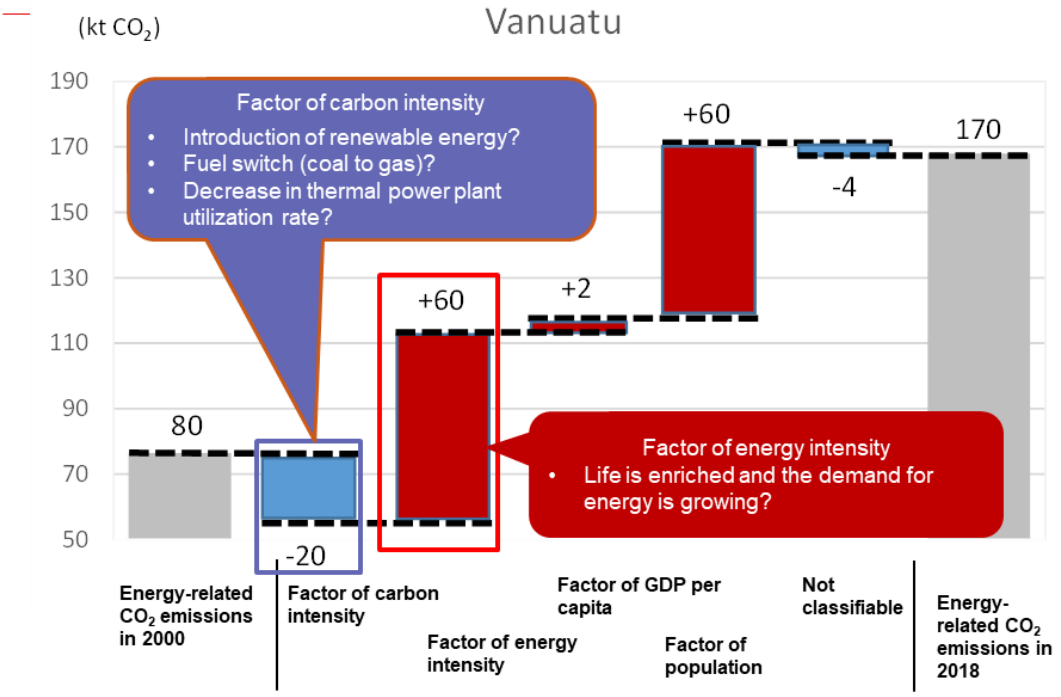


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Figure 36 Factor analysis results (Vanuatu)

2.4 Conclusion

In this chapter, factor decomposition using the Kaya identity method was carried out in order to quantitatively analyze the drivers of the increase of CO_2 emissions over a specific period of time. A total of eight countries has publicly available information on “CO_2 emissions”, “energy consumption”, “GDP”, and “population” required by the Kaya identity analysis. All of these countries also had the characteristic that emissions increased during the period.

Analysis using the Kaya identity analysis revealed that while emissions were increasing in all countries, the factors contributing to the increase vary from country to country. Specifically, Fiji, Papua New Guinea, Samoa, and the Solomon Islands are considered mainly due to the increase in the ratio of coal fuels used, such as an increase in thermal power plants (especially coal-fired power plants), while the Marshall Islands, Tonga, and Vanuatu are considered to be mainly due to the increase in energy demand due to the improvement in living standards. In the Cook Islands, although the main factor is the "per capita GDP factor" in which energy demand increases with economic development, measures to stagnate economic development are generally not implemented. Therefore, it is important to implement mitigation measures that reduce the "energy consumption intensity factors" that are other factors that are increasing.

In addition, although factor decomposition was carried out on energy-derived CO_2 in this study, it is possible to identify more detailed factors of increase or decrease by factor decomposing emissions by sector (Extended Kaya identity). However, since more data (e.g., power generation, GDP by industry type, number of vehicles owned, transportation volume, number of households, etc.) is required in order to implement factor decomposition by sector, the development of data will continue to be important in order to implement effective mitigation measures costly and time-effectively.

3. NDC

3.1 Overview

While comparing and organizing the contents of the NDC submitted by the Pacific island countries, the kind of improvement necessary from the viewpoint of further enhancing the effectiveness of the NDC to achieve the goals set forth in the Paris Agreement was considered (analysis available in Japanese only).

3.2 Overview

項目			クック諸島（2016年9月1日）	フィジー（2020年12月30日）	キリバス（2016年9月21日）	マーシャル諸島（2018年11月22日）
GHG目標	目標のタイプ		基準年目標	ベースライン目標	ベースライン目標	基準年目標
	基準年		2006年	–	–	2010年
	基準年排出量		**23,620［t-CO_2eq］（総排出量の34%）**	2,341［kt-CO_2eq］	**記載なし**	185［kt-CO_2eq］
	目標年		2020年（条件なしの目標）、2030年（条件付きの目標）	2030年	2025年、2030年	2025年、2030年
	目標		2020年（条件なし）：38%減、2030年（条件付き）：81%減	30%減	2025年：13.7%減、2030年：12.8%減	2025年：32%減、2030年：45%減
	対象	ガス	**記載なし**	CO_2/CH_4/N_2O	CO_2	CO_2/CH_4/N_2O
		セクター	電力	エネルギー（発電・送電、省エネ、運輸）	エネルギー（発電、運輸）、海洋と沿岸域	エネルギー（発電、運輸等）、廃棄物
	算定方法論		**記載なし**	2006年IPCC-GL	**記載なし**	1996年改訂IPCC-GL
	市場メカニズムの取り扱い		記載なし	自国のNDC達成及び他国のNDC達成を支援するため、市場ベースの協力の可能性を探求する。	検討する	使用しない
	土地セクターの取り扱い		含まない	含まない	含まない	含まない
GHG以外の目標			あり	あり	なし	なし
目標達成に向けた行動			記載あり	記載あり	記載あり	記載あり
適応目標			あり	あり	あり	あり

項目			ミクロネシア（2016年9月15日）	ナウル（2021年10月14日）	ニウエ（2016年10月28日）	パラオ（2016年4月22日）
GHG目標	目標のタイプ		基準年目標	記載なし	記載なし	基準年目標
	基準年		2000年	記載なし	記載なし	2005年
	基準年排出量		150［kt-CO_2eq］	記載なし	記載なし	88［kt-CO_2eq］
	目標年		2025年	記載なし	記載なし	2025年
	目標		条件なし：28%減、条件付き：35%減	記載なし	記載なし	**22%減（エネルギーセクターのみ）**
	対象	ガス	CO_2	記載なし	記載なし	CO_2/CH_4
		セクター	エネルギー（発電、輸送）	記載なし	記載なし	エネルギー（発電）、運輸、廃棄物
	算定方法論		1996年改訂IPCC-GL	記載なし	記載なし	**記載なし**
	市場メカニズムの取り扱い		使用しない	記載なし	記載なし	使用しない
	土地セクターの取り扱い		含まない	記載なし	記載なし	含まない
GHG以外の目標			なし	あり	あり	あり
目標達成に向けた行動			**記載なし**	記載あり	記載あり	記載あり
適応目標			なし	なし	あり	なし

項目			パプアニューギニア（2020年12月16日）	サモア（2021年7月30日）	ソロモン諸島（2021年7月19日）	トンガ（2020年12月9日）
GHG目標	目標のタイプ		基準年目標	基準年目標	基準年目標	基準年目標
	基準年		2015年	2007年	2015年	2006年
	基準年排出量		1,716［kt-CO_2eq］	352.03［kt-CO_2eq］	707.425［kt-CO_2eq］	120.4［kt-CO_2eq］
	目標年		2030年	2030年	2025年、2030年	2030年
	目標		10,000［kt-CO_2eq］減	26%減（エネルギー：30%減、廃棄物：4%減、AFOLU：26%減）	2025年：14%減（条件なし）、27%減（条件付き） 2030年：33%減（条件なし）、45%減（条件付き）	13%減（16［kt-CO_2eq］減）
	対象	ガス	**CO_2/CH_4/N_2O**	CO_2/CH_4/N_2O	CO_2	CO_2/CH_4/N_2O
		セクター	LULUCF	エネルギー（発電、運輸、観光）、廃棄物、AFOLU	エネルギー（発電、運輸）、AFOLU	エネルギー
	算定方法論		2006年IPCC-GL	2006年IPCC-GL 1996年改訂IPCC-GL	**記載なし**	2006年IPCC-GL
	市場メカニズムの取り扱い		NDCを実施し、結果に基づく支払いを受け取ることで収益化できる。パリ協定第6条の施行に期待。	先進国に対するカーボンクレジットの販売に関心あり。	**使用する**	**使用しない**
	土地セクターの取り扱い		含む	含む	含む	含まない
GHG以外の目標			あり	なし	あり	あり
目標達成に向けた行動			記載あり	記載あり	記載あり	記載あり
適応目標			あり	あり	あり	あり

項目			ツバル（2016年4月22日）	バヌアツ（2021年3月22日）
GHG目標	目標のタイプ		基準年目標	基準年目標
	基準年		2010年	2010年
	基準年排出量		20［kt-CO_2eq］	エネルギー：122.44［kt-CO_2eq］ AFOLU：587.48［kt-CO_2eq］ 廃棄物：10.75［kt-CO_2eq］
	目標年		2025年	2030年
	目標		発電：100%減、エネルギー：60%減	記載なし
	対象	ガス	CO_2/CH_4	記載なし
		セクター	エネルギー（発電、運輸等）、農業、廃棄物	記載なし
	算定方法論		1996年改訂IPCC-GL	記載なし
	市場メカニズムの取り扱い		使用しない	パリ協定第6条に基づく市場メカニズムを含む国際協力と支援により、気候変動に強い社会経済開発の機会を模索する。
	土地セクターの取り扱い		含まない	含まない
GHG以外の目標			なし	あり
目標達成に向けた行動			記載あり	記載なし
適応目標			なし	あり

Note 1）Nauru has not set GHG targets or adaptation targets, and has shown the effects of the latter efforts, saying that efforts to combat climate change and achieve the SDGs will be consistent.

Note 2）Niue has not set GHG targets and shows only mitigation and adaptation actions.

Note 3）Vanuatu shows the target indicators and target values of each indicator of various mitigation measures rather than GHG targets (e.g., 10% of public buses will be electric buses in 2030), and how much emission reduction will be achieved compared to the BAU scenario if these are achieved. Although it is almost synonymous with the GHG target, since the direct target is set in the target index, the GHG target was "not stated".

3.3 Results by country

Results of analysis by country is as follows.

クック諸島

■ GHG目標

GHG目標	目標のタイプ		基準年目標
	基準年		2006年
	基準年排出量		**23,620［t-CO_2eq］（総排出量の34%）**
	目標年		2020年（条件なしの目標）、2030年（条件付きの目標）
	目標		2020年（条件なし）：38%減、2030年（条件付き）：81%減
	対象	ガス	**記載なし**
		セクター	電力
	算定方法論		**記載なし**
	市場メカニズムの取り扱い		記載なし
	土地セクターの取り扱い		含まない
GHG以外の目標			あり

- 基準年排出量あるいは同データの参照先がNDCに記載されておらず、読み手は独自に調べてNC2を参照しなければならない。
- 対象ガスや算定方法論に関する説明もなされておらず、今後さらなる記述の拡充が必要。

■ GHG目標の達成に向けた行動

- ディーゼル燃料から再エネによる電力供給へ2015年までに50%、2020年までに100%転換。既に50%目標を達成。2020年までに発電に伴うCO_2排出量が基準年（2006年）比38%減となる見通し。
- グリッドストレージの新規構築、エネルギー効率の向上と新技術の統合、技術移転、キャパシティ強化にも取り組み、これによって発電に伴うCO_2排出量はさらに43%減、2030年までに基準年比81%減となる。ただし、これらの実現は外部からの支援を受けることが条件。

■ 適応

- 約200万km^{2}に及ぶ排他的経済水域全域を海洋公園に指定し、海洋生態系のレジリエンスを強化。脆弱性の軽減、レジリエンス強化のための優先課題を示したビジョンや開発計画を策定。また、国家適応計画を更新。
- ロス&ダメージについては上記に含まれていない。レジリエンス構築に関連する費用は国際社会の支援に期待。

フィジー

■ GHG目標

GHG目標	目標のタイプ		ベースライン目標
	基準年		–
	ベースライン排出量		2,341［kt-CO_2eq］
	目標年		2030年
	目標		30%減
	対象	ガス	CO_2/CH_4/N_2O
		セクター	エネルギー（発電・送電、省エネ、運輸）
	算定方法論		2006年IPCC-GL
	市場メカニズムの取り扱い		自国のNDC達成及び他国のNDC達成を支援するため、市場ベースの協力の可能性を探求する。
	土地セクターの取り扱い		含まない
GHG以外の目標			あり

- GHG目標に関する情報はひと通りNDCに記載されている。
- 対象ガスにはCO_2のほか、CH_4、N_2Oも含まれている。また、算定方法論として2006年IPCCガイドラインが使用されている。

■ GHG目標の達成に向けた行動

- 発電・送電、省エネ、運輸のセクター毎に、短期（～2020年）、中期（2021～2025年）、長期（2026～2030年）の行動目標を策定。
  - 発電・送電：グリッドの拡充・更新、再エネ発電の増設（太陽光、バイオマス、水力）、持続可能なバイオ燃料の普及
  - 省エネ：エネルギーラベリングや基準の策定、産業部門や公的部門におけるエネルギー効率化等
  - 運輸：買い替え促進、バイオ燃料の使用等

■ 適応

- 適応目標として、①スマート農業の導入、②公共インフラの改修・更新、③早期警報・監視システムの開発、④脆弱なコミュニティの移転、⑤強力な医療ヘルスケアシステムの構築、⑥自然環境と生物多様性の保全、⑦植林（2035年までに3,000万本）、⑧排他的経済水域の30%を海洋保護区として設定、を策定。

キリバス

■ GHG目標

GHG目標	目標のタイプ		ベースライン目標
	基準年		－
	ベースライン排出量		記載なし
	目標年		2025年、2030年
	目標		2025年：13.7%減、2030年：12.8%減
	対象	ガス	CO_2
		セクター	エネルギー（発電、運輸）、海洋と沿岸域
	算定方法論		記載なし
	市場メカニズムの取り扱い		検討する
	土地セクターの取り扱い		含まない
GHG以外の目標			なし

- ベースライン排出量や算定方法論がNDCに明記されておらず、目標値だけが示されている。これでは透明性が十分に確保されないため、今後これらの記述を追加する必要がある。

■ GHG目標の達成に向けた行動

- 病院や学校における太陽光発電ミニグリッドシステムの導入、農村コミュニティ向けの淡水化プラントの導入等。
  - 行動毎に目標発電量や必要な資金額、現在の資金調達状況等の情報も記載されている。

■ 適応

- 世界銀行のイニシアティブの下、日本政府の支援を受けてキリバス適応プロジェクト（KAP）を開始。現在は第3フェーズにあり、水資源の利用と管理の改善（地下水取水システムや給水設備の改善、地域社会の意識醸成等）、沿岸域のレジリエンス強化等を進めている。
- また、2014年にはキリバス気候変動・災害リスク管理共同実施計画（KJIP）を策定2023年までの9年間のビジョンには、ガバナンスや法制度の強化、民間セクターにおける意識醸成、水と食料の安全保障確保のほか、資金アクセスの強化、自国のアイデンティティの維持、脆弱なグループの参加とレジリエンス強化等が謳われている。

マーシャル諸島

■ GHG目標

GHG目標	目標のタイプ		基準年目標
	基準年		2010年
	基準年排出量		185［kt-CO_2eq］
	目標年		2025年、2030年
	目標		2025年：32%減、2030年：45%減
	対象	ガス	CO_2/CH_4/N_2O
		セクター	エネルギー（発電、運輸等）、廃棄物
	算定方法論		1996年改訂IPCC-GL
	市場メカニズムの取り扱い		使用しない
	土地セクターの取り扱い		含まない
GHG以外の目標			なし

- GHG目標に関する情報はひと通りNDCに記載されている。
- 対象ガスにはCO_2のほか、CH_4、N_2Oも含まれている。算定方法論では、1996年改訂IPCCガイドラインが使用されている。

■ GHG目標の達成に向けた行動

- 発電：再エネの導入（太陽光、風力）、蓄電池の導入、省エネシステムへの移行（ヒートポンプ）、建築基準法の改正等
- 運輸：電気自動車の普及、海上輸送の効率化等
- 廃棄物：埋立処理の実施、無秩序な焼却処理の回避等（廃棄物分野における一部の行動は日本の取組がモデルとされている）

■ 適応

- 適応に係る戦略的な原則と優先課題の明確化、気候変動の影響やリスクの理解、段階的な行動が必要。こうした観点から、国別適応計画（NAP）の策定プロセスを進め、2020年、2025年、2030年、2050年までに達成すべきマイルストーンとそれを達成するための方策を示す必要がある。
  - 具体的な適応策は記載されていない。

ミクロネシア

■ GHG目標

GHG目標	目標のタイプ		基準年目標
	基準年		2000年
	基準年排出量		150［kt-CO_2eq］
	目標年		2025年
	目標		条件なし：28%減、条件付き：35%減
	対象	ガス	CO_2
		セクター	エネルギー（発電、輸送）
	算定方法論		1996年改訂IPCC-GL
	市場メカニズムの取り扱い		使用しない
	土地セクターの取り扱い		含まない
GHG以外の目標			なし

- GHG目標に関する情報はひと通りNDCに記載されているが、目標達成に向けた行動が示されていない。GHG目標の対象セクターであるエネルギー（発電、輸送）において具体的にどのような行動を実施することにより目標を達成する計画なのかを明記する必要がある。

■ GHG目標の達成に向けた行動

- 記載なし

■ 適応

- 記載なし

ナウル

■ GHG目標

GHG目標	目標のタイプ		記載なし
	基準年		記載なし
	基準年排出量		記載なし
	目標年		記載なし
	目標		記載なし
	対象	ガス	記載なし
		セクター	記載なし
	算定方法論		記載なし
	市場メカニズムの取り扱い		記載なし
	土地セクターの取り扱い		記載なし
GHG以外の目標			あり

- ナウルはGHG目標や適応目標を定めておらず、気候変動対策とSDGsの達成に向けた取組が整合するとした上で、NDCには後者の取組の効果を示している。

■ GHG目標の達成に向けた行動／適応

- SDGsの達成に向けた以下の取組を実施することによって、気候変動の緩和及び適応にもベネフィットが及ぶ。
  - 生産性の高い土地利用（重要インフラや住宅の高台移転、海岸浸食の抑制、強靭な港湾施設の設置）
  - 教育・公衆衛生
  - 水資源の安全保障（管理事務所や研究所の設置、貯水槽の補修、海面上昇等の影響のモデル化等）
  - 食料の安全保障（持続可能な農業の戦略計画策定、気候変動影響データの収集・分析等）
  - エネルギーの安全保障（発電における再エネ比率50%目標の達成、省エネ30%目標の達成等）
  - その他（廃棄物処理施設の強化、上下水道マスタープランの実施等）

ニウエ

■ GHG目標

GHG目標	目標のタイプ		記載なし
	基準年		記載なし
	ベースライン排出量		記載なし
	目標年		記載なし
	目標		記載なし
	対象	ガス	記載なし
		セクター	記載なし
	算定方法論		記載なし
	市場メカニズムの取り扱い		記載なし
	土地セクターの取り扱い		記載なし
GHG以外の目標			あり

- GHG目標が定められておらず、緩和及び適応の行動のみが示されている。

■ GHG目標の達成に向けた行動

- 2020年までに電力需要を10%削減しつつ、総発電量に占める再エネ比率を38%とする。
- 加えて、追加的な国際支援を条件として、2025年までに総発電量に占める再エネ比率を80%、あるいはそれ以上のレベルに引き上げる。

■ 適応

- 2009年に、気候変動へのレジリエンスを構築する上での重要文書である「国家気候変動政策」を策定。適応を目標の1つに掲げた。
- さらに、2013年には「気候変動適応及び保健計画」を策定した。
  - 上記が参照されたのみであり、具体的な適応策は記載されていない。

MUFG

パラオ

■ GHG目標

GHG目標	目標のタイプ		基準年目標
	基準年		2005年
	基準年排出量		88［kt-CO_2eq］
	目標年		2025年
	目標		**22%減（エネルギーセクターのみ）**
	対象	ガス	CO_2/CH_4
		セクター	エネルギー（発電）、運輸、廃棄物
	算定方法論		**記載なし**
	市場メカニズムの取り扱い		使用しない
	土地セクターの取り扱い		含まない
GHG以外の目標			あり

- GHG目標の対象にはエネルギー（発電）のほか、運輸、廃棄物も含まれているが、具体的な目標値が示されているのはエネルギーのみ。
- 算定方法論に関する説明が記載されていない。NC2におけるインベントリでは1996年改訂IPCCガイドラインが使用されているが、NDCもこれと同じであれば、その旨を明記する必要がある。

■ GHG目標の達成に向けた行動

- 再エネ比率の向上：太陽光発電5MW（既に計画済）、水力10MW、送配電ロスの減少
- エネルギーの効率化：エネルギー改修プログラムの強化、エネルギー効率建築基準法の導入、家電規格の採用、エネルギーラベリング制度の導入、クールルーフプログラムの大幅拡充、エネルギー監査プログラムの対象拡大、ビル管理ワーキンググループの強化、廃水インフラの改善等
- 運輸：廃食油のディーゼル車用バイオ燃料への転換等
- 廃棄物：埋立処理場における排出量の分析、埋立処理場における排出ガス回収プロジェクトのポテンシャル評価等

■ 適応

- 記載なし

MUFG

パプアニューギニア

■ GHG目標

GHG目標	目標のタイプ		基準年目標
	基準年		2015年
	基準年排出量		1,716［kt-CO_2eq］
	目標年		2030年
	目標		10,000［kt-CO_2eq］減
	対象	ガス	**CO_2/CH_4/N_2O**
		セクター	LULUCF
	算定方法論		2006年IPCC-GL
	市場メカニズムの取り扱い		NDCを実施し、結果に基づく支払いを受け取ることで収益化できる。パリ協定第6条の施行に期待。
	土地セクターの取り扱い		含む
GHG以外の目標			あり

- GHG目標の対象セクターはLULUCFのみ。
- 対象ガスにはCO_2のほか、CH_4、N_2Oも含まれているが、その説明や参照先がNDCに記載されておらず、読み手は独自に調べてBURを参照しなければならない。

■ GHG目標の達成に向けた行動

- LULUCF：森林減少面積の減少（2030年までに2015年比25%減）、森林劣化面積の減少（2030年までに2015年比25%減）、人工林と森林再生面積の増加、土地利用計画の強化、気候にやさしい農業の推進、合法木材の強化、REDD+の推進、1,000万本植樹イニシアチブの推進、科学的・社会経済的分析に基づく戦略的アクションプランの提示
- その他：エネルギー効率化による電力需要の削減、Nature-based solutionsによる化石燃料由来排出量のオフセット、エネルギー関連データの収集強化

■ 適応

- 優先課題として、①沿岸域における洪水と海面上昇、②内陸部における洪水、③食料、④都市と気候変動、⑤移住、⑥サンゴ礁の被害、⑦感染症、⑧水と衛生管理、⑨土砂災害、⑩その他を特定し、具体的な適応策を支援の有無毎に整理している。

サモア

■ GHG目標

GHG目標	目標のタイプ		基準年目標
	基準年		2007年
	基準年排出量		352.03［kt-CO_2eq］
	目標年		2030年
	目標		26%減（エネルギー：30%減、廃棄物：4%減、AFOLU：26%減）
	対象	ガス	CO_2/CH_4/N_2O
		セクター	エネルギー（発電、運輸、観光）、廃棄物、AFOLU
	算定方法論		2006年IPCC-GL 1996年改訂IPCC-GL
	市場メカニズムの取り扱い		先進国に対するカーボンクレジットの販売に関心あり。
	土地セクターの取り扱い		含む
GHG以外の目標			なし

- 対象ガスにはCO_2のほか、CH_4、N_2Oも含まれている。
- 算定方法論では、1996年改訂IPCCガイドラインと2006年IPCCガイドラインの両方が使用されている。

■ GHG目標の達成に向けた行動

- エネルギー：2025年までに再エネ発電量を100%、自動車の電動化、電動マイクロモビリティの共有、船舶へのソーラーパネル設置拡大、貨物船や旅客船に対するバイオディーゼルの試験導入等
- 廃棄物：埋立地ガス回収技術の導入
- AFOLU：堆肥管理と肥料使用の改善、森林再生・森林回復・アグロフォレストリーの推進

■ 適応

- AFOLUと沿岸域セクターについて、適応に関する数値目標と活動内容、活動を実施する上でのギャップが記載されている。
- 例えば沿岸域について、マングローブ林面積を2030年までに2019年比で5%拡大することを目標とし、そのためマングローブの再生・植林プログラムに取り組むが、外部からの資金・技術支援が必要であるとしている。

ソロモン諸島

■ GHG目標

GHG目標	目標のタイプ		基準年目標
	基準年		2015年
	基準年排出量		707.425［kt-CO_2eq］
	目標年		2025年、2030年
	目標		2025年：14%減（条件なし）、27%減（条件付き） 2030年：33%減（条件なし）、45%減（条件付き）
	対象	ガス	CO_2
		セクター	エネルギー（発電、運輸）、AFOLU
	算定方法論		**記載なし**
	市場メカニズムの取り扱い		**使用する**
	土地セクターの取り扱い		含む
GHG以外の目標			あり

- 算定方法論についての説明が記載されていない。NC2に基づき1996年改訂IPCCガイドラインが使用されていると考えられるが、NDCに明記すべき。
- 市場メカニズムの使用が表明されているが、どのように使用するのかに関する説明がなされていない。

■ GHG目標の達成に向けた行動

- エネルギー：ディーゼルへの依存度低減、電力へのアクセス向上、電気製品の輸入規制によるエネルギー効率の向上等
- AFOLU：FAOが支援するREDD+プログラムの実施、国有林インベントリの作成、持続可能な伐採政策を通じた森林保全、保護区の設定（陸地及び内陸水域の少なくとも20%、沿岸及び海洋地域の15%）等

■ 適応

- 気候変動によるリスクや脆弱性を評価しつつ、これらを低減し、予測される気候変動の影響に適応するための能力を構築することが不可欠であるとした上で、異常気象に対する短期的な災害リスク軽減策と長期的な適応策、とりわけ生態系や社会のレジリエンス強化、気候変動に強靭なインフラの整備、そして最後の手段としてコミュニティの移転等の実施を述べている。

トンガ

■ GHG目標

GHG目標	目標のタイプ		基準年目標
	基準年		2006年
	基準年排出量		120.4［kt-CO_2eq］
	目標年		2030年
	目標		13%減（16［kt-CO_2eq］減）
	対象	ガス	CO_2/CH_4/N_2O
		セクター	エネルギー
	算定方法論		2006年IPCC-GL
	市場メカニズムの取り扱い		**使用しない**
	土地セクターの取り扱い		含まない
GHG以外の目標			あり

- GHG目標の対象セクターはエネルギーのみ。対象ガスにはCO_2のほか、CH_4、N_2Oも含まれている。
- 市場メカニズムは使用しないとされているが、自国のNDC達成には使用しないとの意味合いであり、自国内の排出削減量を他国に移転することの是非については明確に述べられていない。

■ GHG目標の達成に向けた行動

- エネルギー：2030年までに電力の再エネ比率70%を達成、車両規格の義務化、エネルギー性能基準の採用等
- その他、GHG目標には含まれていないが、2023年までに100万本の植林実施を目標にしている。また、AFOLUと廃棄物セクターについて、2025年提出のNDCにおいてGHG目標を設定するとしている。

■ 適応

- 海面上昇に伴う国土の消失を防ぐとともに、海洋資源を維持するため、海洋保護区を排他的経済水域（EEZ）の30%にまで拡大するとしている。
- また、上記の100万本の植林は適応策としても位置づけている。

ツバル

■ GHG目標

GHG目標	目標のタイプ		基準年目標
	基準年		2010年
	基準年排出量		20［kt-CO_2eq］
	目標年		2025年
	目標		発電：100%減、エネルギー：60%減
	対象	ガス	CO_2/CH_4
		セクター	エネルギー（発電、運輸等）、農業、廃棄物
	算定方法論		1996年改訂IPCC-GL
	市場メカニズムの取り扱い		使用しない
	土地セクターの取り扱い		含まない
GHG以外の目標			なし

- 対象ガスにはCO_2のほか、CH_4も含まれている。

■ GHG目標の達成に向けた行動

- 発電（再エネ）：9つの島全てにおいて再エネによる発電を実施（太陽光、風力、バイオディーゼル）
- エネルギー効率：1人あたりの電力消費量が高いフナフティ島においてエネルギー効率化プログラムを実施

■ 適応

- 記載なし

バヌアツ

■ GHG目標

GHG目標	目標のタイプ		基準年目標
	基準年		2010年
	基準年排出量		エネルギー：122.44［kt-CO_2eq］ AFOLU：587.48［kt-CO_2eq］ 廃棄物：10.75［kt-CO_2eq］
	目標年		2030年
	目標		記載なし
	対象	ガス	記載なし
		セクター	記載なし
	算定方法論		記載なし
	市場メカニズムの取り扱い		パリ協定第6条に基づく市場メカニズムを含む国際協力と支援により、気候変動に強い社会経済開発の機会を模索する。
	土地セクターの取り扱い		含まない
GHG以外の目標			あり

- GHG目標は記載されておらず、緩和行動を実施した結果としてエネルギー、AFOLU、廃棄物セクターの排出量がそれぞれ40%減、9%減、56%減になるとされている。

■ 緩和

- エネルギー：2030年までに発電の再エネ比率をほぼ100%に
- 運輸：2030年までにエネルギー効率を10%向上、公共交通機関において電気自動車を10%導入、ディーゼルにおけるバイオ燃料比率20%達成
- AFOLU：2030年までに牧畜と牧草地管理のための訓練・能力向上を実施、牧草地を牧畜システムへ転用
- 廃棄物：2030年までに都市固形廃棄物（MSW）のための廃棄物発電施設を導入、都市有機ごみを堆肥化して土壌改良剤を生産、排水管理システムを導入

■ 適応

- 2022年までに、農業関連事業者の80%が気候変動災害等が生じても十分な収入を得られるようにする。
- 2030年までに、6つの州において、自給自足農業のレジリエンスを高めるための対策を100%実施する。

3.4 Challenges of NDCs

Explanation of GHG targets

When describing GHG targets, it is necessary to clearly indicate these base annual emissions or baseline emissions, calculation methodologies, etc., in addition to the target gas and target sector. However, some countries' NDC do not specify base annual emissions or estimation methodologies and lacks the integrity of information. In order to promote reader understanding, necessary information must be appropriately stated.

In some cases, base annual emissions and estimation methodologies are described in the NC and BUR instead of NDC. In that case, the reference destination should be described concretely, and the referenced data should be posted to the NDC as much as possible.

Improving the consistency of information within the NDC

In Palau, for example, even though GHG targets include energy, transport and waste sectors, the target values shown are only for the energy sector. NDC as a whole lacks integrity and needs to be improved. If there is not enough information to indicate the target value, it is desirable to clearly state that fact and indicate a future improvement plan.

Enhancing the covered sectors for targets

While many countries include energy in their GHG targets, only a few include agriculture and LULUCF. In addition, not many countries include all CO_2, CH_4, and N_2O as target gases. Since the availability and technical capacity of data is limited in the Pacific island countries, there is no problem with an approach that targets only major gases and sectors for the time being, but it is desirable to expand the scope of the target while improving in the future.

Other

Some countries have expressed interest in market mechanisms but have not adequately explained how they intend to take advantage of them. In general, in developing countries, it is thought that a part of the amount of emission reduction achieved in the developing countries is transferred to developed countries, etc., and funds such as payment based on the results are obtained, but the possibility of using it to complement their own GHG targets is a possibility. Therefore, in addition to information on whether to utilize market mechanisms, countries considering using them should also describe what kind of purpose and how they intend to use them.

4. Results of COP26

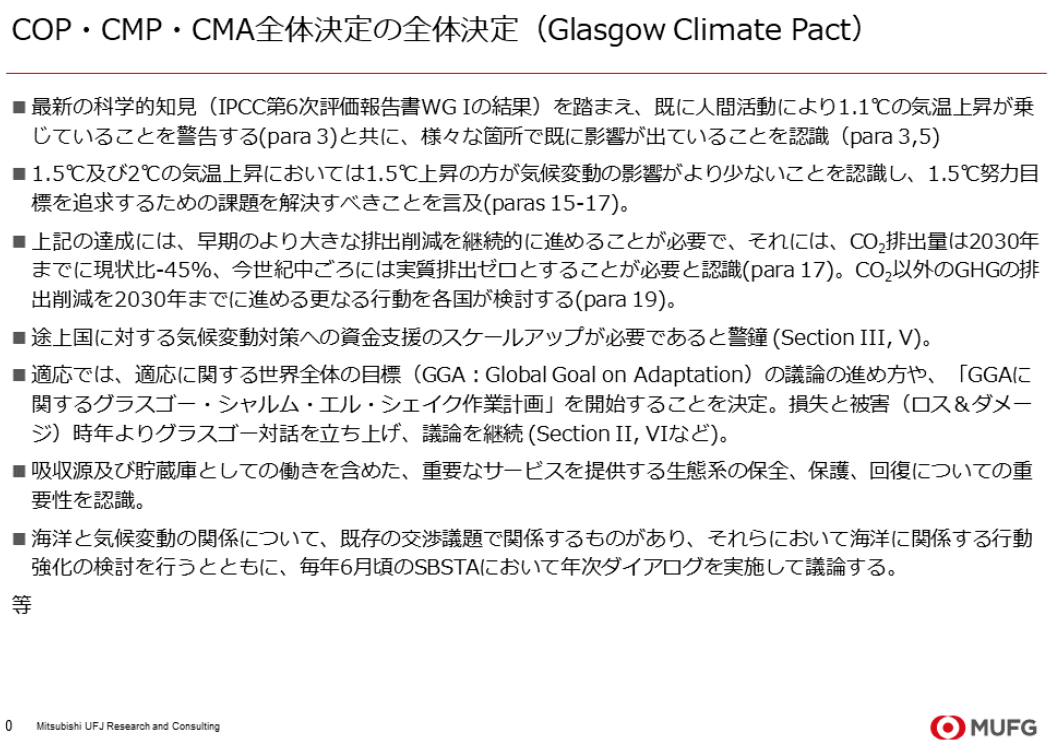
4.1 Overview

From October 31 to November 13, 2021, the 26th Session of the Parties to the United Nations Framework

Convention on Climate Change (COP26) finalized the Paris Rule Book, agreening to important agenda items such as the implementation guidelines for article 6 of the Paris Agreement (market mechanism) which was a continuing agenda from COP24, the reporting form of Article 13 (Transparency Framework), and the common period of implementation (common time frame).

With regard to the transparency framework, the points of discussion were the reporting of GHG emissions in each country based on the implementation guidelines adopted at CMA1 and the reporting form of efforts to achieve the NDC. As a result of the negotiations, it was decided to report on efforts to achieve the NDC in a table format that can compare emissions with items and tables common to all Parties.

4.2 Detail



パリ協定下の透明性枠組み：概要

■ パリ協定13条で定められている透明性枠組み（GHGインベントリや、NDCの進捗等報告を行う隔年透明性報告（BTR）の提出、技術審査、多国間評価等の枠組み）については、2018年末に実施されたCOP24（CMA1）において、基本ルールとなるガイダンスが採択されている（18/CMA.1）。主なポイントは以下。

- 最初の隔年透明性報告は2024年12月末までに提出する。ただし、LDC及び島嶼国については柔軟性措置として、提出時期はそれらの国の裁量に任せされる。
- GHGインベントリは、独立した報告書としても良いし、BTRの一部としても良い。
- GHGインベントリは、先進国・途上国を分けずにすべての国が、2006年IPCCガイドラインに基づき、AR5のGWP100年値を用いて、共通のガイダンスに基づき、共通報告表（Common Reporting Tables: CRT）を用いて実施する。
- 報告分野は、エネルギー、IPPU、農業、LULUCF、廃棄物の5分野、GHGはCO_2、CH_4、N_2O、HFCs、PFCs、SF_6、NF_3。
- GHGインベントリの柔軟性措置を求める途上国は、キーカテゴリー分析（累積排出量95%→85%）、微小排出源としてのNE報告の基準値（標準値の倍を利用）、時系列（1990年以降毎年→NDCの基準年／期間及び2000年以降の毎年）などで、緩めのGHGインベントリ作成実施可。
- 協定4条のNDC（緩和に関する目標）の進捗、達成に必要な情報は18/CMA.1セクションCのガイダンスに基づき必要な情報を透明性高く報告。この際、パラ65～78に記載されている情報を共通の表様式（Common Tabular Format：CTF）を用いて報告する。
- 先進国は資金支援の情報を、途上国は支援ニーズの情報を提出する。
- GHGインベントリ審査と、隔年報告書、隔年更新報告書で別々に実施されていた技術評価が統合一本化。

COP26（CMA3）における透明性枠組ルールの合意内容

■ 18/CMA.1の実施においては、各国が共通して報告に利用する表、インベントリ報告書の共通アウトライン等が必要であり、この作成及び採択をCMA3までに行うこととなっていた。コロナ禍でUNFCCC交渉の延期があったことにより、当初より1年遅れて2021年11月に開催されたCMA3にて、当該作業結果が採択された。採択された内容は以下の通りである。

- GHGインベントリ報告に利用するCRT（18/CMA.1のII章に対応）
- パリ協定4条のNDCの追跡・達成報告に利用するCTF（18/CMA.1のIII章に対応）
- 資金、技術等支援の報告に用いるCTF（18/CMA.1のV-VI章に対応）
- BTR、GHGインベントリ報告文書（National Inventory Document：NID）、BTRの技術専門家審査報告書のアウトライン（18/CMA.1に対応）
- パリ協定に報告制度が変わることに対応するために実施する、BTR技術専門家審査のための訓練プログラム

■ 上記の実施においては、更に以下の付随する決定が決められている。

- CTFの情報は、さらに追加的な補足フォーマットを用いて説明可。
- GHGインベントリ作成時の柔軟性は、①各報告セルにおいて新注釈記号FXを用いて報告する、②行列を非表示にする、③表を非表示にする等の形で利用可能になった。
- 2019年IPCC改良ガイドラインの項目はその他項目の下で任意報告が可能な形になった。
- CRT報告ツールは、2023年6月までの試行版開発、2024年6月の最終版提供を目指すことになり、間に合わない場合には提供が遅延した分提出を遅らせてもよい。
- 先進国のインベントリの提出期限は4月15日であることを再確認。

Summary of Article 6 Rulebook

The Paris Agreement allows Parties to use international market mechanism to achieve their Nationally Determined Contributions (NDCs) in addition to domestic mitigation measures.

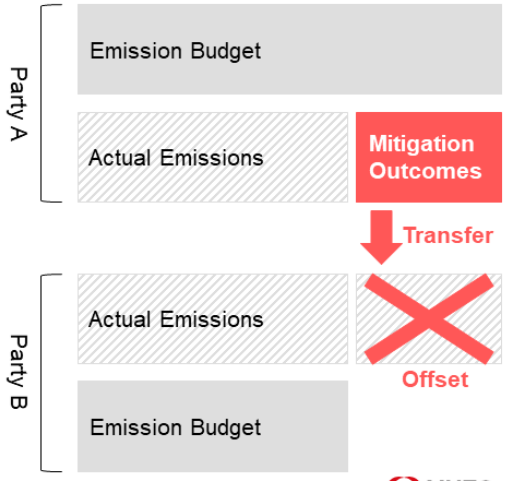
Article 6 of the Paris Agreement

Article 6.2 — Cooperative Approach
⇒ Parties shall promote sustainable development and ensure environmental integrity and transparency and shall apply robust accounting to ensure the avoidance of double counting.

Article 6.4 — New UN-Led Crediting Mechanism
⇒ A mechanism to contribute to the mitigation of GHG emissions and support sustainable development is established under the authority and guidance of the CMA.

Article 6.8 — Non-Market Approach
⇒ Parties recognize the importance of integrated, holistic and balanced non-market approaches being available to Parties to assist in the implementation of their NDCs.

How the Market Mechanism Works



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Summary of Article 6 Rulebook

A6.2 Guidance on cooperative approaches

(1) Definition of ITMOs
- Generated from A6.2 or A6.4 for mitigation from 2021 onward
- Measured in tCO_2eq or other non-GHG metrics

(2) Corresponding adjustment
- Single-year NDC: Either multi-year emissions trajectory or annual average option
- Multi-year NDC: Multi-year emissions trajectory option only
- Shall be applied to all ITMOs (including those not covered by NDC and measured in non-GHG metrics)

(3) SoP and OMGE
- Not mandatory but strongly encouraged
- Contributions for adaptation and delivery of OMGE shall be reported periodically

(4) Reporting, review, recording and tracking
- Parties participating in cooperative approaches shall provide "Initial report", "Annual information" and "Regular information (in part of BTR)"
- Initial report and regular information shall be reviewed by Art 6 TER team, and annual information be compiled in Article 6 database for transparency

A6.4 RMPs for A6.4 mechanism

(1) Authorization and corresponding adjustment by host parties
- Host parties shall provide an authorization on whether A6.4 ERs may be used towards achievement of NDCs and/or for other international mitigation purposes
- Host parties shall apply corresponding adjustments for such A6.4 ERs first transferred

(2) SoP and OMGE
- SoP-adaptation: 5% of issued A6.4 ERs
- SoP-administration: Shall be determined by CMA
- OMGE: 2% of issued A6.4 ERs
- A6.4 ERs set aside for SoP-adaptation and canceled for OMGE shall be subject to corresponding adjustments by host parties

(3) Transition of CDM activities and use of CERs
- Any type of CDM activities registered or listed as provisional as per the current temporary measures may transition to A6.4 mechanism, as long as it meets given conditions
- CERs from CDM activities registered on or after 1 January 2013 may be used towards first/first updated NDCs with no corresponding adjustments applied by host parties

A6.8 Work programme under the framework for non-market approaches

(1) Principles and governance
- NMAs are voluntary actions to deliver higher ambitions and support implementation of NDCs
- The Glasgow Committee is established to implement the framework for NMAs and the work programme

(2) Work programme
- May include workshops, engagement with public and private sector stakeholders, submissions from parties, papers and reports by the secretariat
- Will be initiated in 2022

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Annexes

Annex 1: List of Dispatched Experts

Annex 2: List of Counterparts

Annex 3: JICA Project expert missions to PNG

Annex 4: List of Products produced by the Project

Annex 5: PDM

Annex 6: R/D of the Project

Annex 7: Minutes of JCC

Annex 8: Project Monitoring Sheet

Annex 1: List of Dispatched Experts

Annex 1: List of Dispatched Experts

#	Name	Position	Organization
1	Takeshi Enoki	Project leader/ generalist	MURC
2	Tomoki Takahashi Takuji Terakawa	Energy sector	MURC
3	Matthew Dudley	Industrial Processes and Product Use sector	Independent consultant
4	Atsushi Sato	AFOLU sector	MURC
5	Hiroyuki Ueda	Waste sector	MURC
6	Masaaki Nakamura	Mitigation actions	MURC
7	Yui Ogawa	Training Coordination	MURC

Annex 2: List of counterparts

Annex 2: List of counterparts

#	Name	Position	Organization
1	William Lakain	Acting Managing Director	CCDA
2	Gwen Sissiou	General Manager – REDD+ & Mitigation Division	CCDA
3	Alfred Rungol	General Manager Manager – MRV	CCDA
4	Erick Sarut	National Communication Officer	CCDA
5	Larsen Daboyan	National Communication Officer	CCDA
6	Debra Sungi	MRV Officer	CCDA
7	Jason Paniu	Acting MRV Officer	CCDA
8	Morgan Kai	Trainee Officer – National Communication	CCDA
9	Jacinta Kull	Trainee Officer – National Communication	CCDA
10	Priscilla Pep※	Trainee Officer – MRV	CCDA
11	Nathan Sapala※	Trainee Officer – MRV	CCDA

Annex 3: JICA Project expert missions to PNG

Annex 3: JICA Project expert missions to PNG

Position	name	Organization		# of trips	2017					2018											2019											
					8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
GHG inventory (Leader/General)	Takeshi Enoki	Mitsubishi UFJ research and consulting	plan	11			(14)		(14)		(10)		(14)		(10)			(14)		(10)			(14)			(14)			(12)		(14)		
			actual	11			10/4 10/18 (15)		12/3 12/16 (14)		2/4 2/17 (14)			5/20 5/26 (7)		7/29 7/31 (3)	8/1 8/9 (9)		9/26 9/30 (5)	10/1 10/6 (6)	1/27 11/30 (4)	12/1 12/5 (5)		2/16 2/26 (11)			5/7 5/23 (17)		7/17 7 (14)			10/9 10/23 (15)	11/27 11/30 (4)	12/1 12/11 (11)
GHG inventory (Energy)	Tomoki Takahashi	Mitsubishi UFJ research and consulting	plan	11			(14)		(14)		(10)		(7)		(4)			(4)		(4)			(5)			(4)			(7)		(7)		
			actual	11			10/4 10/18 (15)		12/3 12/16 (14)		2/4 2/15 (12)		4/15 4/21 (7)				8/9 8/15 (7)						3/10 3/16 (7)					7/24 8/1 8/3 (8) (3)			10/13 10/19 (7)		
GHG inventory (IPPU)	Matthew Dudley	consultant	plan	11					(7)						(10)			(10)		(7)			(7)			(7)			(10)		(10)		
			actual	11					12/9 12/15 (7)					5/19 5/25 (7)			8/8 8/15 (8)		10/1 10/6 (6)				2/18 2/24 (7)			5/9 5/17 (9)		7/22 7 (10)			10/10 10/18 (10)		
GHG inventory (AFOLU)	Atsushi Sato	Mitsubishi UFJ research and consulting	plan	7					(7)		(7)		(7)		(5)			(7)								(7)			(7)		(5)		
			actual	7					12/9 12/16 (8)		2/11 2/17 (7)		4/15 4/18 (4)				8/15 8/22 (8)											7/27 8/1 8/3 (5) (3)		9/21 9/28 (8)	10/22 10/30 (9)		
GHG inventory (waste)	Hiroyuki Ueda	Mitsubishi UFJ research and consulting	plan	2					(6)									(7)														
			actual	2					12/11 12/16 (6)							7/29 7/31 (3)	8/1 8/4 (4)																	

Position	name	Organization		# of trips	2020												2021												2022		total days	total man-months
					1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2		
GHG inventory (Leader/General)	Takeshi Enoki	Mitsubishi UFJ research and consulting	plan	11		(14)																									154	5.13
			actual	11																											154	5.13
GHG inventory (Energy)	Tomoki Takahashi	Mitsubishi UFJ research and consulting	plan	18																											80	2.67
			actual	11																											80	2.67
GHG inventory (Energy1)	Takuji Terakawa	Mitsubishi UFJ research and consulting	plan	0																											0	0.00
			actual	0																											0	0.00
GHG inventory (Energy2)	Masaaki Nakamura	Mitsubishi UFJ research and consulting	plan	0																											0	0.00
			actual	0																											0	0.00
GHG inventory (IPPU)	Matthew Dudley	consultant	plan	11		(6)																									74	2.47
			actual	11			3/2 3/11 (10)																								74	2.47
GHG inventory (AFOLU)	Atsushi Sato	Mitsubishi UFJ research and consulting	plan	7																											52	1.73
			actual	7																											52	1.73
GHG inventory (waste)	Hiroyuki Ueda	Mitsubishi UFJ research and consulting	plan	2																											13	0.43
			actual	2																											13	0.43
GHG inventory (waste)	Masato Yano	Mitsubishi UFJ research and consulting	plan	0																											0	0.00
			actual	0																											0	0.00
																													Plan		373	0.00
																													Actual		373	0.00

Annex 4: List of Products Produced by the Project

Annex 4: List of Products Produced by the Project

1. GHG inventory review template
2. BUR1 consultation workshop presentation slides
3. BUR1 as submitted to the UNFCCC
4. ICA preparation guidebook
5. Presentation for the Facilitative Sharing of Views
6. QA/QC plan
7. National inventory report for Energy, Industrial processes and product use, and waste sectors
8. BUR2 without the agriculture and LULUCF sector information

Annex 5: PDM

Annex 5: PDM

Project Design Matrix

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG — **Version 1**

Implementing Agency: CCDA — **Dated February 22, 2017**

Target Group: CCDA

Period of Project: August 2017- July 2021

Project Site: Port Moresby, PNG — **Model Site:**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.	1) A national GHG inventory is prepared every 2 years. 2) Items on TACCC checklist	• National GHG inventory report. • TACCC assessment results of the checklist			
Project Purpose The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.	1) A national GHG inventory report is developed for 2015 and 2017. 2) Items on TACCC checklist	• Reports of national GHG inventory (2015 and 2017) • TACCC assessment results of the checklist	• Relevant agencies cooperate with CCDA.		
Outputs					
Output1 : Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1-1) General inventory compilation procedure(work plan) is documented. 1-2) Data for national GHG inventories are collected, archived and maintained. 1-3) Technical document on procedures of inventory compilation is drafted.	1-1) Work plan 1-2) Set of databases/spread sheet files for national GHG inventories 1-3) National GHG inventory report			
Output2 : Capacity to promote understanding of national GHG inventories is enhanced.	2-1) The average level of understanding of workshops: 70% or above.	2-1) Results of questionnaire			
Output3. Capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3-1) Results of key category analysis and uncertainty assessment are documented. 3-2) Improvements made and necessary improvements for the future are documented.	3-1,2) National GHG inventory report			

Activities	Inputs		Important Assumption
	The Japanese Side	The PNG Side	
1-1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. 1-2: Consider and recommend ways to improve the national GHG inventory arrangements. 1-3:Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). 1-4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. 1-5:Collect data necessary for national GHG inventories from relevant parties. 1-6:Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. 1-7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors. 1-8:Compile national GHG inventories with time series consistency. 1-9:Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR). 2-1:Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. 2-2:Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders. 3-1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. 3-2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. 3-3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories). 3-4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. 3-5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC. 3-6: Draft and improve a national GHG inventory improvement plan (to be included in NIR). 3-7: Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	1) Short term experts • GHG inventory (General) • GHG inventory (Energy) • GHG inventory (Industrial Processes and Product use) • GHG inventory (Agriculture) • GHG inventory (Land use, Land use change and Forestry) • GHG inventory (Waste) 2) Workshops 3) Training in Japan/third country 4) Equipment • PC for data management	1) Counterpart personnel CCDA 2) Office space for the sector expert teams to work 3) Meeting space for group progress report meetings/seminars 4) Necessary operation costs	Pre-Conditions <Issues and countermeasures>

Annex 6: R/D of the Project

RECORD OF DISCUSSIONS

ON

THE PROJECT FOR ENHANCING CAPACITY TO DEVELOP A SUSTAINABLE GHG INVENTORY SYSTEM FOR PNG

IN

INDEPENDENT STATE OF PAPUA NEW GUINEA

AGREED UPON BETWEEN

CLIMATE CHANGE AND DEVELOPMENT AUTHORITY

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Port Moresby, April 24, 2017

Mr. Takashi Toyama
Chief Representative,
Papua New Guinea Office,
Japan International Cooperation Agency

Mr. Ruel Yamuna
Acting Managing Director,
Climate Change and Development Authority

Witnessed by

Ms. Hakaua Harry
Secretary,
Department of National Planning and Monitoring

Based on the minutes of meetings on the Detailed Planning Survey on the Project for Enhancing Capacity to Develop a Sustainable GHG Inventory System for PNG (hereinafter referred to as "the Project") signed on February 9, 2017 between the Climate Change and Development Authority (hereinafter referred to as "CCDA") and the Japan International Cooperation Agency (hereinafter referred to as "JICA"), JICA held a series of discussions with CCDA and relevant organizations to develop a detailed plan of the Project.

Both parties agreed the details of the Project and the main points discussed as described in the Appendix 1 and the Appendix 2 respectively.

Both parties also agreed that CCDA, the counterpart to JICA, will be responsible for the implementation of the Project in cooperation with JICA, coordinate with other relevant organizations and ensure that the self-reliant operation of the Project is sustained during and after the implementation period in order to contribute toward social and economic development of Independent State of Papua New Guinea (hereinafter referred to as "PNG").

The Project will be implemented within the framework of the Agreement on Technical Cooperation signed on October 27, 2015 (hereinafter referred to as "the Agreement") and the Note Verbales exchanged on May 2, 2016 between the Government of Japan (hereinafter referred to as "GOJ") and the Government of PNG (hereinafter referred to as "GOPNG").

Appendix 1: Project Description
Appendix 2: Main Points Discussed
Appendix 3: Minutes of Meetings on the Detailed Planning Survey on the Project for Enhancing Capacity to Develop a Sustainable GHG Inventory System for PNG

Appendix 1

PROJECT DESCRIPTION

Both parties confirmed that there is no change in the Project Description in the minutes of meetings for Preparatory Survey on the Project signed on February 9, 2017 (Appendix 3).

I. BACKGROUND

The GOPNG set Environmental Sustainability and Climate Change as one of the seven strategic focus areas, which are referred to as pillars to underpin its long-term strategy of PNG Vision 2050. The vision pursues the pathway to realize the carbon neutral society by 2050 and to work on the mainstreaming of climate change consideration. PNG, has been an advocacy country of REDD (Reducing Emissions from Deforestation and Forest Degradation) and has especially been actively working on the emission reduction in forestry sector as a pilot country of UN REDD program. Also, recognizing the increasing trend of GHG emisions from the energy sector due to the growth in economy and increase in fossil fuel consumption, GOPNG announced the ambitious target of full transition to a renewable energy society by 2030, cross-field improvement of energy efficiency and emission reduction in the transport sector in its Nationally Determined Contribution (NDC).

So far, PNG has experienced GHG inventory preparation twice in order to submit the Initial and Second National Communications (INC/SNC) under its obligations to UNFCCC. The GOPNG has been responding positively to the challenges in GHG inventory preparation analyzed in the SNC. For instance, the parliament certified the Climate Change (Management) Act in 2015 and the Act declared the establishment of the Climate Change and Development Authority (CCDA) to replace the Office of Climate Change and Development as the comprehensive promoting and management authority in climate change related policies. In addition, the launch of UNFCCC Paris Agreement (Implementation) Bill 2016 made the emission reduction target set in the NDC domestically binding.

In the background of the obligation of BUR submission, the biennial development of GHG inventory became a requirement of all Non-Annex I countries in 2011,. Accordingly, GOPNG made a decision to switch its implementing structure from the ad-hoc, project-based approach to the internal and institutional approach in order to realize the periodical GHG inventory preparation. However, there is an issue of shortage of human resources with the skill set required for GHG inventory development such as database design, data collection and management, and establishment of the implementing system in addition to knowledge of the IPCC Guidelines, UNFCCC reporting guidelines. The CCDA has already been increasing the number of staff but the enhancement of their capacity is the remaining issue. As PNG is currently under the development of the Third National Communication (TNC) and the first Biennial Update Report (BUR), the enhancement of the National Capacity including the capacity building of the CCDA is requested by GOPNG in this project.

II. OUTLINE OF THE PROJECT

Details of the Project are described in the Logical Framework (Project Design Matrix: PDM) (Annex 1) and the tentative Plan of Operation (Annex 2).

1. Title of the Project

The Project for Enhancing Capacity to Develop a Sustainable GHG Inventory System for PNG

2. Expected Goals which will be attained after implementing the Proposed Plan

(1) Overall Goal

TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.

(2) Project Purpose

The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.

3. Outputs

Output 1.

Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.

Output 2.

Capacity to promote understanding of national GHG inventories is enhanced.

Output 3.

Capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste).

4. Input

(1) Input by JICA

(a) Dispatch of Experts

Short-term experts of GHG inventory (General: Energy: Industrial Processes and Product Use: Agriculture: Land Use, Land Use Change and Forestry: Waste) with sound experience on National GHG inventory development. The number and the expertise of experts will be determined through the discussions between both sides within the framework of the Project.

(b) Training

Necessary short training courses (in-country, in Japan and/or in third countries) will be conducted.

(c) Machinery and Equipment

JICA will provide, according to the priority, such machinery, equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Project.

Input other than indicated above will be determined through mutual consultations between JICA and CCDA during the implementation of the Project, as necessary.

(2) Input by CCDA

CCDA will take necessary measures to provide at its own expense:

(a) Services of counterpart personnel and administrative personnel as referred to in II-5;
(b) Suitable office space with necessary equipment;
(c) Supply or replacement of machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the equipment provided by JICA;
(d) Information as well as support in obtaining medical service;
(e) Credentials or identification cards;
(f) Available data (including maps and photographs) and information related to the Project;
(g) Running expenses necessary for the implementation of the Project;
(h) Expenses necessary for transportation within PNG of the equipment referred to in II-4 (1) as well as for the installation, operation and maintenance thereof; and
(i) Necessary facilities to the JICA experts for the remittance as well as utilization of the funds introduced into PNG from Japan in connection with the implementation of the Project

5. Implementation Structure

The project organization chart is given in the Annex 3. The roles and assignments of relevant organizations are as follows:

(1) Responsible and Implementing Agency

CCDA will be the responsible agency of the Project as Project Director. CCDA will organize the GHG inventory team as shown in Annex 4. Roles and responsibilities of team members are defined as follows:

(a) Inventory coordinator

Inventory coordinator will be responsible for overall administration and implementation of the Project. He/she will be specifically in charge of overall planning, coordination, management and technical oversight of the inventory.

(b) Inventory compiler

Inventory compiler will be responsible for overall data and document management of the Project. He/she will combine sector experts' work into a cohesive inventory product and identify an propose ways to cross cutting issues of the Project

(c) Sector experts

At least one sector expert will be assigned to each sector and he/she will be responsible for undertaking research, data collection, calculations, drafting, quality control, archiving, and documentation of the Project.

(d) QA/QC coordinator

QA/QC coordinator will be responsible for overall quality assurance /

quality control coordination and/or overall data and document management of the Project.

(2) JICA Experts

The JICA experts will give necessary technical guidance, advice and recommendations to CCDA on any matters pertaining to the implementation of the Project.

(3) Joint Coordinating Committee

Joint Coordinating Committee (hereinafter referred to as "JCC") will be established in order to facilitate inter-organizational coordination. JCC will be held at least once a year and whenever deems it necessary. JCC will review the progress, revise the overall plan when necessary, approve an annual work plan, conduct evaluation of the Project, and exchange opinions on major issues that arise during the implementation of the Project. A list of proposed members of JCC is shown in the Annex 5.

7. Project Site(s) and Beneficiaries
   (1) Project sites: Port Moresby
   (2) Direct beneficiary: CCDA

8. Duration

The duration of the Project will be four (4) years from the first arrival of the JICA experts team.

9. Reports

CCDA and JICA experts will jointly prepare the following reports in English:
   (1) Monitoring Sheet on semiannual basis until the project completion
   (2) Project Completion Report at the time of project completion

10. Environmental and Social Considerations

CCDA will abide by 'JICA Guidelines for Environmental and Social Considerations' in order to ensure that appropriate considerations will be made for the environmental and social impacts of the Project.

III. UNDERTAKINGS OF CCDA and relevant PNG authorities

1. CCDA and relevant PNG authorities will take necessary measures to:
   (1) ensure that the technologies and knowledge acquired by the PNG nationals as a result of Japanese technical cooperation contributes to the economic and social development of PNG, and that the knowledge and experience acquired by the personnel of PNG from technical training as well as the equipment provided by JICA will be utilized effectively in the implementation of the Project;
   (2) grant privileges, exemptions and benefits to the JICA experts referred to in II-4 (1) above and their families, which are no less favorable than those granted to experts and members of the missions and their families of third countries or international organizations performing similar missions in PNG.
2. Other privileges, exemptions and benefits will be provided in accordance

with the Agreement on Technical Cooperation signed on October 27, 2015 and Note Verbales exchanged on May 2, 2016 between the GOJ and the GOPNG.

IV. MONITORING AND EVALUATION

JICA and the CCDA will jointly and regularly monitor the progress of the Project through the Monitoring Sheets based on the Project Design Matrix (PDM) and Plan of Operation (PO). The Monitoring Sheets will be reviewed every six (6) months.
Also, Project Completion Report will be drawn up one (1) month before the termination of the Project.

JICA will conduct the following evaluations and surveys to verify sustainability and impact of the Project. The CCDA is required to provide necessary support for them.
1. Ex-post evaluation three (3) years after the project completion, in principle
2. Follow-up surveys on necessity basis

V. PROMOTION OF PUBLIC SUPPORT

For the purpose of promoting support for the Project, CCDA will take appropriate measures to make the Project widely known to the people of PNG.

VI. MISCONDUCT

If JICA receives information related to suspected corrupt or fraudulent practices in the implementation of the Project, CCDA and relevant organizations will provide JICA with such information as JICA may reasonably request, including information related to any concerned official of the government and/or public organizations of the PNG.
CCDA and relevant organizations will not, unfairly or unfavorably treat the person and/or company which provided the information related to suspected corrupt or fraudulent practices in the implementation of the Project.

VII. MUTUAL CONSULTATION

JICA and CCDA will consult each other whenever any major issues arise in the course of Project implementation.

