SOCIALIST REPUBLIC OF VIET NAM
MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT

THE SECOND BIENNIAL UPDATED REPORT OF VIET NAM TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

HA NOI, 2017

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ABBREVIATIONS

AFD	Agence Française de Développement
AU$	Australian Dollar
AusAID	Australian Agency for International Development
BAU	Business As Usual
BMUB	German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
BUR	Biennial Updated Report
BUR1	The Initial Biennial Updated Report of Viet Nam to the UNFCCC
BUR2	The Second Biennial Updated Report of Viet Nam to the UNFCCC
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CIDA	Canadian International Development Agency
CO_2e	Carbon dioxide equivelant
DKK	Danish Krone
DOIT	Department of Industry and Trade
DTU	Technical University of Denmark
EB	Executive Board of CDM
EE	Energy Efficiency
EUR	Euro
FAO	Food and Agriculture Organization of the United Nations
FIRM	Facilitating Implementation and Readiness for Mitigation
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GHG	Greenhouse Gas
GNI	Gross National Income
GSO	General Statistics Office
GWP	Global Warming Potential
IE	Included Elsewhere
INC	The Initial National Communication of Viet Nam to the UNFCCC
IPCC	Intergovernmental Panel on Climate Change
ISPONRE	Institute of Strategy and Policy on Natural Resources and Environment
JCM	Joint Crediting Mechanism
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
KCA	Key Categories Analysis
KP	Kyoto Protocol

LEAP	Long-range Energy Alternatives Planning
LED	Light-emitting Diode
LPG	Liquefied Petroleum Gas
LULUCF	Land use, Land use change and Forestry
MARD	Ministry of Agriculture and Rural Development
MOC	Ministry of Construction
MOF	Ministry of Finance
MOIT	Ministry of Industry and Trade
MONRE	Ministry of Natural Resources and Environment
MOST	Ministry of Science and Technology
MOT	Ministry of Transport
MPI	Ministry of Planning and Investment
MRV	Measurement, Reporting and Verification
NA	Not applicable
NAMA	Nationally Appropriate Mitigation Action
NDC	Nationally Determined Contribution
NE	Not Estimated
NIR	National Greenhouse Gas Inventory Report
NO	Not Occurring
PA	Paris Agreement
ODA	Official Development Assistance
QA	Quality Assurance
QC	Quality Control
RE	Renewable energy
REDD+	Reducing Emissions from Deforestation and Forest Degradation as well as conservation, sustainable management of forests and enhancement of forest carbon stocks
SNC	The Second National Communication of Viet Nam to the UNFCCC
SP-RCC	Support Program to Respond to Climate Change
TNC	The Third National Communication of Viet Nam to the UNFCCC
UNDP	United Nations Development Programme
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
US$	United States Dollar
VND	Viet Nam Dong
WB	World Bank

CHEMICAL FORMULA

CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
HFCs	Hydrofluorocarbons
NO_x	Oxides of nitrogen
NMVOC	Non-Methane Volatile Organic Compounds
NO	Nitrous oxide
NH_3	Ammonia
PFCs	Perfluorocarbons
SO_x	Sulfur dioxide
SF_6	Sulfur hexafluoride

UNIT

°C	Degree Celsius
kg	Kilogram
cm	Centimeter
m	Meter
km	Kilometer
m^2	Meter square
km^2	Kilometer square
m^3	Meter cubic
ha	Hectare
t	Tonne
kt	Thousand tonnes
Mt	Million tonnes
tCO_2	Tonnes of Carbon dioxide
tCO_2e	Tonnes of Carbon dioxide equivelant
$ktCO_2e$	Thousand tonnes of Carbon dioxide equivelant
$MtCO_2e$	Million tonnes of Carbon dioxide equivelant
TOE	Tonnes of oil equivalent
kW	Kilowatt
kWh	Kilowatt per hour
MW	Megawatt
MWh	Megawatt per hour
TJ	Terajoule
GJ	Gigajoule

FOREWORD

In pursuance of Decision No. 2/CP.17 dated March 15th, 2012 of the 17th Conference of the Parties to the UNFCCC, Ministry of Natural Resources and Environment, the National Focal Point of the Government of Viet Nam to implement the UNFCCC, Kyoto Protocol and Paris Agreement as well as the Standing Office of the National Climate Change Committee, in coordination with the line ministries and agencies has developed the Second Biennial Updated Report of Viet Nam to submit to the UNFCCC with sponsorship from such international organizations as GEF and UNEP.

The Second Biennial Updated Report of Viet Nam to the UNFCCC, developed according to the Guidelines of the UNFCCC and IPCC, presents the latest information on the national circumstances of Viet Nam, including: the National greenhouse gas inventory for base year of 2013; mitigation actions; financial needs, and technical support and capacity-building in order to update the Initial Biennial Updated Report of Viet Nam to the UNFCCC in November 2014.

The development of the Second Biennial Updated Report of Viet Nam contributes to meeting Viet Nam's obligations as a developing Party to the UNFCCC as well as representing our determination and active efforts to respond to climate change. The report also shows our contributions to implementing the Paris Agreement, joining the international community to fulfill the ultimate goals of the UNFCCC and the Paris Agreement that aim at keeping global average temperature rise at the end of this century to below 2°C above pre-industrial levels.

The Ministry of Natural Resources and Environment has the honour to present the Second Biennial Updated Report of Viet Nam to the UNFCCC and requests central and local management agencies to take this as a reference in the process of planning and developing policies and programs to respond to climate change and sustainable development in Viet Nam in years to come.

H.E. Tran Hong Ha
Minister of Natural Resources and Environment

CHAPTER 1. NATIONAL CIRCUMSTANCES

1.1. Natural conditions

1.1.1. Geography

Viet Nam is located in Southeast Asia and stretches from latitude 8°27′ to 23°23′ N and longitude 102°08′ to 109°30′ E. Viet Nam's territory borders China to the North, Lao PDR and Cambodia to the West, and the East Sea (Biển Đông) to the East, South and Southwest. Viet Nam has a coastline of 3,260 km and over one million km^2 of sea waters, including two major archipelagos, Hoang Sa (part of Da Nang City) and Truong Sa (part of Khanh Hoa province) and over 3,000 large and small islands along the coastline. Viet Nam, with its S-shaped strip of land, occupies approximately 331,230.8 km^2.[1] Viet Nam has two major deltas, the Mekong River Delta and the Red River Delta. Viet Nam is known as one of the richest countries in biodiversity in the world, with many types of ecosystems, and fauna and flora species with rich and endemic gene sources.

Ha Noi is Viet Nam's capital and political, cultural, scientific and educational centre. Ha Noi has an area of 3,358.9 km^2 and a population of 7.328 million with a population density of 2,182 persons/km^2.[2]

1.1.2. Climate

Viet Nam has a tropical monsoon climate. The highest annual average temperature is 27.7°C and the lowest is 12.8°C.

Average annual rainfall is from 600mm to 5,000mm, most frequently from 1,400mm to 2,400mm. About 80-90% of the rainfall occurs during the rainy season. The number of rainy days throughout the year is about 60-200.

The total number of sunshine hours is about 1,700-2,500 hours per year. Annual average relative humidity is around 80-85%.

1.2. Social, economic and environmental overview

1.2.1. Population

Some characteristics of Viet Nam's population are shown in Table 1.1.

Table 1.1. Some characteristics of Viet Nam's population

Year	Total population (thousand persons)	Growth rate (%)	Gender (%)		Urban and rural area (%)	
			Male	Female	Urban	Rural
2011	87,860.4	1.05	49.45	50.55	31.55	68.45
2012	88,809.3	1.08	49.44	50.56	31.83	68.17
2013	89,759.5	1.07	49.43	50.57	32.17	67.83
2014	90,728.9	1.08	49.33	50.67	33.10	66.90
2015	91,709.8	1.08	49.31	50.69	33.88	66.12

Source: Statistical Yearbook of Viet Nam 2016, GSO, 2017

[1&2] Statistical Yearbook of Viet Nam 2016

1.2.2. Economy

The growth rate of Gross Domestic Product (GDP) in 2011 reached 6.24%, but fell to 5.25% in 2012, after which it rose to 5.42% in 2013, to 5.98% in 2014 and to 6.68% in 2015. GDP in 2013 increased by 5.42%, of which agriculture, forestry and fishing sector rose by 2.67%; industry and construction sector by 5.43%; service sector by 6.56%.

On average, for the 5 years 2011-2015, GDP increased 5.91% per year; within that overall growth the agriculture, forestry and fishing sector achieved 3.12% per year, the industry and construction sector reached 7.22% per year and the service sector reached 6.68% per year. The economic structure shifted to reflect the trends of a decreasing proportional contribution from the agriculture, forestry and fishing sector and the increasing proportion from the industry, construction and service sectors.

GDP per capita at current prices increased from US$ 1,517/person in 2011 to US$ 1,748/person in 2012 and US$ 1,907/person in 2013, US$ 2,052 in 2014 and US$ 2,109 in 2015. GDP at current prices by economic sectors for the period of 2011-2015 are shown in Table 1.2.

Table 1.2. GDP at current prices by economic sectors

Unit: VND billion

Year	Total	Of which			
		Agriculture, forestry and fishing	Industry and construction	Service	Product taxes less subsidies on production
2011	2,779,880	543,960	896,356	1,021,126	318,438
2012	3,245,419	623,815	1,089,091	1,209,464	323,049
2013	3,584,262	643,862	1,189,618	1,388,407	362,375
2014	3,937,856	696,969	1,307,935	1,537,197	395,755
2015	4,192,862	712,460	1,394,130	1,665,962	420,310

Sources: Viet Nam Socio-economic reports 2011-2015, GSO, 2012-2016
Statistical Yearbook of Viet Nam 2016, GSO, 2017

Gross National Income (GNI) at current prices in the period of 2011-2015 showed a gradual increase (Table 1.3).

Table 1.3. GNI at current prices

Year	GDP (VND billion)	GNI (VND billion)	Net income from abroad (VND billion)	GNI over GDP (%)
2011	2,779,880	2,660,076	-119,804	95.69
2012	3,245,419	3,115,227	-130,192	95.99
2013	3,584,262	3,430,668	-153,594	95.71
2014	3,937,856	3,750,823	-187,033	95.25
2015	4,192,862	3,977,609	-215,253	94.87

Source: Statistical Yearbook of Viet Nam 2016, GSO, 2017

The export turnover of goods in 2013 achieved US$ 132 billion, an increase of about US$ 17.5 billion compared with that in 2012. Total exports and imports of goods in the period of 2011-2015 are presented in Table 1.4.

Table 1.4. Total exports and imports of goods

Unit: US$ million

Year	Total	Of which		
		Exports	Imports	Balance (exports minus imports)
2011	203,655.5	96,905.7	106,749.8	-9,844.1
2012	228,309.6	114,529.2	113,780.4	748.8
2013	264,065.5	132,032.9	132,032.6	0.3
2014	298,066.2	150,217.1	147,849.1	2,368.0
2015	327,792.6	162,016.7	165,775.9	-3,759.2

Source: Statistical Yearbook of Viet Nam 2016, GSO, 2017

In the period of 2011-2015, many measures to curb inflation were implemented. Inflation decreased from 13.62% in 2011 to 8.19% in 2012 and to 4.77% in 2013, 3.31% in 2014 and 2.05% in 2015. The significant reduction of inflation in this period was one of the primary factors contributing to macroeconomic stability in Viet Nam.

The total social development investment at current prices by types of ownership is indicated in Table 1.5.

Table 1.5. Total social development investment at current prices by types of ownership

Unit: VND billion

Year	Total	Of which		
		State economy	Non-State economy	Foreign invested sector
2011	924,495	341,555	356,049	226,891
2012	1,010,114	406,514	385,027	218,573
2013	1,094,542	441,924	412,506	240,112
2014	1,220,704	486,804	468,500	265,400
2015	1,366,478	519,878	528,500	318,100

Source: Statistical Yearbook of Viet Nam 2016, GSO, 2017

The total area of paddy in 2013 was about 7.9 million ha, an increase of 141 thousand ha compared to 2012. The total production of paddy in 2013 was 44 Mt, an increase of 301 kt compared to 2012.