VIII. AMENDMENTS

The record of discussions may be amended by the Minutes of Meetings between JICA and CCDA. However, PO may be amended in the Monitoring Sheets.
The Minutes of Meetings will be signed by authorized persons of each side who may be different from the signers of the Record of Discussions.

Annex 1 Logical Framework (Project Design Matrix:PDM)
Annex 2 Tentative Plan of Operation
Annex 3 Project Organization Chart
Annex 4 A List of proposed GHG inventories Team members
Annex 5 A List of Proposed Members of Joint Coordinating Committee/ Steering Committee

Appendix 2

MAIN POINTS DISCUSSED

1. Contribution to promotion of mitigation action

JICA has exchanged opinions with CCDA with regard to the expected impact of the Project in the promotion of mitigation action as well as how the outcomes of the mitigation action should be reflected into the GHG inventories. Especially, the latter point was included as an activity 3-4.

2. Implementing structure

The CCDA is currently undergoing a restructuring. The final draft of new structure has already submitted to the the responsible authority, the Department of Personnel Management, and been waiting for the final appraisal. The timing is uncertain. However, CCDA confirmed that the current restructuring will not have implications on the setup of the GHG inventory team, and the implementing structure and project team members shown in Annex 3 and 4 will be ensured. In case of change of the team composition or reduction of the number of the team members, both sides agreed to review the implementing structure based on further discussion.

3. Schedule for inventory preparation

Both sides noted that the terms of the Project and the PO are to be confirmed based on the state of progress of the GHG inventory preparation for the TNC/ BUR1 at the timing of the project inception. Considering the current status, the inventory year for the Project will be 2015 and 2017.

4. Data provision from other ministries and institutions

Both sides confirmed that the CCDA will proceed the drafing of the MOU/ MOA between the lead organizations in each sector as well as other relevant institutions. The CCDA noted that, in such case, the roles and the responsibilities as well as the purpose of the data usage defined in the MOU/MOA should be consistent with the assumption in the Project.

5. Donor collaboration and partnership

Both sides noted that the FAO is planning a capacity building project, GEF/CBIT project, in regard to the improvement of transparency in AFOLU sector inventory, and the part of its possible project scope has duplication with the scope of this Project. However, the project proposal which is supported by FAO has not been approved yet and the details of the project are not ensured. Therefore, both sides agreed that the possibility of FAO project is not enough to reasonably change the scope of the Project and JICA will proceed the project with original agreement in the first detailed planning survey mission conducted in September 2016 which includes all sectors inventory within the scope. Also, both sides confirmed the necessity of avoiding unnecessary duplications between donors and CCDA agreed to clarify the scope of the Project to FAO in order to have clear demarcation between the two projects. Based on the assumption, both sides agreed to have discussion among CCDA, PNGFA, FAO and JICA on

the best way to collaborate efforts, in case that the project proposal by FAO gets approval.

6. Contribution to mitigation and/or adaptation to climate change

The Project is expected to contribute to mitigation to climate change. Improvement of the National GHG inventory identifies the trend of GHG emissions in PNG and the key category of the emission reduction. This will help planning and reviewing of the mitigation policies including NDC.

Project Design Matrix

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Version 1

Dated February 9, 2017

Implementing Agency: CCDA

Target Group: CCDA

Period of Project: August 2017- July 2021

Project Site: Port Moresby, PNG Model Site:

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.	1) A national GHG inventory is prepared every 2 years. 2) Items on TACCC checklist	・National GHG inventory report. ・TACCC assessment results of the checklist			
Project Purpose The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.	1) A national GHG inventory report is developed for 2015 and 2017. 2) Items on TACCC checklist	・Reports of national GHG inventory (2015 and 2017) ・TACCC assessment results of the checklist	・Relevant agencies cooperate with CCDA.		
Outputs Output1 : Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1-1) General inventory compilation procedure(work plan) is documented. 1-2) Data for national GHG inventories are collected, archived and maintained. 1-3) Technical document on procedures of inventory compilation is drafted.	1-1) Work plan 1-2) Set of databases/spread sheet files for national GHG inventories 1-3) National GHG inventory report			
Output2 : Capacity to promote understanding of national GHG inventories is enhanced.	2-1) The average level of understanding of workshops: 70% or above.	2-1) Results of questionnaire			
Output3. Capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3-1) Results of key category analysis and uncertainty assessment are documented. 3-2) Improvements made and necessary improvements for the future are documented.	3-1) National GHG inventory report			

Activities	Inputs		Important Assumption
	The Japanese Side	The PNG Side	
1-1 : Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. 1-2: Consider and recommend ways to improve the national GHG inventory arrangements. 1-3 : Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). 1-4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. 1-5 : Collect data necessary for national GHG inventories from relevant parties. 1-6 : Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. 1-7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors. 1-8 : Compile national GHG inventories with time series consistency. 1-9 : Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	1) Short term experts ・GHG inventory (General) ・GHG inventory (Energy) ・GHG inventory (Industrial Processes and Product use) ・GHG inventory (Agriculture) ・GHG inventory (Land use, Land use change and Forestry) ・GHG inventory (Waste) 2) Workshops 3) Training in Japan/third country 4) Equipment ・PC for data management	1) Counterpart personnel CCDA 2) Office space for the sector expert teams to work 3) Meeting space for group progress report meetings/seminars 4) Necessary operation costs	

2-1 : Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.

2-2 : Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.

3-1 : Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.

3-2 : Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.

3-3 : Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).

3-4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.

3-5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.

3-6 : Draft and improve a national GHG inventory improvement plan (to be included in NIR).

Pre-Conditions

<Issues and countermeasures>

3-7: Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.			

Annex 2

Version 0

Dated February 9, 2017

Tentative Plan of Operation

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Inputs	Year	2017		2018				2019				2020				2021			Remarks
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	
Expert																			
GHG inventory (General)	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	approximately 1 week to 2 weeks a quarter/expert
	Actual																		
GHG inventory (Energy)	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	Actual																		
GHG inventory (Industrial Processes and Product use)	Plan		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
	Actual																		
GHG inventory (Agriculture, Land use change and Forestry)	Plan		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
	Actual																		
GHG inventory (Waste)	Plan		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
	Actual																		
Equipment																			
PC for data management	Plan	■																	
	Actual																		
Training in Japan																			
Training for Counterpart on GHG inventories in Japan	Plan					■	■												1 week training
	Actual																		
In-country/Third country Training																			
Training for Counterpart on GHG inventories in developing country	Plan													■	■				1 week training
	Actual																		

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Activities / Sub-Activities		Year	2017		2018				2019				2020				2021			Responsible Organization	
			III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	Japan	GOPNG
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.																					
1.1 Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	○ ○ ○ ○ ○	Plan			■								■							JICA	CCDA
		Actual																			
1.2 Consider and recommend ways to improve the national GHG inventory arrangements.	○ △ △ △ △	Plan			■	■							■	■						JICA	CCDA
		Actual																			
1.3 Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	○ ○ ○ ○ ○	Plan				■	■							■						JICA	CCDA
		Actual																			
1.4 Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	△ ○ ○ ○ ○	Plan					■	■						■						JICA	CCDA
		Actual																			
1.5 Collect data necessary for national GHG inventories from relevant parties.	△ ○ ○ ○ ○	Plan						■	■	■	■	■				■	■			JICA	CCDA
		Actual																			

Activity						Plan/Actual	Schedule		
1.6 Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Δ	○	○	○	○	Plan		JICA	CCDA
						Actual			
1.7 Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Δ	○	○	○	○	Plan		JICA	CCDA
						Actual			
1.8 Compile national GHG inventories with time series consistency.	Δ	○	○	○	○	Plan		JICA	CCDA
						Actual			
1.9 Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Δ	○	○	○	○	Plan		JICA	CCDA
						Actual			
Output 2:Capacity to promote understanding of national GHG inventories is enhanced.									
2.1 Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	○	○	○	○	○	Plan			
						Actual			
2.2 Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	○	○	○	○	○	Plan			
						Actual			
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)									
3.1 Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Δ	○	○	○	○	Plan			
						Actual			
3.2 Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	○	Δ	Δ	Δ	Δ	Plan			
						Actual			
3.3 Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).	Δ	○	○	○	○	Plan			
						Actual			
3.4 Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Δ	○	○	○	○	Plan			
						Actual			
3.5 Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	○	○	○	○	○	Plan			
						Actual			
3.6 Draft and improve a national GHG inventory improvement plan (to be included in NIR).	○	Δ	Δ	Δ	Δ	Plan			
						Actual			
3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	○	Δ	Δ	Δ	Δ	Plan			
						Actual			

Duration / Phasing		
	Plan	
	Actual	

Monitoring Plan	Year	2017		2018				2019				2020				2021			Remarks
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	
Monitoring																			
Joint Coordinating Committee	Plan					●				●				●				●	
	Actual																		
Set-up the Detailed Plan of Operation	Plan				▲														
	Actual																		
Submission of Monitoring Sheet	Plan	●		●		●		●		●		●		●		●			
	Actual																		
Reports/Documents																			
Inception Report	Plan	▲																	
	Actual																		
National GHG inventory Report	Plan										▲						▲		
	Actual																		
Project Completion Report	Plan																		
	Actual																▲		
Public Relations																			
Establishment and operation of JICA TC website	Plan																		
	Actual																		

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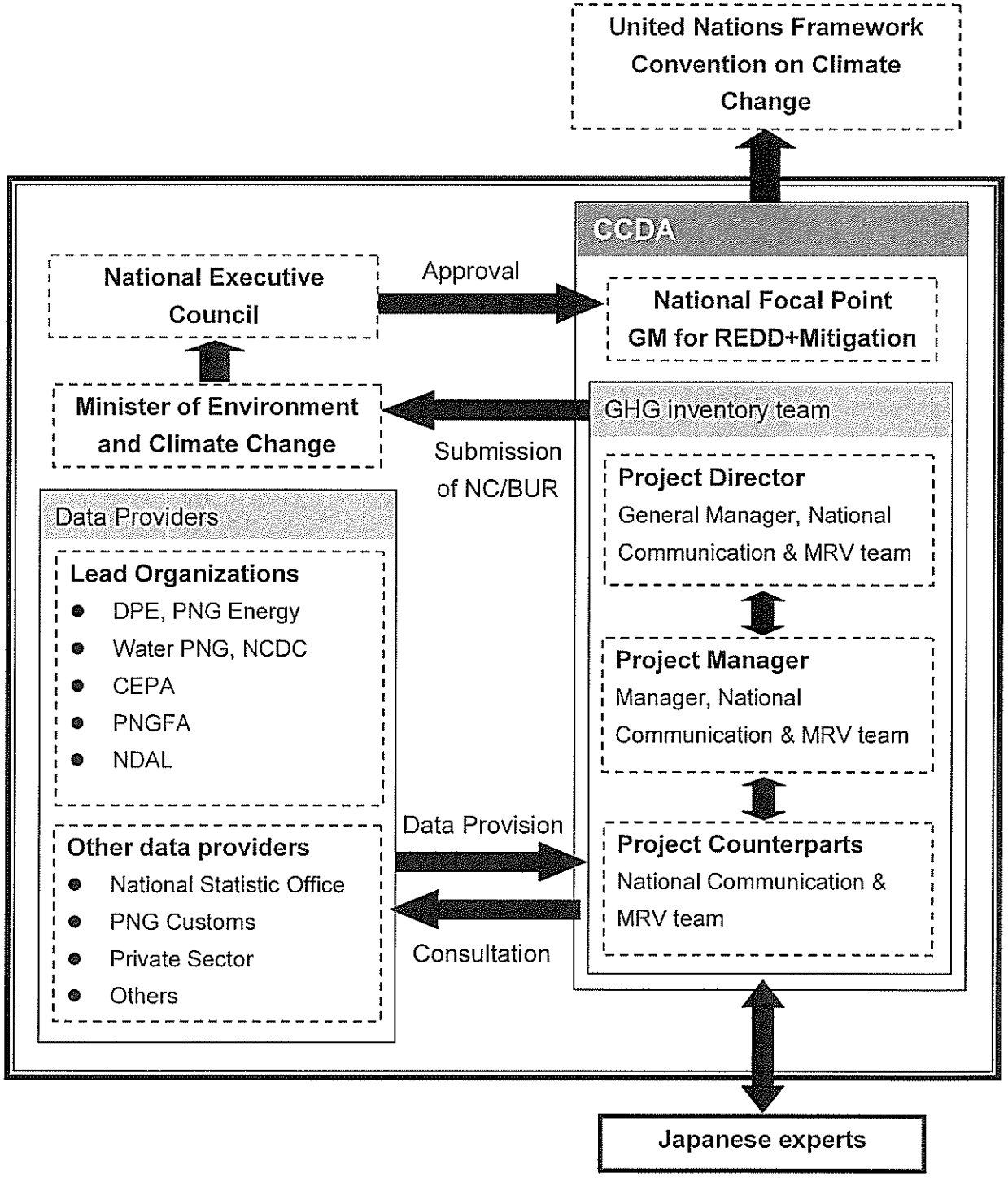
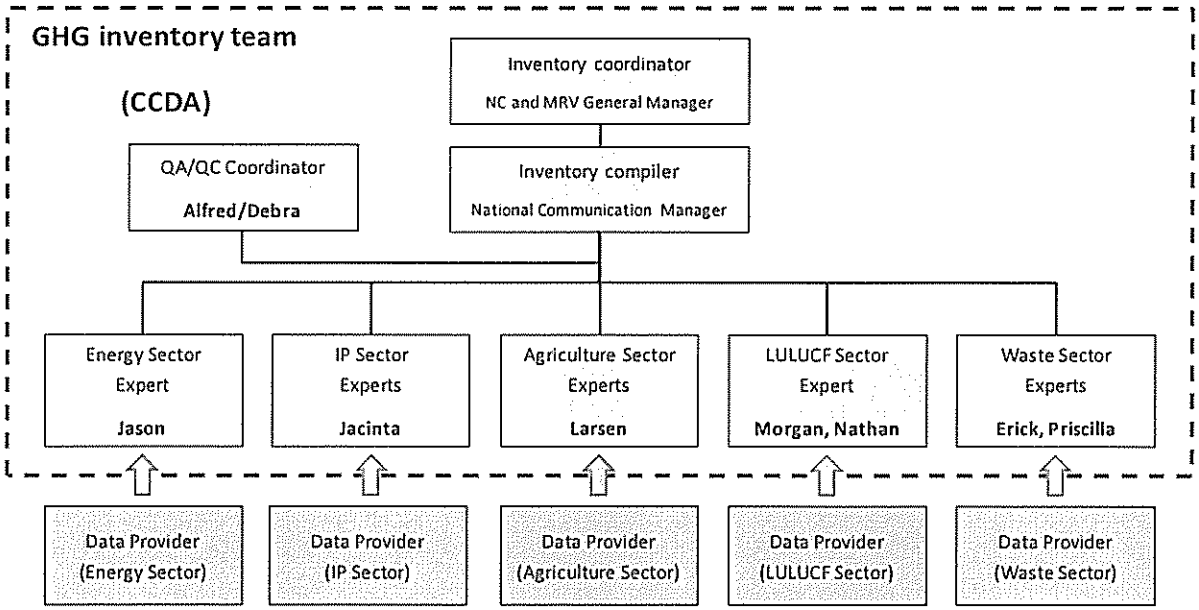
ANNEX 3 Project Organization Chart



JICA Project Implementation setup



GHG Inventory team setup

role of members

Position	General role
Coordinator	•provide **overall planning, coordination, management and technical oversight of the inventory**
Inventory compiler	•Overall data and document management. •**Combine sector experts' work into a cohesive inventory product** •Identify an propose ways to resolve cross **cutting issues**
Sector experts	•**Undertake research, data collection, calculations, drafting, quality control, archiving, and documentation.**
QA/QC coordinator	•Overall quality assurance / quality control coordination and/or overall data and document management

Annex4
A List of Proposed GHG inventories Team Members

#	Name	Title	Roles and Responsibilities	Academic Background	Engagement
1	to be confirmed by the start of the project	General Manager, MRV and National Communication Division	Inventory Coordinator	tbc	tbc
2	to be confirmed by the start of the project	National Communication Manager	Inventory Compiler	tbc	tbc
3	Alfred Rungol	Manager-MRV	QA/QC Coordinator	Climate change & Forestry, Environmental Science	Non-exclusive
4	Erick Sarut	National Communication Officer	Waste Sector Experts Data Collection, Compilation, Estimation, QC	Economics, Environmental Science	Exclusive
5	Larsen Daboyan	Acting National Communication Officer	Agriculture Sector Experts Data Collection, Compilation, Estimation, QC	Environmental Science and Geography	Exclusive
6	Jason Paniu	Acting MRV Officer	Energy Sector Experts Data Collection, Compilation, Estimation, QC	Chemistry	Exclusive
7	Jacinta Kull	Trainee Officer-IPPU	Industrial Process Sector Experts Data Collection, Compilation, Estimation, QC	Geographic Information Science	Exclusive
8	Morgan Kai	Trainee Officer-LULUCF	LULUCF Sector Experts Data Collection, Compilation, Estimation, QC	Environmental Science and Geography	Exclusive
9	Priscilla Pep	Trainee Officer-MRV	Waste Sector Experts Data Collection, Compilation, Estimation, QC	Environmental Science and Geography	Non-exclusive
10	Nathan Sapala	Trainee Officer-MRV	LULUCF Sector Experts Data Collection, Compilation, Estimation, QC	Environmental Science and Geography	Non-exclusive
11	Debra Sungi	MRV Officer	QA/QC Support	Public Policy	Non-exclusive

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ANNEX 5 JOINT COORDINATING COMMITTEE (JCC)

1. Functions

The Joint Coordinating Committee (hereinafter referred to as "JCC") will meet at least once a year or whenever the necessity arises, in order to fulfill the following functions:

(1) To approve an annual work plan of the Project based on the Plan of Operation within the framework of the Record of Discussions;

(2) To monitor and review the overall progress of the Project carried out under the above-mentioned annual work plan; and

(3) To exchange views and ideas on major issues those arise during the implementation of the Project.

2. Members of the JCC

The JCC will be composed of the chair, the members and the observers. The chair may declare closed sessions against the observers. The rules and guidelines for the management of the JCC will be determined at the initial stage of the Project.

(1) Chairperson: Managing Director, Climate Change Development Authority

(2) Vice Chairperson: General Manager, National Communication & MRV team, Climate Change Development Authority

(3) PNG side

- Climate Change Development Authority
- Department of National Planning and Monitoring
- Water PNG
- National Capital District Comission
- Conservation and Environment Protection Authority
- PNG Forestry Authority
- Department of Agriculture and Livestock
- National Statistics Office
- Department of Petroleum and Energy
- PNG Power
- PNG Customs

(4) Japanese side

- JICA Expert(s) of the Project
- JICA PNG Office

Note: Official(s) of Embassy of Japan may attend the JCC meeting as observer(s). The chairperson can name new members or request the attendance of other participants, as necessary, upon agreement of the JCC.

Annex 7: Minutes of JCC

MINUTES OF MEETING

ON

THE FIRST JOINT COORDINATION COMMITTEE

OF

THE PROJECT FOR ENHANCING CAPACITY TO DEVELOP A SUSTAINABLE GHG INVENTORY SYSTEM FOR PNG

Port Moresby, 23 May, 2018

Mr. Ruel Yamuna
Managing Director
Climate Change and Development Authority
JCC Chair

Mr. Takashi Toyama
Chief Representative
Japan International Cooperation Agency
PNG Office

Mr. Takeshi Enoki
Team Leader, GHG Inventory (Institutional Arrangements)
The Project for Capacity Development to Establish a National GHG Inventory Cycle of Continuous Improvement

The first Joint Coordination Committee (hereinafter referred to as the "JCC") of the Project for enhancing capacity to develop a sustainable GHG inventory system for PNG (hereinafter referred to as the "Project") was held at Lamana Hotel, Port Moresby, Papua New Guinea on May 23, 2018.

The Climate Change and Development Authority (hereinafter referred to as "CCDA"), Japan International Cooperation Agency (hereinafter referred to as "JICA") and relevant parties of the Project participated in the JCC meeting, chaired by Mr. Erick Sarut, officer of the MRV and National Communication Division of the CCDA. The list of participants is shown in Appendix 1.

The opening address was delivered by the JCC chair and Mr. Takashi Toyama, the Chief Representative of the PNG JICA.

Mr. Larsen Daboyan, officer of the MRV and National Communication Division, CCDA, gave the first presentation on climate change policy in PNG and provided participants with a history of the evolution of climate change policy in PNG.

Mr. Matthew Dudley, GHG inventory (Industrial Processes and Product Use) expert of the Project, then delivered a presentation on the importance of GHG inventories in the UNFCCC, highlighting the need for PNG to establish institutional arrangements that will allow PNG to continuously and routinely produce GHG inventories.

Mr. Jason Paniu, officer of the MRV and National Communication Division, CCDA, delivered a presentation on PNG's previous experience with GHG inventories. He highlighted that although PNG has moved from a project based approach to an institutional approach, there are several gaps, needs, and capacity building needs. He was also looking forward to addressing those challenges in the Project.

Mr. Takeshi Enoki, team leader of the Project, delivered a presentation providing an overview of the Project and the Work Plan. The participants agreed with the contents of the Work Plan and the updated Plan of Operation, as attached. The following items were presented and confirmed:

1. The overall goal of the Project is that TACCC (Transparent, accurate, consistent, comparable, and complete) GHG inventories will be prepared periodically in PNG.

To that end, the purpose of the Project is that the basic capacity of CCDA to periodically prepare TACCC GHG inventories will be strengthened.

2. There are three outputs to the Project. The first output focuses on the development of the national system and institutional arrangements, the second on the enhancement of the understanding of GHG inventories, and the third, on improving the estimation methods in each sector.
3. As the Project is an on the job training project, all Project activities will be carried out by the CCDA staff and JICA experts together.
4. The JICA experts will directly work on Project activities with the counterpart agency, the CCDA. However, the cooperation of other government agencies, academic institutions, NGOs, and others are crucial in establishing the necessary inventory arrangements. As such, the participants agreed to cooperate in providing necessary technical and data input to the Project members, as needed.

Below are some comments and questions that were raised in the meeting.

1. A participant asked a question with regards to the current level of emissions and removals, and the measures to address them at the global level. Mr. Takeshi Enoki answered that the purpose of all countries preparing GHG inventories is to understand the emissions and removals at the global scale, so that policymakers can understand how much needs to be abated and what the gaps are. Furthermore, the biennial update report (BUR) and national communications (NC) include information on the capacity building needs and needs provided in order to have an understanding of what countries are doing to deal with climate change. An important activity that will arise from the Paris Agreement is the transparency framework, which will make these points clearer in the near future.

2. A participant asked whether there are penalties involved in not submitting, or submitting the BURs and NCs late. As the deadlines are agreed by all countries involved in the UNFCCC negotiations, these should be recognized as legally binding deadlines. As of now, there are no penalties for delay of submission, but this may change when the transparency framework under the Paris Agreement is set at the end of the year 2018.

3. Participants were comfortable with cooperating with the Project members and CCDA in terms of data provision. However, some requested the CCDA to be clear about what data is needed, how it would be used, and how it would be presented to the international community. Mr. Takeshi Enoki explained that Project members would draft documents for the stakeholders in advance of asking for data. He also pointed out that this consultation between CCDA and data providers will be opportunities for JICA and CCDA to provide

capacity building for stakeholders.

Mr. Sarut informed the members that the next JCC meeting will be held in 2019. The main objective of the Second JCC will be to confirm the progress of the Project activities. Any challenges/issues would be shared at the JCC if any, and necessary guidance would be provided to the Project members to facilitate the progress of the Project, as needed.

Appendix I: Participants list

Title: First Joint Coordination Committee
Date: May 23,2018 9:00-11:00
Venue: Lamana Hotel, Room Artemis
JICA Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Name	Institution	Telephone	e-mail
Toyama	JICA	-	-
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Matthew Dudley	JICA/MURC	-	-

Appendix II: 1st JCC agenda

First Joint Coordinating Committee for the Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

May 23, 2018

Lamana Hotel, Artemis Room, Port Moresby, Papua New Guinea

Agenda

Time	Agenda	Speaker
8:30～9:00	Registration (coffee)	
9:00～9:05	Prayer	Nathan Sapala, CCDA
9:05～9:10	Opening remarks	Mr. Ruel Yamuna, Managing Director of CCDA
9:10～9:15	Welcome remarks	Mr. Toyama, Chief Representative of JICA PNG office
9:15～9:20	Self-introduction by participants	
9:20～9:30	Overview of climate change policy in PNG	Mr. Larsen Daboyan, CCDA
9:30～9:40	Importance of GHG inventories in the UNFCCC	Mr. Matthew Dudley, JICA expert
9:40～9:50	The PNG experience with GHG inventories	Mr. Jason Paniu, CCDA
9:50～10:05	Overview of the JICA project for enhancing capacity to develop a sustainable GHG inventory system for PNG	Mr. Takeshi Enoki, JICA expert
10:05～10:50	Q&A, Discussion	
10:50～11:00	Closing	Ms. Erick Sarut, CCDA

Japan International Cooperation Agency

The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Work Plan

September 27th, 2017

Mitsubishi UFJ Research and Consulting Co., Ltd.

Table of Contents

1. Overview (background and purpose)

1.1. Background

The GHG inventory aims to clarify the GHG balance of a country by calculating anthropogenic emissions and removals from each category. The GHG inventory is the national statistics which serves as the fundamental data for developing mitigation actions, or actions to reduce emissions/increase removals. It is also important input data to help understand the impacts of mitigation actions on the mid/long term GHG balance, and to measure progress towards the shift to low-carbon society.

In order to fulfill the reporting requirements to the UNFCCC, PNG has prepared GHG inventories twice, namely, for the first and second National Communications (hereinafter "NC"). However, both were carried out with the support from GEF under an ad-hoc organizational structure. Therefore, PNG lasks the institutional capacity that enables continuous and regular GHG inventory preparation. The experts of PNG also face challenges with regards to the technical expertise of preparing inventories, leading to the lack of capacity to accurately estimate emissions and removals. Based on such background, the government of PNG requested JICA for technical assistance to strengthen their capacity for preparing its 2014 GHG inventory.

JICA conducted the First survey for technical cooperation for this project in September 2016 followed by the Second survey in February 2017(hereinafter either reffered to as "the First Survey", "the Second Survey" or "the Surveys"). The Surveys summarized the issues of GHG inventory preparation in PNG as the following: (1) the lack of basic capacity necessary to prepare GHG inventory regularly; (2) the lack of capacity among relevant institions to promote understanding on GHG inventory; and (3) the lack of capacity to technically review the GHG inventory and make improvements in each sector.

During the Second Survey, JICA and PNG reached an agreement on the project purpose, activities, and cooperation framework, and the Minutes of the Meeting (M/M) was signed. The Record of Discussion (R/D) of the project operation was signed on April 24th, 2017 and the cooperation starts from August 2017 for four years.

1.2. Objective

The overall goal of this project is to enhance the basic capacity of CCDA (Climate Change and Development Authority) to be able to prepare GHG inventories satisfying the transparency, accuracy, consistency, comparability and completeness principles on a regular basis.

Specifically, to develop the capacity of CCDA members, they will undergo on the job training (OJT) for two cycles of inventory development (for years 2015 and 2017), which will include the steps of methodology selection, data collection, estimation spreadsheets preparation, and compilation of GHG emissions and removals.

Project overview is as follows.

[Overall Goal]

TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.

[Project Purpose]

The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.

[Expected Outputs]

Output1 : The capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC (Quality Assurance / Quality Control) procedures is enhanced.

Output2 : The capacity to promote understanding of national GHG inventories is enhanced.

Output3. The capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, and waste).

2. Project implementation principles

2.1. Basic principles

2.1.1. Follow PDM/PO with flexibility

Activities of this project are to be conducted with PNG counterparts following the PDM and PO agreed in the Surveys. If necessary, the PDM may be revised according to the discussion at Joint Coordiating Committee (JCC) between JICA and PNG.

(1) CCDA Support by FAO

Under the support of FAO, CCDA applied for an approximately 2 million US dollar project lasting for 3 years from 2017 provided by GEF/CBIT (hereinafter "GEF/CBIT project") for comprehensive support in data development in the AFOLU sector, and was approved in June 2017[1]. The GEF/CBIT project contains activities to comprehensively support the GHG inventory preparation, from data collection to reporting, in the AFOLU sector. On the other hand, JICA provides GHG inventory preparation support to all sectors. Therefore there are some overlapping activities in the AFOLU sector.

Given this situation, the roles in each project will be discussed, and the agreement will be made among CCDA, JICA, and FAO. The PDM, PO and resource allocation will be modified accordingly.

Table 1 Roles of the projects (draft)

	JICA/CCDA (all sectors)	GEF/CBIT (AFOLU sector)	Other agencies
Data development	△	○	○
Data collection	○		
GHG emissions and removals estimation	○		
Document Inventory report	○		
Compile and edit Inventory (cross-sectorial)	○		

At the point of proposing the project(draft)

	JICA/CCDA (all sectors)	GEF/CBIT (AFOLU sector)	Other agencies
Data development	△	○	○
Data collection	○	○	
GHG emissions and removals estimation	○	○	
Document Inventory report	○	○	
Compile and edit Inventory (cross-sectorial)	○		

After coorinating with GEF/CBIT project(draft)

(2) GHG inventory in progress

CCDA is currently working on the Third National Communication (TNC) and the First Biennial Report (BUR1), and work on the GHG inventory to be included in those reports is underway. At the beginning of this project, the status of inventory preparation for TNC/BUR1 will be checked, and PO may be revised as necessary.

[1] https://www.thegef.org/project/strengthening-capacity-agriculture-and-land-use-sectors-enhanced-transparency-0

(3) CCDA Re-organization and project implementation structure

At the point of the Second Survey, CCDA re-organization was still in progress. The Second Survey indicates that the re-organization would not affect the implementation of this project. However, the progress and status will be checked again at the beginning of this project.

Additionally, there is a possibility that a General Manager and a Manager position (co-acting) in the CCDA project team are yet to be apoointed at the start of the project. Noone was assigned to theses positions at the time of the Second Survey. In the project, the General Manager is the position in charge of the GHG inventory, and shall discuss with other leading institutions when required, reprensenting the CCDA. The Manager edits the GHG inventory as a leader of the group in charge of practical tasks. Since both are important positions in this project, CCDA organizational structure will be reviewed and CCDA project members' roles should be discussed as necessary at the beginning of the project.

(4) Internet Platform

There are several options for creating GHG inventory estimation files; (1) by using spreadsheet application (eg. Microsoft Excel), (2) by using a specialized software developed by international institutions or reseach centers[2], (3) by developing a project/country-specifc system, with merit and demerit for each (Table 2). The appropriate format should be selected which is in line with the work environment of the country in order to configure GHG inventory estimation files.

Table 2 Examples of GHG inventory estimation files, merit and demerit

File format	Merit	Demerit
Spreadsheet application (e.g.: Microsoft Excel)	・Does not require special knowledge to develop estimation files ・Less cost	・Improvement in work efficiency is limited; e.g.: not suitable for simultaneous editing by multiple parties, graphs/tables are made manually
Specialized software	・Works efficienctly with partially task automation such as emission calculation ・Less cost when a free software is used	・Need to familiarize with the operation ・Cannot run methodologies not programmed in the software, cannot enter data not provisioned by the software
Project/country-specific system	・May be capable of noticeable improvement of work efficiency, such as simultaneous editing by multiple parties, automated calculations.	・Requires high level of knowledge on GHG inventory and IT ・Development cost can be high ・Development can be time consuming ・Operational cost required for running a web based system

[2] The IPCC Inventory Software, publicly available from IPCC TFI, Agriculture and Land Use National Greenhouse Gas Inventory Software ("ALU Software") developed by Colorado State University

At the point of submitting the request document of the project and at the point of the Surveys, CCDA assumed that a project/country-specific web based database will be used as the format of the estimation file. CCDA expected a system that the data providers directly access the database and enter the data, so that the GHG emissions and removals are automatically calculated. As a result of the discussion held during the Surveys, JICA and CCDA agreed that in the first cycle of inventory development, improvement of institutional and procedural capacity is prioritized, and the development of the automated web based proprietary system will be considered after the completion of the first cycle.

With the agreement above, in the first cycle, GHG inventory will be developed using spreadsheets that would not require special knowledge in compiling the files. Then a consultation will be held with CCDA and JICA on the necessity of developing a project/country-specific system. If as a consequence a project/country-specific system is decided to be used in the second cycle, the priciples and relevant activities of the project shall immediately be revisited through consultations with JICA.

(5) Impact of the negotiation of The Paris Agreement

The national GHG inventory prepared by this project is to be submitted to UNFCCC, therefore it needs to be in accordance with the rules agreed by the negotiations within UNFCCC. GHG inventory preparation and reporting criteria to be included in the NC are defined in the Guidelines for the Preparation of National Communications from Parties not included in Annex I to the Convention[3]. Criteria for the GHG inventory to be included in BUR is defined in the UNFCCC Biennial Reporting Guidelines for Developed Country Parties[4]. In this project, GHG inventories will be prepared in full compliance with the criteria in both guidelines.

Currently negotiations on the Paris Agreement is taking place under the UNFCCC, and new rules for preparation, reporting and review criteria of NC/BUR/GHG inventory for all countries are being considered. The new rules are expected to be adopted at COP24 in 2018. In the new reporting rules, revisions of the gases to be included in GHG inventory, and/or emssions and removals source are likely to be made. Therefore the project members will follow the discussion in the international negotiations at UNFCCC and revisit the contents of the GHG inventory prepared in this project as required. At the moment, no revisions to PO or PDM are expected as a result of the negotiations.

2.1.2. Capacity Development

(1) Comprehensive improvement

This project consists of members from each sector of GHG inventory (Energy, IPPU, AFOLU, and Waste) and a general manager in charge of cross-sectorial issues. During the terms of this project, each member will work on technology/ know-how transfer by OJT to individuals, through joint activities with CCDA members and managers

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[3] http://unfccc.int/resource/docs/cop8/07a02.pdf

[4] http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf#page=4

from each sector. In addition, project members will work on activities targeting the enhancement of organizational cooperation among CCDA, leading institutions and data providers. Institutional capacity will be strengthened for example by creating a table of roles of each stakeholder in the GHG inventory development. Other examples include developing a QA / QC plan which includes timetables and MoU templates for data provision. Moreover, efforts on public relations activities are to be made in this project. The country level capacity improvement is planned by issuing general information not limited to this project but also on PNG's overall strategy on climate change, mitigation actions and GHG inventories.

UNFCCC define rules for national GHG inventory development, reporting and archiving[5]. Organizational, legal and procedural rules are covered, and are referred when the national system for GHG inventories is reviewed. In this project, activities will be conducted targeting enhancement of organizational, legal and procedural rules in addition to individual capacity improvement.

(2) OJT

The project members will go through OJT for approximately two years by working together with the CCDA team members. For the second cycle of GHG inventory development, CCDA will lead a main role to conduct the activities while the project team members provide supplementary technical support.

In order to encourage a sense of ownership of CCDA members, the project team members bear in mind the followings:

- Sharing awareness of issues
- Participatory approach to identifying issues
- Proper motivation
- Choosing appropriate relationship with CCDA members
- Learning by doing
- Influence from technical experts
- Establishing trust
- Promoting communication

Reference: "Capacity Development (CD): Improving capacity to cope with comprehensive issues by the primary role of developing countries"

(3) Maintaining the sense of ownership

The Surveys indicate that CCDA members' sense of ownership towards the project and their motivations for achieving the goal seems significantly high. The project leader Mr. Enoki received technical questions from CCDA members even after the Surveys. While activities within PNG play main part of this project, the project members are ready to support the motivation and ownership of the local members by following up through email / Skype from Japan.

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5 http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf

Apart from the Project PO, CCDA project team will have individual target, and the progress will be checked from time to time. Activities shall be conducted with additional incentives to the CCDA members, such as learning IPCC Guideline alongside receiving a program to acquire the reviewer qualification under UNFCCC.

2.1.3. Principles of the GHG inventory

(1) Inventory preparation in accordance with The UNFCCC Reporting Guidelines for non Annex I Party countries

GHG inventory emissions and removals are estimated in accordance with the rules in the Guideline for National Inentory Report for Non-Annex I Parties as well as BUR reporting guidelines that developing countries are to follow. As mentioned earlier, status and contents of the negotiation of the Paris Agreement will be considered.

(2) The five principles of GHG inventories

The UNFCCC inventory reporting guidelines require parties to prepare their inventories in accordance with the five principles shown in Table 3. These five principles will be followed to prepare inventories in this Project.

Table 3 The Five principles of GHG inventory

Principles	Description
Transparency	The assumptions and methodologies used for an inventory should be clearly explained to facilitate replication and assessment of the inventory by users of the reported information.
Consistency	An inventory should be internally consistent in all its elements with inventories of other years. An inventory is consistent if the same methodologies are used for the base and all subsequent years and if consistent data sets are used to estimate emissions or removals from sources or sinks.
Comparability	Estimates of emissions and removals reported by Annex I Parties in inventories should be comparable among Annex I parties. For this purpose, Annex I Parties should use methodologies and formats agreed by the COP for estimating and reporting inventories.
Completeness	An inventory covers all sources and sinks, as well as all gases, included in the IPCC Guidelines as well as other existing relevant source/sink categories which are specific to individual Annex I Parties and, therefore, may not be included in the IPCC Guidelines. Completeness also means full geographic coverage of sources and sinks of an Annex I Party.
Accuracy	A relative measure of the exactness of an emission or removal estimate. Estimates should be accurate in the sense that they are systematically neither over nor under true emissions or removals, as far as can be judged, and that uncertainties are reduced as far as practicable

Source : UNFCCC reporting guidelines on annual inventories

(3) Methodological Issues

In accordance with the UNFCCC inventory reporting guideline, emissions and removals are estimated using

methodologies described on the 2006 IPCC Guidelines. In the IPCC guidelines, primarily three estimation methodologies (see Table 4) are described and 2006 IPCC Guidelines provide decision trees that guide the user on which method should be used. Generally higher tier generates more accurate emissions estimation, but it is also more data intensive. As an accurate estimation is possible even using Tier1 depending on the emissions / removals source, an approapriate selection of the Tier is required considering the availability of data and the required level of estimation accuracy.

Table 4 Description of tiers

Methodology	General description of methodology
Tier 1	Simple estimation method that can be applied by all countries. Generally, emissions or removals can be estimated by multiplying activity data by default emission factors provided in the IPCC guidelines.
Tier 2	Estimation method using country-specific emission factors.
Tier 3	Use of country-specific emission method and actual measured values.

(4) Data gaps

Lack of sufficient data statistics is common in developing countries, and is also expected to be raised as an issue with PNG. In this project statistics prepared by the central government will be checked for each sector, followed by looking into the international statisctics, statistics prepared by regional government and statistics prepared by industrial bodies and individual companies. Ideally, as indicated in the IPCC Guideline, data with time series consistancy should be used, however in some cases activity data can be estimated from multiple statistics, or other indicators relevant to the requested activity data can be used for estimation.

Data gaps as such are referred in a chapter in the 2006IPCC Guidelines. By referring to the Guideline's chapter and taking advice from experts in each sector of PNG, data gaps will be filled using the appropriate approaches. When possible, the project will seek cooperation with the organization/ institution responsible for data collection.

(5) QA/QC system

Quality Assurance / Quality Control (QA/QC) activities described below play an important role in order to develop GHG inventory with a certain level of quality/accuracy.

(a) Draft inventory development plan with defined organizational structure, procedures, and schedule.

(b) Apply methodology approapriate for PNG considering the country's situation, and have it documented.

(c) Receive checks and reviews by the external experts.

(d) Measure the emission uncertainty quantitatively.

(e) Set up an organizational structure to regularly revisit the methodology. Draft plan(s) to improve actual

measurement and statistics for emission factor calculation, prioritizing emission source with higher uncertainty levels.

In this project, QA / QC activities from 2006 IPCC Guidelinies and QA /QC activities of other countries including Japan will be referred to to develop the QA/QC system compatible to PNG's circumstances.

2.1.4. Public relations activity

Upon implementation of the project, public relations activity on this project will be run to promote the correct understanding of the purpose of the cooperation, contents of the activities and the result among the people of PNG. Concretely, three activities described below are planned.

- Writing and sending draft for the project webpage
- Posts to JICA PNG office website
- Provide support to newsletter publication by PNG

Concrete descriptions of each activity are as below.

(1) Drafting contents for the project webpage

Provided that a webpage for this project will be available on JICA website and that information will be published, project status or results will be put into a draft on a regular basis and sent to JICA.

Activites below are assumed as possible themes of the webpage. If any additional important project activities are carried out, contents may be added as needed.

- When workshops are held
- When a Joint-Cordination Committee (JCC) is held
- When trainings in Japan or in a third country are held
- When GHG inventory is completed
- When output(s) are accomplished (Work plan/Guidebook/check list of national GHG inventory development, inventory editing procedure and technical document of QA/QC activities in each sector, Guidebook/ FAQ on international negotiations / analysis procedure, etc)

When workshops or trainings in Japan or in a third country are held, training overview, schedule, discussions, and activity output are put together into a separate workshop/ training report, and will be submitted with the webpage draft.

The draft and the report will include photos or tables to promote visual understanding.

(2) Posts to JICA PNG office website

Assuming the project information is published on JICA PNG office website, drafts on activities will be written and sent to JICA PNG office. Concretely, when writing drafts on activities as listed in (1), in addition to the Japanese version the English version will also be made and sent to JICA PNG office.

(3) Provide support to newsletter publication by PNG

When CCDA issues newsletter on this project, contents necessary for drafting will be provided, as well as to support the publication.

2.1.5. Project team structure appropriate for this project

The project team structure consists of members with very high expertise on GHG inventory for UNFCCC to achieve the highest level of project objectives.

Expert knowledge and professional experiences are necessary for GHG inventory preparation in addition to understanding UNFCCC inventory rules, scientific knowledge on GHG emissions and removals (IPCC Guidelines), knowledge on data collection, specific know-how on emissions and removals methodologies. In this project team, in all sectors, experts are UNFCCC certified inventory reviewer having experiences of not only preparing but also reviewing inventories, thus enable the high level of support.

To reduce logistic activities of the project members, a local assistant is hired enabling the project members to focus on the core project activities. For Energy and Waster sectors, difficulties are expected with activity data collections. An expert in PNG with data collection know-how will be hired if identified, for a short period of time to improve project efficiency.

2.1.6. Utilizing existing tools

For efficient project implementation, available tools and materials will be utilized, and data are shared in cooperation with relative ongoing projects in PNG. Tools likely to be used in this project are showed in Table 5.

Table 5 Tools to be used for inventory preparation

Sector	Tools	Description
Overall inventory	CGE tools	· Technical tools for NC/BUR preparation · Manuals of UNFCCC Guidelines · Sectorial guide of GHG inventory
	Guidebooks and templates used to support project on JICA's GHG inventory preparation for Vietnam, Indonesia	· 2006 IPCC Guideline summary · Inventory report template used in the project
	IPCC Inventory software	· 2006 IPCC Guideline software
	IPCC EFDB	· Country specific emission factor or parameter database
Energy	Energy balance table by Asia Pacific Energy Research Center	· Simplified version of the energy balance table made from the data collected from

		relative institutions in PNG
IPPU	Ozone depletion material data supported by GIZ	· Data on import volume of ODS equipment developed by GIZ under the support provided to Public Corporation of Environmental Protection and Maintenance
AFOLU	AFOLU software	· Emissions and removals estimation software from Agriculture and Land Use
Waste	Waste tool developed in the JICA Indoenesia GHG inventory development project	· Manual on organizing waste data, estimation tool
	J-PRISM data	· Data on solid waste

2.1.7. On-site activities

Project members support the technical capacity building of CCDA, through joint data collection from other ministry bodies, estimation of emissions and removals, and editing inventory report. Each project member plan to visit PNG for 1 to 2 weeks per quarter based on the PO. A few members will visit at the same time from safety management point of view as well as from the necessity to work together among the sectors to share / separate overlapping activity data efficiently and effectively, and to use consistant methodologies.

2.1.8. Support activities in Japan

As mentioned earlier, the sense of ownership among CCDA, the counterpart of this project, is very high. During the project terms, very frequent communications are expected to continue. Regular Email and Skype communications even when the project members are away from PNG will support the continuity of the activities and seamless management of the project output.

As the communication infrastrure at CCDA is not sufficiently organized, internet WiFi modem for CCDA office and mobile phones for the project are purchased and set to secure an environment for smooth operation for internet searches and Skype meetings.

2.2. Project implementation plan

2.2.1. Implementation Plan for Each Output

(1) Output 1

1) Capacity assessment (Activity1-1, 1-2)

Check PNG's inventory preparation structure and capacity (Activity1-1), and then investigate/propose improvement.

Upon capacity assessment, a checklist (capacity assessment checkilist) shall be used for checking PNG's capacity and consider the areas for improvements. Table 6 shows the draft of the checklist. The actual list will be finalized by following UNFCCC rules and 2006 IPCC Guidelines and by consultations with CCDA members.

Table 6 Capacity Assessment Checklist (draft)

Areas for assessment		Detailed criteria for assessment	assessment	Improvement
National inventory arrangements	Institutional arrangements	Check if there is one institution that has main responsibility for the inventory preparation. Are all relevant stakeholders of GHG inventory sectors involved in the inventory process? Are the roles of each stakeholder clarified?		
	Legal arrangements	Is there a law or regulation that formalizes the institutional setup for the inventory preparation? Are there formal legal contracts between the inventory preparation institution and the relevant ministries?		
	Procedural arrangements	Is there a timeline or an inventory preparation schedule that is agreed by all stakeholders? Is it documented? Is there a concrete schedule? How often is the timeline or schedule updated?		
QC Activity		Does the Party have a QA/QC plan? Is it described or summarized in the inventory report? Does the Party have a QC check list? Is the QC check list used in the inventory made in the previous round? Are there any obvious errors or inconsistencies in the reporting? In the inventory development process this time, are there comparisons against the volumes from the past GHG emissions and removals? In case judgements by the experts are directly		

	reflected to the estimation, is there an application guidline?		
QA Activity	Are QA activities in place? What are the institutions and the content of contracts? Are the results documented?		
Key category analysis	Is a key category analysis conducted? Is the methodology in line with 2006 IPCC Guideline? Is analysis without LULUCF conducted? What is the key category analysis results used for?		
Uncertainty analysis	Is the uncertainty analysis conducted? Is the methodology in line with 2006 IPCC Guideline? What is the uncertainty analysis results used for?		
Improvement plans	Is there an improvement plan? How are the necessary improvements prioritized within the improvement plan? Is the improvement plan concrete and realistic?		
Archiving	Are the GHG inventory estimation files, reports and relative information archived? How are they organized? Are there any rules or guidelines on archiving?		

*Check list for individuals prepared separately

2) Development of TACCC check list Activity1-3)

According to the UNFCCC rules, a GHG inventory must satisfy Transparency (T), Accuracy (A), Consistency (C), Comparability (C), and Completeness (C). On the other hand, there are no clear criteria provided by neither UNFCCC nor IPCC. For this reason, the team will develop a check list to review TACCC of PNG's GHG inventory.

Check list will be made based on the experience of the project members in addition to rules by UNFCCC and IPCC Guidelines. The check list will be finalized based on the discussions with CCDA project members. The draft checklist is in Table 7.

Table 7 TACCC check list (draft)

		Check items	assessment	Improvement required
Transparency	Documentation	Are choice of methodologies, EF data, methodology actually used, result, uncertainty, and issues reported in the Inventory report?		
	Confidential information	How is the confidential information described in the report?		
	Data	Are there explanations provided on organization,		

		range, and appropriateness for data used in GHG emissions and removals estimation?		
Accuracy	Tier selection	Are Tiers selected in accordance with the decision tree by the IPCC Guideline? When not, are the reasons provided, and recorded as points to improve in the Improvement Plan?		
	Estimation equation	Has the Party used the correct estimation equation (Is the IPCC Guideline interpreted correctly)?		
	Activity data	Are the data correctly applied? (Are the activity data from national statistics or collection of regional / corporate statistics? How are the data organized?)		
	Recalculation	Has the recalculationbeen done? What are the impacts of the recalculation, other than the increase / decrease of emissions and removals? Are uncertainties reduced?		
	Data gap	How the project overcame the data gap? Were the approaches taken from IPCC Guidelines?		
Consistency	Data	Are the activity data / emission factor / other parameters used for the emissions and removals source time series consistent? If the data are not used with consistency, what are the reasons? How were data gap filled?		
Comparability	Category	Is the interpretation of estimation category as described in IPCC Guideline?		
	Estimation equation	Has the correct estimation equation described in the IPCC Guideline being used?		
	Allocation	Have the emissions and removals being allocated into accurate sub categories? If not, what is the reason?		
Completeness	Region	Are the emissions and removals estimated nationwide?		
	Timeline	Are emissions and removals factor (or notation keys reported) estimated for all years?		
	Notation key	Are notation keys (NE, NO, NA, C) reported for estimation categories without estimations?		
	emissions and removals source category	Are all emissions and removals source estimated per sub categories (or notation keys reported)?		
	Report	Does the Improvement plan address all improvement points?		

3) Draft GHG inventory work plan and guidebook (Activity1-3)

Inventory work plan is made at the beginning of the GHG inventory preparation cycle. A feasible work plan, taking the current GHG inventory development process by PNG as a basis, and considering the reporting period to UNFCCC will be developed. This plan will includes generic contents such as work procedure, background information, explanation on GHG inventory, roles of each stakeholder, and descriptions of QA / QC activities, so that the management positions of each stakeholder can understand. At the beginning of the 2nd cycle, the work plan will be updated following the process used in the 1st cycle.

In Activity 1-3, technical manual will be developed for GHG inventory experts in PNG. This manual includes the scientific information and methodologies from IPCC Guidline 2006 in a simplified manner, and will be updated at the 2nd cycle.

4) Institutionalization of arrangements (Activity1-4)

On data sharing, CCDA drafted MoU/MoA with the data providers and currently working on the contents. The objective described in the draft MoU/MoA which was shared during the Second Survey did not refer to details on necessary data. As the draft of MoU/MoA was prepared unilaterally by CCDA without explanations or consultations with data providers in advance, discussions are facing difficulties. In this project, the most efficient and effective way to secure data regularly will be identified first and then new MoU/MoA will be drafted as needed. The MoU/MoA draft will clarify purposes of data sharing and describe necessary data. The content will also cover other subjects for cooperation, such as schedules and deadlines.

At the beginning of 2nd cycle, based on the experiences from the 1st cycle the revisions may be made if necessary, andMoU/MoA will be signed again between CCDA and data providers.

5) Skills transfer related to the inventory preparation process(Activity1-5～1-8)

As described in 2.1, the project members will work together with CCDA project members on data collection, data management, emissions and removals estimation and editing GHG inventory. The most important points are described in 2.1 but Table 8 shows issues and draft countermeasure on data collection, the part regarded as the most difficult in the GHG inventory process.

Table 8 Technical issues/remarks and draft countermeasure

Sector	Issues / Remarks	Draft countermeasure
Cross-cutting	In the interview during the Second Survey, many data providers commented they do not know which and why the data are needed, as well as its usages. Even though considering the situation that MoU/MoA	Make materials for data providers in advance, fully explain this project and the purpose of GHG inventory development, to build trustworthy relationships. From the project members' standpoint,

	discussion just started to take place, there is a room for improvement on CCDA's ways to request data provision.	data providers are also subject to capacity development. Therefore it is importance to provide explanation about GHG inventory data to them.
	The data was not provided due to its confidentiality	Handling of confidential data in GHG inventory preparation is already assumed. Options of treating confidential data will be fully explained and investigated.
Energy	There is no energy balance table available as national statistics in PNG. Simple energy balance table for PNG is available from Asia Pacific Energy Research Center, however, due to insufficient data, the data is incomplete. Some data may be available from Ministry of Petroleum / Energy, PNG Electric Power Corporation, and Ministry of Transport but data with consistency are limited.	Hold interview with an expert who is involved in APERC energy balance table. Need to hold interviews not with government bodies but with private companies for each data. Environment reports or CSR reports must be checked prior to requesting interview to such private companies.
IPPU	Data provision from private companies seems to be an issue. Coverage of GHG inventory currently developed may possibly be less than SNC. Information exchange with GIZ is necessary as GIZ is currently providing technical support to Conservation and Environment Protection Authority (CEPA) on ODS.	Environment reports or CSR reports must be checked prior to requesting data provision to such private companies. Profiles of Industrial products in PNG need to be researched before starting on data collection in order to improve completeness of the inventory. Build trusting relationship with CEPA and GIZ. Estimate HFC emission referring to the processes of GIZ projects.
AFOLU	Suburban live stock data is under development; however there is no information available on agriculture. Need to check whether the data development or emissions and removals estimation methodologies by other donors are based on IPCC Guideline.	List up necessary data and request data development in a planned manner. Discuss countermeasures in advance in case modifications are required after reviewing results from each donor.
Waste	Part of solid waste data of Port Moresby is available from a CEPA J-PRISM project. Part of annual processed waste water volume and required volume of biochemical enzyme for wastewater are also available.	Data provision to be done after running research on wasteprocessing situation in PNG. If data from certain area is available, consider how to fill the data gap using those data.

6) Draft and update technical documents on inventory development (Activity1-9)

Activities, estimation result, and QA / QC of each sector will be drafted. Also, inventory report will be made by consolidating documents written in activities 1-3, 1-9, 3-2, and 3-6. Structure (draft) of the inventory report is as below.

Table 9 Structure of GHG inventory report (draft)

項目	Activity
Overview	Activity 1-9
Chapter 1 Introduction	
Background of GHG Inventory	Activity 1-3
Agreement related to GHG Inventory	Activity 1-3
Development procedure, Data collection, Data processing, Data archives, QA/QC of GHG Inventory	Activity 1-3
Overview of the methodologies	Activity 1-9
Result of key category analysis and uncertainty assessment	Activity 3-2
Chapter 2 GHG Emissions Trends	
Total Emissions / Removals Trends	Activity 1-9
Trends by Sector / Gas	Activity 1-9
Chapter 3 Energy Chapter 4 Industrial Processes and Product Use Chapter 5 Agriculture Chapter 6 LULUCF Chapter 7 Waste	
Sector overview	Activity 1-9
(For each caterogy)	
About category (Explanation of GHG emission process)	Activity 1-3
Current status of category in PNG	Activity 1-9
Methodologies (Methodology, Emission Factor, Activity Data)	Activity 1-9
Emission and removal trends	Activity 1-9
Uncertainty	Activity 3-2
QA/QC	Activity 1-3, 1-9
Recalculation	Activity 1-9
Improvement plan and Issues	Activity 3-6
Chapter 8 Recalculation and Improvement Plan	Activity 3-6
References	Activity 1-9

(2) Output 2

1) Inception workshop (Activity2-1)

Inception workshop of this project is planned in prior to 2015 inventory development start, after the completion of 2013 inventory that CCDA is developing under the support of UNEP/GEF. To note, the workshop may be held later as there is a possiblility of CCDA not being able to complete the 2013 inventory by its deadline, December 2017. Although it is subject to change depending on the result of consultations with CCDA and JICA which will be held after the start of the project , the current estimation for the timing, participants, size and contents are as

shown below.

Table 10 Overview of Inception workshop (without participants from regional government)

Timing	February or March, 2018, half day (plan)	
Objective	Understanding the objective of this project Understanding basic knowledge on climate change, UNFCCC, GHG inventory	
Participants	JCC members, donors (around 30 people)	
Day / time	**Agenda**	**Speaker**
9:00～9:30	Opening	CCDA, PNG JICA, Participants
9:30～10:00	Overview of the Project	The Project team
10:00～10:40	Climate change, UNFCCC, and GHG Inventories	The Project team, CCDA
10:40～11:00	Break	
11:00～12:00	Institutional arrangements of the Project	The Project team
11:30～12:00	Closing	CCDA

2) Workshops to promote understanding on GHG inventory (Activity2-2)

The workshops are planned to be held four times during the term of this project, targeting data providers, aiming to promote understandings towards GHG inventory and to build good cooperative relationship.

The 1st workshop will be held as a presentation opportunity of 2013 inventory output. In case CCDA's 2013 inventory development is behind the schedule, the 1st workshop may be delayed.

Table 11 Overview of the 1st workshop (with participants from regional government)

Timing		December 2017, 2 days (plan)	
Objective		Outputs and issues of 2013 inventory, issues towards the next cycle of inventory development	
Participants		Data providers (including regional government), JCC members, donors (around 80 people)	
Day / time		**Agenda**	**Speaker**
Day 1	AM	Opening	CCDA
	PM	National Arrangements, Energy sector	CCDA
Day 2	AM	IPPU sector, AFOLU sector	CCDA
	PM	Waste sector,-Closing	CCDA

The 2nd workshop is planned to be held after the inception workshop, targeting leading ministries to provide

lectures on GHG inventory development, reporting items and necessary data as well as to hold discussion on data collection.

Table 12 Overview of the 2nd workshop (without participants from regional government)

Timing	February or March 2018, half day (plan)	
Objective	Understanding development of GHG inventory, reporting items, basic knowledge on required data	
Participants	JCC members, donors (around 30 people)	
Day / time	**Agenda**	**Speaker**
14:00～14:15	Opening	CCDA, the project team
14:15～14:30	UNFCCC Reporting Guidelines	The project team
14:30～15:15	IPCC Guidelines	The project team、 CCDA
15:15～15:30	Break	
15:30～16:00	Institutional arrangements of the Project, data needs	The project team
16:00～16:40	Discussion	
16:40～17:00	Closing	

The 3rd and the 4th workshops are held to present output of 2017 and 2019 inventory.

Table 13 3rd and 4th workshop (with participants from regional government)

Timing		December 2019, July 2021 for 2 to 3 days (plan)	
Objective		Output of 2017 and 2019 inventory	
Participants		Data provider (including regional government), JCC members, donors (around 80 people)	
Day / time		**Agenda**	**Speaker**
Day 1	AM	Opening	CCDA
	PM	National Arrangements	CCDA, the Project team
Day 2	AM	Energy sector, IPPU sector	CCDA, the Project team
	PM	AFOLU sector	CCDA, the Project team
Day 3	AM	Waste sector	CCDA, the Project team
	PM	Further improvement Areas of further collaboration	CCDA, the Project team
	PM	Closing	CCDA

(3) Output 3

1) IPCC methodology (Activity3-1)

In this project, methodologies from 2006 IPCC Guideline are referred to estimate GHG emissions and removals. The first step of the inventory cycle is to understand the methodologies of IPCC Guideline on emissions and removals estimation, and to decide approapriate method considering PNG's country situation per emissions and removals source. The data required to implement the selected methodology (data activity, emission factor, and other parameters) are listed up, and the data storage options are explored.

The project members will explain and guide the methodologies from IPCC Guidelines and QA/QC method for each category, utilizing the materials made during the GHG inventory capacity development support project by JICA for Vietnam and for Indonesia.

This activity will be conducted steadily and gradually along with the learning curve of the counterpart, as in order to investigate technical analysis and the points for imporovement, the technical contents of the relative sector in the IPCC Guideline must firmly be understood and methodologies need to be interpreted profoundly. The materials to be used for explanation by the project members will be used as a reference for Guidebook(s) which are made in Activity 1-3.

2) Activities related to technical improvement (Activity3-2, 3-3)

The objective of reviewing key category analysis uncertainties is to identify emissions and removals source to improve accuracy of the GHG inventory. Identification methods are first explained to CCDA project members followed by a joint implementation with the project members. The important points to explain are that identification methods are not intended for judging the rightfulness of a country's GHG inventory by the level of uncertainty, or for comparing the accuracy of the inventories among countries.

According to 2006 IPCC Guidelines, emissions and removals whose source are identified as key categories, should be estimated using country specific emission factor or higher level of tier. In this project therefore, to the possible extent, for emissions and removals source identified as key categories, emission factors which reflect PNG's country situation will be investigated. Concretely, academic literature or IPCC EFDB (as mentioned in 2.1.6) will be reviewed. When the search result is compared against the IPCC default values and regarded as reflecting PNG's country specific situation, the result is used to measure the emissions and removals.

3) Reflecting mitigation actions to GHG inventory (Activity3-4)

In September 2015, PNG submitted its Intended Nationally Determined Contribution (INDC) to UNFCCC. In the following year as the Paris Agreement was adopted, contents of INDC has became the NDC, with legal basis based on the Paris Agreement (refer to Table 14). Moreover, in 2016 the Act on Implementing the Paris Agreement for Papua New Guinea was approved, which provided domestic legal basis to the activities described in the NDC.

Collecting relevant data is required to monitor progress on each NDC activities, and CCDA is responsible for this activity. In this project, employees of the relevant CCDA divisions on implementing the NDC as well as monitoring the progress will be interviewed. Monitoring methods on NDC progress and the contents of collected data are clarified, and the project will investigate whether the data can be utilized for GHG inventory.