The total area of forest in 2013 was 13,954,400 ha (an increase of 92,000 ha compared to 2012) with the proportion of forest coverage of 41.0%, of which the area of natural forest was 10,398,100 ha and the area of planted forest was 3,556,300 ha. The area of new concentrated planted forest by types of forest in 2013 was 227,100 ha, an increase of 40,100 ha compared to 2012.

The total area of water surface for aquaculture in 2013 was 1,046.4 thousand ha, an increase of 7.5 thousand ha compared to 2012. Total production of fishery in 2013 was 6,019.7 kt, an increase of 199 kt compared to 2012.

The transport of passengers in 2013 reached 2,839.9 million persons (an increase of 163.4 million persons compared with that in 2012). The volume of freight transported in 2013 was 1,010.4 Mt (an increase of 49.3 Mt compared with that in 2012).

The number of foreign visitors to Viet Nam in 2013 reached 7,572.4 thousand persons, increasing 724.7 thousand persons in comparison with that in 2012, of which number of visitors coming by airway was 5,980 thousand persons, by waterway 193.3 thousand persons and by roadway 1,399.1 thousand persons.

The Index of Industrial Production (IIP) by industrial activity in 2013 grew 5.9% over 2012, of which manufacturing activity rose by 7.6%; electricity, gas and air-conditioning supply grew by 8.4%; water supply, sewerage, waste management and remediation activities increased 9.5% while mining and quarrying decreased by 0.6%. The productivity of some major industrial products in 2013 increased slightly compared to 2012; for example, cement production increased by 1%, steel by 1.1% and electricity by 1%.

Total primary energy consumption by types of energy in 2010, 2013 and 2014 is shown in Table 1.6.

Table 1.6. Total primary energy consumption by types of energy

Unit: KTOE

Types of energy / Year	Coal	Crude oil	Total oil products	Natural gas	Non -commercial energy	Hydro power	Electricity	Total
2010	14,730	6,630	10,689	8,316	13,890	2,369	399	**57,023**
2013	17,239	6,918	7,757	8,522	13,673	4,468	200	**58,777**
2014	19,957	8,248	9,453	9,124	12,745	5,146	124	64,797

Source: Viet Nam Energy Statistics 2014, Institute of Enerrgy, 2016

Total end-use energy consumption by types of energy in 2010, 2013 and 2014 is presented in Table 1.7.

Table 1.7. Total end-use energy consumption by types of energy

Unit: KTOE

Types of energy / Year	Coal	Total oil products	Natural gas	Non-commercial energy	Electricity	Total
2010	9,893	15,723	493	13,875	7,461	47,445
2013	10,559	14,971	1,460	13,628	9,988	50,606
2014	11,457	15,592	1,458	12,696	11,045	52,248

Source: Viet Nam Energy Statistics 2014, Institute of Enerrgy, 2016

Regarding international economic integration, Viet Nam has carried out renovation and accelerated regional and international economic integration, has undertaken expansion of trade relations, and export of goods to more than 230 markets across many countries and territories, and has signed over 90 Bilateral Trade Agreements, nearly 60 Investment Promotion and Protection Agreements, and 54 Double Taxation Avoidance Agreements. Viet Nam has active cooperation with international monetary organizations such as the Asian Development Bank (ADB), the World Bank (WB) and the International Monetary Fund (IMF).

Viet Nam has been actively participating in and promoting its role in international and regional organizations such as the World Trade Organization (WTO), the Asia-Pacific Economic Cooperation (APEC), the Association of Southeast Asian Nations (ASEAN) and the Asia-Europe Meeting (ASEM).

Viet Nam is also active in negotiating and signing Free Trade Agreements (FTAs) with many countries.

1.2.3. Society

Some important results and key indicators which have obtained in social issues in the period of 2011-2015 are introduced in Table 1.8.

Table 1.8. Some important results and key indicators obtained in social issues in the period of 2011-2015

Indicator	Year				
	2011	2012	2013	2014	2015
The unemployment rate of labour force at working age in urban areas (%)	3.60	3.21	3.59	3.40	3.37
The rate of poor households (%)	12.60	11.10	9.80	8.40	7.00
The percentage of literate population at 15 years of age and above (%)	94.20	94.70	94.80	94.70	94.90
Human Development Index (HDI)	0.662*	0.662	0.667	0.682	0.688
The national average life expectancy at birth	73.0	73.0	73.1	73.2	73.3

**Report on human development 2016, UNDP, 2016*

Source: Statistical Yearbook of Viet Nam 2016, GSO, 2017

The total expense spent for social security, hunger elimination and poverty reduction in 2013 was VND 2,929 billion. Additionally, local authorities granted over 7.4 million health insurance cards for persons under social policy to consult medical doctors free of charge. The total life insurance premium revenue of Viet Nam's insurance market in 2013 reached VND 44.4 trillion, an increase of 7.6% compared with last year[3].

In general, in spite of confronting many difficulties and challenges, the socio-economic situation in Viet Nam in 2013 and in the period of 2011-2015 overall, developed in positive directions and made new achievements in several aspects. Macroeconomic balances basically remained stable. Inflation was curbed and controlled. Some key economic industries and socio-economic sectors made significant advances. Social security was assured, and both cultural and living standards of the people have been improved.

1.2.4. Environment

By 2015, out of a total of 283 industrial zones operating in the country, 212 have completed concentrated wastewater treatment systems (74.9%), and 24 are under construction (11.5%).

The average rate of solid waste collection and treatment in urban areas during the period of 2013-2014 is about 84-85%, an increase of about 3-4% compared to that of 2008-2010. The rate of hazardous waste collection and treatment in 2014 is about 40% of the total amount nationwide, and has increased by 93.4% compared to 2012.

The rate of households with clean and hygienic water supply increased from 91% in 2012 to 93% in 2014.

[3]Statistical Yearbooks of Viet Nam 2014, 2015, 2016; Viet Nam Socio-economic report 2013

In order to implement the sustainable development goals of the United Nations 2030 Agenda adopted by the General Assembly of the United Nations in September 2015 and to continue to promote the socio-economic development of the country, the Prime Minister of Viet Nam's Government issued in May 2017 a National Action Plan for implementing the 2030 Agenda for Sustainable Development. The overall objective of this Action Plan is to: "Maintain sustainable economic growth coupled with the promotion of social and equitable advancement and ecological environment protection, management and effective use of natural resources, and proactive response to climate change; ensure every individual fully develops their potential, participates in and equally benefits from development achievements; and thus build a peaceful, prosperous, inclusive, democratic, equitable, civilized and sustainable Viet Nam society".

1.3. Some policies relating to climate change

In recent years, Viet Nam has issued a number of policies, programs and plans relating to climate change:

- Law on Environmental Protection No. 55/2014/QH13 (National Assembly of the Socialist Republic of Viet Nam, Session XIII adopted on June 23rd , 2014). The particular content responding to climate change is at Chapter IV of the Law.

- Law on Meteorology and Hydrology No. 90/2015/QH13 (National Assembly of Socialist Republic of Viet Nam, Session XIII adopted on November 23rd, 2015). The basic contents of this Law includes "Climate change monitoring; climate change impact assessment; evaluation of adaptation and mitigation measures; national climate assessment; periodical development and publication of climate change scenarios; integration of climate change monitoring into socio-economic development strategies and plans".

- Resolution No. 08/NQ-CP dated January 23rd, 2014 by the Government issued the Government's action program to implement Resolution No. 24-NQ/TW dated June 3rd, 2013 of the Central Committee of the Party, session XI, on active response to climate change, strengthening natural resources management and environmental protection. The program identifies the key tasks and key measures of the Government in actively responding to climate change, enhancing resource management and environmental protection to mitigate the impacts of climate change; exploiting and using national resources reasonably, efficiently and sustainably; improving the quality of the living environment and ensuring ecological balance, towards the goal of sustainable development of the country.

- Decision No. 403/QD-TTg dated March 20th, 2014 of the Prime Minister approving the National Green Growth Action Plan for the period of 2014-2020. The plan covers four key themes (Local Institutional Development and Green Growth Planning; Greenhouse Gas Emission Reduction and Promotion of the Use of Clean Energy and Renewable Energy; Green Production; Green Living and Sustainable Consumption), 12 activity groups and 66 specific action missions.

- Decision No. 2068/QD-TTg dated November 25th, 2015 of the Prime Minister approved Viet Nam's Renewable Energy Development Strategy up to 2030 with a vision to 2050. This strategy provides direction to gradually increase the share of renewable energy (RE) sources in national energy production and consumption in order to reduce dependence on fossil fuels, contributing to energy security and mitigation of climate change, climate and environmental protection and sustainable socio-economic development. Some key objectives of the strategy are to "increase the share of RE in total national electricity production from about 35% in 2015 to around 38%

by 2020, to around 32% in 2030 and about 43% by 2050" and "reduce greenhouse gas emissions in energy activities compared to normal development: about 5% by 2020; 25% by 2030 and 45% by 2050".

- Resolution No. 63/NQ-CP dated July 22nd, 2016 of the Government issued the Government's Action Program to implement the National Assembly's Resolution on the 5-year socio-economic development plan for the period of 2016-2020 and the Resolution No. 64/NQ-CP dated July 22nd, 2016 issued the Government's Action Program to implement the Resolution of the XII National Party Congress. These programs identify many important tasks, including those related to climate change response, especially sea level rise in key areas of the country as well as modernization of the forecasting, disaster warning, and climate change monitoring systems.

- Decision No. 2359/QD-TTg dated December 22nd, 2015 of the Prime Minister approved the National Greenhouse Gas (GHG) Inventory System. The main objectives of the system include to "make biennial GHG inventories and develop national climate change reports and to submit them to the UNFCCC" and "contribute to the achievement of low carbon economy, green growth and GHG reduction targets in the Nationally Determined Contribution (NDC) of Viet Nam".

- Resolution No. 93/NQ-CP dated October 31st, 2016 of the Government approved Paris Agreement (PA) to implement the UNFCCC. In this Resolution, the Government assigned Ministry of Natural Resources and Environment (MONRE) to preside and cooperate with concerned ministries, sectors and localities to implement and widely disseminate PA after the PA enters into force.

- Decision No. 2053/QD-TTg dated October 28th, 2016 of the Prime Minister approved the Implementation Plan of PA of Viet Nam. This plan stipulates the tasks to respond to climate change, including the responsibility to reduce GHG emissions during the period of 2016-2030. According to Implementation Plan of PA, a number of legal documents and measures related to climate change will be prepared in the coming period, including: (1) The Government's Decree on a Roadmap and measures for Viet Nam to participate in global GHG emission reduction; (2) setting up a Measurement, Reporting and Verification (MRV) system for GHG emission reduction activities at national level towards achieving the GHG emission reduction targets in NDC; (3) establishing the MRV System for GHG emission reduction activities at sectoral level, including industries, LULUCF, agriculture, construction and transport; (4) adjusting and supplementing climate change response strategies, GHG emission mitigation and climate change adaptation regulations in line with Viet Nam's commitments in the NDC and to study and propose the Law on Climate Change; (5) developing and updating the policy framework for responding to climate change under the 2020 SP-RCC Program in line with the PA implementation requirements; (6) development management and updating of the national database on climate change and guidance on the use of information on climate change; (7) continuing integrating climate change and green growth into priority policies, planning, and programs for development investment.

- Decision No. 622/QD-TTg dated May 10th, 2017 of Prime Minister issued the National Action Plan to implement the 2030 Agenda for Sustainable Development. This Action Plan identified 17 sustainable development goals of Viet Nam by 2030, of which goal No. 13 is to take timely and efficient actions to respond to climate change and natural disasters.

1.4. Viet Nam's contribution to mitigation of global GHG emissions

1.4.1. Nationally Determined Contribution of Viet Nam

Viet Nam committed to working with the international community to respond to climate change, which is reflected in the range of national policies and specific actions that have been or are being

taken to combat climate change. On September 30th, 2015, Viet Nam sent the UNFCCC Secretariat "Viet Nam's Intended Nationally Determined Contribution (INDC)". Viet Nam signed the PA on Climate Change on April 22nd, 2016 and approved the PA on November 3rd, 2016. From that time, Viet Nam's INDC has officially become its NDC. According to Viet Nam's NDC, with domestic resources, by 2030, Viet Nam will reduce GHG emissions by 8% compared to the Business as Usual (BAU) scenario (estimated at 62.65 $MtCO_2e$) and this above-mentioned 8% contribution could be increased to 25% (approximately 197.94 $MtCO_2e$) if international support is received.