Table 14 Mitigation action and target for PNG NDC

Sector	Action / Target
Energy	By 2030 replace all power supply to hydro, thermal, biomass and / or solar
	Improvement of energy efficiency in Transport and Forest sectors
	Reduction of emission in Transport sector
LULUCF	Formulate national REDD+ strategy by 2018
	Improve Forest Inventory, accurately assess emissions from deforestation

4) Supporting ICA process (Activity3-5)

For BURs from developing countries, ICA (International Consultation and Analysis) is held under UNFCCC. In ICA, three componesnts of the BUR are technically analysed (Technical analysis; TA) by external experts – GHG inventory, mitigation actions, and support. The result of the analysis becomes the subject of discussion at Facilitative Sharing of Views (see Figure 1). GHG inventory expert of the developing countries is required to correspond with the ICA process, in addition to estimating GHG emissions and removals and creating relevant reports. Specifically, the expert of the developing countries is expected to respond to technical questions from external experts during TA.

In this project, the ICA process is explained in detail at the end of the cycle of PNG's GHG inventory preparion. Then the work around plan and expected TA questions and answers are made in cooperation with the counterpart. To note, the project member in charge of GHG inventory (General) has experience as an external expert, participating in the TA twice. His experience and knowledge are utilized to support PNG to prepare for following the ICA process.

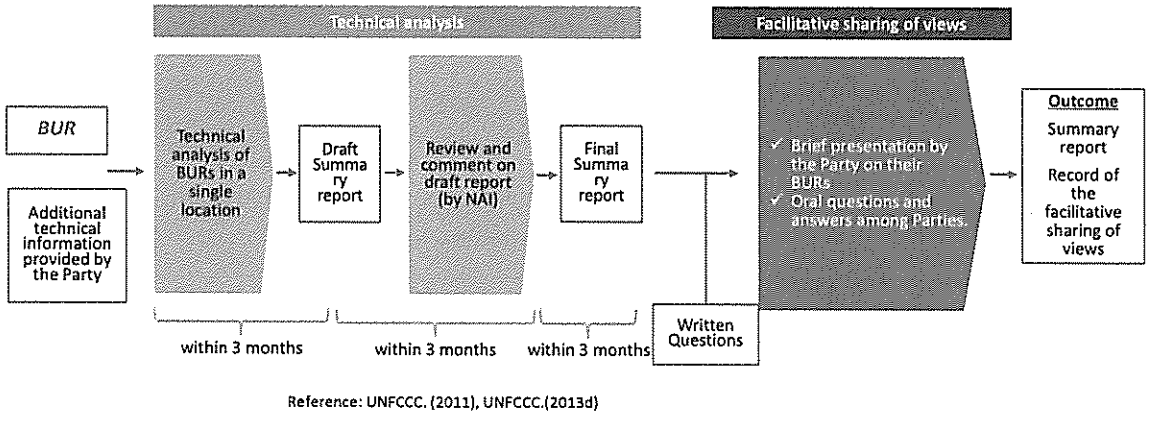

Figure 1 Flow of BUR ICA Process

5) Improvement plan (Activity 3-6)

Members responsible for each sector will clarify the issues identified during the GHG emissions and removals process by the category, and put them in the order of priority based on the result of key category analysis and uncertainty assessment conducted in Activity 3-2. Project members will work and document jointly with CCDA

project members to reinvestigate the countermeasures for the listed issues, schedule, and priorities. Draft structure of the improvement plan is shown in Table 15.

Table 15 Structure of improvement plan (draft)

Emissions and removals source	Gas	Key category or not	Issues	Countermeasure	Resource required for countermeasure	Due
・・・	・・・	・・・	・・・	・・・	・・・	・・・
・・・	・・・	・・・	・・・	・・・	・・・	・・・
・・・	・・・	・・・	・・・	・・・	・・・	・・・

2.2.2. Other Activities

(1) Training in Japan and a third country

1) Training in Japan

In this project, the training in Japan will be held in order to improve technical knowledge of counter part members for their GHG inventory development. Visits to Japanese GHG inventory compilers and academic contacts are planned, and the lectures to be held on GHG inventory preparation and improvement process, and case studies on improving the accuracy of the methodologies for particular sectors. In addition, visit to IPCC Inventory Task Force (IPCC-TFI) will be included to learn technical skillsof key category analysis and uncertainty review, and to be introduced to relative tools for inventorypreparation. Table 16 shows the visit plan.

Table 16 Places to visit during the training in Japan (plan)

Places to visit (plan)	Description
National Institute for Environmental Studies Greehouse Gas Inventory Office(GIO) Mr. Yukihiro NOJIRI	・Representative of GIO, the development institute of the GHG inventory for Japan.
Forestry and Forest Products Research Institute Mr. Kazuo HOSODA	・Researcher of forest biomass. Currently the committee member of Methodology Committee for Japan, forest sector.
National Institute for Agro-Environmental Sciences Mr. Kazuyuki YAGI	・Agriculture researcher, head of Agriculture sector of the Methodology Committee for Japan. He has profound understandings on IPCC activities.
IPCC-TFI Mr. Kiyohito TANABE	・Co-chair of IPCC-TFI that develops and distributes guidelines and tools on GHG emissions and removals methodology and reporting.
Ministry of Environment, Global Environment Bureau	・Bureau of Ministry of Environment, in charge of climate change policies.
Ministry of Foreign Affairs, International Cooperation	・Bureau of Ministry of Foreign Affairs, in charge of

Bureau	international cooperations of Japan.

The training in Japan is planned once in 2018, for 8 days. Table 17 shows the training overview. The final points of visit, training contents and the schedule are subject to the availabilities of the candidate institutes and government bodies, as well as discussion among the counterpart, JICA Global Environment Department and JICA PNG Office.

Table 17 Training schedule in Japan (overview)

Day		Schedule	Contents (draft)
Wed	PM	Trainees arrive Japan	-
Thu	AM	Visit JICA	・Briefing, training in Japan
	AM	Visit Ministry of Foreign Affairs, International Cooperation Bureau	・Courtesy visit
	PM	Visit Ministry of Environment, Global Environment Bureau	・Japan's policy on climate changes
Fri	AM	National Institute for Environmental Studies Visit Greehouse Gas Inventory Office (GIO)	・Background of Japan's GHG inventory development structure
	PM		・Improvement process of GHG inventory in Japan ・Remarks on the practical side of GHG inventory preparation
Sat		Document reports	-
Sun		Document reports	-
Mon	AM	Visit Forestry and Forest Products Research Institute	・Forest related methodologies, implementationof REDD+, technical issues, GHG inventory cooperation
	PM	Visit National Institute for Agro-Environmental Sciences	・AFOLU sector methodologies, coordination with mitigations, linkages between research and improvement of methodologies
Tue	AM	Visit IPCC-TFI	・Introduction to GHG inventory development support tool ・Abount key category analysis, uncertainty review
	PM	Document reports	-
Wed	AM	Visit JICA	・Report presentation and review
	PM	Trainees leave Japan	-

2) The training in a third country

A third country training is planned in this project where CCDA members and the inventory experts from other developing country learn from each other on inventory preparationand usages. Creating occasions where, for

instance, inventory experts from both countries present on their inventory, share issues and lessons learned, and to ask questions and provide answers on technical issues on each sector, are considered very useful mutually.

As a candidate country to visit, Vietnam, where JICA had implemented the capacity development project for GHG inventory preparation in the past, is considered as suitable, but will be decided through consultations with JICA and CCDA, considering the feasibility and the impact of the training. Possible contacts to visit in case the training is held in Vietnam are in Table 18.

Table 18 Places to visit during the third country training (plan)

Places to visit (plan)	Description
The deparment of Hydrology, Meteology, and Climate change(DMHCC), Ministry of Natural Resources and Environment	・Bureau in change of climate change policies (including GHG inventory) in Vietnam
Institute of Strategy and Policy on Natural Resources and Environement(ISPONRE)	・Institute in charge of GHG inventory development organization and OA/QC activities in Vietnam
Institute of Meteorology, Hydrology and Environment(IMHEN)	・Institute in charge of GHG inventory of Energy and IPPU sectors in Vietnam
Natural Conservation and Community Development Center	・Institute in charge of GHG inventory of Agriculture and Waste sectors in Vietnam

The third country training is to be held after the completion of the first cycle of inventory development, currently planned in April 2020 for total 6 days. Overview is shown in Table 19.

Contacts to visit / tranining contents / schedule will be decided taking the availability of the partners in the third country account and through consultations with CCDA JICA Global Environment Department and JICA PNG Office.

Table 19 Training schedule in third country (overview)

Day		Schedule	Contents (draft)
Mon	PM	Trainees arrive	-
Tue	AM	Visit JICA Vietnam Office	・Briefing, training in third country
	PM	The deparment of Hydrology, Meteology, and Climate change(DMHCC), Ministry of Natural Resources and Environment	・Vietnam's policy on climate change ・Experience of Vietnam's GHG inventory development
Wed	AM	Institute of Strategy and Policy on Natural Resources and Environement(ISPONRE)	・Background of Vietnam's GHG inventory development structure
	PM	Study and review Inventory of both parties	・Discussion with IMHEN and Natural Conservation and Community Development

Day		Schedule	Contents (draft)
Thu	AM	Study and review Inventory of both parties	Center on the results, issues and utilizations of each country's GHG inventory
	PM	Study and review Inventory of both parties	
Fri	AM	Work on the presentation	
	PM	Visit JICA	・Report presentation and review
Sat	AM	Trainees leave	-

(2) Project brief note

As part of public relations activities, project brief note will be made and be provided to external bodies, covering major points of project achievements and learnings. Project brief note will be published with visual appeal using photographs, and shall include contents listed below.

- Background of the project and issues
- Problem solving approaches
- Result of the approaches taken
- Attempts and learning

(3) Training on spreadsheet software operation

Spreadsheet software must be used in order to calculate emissions from multiple data source in preparing GHG inventory. However, there are certain numbers of CCDA members who are not well aquainted with such software. In this project, training on the spreadsheet software for CCDA employees will be held. Described below are the proposals on the training contents, timing and duration, style and implementing agency. Final decisions will be made through discussions with CCDA and Global Environment Department of JICA.

1) Contents of the training

Configuration of the GHG inventory estimation file requires calcuations by referring to the data from other sheets in the same file or from other files, using spreadsheet software. To run the calculation efficiently, one must be familiar with how to run calculations between different sheets and files, or about functions to look up and refer to a certain data. One needs also to be familiar with creating diagrams and tables as they need to be presented in NIR and BUR. Considering the required skillset and the current skillset level of CCDA employees, the training provided in this project shall satisfy requirements below:

- Shall be applicable for beginners, starting from basics such as making files and arithmetic operations.
- Include training on operation between multiple sheets / files, and functions to find / look up data.
- Include training on drawing graphs and tables.

For the spreadsheet software, Microsoft Excel is planned to be used

2) Timing and duration

Since the spreadsheet software skills are inevitable for inventorypreparation, the training shall be held in 2017 during the preparation of GHG inventory for TNC / BUR1. The training is planned for one week in total, and may be held in couple of sessions depending on CCDA members' availabilities.

3) Training formality / implementation agency

Training will be done as a lecture and is to be outsourced to a company in PNG that provides spreadsheet software training. Candidates of outsourcing companies are shown in Table 20. As the cost is currently estimated to be less than 1 million Japanese yen[6], the training will be contracted with a purchase agreement by requesting for quotations and comparing the cost.

Table 20 Candidate subcontractors for spreadsheet software operation training

Company name	Training overview
Datec New Horizons Computer Learning Centers	・Provides training programs for Microsoft Excel 2013 and 2016. There are levels 1 to 3, covering basic operation of Excel to advanced operations such as fuctions and operations using multiple sheets or files.
Daltron Training Centre	・Provides training programs for Microsoft Excel 2013 and 2016. There are 3levels – Introduction, Intermediate, and Advanced.
Kenmore Ltd Training Centre	・Provides training program for Microsoft Excel 2000.

2.2.3. Reports and Outputs

Reports and their submission time are described in Table 21.

Table 21 Deliverables

Year	Report	Time	No. of copies / Language	Summary
2017	Work Plan	Within 10 days business from the contract date	Japanese x 5 Electronic data	Project principle, Activities / summary, assignment schedule, member assignment plan
	Work Plan (English)	1 week prior to the first visit to	English x 5 Electronic data	English version of the Work Plan

6 Pricing from Datec New Horizons Computer Learning Centers was 27,280 PGK (tax included, approximately 980K Japanese Yen) for Microsft Excel Level 1 to 3 training.

		PNG		
	Monitoring sheet	With the Work Plan (September)	English x 5 Electronic data	Ver.1
2018	Progress report	January	Japanese x 5. English x 5 Electronic data	Project progress
	Monitoring sheet	March, September	English x 5 Electronic data	
2019	Progress report	January	Japanese x 5, English x 5 Electronic data	Project progress
	Monitoring sheet	March, September	English x 5 Electronic data	
2020	Progress report	January	Japanese x 5, English x 5 Electronic data	Project progress
	Monitoring sheet	March, September	English x 5 Electronic data	
2021	Progress report	January	Japanese x 5, English x 5 Electronic data	
	Monitoring sheet	June	English x 5 Electronic data	Final version
	Project Brief Note	August	Electronic data	
	Project Completion report	Final draft by July 31st	Japanese x 5, English x 5 CD-R (Japanese and English, 3 copies)	Overall project tasks

2.3. Operational organization

2.3.1. Project organization

The overall organization of this project is presented in Figure 2. The counterpart of the project is CCDA. Capacity building on GHG inventory preparation is provided to total ten members from National Communication & MRV team.

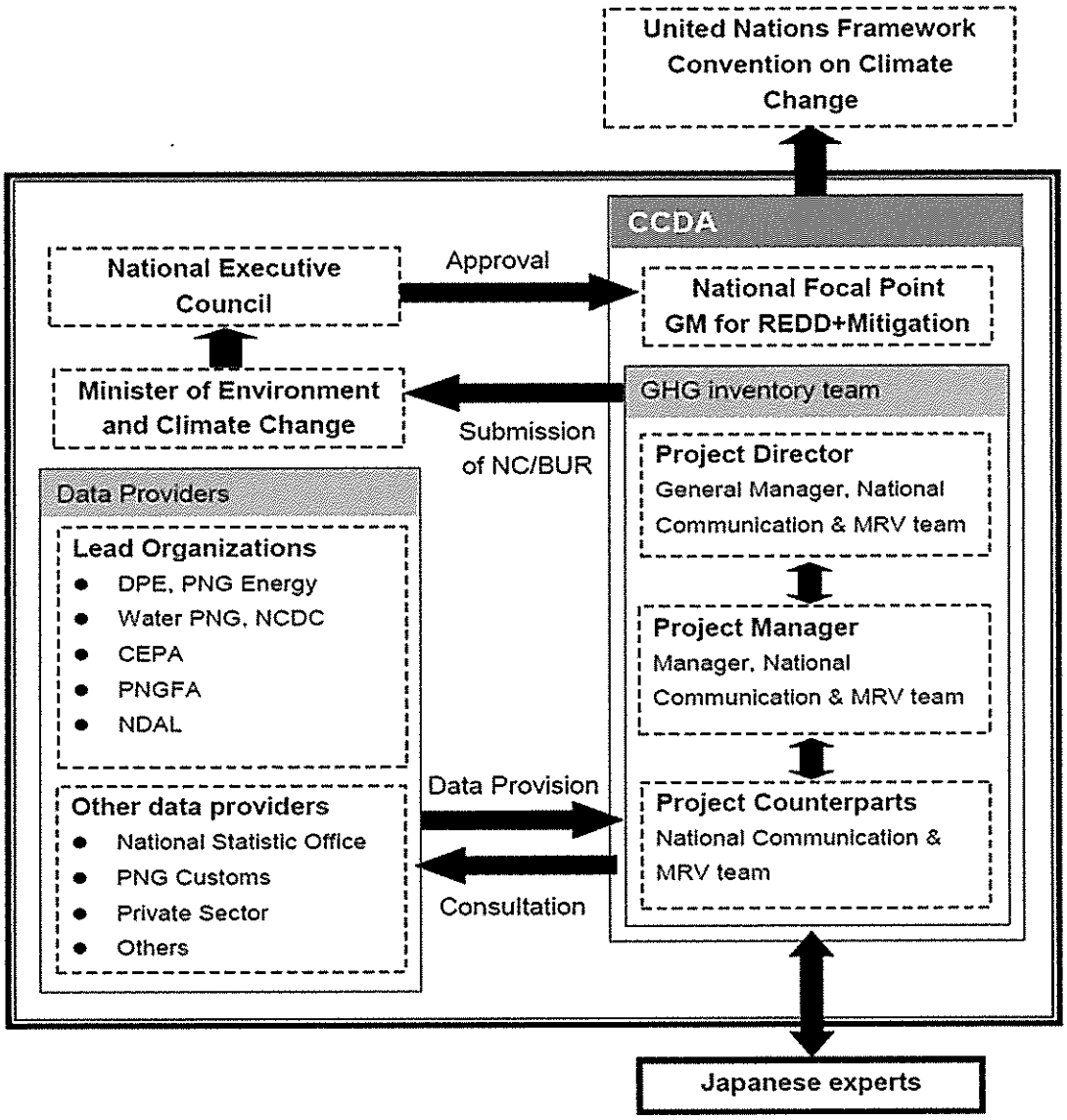

Figure 2 Project Organization

2.3.2. On-site operational organization

On-site operaton organization is shown in Figure 3.

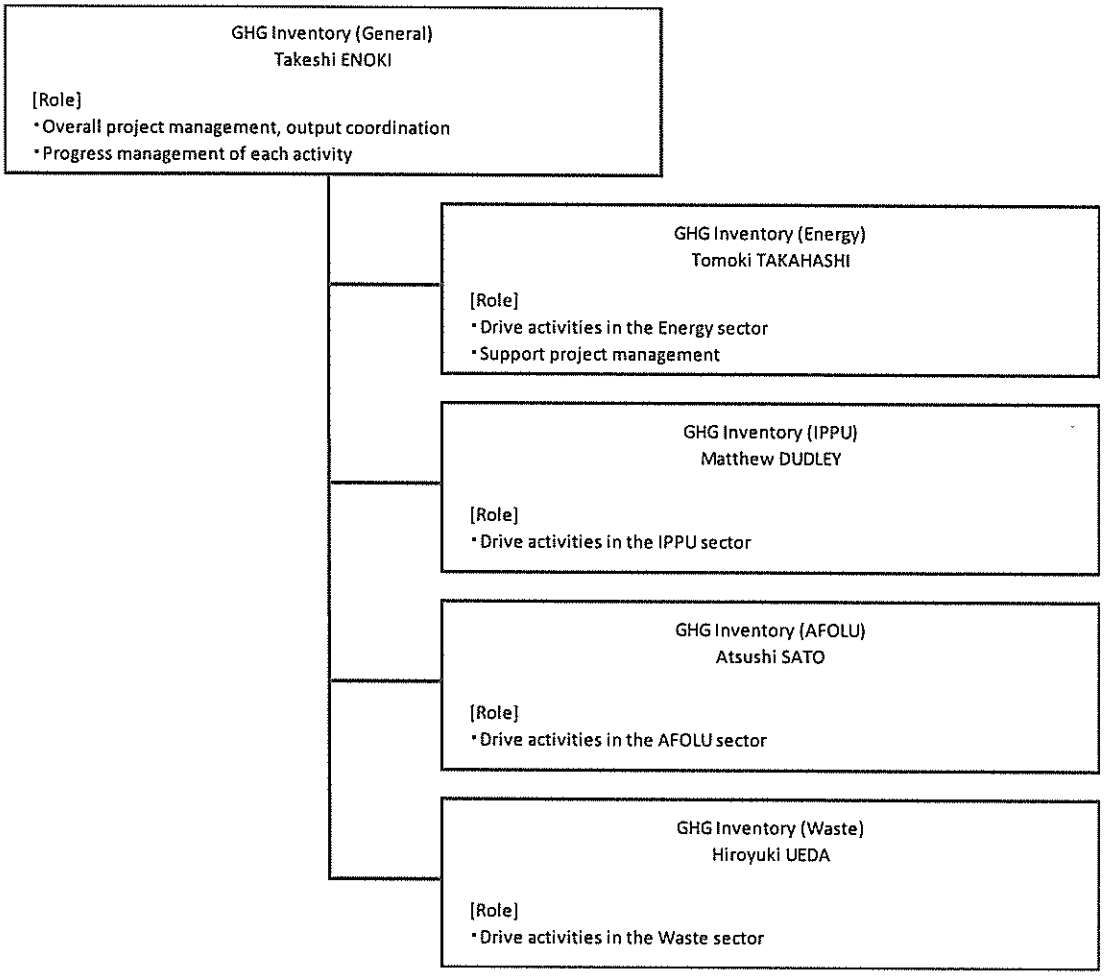

Figure 3 On-site operational organization

2.3.3. JCC organization

JCC organization is subject to finalization during the first visit to PNG; currently planned as below.

Table 22 Proposed JCC Members

Chairperson	Managing Director, CCDA
Vice Chairperson	General Manager, National Communication & MRV Team, CCDA
PNG side	CCDA
	Department of National Planning and Monitoring
	Water PNG
	National Capital Distric Commission
	Conservation and Environment Protection Authority
	PNG Forestry Authority
	Department of Agriculture and Livestock
	National Statistics Office
	Department of Petroleum and Energy

	PNG Power
	PNG Customs
Japan side	JICA expert(s) of the project
	JICA PNG Office

2.3.4. Backup structure of the organization

(1) Supporting structure

Regarding the implementation of the project, Mitsubishi UFJ Research and Consulting Co., Ltd. (MURC) encompasses sufficient backup structure for both technical and operational side. The members shown in Figure 4 will provide full support for the project through frequent comminications and coordinations with the project members, as well as by securing the structure where project members are able to have sufficient communication with JICA and respond to any questions.

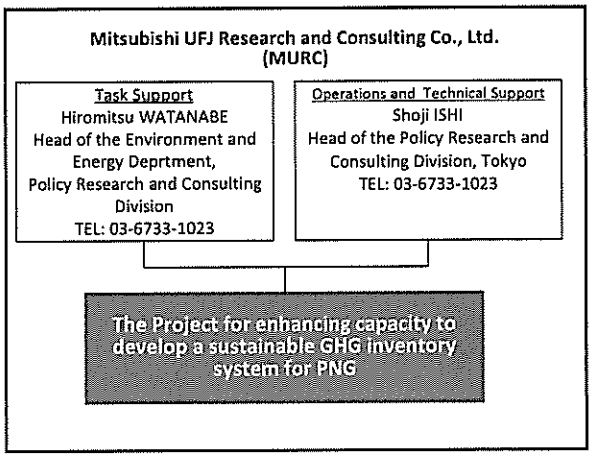

Figure 4 MURC supporting structure

(2) Technical backup

1) Expert team

The Global Environment team (9 members) and the Forestry and Land Ecosystem team (6 members) in the department of Environment and Energy in MURC have much experience working on GHG inventories, and the project members all belong to either team. Both teams share information on daily basis, and it is possible for project members to receive technical support from the team members at any point.

The project members have knowledges on GHG inventories and also have networks with Low-carbon Society Promotion Office, Global Environment Bureau, Ministry of the Environment Japan and IPCC Inventory Taskforce Technical Support Unit, Institute for Global Environmental Studies who publishes the IPCC guidelines. If necessary, it is possible for the project members to receive technical support through these networks. In addition, the GHG Inventory (General) expert is a member of Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention (CGE), and has networks with UNFCCC secretariat and other experts who are involved in GHG inventory preparation in developing countries. It is possible for the project members to receive support from these experts if necessary.

2) Logistics and documentation team

Within Global Environment team, the department of Environment and Energy, MURC, there are two assistants who support the team in administrative tasks, such as preparation of the estimate and contracts, translation and review of the reports. For this project, these assistants will be providing logistical support. One of the

assistants has participated in the seminar provided by JICA on accounting procedures for consultancy agreements and has experience of working on the administrative tasks for JICA projects.

2.3.5. Safety management system

The project members will collect sufficient security-related information in prior to the travel and will be aware of the measures to avoid any danger. In addition, by informing the stakeholders and related members of the project with the contact details of the peoject members' local mobile phones and the accomodations, the environment where on-site project members would be 24 hours reachable would be secured. Even though MURC does not have a backup structure in PNG, project members will be in close touch with the Japanese embassy, JICA PNG office, Japanese companies operaring in PNG and other stakeholders.

Based on "Risk Management Regulations" by MURC and "MUFG Risk Management Regulations", MURC has established "Crisis Management Regulations" which sets out the company's basic principles and rules towards crisis management. When the emergency such as disaster, terrorism/riot/severe crime, spread of infectious disesase or sudden disruption in political/economic situation of the country happens, depending on the necessity, measures such as set up of the crises response unit (the company president will be the director) will be taken.

In case of injury or illness, project members are able to use the company insurance service by Sompo Japan Nipponkoa Insurance Inc., and members are also entiltled to receive medical care and emergency transport service provided by International SOS Japan Ltd.

2.3.6. Compliance

Mitsubishi UFJ Research and Consulting Co., Ltd strictly follows "Privacy Policy" established in January 2006. Any personal information obtained from this Project shall be treated in compliance with the Privacy Policy. As one of the Related Companies in MUFG Group, MURC is in a position to strictly follow "MUFG Ethical Framework" and "Principles of Ethics and Conducts" and shall conform to the rules defined in the Framework and the Principles (such as Strict observance of laws, Thorough observance of confidentiality duty, Awareness of public accountability, Task fulfillment based on high ethical perspective and in good faith). Privacy Mark is obtained as part of controlling confidential duties.

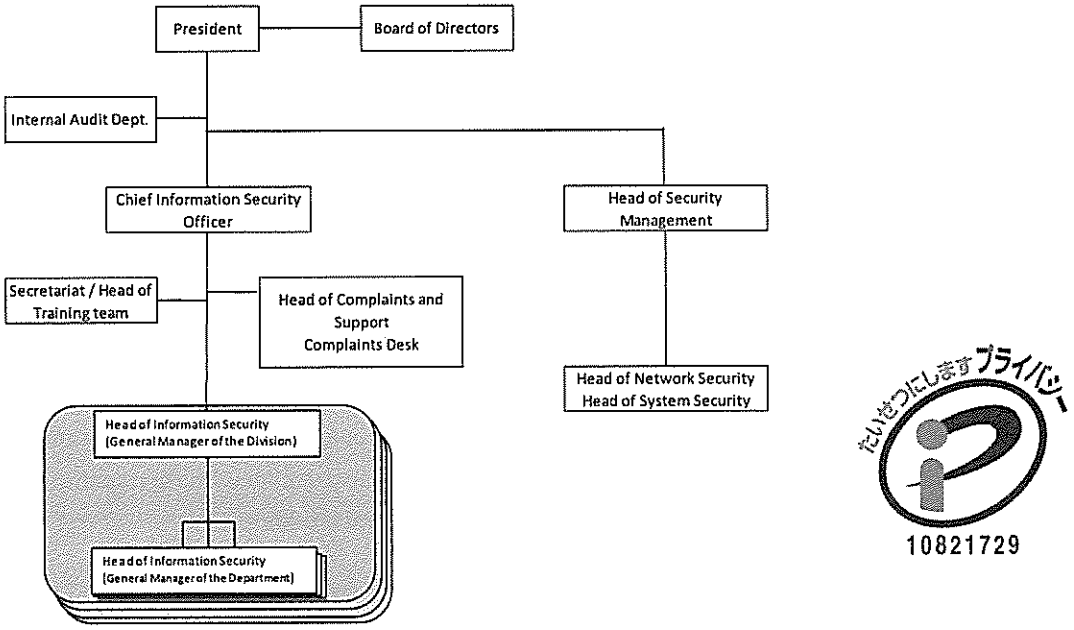

Figure 5 MURC Information control system and Privay Mark

Table 23 Compliance system

	Description	Yes/No
1	Has a company compliance regulation	(Yes / No)
2	Has a systematic management and organization for compliance	(Yes / No)
3	Management member is assigned as the head of the compliance system	(Yes / No)
4	Has in-house systems such as internal reporting or auditing in place to monitor or audit compliance system	(Yes / No)
5	Employees training on compliance more than once a year continuously	(Yes / No)
6	Compliance related activities to note	
	Mitsubishi UFJ Research and Consulting Co., Ltd strictly follows "Privacy Policy" established in January 2006. Any personal information obtained from this Project shall be treated in compliance with the Privacy Policy. As one of the Related Companies in MUFG Group, MURC is in a position to strictly follow "MUFG Ethical Framework" and "Principles of Ethics and Conducts" and shall conform rules defined in the Framework and the Principles (such as Strict observance of laws, Thorough observance of confidentiality duty, Awareness of public accountability, Task fulfillment based on high ethical perspective and in good faith). Privacy Mark is obtained as part of controlling confidential duties. Strict in-house check system is in operation centralized by Internal Audit Department for the compliance of copyright and excluding anti-social activities.	

2.4. PDM

Project Design Matrix

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Implementing Agency: CCDA

Target Group: CCDA

Period of Project: August 2017- July 2021

Project Site: Port Moresby, PNG

Model Site:

Version 1

Dated February 9, 2017

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.	1) A national GHG inventory is prepared every 2 years. 2) Items on TACCC checklist	・National GHG inventory report. ・TACCC assessment results of the checklist			
Project Purpose					
The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.	1) A national GHG inventory report is developed for 2015 and 2017. 2) Items on TACCC checklist	・Reports of national GHG inventory (2015 and 2017) ・TACCC assessment results of the checklist	・Relevant agencies cooperate with CCDA.		
Outputs					
Output1 : Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1-1) General inventory compilation procedure(work plan) is documented. 1-2) Data for national GHG inventories are collected, archived and maintained. 1-3) Technical document on procedures of inventory compilation is drafted.	1-1) Work plan 1-2) Set of databases/spread sheet files for national GHG inventories 1-3) National GHG inventory report			
Output2 : Capacity to promote understanding of national GHG inventories is enhanced.	2-1) The average level of understanding of workshops: 70% or above.	2-1) Results of questionnaire			
Output3. Capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3-1) Results of key category analysis and uncertainty assessment are documented. 3-2) Improvements made and necessary improvements for the future are documented.	3-1,2) National GHG inventory report			

Activities	Inputs		Important Assumption
	The Japanese Side	The PNG Side	
1-1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	1) Short term experts ・GHG inventory (General) ・GHG inventory (Energy) ・GHG inventory (Industrial Processes and Product use) ・GHG inventory (Agriculture) ・GHG inventory (Land use, Land use change and Forestry) ・GHG inventory (Waste)	1) Counterpart personnel CCDA 2) Office space for the sector expert teams to work 3) Meeting space for group progress report meetings/seminars 4) Necessary operation costs	
1-2: Consider and recommend ways to improve the national GHG inventory arrangements.			
1-3:Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).			
1-4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.			
1-5:Collect data necessary for national GHG inventories from relevant parties.			
1-6:Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.			
1-7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.			
1-8:Compile national GHG inventories with time series consistency.			
1-9:Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).			
2-1:Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.			
2-2:Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	2) Workshops		Pre-Conditions
3-1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.			
3-2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	3) Training in Japan/third country		
3-3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).			
3-4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	4) Equipment ・PC for data management		
3-5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.			
3-6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).			<Issues and countermeasures>
3-7: Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.			

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2.5. Work flow chart

Based on the basic pronciples mentioned above, the task flow chart is designed to implement project activities efiicienty and effectively.

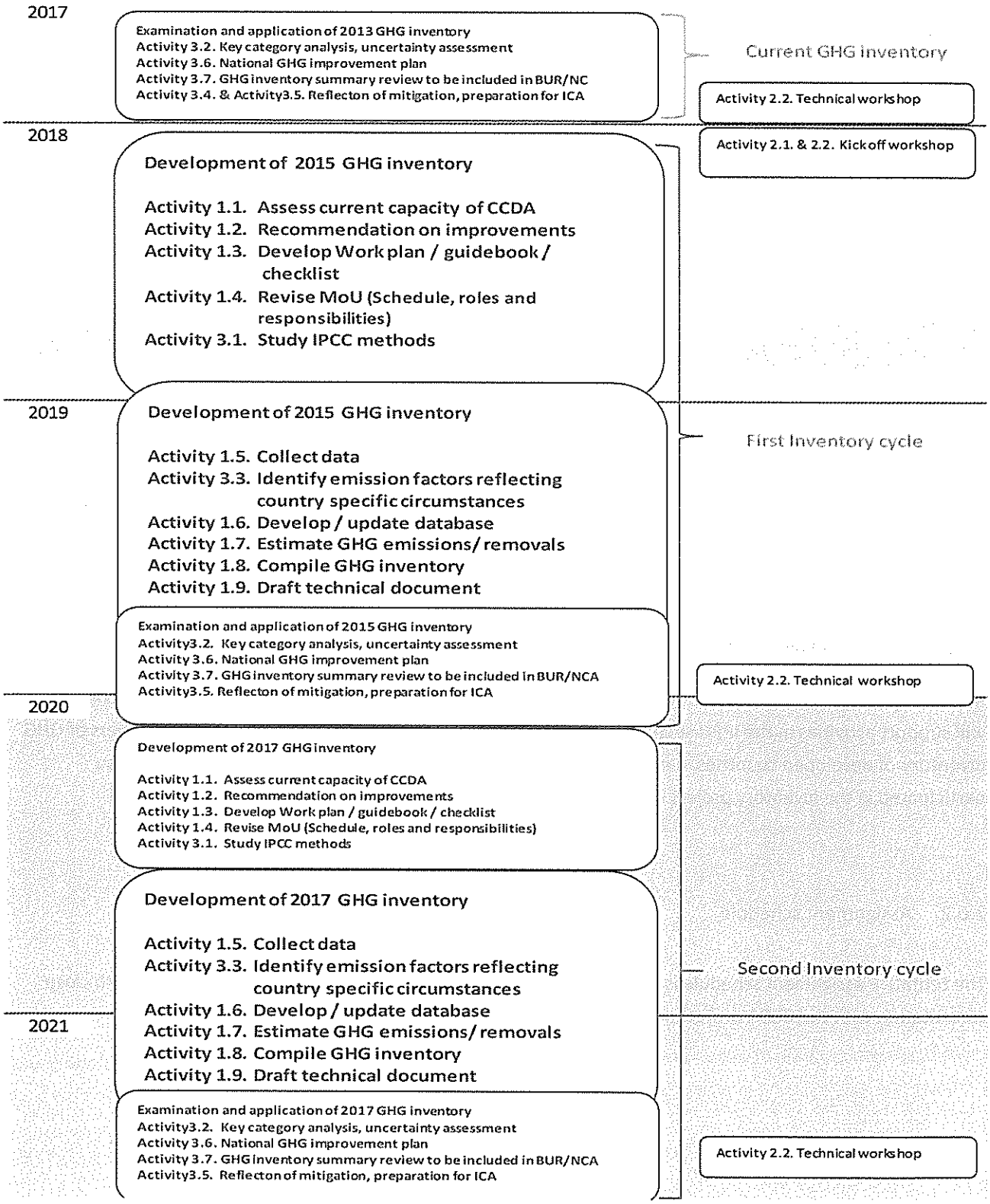


Figure 6 Work flow chart

2.6. Resource plan

2.6.1. Project team organizational structure

In addition to the positions in the Work Instruction from JICA, there is a Logistic Coordinator in this project for effective and smooth operation, covering arrangements of the workshop, training in Japan and in the third country, working in Japan.

In addition to managing the activities in the responsible sector, the project member in charge of GHG inventory (Energy) will also support management tasks run by the project member in charge of GHG inventory (General), and other activities such as supporting training in Japan, locally supporting the training in the third country, negotiation with locally hired staff in PNG.

Table 24 Positions and areas in charge

Positions presented in the Work Instruction from JICA	The person in charge
GHG inventory (General)	Takeshi ENOKI
GHG inventory (Energy)	Tomoki TAKAHASHI
GHG inventory (Industrial Processes and Product Use)	Matthew DUDLEY
GHG inventory (Agriculture, Land use change and Forestry)	Atsushi SATO
GHG inventory (Waste)	Hiroyuki UEDA
Coodinator / Training	Yui OGAWA

The support from individual consultant

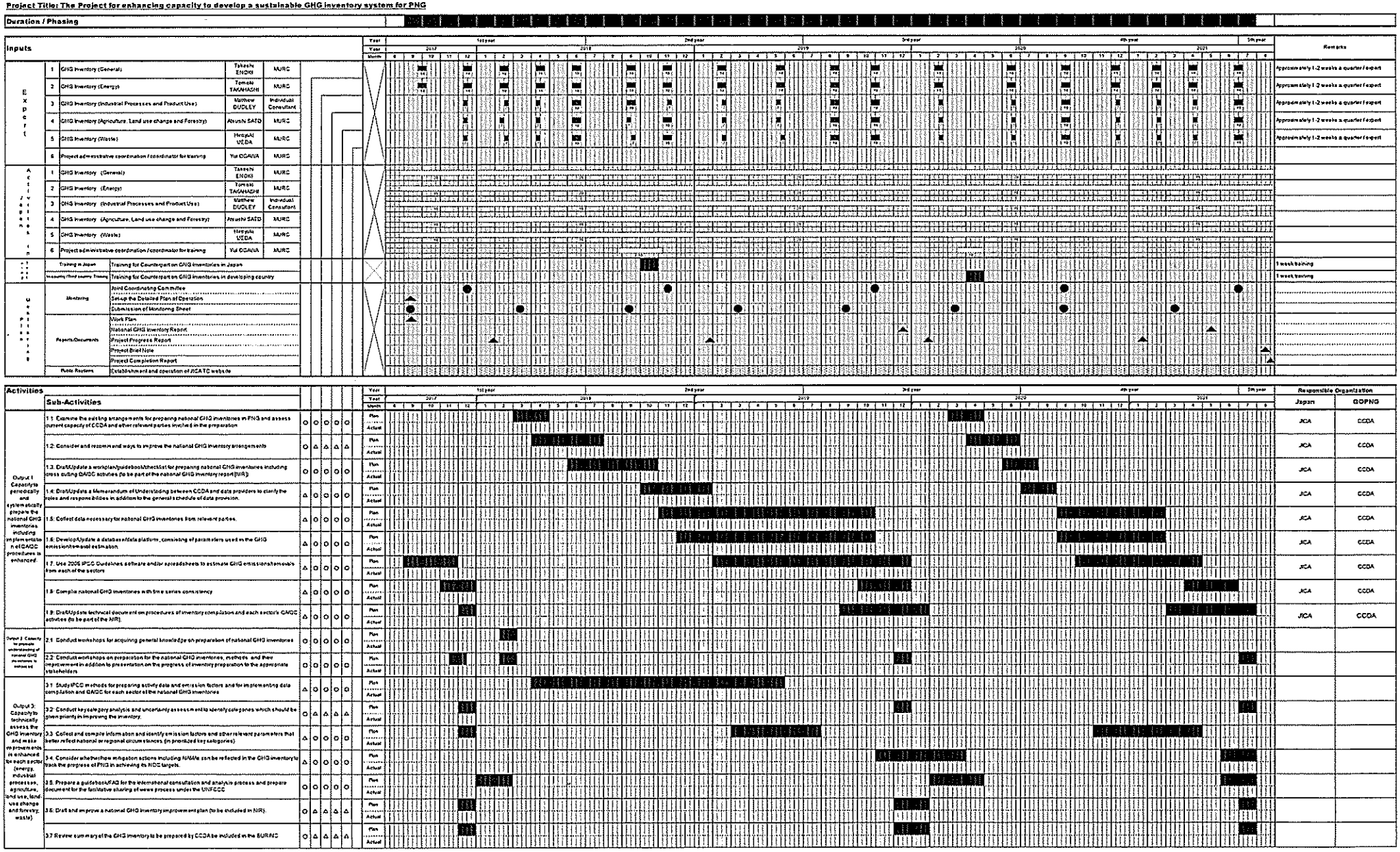
MURC will not establish a joint venture in order to implement this project, however a non-Japanese consultant will support activities in the IPPU sector. The indivisual consultant, who is one of the UNFCCC reviewers of GHG inventory of developed countries, has experience in GHG inventory development for Australia and also participated in the inventory project in Indonesia with JICA. His task fulfillment capacity is very high.

2.6.2. Assignment schedule

The tentative assignment schedule is shown in Table 25. The actual schedule will be determined with close consultation with the CCDA project member.

Table 25 Assignment Schedule

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG



2.6.3. Team members' assignment (domestic and on-site)

Main tasks each team member will be responsible for is shown in Table 26. The team members will actively work to fulfill the responsibilities assigned to him/her. The members will also support other members' tasks whenever the need arises.

Table 26 Roles and responsibilites of the team members

Name	In charge	Activities
Takeshi ENOKI	GHG inventory (General)	<u>Management</u> Activity1-4 : Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. Activity1-5 : Collect data necessary for national GHG inventories from relevant parties. Activity1-6 : Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. Activity1-7 : Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions and removals from each of the sectors. Activity3-3 : Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories). Activity3-4 : Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. Activity3-5 : Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC. <u>In charge</u> Activity1-1 : Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. Activity1-2 : Consider and recommend ways to improve the national GHG inventory arrangements. Activity1-3 : Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). Activity1-8 : Compile national GHG inventories with time series consistency. Activity1-9 : Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR). Activity2-1 : Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. Activity2-2 : Conduct workshops for the stakeholders on preparation, methods, progress, and the improvement of the national GHG inventories.

		Activity3-1 : Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. Activity3-2 : Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. Activity3-6 : Draft and improve a national GHG inventory improvement plan (to be included in NIR). Activity3-7 : Review the summary of the GHG inventory prepared by CCDA which is to be included in the BUR/NC.
Tomoki TAKAHASHI	GHG inventory (Energy)	In charge of Activity1-1 : Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. Activity1-3 : Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). Activity1-4 : Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. Activity1-5 : Collect data necessary for national GHG inventories from relevant parties. Activity1-6 : Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. Activity1-7 : Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions and removals from each of the sectors. Activity1-8 : Compile national GHG inventories with time series consistency. Activity1-9 : Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR). Activity2-1 : Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. Activity2-2 : Conduct workshops for the stakeholders on preparation, methods, progress, and the improvement of the national GHG inventories. Activity3-1 : Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. Activity3-2 : Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. Activity3-3 : Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories). Activity3-4 : Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. Activity3-5 : Prepare a guidebook/FAQ for the international consultation and

		analysis process and prepare document for the facilitative sharing of views process under the UNFCCC. Sub-Leader (Support GHG inventory (General)) Activity1-2 : Consider and recommend ways to improve the national GHG inventory arrangements. Activity3-6 : Draft and improve a national GHG inventory improvement plan (to be included in NIR). Activity3-7 : Review the summary of the GHG inventory prepared by CCDA which is to be included in the BUR/NC.
Matthew DUDLEY	GHG inventory (Industrial Processes and Product Use)	<u>In charge of</u> Activity1-1 : Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. Activity1-3 : Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). Activity1-4 : Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. Activity1-5 : Collect data necessary for national GHG inventories from relevant parties. Activity1-6 : :Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. Activity1-7 : Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions and removals from each of the sectors. Activity1-8 : Compile national GHG inventories with time series consistency. Activity1-9 : :Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR). Activity2-1 : Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. Activity2-2 : Conduct workshops for the stakeholders on preparation, methods, progress, and the improvement of the national GHG inventories. Activity3-1 : Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. Activity3-2 : Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. Activity3-4 : Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. Activity3-5 : Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.
Atsushi	GHG inventory	Same as GHG inventory (Industrial Processes and Product Use)

SATO	(Agriculture, Land use change and Forestry)	
Hiroyuki UEDA	GHG inventory (Waste)	Same as GHG inventory (Industrial Processes and Product Use)
Yui OGAWA	Workshop coordinator / coordinator for training in japan/third country	Logistics in Japan Workshops, training in Japan, logistics support for training in third country

2.7. Support and contribution by the counterpart

Below are the support and countribution by the counterpart in PNG.

a. Services of counterpart personnel and administrative personnel as reffered to in the Record of Disucussions II-5.

b. Suitable office space with necessary equipment

c. Supply or replacement of machinery, equipment. Instrumens and vehicles, tools, spare parts and any other materials necessary for the implementation of the project other than the equipment provided by JICA

d. Information as well as support in obtaining medical service

e. Credentials or identification cards

f. Available data(including maps and photographs) and information related to the project

g. Running expenses necessary for the implementation of the project

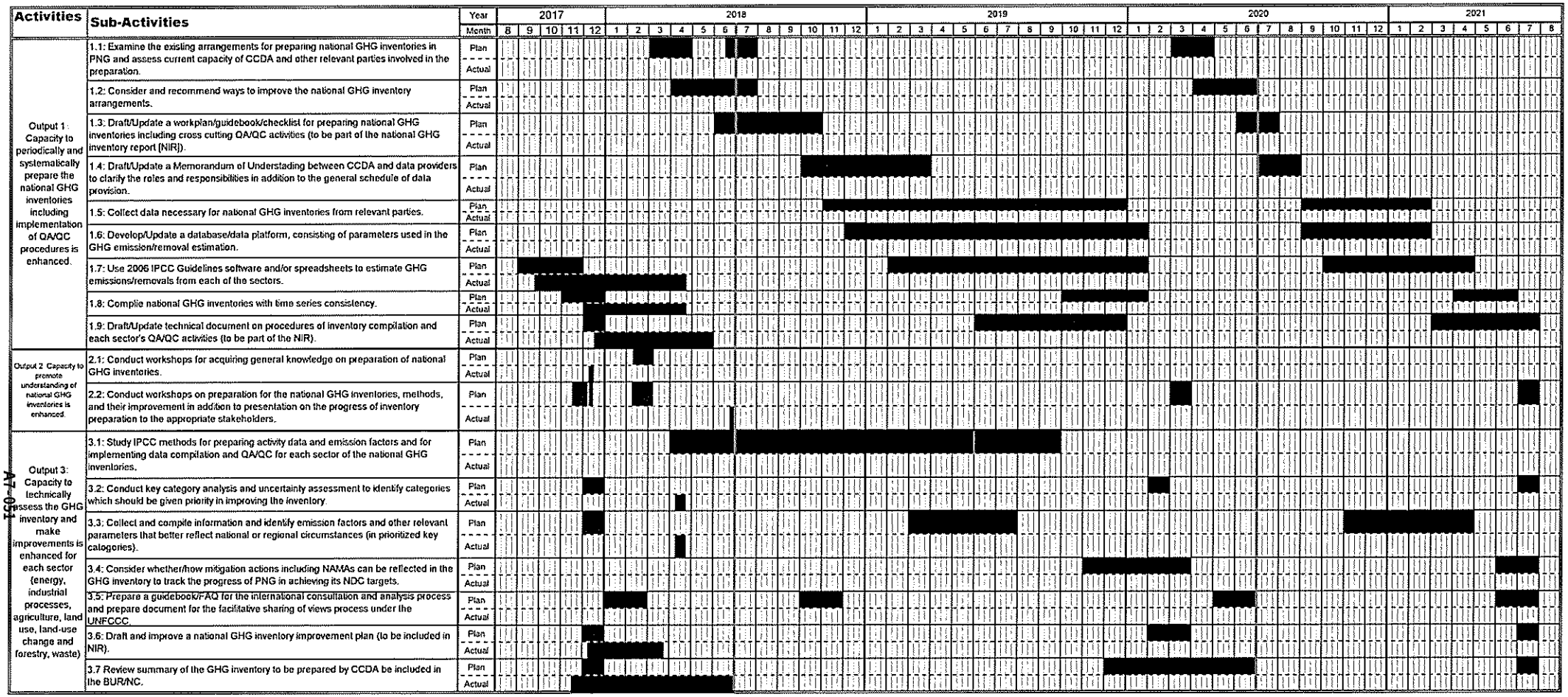
h. Expenses necessary for transportation within PNG of the equipment referred to in the Record of Discussions II-4(1) as well as for the installation, operation and maintenance thereof; and

i. Necessary facilities to the JICA experts for the remittance as well as utilization of the funds introduced into PNG from Japan in connection with the implementation of the project

2.8. Others (Outsourced from MURC)

As described in 2.2.2(3)Training on spreadsheet software operation, the training on spreadsheet software to CCDA will be outsourced.

PNG Plan of Operation (UPDATED AS OF MAY 2018)



MINUTES OF MEETING

ON

THE SECOND JOINT COORDINATION COMMITTEE

OF

THE PROJECT FOR ENHANCING CAPACITY TO DEVELOP A SUSTAINABLE GHG INVENTORY SYSTEM FOR PNG

Port Moresby, 26 July, 2019

Mr. Ruel Yamuna
Managing Director
Climate Change and Development Authority
JCC Chair

Mr. Takashi Toyama
Chief Representative
Japan International Cooperation Agency
PNG Office

Mr. Takeshi Enoki
Team Leader, GHG Inventory (Institutional Arrangements)
The Project for Capacity Development to Establish a National GHG Inventory Cycle of Continuous Improvement

The second Joint Coordination Committee (hereinafter referred to as the JCC) of the Project for enhancing capacity to develop a sustainable GHG inventory system for PNG (hereinafter referred to as the Project) was held at the CCDA Conference Room, Port Moresby, Papua New Guinea on July 26, 2019.

The Climate Change and Development Authority (hereinafter referred to as CCDA), Japan International Cooperation Agency (hereinafter referred to as JICA) and relevant parties of the Project participated in the JCC meeting, chaired by Mr. Alfred Rungol, Acting General Manager of the MRV and National Communication Division of the CCDA. The list of participants and agenda are provided in Appendix 1 and Appendix 2, respectively.

The opening remarks were delivered by the JCC chair and Mr. Masato Koinuma, Senior Representative of the PNG JICA.

Mr. Takeshi Enoki, the team leader of the Project, delivered the first presentation that provided an overview of the BUR 1 GHG inventory and identified necessary improvements for the next GHG inventory.

Key points raised in this presentation include:

1. The timeline for BUR1 and milestones achieved, and to underscore a shared understanding to compress the timeline for BUR2
2. The extent of JICA Project support to CCDA to compile BUR1
3. An overview of the BUR1 including commentary on the GHG emissions and removal trend
4. Necessary improvements identified by CCDA including planning, preparing and coordination processes with key stakeholders in regards to timelines, data collection and emissions estimation
5. An overview of key challenges identified by CCDA for each sector and priorities therein. Completeness remains an ongoing challenge for CCDA to resolve in regard to the GHG inventory, and CCDA is to continue working with key stakeholders to resolve completeness issues
6. Institutional arrangements are necessary to improve the completeness and accuracy of the GHG inventory

Mr. Jason Paniu, officer of the MRV and National Communication Division, CCDA, delivered a presentation on the plan for the BUR2 inventory and progress to date. Improvements within

each sector of the GHG inventory was delivered by respective CCDA officers responsible for the energy (Mr. Jason Paniu), industrial processes and other product use (Ms. Jacinta Krull), agriculture (Mr. Larson Daboyan), land use, land-use change and forestry (Mr. Matthew Dudley of the JICA Project) and waste (Erick Sarut) sectors.

This presentation highlighted the following points:

1. Structured plan developed to deliver a GHG inventory for BUR2 by the end of 2019
2. Memorandum of Understanding (MoU) for data collection are critical for strengthened institutional arrangements
3. Quality assurance/Quality control plan is to be developed, as well as a document management procedure
4. Completeness is a critical challenge an improvement plan has been developed for each sector to confirm completeness of the GHG inventory
5. Timeline for PNG NC/BUR provided. JICA experts to work with CCDA to deliver a further 2 GHG inventories with the last to be developed by 2021
6. Cross-cutting/General challenges including strengthened institutional arrangements, QA/QC plan, completeness
7. Sector-specific challenges including the role of key stakeholders to overcome completeness and accuracy issues, and in data collection and data quality

Mr. Alfred Rungol delivered a presentation on enhancing the institutional arrangements. Key points from this presentation include:

1. A recognition that there is a lack of published statistics as a source of activity data.
2. Strengthened institutional arrangements are important to ensure provision of activity data under BUR reporting requirements. Previously legal, procedural and institutional arrangements were temporary
3. Introduced key elements of institutional arrangements that CCDA wishes to strengthen, namely long term cooperation, data sharing process and clear identification of roles and responsibilities
4. Outlined 2 options for PNG on institutional arrangement a national regulation, or pursue MoUs or contract between CCDA and individual stakeholders.
5. MoU preferred approach and benefits and characteristics of this option presented.
6. Outlined next steps including pursuing MoUs with key stakeholders, establish technical committees but trial this concept with energy first.

Below are some comments and questions that were raised in the meeting.

1. A participant suggested that CCDA should develop project proposals as a basis to work with key stakeholders on activity data, and to identify capacity needs. This was supported by the Department of National Planning and Monitoring who suggested CCDA develop a Strategy for developing GHGs/BURs, and that this strategy includes data requirements, timeframes, capacity needs etc. The Department also advised that they would be willing to support a process to develop this strategy. The JCC Chair appreciated the suggestion of developing a strategy and also acknowledged that training could be pursued through the Paris Committee on Capacity Building under the UNFCCC and will confirm this pathway.

2. In regards to the sub-technical working groups, a participant advised that all stakeholders need to be aware of the existence of these committees. A participant asked whether there is an overarching committee that is to exist above these sub-technical working groups. The JCC Chair advised that the process is for the sub- technical working groups to report to the REDD+ MRV working group, but he also acknowledged that the technical nature of GHG development requires consultations at the technical level (as opposed to a higher level group).

3. A participant recommended that CCDA timelines for developing GHG inventories and BURs need to be mindful of data provider timelines. It was suggested that a national workshop could be held to discuss and agree timelines. The team leader of the Project advised that the UNFCCC sets the due dates of BURs, and that at the national level, a QA/QC Plan will be developed through the Project to identify the process to develop BURs every 2 years, which will facilitate the development of GHG inventories on a regular basis.

4. An observer indicated they were expecting the meeting to provide information on progress of the Project activities. The team leader of the Project acknowledged that the team could explain specific JICA experts achievements in the context of the detailed Project activities, but emphasized that all Project activities are in line with CCDA activities and timelines. The PNG JICA office highlighted that technical cooperation projects are counterpart driven, and that the Project is supporting the CCDA work as expected.

The next JCC meeting will be held in 2020. The main objective of the Third JCC will be to confirm the progress of the Project activities. Any challenges/issues would be shared at the JCC if any, and necessary guidance would be provided to the Project members to facilitate the progress of the Project, as needed.

Appendix I: Participants list

No	Name	Organization	Job Title
1	Mitsugu Yachidate	Embassy of Japan	First Secretary
2	Masato Koinuma	JICA	Senior Representative
3	Ippei Shimizu	JICA	Project Formulator Adviser
4	Fiona Silo	JICA	Staff
5	Melinda Benjamin	FAO	Program Officer
6	Erick Sarut	CCDA	National Communication Officer
7	Matthew Dudley	JICA Project Expert	IPPU expert
8	Takeshi Enoki	JICA Project Expert	JICA Project Team Leader
9	Tomoki Takahashi	JICA Project Expert	Energy expert
10	Wakai Digine	DNPM	Senior Programming Officer-Renewables
11	Brian Kunai	DNPM	Policy Officer-General
12	Sailas-Tipayamb	Water PNG	Environment Officer
13	Daisy Lepon	DAL	Policy Advisor
14	Jason Paniu	CCDA	MRV Officer
15	Jacinta Kull	DDCA	NC Officer
16	Debra Sungi	CCDA	MRV Officer-International Negotiation

Appendix II: 2nd JCC agenda

Climate Change and Development Authority

JICA

Second Joint Coordinating Committee for the Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

July 26, 2019

CCDA conference room, Port Moresby, Papua New Guinea

Agenda

Time	Agenda	Speaker
8:30～9:00	Registration	
9:00～9:05	Prayer	Erick Sarut, CCDA
9:05～9:10	Opening remarks	Mr. Alfred Rungol, acting General Manager of MRV and NC Division, CCDA
9:10～9:15	Welcome remarks	Mr. Masato Koinuma, Deputy Chief Representative of JICA PNG office
9:15～9:20	Self-introduction by participants	
9:20～9:45	Overview of the BUR 1 GHG inventory and necessary improvements for the next GHG inventory	Mr. Takeshi Enoki, JICA Project leader
9:45～10:15	Plan for the BUR2 inventory and the progress	Mr. Jason Paniu, CCDA
10:15～10:30	Enhancing institutional arrangements	Mr. Alfred Rungol, acting General Manager of MRV and NC Division, CCDA
10:30～10:55	Q&A, Discussion	
10:55～11:00	Closing	Alfred Rungol, CCDA

MINUTES OF MEETING
ON
THE THIRD JOINT COORDINATION COMMITTEE
FOR
THE PROJECT FOR ENHANCING CAPACITY TO DEVELOP A SUSTAINABLE GHG INVENTORY SYSTEM FOR PNG

Based on the Record of Discussion signed April 24, 2017 between Climate Change and Development Authority (hereinafter referred to as "CCDA") and Japan International Cooperation Agency (hereinafter referred to as "JICA"), both parties have been jointly implementing the Project for enhancing capacity to develop a sustainable GHG inventory system for PNG (hereinafter referred to as "Project") since August 2017.

Taking into account the COVID19 pandemic which has affected the implementation of the Project, CCDA and JICA had discussions during third Joint Coordination Committee (hereinafter referred to as the "JCC") held March 10, 2021 and hereby agree on the tasks described for each of the Project activities listed in the Annex.

Port Moresby, 10 March, 2021

Mr. Ruel Yamuna
Managing Director
Climate Change and Development Authority
JCC Chair

Mr. Masato Koinuma
Chief Representative
Japan International Cooperation Agency
PNG Office

The third JCC was held at the PNG JICA office conference room, Port Moresby, Papua New Guinea on March 10, 2021. The JICA Project experts participated online due to the COVID travel restrictions.

The CCDA, JICA and relevant parties of the Project participated in the JCC meeting, chaired by Mr. Alfred Rungol, General Manager of the MRV and National Communication Division of the CCDA. The list of participants and agenda are provided in Appendix 1 and Appendix 2, respectively.

The opening remarks were delivered by the acting JCC chair and Mr. Masato Koinuma, Chief Representative of the PNG JICA.

Mr. Jason Paniu, officer of MRV & National Communication Division, delivered the first presentation that provided the progress of the Project activities, specifically the BUR2 GHG inventory. Key points of the presentation are of the following:

1. Progress has been made on crosscutting issues such as improved design of the estimation files, inventory report template for the BUR2, mitigation actions template for BUR2, completed international consultation and analysis process of the BUR1.
2. For the energy sector, the Energy Sub-Technical Working Committee (ESTWC) was established for technical consideration of energy emissions, the estimation for fuel combustion is complete.
3. Some progress was made in the industrial processes and product use (IPPU) sector and waste sectors, but delays were acknowledged.

Mr. Takeshi Enoki, Project leader, delivered the second presentation on the remaining activities of the Project. Key points of the presentation are of the following:

1. The Project is on track to complete the deliverables as described in the Project Design Matrix of the Project and the CCDA capacity to prepare transparent, accurate, consistent, comparable, compete inventory has been strengthened. However, due to the impact of COVID19, the progress of the IPPU and waste sectors are behind schedule, specifically stakeholder consultation and data collection.
2. As the Project is developing an estimation file system for the IPPU and waste sectors as well, the members will use data from the BUR1 to test the file and finalize the estimation file system. CCDA will continue data collection activities as possible and replace any data when new information is collected.
3. The mitigation actions chapter of the BUR2 will be completed jointly between JICA Project experts and CCDA, reflecting any developments on mitigation policies/measures.
4. Capacity analysis, arrangement recommendation, and country specific emission factor research documents will be drafted by the JICA Project experts.

MK

Below are some comments and questions that were raised in the meeting.

- Participants noted the impact of the global COVID-19 pandemic on the Project progress, but also welcomed the update on progress to date including completion of the BUR1 and the current work on compiling BUR2. Participants agreed that with increased collaboration, the Project can continue to enhance the capacity development of PNG to sustainably develop transparent, accurate, comparable, complete, and consistent GHG inventories.
- CCDA confirmed that PNG intends to submit its BUR2 in 2021. In this context, there was a question regarding the use of the dummy data for the IPPU and waste sectors in the BUR2, and whether its use would be accepted by the UNFCCC. Mr. Enoki clarified that the dummy data is a simplification term indicating that data obtained for years 2000 to 2015 for BUR1 could be used to estimate emissions for 2016 and 2017 in BUR1. Mr. Enoki explained that in-lieu of CCDA receiving 2016 and 2017 activity data for BUR2, alternative methods can be used to estimate GHG emissions. These methods include identifying a proxy that can be used to extrapolate a trend, or to have a limiting assumption where by the 2015 data is used for both 2016 and 2017. Mr. Enoki also advised if alternate methods are used then these methods would need to be elaborated transparently in the BUR2 report.
- Mr. Rungol highlighted the work by the ESTWC and the Working Committee for Land Use, Land Use and Change, and Forestry sector for the NDC, and that this platform should be used to make improvements to the energy sector estimation. He further explained that the ESTWC would be meeting monthly starting the week of March 15, and that he would inform the members there of the discussions in the JCC. Although the priority for the ESTWC is the NDC implementation, the GHG inventory is within the scope of the Committee. Mr. Rungol also explained his plan for establishing a similar Working Committee for the IPPU and waste sectors for facilitating data collection in the future. Mr. Dudley noted the need for a structured approach to establish such Working Committees and proposed that the JICA Project experts include a detailed way forward in the institutional arrangement recommendation paper to be drafted under activity 1.2.
- Mr. Rungol reported that there are planning mitigation action projects in PNG such as Global Green Growth Institute and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) that have data collection components. Mr. Enoki noted that such data could be useful input to the GHG inventory and collaboration between inventory experts and mitigation experts can enhance the accuracy of the projects' outputs.