The main solutions to achieve the goal of reducing GHG emissions of Viet Nam's NDC are identified as to: (1) Strengthen the leading role of the State in responding to climate change; (2) Enhance the efficiency and effectiveness of energy use, and reduce energy consumption; (3) Change the fuel structure in industry and transportation; (4) Promote effective exploitation and increase the proportion of new and renewable energies in energy production and consumption; (5) Reduce GHG emissions through sustainable agricultural development, and improve efficiency and competitiveness in agricultural production; (6) Manage and develop sustainable forests, enhance carbon sequestration and environmental services, and conserve biodiversity associated with livelihood development and income generation for communities and people dependent on forests; (7) Improve waste management; (8) Raise public awareness and (9) Enhance international cooperation.

1.4.2. Organization to implement UNFCCC

The Government of Viet Nam has designated the MONRE as the National Focal Point to implement the UNFCCC, KP, PA and other relevant international treaties on climate change; and as the permanent acting agency of the National Committee on Climate Change (NCCC). The National Steering Committee for UNFCCC, KP, and PA is chaired by the leader of MONRE, and is composed of representatives from the relevant ministries. According to the functions, tasks, responsibilities and management sectors assigned by the Government, MONRE has the tasks of presiding and cooperating with other relevant ministries, branches, agencies, localities and socio-political organizations in order to carry out the national strategies, programs on climate change and activities, and plans for implementing the UNFCCC, KP and PA and to achieve the sustainable development goals in Viet Nam.

Ministries, Agencies and People's Committees of provinces and cities under central authority, in accordance with their respective functions, tasks, responsibilities and management sectors assigned by the Government, have the responsibility to cooperate with the Ministry of Natural Resources and Environment to implement the national strategies and programs on climate change and action plans to respond to climate change and to participate in the implementation of the UNFCCC, KP and PA.

The Department of Climate Change of MONRE is designated to carry out the tasks of the Office of the National Committee on Climate Change and is the national focal point to implement the UNFCCC, KP and PA. The Department of Climate Change chairs and coordinates with related agencies, units and organizations to implement the UNFCCC, KP, PA and other international treaties on climate change as assigned by the Minister.

The working groups consist of scientists and experts with much experience in the climate change sector from relevant agencies, research institutes, scientific and technical centres, universities.

Viet Nam has been actively participating in international climate change negotiations, developing international cooperation and gaining international support to deploy the outlined strategies,

programs, plans and projects to implement UNFCCC in Viet Nam.

Viet Nam's NCs and BURs are prepared within Viet Nam's plan to implement the UNFCCC, KP and PA.

Institutional arrangement for the development of the Second Biennial Updated Report (BUR2) is summarized in Figure 1.1.

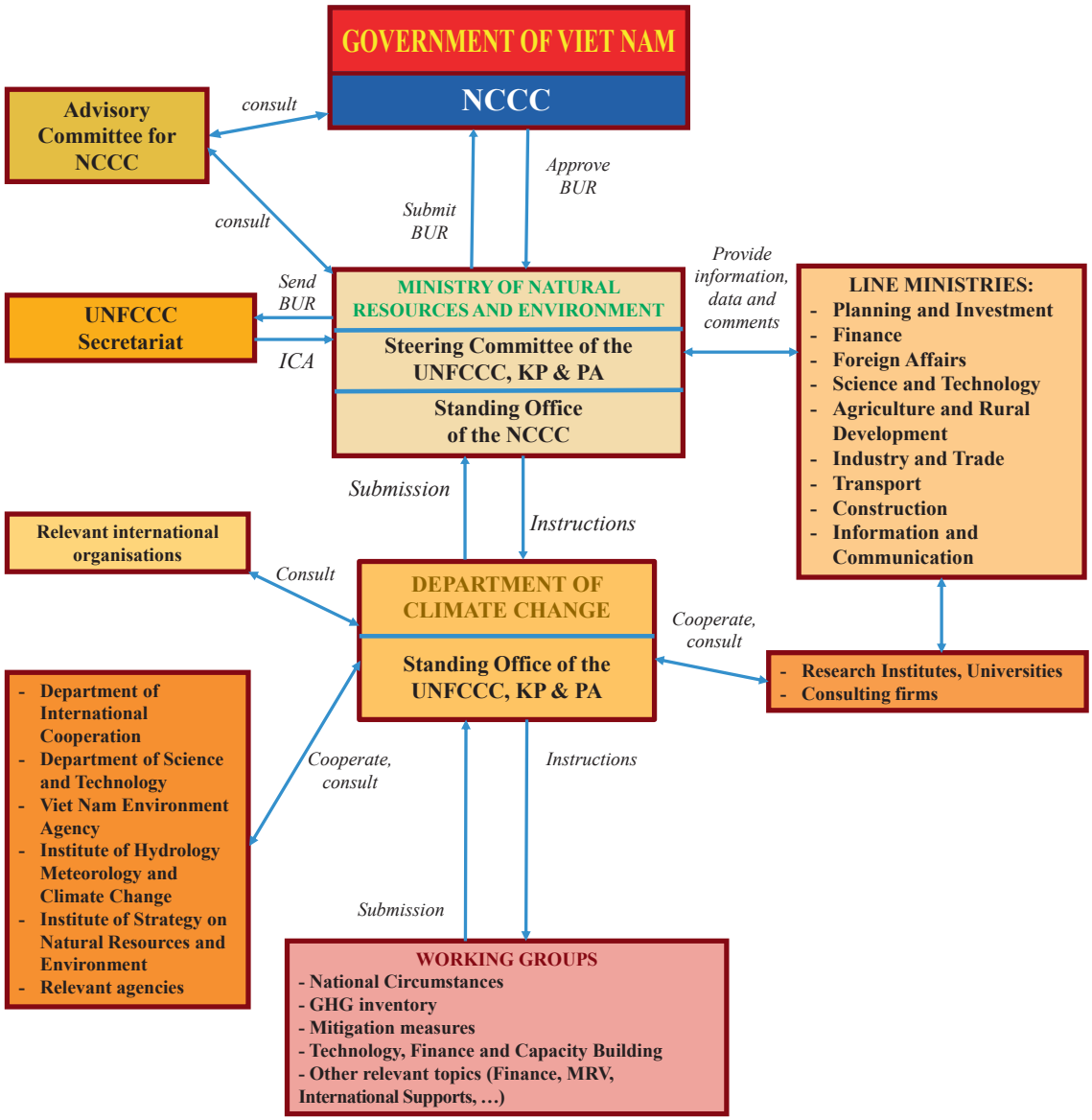

Figure 1.1. Institutional arrangement for BUR2 development in Viet Nam

CHAPTER 2. THE 2013 NATIONAL GREENHOUSE GAS INVENTORY

2.1. Institutional arrangement for the 2013 National GHG inventory

The institutional arrangement for implementing the 2013 National GHG inventory in accordance with the National GHG Inventory System is provided in Decision No. 2359/QD-TTg dated December 22nd, 2015 by the Prime Minister as follows:

- The Department of Climate Change of MONRE is assigned to establish a plan of GHG inventory, to chair and cooperate with related agencies in the National GHG Inventory System and to develop technical reports.

- The Institute of Strategy and Policy on Natural Resources and Environment (ISPONRE) of MONRE is in charge of Quality Control (QC)/Quality Assurance (QA).

- The GSO, MPI, is responsible for compiling data from focal point units at MOT, MOIT, MARD, MOC and Provincies and Cities' People's Committees to provide data for the Department of Climate Change to implement the GHG inventory. Besides, some specific data are collected from other organizations and agencies outside the system.

2.2. Methodology

2.2.1. IPCC Guidelines

The 2013 National GHG inventory is implemented in compliance with the Intergovernmental Panel on Climate Change (IPCC) Guidelines, which includes:

- The Revised 1996 IPCC Guidelines for National GHG Inventories (hereinafter referred to as the Revised 1996 IPCC Guidelines);

- The 2006 IPCC Guidelines for National GHG Inventories (IPCC 2006 GL);

- The IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (hereinafter referred to as the GPG 2000);

- The IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (hereinafter referred to as the GPG-LULUCF);

- Agriculture and Land Use GHG Inventory (ALU) software for inventory of LULUCF sector.

2.2.2. Activity data and Emission Factors

Information and activity data are collected and compiled by GSO, from national statistics data and a number of central and local agencies. Some data from relevant studies have also been used.

Most Emission Factors (EFs) used in the GHG inventory are default values according to IPCC. However, some country-specific EFs were applied in energy, agriculture, LULUCF and waste sectors.

Table 2.1 summarises the methods used and data sources for the inventory in the various sectors.

Table 2.1. Methods and data sources

Sector	Method	Data sources		
		Activity data	EFs	Other parameters
Energy	Tier 1	Viet Nam Energy Statistics 2013	- IPCC default values for EFs - Country-specific value for coal mining	- IPCC default values - Country-specific calorific values
Industrial Processes	Tier 1	Statistical Yearbook of Viet Nam 2014	IPCC default values for EFs	IPCC default values
Agriculture	Tier 1/ Tier 2	- Statistical Yearbook of Viet Nam 2014 - Statistical Yearbook of Agriculture and Rural Development 2014	- IPCC default values for EFs - Country-specific value for rice cultivation and manure management	- IPCC default values - Country-specific for fraction of manure handled using ma-nure system
LULUCF	Tier 1/ Tier 2	- Statistical Yearbook of Viet Nam 2014 - Statistical Yearbook of Agriculture and Rural Development 2014 - Land matrix from 2002 to 2012, Department of Remote Sensing, MONRE	IPCC default values for EFs	- IPCC default values - Results from studies
Waste	Tier 1/ Tier 2	- Statistical Yearbook of Viet Nam 2014 - State of Environment Reports of 40 provinces/ cities	IPCC default values for EFs	- IPCC default values - Results from studies

Source: The 2013 National GHG Inventory Report (NIR 2013), MONRE, 2017

2.2.3. Global Warming Potential

The values of Global Warming Potential (GWP) of GHGs for 100 years which have been used in this inventory cycle are shown in Table 2.2.

Table 2.2. The values of Global Warming Potential of GHGs

Gas	GWP
CO_2	1
CH_4	25
N_2O	298
HFCs	124-14,800

Source: AR4 Report, IPCC, 2007

2.3. Quality assurance and quality control

For the 2013 National GHG inventory, both QC and QA were carried out, which is an improvement compared to only QC process used in the 2010 National GHG inventory for BUR1.

2.3.1. Quality control

The implementation of QC for the 2013 National GHG inventory includes: rechecking the activity data and EFs in different sectors; checking the estimation of emissions/removals; checking the conversional calculation, Key Categories Analysis (KCA), and other related issues.

2.3.2. Quality assurance

- QA procedures involving rechecking calculations include: checking used parameters and cross-cutting emissions/removals, checking consistency of using common input data, checking records and units of calculation to assure consistency among inventory sectors and checking the compilation from lower level to higher level etc. The results serve as a basis for further improvements in the future.

- Rechecking the reporting documents covers: the consistency of inventory reports from different sectors; data detail and results in each document; level of completion among documents in different involved groups; and lack of data and proposals for solutions in the short and long term.

2.3.3. Results of QA/QC

Results show that inventory activities are conducted strictly according to IPCC Guidelines: EFs follow IPCC regulations; data activities are put into practice based on conditions of Viet Nam; calculation steps are correct; and procedures and manner of conducting the inventory are appropriate.

In addition, the 2013 National GHG inventory conducts more activities to enhance inventory quality such as recalculation of the 2010 National GHG inventory to compare to the previous inventory cycle. Further improvements for each sector have been identified by technical experts for the next inventory cycle.

2.4 Key emission/removal categories in 2013

Information on emissions/removals categories is compiled in Table 2.3. The Table 2.4 shows 34 categories with LULUCF while Table 2.5 shows 30 categories without LULUCF, which accounts for 95% of total national emissions.

Table 2.3. Key categories analysis in the 2013 National GHG inventory

No.	Sector	KCA without LULUCF	KCA with LULUCF	CO_2	CH_4	N_2O	HFCs
1	Energy	16	16	12	4	0	0
2	Industrial Processes	2	2	1	0	0	1
3	Agriculture	8	8	0	5	3	0
4	LULUCF		4	4	0	0	0
5	Waste	4	4	0	3	1	0
	Total	30	34	17	12	4	1

Source: NIR 2013, MONRE, 2017

Among 34 key categories, there are 17 emission/removal sub-sectors related to CO_2, 12 related to CH_4 and four related to N_2O and one to HFCs.

Table 2.4. Key categories analysis in the 2013 National GHG inventory with LULUCF

No.	Sectors/Sub-sectors	Gas	Emission/ Removals in 2013 ($ktCO_2e$)	Ratio (%)	Accumulated ratio (%)
1	4.C.1. Rice cultivation – Irrigated	CH_4	42,561.0	12.6	12.6
2	1.A.1.a. Energy industry: Public Electricity and Heat Production	CO_2	41,429.3	12.2	24.8
3	2.A.1. Cement Production	CO_2	28,207.1	8.3	33.1
4	1.A.3.b. Transport: Road Transportation	CO_2	26,815.0	7.9	41.0
5	5.A.2. Land converted to Forest Land	CO_2	22,489.7	6.6	47.6
6	1.A.2.c. Manufacturing Industries and Construction: Cement and Building materials	CO_2	17,992.8	5.3	52.9
7	1.B.2.a. Fugitive: Oil	CH_4	14,323.0	4.2	57.2
8	4.D.1. Cropland: Direct Soil Emissions	N_2O	13,167.3	3.9	61.0
9	5.A.1. Forest Land remaining Forest Land	CO_2	12,016.9	3.5	64.6
10	4.D.3. Cropland: Indirect Soil Emissions	N_2O	9,950.2	2.9	67.5
11	6.B2. Domestic and Commercial Waste Water	CH_4	9,436.0	2.8	70.3
12	6.A. Solid Waste Disposal on Land	CH_4	7,436.0	2.2	72.5
13	1.A.4.b. Other: Residential	CO_2	6,608.9	1.9	74.5
14	1.A.2.g. Manufacturing Industries and Construction: Other	CO_2	6,378.5	1.9	76.3
15	4.B.9. Manure management: aerobic treatment	N_2O	5,694.6	1.7	78.0
16	4.A.1. Enteric fermentation: Cattle	CH_4	5,672.4	1.7	79.7
17	1.A.2.e. Manufacturing Industries and Construction: Textile and Leather	CO_2	5,610.3	1.7	81.3
18	5.B.1. Cropland remaining as cropland	CO_2	5,502.3	1.6	83.0
19	1.A.2.b. Manufacturing Industries and Construction: Chemical and Petroleum	CO_2	4,350.6	1.3	84.2
20	4.A.2. Enteric fermentation: Buffalo	CH_4	3,519.4	1.0	85.3
21	1.A.4.b. Other sectors: Residential	CH_4	3,497.3	1.0	86.3
22	1.A.4.a. Other sectors: Commercial/ Institutional	CO_2	3,312.7	1.0	87.3
23	5.B.2. Land converted to cropland	CO_2	3,163.2	0.9	88.2
24	1.A.2.d. Manufacturing Industries and Construction: Food and Tobacco	CO_2	2,936.2	0.9	89.1
25	1.B.2.b. Fugitive: Natural gases	CH_4	2,886.5	0.9	89.9
26	4.C.2. Rice cultivation: Rain-fed	CH_4	2,180.7	0.6	90.6

No.	Sectors/Sub-sectors	Gas	Emission/ Sinks in 2013 ($ktCO_2e$)	Ratio (%)	Accumulated ratio (%)
27	1.A.1.b. Energy industry: Petrochemical	CO_2	2,098.6	0.6	91.2
28	4.F. Field Burning of Agricultural Residues	CH_4	1,972.9	0.6	91.8
29	2.F.1. HFCs Consumption	HFCs	1,967.6	0.6	92.4
30	6.B. Wastewater handling: Human sewage	N_2O	1,937.0	0.6	92.9
31	1.B.1.a. Fugitive: Underground coal mining	CH_4	1,824.7	0.5	93.5
32	6.B.1. Industrial Wastewater	CH_4	1,623.0	0.5	94.0
33	1.A.2.a. Manufacturing Industries and Construction: Iron and Steel	CO_2	1,609.4	0.5	94.4
34	1.A.4.c. Other sectors: Agriculture/Forestry/ Fishing	CO_2	1,425.3	0.4	94.9

Source: NIR 2013, MONRE, 2017

Table 2.5. Key categories analysis in the 2013 National GHG inventory without LULUCF

No.	Sectors/Sub sectors	Gas	Emission in 2013 ($ktCO_2e$)	Ratio (%)	Accumulated ratio (%)
1	4.C.1. Rice cultivation- Irrigated	CH_4	42,561.0	14.5	14.5
2	1.A.1.a. Energy industry: Public Electricity and Heat Production	CO_2	41,429.3	14.1	28.6
3	2.A.1. Cement Production	CO_2	28,207.1	9.6	38.3
4	1.A.3.b. Transport: Road Transportation	CO_2	26,815.0	9.1	47.4
5	1.A.2.c. Manufacturing Industries and Construction: Cement and Building materials	CO_2	17,992.8	6.1	53.5
6	1.B.2.a. Fugitive: Oil	CH_4	14,323.0	4.9	58.4
7	4.D.1. Cropland: Direct Soil Emissions	N_2O	13,167.3	4.5	62.9
8	4.D.3. Cropland: Indirect Soil Emissions	N_2O	9,950.2	3.4	66.3
9	6.B2. Domestic wastewater	CH_4	9,436.0	3.2	69.5
10	6.A. Solid Waste Disposal on Land	CH_4	7,436.0	2.5	72.1
11	1.A.4.b. Other sectors: Residential	CO_2	6,608.9	2.3	74.3
12	1.A.2.g. Manufacturing Industries and Construction: Other	CO_2	6,378.5	2.2	76.5
13	4.B.9. Manure management: aerobic treatment	N_2O	5,694.6	1.9	78.4
14	4.A.1. Enteric fermentation: Cattle	CH_4	5,672.4	1.9	80.4
15	1.A.2.e. Manufacturing Industries and Construction: Textile and Leather	CO_2	5,610.3	1.9	82.3
16	1.A.2.b. Manufacturing Industries and Construction: Chemical and Petroleum	CO_2	4,350.6	1.5	83.8
17	4.A.2. Enteric fermentation: Buffalo	CH_4	3,519.4	1.2	85.0

No.	Sectors/Sub sectors	Gas	Emission in 2013 ($ktCO_2e$)	Ratio (%)	Accumulated ratio (%)
18	1.A.4.b. Other sectors: Residential	CH_4	3,497.3	1.2	86.2
19	1.A.4.a. Other sectors: Commercial/Institutional	CO_2	3,312.7	1.1	87.3
20	1.A.2.d. Manufacturing Industries and Construction: Food and Tobacco	CO_2	2,936.2	1.0	88.3
21	1.B.2.b. Fugitive: Natural gases	CH_4	2,886.5	1.0	89.3
22	4.C.2. Rice cultivation: Rain-fed	CH_4	2,180.7	0.7	90.0
23	1.A.1.b. Energy industry: Petrochemical	CO_2	2,098.6	0.7	90.7
24	4.F. Field Burning of Agricultural Residues	CH_4	1,972.9	0.7	91.4
25	2.F.1. HFCs Consumption	HFCs	1,967.6	0.7	92.1
26	6.B. Wastewater handling: Human sewage	N_2O	1,937.0	0.7	92.7
27	1.B.1.a. Fugitive: Underground coal mining	CH_4	1,824.7	0.6	93.4
28	6.B.1. Industrial Wastewater	CH_4	1,623.0	0.6	93.9
29	1.A.2.a. Manufacturing Industries and Construction: Iron and Steel	CO_2	1,609.4	0.5	94.5
30	1.A.4.c. Other sectors: Agriculture/Forestry/ Fishing	CO_2	1,425.3	0.5	94.9

Source: NIR 2013, MONRE, 2017

2.5. Results of the 2013 National GHG inventory

2.5.1. Total GHG emissions and removals in 2013

The total 2013 GHG emission in Viet Nam is 259.0 $MtCO_2e$ with LULUCF sector and 293.3 $MtCO_2e$ without LULUCF sector.

The results of the 2013 National GHG inventory by gases and shares of emissions by sectors are summed up in Table 2.6, Figures 2.1 and 2.2.

Table 2.6. The 2013 GHG emissions and removals by gases

Unit: $ktCO_2e$

Sectors	CO_2	CH_4	N_2O	HFCs	Total
Energy	126,914.6	23,397.8	1,090.1		151,402.5
Industrial Processes	29,799.8			1,967.6	31,767.4
Agriculture		59,131.2	30,276.7		89,407.8
LULUCF	-34,359.5	101.1	18.6		-34,239.8
Waste	254.9	18,494.4	1,936.9		20,686.2
Total emission (without LULUCF)	156,969.3	101,023.4	33,303.7	1,967.6	293,263.9
Total emission (with LULUCF)	122,609.8	101,124.5	33,322.3	1,967.6	259,024.1