Mr. Rungol acknowledged and thanked the JICA Project for its work to date, noting that the GHG inventory is fundamental statistics used for planning and monitoring mitigation actions and plans such as the Nationally Determined Contributions to the UNFCCC. Mr. Rungol closed the meeting.

MC

Annex

The table below outlines the detailed contents of activities for the remainder of the Project period. The Project activities have not been revised, but the scope of the activities has been changed to reflect the level of progress between sectors of the GHG inventory. Also, some activities relating to recommendations or guidance papers (activities 1.1, 1.2, 3.2, 3.3, 3.6) will be carried out by the JICA Project members with input from CCDA, and the contents will be used to train CCDA counterparts.

Detailed activities for the remainder of the Project term

Output	Activity	Plan
Output 1 : Capacity to periodically and systematically prepare GHG inventories including implementation of QA/QC procedures	1.1: Examine the arrangements and assess capacity of CCDA and other relevant parties.	JICA Project experts carry out a review of the capacity by the end of the Project. CCDA members will review the assessment results, and revisions will be made as necessary.
	1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	JICA Project experts will develop a detailed improvement plan by the end of the Project. CCDA members will review the assessment results, and revisions will be made as necessary.
	1.3: Draft/Update workplan/guidebook/ checklist for preparing GHG inventories including QA/QC activities (part of NIR).	JICA Project experts will finalize draft QA/QC Plan in March. CCDA members will review the assessment results, and revisions will be made as necessary.
	1.4: Draft/Update a MoU for data provision.	MoU for data provision and for the Energy Sub-Technical Working Committee has been drafted and updated.
	1.5: Collect data necessary for national GHG inventories from relevant parties.	The energy sector has all data for BUR2, but CCDA will continue to work with the Energy Sub-Technical Working Committee members on a monthly basis, to plan the national energy balance table development, with the support of the JICA Project experts. CCDA will continue data collection for the other sectors.
	1.6: Develop/Update a database/data platform for estimating GHG emission/removals.	Database for energy sector complete. The JICA Project experts will develop a new database for IPPU and waste sectors and test using available data in March. CCDA

		members will review the assessment results, and revisions will be made as necessary.
	1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate emissions/removals.	Estimation file system for energy sector mostly done. JICA Project experts will develop similar estimation file system for IPPU and waste sectors in April. CCDA members will review the assessment results, and revisions will be made as necessary.
	1.8: Compile national GHG inventories with time series consistency.	JICA Project experts and CCDA will compile inventory using energy data and BUR1 IPPU/waste data.
	1.9: Draft/Update technical document of NIR.	CCDA will fill out NIR template for energy, IPPU and waste sectors with support from JICA Project experts.
Output 2: Capacity to promote understanding of GHG inventories	2.1: Conduct workshops on national GHG inventories.	The Inception workshop was held in 2017
	2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement.	The consultation workshop for the BUR1 was held in 2018, and the F gases workshop held in 2020.
Output 3: Capacity to technically assess the GHG inventory and make improvements	3.1: Study IPCC methods.	JICA Project experts can provide technical support to sectors as needed.
	3.2: Conduct key category analysis and uncertainty assessment.	Template for key category analysis and uncertainty assessment will be prepared by JICA Project experts. The JICA Project experts will conduct lectures on the two files.
	3.3: Collect and compile information and identify country/region emission factors and other relevant parameters	JICA Project experts will draft short paper on how to look for country specific parameters and will conduct lectures on the approach and the need for improving the accuracy of the inventory.
	3.4: Consider whether/how mitigation actions can be reflected in the GHG inventory to track the progress of targets.	JICA Project experts will work with CCDA to support mitigation chapter of BUR2 and carry out analysis of how actions could be reflected in the inventory
	3.5: Prepare guidebook/FAQ for ICA process and prepare document for the FSV process.	A guidebook for preparing for the ICA process including the FSV was developed in 2019.
	3.6: Draft and improve a national GHG inventory improvement plan (part of NIR).	JICA Project experts will develop a detailed improvement plan and will conduct lectures on the approach and the need for improving the accuracy of the inventory.
	3.7 Review summary of GHG inventory to be prepared by CCDA be included in the BUR/NC.	JICA Project experts will support BUR2 draft for sectors that are complete. CCDA will finalize the draft when estimations are complete.

MINUTES OF MEETING
ON
THE FOURTH JOINT COORDINATION COMMITTEE
FOR
THE PROJECT FOR ENHANCING CAPACITY TO DEVELOP A SUSTAINABLE GHG INVENTORY SYSTEM FOR PNG

Based on the Record of Discussion signed April 24, 2017 between Climate Change and Development Authority (hereinafter referred to as "CCDA") and Japan International Cooperation Agency (hereinafter referred to as "JICA"), both parties have been jointly implementing the Project for enhancing capacity to develop a sustainable GHG inventory system for PNG (hereinafter referred to as "Project") since August 2017.

The CCDA and JICA had discussions during the fourth and final Joint Coordination Committee (hereinafter referred to as the "JCC") held October 4, 2021 and hereby confirmed the achievements of the Project including the GHG inventory for the energy, industrial processes and product use, and waste sectors, to be included in the second biennial update report (hereinafter referred to as "BUR") of PNG.

Port Moresby, 4 October 2021

Mr. William Lakain
Acting Managing Director
Climate Change and Development Authority
JCC Chair

Mr. Masato Koinuma
Chief Representative
Japan International Cooperation Agency
PNG Office

The fourth and final JCC was held at the PNG JICA office conference room, Port Moresby, Papua New Guinea on October 4, 2021. Some participated online due to the coronavirus disease 2019 (COVID-19) travel restrictions.

The CCDA, JICA and relevant parties of the Project participated in the JCC meeting, chaired by Mr. Alfred Rungol, General Manager of the MRV and National Communication Division of the CCDA. The list of participants and agenda are provided in Appendix 1 and Appendix 2, respectively.

The opening remarks were delivered by the acting JCC chair and Mr. Masato Koinuma, Chief Representative of the PNG JICA.

Mr. Takeshi Enoki, Project leader, delivered the first presentation on the GHG inventories and the JICA Project. Key points of the presentation of the following:

1. The GHG inventory is not only an important policy tool for developing and monitoring climate change mitigation actions, but is also central to all UNFCCC reporting, namely the national communications (NC), the BUR, and the biennial transparency report (BTR) under the Paris Agreement.
2. Papua New Guinea has developed two GHG inventories as part of its initial and second NCs. The BUR1 was submitted in 2019 with the support of the Project and other donors, and the BUR2 is planned for submission in 2021.
3. The CCDA and JICA Project experts prepared two GHG inventories under the Project. The first is a complete GHG inventory including all sectors, energy, industrial processes and product use (IPPU), agriculture land use, land use change and forestry (LULUCF), and waste sectors. The Project produced the second GHG inventory for the energy, IPPU, and waste sectors.

Mr. Jason Paniu, officer of MRV & National Communication Division, delivered a presentation on the overview of the BUR2 inventory. Key points of the presentation are of the following:

1. The CCDA and JICA Project experts were not able to meet stakeholders as planned due to COVID19 and other reasons. In cases where updated data were not available, the 2015 data was used, as agreed in the 3rd JCC. Still, members managed to make improvements in all three sectors. Most important improvement made is transparency of the estimation files and the inventory report. Accuracy and completeness also were improved with additional source categories estimated.
2. Crosscutting improvements of the BUR2 include the following: improved estimation file system; comprehensive and detailed GHG inventory report; drafting of the first QA/QC Plan; updated BUR2 chapters specifically mitigation, which has detailed the policy context, PNG's

nationally determined contribution (NDC), and all mitigation actions.

3. In the energy sector, the improvements include the following: strengthening the institutional arrangements through the development of the Energy Sub-technical working group; updated energy balance; improved allocation for emissions from auto production; and non-methane volatile organic compounds (NMVOC) emissions estimated from fugitive categories.
4. In the IPPU sector, improvements were made in the new HFC emission estimates from the refrigeration and air-conditioning category. Mr. Paniu noted that these emissions are projected to increase in the future and there may be a need to consider planning for mitigation actions in the future.
5. In the waste sector, the improvements include the following: inclusion of methane (CH_4) emissions from open burning of waste; CH_4 from wastewater, lagoon treatment was added as a wastewater treatment type in the estimation of CH_4 from wastewater; and the population for each type of wastewater treatment was improved; and for nitrous oxide (N_2O) from wastewater, the amount of protein in industrial wastewater was taken into account in the parameter.

Mr. Takeshi Enoki delivered a presentation on the achievements of the Project, specifically on the deliverables (objectively verifiable indicators) of the Project and each of the Outputs as described in the Project Design Matrix. Key points of the presentation are of the following:

1. For Output 1, the workplan, the estimation files/database, and GHG inventory report were produced twice by the Project, once for the BUR1 and second for the BUR2. For each of the deliverables, Mr. Enoki noted that significant improvements were made to enhance the user friendliness of the products, which would help CCDA in updating the inventory in the future.
2. For Output 2, questionnaires were conducted to workshop participants to assess the level of satisfaction or understanding of the material delivered. Three workshops were held during the Project duration, the inception workshop, consultation workshop, and F gases workshop. In all workshops, over 80% of participants were either very satisfied or satisfied with the material presented, showing that there was a good understanding of the topics presented and discussed.
3. For Output 3, the GHG inventory report was produced for BUR1 and BUR2. The report includes detailed information on the methods, data used, the results, improvements made, and improvements which need to be made in the future. The BUR1 includes a full key category assessment and some information on uncertainties. The BUR2 includes quantitative information on both key category assessment and uncertainties for the energy, IPPU, and waste sectors.
4. Progress was made in strengthening institutional arrangements such as the Energy sub technical working group and unofficial networks developed through the project. Mr. Enoki stressed the importance of the inventory agency to demonstrate active leadership and hands on management of the GHG inventory preparation process to ensure sustainability of the work. Mr. Enoki also

noted that two CCDA staff left the office and were not replaced during the Project and encouraged CCDA to ensure the necessary technically capable human resources to continue the work on GHG inventories.

Mr. Matthew Dudley delivered the final presentation on some recommendations to PNG and CCDA. Key points of the presentation are of the following:

1. PNG has enhanced its institutional arrangements to prepare GHG inventories on a regular basis. The Climate Change (Management) Act established CCDA as the national authority on GHG inventories and set sector lead agencies for the inventory sectors. The Sub technical working group for LULUCF sector was established before the Project. During the Project, energy was established, and plans are in place for other sectors as well. Mr. Dudley also noted that the NDC Regulation may also enhance the role of CCDA as the lead agency in GHG inventory preparation and facilitate the data provision by relevant stakeholders.
2. An assessment of general competencies of CCDA was made by the JICA Project experts based on criteria such as the following: compile a GHG inventory; incorporate improvement in the GHG inventory; leverage improvement via collaboration; enhance capacity of its stakeholders on GHG inventory; and plan, prepare and manage a GHG inventory. While the CCDA and the JICA Project experts were able to compile two GHG inventories, Mr. Dudley noted that there is still room for CCDA to improve in terms of preparing the best GHG inventory for PNG. In terms of arrangements for the GHG inventory, Mr. Dudley noted that the level of data/information collected, and improvements made in the Project were sufficient but also still should be improved in the future.
3. Existing arrangements could be viewed as procedural than substantive. Mr. Dudley noted that arrangements should set the collaborative framework in which there is full buy in from the management of key stakeholders in order for the inventory work to progress smoothly. A high level of commitment by CCDA is needed to leverage the existing arrangements to lead the process.
4. Some recommendations for CCDA were of the following: leverage opportunities and maximize benefits from sub technical working groups; strengthen current arrangements to ensure effective collaboration on improvements in the GHG inventory such as the approach to include more education, not a stick in dealing with collaborators; investment in an organization, not an individual; develop and implement a structured approach to plan, prepare and manage a GHG inventory.

Below are some comments and questions that were raised in the meeting.

- Mr. Enoki clarified how the recalculations in energy, IPPU, and waste sectors thereby improved

the transparency, accuracy, completeness, comparability, time series consistency (TACCC) of the sector emissions and can inform mitigation policies and measures. This is a key function of the GHG inventory data, and the reason the TACCC of the GHG inventory needs to be improved continuously.

- Participants welcomed the GHG inventory for the energy, IPPU, and waste sectors for the BUR2. Mr. Rungol provided an update on the agriculture and LULUCF sectors that the emission and removal estimations should be concluded in two weeks' time and that the progress has been constrained due to the COVID19 lockdowns. Mr. Rungol informed the participants that the technical annex would also be updated for the BUR2 and that the it will be PNG's last submission under the current MRV framework as PNG will be preparing for the BTR under the ETF for submission in 2024. He also mentioned that the Prime Minister may announce before the twenty sixth meeting of the Conference of the Parties (COP26) progress on BUR2 and its likely submission in December. Mr. Rungol mentioned that he would confirm which IPCC Guidelines was used in the agriculture and LULUCF sector estimations.
- A question was raised regarding the collaboration with other donors throughout the Project. Mr. Enoki emphasized that the JICA Project experts engaged with relevant donors who were working on GHG inventory relevant projects. Mr. Enoki explained that the Food and Agriculture Organization (FAO), Coalition for Rainforest Nations (CfRN) and other donors were supporting the CCDA and PNG Forest Authority in producing the agriculture and LULUCF sector inventories, and that the JICA Project and CCDA agreed at start of the Project for JICA to prioritize the other sectors in order to avoid confusion and duplication of work. Still, the Project experts fully supported CCDA to finalize the estimation in those sectors for the BUR1 inventory. For the waste sector, the CCDA and JICA Project experts consulted the JICA experts working on the "Project for Promotion of Regional Initiative on Solid Waste Management in Pacific Island Countries" for information on solid waste management in Port Moresby and in PNG. In the IPPU sector, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), which was supporting the Conservations and Environment Protection Authority (CEPA) with the Montreal Protocol work, was consulted in the process of preparing the F gas inventory. The Project experts engaged in discussion with the Global Green Growth Institute (GGGI), who were supporting CCDA with the NDC work, regarding the energy sector emissions of PNG and discussed potential methods to project emissions in the future. Furthermore, the Project experts participated and lectured on GHG inventories in a GGGI workshop held in 2020.

Mr. Rungol expressed great appreciation to JICA and the Japanese people for successful implementation of the Project, noting that the GHG inventory is fundamental statistics used for

planning and monitoring mitigation actions and plans such as the NDCs to the UNFCCC. He emphasized the importance of the GHG inventory work, explaining that the NDC was predicated on the BUR1 GHG inventory data and that updates to the NDC will also be based on the most recent GHG inventory.

JICA also expressed appreciation to Mr. Rungol, the CCDA, and relevant stakeholders for its cooperation throughout the Project and emphasized that the GHG inventory work needs to be sustained after conclusion of the Project.

Mr. Rungol closed the meeting.

Appendix 1 List of participants

1	Mr. Alfred Rungol	CCDA
2	Mr. Jason Paniu	CCDA
3	Mr. Japheth Gai	CCDA
4	Ms. Anita Poesi	CEPA
5	Mr. Atsushi Namba	Embassy of Japan in Papua New Guinea
6	Mr. Masato Koinuma	JICA PNG Office
7	Mr. Takahiro Yokota	JICA PNG Office
8	Mr. Akira Fujiwara	JICA PNG Office
9	Mr. Masaki Aoki	JICA PNG Office
10	Mr. Takeshi Enoki	JICA Project expert
11	Mr. Takuji Terakawa	JICA Project expert
12	Mr. Masaaki Nakamura	JICA Project expert
13	Mr. Matthew Dudley	JICA Project expert
14	Mr. Atsushi Sato	JICA Project expert

Appendix 2 Agenda

Climate Change and Development Authority

Fourth Joint Coordinating Committee meeting for "The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG"

October 4, 2021 at CCDA conference room

Agenda

Time	Agenda Facilitator: Mr. Alfred Rungol	Speaker
12:45～13:00	Registration	
13:00～13:05	Prayer	Mr. Erick Sarut, CCDA
13:05～13:10	Opening remarks	Mr. Alfred Rungol, General Manager of CCDA
13:10～13:15	Welcome remarks	Mr. Masato Koinuma, Chief Representative of JICA PNG office
13:15～13:25	Introduction to the GHG inventory and the JICA Project	Mr. Takeshi Enoki, JICA Project expert
13:25～13:45	Overview of the second GHG inventory and BUR2	Mr. Jason Paniu, CCDA
13:45～14:10	Question and Answer	
14:10～14:25	Achievements and Challenges of the Project	Mr. Takeshi Enoki, JICA Project expert
14:25～14:40	Recommendations for the future	Mr. Matthew Dudley, JICA Project expert
14:40～14:55	Discussion	
14:55～15:00	Closing Remarks	

Annex 8: Project Monitoring Sheets

- Annex 8-1: Project Monitoring Sheet ver.1
- Annex 8-2: Project Monitoring Sheet ver.2
- Annex 8-3: Project Monitoring Sheet ver.3
- Annex 8-4: Project Monitoring Sheet ver.4
- Annex 8-5: Project Monitoring Sheet ver.5
- Annex 8-6: Project Monitoring Sheet ver.6
- Annex 8-7: Project Monitoring Sheet ver.8
- Annex 8-8: Project Monitoring Sheet ver.8
- Annex 8-9: Project Monitoring Sheet ver.9

Annex 8-1: Project Monitoring Sheet Ver.1

TO CR of JICA　Papua New Guinea　OFFICE

Project Monitoring Sheet

Project Title : The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG
Version of the Sheet: Ver. 1（Term: August, 2017 - September, 2017）

Name: Takeshi Enoki
Title: GHG Inventory (General)
Submission Date: September 7, 2017

I. Summary

1　Progress

1-1 Progress of Inputs

The contract for the JICA Project members started in August 28, 2017, and the members have drafted the Work Plan (Japanese) describing the project objectives, detailed activities, implementation structure, etc. This will be translated into English a week before the first mission to PNG, tentatively scheduled for October 4 to October 18 and shared with the project counterparts.
During this first mission, the JICA Project members, consisting of GHG inventory (General) and GHG inventory (Energy), will hold kickoff meetings with CCDA and other stakeholders, in addition to discussing the contents of the Work Plan with CCDA and finalizing it.

1-2 Progress of Activities

Activity 1-7: Project members are in the initial stages of supporting the PNG counterparts estimate GHG emissions and removals for the first BUR.

1-3 Achievement of Output

None

1-4 Achievement of the Project Purpose

A draft TACCC checklist, which is one of the Objectively Verifiable Indicators of the Project Purpose, has been developed and included in the Work Plan. The Project members will initiate discussion on the list during the first mission.

1-5 Changes of Risks and Actions for Mitigation

There have been no changes in risks of implementation of the Project since the

planning of the Project.
A kickoff teleconference will be held September 11 to clarify the following issues: the Project Implementation structure of CCDA, specifically the Inventory Coordinator and Inventory Compiler positions; and discuss the progress of the GEF/CBIT project and its Project scope, particularly in regards to the GHG inventory preparation activities to be carried out by the GEF/CBIT project. The results of this teleconference may affect the scope of the JICA Project members' work.

1-6 Progress of Actions undertaken by JICA
JICA headquarters, JICA PNG office, CCDA, and the JICA Project member will attend the kickoff meeting on September 11.

1-7 Progress of Actions undertaken by Gov. of PNG
JICA headquarters, JICA PNG office, CCDA, and the JICA Project member will attend the kickoff meeting on September 11.

1-8 Progress of Environmental and Social Considerations (if applicable)
Not applicable

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)
Not applicable

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)
The GEF/CBIT project mentioned in 1-5 aims to improve the quality of GHG inventory data for the Agriculture, Forestry, and other Land Use sector. Since members of the JICA Project will carry out all GHG inventory preparation steps including the collection of data, estimation of GHG emissions/removals, and drafting the Inventory Report for all sectors, there is a duplication of work. The teleconference meeting on September 11 will clarify the overlaps and members will ensure that there is no duplication of work and that there will be good coordination between the two projects.

2 Delay of Work Schedule and/or Problems (if any)

2-1 Detail
None

2-2 Cause
None

2-3 Action to be taken
None

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of PNG,etc.)
None

3 Modification of the Project Implementation Plan

Minor revisions were made to the PO attached to the R/D. These were made in light of the fact that the Project duration began a few weeks later than anticipated. In addition, a three month period was added to activity 3.1 to reflect the need for CCDA members to enhance their understanding of the IPCC methods every cycle. Neither changes are expected to impact the implementation of the Project.

3-2 Other modifications on detailed implementation plan
None

4 Current Activities of Gov. of xx to Secure Project Sustainability after its Completion

To be confirmed in the next term.

II. Project Monitoring Sheet I & II *as Attached*

Monitoring sheet I

Project Monitoring Sheet I （Revision of Project Design Matrix）

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Version 1

Implementing Agency: CCDA

Dated September 11, 2017

Target Group: CCDA

Period of Project: August 2017- July 2021

Project Site: Port Moresby, PNG　**Model Site:**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.	1) A national GHG inventory is prepared every 2 years. 2) Items on TACCC checklist	・National GHG inventory report. ・TACCC assessment results of the checklist		none	none
Project Purpose					
The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.	1) A national GHG inventory report is developed for 2015 and 2017. 2) Items on TACCC checklist	・Reports of national GHG inventory (2015 and 2017) ・TACCC assessment results of the checklist	・Relevant agencies cooperate with CCDA.	a draft TACCC checklist has been developed	none
Outputs					
Output1 : Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1-1) General inventory compilation procedure(work plan) is documented. 1-2) Data for national GHG inventories are collected, archived and maintained. 1-3) Technical document on procedures of inventory compilation is drafted.	1-1) Work plan 1-2) Set of databases/spread sheet files for national GHG inventories 1-3) National GHG inventory report		none	none
Output2 : Capacity to promote understanding of national GHG inventories is enhanced.	2-1) The average level of understanding of workshops: 70% or above.	2-1) Results of questionnaire			
Output3. Capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3-1) Results of key category analysis and uncertainty assessment are documented. 3-2) Improvements made and necessary improvements for the future are documented.	3-1) National GHG inventory report			

Activities	Inputs		Important Assumption
	The Japanese Side	The PNG Side	
1-1 : Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. 1-2: Consider and recommend ways to improve the national GHG inventory arrangements. 1-3 : Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). 1-4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. 1-5 : Collect data necessary for national GHG inventories from relevant parties. 1-6 : Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. 1-7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors. 1-8 : Compile national GHG inventories with time series consistency. 1-9 : Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR). 2-1 : Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. 2-2 : Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders. 3-1 : Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. 3-2 : Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. 3-3 : Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories). 3-4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. 3-5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC. 3-6 : Draft and improve a national GHG inventory improvement plan (to be included in NIR). 3-7: Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	1) Short term experts ・GHG inventory (General) ・GHG inventory (Energy) ・GHG inventory (Industrial Processes and Product use) ・GHG inventory (Agriculture) ・GHG inventory (Land use, Land use change and Forestry) ・GHG inventory (Waste) 2) Workshops 3) Training in Japan/third country 4) Equipment ・PC for data management	1) Counterpart personnel CCDA 2) Office space for the sector expert teams to work 3) Meeting space for group progress report meetings/seminars 4) Necessary operation costs	**Pre-Conditions** **<Issues and countermeasures>** none. A teleconference is scheduled on Sept. 11 to discuss implementation structure and other donor activities.

Monitoring Sheet II

Project Monitoring Sheet II (Revision of Plan of Operation)

Version 1

Dated September 7, 2017

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Inputs	Year	2017		2018				2019				2020				2021			Remarks	Monitoring: Issue	Monitoring: Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Expert																					
GHG inventory (General)	Plan	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	approximately 1 week to 2 weeks a quarter/expert	none	none
	Actual																				
GHG inventory (Energy)	Plan	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				
GHG inventory (Industrial Processes and Product use)	Plan			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				
GHG inventory (Agriculture, Land use change and Forestry)	Plan			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				
GHG inventory (Waste)	Plan			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				
Project administrative coordination / coordinator for training	Plan																		support from Japan		
	Actual																				
Equipment																					
PC for data management	Plan	■	■	■	■															timing of purchase will be as soon as possible but before March 2018	none
	Actual																				
Training in Japan																					
Training for Counterpart on GHG inventories in Japan	Plan					■	■												1 week training	none	none
	Actual																				
In-country/Third country Training																					
Training for Counterpart on GHG inventories in developing country	Plan												■	■					1 week training	timing changed from 3rd q to 2nd q	none
	Actual																				

Duration / Phasing																					
	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				

Monitoring Plan	Year	2017		2018				2019				2020				2021			Remarks	Issue	Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Monitoring																					
Joint Coordinating Committee	Plan		■				■				■				■			■		none	none
	Actual																				
Set-up the Detailed Plan of Operation	Plan	■																		none	none
	Actual	■																			
Submission of Monitoring Sheet	Plan	■		■		■		■		■		■		■		■				none	none
	Actual	■																			
Reports/Documents																					
Work Plan	Plan	■																		none	none
	Actual	■																			
National GHG inventory Report	Plan										■							■		timing shifted back a month	none
	Actual																				
Project Progress Report	Plan			■				■				■				■				none	none
	Actual																				
Project Brief Note	Plan																	■		none	none
	Actual																				
Project Completion Report	Plan																	■		none	none
	Actual																				
Public Relations																					
Establishment and operation of JICA TC website	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				

Activities / Sub-Activities						Year	2017		2018				2019				2020				2021			Responsible Organization		Achievements	Issue & Countermeasures
							Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Japan	GOPNG		
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.																											
1.1 Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	○	○	○	○	○	Plan																		JICA	CCDA	timing shifted back a month	none
						Actual																					
1.2 Consider and recommend ways to improve the national GHG inventory arrangements.	○	△	△	△	△	Plan																		JICA	CCDA	none	none
						Actual																					
1.3 Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	○	○	○	○	○	Plan																		JICA	CCDA	timing shifted back a 2 months	none
						Actual																					
1.4 Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	△	○	○	○	○	Plan																		JICA	CCDA	timing shifted back a month	none
						Actual																					
1.5 Collect data necessary for national GHG inventories from relevant parties.	△	○	○	○	○	Plan																		JICA	CCDA	timing extended one month	none
						Actual																					
1.6 Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	△	○	○	○	○	Plan																		JICA	CCDA	timing extended one month	none
						Actual																					
1.7 Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	△	○	○	○	○	Plan																		JICA	CCDA	timing extended one month	none
						Actual																					
1.8 Compile national GHG inventories with time series consistency.	△	○	○	○	○	Plan																		JICA	CCDA	timing extended one month	none
						Actual																					
1.9 Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	△	○	○	○	○	Plan																		JICA	CCDA	timing extended one month	none
						Actual																					
Output 2: Capacity to promote understanding of national GHG inventories is enhanced.																											
2.1 Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	○	○	○	○	○	Plan																				none	none
						Actual																					
2.2 Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	○	○	○	○	○	Plan																				timing shifted back a month	none
						Actual																					
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)																											
3.1 Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	△	○	○	○	○	Plan																				timing shifted back a month and extended. Additional period in 2020.	none
						Actual																					
3.2 Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	○	△	△	△	△	Plan																				timing shifted back a month	none
						Actual																					
3.3 Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).	△	○	○	○	○	Plan																				timing shifted back a month	none
						Actual																					
3.4 Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	△	○	○	○	○	Plan																				timing shifted back a month	none
						Actual																					
3.5 Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	○	○	○	○	○	Plan																				timing shifted back a month	none
						Actual																					
3.6 Draft and improve a national GHG inventory improvement plan (to be included in NIR).	○	△	△	△	△	Plan																				timing shifted back a month	none
						Actual																					
3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	○	△	△	△	△	Plan																				timing shifted back a month	none
						Actual																					

Annex 8-2: Project Monitoring Sheet ver.2

TO CR of JICA　Papua New Guinea　OFFICE

Project Monitoring Sheet

Project Title : The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Version of the Sheet: Ver. 2（Term: August, 2017 - December, 2017）

Name: Takeshi Enoki

Title: GHG Inventory (General)

Submission Date: January 31, 2018

I. Summary

1　Progress

1-1 Progress of Inputs

The contract for the JICA Project members started in August 28, 2017. The detailed Plan of Operation, the first draft of the Monitoring Sheet, and Work Plan of the Project were complete the following month.

During the first mission from October 4 to 18, the JICA expert team members held kickoff meetings with CCDA and other stakeholders, and agreed on the contents of the Work Plan for the Project. The Project members also purchased one desktop computer, two laptop computers, a printer, and relevant appliances, as per the PDM.

During the second mission from December 3 to 16, the JICA expert team members worked with CCDA counterparts to estimate GHG emissions and removals for the GHG inventory to be included in the first Biennial Update Report (hereinafter referred to "BUR 1 inventory"). The Joint Coordinating Committee (hereinafter referred to "JCC") is tentatively scheduled for February 2018, depending on whether the timelines for BUR1 preparation can be clarified by then.

The Project website, describing Project activities and updating milestones was opened in November 2017.

The table below shows the inputs by JICA expert team and monitoring activities in 2017.

Table 1 Input for year 2017

Inputs				Year	2017			
				Month	9	10	11	12
Expert	1	GHG Inventory（General）		Plan	14			14
				Actual	15			14
	2	GHG Inventory（Energy）		Plan	14			14
				Actual	15			14
	3	GHG Inventory（Industrial Processes and Product Use）		Plan				7
				Actual				7
	4	GHG Inventory（Agriculture, Land use change and Forestry）		Plan				7
				Actual				8
	5	GHG Inventory（Waste）		Plan				7
				Actual				6
Japan's Activitie	1	GHG Inventory （General）		Plan	20			
				Actual	21			
	2	GHG Inventory （Energy）		Plan	15			
				Actual	15			
	3	GHG Inventory （Industrial Processes and Product Use）		Plan	10			
				Actual	10			
	4	GHG Inventory （Agriculture, Land use change and Forestry）		Plan	10			
				Actual	9			
	5	GHG Inventory （Waste）		Plan	10			
				Actual	10			
	6	Project administrative coordination / coordinator for training		Plan				
				Actual				
Equipment	PC for data management			Plan				
				Actual				
Plan Monitoring	Monitoring		Joint Coordinating Committee	Plan				
				Actual				
			Set-up the Detailed Plan of Operation	Plan				
				Actual				
			Submission of Monitoring Sheet	Plan				
				Actual				
	Reports/Documents		Work Plan	Plan				
				Actual				
			National GHG inventory Report	Plan				
				Actual				
			Project Progress Report	Plan				
				Actual				
			Project Brief Note	Plan				
				Actual				
			Project Completion Report	Plan				
				Actual				
	Public Reations		Establishment and operation of JICA TC website	Plan				
				Actual				

1-2 Progress of Activities

a.　Overview of activities carried out in 2017

Due to the delay of the BUR 1 inventory preparation by CCDA, some of the Project activities have yet to be carried out. For example, activities 2.2, 3.2, 3.3 are activities planned under the assumption that the BUR 1 inventory would be completed by December 2017, and have yet to be implemented.

The table below shows an overview of the progress of activities.

Table 2 Overview of progress of activities

	Activities	Year	2017				
		Month	8	9	10	11	12
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan					
		Actual					
	1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	Plan					
		Actual					
	1.3: Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan					
		Actual					
	1.4: Draft/Update a Memorandum of Understading between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan					
		Actual					
	1.5: Collect data necessary for national GHG inventories from relevant parties.	Plan					
		Actual					
	1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan					
		Actual					
	1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan					
		Actual					
	1.8: Complie national GHG inventories with time series consistency.	Plan					
		Actual					
	1.9: Draft/Update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan					
		Actual					
Output 2: Capacity to promote understanding of national GHG inventories is enhanced.	2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan					
		Actual					
	2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan					
		Actual					
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan					
		Actual					
	3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan					
		Actual					
	3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key catogories).	Plan					
		Actual					
	3.4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan					
		Actual					
	3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan					
		Actual					
	3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan					
		Actual					
	3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan					
		Actual					

b.　Output 1activities

JICA expert team members began supporting the PNG counterparts to estimate GHG emissions and removals for the BUR 1 inventory (activities 1-7, 1-8, and 1-9). Regarding data management, CCDA members have taken an inconsistent approach in approach to estimating GHG emissions and removals for the BUR1. Some have used excel spreadsheets while others used different software for the GHG estimation. When the BUR1 inventory is complete, the Project members will discuss a consistent and common approach to managing inventory data and the

most efficient and effective way to estimate emissions and removals. Below is a summary of the current approach to data management.

Table 3 Data management approach for the BUR1 inventory

Sector	Approach
Energy	Data is managed and emissions are estimated on a series of excel spreadsheets.
Industrial Processes and Product Use (IPPU)	Emissions are estimated using the 2006 IPCC Guidelines software.
Agriculture	Emissions are estimated using the UNFCCC software based on 1996 IPCC Guidelines. The different IPCC Guidelines is used, making compilation difficult for the inventory compiler.
Land use, Land use change, and Forestry (LULUCF)	The tables included in the 2006 IPCC Guidelines have been modified to estimate emissions and removals.
Waste	Data is managed and emissions are estimated on a series of excel spreadsheets.
General (compilation of emissions and removals)	Not yet designed. At the beginning of the Project, CCDA had not considered or planned the compilation of the sector results into a national GHG inventory.

c. Output 2 activities

The inception workshop of the Project (activity 2-1) was held in the morning of December 6, 2017. The objectives of the inception workshop were of the following:

i. To familiarize participants with the GHG inventory and the UNFCCC reporting requirements and guidelines;

ii. To familiarize participants with the objectives, activities, and outputs of the JICA project; and

iii. To discuss the challenges of GHG inventory preparation, specifically the institutional arrangements and data collection.

More than 30 representatives from over 10 organizations participated in the inception workshop. The inception workshop successfully provided participants with general information on GHG inventory such as its uses, the UNFCCC reporting requirements, and the importance of institutional arrangements for regular preparation of GHG inventories. The participants found the workshop to be informative and that they have a better understanding of the objectives, outputs, and activities of the JICA project. For more details, see Annex: inception workshop report.

The workshop to present the results of the BUR 1 inventory (activity 2-2) was originally scheduled to be held in Nov. to Dec. but will be postponed until the BUR 1 inventory is complete.

d. Output 3 activities

As the BUR 1 inventory has yet to be completed, the key category analysis (activity 3.2) and compiling information on country specific parameters (activity 3.3) has yet to be carried out. The summary of the GHG inventory has yet to be drafted due to the delay of inventory activities, but during the December mission, the Project members discussed the structure to be used in the GHG inventory chapter of the BUR1 (see figure below). This structure takes into consideration the reporting criteria as described in the *"Guidelines for the Preparation of National Communications from Parties not included in Annex I to the Convention" and the "UNFCCC Biennial Reporting Guidelines for Developed Country Parties."*

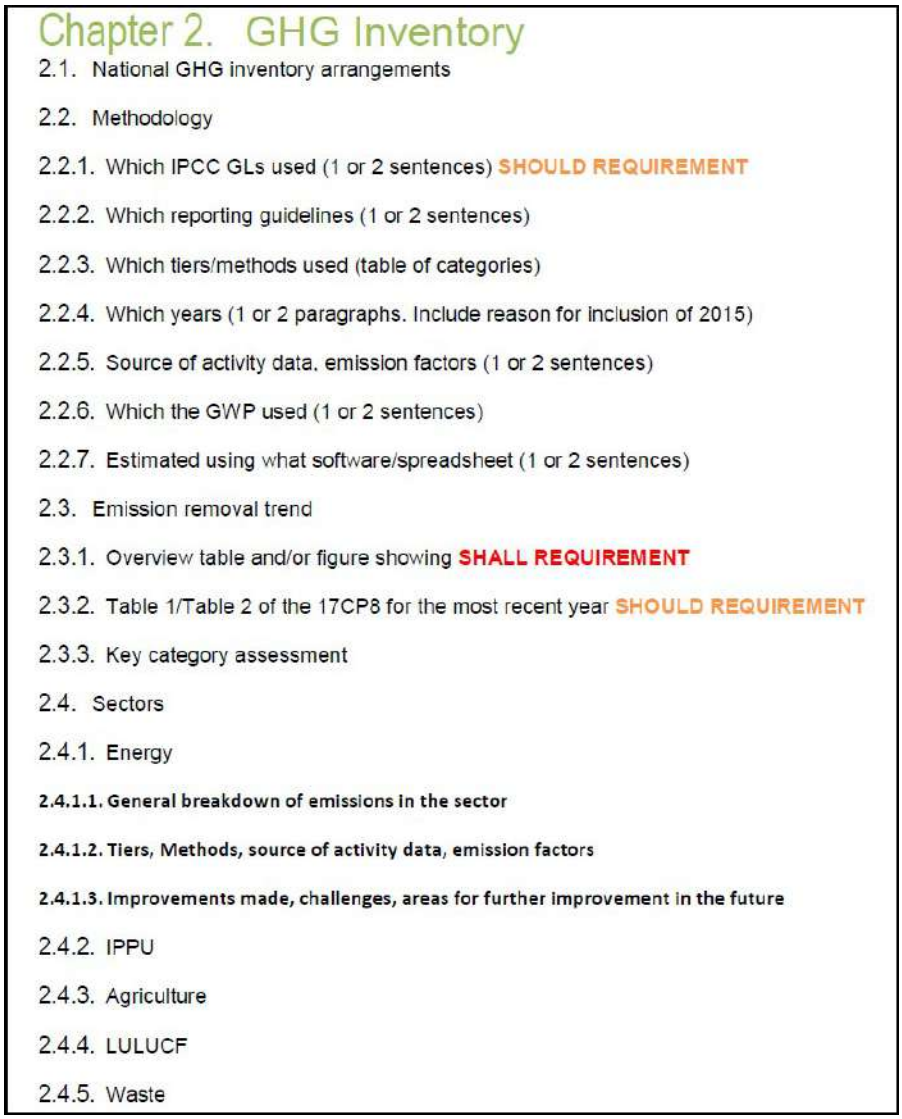


Figure 1 Proposed structure of the GHG inventory chapter of BUR1

1-3 Achievement of Output

As mentioned above, a half day inception workshop for the Project was held in December 2017.　A questionnaire was handed out to the participants at the end of the workshop asking the following questions:

- **How would you rate this training workshop?**
- **How satisfied were you with these sessions?**
- **How useful/relevant were the individual sessions for your work?**

Assuming that the level of satisfaction reflects the level of understanding of the workshop, most participants had a good level of understanding of the workshop. Specifically, 86% of participants were either very satisfied or satisfied with the "climate change policy in PNG" session, 93% very satisfied or satisfied with the "UNFCCC Reporting (MRV) requirements" and "PNG and inventories" sessions, and 100% for "Overview of the JICA Project" and "Institutional arrangements" sessions. Details of the questionnaire are included in Annex I: inception workshop report.

The level of understanding/satisfaction of each of the sessions is shown in the figure below.

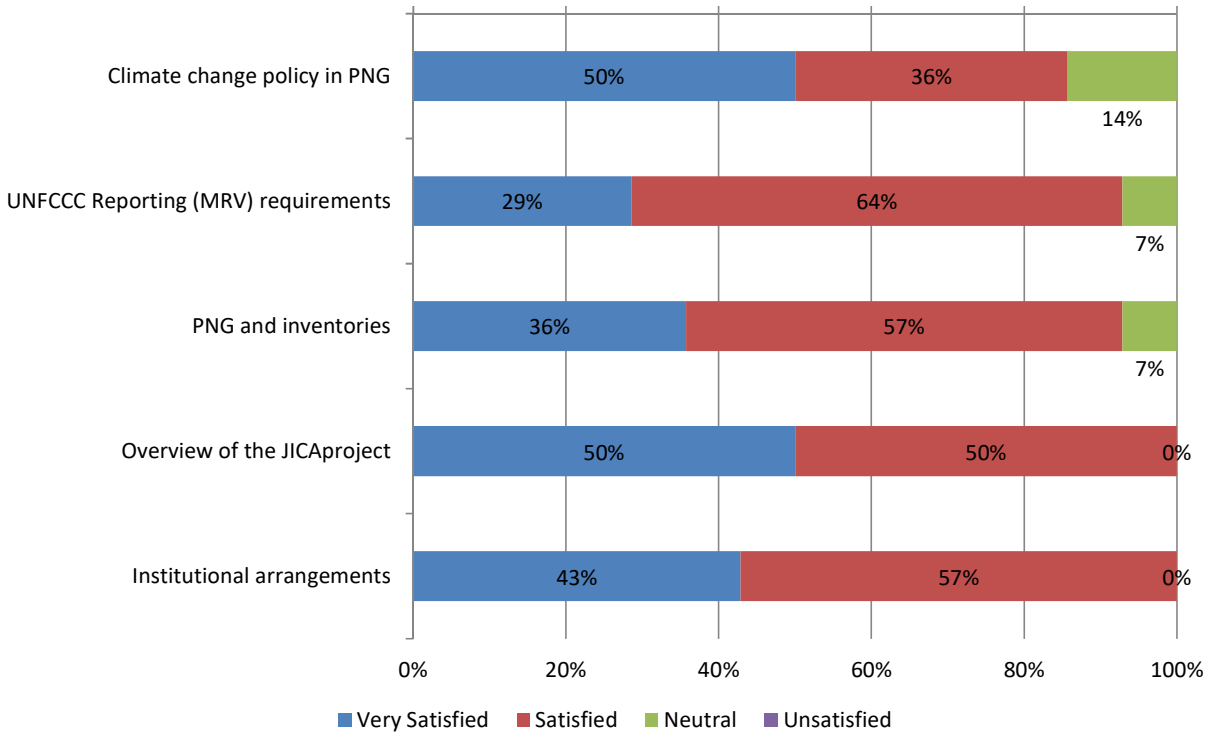


Figure 2 Level of satisfaction of each session

1-4 Achievement of the Project Purpose

A draft TACCC checklist, which is one of the Objectively Verifiable Indicators of the Project Purpose, has been developed and included in the Work Plan. The Project members will discuss the contents when the BUR 1 inventory is complete.

1-5 Changes of Risks and Actions for Mitigation

There have been no changes in risks of implementation of the Project since the planning of the Project.

The risks to the Project implementation are as below.

Table 4 Risks of implementation of the Project

Assumed risk	Background and Implication of risk	Measures taken in 2017
Progress of BUR1 inventory	During the Survey for technical cooperation for this Project carried out in Sept. 2016 and Feb. 2017, JICA was informed by CCDA that PNG was aiming to submit its BUR1 in December 2017. The activities of the Project are designed under this assumption. The timelines and plans of the Project were carefully designed based on this deadline/assumption, with some flexibility built in in case there were minor delays. However, significant delays in the BUR 1 inventory process would result in a delay in the Project activities. The Project is designed to implement two GHG inventory cycles, but with significant delays, the Project may not be able to complete an entire two cycles.	The progress of the BUR1 inventory was discussed during the first and second mission to PNG. The progress for energy, IPPU, and waste were relatively positive, but significant delays in the AFOLU sector. In addition, the CCDA is uncertain about the times lines for the AFOLU sector work and deadlines of the BUR1.
Management positions	The Project Director and Project Manager positions were vacant at the time of the signing of the Record of Discussions in April 2017. The two positions have been tentatively filled by the General Manager of REDD+ and Mitigation, and the Manager of MRV, respectively. However, this is an unfair burden on both managers, as this Project requires full time commitment from the top in order to properly coordinate with JICA and other donors, and other stakeholders relevant to the preparation of GHG inventories.	A kickoff teleconference was held in Sept. 11 for clarification. During the first mission to PNG, the JICA team was informed that General Manager of REDD+ and Mitigation, and the Manager of MRV would fill the Project Director and Project Manager positions, respectively.
Duplication of work with other donors	The FAO has been supporting CCDA with the AFOLU inventory as part of the UN-REDD support to CCDA. In addition, the CCDA requested further support from the Capacity Building Initiative for Transparency (CBIT)/GEF and The Coalition for Rainforest Nations (CfRN) to estimate GHG emissions and removals from the AFOLU sector. Depending on the scope of the other donor projects, the JICA Project will need to adjust their scope and input to the Project. There are also considerations with regards to timing, and producing a GHG inventory. The coordination of projects will be critical for timely and efficient GHG inventory process.	A kickoff teleconference was held in Sept. 11 for clarification. During the two missions, the JICA expert team was informed of the two projects for AFOLU support, but there is still a lack of clarity on the timelines and deadlines of the two projects.

1-6 Progress of Actions undertaken by JICA

Given the situation described in 1.5, JICA will consider taking formal steps to request CCDA to provide clarity on the deadline of the BUR1 and the management positions.

1-7 Progress of Actions undertaken by Gov. of PNG

The CCDA is in the process of considering actions to address the risks outlined in 1.5.

1-8 Progress of Environmental and Social Considerations (if applicable)

Not applicable

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

Not applicable

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

Described in 1.5. Under the support of FAO, CCDA applied for an approximately 2 million US dollar project lasting for 3 years from 2017 provided by GEF/CBIT for comprehensive support in data development in the AFOLU sector, and was approved in June 2017. The GEF/CBIT project contains activities to comprehensively support the GHG inventory preparation, from data collection to reporting, in the AFOLU sector. In addition, the CCDA has requested the Coalition for Rainforest Nations (CfRN) to support the estimation of GHG emissions and removals from the AFOLU sector as well. However, there is little coordination between these projects, and the timelines, the outputs, and deadlines for the BUR1 are unclear.

The JICA Project initially planned to provide GHG inventory preparation support to all sectors but the scope will need to be adjusted when there is clarity on what the scope, activities, and timelines are for the other projects.

2 Delay of Work Schedule and/or Problems (if any)

2-1 Detail

Described in 1.5. JICA conducted two Detailed Planning Surveys specifically for this Project, in September 2016 and in February 2017. During both Survey missions, CCDA informed JICA that it was expecting to submit its first BUR to the UNFCCC at the end of 2017. The timelines and plans of the Project were carefully designed based on this deadline/assumption, with some flexibility built in in case there were minor delays. However, CCDA does not consider the end of 2017 as a deadline anymore, and has not clearly assessed how long the delay will be. This uncertainty and lack of urgency has implications on the activities of the Project, which is designed to carry out two cycles of GHG inventory preparation.

2-2 Cause

The NC/BUR manager position in CCDA was vacated in the middle of the year, which has negatively impacted the GHG inventory preparation in CCDA, specifically in terms of planning, setting goals, and timelines for preparing the GHG inventory.

In addition, there are delays in the FAO support to the GHG estimation of the LULUCF sector. Furthermore, other donors are influencing CCDA to reconsider the submission contents and timing. However, the CCDA has not been able to coordinate and manage the other projects, leading to confusion about timelines for the BUR submission.

2-3 Action to be taken

The JICA expert team discussed the issues above with the Project Director, Ms. Gwen Sissiou during the December mission. Ms. Sissiou mentioned that the CCDA will try to improve its donor coordination and clarify the deadline for BUR1 submission. It was mentioned that a letter of concern to the CCDA Managing Director could facilitate the actions by CCDA. The JICA expert team will consult JICA headquarters to plan a way forward to support the smooth implementation of the Project.

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of PNG,etc.)

JICA will consider the steps forward, including sending a letter of concern to the Managing Director of CCDA, with a view to have senior management provide more clarity on the submission timing of the BUR and coordination of donors.

3 Modification of the Project Implementation Plan

3.1 Plan of Operation

Minor revisions were made to the PO attached to the R/D when the Project began. These were made in light of the fact that the Project duration began a few weeks later than anticipated. In addition, a three month period was added to activity 3.1 to reflect the need for CCDA members to enhance their understanding of the IPCC methods every cycle. Neither change is expected to impact the implementation of the Project.

Given the delay of the BUR 1 inventory preparation, further revisions will be needed in the future. However, without a clear deadline/goal for the BUR1, it is difficult to propose the changes at this time. Assuming that the BUR1 will be submitted in June 2018, a revised PO could be as below.

Table 5 Plan for 2018

	Activities	Year	2017				2018											
		Month	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan																
		Revised																
	1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	Plan																
		Revised																
	1.3: Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan																
		Revised																
	1.4: Draft/Update a Memorandum of Understading between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan																
		Revised																
	1.5: Collect data necessary for national GHG inventories from relevant parties.	Plan																
		Revised																
	1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan																
		Revised																
	1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan																
		Revised																
	1.8: Complie national GHG inventories with time series consistency.	Plan																
		Revised																
	1.9: Draft/Update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan																
		Revised																
Output 2: Capacity to promote understanding of national GHG inventories is enhanced.	2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan																
		Revised																
	2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan																
		Revised																
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan																
		Revised																
	3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan																
		Revised																
	3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key catogories).	Plan																
		Revised																
	3.4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan																
		Revised																
	3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan																
		Revised																
	3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan																
		Revised																
	3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan																
		Revised																

Actual
Plan
Complete BUR1 inventory draft
BUR1 submission

3-2 Other modifications on detailed implementation plan

None

4 Current Activities of Gov. of PNG to Secure Project Sustainability after its Completion

none

II. Project Monitoring Sheet I & II *as Attached*

Monitoring Sheet I

Project Monitoring Sheet I （Revision of Project Design Matrix）

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Version 2

Implementing Agency: CCDA

Dated January 31, 2018

Target Group: CCDA

Period of Project: August 2017- July 2021

Project Site: Port Moresby, PNG　　**Model Site:**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.	1) A national GHG inventory is prepared every 2 years. 2) Items on TACCC checklist	・National GHG inventory report. ・TACCC assessment results of the checklist		none	none
Project Purpose					
The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.	1) A national GHG inventory report is developed for 2015 and 2017. 2) Items on TACCC checklist	・Reports of national GHG inventory (2015 and 2017) ・TACCC assessment results of the checklist	・Relevant agencies cooperate with CCDA.	Draft TACCC checklist developed	none
Outputs					
Output1 : Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1-1) General inventory compilation procedure(work plan) is documented. 1-2) Data for national GHG inventories are collected, archived and maintained. 1-3) Technical document on procedures of inventory compilation is drafted.	1-1) Work plan 1-2) Set of databases/spread sheet files for national GHG inventories 1-3) National GHG inventory report		none	none
Output2 : Capacity to promote understanding of national GHG inventories is enhanced.	2-1) The average level of understanding of workshops: 70% or above.	2-1) Results of questionnaire		level of satisfaction was over 70% for inception workshop	none
Output3. Capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3-1) Results of key category analysis and uncertainty assessment are documented. 3-2) Improvements made and necessary improvements for the future are documented.	3-1) National GHG inventory report			

Activities	Inputs		Important Assumption
	The Japanese Side	The PNG Side	
1-1 : Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. 1-2: Consider and recommend ways to improve the national GHG inventory arrangements. 1-3 : Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). 1-4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. 1-5 : Collect data necessary for national GHG inventories from relevant parties. 1-6 : Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. 1-7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors. 1-8 : Compile national GHG inventories with time series consistency. 1-9 : Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR). 2-1 : Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. 2-2 : Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders. 3-1 : Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. 3-2 : Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. 3-3 : Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories). 3-4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. 3-5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC. 3-6 : Draft and improve a national GHG inventory improvement plan (to be included in NIR). 3-7: Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	1) Short term experts ・GHG inventory (General) ・GHG inventory (Energy) ・GHG inventory (Industrial Processes and Product use) ・GHG inventory (Agriculture) ・GHG inventory (Land use, Land use change and Forestry) ・GHG inventory (Waste) 2) Workshops 3) Training in Japan/third country 4) Equipment ・PC for data management	1) Counterpart personnel CCDA 2) Office space for the sector expert teams to work 3) Meeting space for group progress report meetings/seminars 4) Necessary operation costs	**Pre-Conditions** **<Issues and countermeasures>**

Monitoring Sheet II

Project Monitoring Sheet II (Revision of Plan of Operation)

Version 2

Dated January 31, 2018

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Inputs	Year	2017		2018				2019				2020				2021			Remarks	Monitoring	
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III		Issue	Solution
Expert																					
GHG inventory (General)	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	approximately 1 week to 2 weeks a quarter/expert	none	none
	Actual	■	■																		
GHG inventory (Energy)	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual	■	■																		
GHG inventory (Industrial Processes and Product use)	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■																		
GHG inventory (Agriculture, Land use change and Forestry)	Plan		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■																		
GHG inventory (Waste)	Plan		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■																		
Equipment																					
PC for data management	Plan	■	■	■	■	■														none. All purchased in October 2017	none
	Actual		■																		
Training in Japan																					
Training for Counterpart on GHG inventories in Japan	Plan									■	■								1 week training	timing changed from 2018 to 2019	none
	Actual																				
In-country/Third country Training																					
Training for Counterpart on GHG inventories in developing country	Plan											■	■						1 week training	timing changed from 3rd q to 2nd q	none
	Actual																				

Duration / Phasing																					
	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				

Monitoring Plan	Year	2017		2018				2019				2020				2021			Remarks	Issue	Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Monitoring																					
Joint Coordinating Committee	Plan					■				■				■				■		to be held when there is clarity on BUR1	none
	Actual																				
Set-up the Detailed Plan of Operation	Plan	■																		none	none
	Actual		■																		
Submission of Monitoring Sheet	Plan	■		■		■		■		■		■		■		■				none	none
	Actual		■																		
Reports/Documents																					
Work Plan	Plan	■																		none	none
	Actual		■																		
National GHG inventory Report	Plan										■						■			timing shifted back a month	none
	Actual																				
Project Progress Report	Plan						■				■					■				none	none
	Actual																				
Project Brief Note	Plan																	■		none	none
	Actual																				
Project Completion Report	Plan																	■		none	none
	Actual																				
Public Relations																					
Establishment and operation of JICA TC website	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				

Activities / Sub-Activities							Year	2017		2018				2019				2020				2021			Responsible Organization		Achievements	Issue & Countermeasures
								Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Japan	GOPNG		
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.																												
1.1 Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	○	○	○	○	○	Plan				■								■							JICA	CCDA	none	none
						Actual																						
1.2 Consider and recommend ways to improve the national GHG inventory arrangements.	○	△	△	△	△	Plan				■	■							■							JICA	CCDA	none	none
						Actual																						
1.3 Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	○	○	○	○	○	Plan					■	■	■							■					JICA	CCDA	none	none
						Actual																						
1.4 Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	△	○	○	○	○	Plan						■	■							■					JICA	CCDA	none	none
						Actual																						
1.5 Collect data necessary for national GHG inventories from relevant parties.	△	○	○	○	○	Plan						■	■	■	■	■	■			■	■	■			JICA	CCDA	none	none
						Actual																						
1.6 Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	△	○	○	○	○	Plan						■	■	■	■	■	■			■	■	■			JICA	CCDA	none	none
						Actual																						
1.7 Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	△	○	○	○	○	Plan		■	■					■	■	■	■	■	■			■	■	■	JICA	CCDA	none	none
						Actual			■																			
1.8 Compile national GHG inventories with time series consistency.	△	○	○	○	○	Plan		■	■							■	■	■					■	■	JICA	CCDA	none	none
						Actual			■																			
1.9 Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	△	○	○	○	○	Plan			■								■	■	■				■	■	JICA	CCDA	none	none
						Actual			■																			
Output 2:Capacity to promote understanding of national GHG inventories is enhanced.																												
2.1 Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	○	○	○	○	○	Plan				■															JICA	CCDA	held in December	none
						Actual			■																			
2.2 Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	○	○	○	○	○	Plan			■	■								■						■	JICA	CCDA	none	none
						Actual																						
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)																												
3.1 Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	△	○	○	○	○	Plan				■	■	■	■	■	■	■	■			■	■				JICA	CCDA	none	none
						Actual																						
3.2 Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	○	△	△	△	△	Plan			■								■							■	JICA	CCDA	none	none
						Actual																						
3.3 Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).	△	○	○	○	○	Plan			■					■	■	■						■	■	■	JICA	CCDA	none	none
						Actual																						
3.4 Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	△	○	○	○	○	Plan											■	■	■					■	JICA	CCDA	none	none
						Actual																						
3.5 Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	○	○	○	○	○	Plan			■	■								■	■					■	JICA	CCDA	none	none
						Actual																						
3.6 Draft and improve a national GHG inventory improvement plan (to be included in NIR).	○	△	△	△	△	Plan			■								■	■						■	JICA	CCDA	none	none
						Actual			■																			
3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	○	△	△	△	△	Plan			■								■	■						■	JICA	CCDA	none	none
						Actual			■																			

Annex 8-3: Project Monitoring Sheet ver.3

TO CR of JICA　Papua New Guinea　OFFICE

Project Monitoring Sheet

Project Title : The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG
Version of the Sheet: Ver. 3（Term: January, 2018 - September, 2018）

Name: Takeshi Enoki
Title: GHG Inventory (General)
Submission Date: October 1, 2018

I. Summary

1　Progress

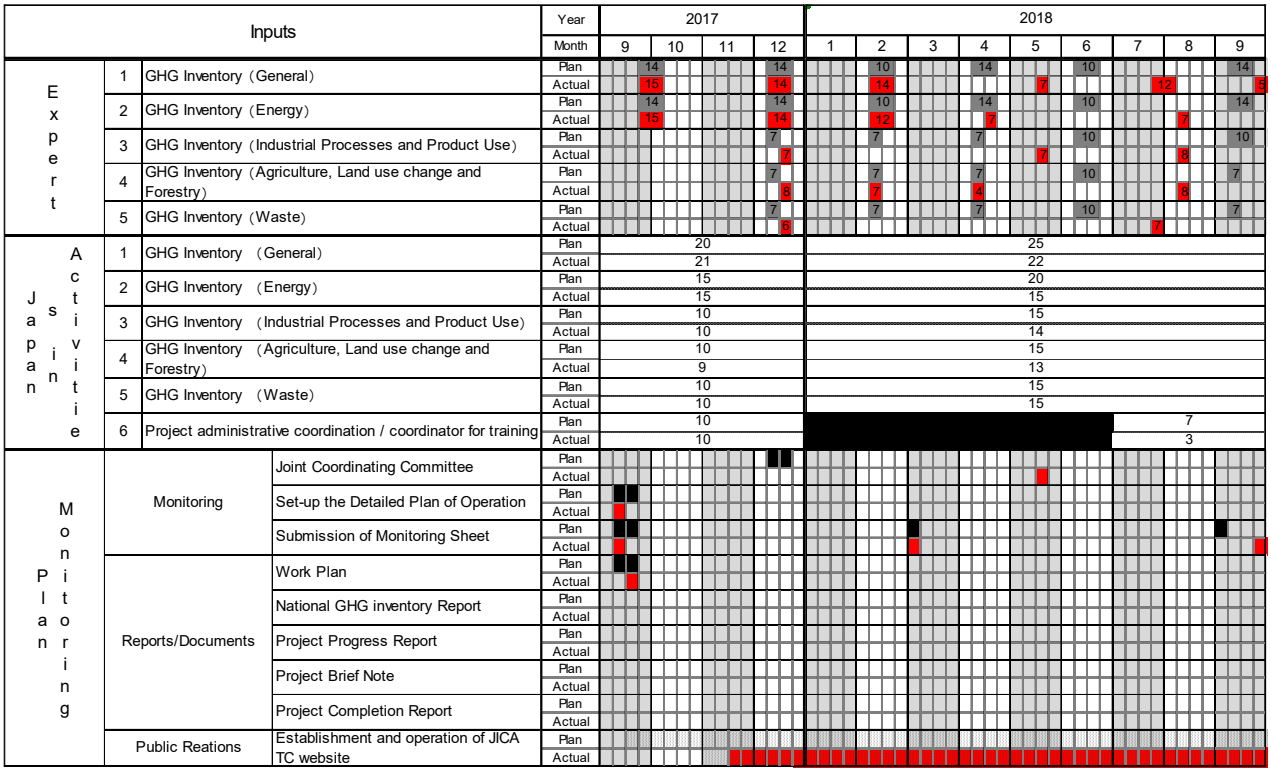
1-1 Progress of Inputs

During the term January ~ September 2018, the JICA experts made 13 man trips to PNG to work with CCDA counterparts to estimate GHG emissions and removals for the GHG inventory to be included in the first Biennial Update Report (hereinafter referred to “BUR 1 inventory”). In addition to guiding the CCDA members prepare their GHG inventory, the JICA experts supported the drafting of the other chapters of the BUR such as national circumstances, mitigation actions, and support need/received. The first draft of the BUR was mostly completed during the August mission. A consultation workshop is scheduled to be held on October 4-5, where stakeholders will be asked to review and approve the BUR. If stakeholders have revision proposals for the BUR1 draft, the CCDA staff will reflect these by mid-November, so that the document can be officially approved by the Minister, and submitted to the UNFCCC secretariat in December 2018.

The Joint Coordinating Committee (hereinafter referred to “JCC”) was held on May 23, 2018. The objectives of the JCC were to familiarize JCC members with the GHG inventory and the UNFCCC reporting requirements and guidelines, and to agree on the objectives, activities, timelines, and outputs of the JICA Project. The JCC members agreed to the work plan presented at the meeting, and also agreed to cooperate with CCDA in providing necessary technical and data input to the CCA members, as needed.

The table below shows the inputs by JICA experts and monitoring activities from January to September 2018.