Source: NIR 2013, MONRE, 2017

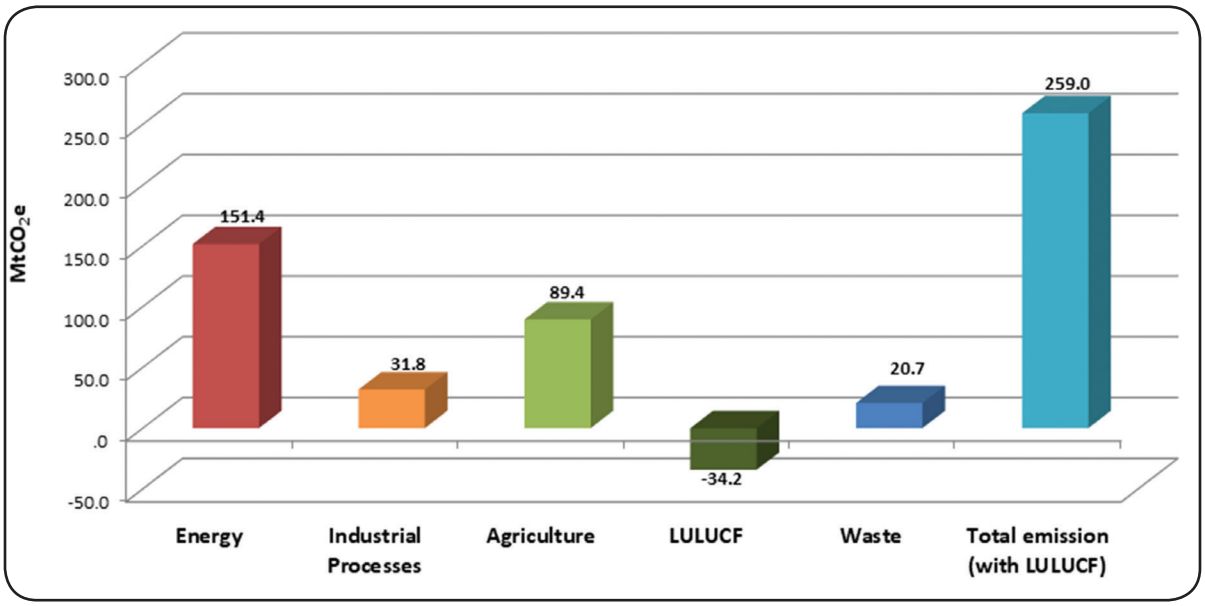

Figure 2.1. The 2013 GHG emissions and removals by sectors

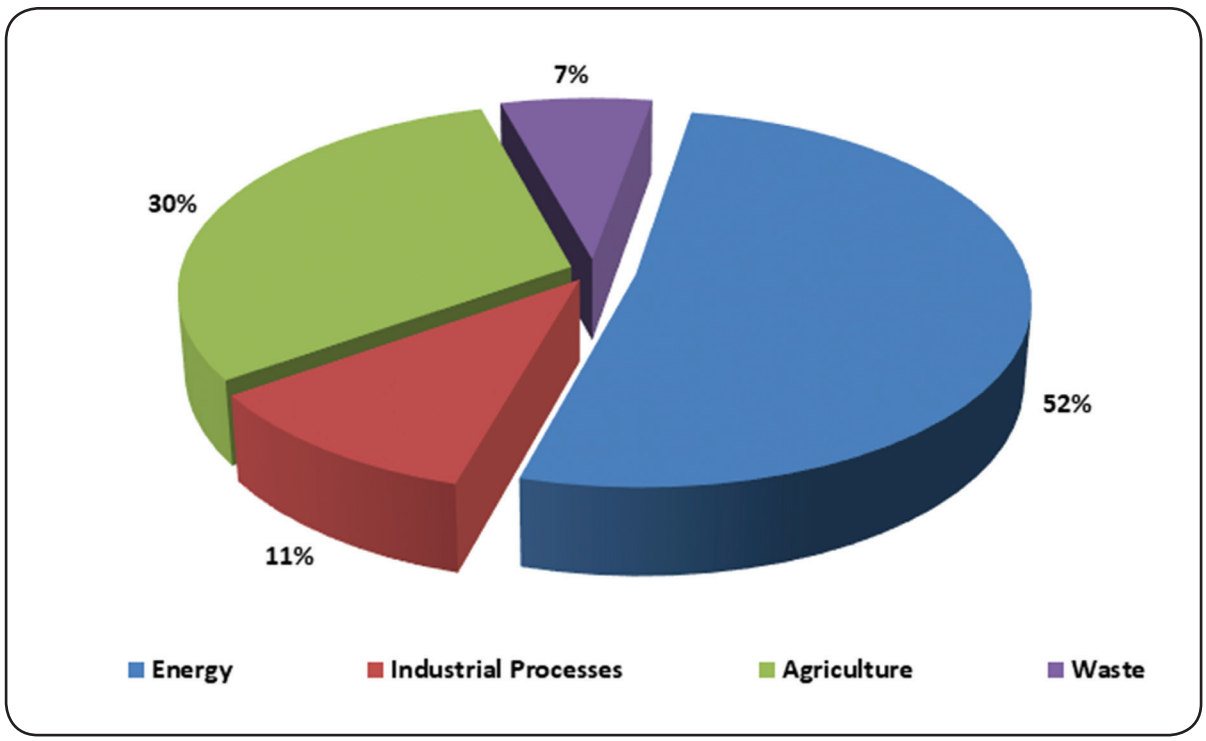

Figure 2.2. The 2013 GHG shares of emissions by sectors

The total GHG emissions/removals in 2013 not controlled by the Montreal Protocol are shown in Table 2.7. Total HFCs emissions in industrial processes sector are shown in Table 2.8. This is another way to show the 2013 National GHG inventory provide futher improvements compared to the 2010 National GHG inventory implemented for BUR1.

Table 2.7. The 2013 GHG emissions/removals not controlled by Montreal Protocol

Unit: kt

GHG Sources and Sink Categories	CO_2	CH_4	N_2O	CO	NO_x	NMVOCs	SO_x
Total emissions/ removals	122,609.82	4,044.95	111. 82	1,693.59	51.35	NE, NO	NE, NO
1. Energy	126,914.63	936.91	3.66	NE	NE	NE	NE
1.A. Fuel Combustion Activities (Sectoral Approach)	125,364.91	155.77	3.65	NE	NE	NE	NE
1.A.1. Energy Industries	43,527.92	0.71	0.41	NE	NE	NE	NE
1.A.2. Manufacturing Industries and Construction	40,233.16	8.31	1.12	NE	NE	NE	NE
1.A.3. Transport	29,492.65	4.97	0.27	NE	NE	NE	NE
1.A.4. Other Sectors	11,346.81	140.70	1.82	NE	NE	NE	NE
1.A.5. Other (Non-energy use)	764.36	0.08	0.03	NE	NE	NE	NE
1.B. Fugitive Emissions from Fuels	1,549.72	781.14	0.01	NE	NE	NE	NE
1.B.1. Solid Fuels		92.76		NE	NE	NE	NE
1.B.2. Oil and Natural Gas	1,549.72	688.38	0.01	NE	NE	NE	NE
2. Industrial Processes	29,799.76	NE, NO	NE, NO				
2.A. Mineral Products	28,780.86						
2.B. Chemical Industry	IE, NE, NO	NE, NO	NE, NO				
2.C. Metal Production	1,018.90	NE, NO	NE, NO				
2.D. Other Production							
2.E. Production of Halocarbons and SF6							
2.F. Consumption of Halocarbons and SF6							
2.G. Other	NE	NE	NE				
3. Solvent and other product use	NA			NE	NE	NE	NE
4. Agriculture		2,365.25	101.60	1,658.20	50.35		
4.A. Enteric Fermentation		413.12					
4.B. Manure Management		83.50	19.52				
4.C. Rice Cultivation		1.789.67					
4.D. Agricultural Soils			80.69				

GHG Sources and Sink Categories	CO_2	CH_4	N_2O	CO	NO_x	NMVOCs	SO_x
4.E. Prescribed Burning of Savannas		0.04	0.00	1.00	0.02		
4.F. Field Burning of Agricultural Residues		78.91	1.39	1,657.20	50.34		
4.G. Other (please specify)		NO	NO	NO	NO	NO	NO
5. LULUCF	-34,359.49	4.04	0.06	35.39	1.00		
5.A. Forest Land	-34,506.57	0.31	0.03	2.74	0.08		
5.B. Cropland	-2,339.08	1.94	0.01	16.98	0.48		
5.C. Grassland	539.72	1.59	0.01	13.95	0.39		
5.D. Wetlands	965.64	0.16	0.01	1.41	0.04		
5.E. Settlements	965.61	0.03	0.00	0.28	0.01		
5.F. Other Land	15.19	0.00	0.00	0.04	0.00		
5.G. Other (please specify)	NE	NE	NE	NE	NE		
6. Waste	254.93	739.78	6.50				
6.A. Solid Waste Disposal on Land	NE	297.43					
6.B. Wastewater Handling		442.34	6.50				
6.C. Waste Incineration	254.93	NE	NE				
6.D. Other (please specify)	NE	NE	NE				
7. Other	IE, NE	IE, NE	IE, NE	NE	NE	NE	NE
Memo items							
International bunkers	IE, NE	IE, NE	IE, NE	NE	NE	NE	NE
Aviation	IE	IE	IE	NE	NE	NE	NE
Marine	NE	NE	NE	NE	NE	NE	NE
CO_2 emission from biomass	IE						

Source: NIR 2013, MONRE, 2017

Table 2.8. The 2013 HFCs, PCFs, SF_6 emissions in Industrial Processes sector

Unit: t

GHG Sources of emissions	HFCs										PCFs	SF_6
	HFC-23	HFC-32	HFC-125	HFC-134a	HFC-152a	HFC-227ea	HFC-404a	HFC-407c	HFC-410c	HFC-507c		
Total	16.21	0.00	2.45	638.67	0.00	2.76	67.70	31.29	221.79	3.22	NE	NE
A. Mineral Products												

GHG Sources of emissions	HFCs										PCFs	SF_6
	HFC-23	HFC-32	HFC-125	HFC-134a	HFC-152a	HFC-227ea	HFC-404a	HFC-407c	HFC-410c	HFC-507c		
B. Chemical Industry	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
C. Metal Production	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
D. Other Production												
E. Production of Halocarbons and SF_6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Consumption of Halocarbons and SF_6	16.21	0.00	2.45	638.67	0.00	2.76	67.70	31.29	221.79	3.22	NE	NE
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Source: NIR 2013, MONRE, 2017

2.5.2 Results of the 2013 National GHG inventory by sectors

a. Energy

The total 2013 GHG emission in Energy sector is151.4 $MtCO_2e$, described in Table 2.9. The shares of emissions among energy sub-sectors in 2013 are presented in Figure 2.3. Emissions from Fuel Combustion and Fugitive emissions are 86.1% and 13.9% respectively.

Table 2.9. The 2013 GHG emissions in Energy sector

Unit: kt

Categories	Gases			
	CO_2	CH_4	N_2O	Total CO_2e
Total	126,914.63	935.91	3.66	151,402.52
1.A. Fuel Combustion Activities	125,364.91	154.77	3.65	130,320.41
1.A.1. Energy Industry	43,527.92	0.71	0.41	43,669.38
1.A.1.a. Power plant	41,429.34	0.63	0.40	41,563.47
1.A.1.b. Petroleum Refinery	2,098.57	0.09	0.02	2,105.91
1.A.2. Manufacturing Industries and Construction	40,233.16	8.31	1.12	40,773.46
1.A.2.a. Industry - Iron and steel	1,609.40	0.15	0.02	1,619.83
1.A.2.b. Industry - Chemical and Petroleum	4,350.65	0.39	0.02	4,365.84
1.A.2.c. Industry - Cement and building materials	17,992.75	3.11	0.43	18,198.23
1.A.2.d. Industry - Foods and Tobacco	2,936.24	3.51	0.47	3,164.66
1.A.2.e. Industry - Textile and Leather	5,610.35	0.56	0.08	5,648.29
1.A.2.f. Industry - Paper. pulp and Printing	1,355.22	0.13	0.02	1,364.19
1.A.2.g. Industry - Other	6,378.55	0.45	0.08	6,412.41
1.A.3. Transport	29,492.65	4.97	0.27	29,698.24

Categories	Gases			
	CO_2	CH_4	N_2O	Total CO_2e
1.A.3.a. Transport - Airway	1,219.88	0.01	0.03	1,230.37
1.A.3.b. Transport - Road	26,815.04	4.86	0.23	27,004.17
1.A.3.c. Transport - Rail	109.31	0.01	0.00	109.76
1.A.3.d. Transport - River and Seaway	1,348.42	0.09	0.01	1,353.93
1.A.4. Other Sectors	11,346.81	140.70	1.82	15,405.32
1.A.4.a. Commercial/Institutional	3,312.70	0.43	0.04	3,334.80
1.A.4.b. Residential	6,608.86	139.89	1.77	10,632.22
1.A.4.c. Agriculture/Forestry/Fishing	1,425.25	0.37	0.01	1,438.30
1.A.5. Other (Non-energy use)	764.36	0.08	0.03	774.00
1.B. Fugitive emissions from fuels	1,549.72	781.14	0.01	21,082.12
1.B.1. Solid fuels		92.76		2,319.11
1.B.1.a. Underground coal mining		72.99		1,824.66
1.B.1.b. Surface coal mining		19.78		494.45
1.B.2. Oil and Natural Gas	1,549.72	688.38	0.01	18,763.01
1.B.2.a. Oil	862.77	572.92	0.01	15,189.43
1.B.2.b. Natural gas	686.95	115.46	0.00	3,573.58

Source: NIR 2013, MONRE, 2017

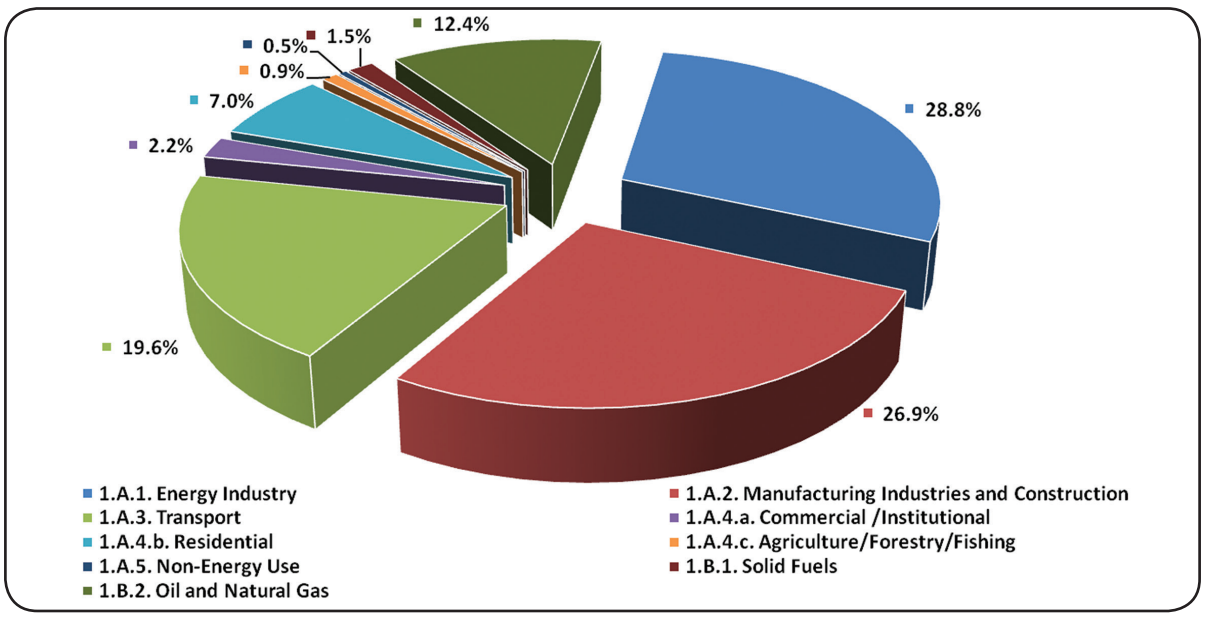

Figure 2.3. The 2013 GHG emissions shares of sub-sectors in Energy sector

In order to estimate GHG emissions in fuel combustion, it is recommended that a reference approach is used in parallel with a sectoral approach. The reference approach is used to calculate CO_2 emissions by top-down control based on national statistics of production, export, import and stock change.