Table 1 Input for term January ~ September 2018



1-2 Progress of Activities

a.　Overview of activities carried out in this term

The work plan/Plan of Operation of the Project was revised in April 2018 to reflect the revised BUR1 submission deadline from December 2017 to June 2018. However, due to further delays with the technical annex on REDD+ and the BUR1 chapters, the submission date was further postponed to end of 2018. The drafts of the BUR1 chapters were mostly complete in August, and a consultation workshop to receive feedback from stakeholders is scheduled for October 4 and 5. On October 18, a separate consultation workshop organized by the FAO will present the results of the annex on REDD+. The CCDA members will reflect any comments from the consultation workshops by mid-November and finally submit to the UNFCCC secretariat in December.

As a result of the delay, some Project activities planned for this term, such as activities 1.3, 2.2, and 3.5, have not implemented yet, but most other activities have been carried out as outlined in the work plan/ Plan of Operation as revised in April.

The table below shows an overview of the progress of activities.

Table 2 Overview of progress of activities

	Sub-Activities	Year / Month	2017: 8	9	10	11	12	2018: 1	2	3	4	5	6	7	8	9
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan								■	■	■		■	■	
		Actual												■	■	
	1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	Plan									■	■	■	■		
		Actual												■	■	■
	1.3: Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan											■	■	■	■
		Actual														
	1.4: Draft/Update a Memorandum of Understading between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan														
		Actual														
	1.5: Collect data necessary for national GHG inventories from relevant parties.	Plan														
		Actual														
	1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan														
		Actual														
	1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan		■	■	■	■									
		Actual			■	■	■	■	■	■	■	■	■	■		
	1.8: Complie national GHG inventories with time series consistency.	Plan				■	■									
		Actual					■	■	■	■	■	■	■	■	■	
	1.9: Draft/Update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan					■									
		Actual					■	■	■	■	■	■	■	■	■	
Output 2: Capacity to promote understanding of national GHG inventories is enhanced.	2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan								■						
		Actual					■									
	2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan				■	■			■						
		Actual														
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan									■	■	■	■	■	■
		Actual										■	■	■	■	■
	3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan					■									
		Actual									■					■
	3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key catogories).	Plan					■									
		Actual									■					
	3.4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan														
		Actual														
	3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan							■	■						
		Actual														
	3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan					■									
		Actual					■	■	■	■	■	■	■	■	■	
	3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan					■									
		Actual				■	■	■	■	■	■	■	■	■	■	■

Work plan/Plan of operation as approved by the 1st JCC

b. Output 1 activities

JICA experts continued to support PNG counterparts to estimate GHG emissions and removals for the BUR 1 inventory (activities 1-7, 1-8, and 1-9). Regarding data management, CCDA members have taken an inconsistent approach in approach to estimating GHG emissions and removals for the BUR1. Some have used excel spreadsheets while others used different software for the GHG estimation. When the BUR1 inventory is complete, the members will discuss a consistent and common approach to managing inventory data and the most efficient and effective way to estimate emissions and removals.

Below is a summary of the CCDA approach to data management for the BUR1 inventory.

Table 3 Data management approach for the BUR1 inventory

Sector	Approach
Energy	Data is managed and emissions are estimated on a series of excel spreadsheets.
Industrial Processes and Product Use (IPPU)	Emissions are estimated on excel spreadsheets.
Agriculture	Emissions are estimated using the UNFCCC software based on the 1996 IPCC Guidelines. The FAO reorganized the results to make the estimates comparable to other sectors.
Land use, Land use change, and Forestry (LULUCF)	Tables included in the 2006 IPCC Guidelines have been modified to estimate emissions and removals
Waste	Data is managed and emissions are estimated on a series of excel spreadsheets.
General (compilation of emissions and removals, KCA)	JICA expert developed a compilation file on excel file

From June to August, the JICA experts conducted a review of the existing arrangements in preparing the GHG inventory in PNG (activities 1-1, 1-2). Some of the major findings and recommendations for BUR 2 are shown in the table below.

Table 4 Findings and recommendations (crosscutting issues)

Theme	Findings	Recommendations
Inventory arrangements	Institutional arrangements between CCDA and data providers need to be enhanced to facilitate the sustainability of the inventory preparation.	During the data collection for the BUR2 inventory, CCDA should discuss and document long term/sustainable provision of data from stakeholders.
Procedural arrangements	CCDA does not have a clear timeline or a QA/QC plan to describe the inventory process in detail.	CCDA should develop clear timelines for themselves and share this with the stakeholders to have common understanding on the inventory process and deadlines.
Key category analysis	A key category analysis and uncertainty assessment were not conducted in the previous inventory.	The JICA experts will explain the key category analysis and uncertainty assessment and its purpose.
Improvement plan	CCDA does not have a clear improvement plan for the GHG inventory. It only has lists of necessary improvements that donors develop.	CCDA should take an active role to prioritize necessary improvements and develop a plan to be included as part of its QA/QC plan.
Archiving/Data management	Data are not stored in a systematic way and not shared among team members making compilation difficult.	The JICA experts will propose ways to manage data and methods to archive information.

c. Output 2 activities

The inception workshop of the Project (activity 2-1) was held on December 6, 2017. The workshop successfully provided participants with general information on GHG inventory such as its uses, the UNFCCC reporting requirements, and the importance of institutional arrangements for regular preparation of GHG inventories. The participants found the workshop to be informative and that they have a better understanding of the objectives, outputs, and activities of the JICA Project.

The consultation workshop to present the results of the BUR 1 inventory (activity 2-2) will be held October 4 and 5, 2018.

d. Output 3 activities

The JICA experts and PNG counterparts studied and used the IPCC Guidelines to review the inventory that the CCDA began compiling (activity 3.1). Revisions were made to the inventory so that it was in line with the methods described in the IPCC Guidelines. The inventory estimation was complete in September, after which the data from all sectors were compiled and a key category analysis conducted by the JICA experts (activity 3.2).

The drafting of the GHG inventory chapter in the BUR1 (activity 3.7) was a group effort, and the draft was completed in September, in time for the consultation workshop (see attachment for the BUR1 draft).

1-3 Achievement of Output

The major achievement during this term is the completed BUR1 draft. This is the first climate change report to be drafted by CCDA internally, without outsourcing the technical work. Although there are many gaps and much room for improvement, this process has been a confidence building activity for the CCDA staff, and the JICA experts are hopeful that the BUR2 inventory will be prepared more efficiently and in a timely manner to make up for lost time.

1-4 Achievement of the Project Purpose

A GHG inventory summary report has been drafted as part of the BUR1. This report summarizes the methods, data used, assumptions, results, challenges, etc. for all sectors of the inventory. This will be elaborated into a technical report for the next inventory cycle. A TACCC checklist, which is one of the Objectively Verifiable Indicators of the Project Purpose, has been agreed by the JICA experts and CCDA staff. This checklist was used to carry out the capacity assessment of PNG to prepare GHG inventories.

1-5 Changes of Risks and Actions for Mitigation

There have been no changes in risks of implementation of the Project since the inception of the Project. Although the BUR1 completion has been delayed a full year, the JICA experts and CCDA staff will continue to carry out the Project activities on the basis of the current work plan/Plan of Operation, with a view to complete two full inventory cycles during the Project duration.

1-6 Progress of Actions undertaken by JICA

none

1-7 Progress of Actions undertaken by Gov. of PNG

none

1-8 Progress of Environmental and Social Considerations (if applicable)

Not applicable

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

Not applicable

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

none

2 Delay of Work Schedule and/or Problems (if any)

2-1 Detail

Described in 1-2 and 1-5.

2-2 Cause

The NC/BUR manager position in CCDA was vacated in the middle of the 2017, which has negatively impacted the GHG inventory preparation in CCDA, specifically in terms of planning, setting goals, and timelines for preparing the GHG inventory.

In addition, there were delays in the FAO support to the GHG estimation of the LULUCF sector. Furthermore, other donors are influencing CCDA to reconsider the submission contents and timing. However, the CCDA has not been able to coordinate and manage the other projects, leading to confusion about timelines for the BUR submission.

2-3 Action to be taken

JICA sent a letter to CCDA in January 2018, to express concern regarding the poor management of the BUR1 process including setting deadlines and coordinating donors. To this, the CCDA informally agreed to set a soft deadline of June 2018, which was delayed again to December 2018.

As mentioned in 1-5, the JICA experts and PNG counterparts will continue to work under the basis of the current work plan/Plan of Operation, with a view to complete two full inventory cycles during the Project duration. The JICA experts expect the BUR2 inventory cycle to be less time consuming, as this is the CCDA staffs' second iteration of the inventory process, and should be carried out more efficiently than the first.

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of PNG,etc.)

none

3　Modification of the Project Implementation Plan

3.1 Plan of Operation

As mentioned before, revisions were made to the work plan/Plan of Operation and agreed at the first JCC.　Although there have been further delays in the BUR1 submission, JICA experts and PNG counterparts will do their best to carry out the Project activities as shown below.

Table 5 Work Plan for 2018 ~ 2019

Sub-Activities	Year	2018												2019											
	Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan																								
	Actual																								
1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	Plan																								
	Actual																								
1.3: Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan																								
	Actual																								
1.4: Draft/Update a Memorandum of Understading between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan																								
	Actual																								
1.5: Collect data necessary for national GHG inventories from relevant parties.	Plan																								
	Actual																								
1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan																								
	Actual																								
1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan																								
	Actual																								
1.8: Complie national GHG inventories with time series consistency.	Plan																								
	Actual																								
1.9: Draft/Update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan																								
	Actual																								
2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan																								
	Actual																								
2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan																								
	Actual																								
3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan																								
	Actual																								
3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan																								
	Actual																								
3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key catogories).	Plan																								
	Actual																								
3.4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan																								
	Actual																								
3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan																								
	Actual																								
3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan																								
	Actual																								
3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan																								
	Actual																								

3-2 Other modifications on detailed implementation plan

None

4 Current Activities of Gov. of PNG to Secure Project Sustainability after its Completion

none

II. Project Monitoring Sheet I & II *as Attached*

Monitoring Sheet I

Project Monitoring Sheet I （Revision of Project Design Matrix）

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Version 3

Implementing Agency: CCDA

Dated October 1, 2018

Target Group: CCDA

Period of Project: August 2017- July 2021

Project Site: Port Moresby, PNG　　**Model Site:**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.	1) A national GHG inventory is prepared every 2 years. 2) Items on TACCC checklist	・National GHG inventory report. ・TACCC assessment results of the checklist		none	none
Project Purpose					
The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.	1) A national GHG inventory report is developed for 2015 and 2017. 2) Items on TACCC checklist	・Reports of national GHG inventory (2015 and 2017) ・TACCC assessment results of the checklist	・Relevant agencies cooperate with CCDA.	A GHG inventory summary report has been drafted as part of the BUR1 Draft TACCC checklist developed	none
Outputs					
Output1 : Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1-1) General inventory compilation procedure(work plan) is documented. 1-2) Data for national GHG inventories are collected, archived and maintained. 1-3) Technical document on procedures of inventory compilation is drafted.	1-1) Work plan 1-2) Set of databases/spread sheet files for national GHG inventories 1-3) National GHG inventory report		GHG estimation files and summary report completed for the BUR1	none
Output2 : Capacity to promote understanding of national GHG inventories is enhanced.	2-1) The average level of understanding of workshops: 70% or above.	2-1) Results of questionnaire		level of satisfaction was over 70% for inception workshop	none
Output3. Capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3-1) Results of key category analysis and uncertainty assessment are documented. 3-2) Improvements made and necessary improvements for the future are documented.	3-1) National GHG inventory report		A summary GHG inventory reportdrafted as part of the BUR1	none

Activities	Inputs		Important Assumption
	The Japanese Side	The PNG Side	
1-1 : Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. 1-2: Consider and recommend ways to improve the national GHG inventory arrangements. 1-3 : Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). 1-4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. 1-5 : Collect data necessary for national GHG inventories from relevant parties. 1-6 : Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. 1-7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors. 1-8 : Compile national GHG inventories with time series consistency. 1-9 : Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR). 2-1 : Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. 2-2 : Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders. 3-1 : Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. 3-2 : Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. 3-3 : Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories). 3-4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. 3-5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC. 3-6 : Draft and improve a national GHG inventory improvement plan (to be included in NIR). 3-7: Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	1) Short term experts ・GHG inventory (General) ・GHG inventory (Energy) ・GHG inventory (Industrial Processes and Product use) ・GHG inventory (Agriculture) ・GHG inventory (Land use, Land use change and Forestry) ・GHG inventory (Waste) 2) Workshops 3) Training in Japan/third country 4) Equipment ・PC for data management	1) Counterpart personnel CCDA 2) Office space for the sector expert teams to work 3) Meeting space for group progress report meetings/seminars 4) Necessary operation costs	**Pre-Conditions** **<Issues and countermeasures>** The BUR1 submission was further delayed from June to December 2018. However, the team members will carry out the mandated activities as shown in the revised PO as contained in PM Form 3-3.

Monitoring Sheet II

Project Monitoring Sheet II (Revision of Plan of Operation)

Version 3

Dated October 1, 2018

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Inputs	Year	2017		2018				2019				2020				2021			Remarks	Monitoring: Issue	Monitoring: Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Expert																					
GHG inventory (General)	Plan	■		■		■		■		■		■		■		■		■	approximately 1 week to 2 weeks a quarter/expert	none	none
	Actual	■		■		■		■	■												
GHG inventory (Energy)	Plan	■		■		■		■		■		■		■		■		■			
	Actual	■		■		■		■													
GHG inventory (Industrial Processes and Product use)	Plan			■		■		■		■		■		■		■		■			
	Actual		■		■		■	■													
GHG inventory (Agriculture, Land use change and Forestry)	Plan			■		■		■		■		■		■		■		■			
	Actual		■	■	■			■													
GHG inventory (Waste)	Plan			■		■		■		■		■		■		■		■			
	Actual		■																		
Project administrative coordination / coordinator for training	Plan																		support from Japan		
	Actual																				
Equipment																					
PC for data management	Plan	■	■	■	■														none. All purchased in October 2017	none	none
	Actual	■																			
Training in Japan																					
Training for Counterpart on GHG inventories in Japan	Plan									■	■								1 week training, to be conducted with the in country/third country training	none	none
	Actual																				
In-country/Third country Training																					
Training for Counterpart on GHG inventories in developing country	Plan												■	■					1 week training, to be conducted with the in country/third country training	none	none
	Actual																				

Duration / Phasing																					
	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				

Monitoring Plan	Year	2017		2018				2019				2020				2021			Remarks	Monitoring: Issue	Monitoring: Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Monitoring																					
Joint Coordinating Committee	Plan						■				■				■			■		none	none
	Actual				■																
Set-up the Detailed Plan of Operation	Plan	■																		none	none
	Actual		■																		
Submission of Monitoring Sheet	Plan	■		■		■		■		■		■		■		■				none	none
	Actual		■	■			■														
Reports/Documents																					
Work Plan	Plan	■																		none	none
	Actual		■																		
National GHG inventory Report	Plan										■							■		timing shifted to December 2020	none
	Actual																				
Project Progress Report	Plan							■				■				■				none	none
	Actual																				
Project Brief Note	Plan																	■		none	none
	Actual																				
Project Completion Report	Plan																	■		none	none
	Actual																				
Public Relations																					
Establishment and operation of JICA TC website	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				

Activities / Sub-Activities						Year	2017		2018				2019				2020				2021			Responsible Organization		Achievements	Issue & Countermeasures
							Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Japan	GOPNG		
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.																											
1.1 Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	○	○	○	○	○	Plan																		JICA	CCDA	developed a checklist to assess capacity of institution to prepare inventories	none
						Actual																					
1.2 Consider and recommend ways to improve the national GHG inventory arrangements.	○	△	△	△	△	Plan																		JICA	CCDA	identified institutional challenges and ways to address challenges	none
						Actual																					
1.3 Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	○	○	○	○	○	Plan																		JICA	CCDA	none	none
						Actual																					
1.4 Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	△	○	○	○	○	Plan																		JICA	CCDA	none	none
						Actual																					
1.5 Collect data necessary for national GHG inventories from relevant parties.	△	○	○	○	○	Plan																		JICA	CCDA	none	none
						Actual																					
1.6 Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	△	○	○	○	○	Plan																		JICA	CCDA	none	none
						Actual																					
1.7 Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	△	○	○	○	○	Plan																		JICA	CCDA	Spreadsheets developed for the BUR1	none
						Actual																					
1.8 Compile national GHG inventories with time series consistency.	△	○	○	○	○	Plan																		JICA	CCDA	compilation file developed	none
						Actual																					
1.9 Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	△	○	○	○	○	Plan																		JICA	CCDA	none	none
						Actual																					
Output 2:Capacity to promote understanding of national GHG inventories is enhanced.																											
2.1 Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	○	○	○	○	○	Plan																		JICA	CCDA	held inception workshop in December	none
						Actual																					
2.2 Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	○	○	○	○	○	Plan																		JICA	CCDA	to be held in October	none
						Actual																					
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)																											
3.1 Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	△	○	○	○	○	Plan																		JICA	CCDA	none	none
						Actual																					
3.2 Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	○	△	△	△	△	Plan																		JICA	CCDA	key categories file developed	none
						Actual																					
3.3 Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).	△	○	○	○	○	Plan																		JICA	CCDA	none	none
						Actual																					
3.4 Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	△	○	○	○	○	Plan																		JICA	CCDA	none	none
						Actual																					
3.5 Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	○	○	○	○	○	Plan																		JICA	CCDA	none	none
						Actual																					
3.6 Draft and improve a national GHG inventory improvement plan (to be included in NIR).	○	△	△	△	△	Plan																		JICA	CCDA	developed a general improvement plan for BUR2	none
						Actual																					
3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	○	△	△	△	△	Plan																		JICA	CCDA	BUR1 developed under JICA supervision	none
						Actual																					

Annex 8-4: Project Monitoring Sheet ver.4

TO CR of JICA Papua New Guinea OFFICE

Project Monitoring Sheet

Project Title : The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG
Version of the Sheet: Ver. 4（Term: October, 2018 – March, 2019

Name: Takeshi Enoki
Title: GHG Inventory (General)
Submission Date: April 1, 2019

I. Summary

1. Progress

1.1 Progress of Inputs

Experts

During this reporting period of January 2018 to March 2019, the Japan International Cooperation Agency (JICA) Project expert team made 18 man-trips to Papua New Guinea (PNG). Total man months was 5.03 in PNG and 5.10 for activities in Japan.

Meetings

The First Joint Coordinating Committee (JCC) was held on May 23, 2018, with the objectives of familiarizing JCC members with the GHG inventory, United Nations Framework Convention on Climate Change (UNFCCC) reporting requirements, and guidelines, and to agree on the objectives, activities, timelines, and outputs of the JICA Project. See Annex I for the first JCC Meeting Minutes. In October 2018, the Project counterparts Climate Change Development Agency (CCDA), JICA Project expert team, and Food and Agriculture Organization (FAO) co-hosted the 'National Stakeholder consultation workshop on PNG's first Biennial Update Report to the UNFCCC' to provide stakeholders a summary of the draft First Biennial Update Report (BUR1) and collect comments for further improvement.

Equipment

In October 2017, the JICA Project expert team purchased one desktop computer, two laptop computers, a printer, and relevant appliances, as per the PDM.

Reports

After confirming the progress of the Project with the CCDA, the second and third monitoring sheets were submitted in March and October 2018, respectively.

Public relations

The Project website (https://www.jica.go.jp/project/english/png/006/index.html), describing Project activities and updating milestones was opened in November 2017, under the JICA website.

Table 1 shows the inputs by JICA Project expert team for this reporting period.

Table 1 Input for this reporting period

Inputs				Year	2018												2019		
				Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
Expert	1	GHG Inventory（General）		Plan		10		14		10			14		10			14	
				Actual		14			7			12		11		9		11	
	2	GHG Inventory（Energy）		Plan		10		14		10			14		10			14	
				Actual		12		7				7							1
	3	GHG Inventory（Industrial Processes and Product Use）		Plan		7		7		10			10		7				
				Actual					7			8		6				1	
	4	GHG Inventory（Agriculture, Land use change and Forestry）		Plan		7		7		10			7		10				
				Actual		7		4				8							
	5	GHG Inventory（Waste）		Plan		7		7		10			7		10				
				Actual							7								
Activities in Japan	1	GHG Inventory （General）		Plan	25														
				Actual	23														
	2	GHG Inventory （Energy）		Plan	20														
				Actual	16														
	3	GHG Inventory （Industrial Processes and Product Use）		Plan	15														
				Actual	15														
	4	GHG Inventory （Agriculture, Land use change and Forestry）		Plan	15														
				Actual	15														
	5	GHG Inventory （Waste）		Plan	15														
				Actual	15														
	6	Project administrative coordination / coordinator for training		Plan							7								
				Actual							4								
Monitoring Plan	Monitoring		Joint Coordinating Committee	Plan															
				Actual					1										
			Set-up the Detailed Plan of Operation	Plan															
				Actual															
			Submission of Monitoring Sheet	Plan			1						1						
				Actual			1								1				
	Reports/Documents		Work Plan	Plan															
				Actual															
			National GHG inventory Report	Plan															
				Actual															
			Project Progress Report	Plan															
				Actual															
			Project Brief Note	Plan															
				Actual															
			Project Completion Report	Plan															
				Actual															
	Public Relations		Establishment and operation of JICA TC website	Plan															
				Actual															

1.2 Progress of Activities

a. Overview of activities carried out in this reporting period

The BUR1 was originally planned to be completed by CCDA before inception of the JICA Project, but due to the untimely passing of the CCDA team leader who

was in charge of managing the preparation process and quality control, the BUR1 preparation was the primary focus from beginning of the Project to this reporting period. This consisted mainly of supporting CCDA to manage the database for parameters to be used in the estimation, to estimate the GHG emissions and removals, and to draft the report. A draft BUR1 inventory was completed in October 2018 for the consultation workshop and finalized in December. The BUR1 is under consideration for approval by the PNG Government in December and will be sent to the UNFCCC afterwards (submission timing is not set, but as of now, scheduled for April 2019).

Table 2 shows an overview of the progress of activities for this reporting period.

Table 2 Progress of the JICA Project activities

	Sub-Activities		Year / Month
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan	2018: 1 2 3 4 5 6 7 8 9 10 11 12 / 2019: 1 2 3
		Actual	
	1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	Plan	
		Actual	
	1.3: Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan	
		Actual	
	1.4: Draft/Update a Memorandum of Understading between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan	
		Actual	
	1.5: Collect data necessary for national GHG inventories from relevant parties.	Plan	
		Actual	
	1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan	
		Actual	
	1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan	
		Actual	
	1.8: Complie national GHG inventories with time series consistency.	Plan	
		Actual	
	1.9: Draft/Update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan	
		Actual	
Output 2: Capacity to promote understanding of national GHG inventories is enhanced.	2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan	
		Actual	
	2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan	
		Actual	
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan	
		Actual	
	3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan	
		Actual	
	3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key catogories).	Plan	
		Actual	
	3.4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan	
		Actual	
	3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan	
		Actual	
	3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan	
		Actual	
	3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan	
		Actual	

b. Output 1 activities

Overview

JICA Project expert team supported CCDA to estimate GHG emissions and removals for the GHG inventory (activities 1.7, 1.8, and 1.9) which would be part of BUR1. After the draft BUR1 GHG inventory was complete, the JICA Project expert team and CCDA experts conducted a review of their BUR1 GHG inventory to identify the most critical challenges/issues to be addressed in the second inventory cycle (activities 1.1, 1.2). The data collection process for the GHG inventory (activities 1.5, 3.1, 3.6) for the BUR2 GHG inventory cycle began February 2019.

Developing databases and estimating GHG emissions/removals (1.7, 1.8, 1.9)

The JICA Project expert team and CCDA organized the data collected into a database for emission/removal estimation. However, regarding data management in the estimation, CCDA members have taken an inconsistent approach in approach to estimating GHG emissions and removals for the BUR1. Some have used excel spreadsheets while others used different software for the GHG estimation. The JICA Project expert team plan to discuss a consistent and common approach to managing inventory data and the most efficient and effective way to estimate emissions and removals in May 2019.

Below is a summary of the current approach to data management.

Table 3 Data management approach for the BUR1 GHG inventory

Sector	CCDA approach	Typical approach
Energy	Data is managed and emissions are estimated on a series of excel spreadsheets.	In other countries, one of the approaches as shown below is taken: 1. Data is managed and GHG emissions/removals estimated on a series of excel spreadsheets. 2. Data is managed in excel spreadsheets and the GHG emissions/removals estimated by the 2006 IPCC Guidelines software
Industrial Processes and Product Use (IPPU)	Emissions are estimated using the 2006 IPCC Guidelines software.	
Agriculture	Emissions are estimated using the UNFCCC software based on 1996 IPCC Guidelines. The different IPCC Guidelines is used, making compilation difficult for the inventory compiler.	
Land use, Land use change, and Forestry (LULUCF)	The tables included in the 2006 IPCC Guidelines have been modified to estimate emissions and removals.	
Waste	Data is managed and emissions are estimated on a series of excel spreadsheets.	

General (compilation of emissions and removals)	Not yet designed. At the beginning of the Project, CCDA had not considered or planned the compilation of the sector results into a national GHG inventory.	

Review of the BUR1 GHG inventory (1.1, 1.2)

A simple review of the BUR1 GHG inventory was carried out by the JICA Project expert team and CCDA, particularly for the crosscutting, energy, industrial processes and product use (IPPU), and waste sectors. The review was conducted using a review checklist/template developed by the UNFCCC ('Guide for Peer Review of National GHG Inventories', UNFCCC, 2017) with some alterations. As an example, the review results of the national GHG inventory arrangements is shown in Table 4.

Table 4 Review results on GHG inventory arrangements

	Processes for data collection, estimation, and approval of the inventory information		
Detailed review element	**Question**	**Findings/recommendations**	**priority (high/medium/low)**
Institutional arrangements	Check if there is one entity that has main responsibility for the inventory preparation.	The CCDA is responsible for the inventory preparation and submmision.	Not applicable
	Are all relevant government agencies (statistics office, energy, forestry, agriculture agency, etc.) involved in the inventory process?	Not all relevant institutions involved.	high
	On what basis do data providers provide data to the inventory agency? Are there potential data providers that are not providing data?	Data providers send data upon request by CCDA (letter from MD's office). For AFOLU sector, MoA on data sharing on climate change with DAL, PNGFA was signed. MoA and MoUs were drafted with other agencies but not signed. There are data providers that are not providing data for confidentiality reasons, data sharing policy, etc.	high
	How are the data collected (purchasing statistics, online submission of data, telephone interview, fax, etc.)?	Data are collected via email, hard copy, online.	Not applicable
	Check if the experts estimating the emissions and removals and those compiling the inventory have a common understanding of the limitations in the data.	my job to enhace capacity	high
Procedural arrangements	Is there a time line or an inventory preparation schedule that is agreed by all stakeholders?	No. Internally, CCDA had timelines drafted, but not shared/agreed with all stakeholders.	high
	How often is the timeline or schedule updated?	Never	high
Legal arrangements	Is there a law or regulation that formalizes the institutional setup for the inventory preparation?	The Climate Change (Management) Act does describe the institutional setup for inventory preparation. However, this Act has not been implemented or enforced.	high priority but a political issue
	Are there formal legal contracts between organizations?	No, apart from the MoA with DAL and PNG FA.	Not applicable
Documentation	Has the Party described the inventory arrangements in the country?	Yes inventory arrangements are described, but further elaboration needed.	medium

A summary of the high priority challenges and planned improvements for the BUR2 are as follows.

Table 5 Summary of review findings

Sector	High priority challenge	Planned improvement
Crosscutting	・ Not all relevant government agencies are involved in the inventory process	・ Ensure complete participation of institutions/experts in the country
	・ Stakeholders are unwilling to share data	・ Take appropriate steps to understand why they are unwilling and address them. Also, document all findings
	・ Stakeholders need capacity building	・ Ensure that each bilateral meeting with stakeholders includes a capacity building component.
	・ There are no timelines for the inventory preparation	・ Develop a timeline for CCDA and stakeholders.
	・ No QA/QC plan	・ Develop together with JICA expert team
	・ JICA experts carried out the key category analysis for the BUR1 GHG inventory	・ Learn the method to carry out the analysis, and carry out for BUR2
	・ No uncertainty analysis was conducted	・ Carry out the uncertainty analysis for the BUR2 using default values.
	・ There is no archiving system in CCDA	・ Discuss a free online server that all experts will upload all relevant files
Energy	・ (Accuracy issue) The source of all activity data in BUR1 was taken from an international source. ・ (Completeness issue) Not all categories have been estimated	・ Collect data on petroleum refining, other energy industries, mining and quarrying and fugitive emissions from oil and natural gas, in addition to emission factors for fugitive emission and fuel combustion ・ Collect activity data for the transport (land, aviation, marine) category
Industrial Processes and Product Use (IPPU)	・ (Completeness issue) Not all categories have been estimated	・ Conduct research for all categories of the sector (for example, lime production, glass production, ammonia production, nitric acid production, carbide production, soda ash production, and all other categories).
Agriculture	・ Conducting with FAO	・ Conducting with FAO
Land use, Land use change, and Forestry (LULUCF)		
Waste	・ (Completeness issue) Not all categories have been estimated ・ (Accuracy issue) many assumptions were made in estimating the activity data	・ Collect amount of industrial waste water, industrial solid waste, incineration and open burning to improve the completeness of the sector. ・ Collect composition data, waste generation ratio for solid waste disposal

Identify the data needs and collect data (1.5, 3.1, 3.6)

Based on the review conducted under activities 1.2 and 1.3, the JICA Project expert team and CCDA counterparts developed a plan (3.6) to prepare the BUR2 GHG inventory. After reviewing the respective sections of the 2006 IPCC Guidelines, the CCDA counterparts developed technical papers and questionnaires for the relevant stakeholders (3.1). The technical paper describes the background to GHG inventories, an explanation of what data is needed, how the data will be used in the emission/removal estimation, followed by technical questions to the stakeholder in question. This paper is meant to explain the reasons for data collection, while also attempting to build capacity on the stakeholder side to understand GHG inventories better. A sample technical paper is shown in Annex II.

As of March 2019, the JICA Project expert team and CCDA counterparts have approached the following stakeholders (1.5):

Table 6 Stakeholders met for BUR2 GHG inventory

Sector	Stakeholder	Necessary data/information	Result
crosscutting	· National Statistics Office	· Fuel consumption, industrial product production	· Not able to meet yet.
Energy	· Department of Petroleum and Energy	· Oil and gas production data · Energy consumption data from a refinery	· Some oil and gas production data available but not amount of fuel refined.
	· Civil Aviation Safety Authority	· Fuel consumption from airports	· There is a plan to collect international aviation data, but not available now.
	· National Maritime Safety Authority	· Fuel consumption data from shipping industry	· There are plans to collect data from shipping industries, but not available now.
Industrial Processes and Product Use (IPPU)	· HFC consultants	· Amount of HFC imported, consumed	· HFC consultants working with CCDA to collect data for project. Data to be collected later in 2019.
	· The Conservation and Environment Protection	· Information on what types of industries exist in PNG	· Need to develop an MoU to receive any information
	· Private company	· Amount of lubricants sold in PNG	· Not able to meet. However, data expected to be provided

c. Output 2 activities

The 'National Stakeholder consultation workshop on Papua New Guinea's first Biennial Update Report to the UNFCCC' (activity 2.2) was held on October 4-5, 2018 to present the draft BUR1 to all stakeholders. The specific objectives of the workshop were:

a) To present the summary of the BUR1 to participants;
b) To agree on any necessary revisions to the BUR1 for finalization; and
c) To present the next steps in the JICA Project

More than 50 representatives from over 15 organizations participated in the workshop. Mr. Ruel Yamuna, the Managing Director of CCDA opened the workshop, followed by opening remarks by the leader of the JICA Project expert team, and a representative of the FAO. The workshop consisted of the following five sessions: 1. Overview and background of the BUR1; 2. The GHG inventory; 3. Mitigation actions; 4. Support; and 5. Next steps.

JICA Project expert team and CCDA compiled all comments from the participants regarding the necessary improvements to the BUR1. Most comments were either editorial comments or comments that should be addressed in future BURs. A summary of the comments is shown in Table 7.

Table 7 Overview of necessary revisions

Comment/proposal	CCDA action	Deadline
・ BUR to be clear on the references used, especially for the national circumstances chapter.	・ CCDA to double check the facts to ensure the document represents an accurate account of the country.	・ Before BUR1 submission
・ GHG inventory chapter, most comments were on recent developments in PNG that the CCDA will need to include in the next BUR such as LNG projects and recent mining operations.	・ These will be addressed in future BURs, as the inventory covers years from 2000 to four years before year of submission.	・ Future BURs
・ Important to formalize institutional arrangements for providing data for the preparation of the GHG inventory by, for example, establishing a MoU or MoA between data providers and the CCDA.	・ CCDA will implement the appropriate arrangement	・ Future BURs
・ Description of methods not described in detail	・ CCDA will draft a national inventory report for BUR2	・ Future BURs

The consultation workshop successfully met the three objectives mentioned above and participants were satisfied with the outcome. For details on the consultation workshop, see Annex III: consultation workshop report.

d. Output 3 activities

Overview

The JICA Project expert team and the CCDA counterparts drafted the GHG inventory chapter for the BUR1 (3.7). Included is the results of the key category assessment of the GHG inventory (3.2), which identify the most important categories which should be the focus of improvements in the future.

It should be highlighted that the JICA Project expert team supported the CCDA counterparts draft and edit all sections of the BUR1 including national circumstances, mitigation, and support which are outside the scope of the JICA Project.

Drafting the GHG inventory chapter of the BUR1 (3.7)

The JICA Project team and the CCDA counterparts drafted the GHG inventory chapter of the BUR1. The chapter describes crosscutting issues such as the roles and responsibilities of all stakeholders, the GHG inventory preparation process, a description of the guidelines used for the GHG inventory, the methods and global warming potentials used, the years covered, an overview of the activity data and emission factors used, with a section on the emission and removal trend results of the inventory, and results of the key category analysis. For each of the inventory sectors (Energy, IPPU, AFOLU, Waste), the BUR describes an overview of the emissions and removals within the sector, the methods/activity data/emission factors used, and the improvements made along with necessary improvements for the future.

Conducting the key category analysis (3.2)

The key category analysis (activity 3.2) was carried out as described in the 2006 IPCC Guidelines, for both with and without the LULUCF sector. Thirteen categories are identified as key including LULUCF, 12 were identified as key without LULUCF. These categories have been prioritized in terms of future improvement.

See Table 8 for the list of key categories with LULUCF, and Table 9 for the list of key categories without LULUCF.

Table 8 Key categories (with LULUCF) of the BUR 1 GHG inventory

crf code	category name	gas	2015 emissions	absolute value of 2015 emissions	Level assessment	cumulative total
3B2	Cropland	CO2	12,648	12,647.58	32.510%	32.510%
3B1	Forest land	CO2	-11,855	11,855.41	30.473%	62.983%
1.A.1:	1A1 Energy Industries	CO2	4,120	4,119.9	10.590%	73.573%
1.B.2.b.iii.2	Gas Production	CH4	2,395	2,394.5	6.155%	79.728%
1.A.3	1A3 Transport	CO2	1,938	1,937.6	4.980%	84.708%
1.A.2:	1A2 Manufacturing Industries and Construction	CO2	1,445	1,445.0	3.714%	88.422%
1.B.2.a.iii2	Production and Upgrading	CH4	556	555.6	1.428%	89.851%
4D	Wastewater Treatment and Discharge	CH4	488	487.68	1.254%	91.104%
1.A.4:	1A4 Other Sectors	CO2	457	456.7	1.174%	92.278%
3C4	Direct N2O Emissions from Managed Soils	N2O	411	411.0	1.056%	93.335%
3C1	Biomass burning - FL	CH4	395	394.89	1.015%	94.350%
1.B.2.b.iii.5	Gas Distribution	CH4	354	353.6	0.909%	95.258%

Table 9 Key categories (without LULUCF) of the BUR 1 GHG inventory

crf code	category name	gas	2015 emissions	absolute value of 2015 emissions	Level assessment	cumulative total
1.A.1:	1A1 Energy Industries	CO2	4,119.87	4,119.87	30.57%	30.57%
1.B.2.b.iii.2	Gas Production	CH4	2,394.52	2,394.52	17.77%	48.34%
1.A.3	1A3 Transport	CO2	1,937.59	1,937.59	14.38%	62.71%
1.A.2:	1A2 Manufacturing Industries and Construction	CO2	1,444.99	1,444.99	10.72%	73.44%
1.B.2.a.iii2	Production and Upgrading	CH4	555.61	555.61	4.12%	77.56%
4D	Wastewater Treatment and Discharge	CH4	487.68	487.68	3.62%	81.18%
1.A.4:	1A4 Other Sectors	CO2	456.73	456.73	3.39%	84.57%
3C4	Direct N2O Emissions from Managed Soils	N2O	411.00	411.00	3.05%	87.62%
1.B.2.b.iii.5	Gas Distribution	CH4	353.58	353.58	2.62%	90.24%
4A	Solid Waste Disposal	CH4	250.26	250.26	1.86%	92.10%
3A1	Enteric Fermentation	CH_4	168.30	168.30	1.25%	93.35%
1.B.2.b.iii.3	Gas Processing	CH4	155.18	155.18	1.15%	94.50%
3A2	Manure Management	CH_4	144.83	144.83	1.07%	95.57%

1.3 Achievement of Output

As mentioned above, the consultation workshop for the Project was held in October 2018. The JICA Project expert team conducted an online questionnaire to the participants to evaluate the consultation workshop, specifically asking the following questions:

- How would you rate this workshop?
- How satisfied were you with each of the 5 sessions?

All participants responded to the first question that the workshop met expectations.

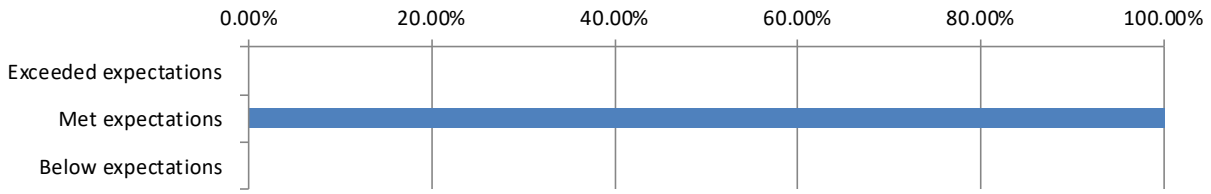


Figure 1 Overall level of satisfaction of the consultation workshop

Assuming that the level of satisfaction reflects the level of understanding of the workshop, most participants had a good level of understanding of the workshop. Specifically, 92% of participants were either very satisfied or satisfied with the "national circumstances of PNG" session, 100% were very satisfied or satisfied with the "GHG inventories," 83% were very satisfied or satisfied with "mitigation actions" sessions, and 100% for "support" session. The level of understanding/satisfaction of each of the sessions is shown in the figure below.

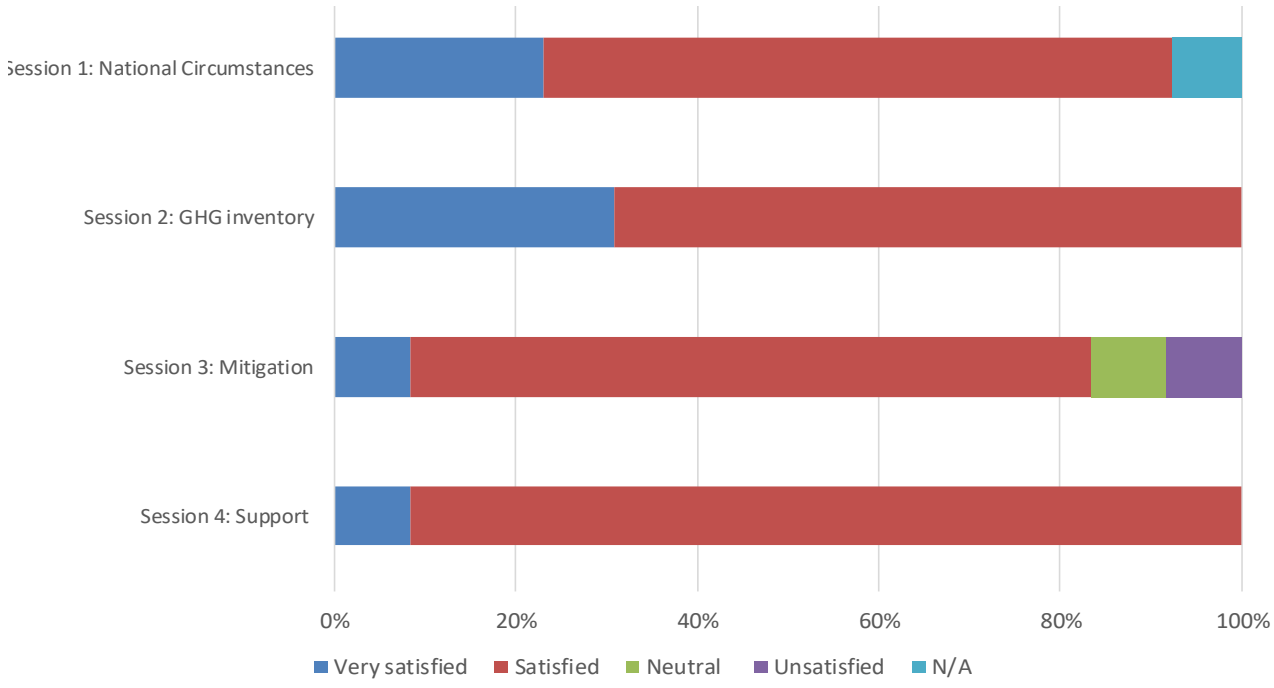


Figure 2 Level of satisfaction of each session

1.4 Achievement of the Project Purpose

A draft transparency, accuracy, completeness, comparability, consistency (TACCC) checklist, which is one of the Objectively Verifiable Indicators of the Project Purpose, was developed and used for the BUR1 inventory review (activity 1.1, 1.2).

A summarized national inventory report has been drafted and included in the BUR1 as the GHG inventory chapter. See chapter 2 of the “PNG’s first BUR” file.

1.5 Changes of Risks and Actions for Mitigation

There have been no changes in risks of implementation of the Project since the previous reporting period. The risk regarding management structure of CCDA and the JICA Project implementation structure has been addressed by CCDA in 2018, but Progress of the BUR1 inventory and the duplication with other donor projects continues to be a risk for implementation.

The risks to the Project implementation are shown in Table 10.

Table 10 Risks of implementation of the Project

Assumed risk	Background and Implication of risk	Measures taken in 2017	Further measures taken in 2018
Progress of BUR1 inventory	During the Survey for technical cooperation for this Project carried out in Sept. 2016 and Feb. 2017, JICA was informed by CCDA that PNG was aiming to submit its BUR1 in December 2017. The activities of the Project are designed under this assumption. The timelines and plans of the Project were carefully designed based on this deadline/assumption, with some flexibility built in in case there were minor delays. However, significant delays in the BUR 1 inventory process would result in a delay in the Project activities. The Project is designed to implement two GHG inventory cycles, but with significant delays, the Project may not be able to complete an entire two cycles.	The progress of the BUR1 inventory was discussed during the first and second mission to PNG. The progress for energy, IPPU, and waste were relatively positive, but significant delays in the AFOLU sector. In addition, the CCDA is uncertain about the times lines for the AFOLU sector work and deadlines of the BUR1.	JICA Headquarters sent a concern letter to CCDA in January 2018, addressing all three issues. In response, CCDA replied that 1) it will try to finalize and submit the BUR1 in June 2018; 2) Mr. Alfred Rungol will officially be the Manager of MRV and NC team; 3) CCDA will do a better job to coordinate with all donors in the MRV field The P/O was revised in February 2018 to reflect the revised deadline for BUR1. This was approved at the first JCC meeting in May. Although the BUR1 has not been submitted as of March 29, CCDA is planning to do so in early April.
Management positions	The Project Director and Project Manager positions were vacant at the time of the signing of the Record of Discussions in April 2017. The two positions have been tentatively filled by the General Manager of REDD+ and Mitigation, and the Manager of MRV, respectively. However, this is an unfair burden on both managers, as this Project requires full time commitment from the top in order to properly coordinate with JICA and other donors, and other stakeholders relevant to the preparation of GHG inventories.	A kickoff teleconference was held in Sept. 11 for clarification. During the first mission to PNG, the JICA team was informed that General Manager of REDD+ and Mitigation, and the Manager of MRV would fill the Project Director and Project Manager positions, respectively.	
Duplication of work with other donors	The FAO has been supporting CCDA with the AFOLU inventory as part of the UN-REDD support to CCDA. In addition, the CCDA requested further support from the Capacity Building Initiative for Transparency (CBIT)/GEF and The Coalition for Rainforest Nations (CfRN) to estimate GHG emissions and removals from the AFOLU sector. Depending on the scope of the other donor projects, the JICA Project will need to adjust their scope and input to the Project. There are also considerations with regards to timing, and producing a GHG inventory. The coordination of projects will be critical for timely and efficient GHG inventory process.	A kickoff teleconference was held in Sept. 11 for clarification. During the two missions, the JICA expert team was informed of the two projects for AFOLU support, but there is still a lack of clarity on the timelines and deadlines of the two projects.	

1.6 Progress of Actions undertaken by JICA

Given the situation described in 1.5, JICA Headquarters sent an official letter of concern to CCDA in January 2018.

1.7 Progress of Actions undertaken by Gov. of PNG

As stated in 1.5., CCDA sent a reply to the concern letter. In the letter, CCDA responded that 1) it will try to finalize and submit the BUR1 in June 2018; 2) Mr. Alfred Rungol will officially be the Manager of MRV and NC team; 3) CCDA will do a better job to coordinate with relevant donors.

In September 2018, Mr. Nathan Sapala, one of the LULUCF experts, resigned, and Mr. Paul Hasagama was appointed as a replacement staff. In November 2018, Ms. Priscilla Pep, the waste expert, also resigned. As a response to the staff resignations and any possible resignations in the future, from January 2019 onward, all sectors of the inventory were assigned an expert and a backup, to improve the information sharing among the team.

In November 2018, Mr. Afred Rungol was promoted to General Manager of the CCDA.

1.8 Progress of Environmental and Social Considerations

Not applicable

1.9 Progress of Considerations on Gender/Peace Building/Poverty Reduction

Not applicable

1.10 Other remarkable/considerable issues related/affect to the project

As described in 1.5, CCDA has requested many donors for GHG inventory support. The coordination of these projects and their roles in the GHG inventory preparation became clearer in 2018.

Table 11 Relevant donors supporting CCDA

Donor	Overview of support	Aid partner	Duration	Role in GHG inventory preparation
FAO	Support PNG Forest Authority (PNGFA) in	PNGFA	2014~2019	CCDA collected data from PNG FA to estimate emissions/removals from the

	developing data bases			LULUCF sector.
	Support AFOLU sectors in preparing GHG inventories	CCDA	Unknown	Team in Rome serves as a help desk. Progress of work is dependent on the CCDA staff working on AFOLU sector.
	Support AFOLU sector data development	CCDA, Department of Agriculture	2018~2021	Project has not begun actual work as of now.
Coalition for Rainforest Nations (CfRN)	Unclear support	CCDA	Unknown	CfRN conducted a review of the LULUCF sector before finalization

2. Delay of Work Schedule and/or Problems

2.1 Detail

Described in 1.5. During the two Detailed Planning Survey missions carried out in 2016 and 2017, CCDA informed JICA that it was expecting to submit its first BUR to the UNFCCC at the end of 2017. The Project Design Matrix (PDM) and Plan of Operation (P/O) were carefully designed based on this deadline/assumption, with some flexibility built in in case there were minor delays. However, in late 2017, CCDA informed the JICA Project expert team that it did not consider the end of 2017 as a deadline and did not assess how long the delay will be.

Therefore, in early 2018, the JICA Headquarters sent a concern letter to CCDA. After discussion on a submission target date, the JICA Project expert team and CCDA agreed to June 2018, and the P/O was revised accordingly. Still, due to major setbacks, particularly in the AFOLU sector estimation, the GHG inventory completion was delayed significantly.

2.2 Cause

The NC/BUR manager position in CCDA was vacated in the middle of the year, which has negatively impacted the GHG inventory preparation in CCDA, specifically in terms of planning, setting goals, and timelines for preparing the GHG inventory.

In addition, there are delays in the FAO support to the GHG estimation of the LULUCF sector. Furthermore, other donors are requesting CCDA to reconsider the submission contents and timing. However, the CCDA has not been able to coordinate and manage the other projects, leading to confusion about timelines for the BUR submission.

2.3 Action to be taken

Although there is a significant delay in the submission of the BUR1, the JICA Project expert team and CCDA have carried out activities for the BUR2 GHG inventory since January 2019, and plan to finalize the GHG inventory by the end of 2019.

2.4 Roles of Responsible Persons/Organization

None.

3. Modification of the Project Implementation Plan

3.1 Plan of Operation

Minor revisions were made to the Plan of Operation (P/O) at the inception of the JICA

Annex 8-5: Project Monitoring Sheet ver.5

TO CR of JICA　Papua New Guinea　OFFICE

Project Monitoring Sheet

Project Title : The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG
Version of the Sheet: Ver. 5（Term: April, 2019 - September, 2019）

Name: Takeshi Enoki
Title: GHG Inventory (General)
Submission Date: December 13, 2019

I. Summary

1　Progress

1-1 Progress of Inputs

Experts

During this reporting period of April 2019 to September 2019, the Japan International Cooperation Agency (JICA) Project expert team made 7 man-trips to Papua New Guinea (PNG). Total man months during this reporting period was 2.73 in PNG and 3.00 for activities in Japan.

Meetings

The Second Joint Coordinating Committee (JCC) was held on July 26, 2019, with the objectives to report to JCC members the progress of the Project activities, specifically the submission of the first Biennial Update Report (BUR 1) and on preparing the second BUR GHG inventory; and to present the plan for strengthening the institutional arrangements to prepare GHG inventories in PNG. The JCC members welcomed news that the CCDA submitted in April 2019 its first BUR under the United Nations Framework Convention on Climate Change (UNFCCC). All participants acknowledged the importance of strengthened institutional arrangements to ensure the ongoing sustainability of compiling GHG inventories and BURs.

Public relations

During this reporting period, one post on the Second JCC was made on the Project website (https://www.jica.go.jp/project/english/png/006/index.html).

Table 1 shows the inputs by JICA Project expert team for this reporting period.

Table 1 Input for term April ~ September 2019

Inputs				Year	2019					
				Month	4	5	6	7	8	9
Expert	1	GHG Inventory（General）		Plan		14			10	
				Actual		17		14		
	2	GHG Inventory（Energy）		Plan		14			10	
				Actual				11		
	3	GHG Inventory（Industrial Processes and Product Use）		Plan		7			10	
				Actual		8		9		
	4	GHG Inventory（Agriculture, Land use change and Forestry）		Plan		7			10	
				Actual				8		8
	5	GHG Inventory（Waste）		Plan		7			10	
				Actual						
Japan's Activitie	1	GHG Inventory （General）		Plan						
				Actual						
	2	GHG Inventory （Energy）		Plan						
				Actual						
	3	GHG Inventory （Industrial Processes and Product Use）		Plan						
				Actual						
	4	GHG Inventory （Agriculture, Land use change and Forestry）		Plan						
				Actual						
	5	GHG Inventory （Waste）		Plan						
				Actual						
	6	Project administrative coordination / coordinator for training		Plan						
				Actual						
Plan Monitoring	Monitoring		Joint Coordinating Committee	Plan						
				Actual						
			Set-up the Detailed Plan of Operation	Plan						
				Actual						
			Submission of Monitoring Sheet	Plan						
				Actual						
	Reports/Documents		Work Plan	Plan						
				Actual						
			National GHG inventory Report	Plan						
				Actual						
			Project Progress Report	Plan						
				Actual						
			Project Brief Note	Plan						
				Actual						
			Project Completion Report	Plan						
				Actual						
	Public Relations		Establishment and operation of JICA TC website	Plan						
				Actual						

1-2 Progress of Activities

a.　Overview of activities carried out in this term

Papua New Guinea's first BUR was approved by the PNG Government in April 2019 and submitted to the UNFCCC secretariat on April 17, 2019.　Since submission of the BUR1, the JICA Project expert team and CCDA have continued to make progress in collecting data for the BUR2 GHG inventory, in particular, for the energy, industrial processes and product use (IPPU), and waste sectors.　The JICA Project expert team and CCDA have spent most time consulting with stakeholders to discuss the methods to estimate GHG emissions, the necessary data to estimate emissions, and the steps necessary for CCDA to acquire the data from the stakeholders.　In September 2019, the technical analysis for PNG's BUR1 was conducted in Bonn, Germany. The JICA Project expert team and CCDA

answered all questions posed to the CCDA from the experts carrying out the technical analysis.

Table 2 shows an overview of the progress of activities for this reporting period.

Table 2 Overview of progress of activities

	Sub-Activities	Year	2019					
		Month	4	5	6	7	8	9
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan						
		Actual						
	1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	Plan						
		Actual						
	1.3: Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan						
		Actual						
	1.4: Draft/Update a Memorandum of Understading between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan						
		Actual						
	1.5: Collect data necessary for national GHG inventories from relevant parties.	Plan						
		Actual						
	1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan						
		Actual						
	1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan						
		Actual						
	1.8: Complie national GHG inventories with time series consistency.	Plan						
		Actual						
	1.9: Draft/Update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan						
		Actual						
Output 2: Capacity to promote understanding of national GHG inventories is enhanced.	2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan						
		Actual						
	2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan						
		Actual						
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan						
		Actual						
	3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan						
		Actual						
	3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key catogories).	Plan						
		Actual						
	3.4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan						
		Actual						
	3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan						
		Actual						
	3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan						
		Actual						
	3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan						
		Actual						

b. Output 1 activities

Overview

JICA Project expert team supported CCDA to identify the necessary data to estimate GHG emissions and removals for the GHG inventory, prepared for stakeholder meetings (activity 3.1) and held the stakeholder meetings to inform stakeholders of the necessary data and make the data requests. In many cases, follow up was necessary by preparing a Memorandum of Understanding (MoU) between CCDA and the stakeholder for the sharing of data (activity 1.4). Some data have been sent to the CCDA (activity 1.5) but most stakeholders are still in the process of reviewing the MoU.

Detail

After reviewing the respective sections of the 2006 IPCC Guidelines, the CCDA counterparts developed technical papers and questionnaires for the relevant stakeholders (activity 3.1). The technical paper describes the background to GHG inventories, an explanation of what data is needed, how the data will be used in the emission/removal estimation, followed by technical questions to the stakeholder in question. This paper is meant to explain the reasons for data collection, while also attempting to build capacity on the stakeholder side to understand GHG inventories better. The status of stakeholder meetings and the data collected by sector is shown below.

- Energy sector

subsector	stakeholder	assigned to	date interview request was sent	met	minutes	followup action required?
1. Energy sector						
crosscutting	Department of Petroleum and Energy (Energy Wing)	Jason	5-Mar-19	12-Mar-19	Y	need to consult petroleum div.
	Chamber of Mines and Petroleum	Jason	16-Jul-19	no	N	
1.A.1. Energy Industries	Independent Consumer Competition Commission	Jason	31-Jul-19	31-Jul-19	Y	send data request letter
	PNG Power	Jason	2-Jul-19	29-Jul-19	Y	send data request letter
1.A.2. Manufacturing	PNG Conservation and Environment Protection Authority	Jason	not yet			
1.A.3. Transport	Department of Transportation	Jason	11-Mar-19	no	N	
	National Maritime Safety Authority	Jason	11-Mar-19	14-Mar-19	Y	get annual report
	Civil Aviation Safety Authority	Jason	5-Mar-19	15-Mar-19	Y	none
	Department of Transportation	Jason	1-Aug-19	1-Aug-19	Y	send draft ToR of energy sector WG
	National Airports Corporation and Road Traffic Authority	Jason	not yet			
1.A.4. Other		Jason				
1.B.1 Coal		Jason				
1.B.2 Oil and gas	Exxon Mobile	Jason		20-May-19	Y	share guidelines
	Department of Petroleum and Energy (Petroleum Wing)	Jason	not yet			

The JICA Project expert and CCDA have met most energy sector stakeholders and have also sent official data request letters to stakeholders including the Independent Consumer Competition Commission, and PNG Power. CCDA has also informed many of the stakeholders of an Energy sector technical working group meeting that CCDA plans to hold, with the view to facilitate the data sharing for the estimation of GHG in the energy sector.

- IPPU sector

subsector	stakeholder	assigned to	date interview request was sent	met	minutes	followup action required?
2. IPPU sector						
crosscutting	National Statistics Office	Jacinta	19-Feb-19	no	N	
	PNG Conservation and Environment Protection Authority	Jacinta	19-Feb-19	23-Feb-19	Y	
	PNG Conservation and Environment Protection Authority	Jacinta	15-May-19	15-May-19	Y	share activity data map. Sent letter in July
	National Statistics Office	Jacinta	15-May-19	15-May-19	Y	need MoU
	PNG Customs	Jacinta	1-May-19	17-May-19	Y	send data request letter
2.A. Mineral		Jacinta	not yet			
2.B. Chemical		Jacinta	not yet			
2.C. Metal		Jacinta	not yet			
2.D. Non energy	BOC Papua New Guinea Limited	Jacinta	19-Feb-19	no	N	data request letter sent
2.E. Electronics		Jacinta	not yet			
2.F. Substitutes for ODS	Econoler	Jacinta	19-Feb-19	19-Feb-19	Y	
	Econoler	Jacinta	3-Aug-19	3-Aug-19	Y	follow up ODS project?
		Jacinta				

The JICA Project expert and CCDA have met most IPPU sector stakeholders that have been identified and have also sent official data request letters to stakeholders including the PNG Conservation and Environment Protection Authority, PNG Customs, and BOC PNG Limited. An MoU has been drafted and shared with National Statistics Office and is under review. The JICA Project expert and CCDA are attempting to develop a mapping of all relevant manufacturing industries in PNG by using NSO, PNG Conservation and Environment Protection Authority, and Customs data, which have yet to be shared. This exercise will help clarify which categories in the 2.A. Mineral, 2.B. Chemical, and 2.C. Metal industries should be included in the BUR2 GHG inventory.

- Waste sector

subsector	stakeholder	assigned to	date interview request was sent	met	minutes	followup action required?
5. Waste sector						
5.A. Solid Waste	NCDC	Erick	sent	In October		
	Total Waste Management (TWM)	Erick	not yet	In October		
	Pasifika Eagle Chemical Ltd	Erick	not yet	In October		
	UPNG	Erick	not yet			
	JPRISM	Erick	not yet			
	Town authorities	Erick	not yet			
5.B. Biological treatment of Solid waste	Town authorities?	Erick	not yet			
5.C. Incineration	Health Department	Erick	13-May-19	13-May-19	Y	none
	hospital	Erick	call made		Y	
	DAL?	Erick	not yet			
5.D. Wastewater	Water PNG	Erick	31-Jul-19	31-Jul-19	Y	First set of data received. followup question sent.
	Eda Ranu	Erick	1-Aug-19	26-Sep-19	Y	followup question sent
	UPNG Medfac	Erick	not yet			

The JICA Project expert and CCDA have held meetings with the Health Department, hospitals in the Port Moresby area, Water PNG, and Eda Ranu, but have yet to meet any stakeholders for solid waste. As of September, CCDA has received datasets from Water PNG on population connected to the sewerage treatment system, amount of wastewater generated and the share by type of customer, biological oxygen demand, chemical oxygen demand, and nitrogen load for select regions of PNG.

- Memorandum of Understanding

Most stakeholders that have data have requested an MoU between CCDA and the data provider to solidify the institutional arrangements between institutions. The JICA Project expert team and CCDA drafted such MoU and have submitted them to the relevant authorities. The structure of the MoUs that have been drafted by the JICA Project experts and CCDA is as follows:

1. APPLICABLE LAW
2. PURPOSE OF THE MEMORANDUM OF UNDERSTANDING
3. BACKGROUND TO THE MOU
4. MOU JOINT COMMITMENTS
5. CONFIDENTIALITY
6. PROTECTION OF CONFIDENTIAL INFORMATION
7. RETURN OF CONFIDENTIAL INFORMATION
8. INDEMNIFICATION

9. SPECIFIC PERSONS TO RECEIVE INFORMATION
10. MARKING OF CONFIDENTIAL INFORMATION
11. RELATIONSHIP OF THE PARTIES
12. CONTINUATION OF MOU
13. AGREEMENT ON COST
14. AMMENDMENT AND TERMINATION OF MOU
15. WARRANTIES
16. ENTIRE AGREEMENT

c. Output 2 activities

There were no Output 2 activities during this reporting term.

d. Output 3 activities

Overview

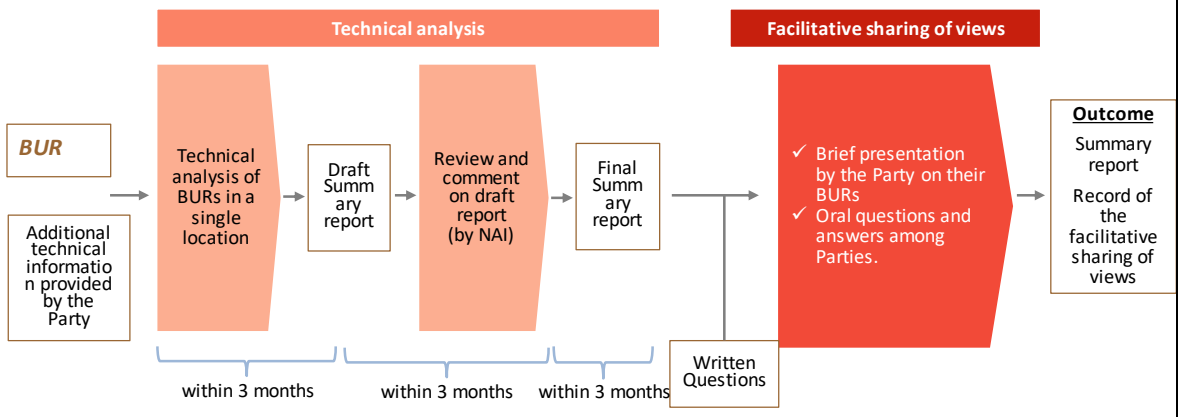
The JICA Project expert team and CCDA counterparts drafted technical papers and questionnaires for the relevant stakeholders (activity 3.1) as described in Output 1 activities section. In preparation for the technical analysis of PNG's BUR1, the JICA Project expert team developed a guidebook/FAQ for CCDA describing the process and explaining the types of questions to expect from the technical analysis process. In September 2019, the JICA Project experts supported CCDA in answering all questions from the technical analysis team.

Detail

The JICA Project expert team drafted a power point presentation describing the process of the technical analysis and how PNG can better prepare. This guidebook/FAQ will be used by CCDA for the International Consultation and Analysis process for the BUR1 and future BURs. An excerpt of the presentation is shown below.

International Consultation and Analysis

- International Consultation and Analysis (ICA) process which consists of:
  - Technical analysis (TA)
  - Facilitative sharing of views (FSV)



Reference: UNFCCC. (2011), UNFCCC.(2013d)

Aim of the technical analysis

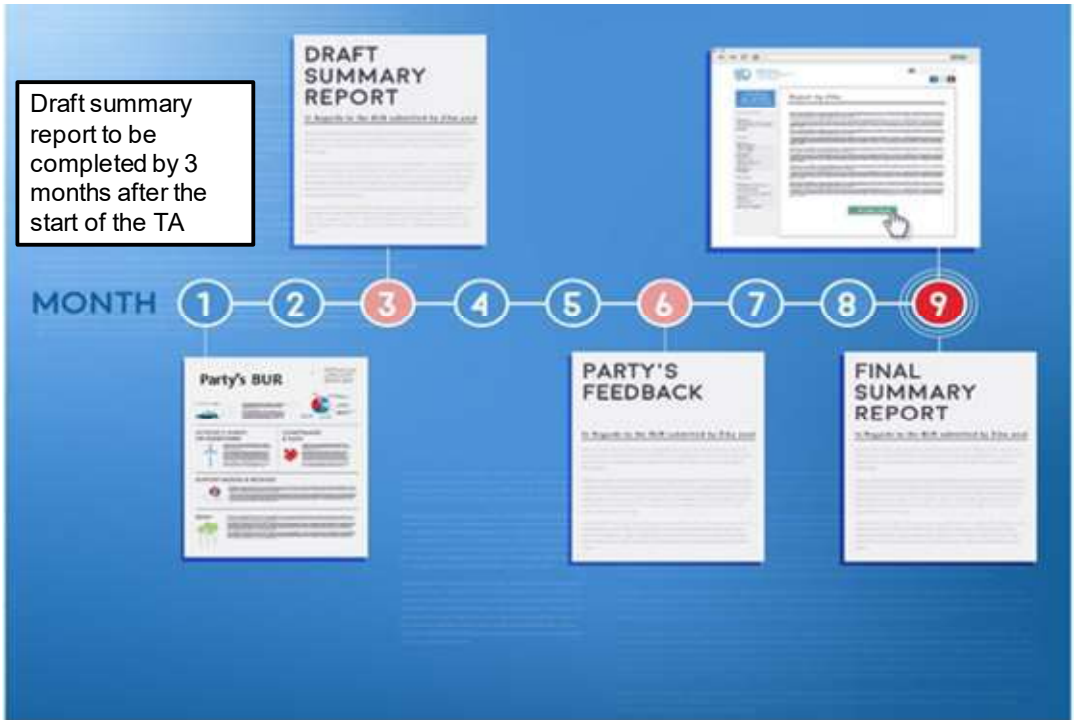
The technical analysis will aim to **increase transparency** of mitigation actions and their effects. The TTE shall:

(a) **Identify information**: Identify the extent to which the elements of information listed in paragraph 3(a) of the guidelines contained in decision 2/CP.17, annex IV, are included in the BUR of the Party concerned;

(b) Undertake a **technical analysis** of information contained in the BUR as outlined in the "UNFCCC biennial update reporting guidelines for Parties not included in Annex I to the Convention" contained in annex III to decision 2/CP.17, and any additional technical information that may be provided by the Party concerned;

(c) In consultation with the Party concerned, **identify capacity-building needs** in order to facilitate reporting in accordance with annex III to decision 2/CP.17, and participating in international consultation and analysis in accordance with annex IV to decision 2/CP.17, taking into account Article 4, paragraph 3, of the Convention.

Timeline for the technical analysis



http://unfccc.int/playground/items/10345.php

General Steps to the TA

When	Activity
Before the TA week	1. TTE will read the BUR and begin filling out the checklist. 2. TTE will ask Party any issues that need further explanation/clarification. This is particularly for information that is partly or not provided.
During the TA week	1. TTE will complete the checklist. 2. For reporting element that is "partly provided" or "not provided," TTE will ask Party whether that issue can be resolved by themselves, or whether there is a capacity building need. 3. Consultation meeting between TTE and Party to confirm the capacity building needs. 4. TTE will draft the Summary Report.
After the TA week	1. Team, Co leads, and secretariat reviews Summary Report draft. 2. Draft report sent to Party for comments (3 months after the TA week). 3. Party provide feedback to TTE (3 months after receiving the Summary Report Draft). 4. Report published (3 moths after receiving feedback from Party).

If the TA for PNG is held from 9/2 to 9/6

- Sometime July: UNFCCC secretariat confirm TA schedule with PNG through focal point
- July: UNFCCC secretariat organize the TTE members
- 8/28: Questions of clarification emailed to PNG through secretariat or co-leads of the TTE
- 9/2 (Mon), 9/3 (Tue), 9/4 (Wed): Final questions of clarification sent to PNG.
- 9/5 (Thu), 9/6 (Fri): TTE will draft list of capacity building needs in consultation with PNG (via Skype, teleconference, email)
- 12/6: Draft Summary Report sent from secretariat to PNG
- 3/6/2020: PNG provide feedback to TTE
- 6/6/2020: Secretariat finalize Summary Report

Questions to expect from TTE on GHG inventories

- The TTE could not find information on uncertainties. Could PNG elaborate on uncertainties? Is this a capacity building need for PNG?
- Sectoral sheets are not included in the BUR. Is this a capacity building need for PNG?
- The TTE noted that PNG uses the GWP from AR4 instead of the SAR. Could PNG explain why?
- The TTE noted that PNG did not report HFCs, PFCs, SF6, Nox, Sox, NMVOCs. Could PNG explain why PNG did not report these gases. Is this a capacity building need?

- NOTE: The NC Guidelines are very old and the some reporting requirements are outdated. Deviating from the guidelines is not a bad thing for some cases.

To prepare for the technical analysis

- Before the analysis
  - In-depth understanding on the reporting guidelines
  - Fill out the table by yourselves to prepare
- During the analysis week
  - Helpful to respond to the questions by TTE fast to give them good understanding on capacity building needs.
- After the analysis
  - Check the TTE findings! (PARTS OF SUMMARY REPORT MIGHT BE WRONG)
  - Use the Summary Report as input to your next BUR cycle.
- The approach to the technical analysis: good opportunity to learn and receive guidance/advice.

In addition to developing the FAQ/Guidebook for the technical analysis, the JICA Project expert team supported the CCDA in preparing and responding to the actual technical analysis questions for the BUR1.　A sample of the questions asked during the technical analysis are as follows:

- Could the Party clarify whether it experienced any challenges or constraints in reporting the information for it National GHG Inventory?
- To enable the TTE to better understand the National GHG Inventory trends, could the party clarify the reasons for LULUCF emission fluctuation?
- The BUR1 notes that it took 5-years to prepare the GHG inventory, could the Party clarify whether it experienced any challenges or constraints in establishing a process than enable the Party to prepare it GHG inventory?
- Could the Party clarify whether it experienced and challenges or constraints to undertake key source analysis as indicated in the IPCCC good practice guidance?
- To enable the TTE to better understand the information that describes procedures and arrangements undertaken to collect and archive data for the preparation of national GHG inventories, as well as efforts to make this a continuous process, including information on the role of the institutions involved

1-3 Achievement of Output

There are no achievements during this term.

1-4 Achievement of the Project Purpose

There are no achievements during this term.

1-5 Changes of Risks and Actions for Mitigation

There have been no changes in risks of implementation of the Project since the previous reporting period.

1-6 Progress of Actions undertaken by JICA

none

1-7 Progress of Actions undertaken by Gov. of PNG

none

1-8 Progress of Environmental and Social Considerations (if applicable)

Not applicable

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

Not applicable

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

none

2　Delay of Work Schedule and/or Problems (if any)

2-1 Detail

None.

2-2 Cause

None.

2-3 Action to be taken

None.

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of PNG, etc.)

none

3　Modification of the Project Implementation Plan

3.1 Plan of Operation

No changes have been made to the Plan of Operation.

3-2 Other modifications on detailed implementation plan

None

4 Current Activities of Gov. of PNG to Secure Project Sustainability after its Completion

none

II. Project Monitoring Sheet I & II *as Attached*

Monitoring Sheet I

Project Monitoring Sheet I （Revision of Project Design Matrix）

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Version 5

Dated December 13, 2019

Implementing Agency: CCDA

Target Group: CCDA

Period of Project: August 2017- July 2021

Project Site: Port Moresby, PNG　　**Model Site:**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.	1) A national GHG inventory is prepared every 2 years. 2) Items on TACCC checklist	・National GHG inventory report. ・TACCC assessment results of the checklist		none	none
Project Purpose					
The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.	1) A national GHG inventory report is developed for 2015 and 2017. 2) Items on TACCC checklist	・Reports of national GHG inventory (2015 and 2017) ・TACCC assessment results of the checklist	・Relevant agencies cooperate with CCDA.	A GHG inventory summary report has been drafted as part of the BUR1 Draft TACCC checklist developed	none
Outputs					
Output1 : Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1-1) General inventory compilation procedure(work plan) is documented. 1-2) Data for national GHG inventories are collected, archived and maintained. 1-3) Technical document on procedures of inventory compilation is drafted.	1-1) Work plan 1-2) Set of databases/spread sheet files for national GHG inventories 1-3) National GHG inventory report		GHG estimation files and summary report completed for the BUR1	none
Output2 : Capacity to promote understanding of national GHG inventories is enhanced.	2-1) The average level of understanding of workshops: 70% or above.	2-1) Results of questionnaire		level of satisfaction was over 70% for inception workshop	none
Output3. Capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3-1) Results of key category analysis and uncertainty assessment are documented. 3-2) Improvements made and necessary improvements for the future are documented.	3-1) National GHG inventory report		A summary GHG inventory report drafted as part of the BUR1	none

	The Japanese Side	The PNG Side	
1-1 : Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. 1-2: Consider and recommend ways to improve the national GHG inventory arrangements. 1-3 : Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). 1-4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. 1-5 : Collect data necessary for national GHG inventories from relevant parties. 1-6 : Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. 1-7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors. 1-8 : Compile national GHG inventories with time series consistency. 1-9 : Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR). 2-1 : Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. 2-2 : Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders. 3-1 : Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. 3-2 : Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. 3-3 : Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories). 3-4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. 3-5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC. 3-6 : Draft and improve a national GHG inventory improvement plan (to be included in NIR). 3-7: Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	1) Short term experts ・GHG inventory (General) ・GHG inventory (Energy) ・GHG inventory (Industrial Processes and Product use) ・GHG inventory (Agriculture) ・GHG inventory (Land use, Land use change and Forestry) ・GHG inventory (Waste) 2) Workshops 3) Training in Japan/third country 4) Equipment ・PC for data management	1) Counterpart personnel CCDA 2) Office space for the sector expert teams to work 3) Meeting space for group progress report meetings/seminars 4) Necessary operation costs	**Pre-Conditions** **<Issues and countermeasures>** none

Monitoring Sheet II

Project Monitoring Sheet II (Revision of Plan of Operation)

Version 5

Dated December 13, 2019

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Inputs	Year	2017		2018				2019				2020				2021			Remarks	**Monitoring** Issue	Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Expert																					
GHG inventory (General)	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	approximately 1 week to 2 weeks a quarter/expert	none	none
	Actual	■	■	■	■	■	■	■	■	■	■										
GHG inventory (Energy)	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual	■	■	■	■	■	■	■	■	■	■										
GHG inventory (Industrial Processes and Product use)	Plan		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■	■	■	■	■	■	■	■	■										
GHG inventory (Agriculture, Land use change and Forestry)	Plan		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■	■	■	■	■	■	■	■	■										
GHG inventory (Waste)	Plan		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■			■	■														
Project administrative coordination / coordinator for training	Plan																		support from Japan		
	Actual																				
Equipment																			none. All purchased in October 2017	none	none
PC for data management	Plan	■	■	■	■	■															
	Actual	■																			
Training in Japan																			1 week training, to be conducted with the in country/third country training	none	none
Training for Counterpart on GHG inventories in Japan	Plan									■	■										
	Actual																				
In-country/Third country Training																			1 week training, to be conducted with the in country/third country training	none	none
Training for Counterpart on GHG inventories in developing country	Plan												■	■							
	Actual																				

Duration / Phasing																					
	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				

Monitoring Plan	Year	2017		2018				2019				2020				2021			Remarks	**Monitoring** Issue	Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Monitoring																					
Joint Coordinating Committee	Plan		■				■				■				■			■		none	none
	Actual				■					■											
Set-up the Detailed Plan of Operation	Plan	■																		none	none
	Actual		■																		
Submission of Monitoring Sheet	Plan	■		■			■		■		■				■			■		none	none
	Actual		■		■			■													
Reports/Documents																					
Work Plan	Plan	■																		none	none
	Actual		■																		
National GHG inventory Report	Plan										■							■		none	none
	Actual																				
Project Progress Report	Plan								■						■			■		none	none
	Actual							■													
Project Brief Note	Plan																	■		none	none
	Actual																				
Project Completion Report	Plan																	■		none	none
	Actual																				
Public Relations																					
Establishment and operation of JICA TC website	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■	■	■	■	■	■	■	■	■										

Activities / Sub-Activities							Year	2017		2018				2019				2020				2021			Responsible Organization		Achievements	Issue & Countermeasures
								Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Japan	GOPNG		
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.																												
1.1 Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	○	○	○	○	○		Plan																		JICA	CCDA	Developed a checklist to assess capacity of institution to prepare inventories	none
							Actual																					
1.2 Consider and recommend ways to improve the national GHG inventory arrangements.	○	△	△	△	△		Plan																		JICA	CCDA	Identified institutional challenges and ways to address challenges	none
							Actual																					
1.3 Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	○	○	○	○	○		Plan																		JICA	CCDA	drafted summary of the institutional arrangements and process	none
							Actual																					
1.4 Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	△	○	○	○	○		Plan																		JICA	CCDA	MoUs have been drafted and sent to relevant stakeholders	none
							Actual																					
1.5 Collect data necessary for national GHG inventories from relevant parties.	△	○	○	○	○		Plan																		JICA	CCDA	some data have been shared with CCDA	none
							Actual																					
1.6 Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	△	○	○	○	○		Plan																		JICA	CCDA	data management rules are under discussion	none
							Actual																					
1.7 Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	△	○	○	○	○		Plan																		JICA	CCDA	none	none
							Actual																					
1.8 Compile national GHG inventories with time series consistency.	△	○	○	○	○		Plan																		JICA	CCDA	none	none
							Actual																					
1.9 Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	△	○	○	○	○		Plan																		JICA	CCDA	none	none
							Actual																					
Output 2:Capacity to promote understanding of national GHG inventories is enhanced.																												
2.1 Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	○	○	○	○	○		Plan																		JICA	CCDA	none	none
							Actual																					
2.2 Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	○	○	○	○	○		Plan																		JICA	CCDA	none	none
							Actual																					
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)																												
3.1 Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	△	○	○	○	○		Plan																		JICA	CCDA	Drafted technical papers for data collection	none
							Actual																					
3.2 Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	○	△	△	△	△		Plan																		JICA	CCDA	none	none
							Actual																					
3.3 Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).	△	○	○	○	○		Plan																		JICA	CCDA	none	none
							Actual																					
3.4 Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	△	○	○	○	○		Plan																		JICA	CCDA	none	none
							Actual																					
3.5 Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	○	○	○	○	○		Plan																		JICA	CCDA	Guidebook/FAQ for the international consultation and analysis process drafted	none
							Actual																					
3.6 Draft and improve a national GHG inventory improvement plan (to be included in NIR).	○	△	△	△	△		Plan																		JICA	CCDA	none	none
							Actual																					
3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	○	△	△	△	△		Plan																		JICA	CCDA	none	none
							Actual																					

TO CR of JICA　Papua New Guinea　OFFICE

Project Monitoring Sheet

Project Title : The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG
Version of the Sheet: Ver. 6（Term: April, 2019 - March, 2020）

Name: Takeshi Enoki
Title: GHG Inventory (General)
Submission Date: April 13, 2020

I. Summary

1　Progress

1-1 Progress of Inputs

Experts

During this reporting period, the Japan International Cooperation Agency (JICA) Project expert team made 13 man-trips to Papua New Guinea (PNG).　Total man months during this reporting period was 4.69 in PNG and 6.00 for activities in Japan.

Meetings

The Second Joint Coordinating Committee (JCC) was held on July 26, 2019, with the objectives to report to JCC members the progress of the Project activities, specifically the submission of the first Biennial Update Report (BUR1) and on preparing the second BUR Greenhouse gas (GHG) inventory; and to present the plan for strengthening the institutional arrangements to prepare GHG inventories in PNG.　The JCC members welcomed news that the CCDA submitted in April 2019 its first BUR under the United Nations Framework Convention on Climate Change (UNFCCC).　All participants also acknowledged the importance of strengthened institutional arrangements to ensure the ongoing sustainability of compiling GHG inventories and BURs.

A workshop on fluorinated substitutes for ozone depleting substances was held on March 6, 2020, with the objective of obtaining agreements with key Refrigeration and Air Conditioning (RAC) stakeholders on a pathway forward to develop a refrigerants and air conditioning GHG inventory for BUR2.　Key stakeholders such as the Conservation and Environment Protection Authority (CEPA), PNG Refrigeration and Air Conditioning Association, and RAC importers/distributors attended the meeting.　Participants agreed to respond to the CCDA survey that seeks activity data to enable a GHG inventory to be compiled for 2016 and 2017 by June 2020, provide a list of additional relevant stakeholders, and provided in-principle agreement to be part of a technical working group

on fluorinated gases.

Public relations

During this reporting period, one post on the Second JCC was made on the Project website on the second JCC (https://www.jica.go.jp/project/english/png/006/index.html).

Table 1 shows the inputs by JICA Project expert team for this reporting period of April 2019 to March 2020.

Table 1 Input for term April ~ March 2020

Inputs				Year	2019									2020		
				Month	4	5	6	7	8	9	10	11	12	1	2	3
Expert	1	GHG Inventory (General)		Plan		14			10		14				14	
				Actual		17		14			15	15				
	2	GHG Inventory (Energy)		Plan		14			10		10				14	
				Actual				15			8					
	3	GHG Inventory (Industrial Processes and Product Use)		Plan		8			10		10				8	
				Actual		9		13			11					10
	4	GHG Inventory (Agriculture, Land use change and Forestry)		Plan		7			10		10				7	
				Actual				9		6	9					
	5	GHG Inventory (Waste)		Plan		9			10		10				9	
				Actual												
Japan Activities in	1	GHG Inventory (General)		Plan												
				Actual												
	2	GHG Inventory (Energy)		Plan												
				Actual												
	3	GHG Inventory (Industrial Processes and Product Use)		Plan												
				Actual												
	4	GHG Inventory (Agriculture, Land use change and Forestry)		Plan												
				Actual												
	5	GHG Inventory (Waste)		Plan												
				Actual												
	6	Project administrative coordination / coordinator for training		Plan												
				Actual												
Plan Monitoring		Monitoring	Joint Coordinating Committee	Plan												
				Actual				7								
			Set-up the Detailed Plan of Operation	Plan												
				Actual												
			Submission of Monitoring Sheet	Plan												
				Actual												
		Reports/Documents	Work Plan	Plan												
				Actual												
			National GHG inventory Report	Plan												
				Actual												
			Project Progress Report	Plan												
				Actual												
			Project Brief Note	Plan												
				Actual												
			Project Completion Report	Plan												
				Actual												
		Public Relations	Establishment and operation of JICA TC website	Plan												
				Actual												

1-2 Progress of Activities

a. Overview of activities carried out in this term

Papua New Guinea's BUR1 was approved by the PNG Government in April 2019 and submitted to the UNFCCC secretariat on April 17, 2019. Since submission of the BUR1, the JICA Project expert team and CCDA have continued to make progress in collecting data for the BUR2 GHG inventory, in particular, for the energy, industrial processes and

product use (IPPU), and waste sectors.　The JICA Project expert team and CCDA have spent most time consulting with stakeholders to discuss the methods to estimate GHG emissions, the necessary data to estimate emissions, and the steps necessary for CCDA to acquire the data from the stakeholders. Most JICA Project expert team missions from January 2020 have been postponed due to the coronavirus situation.　However, in March 2020, a workshop on fluorinated gases was held by JICA Project expert and CCDA.

In September 2019, the technical analysis for PNG's BUR1 was conducted in Bonn, Germany. The JICA Project expert team and CCDA answered questions posed to the CCDA from the experts carrying out the analysis. The Summary report by the technical analysis team was submitted to CCDA in February 2020. The JICA Project expert team and CCDA analyzed the draft and made revision proposals to the report.

Table 2 shows an overview of the progress of activities for this reporting period.

Table 2 Overview of progress of JICA Project activities

	Sub-Activities	Year / Month	2019: 4	5	6	7	8	9	10	11	12	2020: 1	2	3
Output 1 : Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan												■
		Actual												
	1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	Plan												
		Actual												
	1.3: Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan												
		Actual												
	1.4: Draft/Update a Memorandum of Understading between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan												
		Actual			■	■	■	■	■	■	■			
	1.5: Collect data necessary for national GHG inventories from relevant parties.	Plan	■	■	■	■	■	■	■	■	■			
		Actual		■	■	■	■	■	■	■	■	■	■	■
	1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan	■	■	■	■	■	■	■	■	■			
		Actual						■	■	■	■	■	■	■
	1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan	■	■	■	■	■	■	■	■	■			
		Actual												
	1.8: Complie national GHG inventories with time series consistency.	Plan							■	■	■			
		Actual												
	1.9: Draft/Update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan			■	■	■	■	■	■	■			
		Actual						■	■	■	■			
Output 2 : Capacity to promote understanding of national GHG inventories is enhanced.	2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan												
		Actual												
	2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan												■
		Actual											■	
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan	■	■	■	■	■	■						
		Actual	■	■	■	■	■	■	■	■	■			
	3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan											■	
		Actual												
	3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key catogories).	Plan	■	■	■	■								
		Actual												
	3.4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan								■	■	■	■	■
		Actual												
	3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan												
		Actual				■	■	■	■	■	■		■	
	3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan											■	■
		Actual												
	3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan								■	■	■	■	■
		Actual												

b. Output 1 activities

Overview

JICA Project expert team supported CCDA to identify the necessary data to estimate GHG emissions and removals for the GHG inventory, prepared for stakeholder meetings (activity 3.1) and held the meetings to inform stakeholders of the necessary data and

make data requests. In many cases, follow up was necessary by preparing a Memorandum of Understanding (MoU) between CCDA and the stakeholder for the sharing of data (activity 1.4). Some data have been sent to the CCDA (activity 1.5) but most stakeholders are still in the process of reviewing the MoU.

The inventory preparation/compilation structure is as shown in Figure 1. A CCDA staff is assigned as a lead for each of the four sectors of the GHG inventory, namely, Energy, IPPU, Waste, and the Agriculture, Forestry, and Land use (AFOLU) sectors. Several stakeholders/data providers have been identified, and for the energy and IPPU sectors, CCDA plans to establish a technical working group, which will consider the inventory data, methods, and other technical issues regarding the GHG inventory.

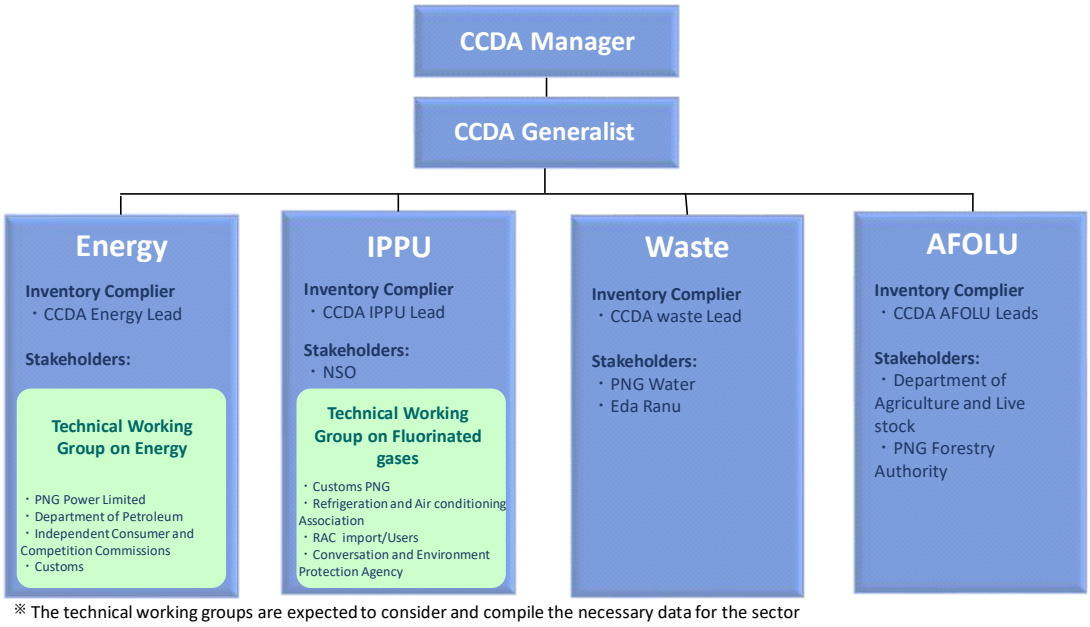


Figure 1　GHG inventory implementation structure for the BUR2 inventory

Detail

Data collection (Activity 3.1, 1.5)

After reviewing the respective sections of the 2006 IPCC Guidelines, the JICA Project experts and CCDA counterparts developed technical papers and questionnaires for the relevant stakeholders (activity 3.1). The technical paper describes the background to GHG inventories, an explanation of what data is needed, how the data will be used in the emission/removal estimation, followed by technical questions to the stakeholder in question. This paper is meant to explain the reasons for data collection, while also attempting to build capacity on the stakeholder side to understand GHG inventories better.

The status of stakeholder meetings and the data collection (activity 1.5) by sector is shown below.

- Energy sector

Table 3　Progress of the energy sector

subsector	stakeholder	assigned to	date interview request was sent	met	minutes	followup action required?
1. Energy sector						
crosscutting	Department of Petroleum and Energy (Energy Wing)	Jason	5-Mar-19	12-Mar-19	Y	need to consult petroleum div.
	Chamber of Mines and Petroleum	Jason	16-Jul-19	no	N	
1.A.1. Energy Industries	Independent Consumer Competition Commission	Jason	31-Jul-19	31-Jul-19	Y	send data request letter
	PNG Power	Jason	2-Jul-19	29-Jul-19	Y	send data request letter
1.A.2. Manufacturing	PNG Conservation and Environment Protection Authority	Jason	not yet			
1.A.3. Transport	Department of Transportation	Jason	11-Mar-19	no	N	
	National Maritime Safety Authority	Jason	11-Mar-19	14-Mar-19	Y	get annual report
	Civil Aviation Safety Authority	Jason	5-Mar-19	15-Mar-19	Y	none
	Department of Transportation	Jason	1-Aug-19	1-Aug-19	Y	send draft ToR of energy sector WG
	National Airports Corporation and Road Traffic Authority	Jason	not yet			
1.A.4. Other		Jason				
1.B.1 Coal		Jason				
1.B.2 Oil and gas	Exxon Mobile	Jason		20-May-19	Y	share guidelines
	Department of Petroleum and Energy (Petroleum Wing)	Jason	not yet			

The JICA Project expert and CCDA have met most energy sector stakeholders and have also sent official data request letters to stakeholders including the Independent Consumer Competition Commission and PNG Power. CCDA has also informed many of the stakeholders of an Energy sector technical working group meeting that CCDA plans to hold, with the view to facilitate the data sharing for the estimation of GHG in the energy sector. Terms of Reference (ToR) for the technical working groups have been sent out to the stakeholders. However, the ToRs have not been signed and no technical working group meetings have been scheduled as of March 2020.

- IPPU sector

Table 4　Progress of the IPPU sector

subsector	stakeholder	assigned to	date interview request was sent	met	minutes	followup action required?
2. IPPU sector						
crosscutting	National Statistics Office	Jacinta	19-Feb-19	no	N	
	PNG Conservation and Environment Protection Authority	Jacinta	19-Feb-19	23-Feb-19	Y	
	PNG Conservation and Environment Protection Authority	Jacinta	15-May-19	15-May-19	Y	share activity data map. Sent letter in July
	National Statistics Office	Jacinta	15-May-19	15-May-19	Y	need MoU
	PNG Customs	Jacinta	1-May-19	17-May-19	Y	send data request letter
2.A. Mineral		Jacinta	not yet			
2.B. Chemical		Jacinta	not yet			
2.C. Metal		Jacinta	not yet			
2.D. Non energy	BOC Papua New Guinea Limited	Jacinta	19-Feb-19	no	N	data request letter sent
2.E. Electronics		Jacinta	not yet			
2.F. Substitutes for ODS	Econoler	Jacinta	19-Feb-19	19-Feb-19	Y	
	Econoler	Jacinta	3-Aug-19	3-Aug-19	Y	follow up ODS project?
		Jacinta				

The JICA Project expert and CCDA have met most IPPU sector stakeholders that have been identified and have also sent official data request letters to stakeholders including the CEPA PNG Conservation and Environment Protection Authority, PNG Customs, and BOC PNG Limited.　An MoU has been drafted and shared with National Statistics Office and is under review.　The JICA Project expert and CCDA are attempting to develop a mapping of all relevant manufacturing industries in PNG by using NSO, PNG Conservation and Environment Protection Authority, and Customs data, which have yet to be shared.　This exercise will help clarify which categories in the 2.A. Mineral, 2.B. Chemical, and 2.C. Metal industries should be included in the BUR2 GHG inventory.

The JICA Project experts and CCDA held a technical workshop to consult stakeholders for 2.F. Substitutes for ODS, specifically the RAC importers/distributors. This approach was taken as there are several private companies that import RAC equipment that emit hydrofluorocarbons (HFCs) during its production, usage, and destruction processes.

- Waste sector

Table 5　Progress of the waste sector

subsector	stakeholder	assigned to	date interview request was sent	met	minutes	followup action required?
5. Waste sector						
5.A. Solid Waste	NCDC	Erick	sent	In October		
	Total Waste Management (TWM)	Erick	not yet	In October		
	Pasifika Eagle Chemical Ltd	Erick	not yet	In October		
	UPNG	Erick	not yet			
	JPRISM	Erick	not yet			
	Town authorities	Erick	not yet			
5.B. Biological treatment of Solid waste	Town authorities?	Erick	not yet			
5.C. Incineration	Health Department	Erick	13-May-19	13-May-19	Y	none
	hospital	Erick	call made		Y	
	DAL?	Erick	not yet			
5.D. Wastewater	Water PNG	Erick	31-Jul-19	31-Jul-19	Y	First set of data received. followup question sent.
	Eda Ranu	Erick	1-Aug-19	26-Sep-19	Y	followup question sent
	UPNG Medfac	Erick	not yet			

The JICA Project expert and CCDA have held meetings with the Health Department, hospitals in the Port Moresby area, Water PNG, and Eda Ranu, but have yet to meet any stakeholders for solid waste. As of March 2020, CCDA has received datasets from Water PNG on population connected to the sewerage treatment system, amount of wastewater generated and the share by type of customer, biological oxygen demand, chemical oxygen demand, and nitrogen load for select regions of PNG. The JICA Project experts and CCDA have identified some irregularities with the data, and have made inquiries to the Water PNG for clarification.

AFOLU sector

The CCDA is working with the Food and Agriculture Organization to collect the necessary data and estimate GHG emissions and removals.

Memorandum of Understanding (activity 1.5)

As of March 2020, four stakeholders have requested an MoU between CCDA and the data provider to strengthen the institutional arrangements for data sharing. The JICA Project expert team and CCDA drafted MoUs and have submitted them to the relevant authorities. A summary of the progress of MoU signing is shown in the table below.

Table 6 Progress of MoU signing

Sector	Stakeholder	Progress
Crosscutting	National Statistics Office	Draft MoU have been drafted by CCDA and sent to National Statistics Office for their approval
	Customs PNG	Draft MoU have been drafted by CCDA and sent to Customs PNG for their approval
Energy	Energy, Independent Consumer and Competition Commission (ICCC)	Draft MoU have been drafted by CCDA and sent to Commission for their approval
	PNG Power Limited (PPL)	Draft MoU have been drafted by CCDA and sent to PNG Power Limited for their approval

The structure of the MoUs that have been drafted by the JICA Project experts and CCDA is as follows:

1. APPLICABLE LAW
2. PURPOSE OF THE MEMORANDUM OF UNDERSTANDING
3. BACKGROUND TO THE MOU
4. MOU JOINT COMMITMENTS
5. CONFIDENTIALITY
6. PROTECTION OF CONFIDENTIAL INFORMATION
7. RETURN OF CONFIDENTIAL INFORMATION
8. INDEMNIFICATION
9. SPECIFIC PERSONS TO RECEIVE INFORMATION
10. MARKING OF CONFIDENTIAL INFORMATION
11. RELATIONSHIP OF THE PARTIES
12. CONTINUATION OF MOU
13. AGREEMENT ON COST
14. AMMENDMENT AND TERMINATION OF MOU
15. WARRANTIES
16. ENTIRE AGREEMENT

Developing database structure for BUR2 inventory (Activity 1.6)

The JICA Project experts and CCDA discussed ways to improve the data management system in CCDA. As a result, the CCDA agreed to properly utilize the shared storage/server to save all relevant inventory files regularly, and sector experts agreed to use a consistent structure in the data storage and emission estimation (see Figures 2 and 3).

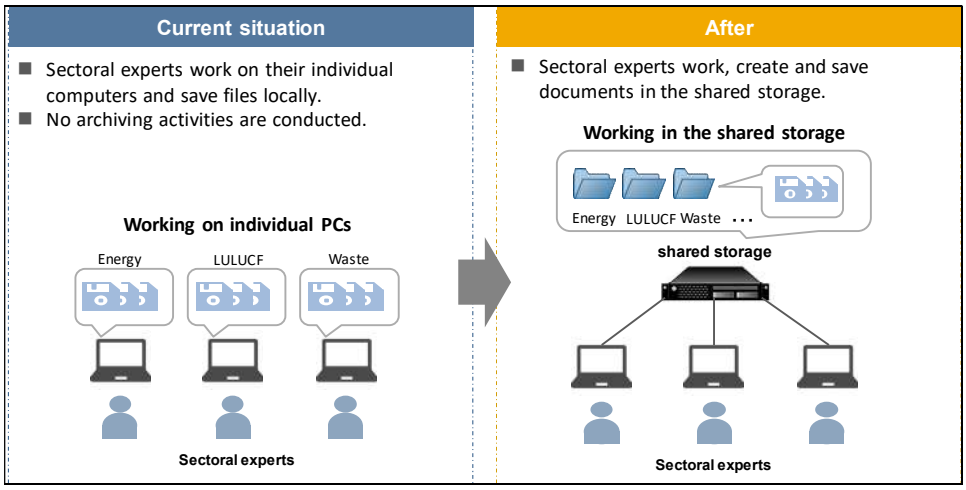


Figure 2　Improvement of data management

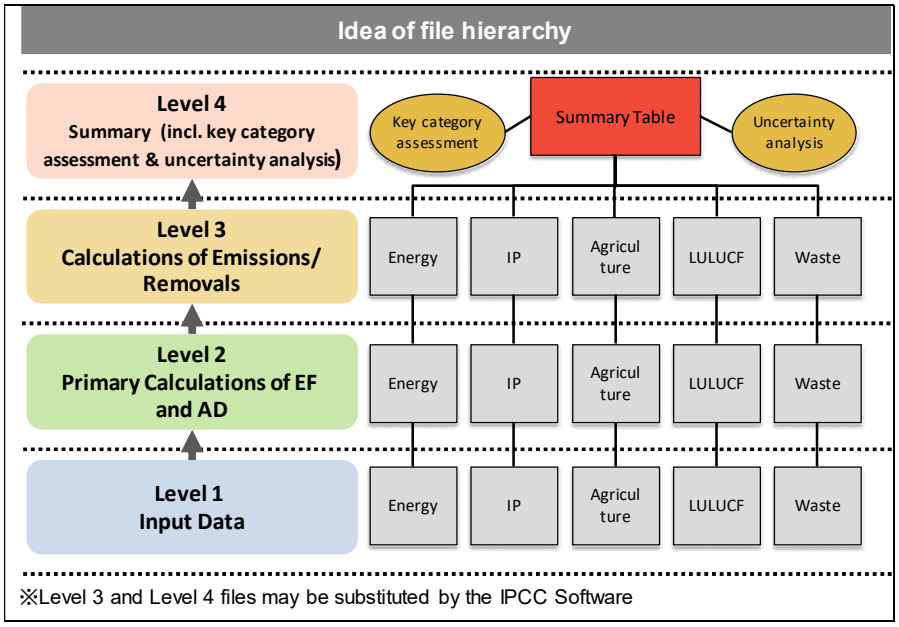


Figure 3　Possible file hierarchy for the GHG inventory

c.　Output 2 activities

A workshop on fluorinated substitutes for ozone depleting substances was held on March 6, 2020 (activity 2.2), with the objective of obtaining agreements with key RAC stakeholders on a pathway forward to develop a refrigerants and air conditioning GHG inventory for BUR2.　Key stakeholders such as the CEPA, PNG Refrigeration and Air Conditioning Association, and RAC importers/distributors attended the meeting.

The workshop consisted of the following five sessions: 1. The UNFCCC reporting requirements and inventory requirements; 2. Planned improvements for PNG's BUR2 GHG inventory; 3. CEPA regulatory framework on HFCs; 4. Methodologies to estimate GHG emissions from RAC equipment; 5. Discussion on how to collect activity data.

While many of the participants were willing to cooperate with CCDA to estimate the HFC emissions, there was some reluctance to provide detailed data.
Participants agreed to respond to the CCDA survey that seeks activity data to enable a GHG inventory to be compiled for 2016 and 2017 by June 2020, provide a list of additional relevant stakeholders, and provided in-principle agreement to be part of a Technical Working Group on fluorinated gases.

d. Output 3 activities

Overview

The JICA Project expert team and CCDA counterparts drafted technical papers and questionnaires for the relevant stakeholders (activity 3.1) as described in Output 1 activities section.
In preparation for the technical analysis of PNG's BUR1, the JICA Project expert team developed a guidebook/FAQ for CCDA describing the process and explaining the types of questions to expect from the technical analysis process and the facilitative sharing of views process under the UNFCCC. The JICA Project expert team also supported the CCDA in responding to technical analysis of PNG's BUR1 which was conducted in September 2019.

Detail

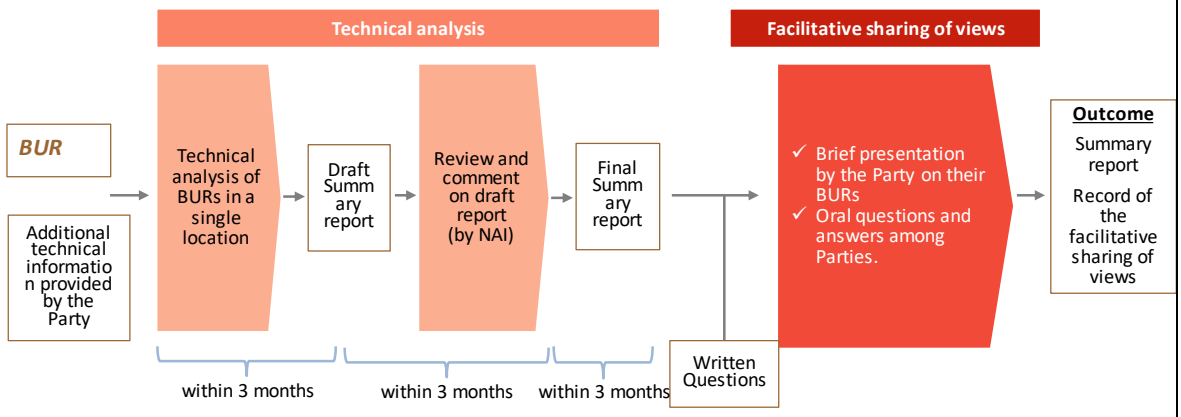
Understanding the IPCC methods (activity 3.1)
As described in output 1 activities.

Guidebook (activity 3.5)

Development of Guidebook
The JICA Project expert team drafted a power point presentation describing the process of the technical analysis and how PNG can prepare for the process. This guidebook/FAQ will be used by CCDA for the International Consultation and Analysis (ICA) for the BUR1 and future BURs. An excerpt of the presentation is shown below.

International Consultation and Analysis

- International Consultation and Analysis (ICA) process which consists of:
  - Technical analysis (TA)
  - Facilitative sharing of views (FSV)



Reference: UNFCCC. (2011), UNFCCC.(2013d)

Aim of the technical analysis

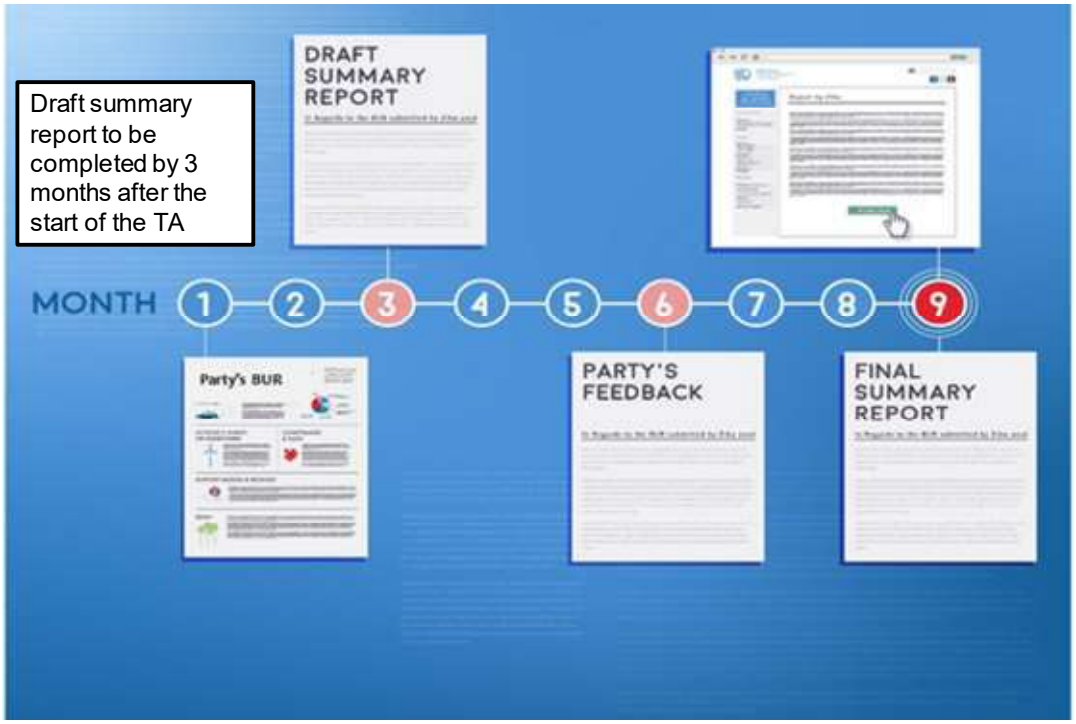
The technical analysis will aim to **increase transparency** of mitigation actions and their effects. The TTE shall:

(a) **Identify information**: Identify the extent to which the elements of information listed in paragraph 3(a) of the guidelines contained in decision 2/CP.17, annex IV, are included in the BUR of the Party concerned;

(b) Undertake a **technical analysis** of information contained in the BUR as outlined in the "UNFCCC biennial update reporting guidelines for Parties not included in Annex I to the Convention" contained in annex III to decision 2/CP.17, and any additional technical information that may be provided by the Party concerned;

(c) In consultation with the Party concerned, **identify capacity-building needs** in order to facilitate reporting in accordance with annex III to decision 2/CP.17, and participating in international consultation and analysis in accordance with annex IV to decision 2/CP.17, taking into account Article 4, paragraph 3, of the Convention.

Timeline for the technical analysis



http://unfccc.int/playground/items/10345.php

General Steps to the TA

When	Activity
Before the TA week	1. TTE will read the BUR and begin filling out the checklist. 2. TTE will ask Party any issues that need further explanation/clarification. This is particularly for information that is partly or not provided.
During the TA week	1. TTE will complete the checklist. 2. For reporting element that is "partly provided" or "not provided," TTE will ask Party whether that issue can be resolved by themselves, or whether there is a capacity building need. 3. Consultation meeting between TTE and Party to confirm the capacity building needs. 4. TTE will draft the Summary Report.
After the TA week	1. Team, Co leads, and secretariat reviews Summary Report draft. 2. Draft report sent to Party for comments (3 months after the TA week). 3. Party provide feedback to TTE (3 months after receiving the Summary Report Draft). 4. Report published (3 moths after receiving feedback from Party).

Questions to expect from TTE on GHG inventories

- The TTE could not find information on uncertainties. Could PNG elaborate on uncertainties? Is this a capacity building need for PNG?
- Sectoral sheets are not included in the BUR. Is this a capacity building need for PNG?
- The TTE noted that PNG uses the GWP from AR4 instead of the SAR. Could PNG explain why?
- The TTE noted that PNG did not report HFCs, PFCs, SF6, Nox, Sox, NMVOCs. Could PNG explain why PNG did not report these gases. Is this a capacity building need?

- NOTE: The NC Guidelines are very old and the some reporting requirements are outdated. Deviating from the guidelines is not a bad thing for some cases.

To prepare for the technical analysis

- Before the analysis
  - In-depth understanding on the reporting guidelines
  - Fill out the table by yourselves to prepare
- During the analysis week
  - Helpful to respond to the questions by TTE fast to give them good understanding on capacity building needs.
- After the analysis
  - Check the TTE findings! (PARTS OF SUMMARY REPORT MIGHT BE WRONG)
  - Use the Summary Report as input to your next BUR cycle.
- The approach to the technical analysis: good opportunity to learn and receive guidance/advice.

Supporting the International Consultation and Analysis for the PNG BUR1

In addition to developing the FAQ/Guidebook for the technical analysis, the JICA Project expert team supported the CCDA in responding to the ICA process.　The table below describes the timeline for PNG's BUR1 ICA process.

Table 7　ICA process for PNG

Time	Action	CCDA action (JICA support)
July 2019	UNFCCC secretariat confirm technical analysis schedule with PNG through focal point	None
July 2019	UNFCCC secretariat organize the team of technical experts (TTE)	None
8/28/2019	Questions of clarification emailed to PNG through secretariat or co-leads of the TTE	Answer questions by the TTE
9/2- 9/4	Final questions of clarification sent to PNG.	Answer questions by the TTE
9/5-9/6	TTE will draft list of capacity building needs in consultation with PNG (via Skype, teleconference, email)	Confirm list of capacity building needs by the TTE
12/6	Draft Summary Report sent from secretariat to PNG	None
3/6/2020	PNG provide feedback to TTE	Analyze the Summary report and identify any issues
6/62020	Secretariat finalize Summary Report	None
Summer SBI	Facilitative Sharing of Views during the Subsidiary Body of Implementation negotiations session.	Plan to support CCDA in drafting presentation for the Facilitative Sharing of Views workshop

In August and September 2019, the JICA Project experts supported CCDA in responding to the technical analysis, specifically by helping CCDA answer questions posed by the technical team of experts conducting the technical analysis.　A sample of the questions and answers during the technical analysis (TA) are shown in the table below.

Table 8　Questions and answers during the TA

Questions	Answers
Could the Party clarify whether it experienced any challenges or constraints in reporting the information for it National GHG Inventory?	Since it was the first National GHG inventory that was developed by CCDA, PNG faced challenges on understanding the 2006 IPCC Guidelines and what to report as per Decision 2/CP.17. As such it took five years to complete. But with technical support from Food and Agriculture Organization and JICA which started in 2017, PNG was able to complete the inventory.
To enable the TTE to better understand the National GHG Inventory trends, could the party clarify the reasons for LULUCF emission fluctuation?	The reasons for fluctuation of emissions and removals in the LULUCF sector, is decrease in forest lands mainly from forest degradation and deforestation. This section also mentions the drivers which were logging (degradation) and subsistence agriculture and oil palm planation (deforestation).
The BUR1 notes that it took 5-years to prepare the GHG inventory, could the Party clarify whether it experienced any challenges or constraints in establishing a process than enable the Party to prepare it GHG inventory?	This wasn't the first inventory to be undertaken by PNG but the first inventory to be developed internally by CCDA. PNG faced challenges on understanding the 2006 IPCC Guidelines and what to report as per Decision 2/CP.17.
Could the Party clarify whether it experienced and challenges or constraints to undertake key source analysis as indicated in the IPCCC good practice guidance?	Although not mentioned in the BUR, it can be clearly seen that in table 2.6 and 2.7 that PNG used a quantitative approach to conduct the KCA and on level for the year 2015.
To enable the TTE to better understand the information that describes procedures and arrangements undertaken to collect and archive data for the preparation of national GHG inventories, as well as efforts to make this a continuous process, including information on the role of the institutions involved	CCDA (the agency responsible for GHG inventory in PNG) collects all activity data from data providers in which some are confidential data and achieves them in its server and back-up are stored in an external hard drive. After CCDA estimates the GHG emissions, the estimation files are also archived in the CCDA server and back-up are stored in the same external hard drive that stores the activity data.

In December, the UNFCCC secretariat submitted a draft Summary Report to CCDA for review. The JICA Project expert team and CCDA reviewed the draft and identified errors and areas of misunderstanding by the technical analysis team. These comments were compiled and submitted to the UNFCCC secretariat on March 2, 2020. The UNFCCC secretariat is currently finalizing the report, which will be uploaded on the UNFCCC website by early June. The facilitative sharing of views workshop is scheduled to be held in the summer 2020 during the climate change negotiations.

1-3 Achievement of Output

a. Output 1

The set of databases/spread sheet files for national GHG inventories and national GHG inventory report was finalized and approved in April 2020.

b.　Output 2

For output 2, the JICA Project expert team conducted an online questionnaire to the participants to evaluate the workshop on fluorinated substitutes for ozone depleting substances, specifically asking the following questions:

- How would you rate this workshop?
- How satisfied were you with each of the 5 sessions?

Six participants responded to the questionnaire.　Assuming that the level of satisfaction reflects the level of understanding of the workshop, only 67% of participants had a good level of understanding of the workshop.

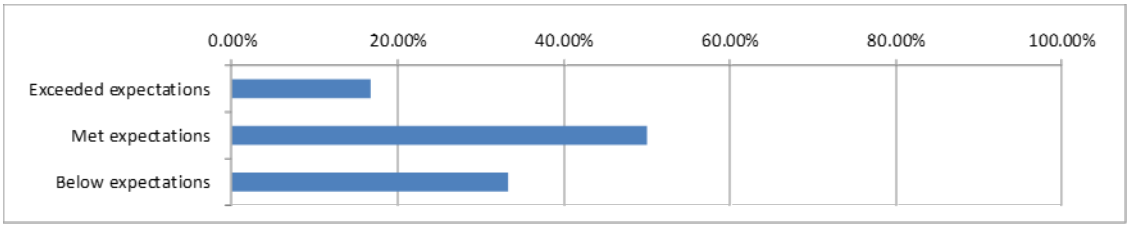


Figure 4　Level of satisfaction of the workshop

However, the level of understanding of the specific sessions were high.　Specifically, 100% of participants were either very satisfied or satisfied with the “UNFCCC reporting obligations” session, 83% were very satisfied or satisfied with the other three sessions. The level of understanding/satisfaction of each of the sessions is shown in the figure below.

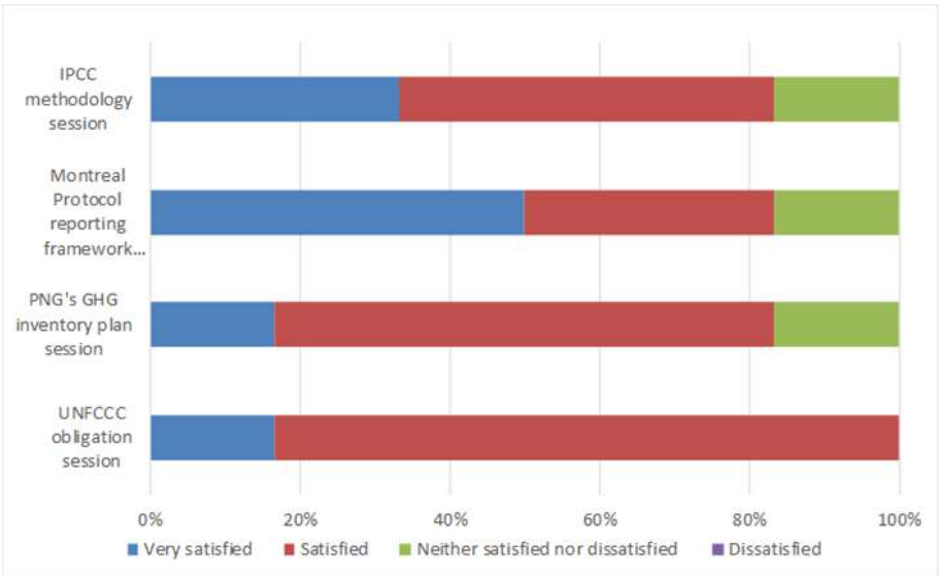


Figure 5　Level of satisfaction of each session of the workshop

c. Output 3

The national GHG inventory report was finalized and approved in April 2020.

1-4 Achievement of the Project Purpose

The BUR1, which contains a summarized national GHG inventory report was approved in April 2020

1-5 Changes of Risks and Actions for Mitigation

The risks of implementation of the Project are mostly the same as the previous reporting period. An additional risk is the coronavirus situation which has limited the JICA Project experts' travel to PNG since January 2020.

Table 9 Risks of implementation of the Project

Assumed risk	Background and Implication of risk	Measures taken in this reporting term
Progress of BUR1 inventory	During the Survey for technical cooperation for this Project carried out in Sept. 2016 and Feb. 2017, JICA was informed by CCDA that PNG was aiming to submit its BUR1 in December 2017. The timelines and plans of the Project were carefully designed based on this deadline/assumption, with some flexibility built in in case there were minor delays. The Project is designed to implement two GHG inventory cycles, but with significant delays, the Project may not be able to complete an entire two cycles.	The BUR1 has been submitted in April 2019. The BUR2 GHG inventory is planned to be compiled during early 2020, and the BUR GHG inventory, in the summer of 2011.
Management positions	The General Manager of National Communications and MRV division in CCDA is also serving as the manager of the GHG inventory team. This has limited the involvement of the CCDA manager in the technical work of the GHG inventory.	The CCDA informed the JICA Project expert team that the General Manager will delegate the JICA Project management to one of the officers of the division.
Duplication of work with other donors	The FAO has been supporting CCDA with the AFOLU inventory as part of the UN-REDD support to CCDA. In addition, the CCDA requested further support from the Capacity Building Initiative for Transparency (CBIT)/GEF and The Coalition for Rainforest Nations (CfRN) to estimate GHG emissions and removals from the AFOLU sector. The CCDA will need to coordinate the scope of work for the donors supporting the GHG inventory work, in particular the AFOLU sector.	The JICA Projectexperts and CCD have agreed that CCDA will coordinate with the forestry dono to ensure the timely completion o the AFOLU sector inventory in tin for the BUR2 and BUR3 submissions.
Coronavirus situation	International travel to PNG has been restricted since January 2020 due to the coronavirus pandemic.	The JICA Project experts and CCI will work on the BUR2 GHG inventory remotely, but the extent the travel restrictions is not clear a of now.

1-6 Progress of Actions undertaken by JICA

none

1-7 Progress of Actions undertaken by Gov. of PNG

none

1-8 Progress of Environmental and Social Considerations (if applicable)

Not applicable

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

Not applicable

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

none

2　Delay of Work Schedule and/or Problems (if any)

2-1 Detail

Due to the coronavirus situation, the Japanese experts have not been in PNG since December 2019.　This has caused some delays in progress of the BUR2 GHG inventory.

2-2 Cause

None.

2-3 Action to be taken

The JICA Project experts and CCDA are currently considering ways to continue Project activities while the JICA Project experts are in Japan.

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of PNG, etc.)

none

3　Modification of the Project Implementation Plan

3.1 Plan of Operation

No changes have been made to the Plan of Operation.

The JICA Project experts and CCDA held a series of discussions with the CCDA regarding its timeline for future BURs and National Communications. As a result, the JICA Project experts confirmed that CCDA was planning to submit its NC3 in the end of 2019 and the BUR2 and BUR3 in 2021 and 2023, respectively.　The JICA Project experts also confirmed that the Plan of Operation will not be revised, and that the GHG inventories prepared during the Project will be included in BURs 2 and 3.