The difference between calculations of CO_2 emissions in fuel combustion between the two methods is -1.4% (Table 2.10). Energy consumption and CO_2 emissions are the reasons leading to energy loss and imbalance of the carbon cycle in the Energy Balance Table.

Table 2.10. Emissions of CO_2 in fuel combustion according to top-down and bottom-up approaches

Unit: $ktCO_2e$

Reference approach (Top-down) [4]	Sectoral approach (Bottom-up) [5]	Difference (%)
123,562.6	125,364.9	-1.4%

Source: NIR 2013, MONRE, 2017

b. Industrial Processes

The total 2013 GHG emission in industrial processes sector is 31.8 $MtCO_2e$ as presented in Table 2.11. The share by sub-sectors of the 2013 National GHG inventory in industrial processes sector is shown in Figure 2.4. The biggest share of emissions, which is 90.6%, comes from Mineral Products. For emissions in Consumption of Halocarbons and SF_6 and Metal Production sectors, the shares are 6.2% and 3.2% respectively.

Table 2.11. The 2013 GHG emissions in Industrial Processes sector

Unit: $ktCO_2e$

Categories	CO_2	CH_4	N_2O	HFC, PFC, SF_6
Total				31,767.4
2.A. Mineral Products	28,780.9			
2.A.1. Cement Production	28,207.1			
2.A.2. Lime Production	573.8			
2.A.3. Limestone and Dolomite Use	NE			
2.A.4. Soda Ash Production and Use	NE			
2.A.5. Asphalt Roofing	NE			
2.A.6. Road Paving with Asphalt	NE			
2.B. Chemical Industry	IE, NE			
2.B.1. Ammonia Production	IE	NE	NE	
2.B.2. Nitric Acid Production	NE		NO	
2.B.3. Adipic Acid Production	NO		NO	
2.B.4. Carbide Production	NE	NO		
2.C. Metal Production	1,018.9	NE, NO		NE, NO
2.C.1. Iron and Steel Production	1,018.9	NE		

[4]Calculation method based on primary energy consumption
[5]Calculation method based on secondary energy consumption

Categories	CO_2	CH_4	N_2O	HFC, PFC, SF_6
2.C.2. Ferroalloys Production	NE	NE		
2.C.3. Aluminium Production	NO	NO		NO
2.C.4. SF_6 Used in Aluminium and Magnesium Foundries				NE
2.D. Other Production				
2.D.1. Pulp and Paper				
2.D.2. Food and Drink				
2.E. Production of Halocarbons and SF_6				**NE**
2.E.1. By-product Emissions				NE
2.E.2. Fugitive Emissions				NE
2.F. Consumption of Halocarbons and SF_6				1,967.6
2.G. Other processes	NE	NE	NE	NE

Source: NIR 2013, MONRE, 2017

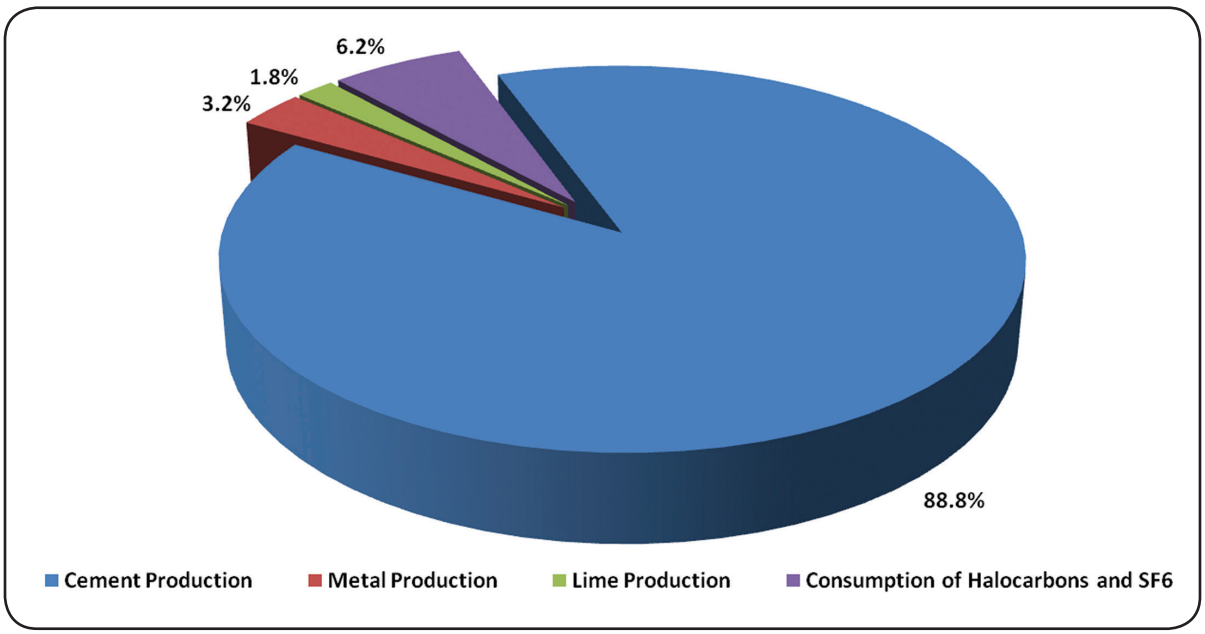

Figure 2.4. The 2013 GHG emission shares of sub-sectors in Industrial Processes sector

c. Agriculture

The total GHG emission from agriculture sector is 89.4 $MtCO_2e$ in 2013, as presented in Table 2.12. The sub-sectoral shares of 2013 emissions from agriculture sector is shown in Figure 2.5. Emissions from Rice Cultivation contributed the largest share with 50.0%. The second largest share comes from Agricultural Soils with 26.9%, followed by Enteric Fermentation with 11.6%, Manure Management with 8.8%, Field Burning of Agricultural Residues with 2.7% and lastly a small amount from Prescribed Burning of Savannas.

Table 2.12. The 2013 GHG emissions in Agricultural sector

Unit: $ktCO_2e$

Categories	CH_4	N_2O	Total
Total	59,131.2	30,276.7	89,407.8
4.A. Enteric Fermentation	10,328.1		10,328.1
4.B. Manure Management	2,087.6	5,816.5	7,904.1
4.C. Rice Cultivation	44,741.7		44,741.7
4.D. Agricultural Soils	0.0	24,044.9	24,044.9
4.E. Prescribed Burning of Savannas	1.0	0.1	1.1
4.F. Field Burning of Agricultural Residues	1,972.9	415.0	2,387.9

Source: NIR 2013, MONRE, 2017

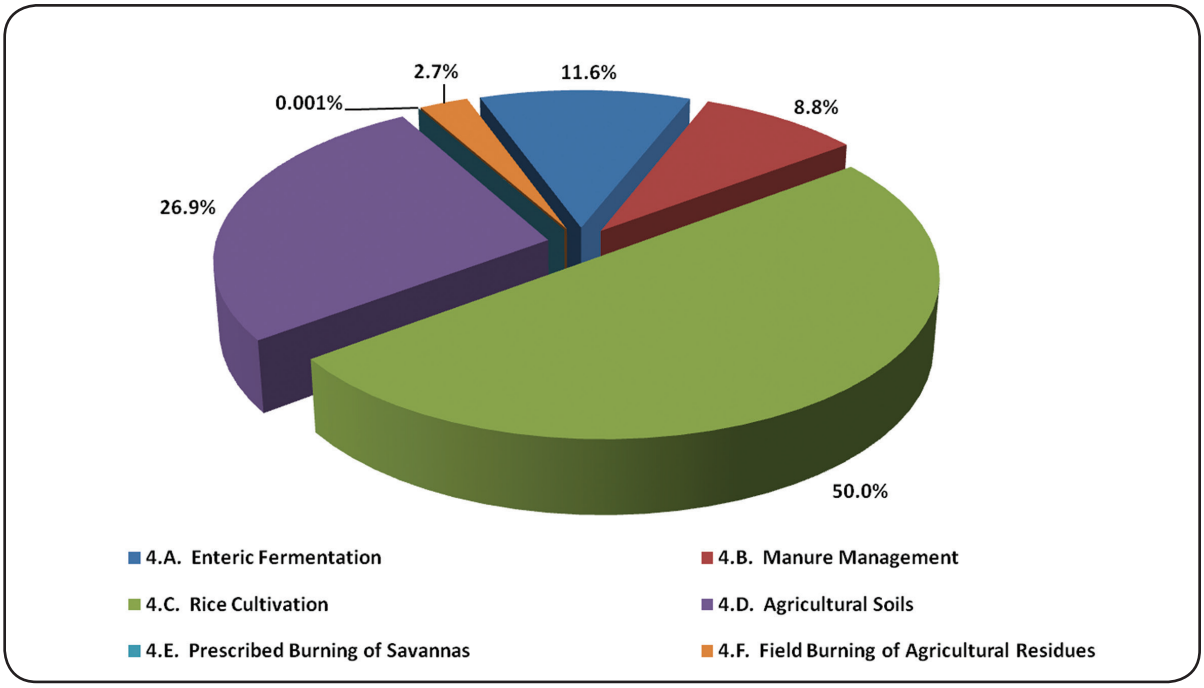

Figure 2.5. The 2013 GHG emission shares of sub-sectors in Agricultural sector

d. LULUCF

The total 2013 GHG emission/removal in LULUCF sector is shown in Figure 2.6 and Table 2.13. Among the total 2013 GHG emissions/removals, Forest Land and Cropland are the sub-sectors that absorb the highest emission of CO_2e, with 34.5 $MtCO_2e$ and 2.3 $MtCO_2e$ respectively. Those sub-sectors emitting CO_2e are: Grassland, 0.6 $MtCO_2e$; Wetlands, 0.97 $MtCO_2e$; Settlements, 0.96 $MtCO_2e$; and Other Lands, 15.3 $MtCO_2e$.