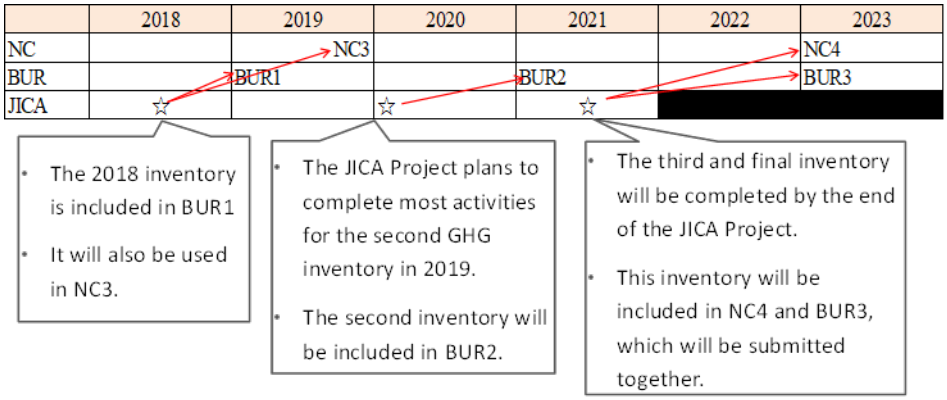


Figure 6　Timeline for future NCs and BURs

3-2 Other modifications on detailed implementation plan

None

4 Current Activities of Gov. of PNG to Secure Project Sustainability after its Completion

none

II. Project Monitoring Sheet I & II *as Attached*

Monitoring Sheet I

Project Monitoring Sheet I （Revision of Project Design Matrix）

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Version 6

Implementing Agency: CCDA

Dated April 1, 2020

Target Group: CCDA

Period of Project: August 2017- July 2021

Project Site: Port Moresby, PNG　　**Model Site:**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.	1) A national GHG inventory is prepared every 2 years. 2) Items on TACCC checklist	・National GHG inventory report. ・TACCC assessment results of the checklist		none	none
Project Purpose					
The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.	1) A national GHG inventory report is developed for 2015 and 2017. 2) Items on TACCC checklist	・Reports of national GHG inventory (2015 and 2017) ・TACCC assessment results of the checklist	・Relevant agencies cooperate with CCDA.	A GHG inventory summary report was included in the BUR1	none
Outputs					
Output1：Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1-1) General inventory compilation procedure(work plan) is documented. 1-2) Data for national GHG inventories are collected, archived and maintained. 1-3) Technical document on procedures of inventory compilation is drafted.	1-1) Work plan 1-2) Set of databases/spread sheet files for national GHG inventories 1-3) National GHG inventory report		GHG estimation files and summary report completed for the BUR1	none
Output2：Capacity to promote understanding of national GHG inventories is enhanced.	2-1) The average level of understanding of workshops: 70% or above.	2-1) Results of questionnaire		level of satisfaction was over 70% for sessions of the RAC workshop	none
Output3. Capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3-1) Results of key category analysis and uncertainty assessment are documented. 3-2) Improvements made and necessary improvements for the future are documented.	3-1) National GHG inventory report		A GHG inventory summary report was included in the BUR1	none

Activities	Inputs		Important Assumption
	The Japanese Side	The PNG Side	
1-1 : Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. 1-2: Consider and recommend ways to improve the national GHG inventory arrangements. 1-3 : Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). 1-4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. 1-5 : Collect data necessary for national GHG inventories from relevant parties. 1-6 : Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. 1-7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors. 1-8 : Compile national GHG inventories with time series consistency. 1-9 : Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR). 2-1 : Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. 2-2 : Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders. 3-1 : Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. 3-2 : Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. 3-3 : Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories). 3-4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. 3-5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC. 3-6 : Draft and improve a national GHG inventory improvement plan (to be included in NIR). 3-7: Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	1) Short term experts ・GHG inventory (General) ・GHG inventory (Energy) ・GHG inventory (Industrial Processes and Product use) ・GHG inventory (Agriculture) ・GHG inventory (Land use, Land use change and Forestry) ・GHG inventory (Waste) 2) Workshops 3) Training in Japan/third country 4) Equipment ・PC for data management	1) Counterpart personnel CCDA 2) Office space for the sector expert teams to work 3) Meeting space for group progress report meetings/seminars 4) Necessary operation costs	**Pre-Conditions** **<Issues and countermeasures>** none

Monitoring Sheet II

Project Monitoring Sheet II (Plan of Operation)

Version 6

Dated April 1, 2020

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Inputs	Year	2017		2018				2019				2020				2021			Remarks	Monitoring: Issue	Monitoring: Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Expert																					
GHG inventory (General)	Plan	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	approximately 1 week to 2 weeks a quarter/expert	Due to the coronavirus situation, Japanese experts have not been to PNG since December 2019	JICA Project experts and CCDA are considering ways to make progress while JICA Project experts are in Japan
	Actual	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
GHG inventory (Energy)	Plan	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
GHG inventory (Industrial Processes and Product use)	Plan			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■		■	■	■	■	■	■	■		■	■	■	■	■	■			
GHG inventory (Agriculture, Land use change and Forestry)	Plan		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
GHG inventory (Waste)	Plan		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■			■	■														
Project administrative coordination / coordinator for training	Plan																		support from Japan		
	Actual																				
Equipment																			All purchased in October 2017	none	none
PC for data management	Plan	■	■	■	■																
	Actual		■																		
Training in Japan																			1 week training, to be conducted in Japan as necessary	none	none
Training for Counterpart on GHG inventories in Japan	Plan									■	■										
	Actual																				
In-country/Third country Training																			To be conducted when PNG will participate in the facilitative sharing of views	none	none
Training for Counterpart on GHG inventories in developing country	Plan												■	■							
	Actual																				

Duration / Phasing																					
	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				

Monitoring Plan	Year	2017		2018				2019				2020				2021			Remarks	Monitoring: Issue	Monitoring: Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Monitoring																					
Joint Coordinating Committee	Plan		■				■				■				■			■		none	none
	Actual				■					■											
Set-up the Detailed Plan of Operation	Plan	■																		none	none
	Actual		■																		
Submission of Monitoring Sheet	Plan	■			■		■		■		■		■		■		■			none	none
	Actual		■		■		■		■		■										
Reports/Documents																					
Work Plan	Plan	■																		none	none
	Actual		■																		
National GHG inventory Report	Plan										■							■		none	none
	Actual																				
Project Progress Report	Plan								■				■				■			none	none
	Actual							■													
Project Brief Note	Plan																	■		none	none
	Actual																				
Project Completion Report	Plan																	■		none	none
	Actual																				
Public Relations																					
Establishment and operation of JICA TC website	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■	■	■	■	■	■	■	■	■	■	■	■							

Activities / Sub-Activities	Year	2017		2018				2019				2020				2021			Responsible Organization		Achievements	Issue & Countermeasures
		Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Japan	GOPNG		
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is																						
1.1 Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan																		JICA	CCDA	none	none
	Actual																					
1.2 Consider and recommend ways to improve the national GHG inventory arrangements.	Plan																		JICA	CCDA	none	none
	Actual																					
1.3 Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan																		JICA	CCDA	none	none
	Actual																					
1.4 Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan																		JICA	CCDA	MoUs have been drafted and sent to relevant stakeholders	none
	Actual																					
1.5 Collect data necessary for national GHG inventories from relevant parties.	Plan																		JICA	CCDA	some data have been shared with CCDA	none
	Actual																					
1.6 Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan																		JICA	CCDA	data management rules agreed	none
	Actual																					
1.7 Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan																		JICA	CCDA	none	none
	Actual																					
1.8 Compile national GHG inventories with time series consistency.	Plan																		JICA	CCDA	none	none
	Actual																					
1.9 Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan																		JICA	CCDA	none	none
	Actual																					
Output 2:Capacity to promote understanding of national GHG inventories is enhanced.																						
2.1 Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan																		JICA	CCDA	none	none
	Actual																					
2.2 Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan																		JICA	CCDA	RCA workshop held in March 2020	none
	Actual																					
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)																						
3.1 Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan																		JICA	CCDA	Drafted technical papers for data collection	none
	Actual																					
3.2 Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan																		JICA	CCDA	none	none
	Actual																					
3.3 Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).	Plan																		JICA	CCDA	none	none
	Actual																					
3.4 Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan																		JICA	CCDA	none	none
	Actual																					
3.5 Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan																		JICA	CCDA	Guidebook/FAQ for the international consultation and analysis process completed.	none
	Actual																					
3.6 Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan																		JICA	CCDA	none	none
	Actual																					
3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan																		JICA	CCDA	none	none
	Actual																					

Annex 8-7 Project Monitoring Sheet ver.7

TO CR of JICA　Papua New Guinea　OFFICE

Project Monitoring Sheet

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG
Version of the Sheet: Ver. 7（Term: January 2020 - July 2020）

Name: Takeshi Enoki
Title: GHG Inventory (General)
Submission Date: September 30, 2020

I. Summary

1　Progress

1-1 Progress of Inputs

Experts

During this reporting period of January to July 2020, the Japan International Cooperation Agency (JICA) Project expert team made 1 man-trip to Papua New Guinea (PNG) in March and have not travelled to PNG since then, due to the global spread of the coronavirus pandemic. Total man months during this reporting period was 0.33 in PNG and 4.05 for activities in Japan. Two energy experts have joined the JICA Project expert team to replace Mr. Takahashi, who left the team in November 2019.

Meetings

A workshop on fluorinated substitutes for ozone depleting substances was held on March 6, 2020, with the objective of obtaining agreements with key Refrigeration and Air Conditioning (RAC) stakeholders on a pathway forward to develop a refrigerants and air conditioning GHG inventory for BUR2. Key stakeholders such as the Conservation and Environment Protection Authority (CEPA), PNG RAC Association, and RAC importers/distributors attended the meeting. Participants agreed to respond to the CCDA survey that seeks activity data to enable a GHG inventory to be compiled for 2016 and 2017 by June, provide a list of additional relevant stakeholders, and provided in-principle agreement to be part of a technical working group on fluorinated gases.

An Initial Meeting for Energy Sector Sub-Technical Working Committee (ESTWC) was held on July 9, 2020. The objective of the Committee to inform key energy sector government agencies of improvement plan for the energy sector GHG emissions and to discuss and agree to the Terms of Reference (TOR) of the ESTWC. Participants generally agreed to participate in future ESTWC meetings but requested more time to review the proposed TOR.

Reports

The Progress Report Volume 3 was submitted to JICA headquarters in June 2020.

Public relations

No posts were made to the Project website during this reporting period.

Table 1 shows the inputs by JICA Project expert team for this reporting period.

Table 1 Input for term January ~ July 2020

Inputs				Year	2020						
				Month	1	2	3	4	5	6	7
Expert	1	GHG Inventory（General）		Plan		14				10	
				Actual							
	2	GHG Inventory（Energy I）		Plan		14				10	
				Actual							
	3	GHG Inventory（Energy II）		Plan							
				Actual							
	4	GHG Inventory（Industrial Processes and Product Use）		Plan		7				7	
				Actual			10				
	5	GHG Inventory（Agriculture, Land use change and Forestry）		Plan		7				7	
				Actual							
	6	GHG Inventory（Waste）		Plan		7				7	
				Actual							
In Japan Activities	1	GHG Inventory （General）		Plan	34						
				Actual	21						
	2	GHG Inventory （Energy I）		Plan	15						
				Actual	6						
	3	GHG Inventory （Energy II）		Plan	14						
				Actual	6						
	4	GHG Inventory （Industrial Processes and Product Use）		Plan	27						
				Actual	17						
	5	GHG Inventory （Agriculture, Land use change and Forestry）		Plan	27						
				Actual	13						
	6	GHG Inventory （Waste）		Plan	27						
				Actual	12						
	7	Project administrative coordination / coordinator for training		Plan	10						
				Actual	6						
Plan Monitoring		Monitoring	Joint Coordinating Committee	Plan							
				Actual							
			Set-up the Detailed Plan of Operation	Plan							
				Actual							
			Submission of Monitoring Sheet	Plan							
				Actual							
		Reports/Documents	Work Plan	Plan							
				Actual							
			National GHG inventory Report	Plan							
				Actual							
			Project Progress Report	Plan							
				Actual							
		Public Relations	Establishment and operation of JICA TC website	Plan							
				Actual							

1-2 Progress of Activities

a. Overview of activities carried out in this term

Due to the coronavirus pandemic, data collection for the BUR2 GHG inventory has seen little progress. In March and April, the JICA Project experts and CCDA discussed ways to make progress during the travel restriction of international flights, and the lockdown period in PNG. Some progress was made in the IPPU and energy sectors, successfully gathering the stakeholders to discuss data and estimation methods. The

JICA Project team also began drafting the inventory report, which will include more detailed technical information on the GHG inventory preparation and data.

Table 2 shows an overview of the progress of activities for this reporting period.

Table 2 Overview of progress of activities

	Sub-Activities	Year / Month	2020 1	2	3	4	5	6	7
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan			■	■			
		Actual							
	1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	Plan				■	■	■	
		Actual							
	1.3: Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan						■	■
		Actual							
	1.4: Draft/Update a Memorandum of Understading between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan							■
		Actual							
	1.5: Collect data necessary for national GHG inventories from relevant parties.	Plan							
		Actual	■	■	■	■	■	■	■
	1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan	■	■					
		Actual	■	■	■	■			
	1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan	■	■					
		Actual							
	1.8: Complie national GHG inventories with time series consistency.	Plan	■	■					
		Actual							
	1.9: Draft/Update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan							
		Actual					■	■	■
Output 2: Capacity to promote understanding of national GHG inventories is enhanced.	2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan							
		Actual							
	2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan			■	■			
		Actual			■				
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan							
		Actual							
	3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan		■	■				
		Actual							
	3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key catogories).	Plan							
		Actual							
	3.4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan	■	■	■	■			
		Actual							■
	3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan					■	■	■
		Actual			■	■			
	3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan		■	■	■			
		Actual							
	3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan	■	■	■	■	■	■	
		Actual						■	■

b. Output 1 activities

Overview

CCDA has enhanced its GHG inventory implementation structure for the GHG inventory preparation as shown in Figure 1. A CCDA staff has been assigned as a lead for each of the four sectors of the GHG inventory, namely, Energy, IPPU, Waste, and the Agriculture, Forestry, and Land use (AFOLU) sectors. Several stakeholders/data providers have been identified, and for the energy sector, a technical working group, which will consider the inventory data, methods, and other technical issues regarding the GHG inventory has been established and meetings held during this reporting term. For the IPPU sector, a meeting on the F gases was held, and a similar technical working groups is expected to be established.

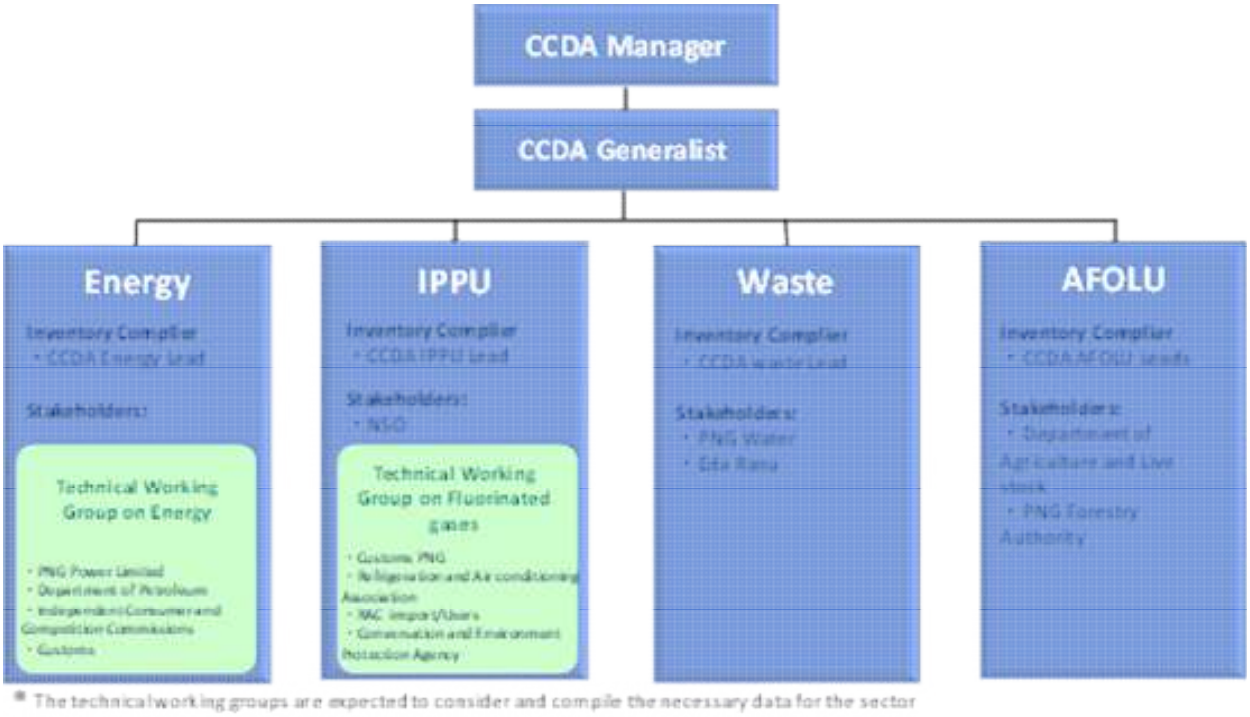


Figure 1 GHG inventory implementation structure for the BUR2 inventory

Detail

The following will describe the progress made in the energy and IPPU sectors and the progress made in drafting the national inventory report.

A. Energy sector

The Initial Meeting for ESTWC was held on July 9, 2020. Nineteen participants attended, including representatives from CCDA, the Department of Petroleum & Energy, PNG Power Ltd, Puma Energy, Independent Consumer & Competition Commission, and

Department of National Planning & Monitoring attended the meeting. The objectives of the meeting were of the following:

- To inform key energy sector government agencies of the improvement plan for the energy sector GHG emissions for the GHG inventory;
- For key energy sector government agencies to agree to be members of the ESTWC;
- To discuss and agree to the ESTWC ToR;
- To inform key energy sector government agencies of the overall NDC preparation plan.

Although participants could not agree on the ToR during the meeting, all agreed to participate in future ESTWC meetings and provide necessary input and data, where possible. The GHG inventory preparation is included in the scope of the ESTWC, but the primary focus for the time being is on the preparation of the enhanced nationally determined contribution (NDC) for PNG. The ToR for the ESTWC was officially delivered to each of the stakeholders, who are expected to review and approve by the next ESTWC meeting, scheduled for September 9.

B. IPPU sector

A workshop on fluorinated substitutes for ozone depleting substances was held on March 6, 2020 (activity 2.2), with the objective of obtaining agreements with key RAC stakeholders on a pathway forward to develop a refrigerants and air conditioning GHG inventory for BUR2. Key stakeholders such as the CEPA, PNG Refrigeration and Air Conditioning Association, and RAC importers/distributors attended the meeting.

The workshop consisted of the following five sessions: 1. The UNFCCC reporting requirements and inventory requirements; 2. Planned improvements for PNG's BUR2 GHG inventory; 3. CEPA regulatory framework on HFCs; 4. Methodologies to estimate GHG emissions from RAC equipment; 5. Discussion on how to collect activity data. While many of the participants were willing to cooperate with CCDA to estimate the HFC emissions, there was some reluctance to provide detailed data, due to the time and effort needed to compile and process the detailed data. For the GHG inventory to be completed in 2020, the stakeholders will provide aggregated data, and after completion of the 2020 GHG inventory, relevant parties will discuss the possibility of sharing the detailed data.

Participants agreed to respond to the CCDA survey that seeks activity data to enable a GHG inventory to be compiled for 2016 and 2017 by June 2020, provide a list of additional relevant stakeholders, and provided in-principle agreement to be part of a Technical Working Group on fluorinated gases. However, the JICA Project experts are still confirming with CCDA with regards to the progress of the CCDA survey.

C. The GHG national inventory report

The BUR1 included a brief overview of the GHG inventory, including general information on the methods and data used, the results, the emission trends/removals. For the BUR2, the JICA Project experts and CCDA will draft a more detailed technical document, which will provide more information on the stakeholders, the inventory preparation process, the institutional arrangements, and more category specific information on the data/methods used, etc. instead of the broad description provided in the BUR1. This document will contain all relevant information on updating the GHG inventory in PNG, therefore serving as a technical manual for the inventory expert who will be tasked to update the inventory next cycle (BUR3).

The table of contents of the inventory report is as follows:

Chapter 1. Introduction
- 1.1. Background information on GHG inventories and climate change
- 1.2. National circumstances
- 1.3. A description of the national inventory arrangements
- 1.4. Inventory preparation process
- 1.5. Brief general description of methodologies and data sources used
- 1.6. Brief description of key categories
- 1.7. General uncertainty evaluation
- 1.8. General assessment of completeness
- 1.9. Recalculations

Chapter 2. Trends in GHG emissions and removals
- 2.1. Description and interpretation of emission trends for aggregated GHG emissions
- 2.2. GHG emission and removal trends by sector
- 2.3. GHG emission and removal trends by gas

Chapter 3. Energy
- 3.1. Overview of sector
- 3.2. Fuel combustion (1.A)
- 3.3. Fugitive emissions from solid fuels (1.B)
- 3.4. CO2 transport and storage (1.C)

Chapter 4. Industrial Processes and Product Use (IPPU)
- 4.1. Overview of sector
- 4.2. Emissions Summary

4.3. Mineral Industry (2.A.)
4.4. Chemical Industry (2.B.)
4.5. Metal Industry (2.C.)
4.6. Non-energy products from fuels and solvent use (2.D)
4.7. Other Product Manufacture and Use (2.G)

Chapter 5. Agriculture
5.1. Overview of sector
5.2. Livestock (3.A)
5.3. Aggregated sources and non-CO2 emission sources from land (3.C)

Chapter 6. Forestry and Other Land Use/LULUCF
6.1. Overview of sector
6.2. Land-use definitions and the classification systems used and their correspondence to the LULUCF categories (e.g. land use and land-use change matrix)
6.3. Information on approaches used for representing land areas and on land-use databases used for the inventory preparation
6.4. Forest land (4.A.)
6.5. Crop land (4.B.)
6.6. Crop land (4.C.)
6.7. Other

Chapter 7. Waste sector
7.1. Overview of sector
7.2. Solid waste disposal (5.A)
7.3. Biological Treatment of Solid Waste (5.B)
7.4. Incineration and Open Burning of Waste (5.C)
7.5. Wastewater Treatment and Discharge (5.D)

Annex I Summary tables

c. Output 2 activities

As described in the previous section, two workshops/meetings have been held during this reporting term.

d.　Output 3 activities

As mentioned in 1-1 Progress of inputs, two energy experts have joined the JICA Project expert team to replace Mr. Takahashi, who left the team in November 2019. One expert will continue to support CCDA with the energy sector inventory, while the other will focus on Activity 3.4. to consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets, and to consider improvements to the mitigation chapter of the BUR.

The JICA Project expert tasked with mitigation issues has had a meeting with CCDA to discuss the way forward with regards to improving the mitigation chapter of the BUR. The JICA Project expert will carry out an independent review the BUR1 mitigation chapter using the BUR Guidelines as adopted by the Conference of the Parties (COP) and the Summary Report of the technical analysis carried out in September 2019 to identify the gaps of BUR1 and the priority issues that need to be addressed for BUR2. In addition, the JICA Project expert will follow the discussion on the enhancement of NDCs that is taking place in the ESTWC to identify potential areas of the NDCs that could be reflected in the next GHG inventory.

1-3 Achievement of Output

There are no achievements during this term.

1-4 Achievement of the Project Purpose

There are no achievements during this term.

1-5 Changes of Risks and Actions for Mitigation

Since late March, international travel to PNG has been closed due to the coronavirus pandemic, and PNG has also been under locked down for some periods of time. As a result, the JICA Project experts and CCDA have not been able to carry out activities as planned. For the time being, the JICA Project experts will focus on activities that can be remotely done, for example, supporting CCDA prepare technical papers for stakeholder meetings, workshops, ESTWC meetings, drafting the qualitative sections of the national inventory report, and preparing CCDA for the upcoming facilitative sharing of views (FSV) workshop in which CCDA will need to present a summary of the BUR1 and answer questions from Parties.

1-6 Progress of Actions undertaken by JICA

The JICA Project expert team has consulted JICA headquarters on the approach during the corona virus pandemic and have agreed to the actions for mitigation above.

1-7 Progress of Actions undertaken by Gov. of PNG

none

1-8 Progress of Environmental and Social Considerations (if applicable)

Not applicable

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

Not applicable

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

none

2　Delay of Work Schedule and/or Problems (if any)

2-1 Detail/Cause

Due to the global spread of the coronavirus, the JICA Project experts have not been in PNG since March 2020.　This has caused delays in progress of all activities related to the BUR2 GHG inventory:

1-5：Collect data necessary for national GHG inventories from relevant parties.

1-6：Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.

1-7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.

1-8：Compile national GHG inventories with time series consistency.

1-9：Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).

3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.

2-3 Action to be taken

As described in section 1-5, for the time being, the JICA Project experts will focus on activities that can be remotely done, for example, supporting CCDA prepare technical papers for stakeholder meetings, workshops, ESTWC meetings, drafting the qualitative sections of the national inventory report, and preparing CCDA for the upcoming facilitative sharing of views (FSV) workshop in which CCDA will present a summary of the BUR1 and answer questions from Parties.

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of PNG, etc.)

none

3　Modification of the Project Implementation Plan

3.1 Plan of Operation

No changes have been made to the Plan of Operation.

3-2 Other modifications on detailed implementation plan

None

4 Current Activities of Gov. of PNG to Secure Project Sustainability after its Completion

none

II. Project Monitoring Sheet I & II *as Attached*

Monitoring Sheet I

Project Monitoring Sheet I （Revision of Project Design Matrix）

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Version 7

Implementing Agency: CCDA

Dated September 30, 2020

Target Group: CCDA

Period of Project: August 2017- July 2021

Project Site: Port Moresby, PNG　　**Model Site:**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.	1) A national GHG inventory is prepared every 2 years. 2) Items on TACCC checklist	・National GHG inventory report. ・TACCC assessment results of the checklist		none	none
Project Purpose					
The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.	1) A national GHG inventory report is developed for 2015 and 2017. 2) Items on TACCC checklist	・Reports of national GHG inventory (2015 and 2017) ・TACCC assessment results of the checklist	・Relevant agencies cooperate with CCDA.	none	none
Outputs					
Output1 : Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1-1) General inventory compilation procedure(work plan) is documented. 1-2) Data for national GHG inventories are collected, archived and maintained. 1-3) Technical document on procedures of inventory compilation is drafted.	1-1) Work plan 1-2) Set of databases/spread sheet files for national GHG inventories 1-3) National GHG inventory report		none	none
Output2 : Capacity to promote understanding of national GHG inventories is enhanced.	2-1) The average level of understanding of workshops: 70% or above.	2-1) Results of questionnaire		none	none
Output3. Capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3-1) Results of key category analysis and uncertainty assessment are documented. 3-2) Improvements made and necessary improvements for the future are documented.	3-1) National GHG inventory report		none	none

Activities	Inputs		Important Assumption
	The Japanese Side	The PNG Side	
1-1 : Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. 1-2: Consider and recommend ways to improve the national GHG inventory arrangements. 1-3 : Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). 1-4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. 1-5 : Collect data necessary for national GHG inventories from relevant parties. 1-6 : Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. 1-7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors. 1-8 : Compile national GHG inventories with time series consistency. 1-9 : Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR). 2-1 : Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. 2-2 : Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders. 3-1 : Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. 3-2 : Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. 3-3 : Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories). 3-4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. 3-5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC. 3-6 : Draft and improve a national GHG inventory improvement plan (to be included in NIR). 3-7: Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	1) Short term experts ・GHG inventory (General) ・GHG inventory (Energy) ・GHG inventory (Industrial Processes and Product use) ・GHG inventory (Agriculture) ・GHG inventory (Land use, Land use change and Forestry) ・GHG inventory (Waste) 2) Workshops 3) Training in Japan/third country 4) Equipment ・PC for data management	1) Counterpart personnel CCDA 2) Office space for the sector expert teams to work 3) Meeting space for group progress report meetings/seminars 4) Necessary operation costs	**Pre-Conditions** **<Issues and countermeasures>** none

Monitoring Sheet II

Project Monitoring Sheet II (Revision of Plan of Operation)

Version 7

Dated September 30, 2020

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Inputs	Year	2017		2018				2019				2020				2021			Remarks	**Monitoring** Issue	Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Expert																					
GHG inventory (General)	Plan																		approximately 1 week to 2 weeks a quarter/expert	Global coronavirus pandemic has shut down international travel	JICA Project experts will focus work on activities that can be done remotely.
	Actual																				
GHG inventory (Energy I)	Plan																				
	Actual																				
GHG inventory (Energy II)	Plan																				
	Actual																				
GHG inventory (Industrial Processes and Product use)	Plan																				
	Actual																				
GHG inventory (Agriculture, Land use change and Forestry)	Plan																				
	Actual																				
GHG inventory (Waste)	Plan																				
	Actual																				
Project administrative coordination / coordinator for training	Plan																		support from Japan		
	Actual																				
Equipment																					
PC for data management	Plan																		none. All purchased in October 2017	none	none
	Actual																				
Training in Japan																					
Training for Counterpart on GHG inventories in Japan	Plan																		1 week training, to be conducted with the in country/third country training	none	none
	Actual																				
In-country/Third country Training																					
Training for Counterpart on GHG inventories in developing country	Plan																		1 week training, to be conducted with the in country/third country training	none	none
	Actual																				

Duration / Phasing																					
	Plan																				
	Actual																				

Monitoring Plan	Year	2017		2018				2019				2020				2021			Remarks	Issue	Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Monitoring																					
Joint Coordinating Committee	Plan																			none	none
	Actual																				
Set-up the Detailed Plan of Operation	Plan																			none	none
	Actual																				
Submission of Monitoring Sheet	Plan																			none	none
	Actual																				
Reports/Documents																					
Work Plan	Plan																			none	none
	Actual																				
National GHG inventory Report	Plan																			none	none
	Actual																				
Project Progress Report	Plan																			none	none
	Actual																				
Project Brief Note	Plan																			none	none
	Actual																				
Project Completion Report	Plan																			none	none
	Actual																				
Public Relations																					
Establishment and operation of JICA TC website	Plan																				
	Actual																				

Activities / Sub-Activities	Year	2017		2018				2019				2020				2021			Responsible Organization		Achievements	Issue & Countermeasures
		Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Japan	GOPNG		
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is																						
1.1 Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan																		JICA	CCDA	none	none
	Actual																					
1.2 Consider and recommend ways to improve the national GHG inventory arrangements.	Plan																		JICA	CCDA	none	none
	Actual																					
1.3 Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan																		JICA	CCDA	none	none
	Actual																					
1.4 Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan																		JICA	CCDA	none	none
	Actual																					
1.5 Collect data necessary for national GHG inventories from relevant parties.	Plan																		JICA	CCDA	none	none
	Actual																					
1.6 Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan																		JICA	CCDA	none	none
	Actual																					
1.7 Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan																		JICA	CCDA	none	none
	Actual																					
1.8 Compile national GHG inventories with time series consistency.	Plan																		JICA	CCDA	none	none
	Actual																					
1.9 Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan																		JICA	CCDA	none	none
	Actual																					
Output 2:Capacity to promote understanding of national GHG inventories is enhanced.																						
2.1 Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan																		JICA	CCDA	none	none
	Actual																					
2.2 Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan																		JICA	CCDA	none	none
	Actual																					
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)																						
3.1 Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan																		JICA	CCDA	none	none
	Actual																					
3.2 Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan																		JICA	CCDA	none	none
	Actual																					
3.3 Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).	Plan																		JICA	CCDA	none	none
	Actual																					
3.4 Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan																		JICA	CCDA	none	none
	Actual																					
3.5 Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan																		JICA	CCDA	none	none
	Actual																					
3.6 Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan																		JICA	CCDA	none	none
	Actual																					
3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan																		JICA	CCDA	none	none
	Actual																					

Annex 8-8 Project Monitoring Sheet ver.8

TO CR of JICA　Papua New Guinea　OFFICE

Project Monitoring Sheet

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG
Version of the Sheet: Ver. 8（Term: August 2020 - April 2021）

Name: Takeshi Enoki
Title: GHG Inventory (General)
Submission Date: May 16, 2021

I. Summary

1　Progress

1-1 Progress of Inputs

Table 1 Input for term January ~ July 2020

Inputs				Year	2020									2021		
				Month	4	5	6	7	8	9	10	11	12	1	2	3
Expert	1	GHG Inventory (General)		Plan												
				Actual												
	2	GHG Inventory (Energy1)		Plan												
				Actual												
	3	GHG Inventory (Energy2)		Plan												
				Actual												
	4	GHG Inventory (Industrial Processes and Product Use)		Plan												
				Actual												
	5	GHG Inventory (Agriculture, Land use change and Forestry)		Plan												
				Actual												
	6	GHG Inventory (Waste)		Plan												
				Actual												
Activities in Japan	1	GHG Inventory (General)		Plan	34									22		
				Actual	45									13		
	2	GHG Inventory (Energy1)		Plan	15									8		
				Actual	25									3		
	3	GHG Inventory (Energy2)		Plan	14									14		
				Actual	13									1		
	4	GHG Inventory (Industrial Processes and Product Use)		Plan	27									20		
				Actual	28									5		
	5	GHG Inventory (Agriculture, Land use change and Forestry)		Plan	27									20		
				Actual	27									2		
	6	GHG Inventory (Waste)		Plan	27									18		
				Actual	27									6		
	7	Project administrative coordination / coordinator for training		Plan	10									0		
				Actual	6									0		
Plan Monitoring	Monitoring		Joint Coordinating Committee	Plan												
				Actual												
			Set-up the Detailed Plan of Operation	Plan												
				Actual												
			Submission of Monitoring Sheet	Plan												
				Actual												
	Reports/Documents		Work Plan	Plan												
				Actual												
			National GHG Inventory Report	Plan												
				Actual												
			Project Progress Report	Plan												
				Actual												
			Project Brief Note	Plan												
				Actual												
			Project Completion Report	Plan												
				Actual												
	Public Relations		Establishment and operation of JICA TC website	Plan												
				Actual												

Experts

During this reporting period, the Japan International Cooperation Agency (JICA) Project expert team did not carry out activities in PNG due to the Covid-19 pandemic. Total man months during this reporting period was 10.2 for activities in Japan.

Meetings

The Third Joint Coordinating Committee (JCC) was held on March 10, 2021 to report progress of GHG inventory preparation for the second Biennial Update Report (BUR2) and to discuss activities taken until completion of the project. The counterparts of the Project, the Climate Change and Development Authority (CCDA) reported that the BUR2 preparation work was delayed in 2020 due to Covid-19 pandemic and the work to update the Nationally Determined Contribution (NDC) to which top priority was given, but the BUR2 which covers the inventory years 2000 to 2017, will be submitted in 2021. CCDA also reported that Energy Sector Sub Technical Working Committee will be held in late March where activity data for the inventory will be discussed and establishment of a Sub technical Working Committee in the Industrial Processes and Product Use (IPPU) sector and other sectors is under discussion. They also stated that some projects to support implementation of the NDC will be conducted and they would like to use data of the project for the inventory, showing importance of strengthened institutional arrangements to ensure the ongoing sustainability of compiling GHG inventories and BURs. These include signing MoUs on data sharing and establishing technical working groups for technical GHG inventory issues.

Reports

After confirming the progress of the Project with the CCDA, the JICA Project expert team submitted the fifth monitoring sheet in December 2020.

1-2 Progress of Activities

a. Overview of activities carried out in this term

The JICA Project expert team and CCDA collected data for the BUR2 GHG inventory for the energy, industrial processes and product use (IPPU), and waste sectors, estimated GHG emissions, and prepared reports, while organizing data on mitigation actions.

Table 2 shows an overview of the progress of activities for this reporting period.

Table 2 Overview of progress of activities

	Sub-Activities	Year / Month	2020 4	5	6	7	8	9	10	11	12	2021 1	2	3
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan												
		Actual												
	1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	Plan												
		Actual												
	1.3: Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan												
		Actual												
	1.4: Draft/Update a Memorandum of Understading between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan												
		Actual												
	1.5: Collect data necessary for national GHG inventories from relevant parties.	Plan												
		Actual												
	1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan												
		Actual												
	1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan												
		Actual												
	1.8: Complie national GHG inventories with time series consistency.	Plan												
		Actual												
	1.9: Draft/Update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan												
		Actual												
Output 2: Capacity to promote understanding of national GHG inventories is enhanced.	2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan												
		Actual												
	2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan												
		Actual												
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land use change and forestry, waste)	3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan												
		Actual												
	3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan												
		Actual												
	3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).	Plan												
		Actual												
	3.4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan												
		Actual												
	3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan												
		Actual												
	3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan												
		Actual												
	3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan												
		Actual												

b.　Output 1 activities

Overview

In July 2020, Energy Sector Sub technical Working Committee was established based on the MoU of this project signed between CCDA and stakeholders. In 2020, the NDC was updated, and estimation methods for the GHG inventory was discussed (activity 1.5). GHG emissions in the waste sector was recalculated using data of the BUR1 in 2020, as there was influence of Covid-19 pandemic and top priority was given to the update work of the NDC.

For the energy and IPPU sectors, GHG emissions was estimated using the data from sources used in the BUR1 such as the APERC database, data provided by private companies, and official national statistics (activity 1.7). The emission estimation files of the BUR1 were not consistent among sectors, so the experts have made improvements to the estimation files to enhance transparency and to make them more user-friendly (activity 1.8). The JICA Project expert team and CCDA prepared a detailed draft report of the inventory report (activity 1.9).

Based on the BUR1 and the BUR2, the QA/QC plan was prepared (activity 1.3).

Detail

Data collection (Activity 1.5)

The JICA Project experts and CCDA attempted to collect new data to improve the completeness of the BUR2, in addition to the data collected for the BUR1. However, because of Covid-19 lockdowns and the work for the NDC, the experts have decided to estimate categories in the BUR1. Some data of 2017, the latest year, were not collected, resulting in use of data of 2015.

Activity data by sector are shown below.

Table 3 Activity data for the BUR2 inventory

	Activity data	Source
Energy sector	Productivity by fuel	APERC database
	Supply by fuel	APERC database
	Import/export volume by fuel	APERC database
	The volume of stored energy by fuel	APERC database
	The volume of consumption of energy by fuel and purpose	APERC database
IPPU sector	Volume of lubricating oil sales	Private companies
	Volume of nitrous oxide sales	Private companies（using data of the BUR1）
Waste sector	Population (urban and rural areas)	Census data（using data of the BUR1）
	Population connected to the sewerage treatment system, amount of wastewater generated, population connected to sewage, and the share by biological oxygen demand, chemical oxygen demand, and nitrogen load for select regions of PNG. (Some data may not be used for estimation)	Eda Ranu, Water PNG

Energy Sector Sub technical Working Committee was established on 9 July 2020, and committees were held on 9 and 30 September 2020. The purpose of the working committee is to improve work on the NDC and to prepare the GHG inventory, and representatives of energy stakeholders and experts serve on the committee. The JICA Project experts and CCDA prepared explanatory materials of the GHG inventory for the 1st committee of 2020, proposing to estimate emissions for the BUR2 using APERC data as with the BUR1, and using data from committee members for the BUR3 and later. This approach was approved by the Committee. The 1st committee of 2021 was scheduled to be held in March 2021 but was postponed due to lockdown measures.

Table 4 Overview of Energy Sector Sub technical Working Committee

Purpose	To discuss preparation/revision and monitoring of the NDC, estimation methods and activity data for the GHG inventory
Chairpersons	A General Manager of CCDA and a Director of Department of Energy Planning
Committee members	・CCDA ・Department of Energy Planning ・PNG Power ・Exxon Mobil ・Puma Energy ・Independent Consumer & Competition Commission ・University of PNG ・Department of Transport ・Global Green Growth (as observers) ・International Renewable Energy Agency (as observers) ・United Nations Development Programme (as observers)
Agenda	The 1st committee（July 9, 2020） ・Purpose of the committee, TOR, sharing of work plans and achieving consensus on establishment of the committee ・Estimation methods and sources of activity data for the energy sector The 2nd committee（September 9, 2020） ・Official approval for Energy Sector Sub technical Working Committee ・A draft of the NDC The 3rd committee（September 30, 2020） ・Improvement of the NDC draft

Developing database structure (Activity 1.7 and 1.8)

The JICA Project experts rebuilt files for estimation of GHG emissions based on management capacity and capacity to use Microsoft Excel of CCDA staffs.

The rebuild includes a new design which updates primary data files to automatically calculate emissions for the IPPU and waste sectors and new files regarding activity data and emission factors uploaded to IPCC software in consideration of possibility that IPCC software will be used instead of Excel-based file system in the near future. Classification of estimation files and structures of the files are shown below.

Table 5 Classification of estimation files

Level 0	Files which primary data are organized. Sheets are prepared by source and provider, and raw data are stored as they are.
Level 1	Files which activity data and emission factors are organized by source using the data of Level 0. The files can be used as the files uploaded to IPCC software in the future.
Level 2	Files to estimate emissions using the data of Level 1, including total emissions in sectors.
Level 3	Files to estimate total emissions and removals after aggregation of the data of Level 2 by sector.

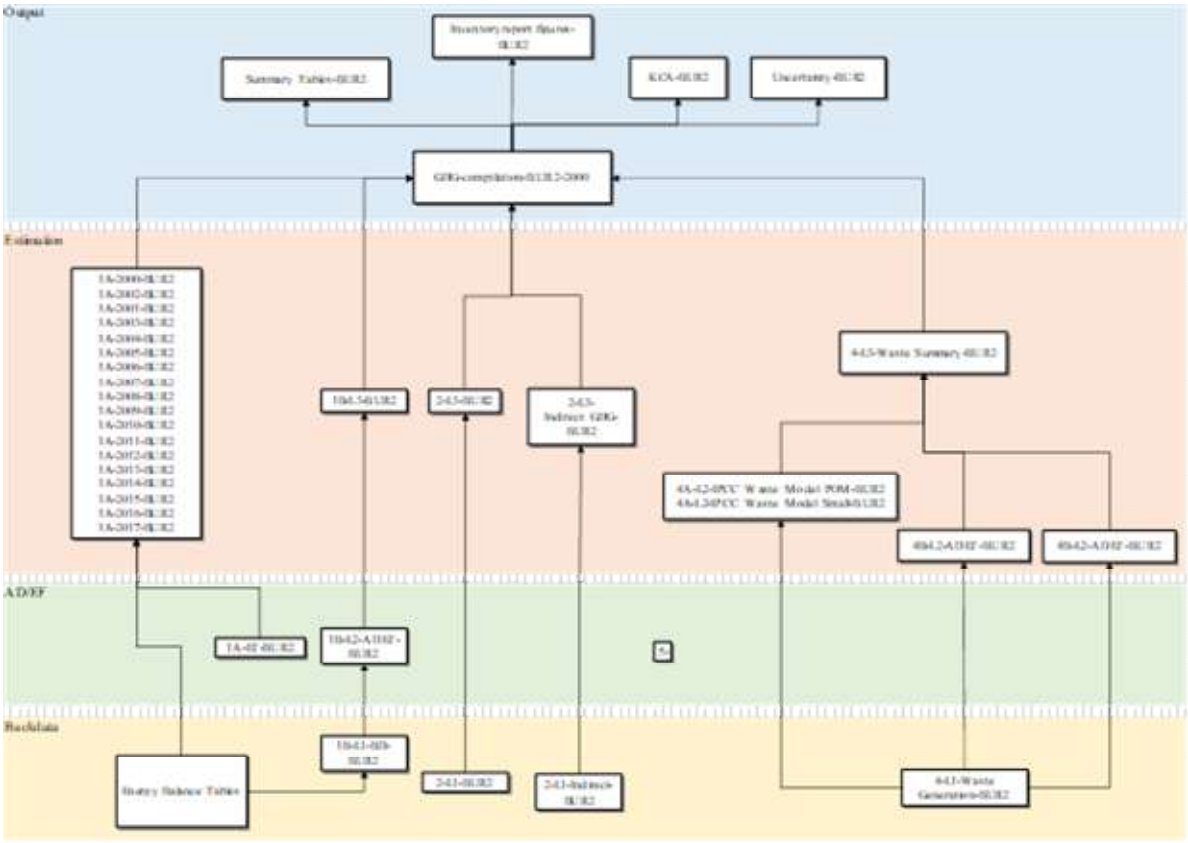


Figure 1 Structure of estimation files for the BUR2 inventory

Preparation of draft of inventory report (Activity 1.9)

In the BUR1, only an overview of the GHG inventory was included, while in the BUR2, a technical inventory report will be submitted as a separate annex. The inventory report includes estimation methods, used data, results, and improvements for total sources and sinks, as well as inventory preparation structure, a preparation timeline, an overview of results. The report is expected to be used as a preparation and update manual of the inventory for CCDA staff in the future.

Preparation of QA/QC plan (Activity 1.4)

The JICA Project experts drafted a QA/QC plan based on the guidelines of IPCC (See Annex II). The plan is expected to be used as a procedure manual to prepare the inventory for CCDA staffs. Main points of the QA/QC plan are shown below.

【Inventory preparation system】

CCDA is a responsible entity and preparation entity of the BUR/the NC under the National Strategy on Climate-Compatible Development" (NEC Decision No 55/2010) and the Paris Agreement Implementation Act. CCDA prepares and submits reports to UNFCCC, while working together with stakeholders.

There is no inter-Ministerial organization in PNG which technically checks contents of the BUR/the NC. A draft of the report prepared by CCDA is discussed at a consultation workshop and is unofficially approved at the workshop. Energy Sector Sub technical Working Committee was established in 2020 to technically discuss the inventory. Sub working committees like Energy Sector Sub technical Working Committee will be established in all sectors in the future.

Figure 2 shows the inventory preparation system in PNG.

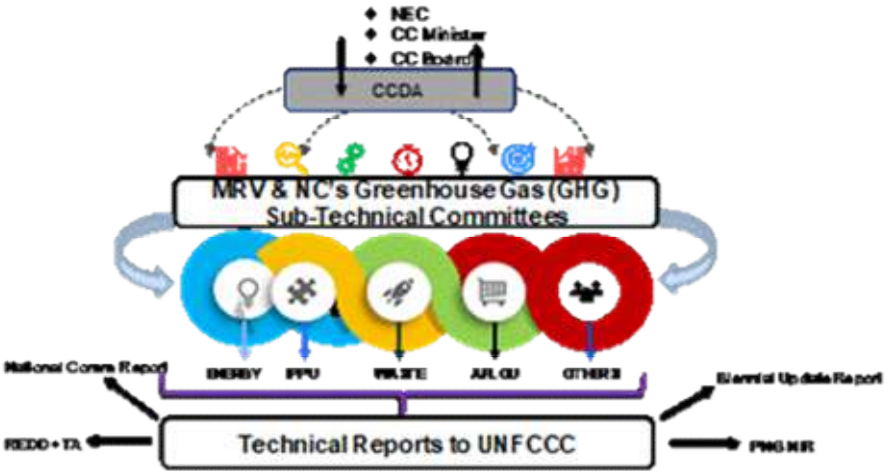


Figure 2 Inventory preparation system in PNG

【Timeline for inventory preparation】

PNG which is categorized into SIDS does not have a legal obligation to prepare and submit the inventory but will make efforts to prepare it every 2 years. The routinized preparation work has not been established yet, but their inventory preparation procedure and its approximate required time are shown below.

Table 6 Timeline for inventory preparation

Milestone	Time
GHG inventory improvement planning	5 months
Project approval by GEF/UNDP/PNG	6 months
Kickoff meeting/workshop	1.5 months
Data collection - Stakeholder identification/stakeholder identification and engagement - Sub technical working committee meetings, as needed - Sending official data request letters including data sheets - Data collection and analysis - Update database	8 months
GHG emission/removal estimation	0.5 months
Compilation of the GHG inventory - Linking all sector files to the summary table files and producing the national total GHG emissions/removals. - updating the key category analysis - updating the uncertainty assessment	0.5 months
Updating the NIR	1 month
Updating the BUR chapter on GHG inventories	0.5 months
Quality control of the inventory products (estimation files and inventory report)	0.5 month
Validation meeting/workshop	1 month
Revision of the GHG inventory, as needed	0.5 months
Quality Assurance activities	1 month
Submission to the PNG NEC and Climate Change Board	1 month
Submission to the UNFCCC	
GHG inventory preparation process	~24 months*

【QC checklist】

Based on IPCC guidelines, a QC checklist was prepared. Only essential items were chosen to be checked due to lack of human resource of CCDA.

Table 7 QC checklist

Checklist for estimation file (for sector experts)	Date checked	Detected errors, and how they were corrected	Name
Data entry done correctly?			
Sources documented?			
Correct units used?			
Eye test for fluctuations?			
Sector totals match summary table emissions/removals?			
Checklist for inventory report	**Date checked**	**Detected errors, and how they were corrected**	**Name**
All values match the estimation file results?			
Table/Figure numbering correct?			
Are sector values consistent throughout the GHG inventory chapter?			
Sources documented correctly?			
Check for confidential data?			

c. Output 2 activities

No workshops were held during the reporting term.

d. Output 3 activities

i. Overview

The JICA Project expert drafted a reporting format regarding BUR mitigation and organized information on the BUR1 and the NDC (activity 3.4). The JICA Project expert team explained a guidebook/FAQ including anticipated questions and planned answers at FSV to CCDA and supported to prepare FSV presentation materials (activity 3.5).

ii. Detail

Mitigation actions (activity 3.4)

The JICA Project experts drafted a reporting format and organized mitigation actions and information included in the NDC in addition to PNG's BUR1 after organizing the reporting requirements as stated in the BUR guidelines. Mitigation actions at the project level which will be stated in the BUR2 are shown below.

Table 8 Mitigation actions in PNG (at the project level)

No.	Name	Implementing Institution
1	RE generated from Geothermal Power Project	New Crest Gold Mine (Lihir)
2	RE generated from Methane capture Kumbango POME methane capture project	New Britain Palm Oil Limited (NBPOL) (West New Britain)
3	RE generated from Methane capture Mosa POME methane capture project	New Britain Palm Oil Limited (NBPOL) (West New Britain)
4	RE generated from Methane capture Numudo POME methane capture project (New!)	New Britain Palm Oil Limited (NBPOL) (West New Britain)
5	RE generated from Methane capture Kapiura POME methane capture project (New!)	New Britain Palm Oil Limited (NBPOL) (West New Britain)
6	RE generated from Methane capture Warastone POME methane capture project (New!)	New Britain Palm Oil Limited (NBPOL) (West New Britain)
7	Facilitating Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction	UNDP Climate Change and Development Authority PNG Power Limited Partnering Provinces (Milne Bay, Eastern Highlands, and East Sepik)
8	EU-GIZ Adapting to Climate Change and Sustainable Energy (ACSE) Program "Integrated Water and Sustainable Energy (IWASE) Project" Rigo District, Central Province.	Department of Petroleum and Energy Central Province Local Level Government (LLG) PNG Power Water PNG University of PNG
9	RE generated from Biomass Project	Oil Search, PNG Biomass

1. Geothermal Power Plant

Summary of the mitigation action
Name of Mitigation action
RE generated from Geothermal Power Project
Objectives
Displacement of electricity that would be provided to the user(s) by more- GHG-Intensive means.
Description
(No information in 1st BUR)
Nature of Action
Infrastructure development, Technology
sector
Energy industry
GHG covered
CO_2, CH_4
duration
2006 - (no information)
status
(No information in 1st BUR)
implementing institution
New Crest Gold Mine (Lihir)
quantitative targets
(No information in 1st BUR)
Methodologies and Assumptions
ACM0002 Consolidated baseline methodology for grid-connected electricity generation from renewable sources.

Progress of the mitigation action
Name of the progress indicators
Amount of GHG reduced
Unit
(No information in 1st BUR)
Base year
(No information in 1st BUR)
Indicator baseline value
(No information in 1st BUR)
Indicator value in the last reporting year
(No information in 1st BUR)
indicator target value
(No information in 1st BUR)
Reduction impacts in the last reporting year
(No information in 1st BUR)
Most relevant data sources for indicator value
(No information in 1st BUR)

2. Methane capture Kumbango POME methane capture project

Summary of the mitigation action
Name of Mitigation action
RE generated from Methane capture Mosa POME methane capture project
Objectives
This CDM project aims to reduce methane emissions generated by the open anaerobic lagoon wastewater treatment system in Mosa Palm Oil Mill. This is achieved by introducing in ground anaerobic lagoon digesters which will recover biogas as renewable energy for use in the mill and displacing the fossil fuel usage at the plant and also supply the generated power to the grid reducing the fossil fuel load at grid. Through the installation of dedicated engines to utilize Biogas for electricity production, the project will also add an additional renewable generation source to the PNG Power Kimbo grid. In doing so, the project helps to increase the amount of environmentally safe renewable electricity which is generated in Papua New Guinea.
Description
The project will be developed in two phases: Phase I: The installation of one unit covered digestor with two units of biogas engine (2 x 953kW) Phase II: The installation of another one units of biogas engine once the project activity is connected to the grid. Thus, the total of three units (3 x 953kW) of biogas engine will be exporting the generated electricity to the grid after meeting internal company deamnd. The aspects related to QA/QC of the monitoring plan are addressed as the following: 1. On site measurement/sampling 2. Equipment maintenance and calibration 3. Audit and Corrective Actions 4. Training and Communication 5. Record Keeping and Documentation All measurements will use calibrated measurement equipment that will be maintained regularly and checked for its functioning.
Nature of Action
Infrastructure development, Technology
sector
Energy industry, Waste handling and disposal
GHG covered
CH_4
duration
2012 - 2019
status
(No information)
implementing institution
New Britain Palm Oil Limited (NBPOL) (West New Britain)
quantitative targets
The total emission reductions from the project activity are estimated to be 63,005 tCO2 eq. per year over the period of 7 years of crediting periods.
Methodologies and Assumptions
AMS III.H. ver. 16 - Methane recovery in waste water treatment AMS I.D. ver. 16 - Grid connected renewable electricity generation

Progress of the mitigation action
Name of the progress indicators
Amount of GHG reduced
Unit
$tCO_2eq./yr$
Base year
2012
Indicator baseline value
0
Indicator value in the last reporting year
62,433 tCO2 eq./yr (2013)
Indicator target value
63,005 tCO2 eq.yr
Reduction impacts in the last reporting year
62,433 tCO2 eq./yr (2013)
Most relevant data sources for indicator value
CDM Monitoring report (https://cdm.unfccc.int/filestorage/B/0/X/B0XR1WMOSS3Y87IU2FEAL9KCDvHKNI/MR_Mosa%205020.pdf?t=UWh8cWdzem8y1DAy1CNrobdX63gs_3qEKdLT)

3. Methane capture Mosa POME methane capture project

Summary of the mitigation action

Name of Mitigation action

RE generated from Methane capture Kumbango POME methane capture project

Objectives

This CDM project aims to reduce methane emissions generated by the open anaerobic lagoon wastewater treatment system in Kumbango Palm Oil Mill. This is achieved by introducing in-ground anaerobic covered lagoon digesters which will recover biogas as renewable energy for use onsite at the mill, refinery and fractionation plants displacing the fossil fuel usage at the plant and also supply the generated power to the grid reducing the fossil fuel load at grid.
Through the installation of dedicated engines to utilize biogas for electricity production, the project will also add an additional renewable generation source to the PNG Power Kimbe grid. In doing so, the project helps to increase the amount of environmentally safe renewable electricity which is generated in Papua New Guinea.

Description

The project will be developed in two phases:
Phase I: The installation of one unit covered digestor with two units of biogas engine (2 x 953kW)
Phase II: The installation of another one units of biogas engine once the project activity is connected to the grid.
Thus, the total of three units (3 x 953kW) of biogas engine will be exporting the generated electricity to the grid after meeting internal company deamnd.

The aspects related to QA/QC of the monitoring plan are addressed as the following:
1. On-site measurement/sampling
2. Equipment maintenance and calibration
3. Audit and Corrective Actions
4. Training and Communication
5. Record-keeping and Documentation
All measurements will use calibrated measurement equipment that will be maintained regularly and checked for its functioning.

Nature of Action

Infrastructure development, Technology

sector

Energy industry, Waste handling and disposal

GHG covered

CH_4

duration

2012 - 2019

status

(No information)

implementing institution

New Britain Palm Oil Limited (NBPOL) (West New Britain)

quantitative targets

The total emission reductions from the project activity are estimated to be 55,769 tCO2 eq. per year over the period of 7 years of crediting periods.

Methodologies and Assumptions

AMS- III.H. ver. 16 - Methane recovery in wastewater treatment
AMS-I.F. - Renewable electricity generation for captive use and mini-grid
AMS-I.D. ver. 16 - Grid connected renewable electricity generation

Progress of the mitigation action

Name of the progress indicators

Amount of GHG reduced

Unit

$tCO_2eq./yr$

Base year

2012

Indicator baseline value

0

Indicator value in the last reporting year

49,236 tCO2eq./yr (2013)

Indicator target value

55,769 tCO2eq.yr

Reduction impacts in the last reporting year

49,236 tCO2eq./yr (2013)

Most relevant data sources for indicator value

CDM Monitoring report
(https://cdm.unfccc.int/filestorage/L/P/1/LP3WM3BIG2ZSVKCN6U1DHO7X6B0FET/MR_Kumbango%2520150...)

4. Methane capture Numudo POME methane capture project

Summary of the mitigation action

Name of Mitigation action

RE generated from Methane capture Numudo POME methane capture project (NEW!)

Objectives

This CDM project aims to reduce methane emissions generated by the open anaerobic lagoon wastewater treatment system in Numundo Palm Oil Mill. This is achieved by introducing an in ground anaerobic digester ponds which will recover biogas as renewable energy for use in the mill displacing the fossil fuel usage at plant and also supply to the grid reducing the fossil fuel load in grid.
Through the installation of a dedicated engine to utilise biogas for electricity production, the project will also add an additional renewable generation source in West New Britain. In doing so, the project helps to increase the amount of environmentally safe renewable electricity which is generated in Papua New Guinea.

Description

The project will be developed in two phases:
Phase I: The installation of one unit covered digestor with two units of biogas engine (2 x 953kW)
Phase II: The installation of another two units of biogas engine once the project activity is connected to the grid.
Thus, the total of four units (4 x 953kW) of biogas engine will be exporting the generated electricity to the grid after meeting internal company deamnd.

The aspects related to QA/QC of the monitoring plan are addressed as the following:
1. On-site measurement/sampling
2. Equipment maintenance and calibration
3. Audit and Corrective Actions
4. Training and Communication
5. Record keeping and Documentation
All measurements will use calibrated measurement equipment that will be maintained regularly and checked for its functioning.

Nature of Action

Infrastructure development, Technology

sector

Energy industry, Waste handling and disposal

GHG covered

CH_4

duration

2015 - 2021

status

(No information)

implementing institution

New Britain Palm Oil Limited (NBPOL) (West New Britain)

quantitative targets

The total emission reductions from the project activity are estimated to be 54,362tCO2 eq. per year over the period of 7years of crediting periods.

Methodologies and Assumptions

AMS- III.H. ver. 15 - Methane recovery in wastewater treatment
AMS- I.D. ver. 16 - Grid connected renewable electricity generation
AMS- I.A. ver. 14 - Electricity generation by the user

Progress of the mitigation action

Name of the progress indicators

Amount of GHG reduced

Unit

$tCO_2eq./yr$

Base year

2015

Indicator baseline value

0

Indicator value in the last reporting year

(No information)

Indicator target value

54,362 $tCO2eq./yr$

Reduction impacts in the last reporting year

(No information)

Most relevant data sources for indicator value

(No information)

5. Methane capture Kapiura POME methane capture project

Summary of the mitigation action

Name of Mitigation action

RE generated from Methane capture Kapiura POME methane capture project (NEW I)

Objectives

This CDM project aims to reduce methane emissions generated by the open anaerobic lagoon wastewater treatment system in Kapiura Palm Oil Mill. This is achieved by introducing an inground anaerobic digester pond which will recover biogas as renewable energy for use in the mill displacing the fossil fuel usage at plant and also supply to the grid reducing the fossil fuel load in grid.
Through the installation of a dedicated engine to utilise biogas for electricity production, the project will also add an additional renewable generation source in West New Britain. In doing so, the project helps to increase the amount of environmentally safe renewable electricity which is generated in Papua New Guinea.

Description

The project will be developed in two phases:
Phase I: The installation of one unit covered digestor with two units of biogas engine (2 x 953kW)
Phase II: The installation of another one unit of biogas engine once the project activity is connected to the grid.
Thus, the total of four units (3 x 953kW) of biogas engine will be exporting the generated electricity to the grid after meeting internal company deamnd.

The aspects related to QA/QC of the monitoring plan are addressed as the following:
1. On-site measurement/sampling
2. Equipment maintenance and calibration
3. Audit and Corrective Actions
4. Training and Communication
5. Record keeping and Documentation
All measurements will use calibrated measurement equipment that will be maintained regularly and checked for its functioning.

Nature of Action

Infrastructure development, Technology

sector

Energy industry, Waste handling and disposal

GHG covered

CH_4

duration

2013 - 2019

status

(No information)

implementing institution

New Britain Palm Oil Limited (NBPOL) (West New Britain)

quantitative targets

The total emission reductions from the project activity are estimated to be 63,801 tCO2 eq. per year over the period of 7 years of crediting periods.

Methodologies and Assumptions

AMS- III.H. ver. 16 - Methane recovery in wastewater treatment
AMS- I.D. ver. 17 - Grid connected renewable electricity generation
AMS- I.A. ver. 14 - Electricity generation by the user

Progress of the mitigation action

Name of the progress indicators

Amount of GHG reduced

Unit

$tCO_2eq./yr$

Base year

2013

Indicator baseline value

0

Indicator value in the last reporting year

(No information)

Indicator target value

63,801 tCO2 eq./yr

Reduction impacts in the last reporting year

(No information)

Most relevant data sources for indicator value

(No information)

6. Methane capture Warastone POME methane capture project

Summary of the mitigation action

Name of Mitigation action

REgenerated from Methane capture Warastone POME methane capture project (NEW!)

Objectives

This CDM project aims to reduce methane emissions by introducing an in-ground anaerobic digester ponds which will recover biogas as renewable energy for use in the mill, mill residential compound and Numundo abattoir, that otherwise would get emitted to atmosphere from the open anaerobic lagoon wastewater treatment system which could generally would have got installed at Warastone Palm Oil Mill.
Through the installation of a dedicated engines to utilize biogas for electricity production, the project will also add an additional renewable generation source in West New Britain. In doing so, the project helps to increase the amount of environmentally safe renewable electricity which is generated in Papua New Guinea.

Description

In this project, two sets of 953 kWe (2 x 953kW) biogas generators will be installed with a total installed capacity is estimated at 1,906 kW (1.906MW).
The aspects related to QA/QC of the monitoring plan are addressed as the following:
1. On site measurement/sampling
2. Equipment maintenance and calibration
3. Audit and Corrective Actions
4. Training and Communication
5. Record keeping and Documentation
All measurements will use calibrated measurement equipment that will be maintained regularly and checked for its functioning.

Nature of Action

Infrastructure development, Technology

sector

Energy industry, Waste handling and disposal

GHG covered

CH_4

duration

2013 - 2019

status

(No information)

implementing institution

New Britain Palm Oil Limited (NBPOL) (West New Britain)

quantitative targets

The total emission reductions from the project activity are estimated to be 46,720 tCO2 eq. per year over the period of 7 years of crediting periods.