Table 2.13. The 2013 GHG emissions/removals in LULUCF sector

Land-use Category		IPCC Guidelines	Annual Change in Carbon Stocks $ktCO_2$				CH_4 (kt)	N_2O (kt)	CO (kt)	NO_x (kt)
Initial Land-use	Land-use during reporting Year		Living Biomass A	Dead Organic Matter B	Soils C	CO_2 Emission/Removals D=(A+B+C) *(-1)D				
Forestland	Forestland	5.A	-12,131.50	NA	114.61	-12,016.90	0.31	0.03	2.74	0.08
Cropland	Forestland	5.A, 5.C, 5.D	-3,698.62	NE	NE	-3,698.62	IE	IE	IE	IE
Grassland	Forestland	5.A, 5.C, 5.D	-18,654.79	NE	NE	-18,654.79	IE	IE	IE	IE
Wetland	Forestland	5.A, 5.C., 5.D	-178.47	NE	NE	-178.47	IE	IE	IE	IE
Settlements	Forestland	5.A, 5.C, 5.D	66.10	NE	NE	66.10	IE	IE	IE	IE
Otherland	Forestland	5.A, 5.C, 5.D	-23.88	NE	NE	-23.88	IE	IE	IE	IE
	Sub-Total for Forestland		-34,621.18	NE	114.61	-34,506.57	0.31	0.03	2.74	0.08
Cropland	Cropland	5.A, 5.D	-5,557.93	NA	55.68	-5,502.26				
Forestland	Cropland	5.B, 5.D	1,055.72	248.27	NE	1,304.00	1.94	0.01	16.98	0.48
Grassland	Cropland	5.B, 5.D	1,961.79	NE	NE	1,961.79	NE	NE	NE	NE
Wetland	Cropland	5.D	-25.09	NE	NE	-25.09	NE	NE	NE	NE
Settlements	Cropland	5.D	-75.33	NE	NE	-75.33	NE	NE	NE	NE
Otherland	Cropland	5.D	-2.18	NE	NE	-2.18	NE	NE	NE	NE
	Sub-Total for Cropland		-2,643.03	248.27	55.68	-2,339.08	1.94	0.01	16.98	0.48
Grassland	Grassland	5.A, 5.D	IE	NE	NE					
Forestland	Grassland	5.B, 5.D	776.24	203.99	NE	980.23	1.59	0.01	13.95	0.39
Cropland	Grassland	5.B, 5.D	-355.70	NE	NE	-355.70	NE	NE	NE	NE
Wetland	Grassland	5.C, 5.D	-11.67	NE	NE	-11.67	NE	NE	NE	NE
Settlements	Grassland	5.C, 5.D	-38.78	NE	NE	-38.78	NE	NE	NE	NE
Otherland	Grassland	5.C, 5.D	-34.36	NE	NE	-34.36	NE	NE	NE	NE
	Sub-Total for Grassland		335.73	203.99	NE	539.72	1.59	0.01	13.95	0.39

Land-use Category		IPCC Guidelines	Annual Change in Carbon Stocks $ktCO_2$				CH_4 (kt)	N_2O (kt)	CO (kt)	NO_x (kt)
Initial Land-use	Land-use during reporting Year		Living Biomass A	Dead Organic Matter B	Soils C	CO_2 Emission/ Removals D=(A+B+C) *(-1)D				
Wetland	Wetland	5.A, 5.E	NE	NE	NE					
Forestland	Wetland	5.B	93.46	20.57	561.03	675.06	0.16	0.01	1.41	0.04
Cropland	Wetland	5.E	171.09	NE	NE	171.09	NE	NE	NE	NE
Grassland	Wetland	5.B	119.49	NE	NE	119.49	NE	NE	NE	NE
Settlements	Wetland	5.E	NE	NE	NE	NE	NE	NE	NE	NE
Otherland	Wetland	5.E	NE	NE	NE	NE	NE	NE	NE	NE
	Sub-Total for Wetland		384.05	20.57	561.03	965.64	0.16	0.01	1.41	0.04
Settlements	Settlements	5.A	NE	NA	NA					
Forestland	Settlements	5.B	18.34	4.04	NE	22.37	0.03	0.00	0.28	0.01
Cropland	Settlements	5.E	892.62	NE	NE	892.62	NE	NE	NE	NE
Grassland	Settlements	5.B	50.62	NE	NE	50.62	NE	NE	NE	NE
Wetland	Settlements	5.E	NE	NE	NE		NE	NE	NE	NE
Otherland	Settlements	5.E	NE	NE	NE		NE	NE	NE	NE
	Sub-Total for Settlements		961.57	4.04	NE	965.61	0.03	0.00	0.28	0.01
Otherland	Otherland	5.A	NE	NE	NE					
Forestland	Otherland	5.B	2.44	0.54	NE	2.98	0.00	0.00	0.04	0.00
Cropland	Otherland	5.E	2.88	NE	NE	2.88	NE	NE	NE	NE
Grassland	Otherland	5.B	9.33	NE	NE	9.33	NE	NE	NE	NE
Wetland	Otherland	5.E	NE	NE	NE	NE	NE	NE	NE	NE
Settlements	Otherland	5.E	NE	NE	NE	NE	NE	NE	NE	NE
	Sub-Total for Otherland		14.65	0.54	NE	15.19	0.00	0.00	0.04	0.00
Sub-Total			-35,568.20	477.40	731.31	-34,359.49	4.04	0.06	35.39	1.00
TOTAL LULUCF SECTOR			**-34,239.83**							

Source: NIR 2013, MONRE, 2017

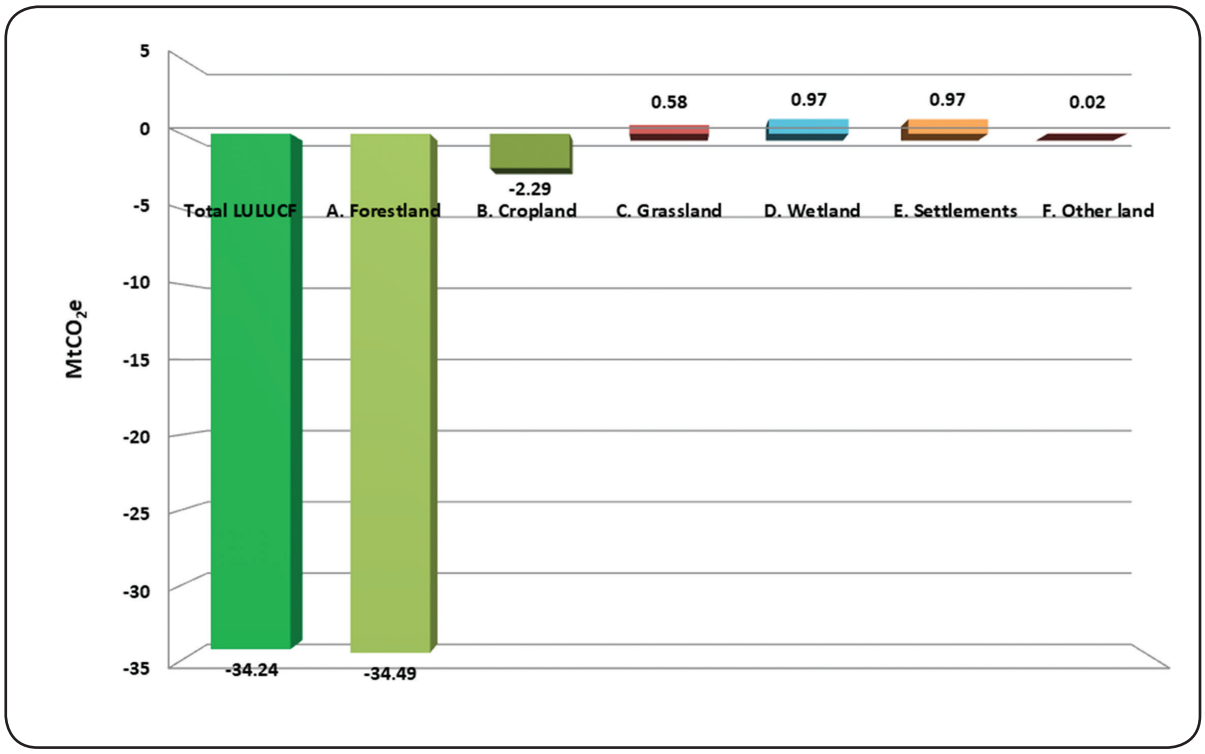

Figure 2.6. The 2013 GHG emissions in LULUCF sector

e. Waste

The total 2013 GHG emission in waste sector is 20.7 $MtCO_2e$, as presented in Table 2.14. The GHG emissions shares of sub-sectors are shown in Figure 2.7. The biggest share of GHG emissions belongs to Domestic Wastewater with 45.6%, followed by emissions from Solid Waste Disposal Sites with 35.9%. For the other sub-sectors, emissions from Human Sewage, Industrial Wastewater and Waste Incineration are respectively 9.4%, 7.9% and 1.2%.

Table 2.14. The 2013 GHG emissions in Waste sector

Unit: kt

Categories	Total emissions			
	CO_2	CH_4	N_2O	Total (CO_2e)
Total	254.9	739.8	6.5	20,686.2
6.A. CH_4 emission from Solid Waste Disposal Sites	NE	297.4		7,435.9
6.B.1. CH_4 emission from Industrial Wastewater		64.9		1,623.0
6.B.2. CH_4 emission from Domestic Wastewater		377.4		9,435.5
6.B.2.b. N_2O emission from Human Sewage			6.5	1,936.9
6.C. CO_2 emission from Waste Incineration	254.9		NE	254.9

Source: NIR 2013, MONRE, 2017

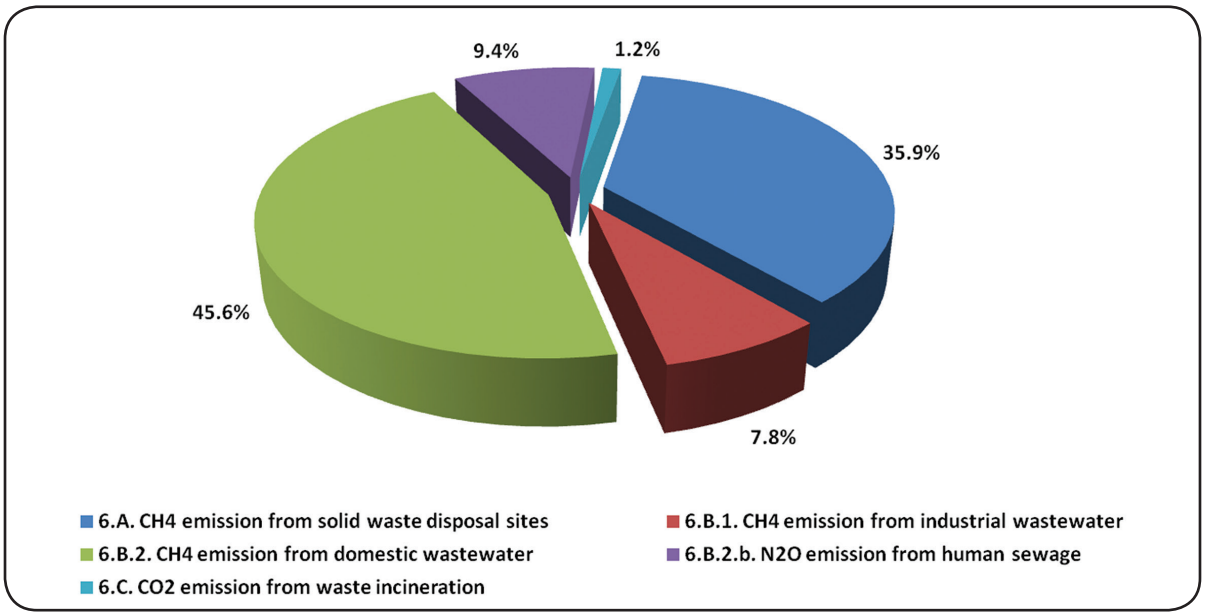

Figure 2.7. The 2013 GHG emission shares of sub-sectors in Waste sector

2.6. Trends of emissions/removals among inventory cycles

During the period of 1994-2013, the total GHG emissions (with LULUCF) have more than doubled from 103.8 $MtCO_2e$ to 259.0 $MtCO_2e$. Emissions in energy sector have gone up the most rapidly, a six-fold increase, from 25.6 $MtCO_2e$ to 151.4 $MtCO_2e$, due to the rapid increase of energy demand. LULUCF sector in 2010 changed from an emissions category to a removal and increased to 34.2 $MtCO_2e$ in 2013 as a result of recent effective reforestation and forest protection activities. Trends of emissions/removals across several inventory cycles are illustrated in Table 2.15 and Figure 2.8.