Methodologies and Assumptions

AMS-III.H. ver. 15 - Methane recovery in wastewater treatment

Progress of the mitigation action

Name of the progress indicators

Amount of GHG reduced

Unit

$tCO_2eq./yr$

Base year

2013

Indicator baseline value

0

Indicator value in the last reporting year

(No information)

Indicator target value

46,720 tCO2 eq./yr

Reduction impacts in the last reporting year

(No information)

Most relevant data sources for indicator value

(No information)

7. Facilitating Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction

Summary of the mitigation action
Name of Mitigation action
Facilitating Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction
Objectives
Enabling of the application of feasible renewable energy and energy efficiency technologies for achieving greenhouse gas emission reduction in PNG
Description
The mitigation action will achieve the objectives through a comprehensive programme of measures to remove barriers with some components below.
Component 1: Energy Policy, Planning, and Institutional Development
Component 2: Renewable Energy and Energy Efficiency Technologies Applications
Component 3: Financing of Renewable Energy and Energy Efficiency Projects
Component 4: Energy Development and utilization Awareness Enhancement
Nature of Action
Infrastructure development, Technology
sector
Energy industry
GHG covered
CO_2, CH_4, N_2O
duration
2017 - 2021
status
(No information in 1st BUR)
implementing institution
UNDP
Climate Change and Development Authority
PNG Power Limited
Partnering Provinces (Milne Bay, Eastern Highlands, and East Sepik)
quantitative targets
(No information in 1st BUR)
Methodologies and Assumptions
(No information in 1st BUR)

Progress of the mitigation action
Name of the progress indicators
Amount of GHG reduced
Unit
(No information in 1st BUR)
Base year
(No information in 1st BUR)
Indicator baseline value
(No information in 1st BUR)
Indicator value in the last reporting year
(No information in 1st BUR)
indicator target value
(No information in 1st BUR)
Reduction impacts in the last reporting year
(No information in 1st BUR)
Most relevant data sources for indicator value
(No information in 1st BUR)

8. EU-GIZ Adapting to Climate Change and Sustainable Energy (ACSE) Program “Integrated Water and Sustainable Energy (IWASE) Project”

Summary of the mitigation action
Name of Mitigation action
EU GIZ Adapting to Climate Change and Sustainable Energy (ACSE) Program "Integrated Water and Sustainable Energy (IWASE) Project" Rigo District, Central Province.
Objectives
To support the socio-economic development of three rural communities in the Rigo District: Imaugoro, Keapaera and Kalo villages and to reduce their vulnerability against climate change impacts through the provision of reliable, integrated water and sustainable energy. At national level this objective will contribute towards fulfilling PNG's commitment to the Kyoto Protocol. The project has four outcomes 1. Water supply systems including, protected water sources, treatment and distribution systems, pumps and reservoirs, rainwater harvesting systems are established and used in the target villages. 2. Stand alone street lighting systems are established in the target communities 3. Refrigeration systems are provided to the target communities 4. Health care centers in the target villages are provided with energy and water supply Different methodologies will be used in each outcome.
Description
(No information in 1st BUR)
Nature of Action
Economic and infrastructure development
sector
Energy industry, Waste
GHG covered
CO_2, CH_4, N_2O
duration
2017
status
(No information in 1st BUR)
implementing institution
Department of Petroleum and Energy Central Province Local Level Government (LLG) PNG Power Water PNG University of PNG
quantitative targets
(No information in 1st BUR)
Methodologies and Assumptions
(No information in 1st BUR)

Progress of the mitigation action
Name of the progress indicators
Amount of GHG prevented from being emitted
Unit
(No information in 1st BUR)
Base year
(No information in 1st BUR)
Indicator baseline value
(No information in 1st BUR)
Indicator value in the last reporting year
(No information in 1st BUR)
Indicator target value
(No information in 1st BUR)
Reduction impacts in the last reporting year
(No information in 1st BUR)
Most relevant data sources for indicator value
(No information in 1st BUR)

9. Biomass Project

Summary of the mitigation action
Name of Mitigation action
RE generated from Biomass Project
Objectives
Displacement of electricity that would be provided to the user(s) by more GHG intensive means.
Description
The mitigation action is devided into five stages below. Stage 1 (2010-2011): Identification of suitable areas for biomass plantation through soil sampling and studies conducted in more than 2,500 kms across PNG Stage 2 (2010-2014): Planting of over 180,000trees at over 30 sites across PNG to evaluate growth and survival rates in order to select the best species of trees to support large-scale plantations. Stage 3 (2014-2017): Agreements were negotiated with landowners to lease land covering 16,000ha to be planted under sustainable forestry practices in order to underwrite the PPA signed with PNG Power Limited for the initial 15MWe. Stage 4 (2018-2019): The 15 MWe power plant modules will be constructed within the plantation area and the power will be tied into the 132kV Ramu electricity grid commencing first delivery of power by 2020. Stage 5 (2020+): Ultimately 30MWe of sustainable power provided into the Ramu grid
Nature of Action
Economic development, conservation sustainable management of forest
sector
Energy industry, LULUCF
GHG covered
CO_2 CH_4, N_2O
duration
2020 (no information)
status
(No information in 1st BUR)
implementing institution
Oil Search, PNG Biomass
quantitative targets
(No information in 1st BUR)
Methodologies and Assumptions
(No information in 1st BUR)

Progress of the mitigation action
Name of the progress indicators
Amount of GHG reduced
Unit
(No information in 1st BUR)
Base year
(No information in 1st BUR)
Indicator baseline value
(No information in 1st BUR)
Indicator value in the last reporting year
(No information in 1st BUR)
Indicator target value
(No information in 1st BUR)
Reduction impacts in the last reporting year
(No information in 1st BUR)
Most relevant data sources for indicator value
(No information in 1st BUR)

<u>Support to prepare FSV presentation materials (activity 3.5)</u>

The JICA Project expert team gave a lecture to CCDA on how to prepare for FSV using power point slides describing the guidebook/FAQ for International Consultations and Analysis (ICA) process and supported to prepare FSV materials. The FSV materials are shown below.

Presentation Outline

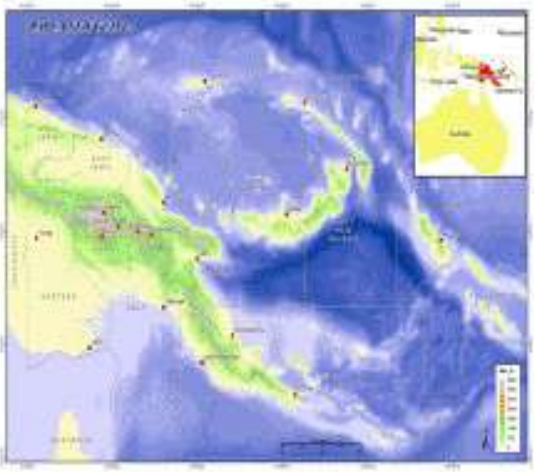
- **Part I**
  - I. National Context
  - II. Institutional arrangement for report preparation
  - III. GHG inventory
  - IV. Mitigation actions
- **Part II**
  - I. Barriers and support needed and received
  - II. Recent developments
  - III. Experience and lessons learned in participating in the ICA process
  - **IV. Q&A**

Part I

i. National Context
ii. Institutional arrangement for report preparation
iii. GHG inventory
iv. Mitigation actions

National Context

- Papua New Guinea (PNG) is located in the South Pacific comprises the eastern half of the island of New Guinea, located just north of Australia.
- PNG has a total area of about 46.9 million ha, of which 77.8 per cent (36.1 million
- ha) is forest. Collectively with West Papua constitutes the third largest expanse of tropical rainforest on the planet after the Amazon and Congo forests.
- PNG is known for its tropical climate which is influenced by its location in the Pacific Warm Pool. PNG is highly vulnerable to the impacts of climate change.
- With an annual growth rate of 3.1% (2011 National Census) the current population is estimated as 9.6 million. 12% live in urban areas while 88% live in rural areas
- PNG's economy is dominated by a large, labour-intensive agricultural sector and a capital intensive mining and petroleum sector (consisting mostly of Crude Oil, liquefied natural gas (LNG), gold, copper, and silver extraction).



National Context (Cont.)

Climate Change Policies in PNG

- The Government of PNG (GoPNG) has developed long term and short term policies and legislation that addresses climate change.
- **Long term Policy**
  - I. Vision 2050
  - II. PNG Development Strategic Plan (DSP) 2010-2030
  - III. National Strategy for Responsible Sustainable Development (StaRS)
- **Short term Policy**
  - I. National Climate Compatible Development Management Policy
- **Legislation**
  - I. Climate Change (Management) Act
  - II. United Nations Paris Agreement (Implementation) Act

Institutional arrangement for report preparation

- The Climate Change and Development Authority (CCDA) is the National Designated Authority (NDA) that has been assigned responsibility to implement the UNFCCC and the Paris Agreement in collaboration with line agencies.
- CCDA as the single body is responsible for the overall coordination and management of the Biennial Update Report (BUR) and National Communication (NC) preparation process.
- Its' main responsibility is to provide the overall coordination for the preparation of BURs and NCs, with key tasks being to:
  - I. Plan and conduct all coordination and consultation activities with governmental and if appropriate, non-governmental stakeholders;
  - II. Identify all institutions and teams that will be involved in the preparation of the BUR or NC, and establish any formal working arrangements required;
  - III. Allocate responsibilities for all components of the BUR and NC, ensuring there is a clear lead for each section, and establish a formal approval process;
  - IV. Develop and monitor a timeline and schedule for BUR or NC preparation, including specific milestones and dates for deliverables
- CCDA, in cooperation with its stakeholders which consist of the private sector, non-governmental agencies, development partners and the government agencies completed and submitted PNG's BUR1 in April 2019.

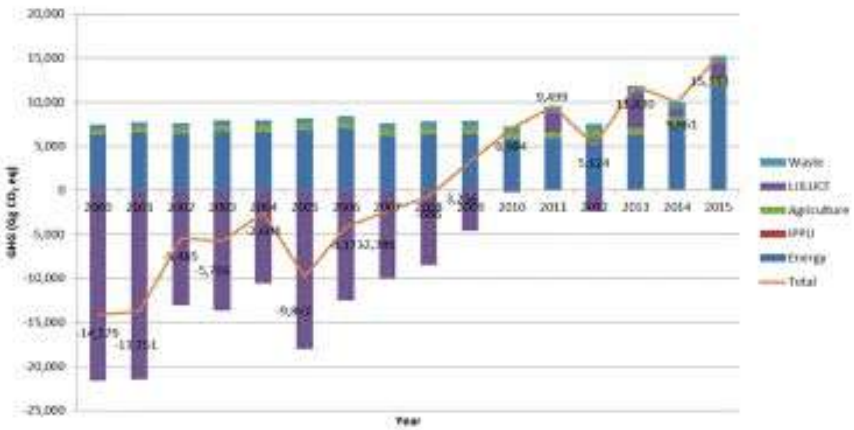
GHG Inventory

Methodology

- 2006 IPCC Guidelines
- GWP from the Second Assessment Report Values
- Years estimated – 2000 to 2015

Sector	Categories Estimated	Method Used	Data Source
Energy	1A (All) 1B1,1B2,1B3	Tier 1	International Source
IPPU	2D1 and 2G4	Tier 1	National Source
Agriculture	3A(All) 3C1,3C4,3C5,3C6, 3C7	Tier 1	National and International Source
LULUCF	3B1,3B2,3B3 and 3B5	Tier 1	National Source
Waste	4A,4B and 4D	4A –Tier 2 4B and 4D- Tier 1	National Source

GHG inventory



- PNG's emissions went from -14,179 Gg CO_2 eq in 2000 to 15,193 Gg CO_2 eq in 2015
- Sectoral Emissions in 2015 were
  I. Energy – 11,806 Gg CO_2 eq
  II. IPPU – 2 Gg CO_2 eq
  III. LULUCF – 1,716 Gg CO_2 eq
  IV. Agriculture – 796 Gg CO_2 eq
  V. Waste – 872 Gg CO_2 eq

Mitigation actions

Sectoral Mitigation Policies

- **LULUCF**

The main mitigation action in this sector is REDD+. The National REDD+ Strategy (NRS) 2017-2027 outlines three action areas

I. Strengthened and Coordinated National Level Development and Land Use Planning
II. Strengthened Environmental Management, Protection and Enforcement
III. Enhanced Economic Productivity and Sustainable Livelihoods

- **Agriculture**

The NCCDMP identifies two mitigation actions in this sector, although they have yet to be implemented

I. Reduce Green House Gas Emissions through improved Agricultural Practices
II. Protect agricultural land from urban and suburban encroachment

- **Energy**

The Vision 2050, PNG's NDC, NEP and NCCDMP identifies two mitigation actions in this sector

I. Provide 100 per cent power generation from renewable sources (Vision 2050, PNG's NDC, NEP
II. Energy Efficiency (NEP and NCCDMP)

- **Transport**

The NCCDMP and NRS identifies two mitigation actions in this sector, although they have yet to be implemented

I. Promote clean fuel technology and standards by establishing low carbon fuel standards
II. Regulation passed to set standards for greenhouse gas emissions from vehicles
III. Economic incentives for fuel efficient vehicles

- **Industrial Process and Product Use (IPPU)**

I. Regulation on Ozone Depleting Substances and Synthetic Green House Gas

- **Waste**

The NCCDMP and NRS identifies two mitigation actions in this sector, although they have yet to be implemented

I. Eco-Industrial Development

Mitigation actions (Cont.)

Mitigation Projects

- There are six quantitative mitigation projects reported in the BUR1, all of which are under the energy sector, and are as follows

I. Renewable energy from Geothermal Power project
II. Renewable energy generated from methane capture (Kumbango)
III. Renewable energy generated from methane capture (Mosa)
IV. Facilitating Renewable Energy & Energy Efficiency Applications for
V. Greenhouse Gas Emission Reduction
VI. EU-GIZ Adapting to Climate Change and Sustainable Energy (ACSE) Program
VII. RE generated from Biomass Project

Barriers and support needed and received

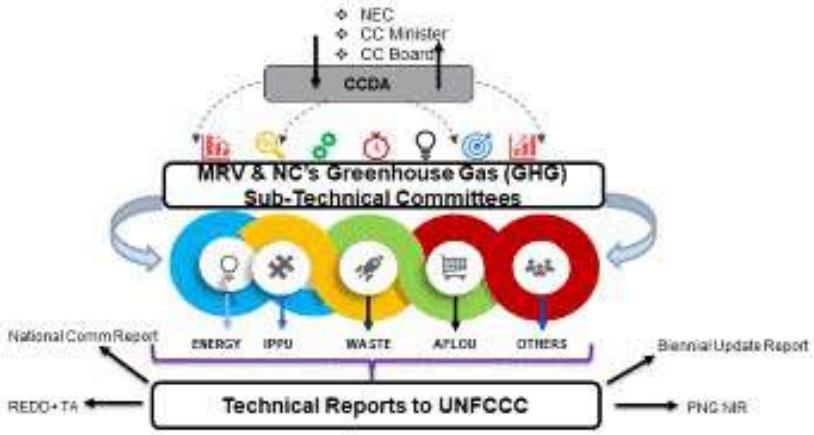
- **Barriers**
  I. Data sensitivity
  II. Limited budget to carry out climate change activities
  III. Ineffective institutional arrangement
  IV. Unavailability of data from data source
  V. Inaccurate and inconsistent data
  VI. No established monitoring system to monitor climate change activities in the country

- **Support needed**
  I. Further understanding of 2006 IPCC guidelines
  II. Mitigation analysis knowledge and skills

- **Support received**
  I. GEF/UNEP – Financial support for the preparation of the BUR1
  II. JICA – Technical support for Development of BUR1 and GHG inventory
  III. FAO – Technical and Financial support for AFOLU sector GHG inventory

Recent developments

- Establishment of AFOLU Sub-Technical Working Committee consisting of key government agencies to improve the AFOLU sector inventory.
- Establishment of Energy Sub-Technical Working Committee consisting of key government agencies and private companies to develop a national energy balance table and improve the energy sector inventory.
- Memorandum of Understanding for data provision



Experience and lessons learned in participating in the ICA process

- PNG now has a fair understanding of the ICA process.
- Enhanced understanding of the BUR reporting requirements under Decision 2/CP17.
- Clear understanding of what information should be reported in the BUR.
- Clear understanding of areas PNG needs to improve on to meet the reporting requirements.
- PNG is aware of the specific capacity building needs it would need to improve its MRV system.

Q&A

- PNG would like to thank those countries that provided written questions to BUR1 in the FSV portal.
- Due to time limitations, PNG will be able to provide answers to only three question. Answers to other questions will be provided in due course.

Category	Question(s)	Answer(s)
Mitigation actions and their effects	Canada congratulates Papua New Guinea on the publication of their first BUR and commends their use of the 2006 IPCC guidelines for their GHG inventory. Can you share any lessons learned from the preparation of this first publication, and how this may have an impact on your future climate policy and plans?	Having used the 2006 IPCC guidelines for the GHG inventory in the BUR1, PNG was able to identify the main emitting categories in PNG. Thus this assisted PNG with the development of its Enhanced NDC in terms of establishing realistic quantitative targets for these main emitting categories that the country may be able to achieve.
General	Since the submission of its first Biennial Update Report is Papua New Guinea able to report any further developments in its progress towards its commitment of 100% renewables by 2030?	The target or 100% renewables by 2030 is currently being reviewed and will be updated in the Enhanced NDC that will be submitted in December. The issue is that there were certain unforeseen circumstances that will have an impact on the 100% renewables target. In terms of progress, there are 10 renewable energy planned projects that will be developed between 2020-2030. The country has also identified 14 proposed renewable projects that will add on to the revised renewable energy target.

Q&A (cont.)

Category	Question(s)	Answer(s)
Mitigation actions and their effects	The BUR mentions the REDD+ Finance and Investment Plan being under development and due to be completed in 2019. Given the importance of REDD+ in achieving PNGs goals, can you provide an update on this plan?	The REDD+ Finance Investment Plan is indeed an essential part of the implementation of the National REDD+ Strategy. It has been drafted to focus on mapping specific needs, gaps and action areas within key sectors at the national and sub-national levels. Therefore in 2018, the GoPNG through the Climate Change & Development Authority, with the financial and technical support of the UNDP FCPF REDD+ Readiness project undertook a series of Sectoral Retreats held with Environment, Forestry, Lands, and Agriculture sector to enable work on costing sector based action plans. In July of 2018, a concept note on the Implementation of Papua New Guinea's REDD+ Finance Investment Plan was submitted to the Green Climate Fund to support elements of implementation from 2020 to 2030. However, given the nature of the concept note the GCF secretariat preferred that the concept note be fashioned to apply for a loan as opposed to a grant. Given the time elapsed since 2018, the RFIP is currently undergoing a financial and economic assessment of the proposed action areas within and should be finalized for Government endorsement through the National Executive Council by December 2020.

1-3 Achievement of Output

a. Output 1

The set of databases/spread sheet files for the GHG inventory for the BUR2 is almost finalized.

b. Output 2

No workshop was held during this reporting period.

c. Output 3

The draft of the national GHG inventory report for the BUR2 was finalized.

1-4 Achievement of the Project Purpose

The national GHG inventory report for the BUR2 will be finalized in June 2021.

1-5 Changes of Risks and Actions for Mitigation

PNG has restricted entry of foreign nationals since January 2020 due to Covid-19 pandemic, resulting that the JICA Project expert has not been able to visit PNG since March 2020. Though the JICA Project expert has remotely prepared the GHG inventory for the BUR2, on-site personnel cannot adequately proceed with the work due to lockdown measures. Thus, an agreement was made at the 3rd JCC to estimate GHG emissions based on the BUR1 data for items which were not able to be newly collected.

1-6 Progress of Actions undertaken by JICA

N/A

1-7 Progress of Actions undertaken by Gov. of PNG

N/A

1-8 Progress of Environmental and Social Considerations (if applicable)

N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

N/A

2　Delay of Work Schedule and/or Problems (if any)

2-1 Detail/Cause

The operation plan until completion of the project agreed at the 3rd JCC is going on schedule.

2-2 Action to be taken

N/A

2-3 Roles of Responsible Persons/Organization (JICA, Gov. of PNG, etc.)

N/A

Annex 8-9 Project Monitoring Sheet ver.9

TO CR of JICA　Papua New Guinea　OFFICE

Project Monitoring Sheet

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Version of the Sheet: Ver. 9（Term: May 2021 - October 2021）

Name: Takeshi Enoki

Title: GHG Inventory (General)

Submission Date: December 1, 2021

I. Summary

1　Progress

1-1 Progress of Inputs

Table 1 Input for term May~ October 2021

Inputs				Year	2021					
				Month	5	6	7	8	9	10
Expert	1	GHG Inventory（General）		Plan						
				Actual						
	2	GHG Inventory（Energy1）		Plan						
				Actual						
	3	GHG Inventory（Energy2）		Plan						
				Actual						
	4	GHG Inventory（Industrial Processes and Product Use）		Plan						
				Actual						
	5	GHG Inventory（Agriculture, Land use change and Forestry）		Plan						
				Actual						
	6	GHG Inventory（Waste）		Plan						
				Actual						
Activities in Japan	1	GHG Inventory （General）		Plan	24					
				Actual	24					
	2	GHG Inventory （Energy1）		Plan	14					
				Actual	14					
	3	GHG Inventory （Energy2）		Plan	26					
				Actual	26					
	4	GHG Inventory （Industrial Processes and Product Use）		Plan	22					
				Actual	22					
	5	GHG Inventory （Agriculture, Land use change and Forestry）		Plan	13					
				Actual	13					
	6	GHG Inventory （Waste）		Plan	1					
				Actual	1					
	7	Project administrative coordination / coordinator for training		Plan	0					
				Actual	0					
Plan Monitoring		Monitoring	Joint Coordinating Committee	Plan						
				Actual						
			Set-up the Detailed Plan of Operation	Plan						
				Actual						
			Submission of Monitoring Sheet	Plan						
				Actual						
		Reports/Documents	Work Plan	Plan						
				Actual						
			National GHG inventory Report	Plan						
				Actual						
			Project Progress Report	Plan						
				Actual						
			Project Brief Note	Plan						
				Actual						
			Project Completion Report	Plan						
				Actual						
		Public Relations	Establishment and operation of JICA TC website	Plan						
				Actual						

Experts

During this reporting period, the Japan International Cooperation Agency (JICA) Project expert team did not carry out activities in PNG due to the Covid-19 pandemic. Total man months during this reporting period was 5.0 for activities in Japan.

Reports

After confirming the progress of the Project with the CCDA, the JICA Project expert team submitted the fourth progress report in May 2021.

1-2 Progress of Activities

a. Overview of activities carried out in this term

The JICA Project expert team and CCDA completed the BUR2 GHG inventory for the energy, industrial processes and product use (IPPU), and waste sectors, estimating GHG emissions, drafting reports, and also drafting and revising the other chapters of the BUR2.

Table 2 shows an overview of the progress of activities for this reporting period.

Table 2 Overview of progress of activities

	Sub-Activities	Year	2021					
		Month	5	6	7	8	9	10
Output 1 : Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1.1: Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.	Plan						
		Actual						
	1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	Plan						
		Actual						
	1.3: Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).	Plan						
		Actual						
	1.4: Draft/Update a Memorandum of Understading between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.	Plan						
		Actual						
	1.5: Collect data necessary for national GHG inventories from relevant parties.	Plan						
		Actual						
	1.6: Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.	Plan						
		Actual						
	1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.	Plan						
		Actual						
	1.8: Complie national GHG inventories with time series consistency.	Plan						
		Actual						
	1.9: Draft/Update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).	Plan						
		Actual						
Output 2: Capacity to promote understanding of national GHG inventories is enhanced.	2.1: Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.	Plan						
		Actual						
	2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.	Plan						
		Actual						
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3.1: Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.	Plan						
		Actual						
	3.2: Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.	Plan						
		Actual						
	3.3: Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key catogories).	Plan						
		Actual						
	3.4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.	Plan						
		Actual						
	3.5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.	Plan						
		Actual						
	3.6: Draft and improve a national GHG inventory improvement plan (to be included in NIR).	Plan						
		Actual						
	3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	Plan						
		Actual						

b.　Output 1 activities

Overview

The GHG emissions for the energy, IPPU sectors, and waste sectors were completed during this reporting period. Additional research was carried out in the IPPU sector, specifically for the HFC emissions, with the support of an international consultant (activities 1.5~1.7). The JICA Project expert team and CCDA completed the draft inventory report and relevant sections of the BUR2 (activity 1.9).

Detail

Data collection and emission estimation for F gases (Activity 1.5~1.7)

Three sources of information were identified with Chinese export data (2015-2019) and PNG Customs import data (2019-2020) selected as most reliable for the GHG inventory. The PNG Customs data was selected as the primary source on the basis it would be a reliable and sustainable source of bulk HFC import data. The Chinese export data provided the necessary speciation of HFC with species ratios used to adjust PNG Customs data.

HFC emissions were estimated for years 2015 to 2020 with use of methods in the 2006 IPCC Guidelines and its 2019 Refinement. Reliable data for 2000 to 2014 were not available, so were not estimated as there is no sufficient basis for extrapolating into the past. The HFC emission trend is as shown in figure 1 below.

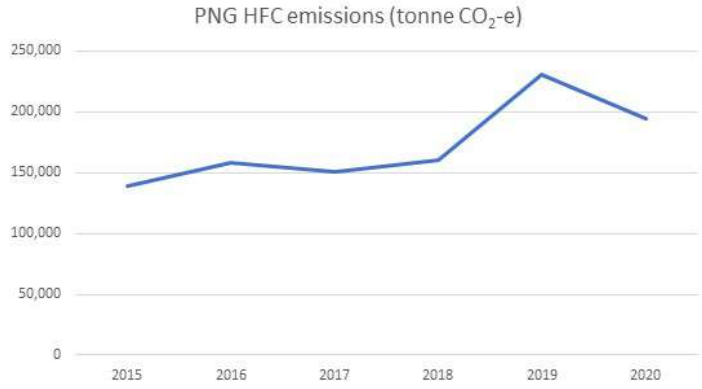


Figure 1 HFC emissions trend (2015-2020)

Notwithstanding the likely uncertainty in derived GHG emission estimates, guidance and direction provided by key stakeholders has provided a degree of confidence in the HFC emission estimates. Stakeholders have provided expert judgement on import sources and quantities and assumptions to enable the use of the preferred methodology to estimate GHG emissions. These stakeholders also provided direction on PNG's transition to a trajectory necessary for its commitments under the UNFCCC and the

Montreal Protocol including the Kigali Amendment.

Finalizing estimations (Activity 1.7 and 1.8)

The JICA Project experts completed the estimation files for the BUR2 GHG inventory. The new structure of the estimation files automatically calculates GHG emissions for the energy, IPPU, and waste sectors once activity data and emission factors have been updated in the raw data sheets. In addition, a separate inventory estimation system has been developed with a structure like the software by the IPCC for validation purposes and in case PNG shifts to using a software to estimate emissions in the future.

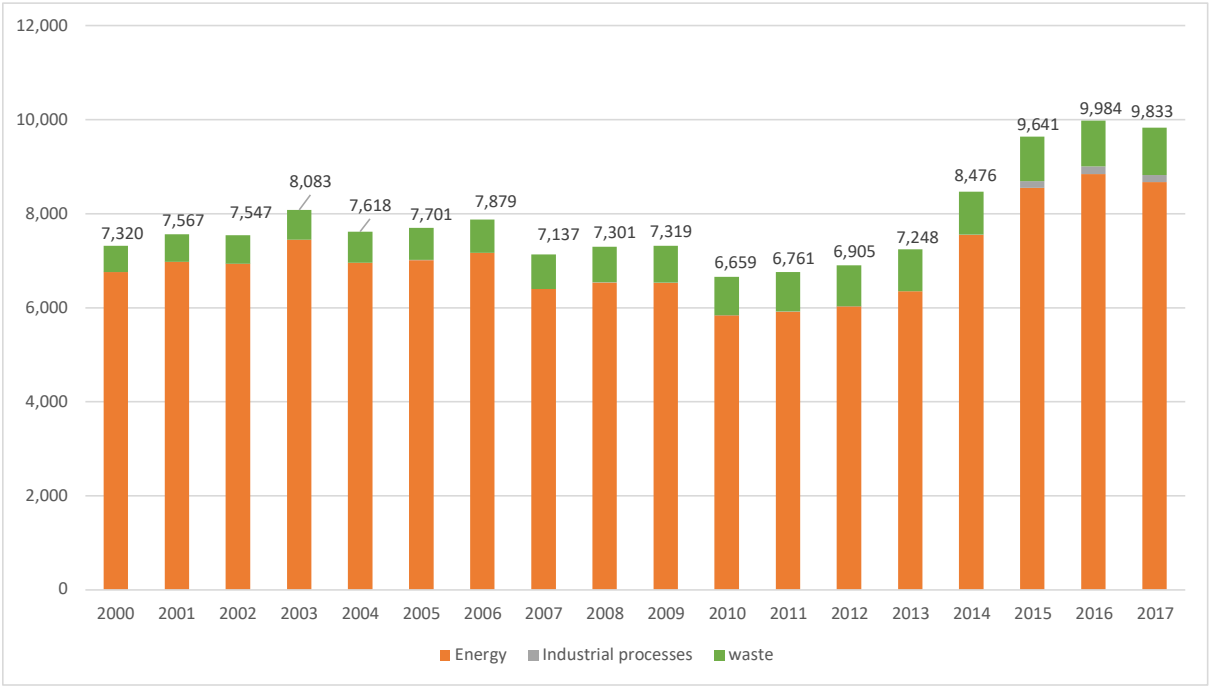


Figure 2 Emission trend for Energy, IPPU, and waste sectors

The total GHG emissions of the non AFOLU sectors, namely, energy, IPPU, and waste sectors for the year 2017 was 9,833 kt CO_2 equivalent as shown in figure 2. The level of emissions fluctuates from 2000 to 2013, but after 2014, the emissions have an increasing trend. Compared to year 2000, there is a 34% increase in year 2017. Of these emissions, the energy sector comprises approximately 90% of GHG emissions.

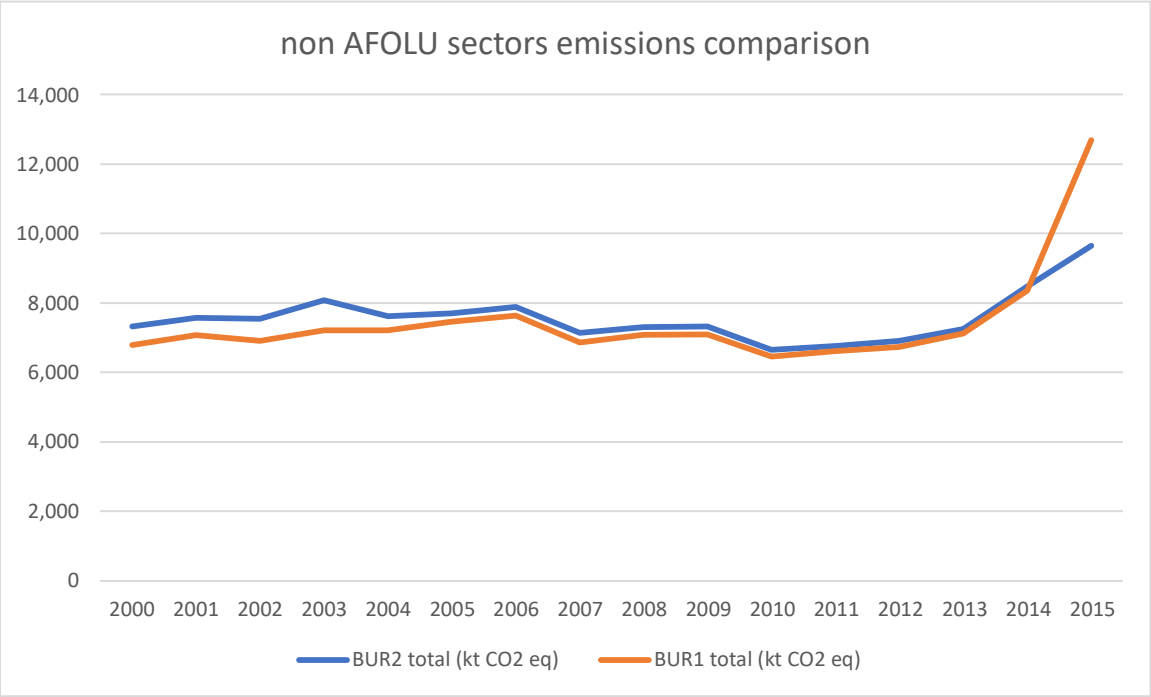


Figure 3 non AFOLU sector emission trend comparison between BUR1 and BUR2

Comparing the BUR1 GHG inventory and the BUR2 GHG inventory, the non AFOLU emissions for BUR2 is generally higher than that of BUR1 by 2.5% to 12% except for 2015, where the emissions reported in BUR1 is higher than BUR2 by 24%. The major reason for the large difference in 2015 is the recalculations performed in the energy sector, where there has been a revision in the energy balance table data, resulting in a change of fuel consumption by the subsectors the energy industries and the manufacturing industry and construction subsectors. As described above, there was also a significant improvement in the IPPU sector, where the HFC emissions were included in the GHG inventory for the first time for the years 2015 onwards. Other minor technical improvements have been made in the three sectors for BUR2 throughout the time series, improving the accuracy and completeness of the GHG inventory. Improvements such as these will need to be made in future inventories as this is fundamental principle of the Enhanced Transparency Framework under the Paris Agreement.

Preparation of draft of inventory report (Activity 1.9)

For the BUR2, a GHG inventory report has been drafted in addition to the summary document which will be the GHG inventory chapter of the BUR2. The inventory report includes estimation methods, used data, results, and improvements for each category, as well as inventory preparation structure, a preparation timeline, an overview of results. The

report is expected to be used as a preparation and update manual of the inventory for CCDA staff in the future. This is a critical tool to sustain the GHG inventory preparation capacity of CCDA in the future. In addition, this format will be the basis for PNG's GHG inventory submissions under the Paris Agreement, as it encompasses most components required for the Enhanced Transparency Framework reporting for GHG inventories.

c. Output 2 activities

No workshops were held during the reporting term.

d. Output 3 activities

i. Overview

The JICA Project expert used carried out the uncertainty analysis for the completed categories in the energy, IPPU, and waste sectors. Also, a file was developed to enable CCDA to carry out a key category analysis when they conclude their work on the AFOLU sectors. The results of the uncertainty analysis and the complete key category assessment will be included in the GHG inventory report. Although these are not mandatory reporting elements under the BUR, they are critical activities to continuously improve the GHG inventory, which is a fundamental principle of the enhanced transparency framework under the Paris Agreement.

ii. Detail

<u>key category analysis (activity 3.2)</u>

The JICA Project experts and CCDA developed a key category analysis file which lists all categories with its GHG emissions and removals so that a key category analysis can be carried out as described in the IPCC Guidelines. A complete analysis can only be carried out with the AFOLU sector categories, which are still under preparation by CCDA and its supporting partners. Below is an excerpt of the key category analysis for year 2017. Manufacturing industries and construction is the largest emitter in the GHG inventory due to the aggregated activity data of all industries in PNG. This is followed by CO_2 from road transportation, and fugitive CH_4 emissions the production of oil and gas.

Table 3 Excerpt of the key category analysis for year 2017

		category	Gas	most recent year emissions	% of total	cumulative %
1	1.A.2.	2. Manufacturing industries and construction	CO2	3764.012749	38.28%	38.28%
2	1.A.3.b	b. Road transportation	CO2	1519.163633	15.45%	53.73%
3	1.B.2.a.2	2. Production	CH4	855.5723379	8.70%	62.43%
4	1.A.1.c	c. Manufacture of solid fuels and other energy industries	CO2	575.454726	5.85%	68.28%
5	5.D.1	1. Domestic wastewater	CH4	503.4042898	5.12%	73.40%
6	1.A.3.a	a. Domestic aviation	CO2	398.143746	4.05%	77.45%
7	1.B.2.a.2	2. Production	CH4	394.8749716	4.02%	81.46%
8	1.A.4.c	c. Agriculture/forestry/fishing	CO2	313.2033432	3.19%	84.65%
9	5.A.1	2. Unmanaged waste disposal sites	CH4	272.5548186	2.77%	87.42%
10	5.D.1	1. Domestic wastewater	N2O	167.8259528	1.71%	89.13%
11	2.F.1	1. Refrigeration and air conditioning	HFC	150.6160175	1.53%	90.66%
12	1.A.1.a	a. Public electricity and heat production	CO2	131.5325088	1.34%	92.00%
13	1.A.1.b	b. Petroleum refining	CO2	122.4597132	1.25%	93.24%
14	1.A.4.b	b. Residential	CO2	89.5305312	0.91%	94.15%
15	1.A.4.b	b. Residential	N2O	69.26934996	0.70%	94.86%
16	1.A.4.a	a. Commercial/institutional	CO2	59.8098336	0.61%	95.47%
17	1.B.2.b.3	3. Processing	CH4	55.4472639	0.56%	96.03%
18	1.B.2.b.4	4. Transmission and storage	CH4	47.34073355	0.48%	96.51%
19	1.A.4.c	c. Agriculture/forestry/fishing	N2O	37.49137049	0.38%	96.89%
20	1.A.4.b	b. Residential	CH4	35.15681081	0.36%	97.25%
21	5.C.2	2. Open burning of waste	CO2	34.98955987	0.36%	97.61%
22	1.B.2.c.i	i. Oil	CO2	30.398345	0.31%	97.92%
23	1.A.3.d	d. Domestic navigation	CO2	29.1526884	0.30%	98.21%
24	1.B.2.c.ii	ii. Gas	CH4	27.51307272	0.28%	98.49%
25	1.A.3.b	b. Road transportation	N2O	24.06321432	0.24%	98.74%
26	1.B.2.b.5	5. Distribution	CH4	19.006974	0.19%	98.93%
27	5.C.2	2. Open burning of waste	CH4	17.67653093	0.18%	99.11%
28	1.A.4.a	a. Commercial/institutional	N2O	12.2976783	0.13%	99.23%
29	1.A.2.	2. Manufacturing industries and construction	N2O	12.03160716	0.12%	99.36%
30	1.B.2.c.ii	ii. Gas	CO2	11.8648455	0.12%	99.48%

※ the top 95% cumulative categories will be considered the key categories

Uncertainty assessment (activity 3.2)

An uncertainty assessment was carried out for all categories of the Energy, IPPU, and waste sector categories according to the IPCC Guidelines. All uncertainty figures for both activity data and emission factors are default figures as provided in the IPCC Guidelines. When uncertainty assessment for all AFOLU categories is complete, the CCDA can combine the uncertainty to derive the uncertainty of the entire GHG inventory. Below are the uncertainty figures for the energy sector categories.

Table 4 uncertainty assessment of the energy sector

	category	Gas	most recent year emissions	activity data uncertainty	Emission factor/estimation parameter uncertainty	combined uncertainty
			input data	input data	input data	$\sqrt{E^2+F^2}$
			kt CO2 eq	%	%	%
1.A.1.a	a. Public electricity and heat production	CO2	132	2%	4%	3.9%
1.A.1.b	b. Petroleum refining	CO2	122	13%	2%	12.6%
1.A.1.c	c. Manufacture of solid fuels and other en	CO2	575	13%	4%	13.0%
1.A.2.	2. Manufacturing industries and constructic	CO2	3,764	3%	1%	2.8%
1.A.3.a	a. Domestic aviation	CO2	398	13%	3%	12.9%
1.A.3.b	b. Road transportation	CO2	1,519	13%	1%	12.6%
1.A.3.d	d. Domestic navigation	CO2	29	13%	2%	12.7%
1.A.4.a	a. Commercial/institutional	CO2	60	13%	2%	12.7%
1.A.4.b	b. Residential	CO2	90	13%	2%	12.6%
1.A.4.c	c. Agriculture/forestry/fishing	CO2	313	13%	1%	12.6%
1.B.2.a.2	2. Production	CO2	1	12.5%	100%	100.8%
1.B.2.a.3	3. Transport	CO2	0.001	12.5%	100%	100.8%
1.B.2.b.2	2. Production	CO2	0.3	12.5%	100%	100.8%
1.B.2.b.3	3. Processing	CO2	0.8	12.5%	100%	100.8%
1.B.2.b.4	4. Transmission and storage	CO2	0.01	12.5%	105%	106.1%
1.B.2.b.4	Transmission	CO2	0.005	12.5%	100%	100.8%
1.B.2.b.4	Storage	CO2	0.001	12.5%	500%	500.2%
1.B.2.b.5	5. Distribution	CO2	0.05	12.5%	500%	500.2%
1.B.2.c.i	i. Oil	CO2	0.1	12.5%	50%	51.5%
1.B.2.c.ii	ii. Gas	CO2	0.02	12.5%	75%	76.0%
1.B.2.c.i	i. Oil	CO2	30	12.5%	50%	51.5%
1.B.2.c.ii	ii. Gas	CO2	12	12.5%	25%	28.0%

1-3 Achievement of Output

a.　Output 1

The set of databases/spread sheet files for the GHG inventory for the BUR2 for the energy, IPPU, and waste sectors have been completed. The GHG inventory report for the same sectors have been finalized.

b.　Output 2

No workshop was held during this reporting period.

c.　Output 3

The draft of the national GHG inventory report for the BUR2 was finalized.

1-4 Achievement of the Project Purpose

The national GHG inventory report for the BUR2 has been finalized.

The following is a summary of an assessment of the Project by CCDA and the JICA Project experts, under the five DAC evaluation criteria, namely relevance, effectiveness, efficiency, impact and sustainability. For each criterion, the Project was evaluated on a scale of “highly satisfactory”, “satisfactory”, “partially unsatisfactory”, and “unsatisfactory”.

Relevance is highly satisfactory. GHG inventories are the core component of the national communications and the BURs which allow policymakers to assess the GHG emission/removal trend of the country to help plan mitigation actions and monitor those actions. This is why GHG inventories will be a core reporting element of the Biennial Transparency Report (BTR), to be submitted by all Parties to the Paris Agreement, from 2024. The Project purpose is not only in line with the current reporting under the UNFCCC, but also in line with the reporting requirement under the Enhanced Transparency Framework under the Paris Agreement. Papua New Guinea has a number of policy frameworks, strategies, and policies to address climate change. Most recently, United Nations Paris Agreement (Implementation) Act (2016) addresses climate change issues and how to implement the country's obligations under the Paris Agreement. Climate change and the agreements under the UNFCCC such as the Kyoto Protocol or Paris Agreement is a priority issue for PNG. GHG inventories are the policy tool used in climate change policy and in the UNFCCC context, therefore, the relevance of this Project to PNG is extremely high.

Effectiveness is highly satisfactory. The means of verification of each output have been developed by the CCDA and JICA Project experts. Two sets of work plans, databases, and inventory reports have been developed, the second set an improvement from the first. These improvements in the deliverable products will make inventory compilation easier in future cycles. User friendliness has been a key consideration in developing the workplan, database, and inventory reports so that in case a new CCDA staff takes over the sector the following cycle, he/she can still update the material with even little to no expertise.

Efficiency is partly unsatisfactory. The JICA Project was planned as an efficient project, but due to some unforeseen circumstances and other challenges, such as COVID-19 pandemic and delays by CCDA in preparing the BUR1, the implementation of the Project was not as efficient as planned. The JICA Project scope of the inventory was all sectors, but as there were other donors that were supporting the CCDA with the AFOLU sector, the JICA Project focused on the non AFOLU sectors. Coordinating the work by the AFOLU team and the JICA Project expert team was a challenge as CCDA was not able to sufficiently manage the process or lead the coordination with donors. For the first cycle, the JICA Project team actively managed the inventory process for all sector to compile a complete national GHG inventory, but for the second, the JICA Project

experts focused on the non AFOLU sectors and allowed CCDA to coordinate with its donors to produce the AFOLU inventory. Improved coordination may have allowed the complete GHG inventory to be completed by the end of the JICA Project.

Impact is satisfactory. Regardless of the level of engagement by the CCDA staff in the second cycle, the staff have undergone two cycles of GHG inventory preparation and have a better understanding of the steps and the necessary approaches to prepare and compile an inventory. This learning by doing approach has installed some confidence in the staff and some ownership of their sector of the inventory. The Project has had a positive impact on other relevant stakeholders as well, the level of understanding of GHG inventories and the UNFCCC by relevant authorities has enhanced, and even actors who hadn't been identified by the Project have approached CCDA with questions on the GHG inventory. This improved presence of CCDA and the GHG inventory work has had a positive impact on PNG.

Sustainability is satisfactory. The GHG inventory and the BTR will need to be compiled and submitted under the Paris agreement. This international agreement will continue and PNG's commitment to the UNFCCC requirements is expected to continue in the future. As PNG develops and fleshes out the Paris Agreement Implementation Act and the NDC Regulation, institutions in PNG will be required to regularly support CCDA in preparing the GHG inventory and the BTR. In terms of the institutional arrangements, these are expected to be sustained as the Paris Agreement EFT begins its cycles starting with the submission of updated NDCs, monitoring progress with the BTRs, and the global stocktake under the UNFCCC. PNG has in place arrangements which will consider NDC implementation and GHG inventory preparation such as the Sub Technical Working Committees and any new institutions to be formed as part of the NDC Regulation. Therefore, sustainability from the policy and institutional aspect is very satisfactory.

The CCDA structure has weakened since the initiation of the Project. The manager position of the NC and MRV division was vacated at the start of the Project and two staff members left the CCDA in 2018, but no replacements were hired. The General Manager of CCDA was tasked to be both the overseer of the Project and the day-to-day manager, with five staff members each tasked with a sector of the GHG inventory. This structure changed some in 2020 with a promotion to the generalist/compiler/energy expert becoming the leader of the GHG inventory. While this structure within CCDA is more than seen in most developing countries where one or two staff are charged with overseeing the GHG inventory process, the CCDA staff are relatively young and are not closely supervised by a middle manager. Without the Project, the planning of work and monitoring of progress is a concern even though some staff have risen to the occasion to actively manage the process. Therefore, sustainability from an organizational aspect is partially

unsatisfactory.

PNG has an advantage over many other developing countries as it has a team of staff dedicated to the preparation of NCs and BURs. Staff has decreased since the JICA Project began, but there is no reason to believe that the budget for the division will be taken away in the future, taking into consideration the importance of climate change and the Paris Agreement to PNG. At the same time, the CCDA does rely on the GEF and donors to support the budget for some activities, and this dynamic is unlikely to change in the future. Therefore, sustainability from a financial aspect is satisfactory.

Through on the job training of the CCDA staff, they were able to grow as their respective sector leads and understand the process of the GHG inventory preparation. The level of growth by CCDA staff depends on the staff members, as the level of commitment was different between staff, and decreased while the JICA Project experts were no on the ground. Furthermore, due to COVID-19 restrictions, the level of training was limited during the second cycle of the GHG inventory project. However, inventory preparation tools were developed through the Project such as the GHG inventory TACCC review tool, the estimation files, and the national inventory report are fundamental tools serve as manuals for CCDA staff and should support the sustainability of the bottom-line technical competence of the GHG inventory compilers at CCDA. Therefore, sustainability from the technical aspect is partially unsatisfactory.

1-5 Changes of Risks and Actions for Mitigation

No changes to the risks and actions for mitigation. PNG has restricted entry of foreign nationals since January 2020 due to Covid-19 pandemic, resulting that the JICA Project expert has not been able to visit PNG since March 2020. Though the JICA Project expert has remotely prepared the GHG inventory for the BUR2, on-site personnel cannot adequately proceed with the work due to lockdown measures. Thus, an agreement was made at the 3rd JCC to estimate GHG emissions based on the BUR1 data for items which were not able to be newly collected.

1-6 Progress of Actions undertaken by JICA

N/A

1-7 Progress of Actions undertaken by Gov. of PNG

N/A

1-8 Progress of Environmental and Social Considerations (if applicable)

N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

N/A

2　Delay of Work Schedule and/or Problems (if any)

2-1 Detail/Cause

The operation plan until completion of the project agreed at the 3rd JCC was mainly on schedule.

The JICA Project experts were expecting CCDA to complete its AFOLU estimations to be completed by October so that the JICA Project experts and CCDA could incorporate the emission files and report into the inventory estimation file system and GHG inventory report, in addition to completing the key category analysis, uncertainty assessment, and estimating the total national GHG emissions and removals. However, due to delays in this regard, the final steps and the finalization will be carried out by CCDA after the Project duration.

2-2 Action to be taken

N/A

2-3 Roles of Responsible Persons/Organization (JICA, Gov. of PNG, etc.)

N/A

3　Modification of the Project Implementation Plan

3.1 Plan of Operation

No changes have been made to the Plan of Operation.

3-2 Other modifications on detailed implementation plan

The modified implementation plan agreed at the 3rd JCC is shown below.

		4				5				6				7			
1.1: Examine the arrangements and assess capacity of CCDA and other relevant parties.	JICA Project experts carry out a review of the capacity by the end of the Project. CCDA members will review the assessment results, and revisions will be made as necessary.																
1.2: Consider and recommend ways to improve the national GHG inventory arrangements.	JICA Project experts will develop a detailed improvement plan by the end of the Project. CCDA members will review the assessment results, and revisions will be made as necessary.																
1.3: Draft/Update workplan/guidebook/ checklist for preparing GHG inventories including QA/QC activities (part of NIR).	JICA Project experts will finalize draft QA/QC Plan in March. CCDA members will review the assessment results, and revisions will be made as necessary.																
1.4: Draft/Update a MoU for data provision.	MoU for data provision and for the Energy Sub-Technical Working Committee has been drafted and updated.																
1.5: Collect data necessary for national GHG inventories from relevant parties.	The energy sector has all data for BUR2, but CCDA will continue to work with the Energy Sub-Technical Working Committee members on a monthly basis, to plan the national energy balance table development, with the support of the JICA Project experts. CCDA will continue data collection for the other sectors.																
1.6: Develop/Update a database/data platform for estimating GHG emission/removals.	Database for energy sector complete. The JICA Project experts will develop a new database for IPPU and waste sectors and test using available data in March. CCDA members will review the assessment results, and revisions will be made as necessary.																
1.7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate emissions/removals.	Estimation file system for energy sector mostly done. JICA Project experts will develop similar estimation file system for IPPU and waste sectors in April. CCDA members will review the assessment results, and revisions will be made as necessary.																
1.8: Compile national GHG inventories with time series consistency.	JICA Project experts and CCDA will compile inventory using energy data and BUR1 IPPU/waste data.																
1.9: Draft/Update technical document of NIR.	CCDA will fill out NIR template for energy, IPPU and waste sectors with support from JICA Project experts.																
2.1: Conduct workshops on national GHG inventories.	The Inception workshop was held in 2017																
2.2: Conduct workshops on preparation for the national GHG inventories, methods, and their improvement.	The consultation workshop for the BUR1 was held in 2018, and the F gases workshop held in 2020.																
3.1: Study IPCC methods.	JICA Project experts can provide technical support to sectors as needed.																
3.2: Conduct key category analysis and uncertainty assessment.	Template for key category analysis and uncertainty assessment will be prepared by JICA Project experts. The JICA Project experts will conduct lectures on the two files.																
3.3: Collect and compile information and identify country/region emission factors and other relevant parameters	JICA Project experts will draft short paper on how to look for country specific parameters and will conduct lectures on the approach and the need for improving the accuracy of the inventory.																
3.4: Consider whether/how mitigation actions can be reflected in the GHG inventory to track the progress of targets.	JICA Project experts will work with CCDA to support mitigation chapter of BUR2 and carry out analysis of how actions could be reflected in the inventory																
3.5: Prepare guidebook/FAQ for ICA process and prepare document for the FSV process.	A guidebook for preparing for the ICA process including the FSV was developed in 2019.																
3.6: Draft and improve a national GHG inventory improvement plan (part of NIR).	JICA Project experts will develop a detailed improvement plan and will conduct lectures on the approach and the need for improving the accuracy of the inventory.																
3.7 Review summary of GHG inventory to be prepared by CCDA be included in the BUR/NC.	JICA Project experts will support BUR2 draft for sectors that are complete. CCDA will finalize the draft when estimations are complete.																

4 Current Activities of Gov. of PNG to Secure Project Sustainability after its Completion

N/A

II. Project Monitoring Sheet I & II *as Attached*

Monitoring Sheet I

Project Monitoring Sheet I （Revision of Project Design Matrix）

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Version 9

Implementing Agency: CCDA

Dated October 4, 2021

Target Group: CCDA

Period of Project: October 5 2017- October 4 2021

Project Site: Port Moresby, PNG　　**Model Site:**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories are prepared periodically.	1) A national GHG inventory is prepared every 2 years. 2) Items on TACCC checklist	・National GHG inventory report. ・TACCC assessment results of the checklist		none	none
Project Purpose					
The basic capacity of CCDA to periodically prepare TACCC (Transparent, accurate, consistent, comparable, complete) GHG inventories is strengthened.	1) A national GHG inventory report is developed for 2015 and 2017. 2) Items on TACCC checklist	・Reports of national GHG inventory (2015 and 2017) ・TACCC assessment results of the checklist	・Relevant agencies cooperate with CCDA.	A GHG inventory for 2000-2015 summary report was included in the BUR1. The inventory for 2000-2017 will be completed October 2021.	none
Outputs					
Output1：Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is enhanced.	1-1) General inventory compilation procedure(work plan) is documented. 1-2) Data for national GHG inventories are collected, archived and maintained. 1-3) Technical document on procedures of inventory compilation is drafted.	1-1) Work plan 1-2) Set of databases/spread sheet files for national GHG inventories 1-3) National GHG inventory report		GHG estimation files and summary report completed for the BUR1. The report for 2017 will be completed October 2021	none
Output2: Capacity to promote understanding of national GHG inventories is enhanced.	2-1) The average level of understanding of workshops: 70% or above.	2-1) Results of questionnaire			none
Output3. Capacity to technically assess the GHG inventory and to make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)	3-1) Results of key category analysis and uncertainty assessment are documented. 3-2) Improvements made and necessary improvements for the future are documented.	3-1) National GHG inventory report		A GHG inventory summary report was included in the BUR1. The report for 2017 will be completed October 2021	none

Activities	Inputs		Important Assumption
	The Japanese Side	The PNG Side	
1-1 : Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation. 1-2: Consider and recommend ways to improve the national GHG inventory arrangements. 1-3 : Draft/Update a work plan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]). 1-4: Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision. 1-5 : Collect data necessary for national GHG inventories from relevant parties. 1-6 : Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation. 1-7: Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors. 1-8 : Compile national GHG inventories with time series consistency. 1-9 : Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR). 2-1 : Conduct workshops for acquiring general knowledge on preparation of national GHG inventories. 2-2 : Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders. 3-1 : Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories. 3-2 : Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory. 3-3 : Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories). 3-4: Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets. 3-5: Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC. 3-6 : Draft and improve a national GHG inventory improvement plan (to be included in NIR). 3-7: Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.	1) Short term experts ・GHG inventory (General) ・GHG inventory (Energy) ・GHG inventory (Industrial Processes and Product use) ・GHG inventory (Agriculture) ・GHG inventory (Land use, Land use change and Forestry) ・GHG inventory (Waste) 2) Workshops 3) Training in Japan/third country 4) Equipment ・PC for data management	1) Counterpart personnel CCDA 2) Office space for the sector expert teams to work 3) Meeting space for group progress report meetings/seminars 4) Necessary operation costs	**Pre-Conditions** **<Issues and countermeasures>** none

Monitoring Sheet II

Project Monitoring Sheet II (Plan of Operation)

Version 9

Dated October 4, 2021

Project Title: The Project for enhancing capacity to develop a sustainable GHG inventory system for PNG

Inputs	Year	2017		2018				2019				2020				2021			Remarks	Monitoring: Issue	Monitoring: Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Expert																					
GHG inventory (General)	Plan	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	approximately 1 week to 2 weeks a quarter/expert	Due to the coronavirus situation, Japanese experts have not been to PNG since December 2019	JICA Project experts and CCDA used remote meeting applications in addition to the regular emails to make progress during the COVID-19 restrictions
	Actual	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
GHG inventory (Energy)	Plan	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
GHG inventory (Industrial Processes and Product use)	Plan	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
GHG inventory (Agriculture, Land use change and Forestry)	Plan	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
GHG inventory (Waste)	Plan	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
Project administrative coordination / coordinator for training	Plan																		support from Japan		
	Actual	■	■																		
Equipment																			All purchased in October 2017	none	none
PC for data management	Plan	■	■	■	■	■	■														
	Actual	■	■																		
Training in Japan																			1 week training, to be conducted in Japan as necessary. Deemed not necessary	none	none
Training for Counterpart on GHG inventories in Japan	Plan									■	■	■									
	Actual																				
In-country/Third country Training																			Not carried out as facilitative sharing of views workshop was held remotely.	none	none
Training for Counterpart on GHG inventories in developing country	Plan												■	■	■						
	Actual																				

Duration / Phasing																					
	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual																				

Monitoring Plan	Year	2017		2018				2019				2020				2021			Remarks	Issue	Solution
		III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Monitoring																					
Joint Coordinating Committee	Plan		■				■				■				■			■		none	none
	Actual				■					■						■					
Set-up the Detailed Plan of Operation	Plan	■																		none	none
	Actual		■																		
Submission of Monitoring Sheet	Plan	■			■			■			■				■					none	none
	Actual		■		■		■	■			■				■		■				
Reports/Documents																					
Work Plan	Plan	■																		none	none
	Actual		■																		
National GHG inventory Report	Plan										■							■		none	none
	Actual																		■		
Project Progress Report	Plan								■				■				■			none	none
	Actual							■													
Project Brief Note	Plan																	■		none	none
	Actual																				
Project Completion Report	Plan																	■		none	none
	Actual																				
Public Relations																					
Establishment and operation of JICA TC website	Plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Actual		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			

Activities / Sub-Activities		Year	2017		2018				2019				2020				2021			Responsible Organization		Achievements	Issue & Countermeasures
			III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	Japan	GOPNG		
Output 1: Capacity to periodically and systematically prepare the national GHG inventories including implementation of QA/QC procedures is																							
1.1 Examine the existing arrangements for preparing national GHG inventories in PNG and assess current capacity of CCDA and other relevant parties involved in the preparation.		Plan																		JICA	CCDA	none	none
		Actual																					
1.2 Consider and recommend ways to improve the national GHG inventory arrangements.		Plan																		JICA	CCDA	none	none
		Actual																					
1.3 Draft/Update a workplan/guidebook/checklist for preparing national GHG inventories including cross cutting QA/QC activities (to be part of the national GHG inventory report [NIR]).		Plan																		JICA	CCDA	completed QA/QC Plan	none
		Actual																					
1.4 Draft/Update a Memorandum of Understanding between CCDA and data providers to clarify the roles and responsibilities in addition to the general schedule of data provision.		Plan																		JICA	CCDA	none	none
		Actual																					
1.5 Collect data necessary for national GHG inventories from relevant parties.		Plan																		JICA	CCDA	none	none
		Actual																					
1.6 Develop/Update a database/data platform, consisting of parameters used in the GHG emission/removal estimation.		Plan																		JICA	CCDA	none	none
		Actual																					
1.7 Use 2006 IPCC Guidelines software and/or spreadsheets to estimate GHG emissions/removals from each of the sectors.		Plan																		JICA	CCDA	none	none
		Actual																					
1.8 Compile national GHG inventories with time series consistency.		Plan																		JICA	CCDA	none	none
		Actual																					
1.9 Draft/update technical document on procedures of inventory compilation and each sector's QA/QC activities (to be part of the NIR).		Plan																		JICA	CCDA	none	none
		Actual																					
Output 2:Capacity to promote understanding of national GHG inventories is enhanced.																							
2.1 Conduct workshops for acquiring general knowledge on preparation of national GHG inventories.		Plan																		JICA	CCDA	none	none
		Actual																					
2.2 Conduct workshops on preparation for the national GHG inventories, methods, and their improvement in addition to presentation on the progress of inventory preparation to the appropriate stakeholders.		Plan																		JICA	CCDA	none	none
		Actual																					
Output 3: Capacity to technically assess the GHG inventory and make improvements is enhanced for each sector (energy, industrial processes, agriculture, land use, land-use change and forestry, waste)																							
3.1 Study IPCC methods for preparing activity data and emission factors and for implementing data compilation and QA/QC for each sector of the national GHG inventories.		Plan																		JICA	CCDA	none	none
		Actual																					
3.2 Conduct key category analysis and uncertainty assessment to identify categories which should be given priority in improving the inventory.		Plan																		JICA	CCDA	none	none
		Actual																					
3.3 Collect and compile information and identify emission factors and other relevant parameters that better reflect national or regional circumstances (in prioritized key categories).		Plan																		JICA	CCDA	none	none
		Actual																					
3.4 Consider whether/how mitigation actions including NAMAs can be reflected in the GHG inventory to track the progress of PNG in achieving its NDC targets.		Plan																		JICA	CCDA	completed mitigation actions reporting format for BUR2	none
		Actual																					
3.5 Prepare a guidebook/FAQ for the international consultation and analysis process and prepare document for the facilitative sharing of views process under the UNFCCC.		Plan																		JICA	CCDA	Guidebook/FAQ for ICA process completed.FSV presentation support	none
		Actual																					
3.6 Draft and improve a national GHG inventory improvement plan (to be included in NIR).		Plan																		JICA	CCDA	none	none
		Actual																					
3.7 Review summary of the GHG inventory to be prepared by CCDA be included in the BUR/NC.		Plan																		JICA	CCDA	none	none
		Actual																					