Table 2.15. Trends of emissions/removals among inventory cycles

Unit: $ktCO_2e$

Sectors / Year	Energy	Industrial Processes	Agriculture	LULUCF	Waste	Total
1994	25,637.0	3,807.0	52,445.0	19,378.0	2,565.0	103,832.0
2000	52,774.0	10,006.0	65,091.0	15,105.0	7,925.0	150,901.0
2010*	146,170.7	21,682.4	87,602.0	-20,720.7	17,887.0	252,621.5
2013	151,402.5	31,767.4	89,407.8	-34,239.8	20,686.2	259,024.1

** Updated the 2010 National GHG inventory*

Sources: INC, SNC, NIR 2013, MONRE, 2003, 2010, 2017

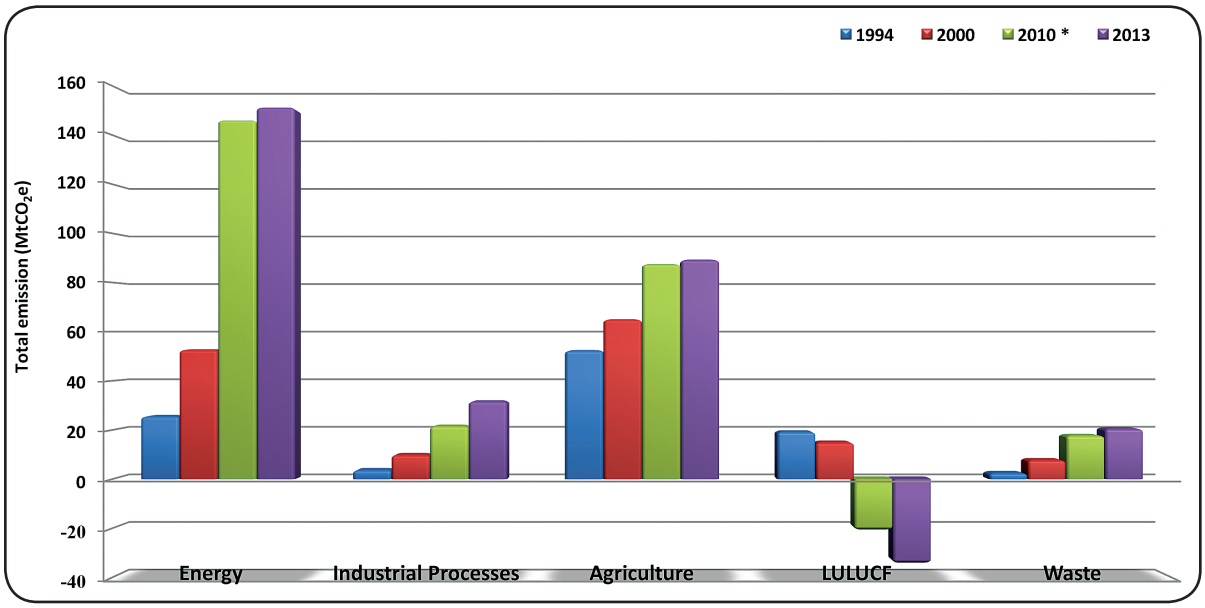

Figure 2.8. Trends of emissions/removals

Among the three gases CO_2, CH_4, and N_2O, CO_2 has had the highest increase rate, from 40.6 $MtCO_2e$ in 1994 to 122.6 $MtCO_2e$ in 2013.

Table 2.16. Trends of emissions/removals by gases

Unit: $MtCO_2e$

	CO_2				CH_4				N_2O			
Sectors	**1994**	**2000**	**2010***	**2013**	**1994**	**2000**	**2010***	**2013**	**1994**	**2000**	**2010***	**2013**
Energy	21.58	45.90	122.91	126.91	3.51	6.48	22.18	23.40	0.54	0.39	1.07	1.09
Industrial Processes	3.81	10.01	21.68	29.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agriculture	0.00	0.00	0.00	0.00	43.95	50.06	59.13	59.13	8.49	15.03	29.27	30.28
LULUCF	15.22	11.86	-22.04	-34.36	3.78	2.95	1.20	0.10	0.38	0.30	0.11	0.02
Waste	0.00	0.00	0.08	0.26	1.43	6.96	16.04	18.49	1.14	0.96	1.77	1.94
Total emissions (without LULUCF)	25.39	55.91	144.68	156.97	48.89	63.50	97.35	101.02	10.17	16.39	32.11	33.30
Total emissions (with LULUCF)	40.60	67.77	122.64	122.61	52.67	66.45	98.55	101.12	10.56	16.69	32.22	33.32

** Updated the 2010 National GHG inventory*

Sources: INC, SNC, MONRE, 2003, 2010

2.7. Uncertainty analysis

Uncertainty analysis is conducted according to:

- GPG 2000,

- IPCC 2006 GL and GPG-LULUCF.

Uncertainty analysis for the 2013 National GHG inventory is implemented with Tier 1, using applied methods presented in Table 2.17. In the absence of default values of the IPCC, uncertainty values of emission sources in five sectors are taken from expert experience. For example, energy sector includes emissions from mining and processing of coal, industrial processes sector includes cement production and consumption of halocarbon and SF_6, agricultural sector includes rice cultivation, and LULUCF sector includes categories such as intact forest land and biomass.

Results of uncertainty analysis for the 2013 GHG inventory are presented in Tables 2.17 and 2.18.

Table 2.17. Uncertainty analysis of the 2013 National GHG inventory

Sectors	Applied method	Emission/Removal ($ktCO_2e$)	Uncertainty (%)
Energy	Chapter 2 of GPG 2000 and Chapter 3, Volume I of IPCC 2006 GL	151,402.5	14.5
Industrial Processes	Chapter 3 of GPG 2000 and Chapter 3, Volume I of IPCC 2006 GL	31,767.4	36.6
Agriculture	Chapter 4 of GPG 2000 and Chapter 3, Volume I of IPCC 2006 GL	89,407.8	17.7
LULUCF	GPG-LULUCF and Chapter 3, Volume I of IPCC 2006 GL	-34,239.8	61.6
Waste	Chapter 5 of GPG 2000 and Chapter 3, Volume I of IPCC 2006 GL	20,686.0	27.0
Total		259,024.1	14.0

Source: NIR 2013, MONRE, 2017

Table 2.18. Uncertainty analysis of the 2013 National GHG inventory key categories with LULUCF

No.	Sectors/Sub-sectors	Gas	Emission ($ktCO_2e$)	Uncertainty (%)
1	4.C.1. Rice cultivation- Irrigated	CH_4	42,561.0	26.9
2	1.A.1.a. Energy industry: Public Electricity and Heat Production	CO_2	41,429.3	4.3
3	2.A.1. Cement Production	CO_2	28,207.1	35.5
4	1.A.3.b. Transport: Road Transportation	CO_2	26,815.0	11.2
5	5.A.2. Land converted to Forest Land	CO_2	22,489.7	73.4
6	1.A.2.c. Manufacturing Industries and Construction: Cement and Building materials	CO_2	17,992.8	4.7
7	1.B.2.a. Fugitive: Oil	CH_4	14,323.0	75.7

No	Sectors/Sub-sectors	Gas	Emission ($ktCO_2e$)	Uncertainty (%)
8	4.D.1. Cropland: Direct Soil Emissions	N_2O	13,167.3	51.4
9	5.A.1. Forest Land remaining Forest Land	CO_2	-12,016.9	87.2
10	4.D.3. Cropland: Indirect Soil Emissions	N_2O	9,950.2	51.4
11	6.B2. Domestic and Commercial Waste Water	CH_4	9,436.0	33.4
12	6.A. Solid Waste Disposal on Land	CH_4	7,436.0	59.6
13	1.A.4.b.Other: Residential	CO_2	6,608.9	13.1
14	1.A.2.g. Manufacturing Industries and Construction: Other	CO_2	6,378.5	4.7
15	4.B.9. Manure management: aerobic treatment	N_2O	5,694.6	62.5
16	4.A.1. Enteric fermentation: Cattle	CH_4	5,672.4	41.8
17	1.A.2.e. Manufacturing Industries and Construction: Textile and Leather	CO_2	5,610.3	4.7
18	5.B.1. Cropland remains to cropland	CO_2	5,502.3	75.8
19	1.A.2.b. Manufacturing Industries and Construction: Chemical and Petroleum	CO_2	4,350.6	4.7
20	4.A.2. Enteric fermentation: Buffalo	CH_4	3,519.4	41.8
21	1.A.4.b.Other sectors: Residential	CH_4	3,497.3	100.8
22	1.A.4.a. Other sectors: Commercial/Institutional	CO_2	3,312.7	13.1
23	5.B.2. Land converted to cropland	CO_2	3,163.2	188.0
24	1.A.2.d. Manufacturing Industries and Construction: Food and Tobacco	CO_2	2,936.2	4.7
25	1.B.2.b. Fugitive: Natural gases	CH_4	2,886.5	0.0
26	4.C.2. Rice cultivation: Rain-fed	CH_4	2,180.7	26.9
27	1.A.1.b. Energy industry: Petrochemical	CO_2	2,098.6	4.3
28	4.F. Field Burning of Agricultural Residues	CH_4	1,972.9	39.7
29	2.F.1. HFCs Consumption	HFCs	1,967.6	300.0
30	6.B. Wastewater handling: Human sewage	N_2O	1,937.0	5.4
31	1.B.1.a. Fugitive: Underground coal mining	CH_4	1,824.7	123.8
32	6.B.1. Industrial Wastewater	CH_4	1,623.0	77.7
33	1.A.2.a. Manufacturing Industries and Construction: Iron and Steel	CO_2	1,609.4	4.7
34	1.A.4.c. Other sectors: Agriculture/Forestry/Fishing	CO_2	1,425.3	13.1

Source: NIR 2013, MONRE, 2017

Detailed activity data and information on the 2013 National GHG inventory are presented in Annexes 1 to 5.

2.8. Recalculation of the 2010 National GHG inventory

The recalculation of the 2010 National GHG inventory aims at consistency between the 2010 and 2013 National GHG inventory cycles. Consistency is achieved through the use of the same methods, EFs and parameters. Table 2.19 illustrates the results of the recalculation of the 2010 National GHG inventory.

Table 2.19. Recalculation of the 2010 National GHG inventory

Sector	Previous 2010 National GHG inventory ($ktCO_2e$)	Recalculated 2010 National GHG inventory ($ktCO_2e$)	Difference (%)
Energy	141,171	146,171	3.5
Industrial Processes	21,172	21,682	2.4
Agriculture	88,355	87,602	0.1
LULUCF	-19,219	-20,721	7.8
Waste	15,352	17,887	16.5
Total emissions (without LULUCF)	**266,050**	**273,342**	**2.7**
Total emissions (with LULUCF)	**246,831**	**252,621**	**2.3**

Source: NIR 2013, MONRE, 2017

CHAPTER 3. MITIGATION ACTIONS

3.1. Mitigation Actions and Policies

From 2014 up to date, the Government of Viet Nam has developed and issued a number of policies related to the mitigation of GHG emissions. The NDC of Viet Nam has defined a roadmap for GHG emissions reduction at national level to 2030, according to which Viet Nam will reduce GHG emissions by 8% compared to the Business As Usual scenario (BAU) by 2030 with domestic resources, and up to 25% by 2030 with international support.

The NDC suggested 45[6] GHG mitigation options focusing on four key sectors: (i) Energy (including energy used in transport and construction sectors), (ii) Waste, (iii) Agriculture, (iv) LULUCF.

In October 2016, the Prime Minister approved the Implementation Plan of PA in Viet Nam. According to this Plan, five groups of tasks to be implemented are as follows:

1. Mitigation of GHG emissions;

2. Adaptation to climate change;

3. Preparation and mobilization of resources;

4. Establishment of MRV system for transparency;

5. Institutional and policy development and strengthening.

In the group of tasks for mitigation of GHG emissions, the related line ministries - MONRE, MPI, MOIT, MOT, MOC, MARD – together with other relevant institutions should undertake regular GHG inventory as well as stock-taking of overall efforts of Viet Nam in GHG reduction in order to update the country's NDC in 2018. At present, ministries and agencies are also trying to concentrate on developing and implementing related programs and projects.

The GHG mitigation actions should be implemented not only at sector or ministry levels but also with cross-sectoral and cross-regional approach, covering the whole country's economy and with participation of both public and private sectors.

This Chapter provides information on GHG mitigation actions as well as the strategies and policies related to GHG emission reduction, including those which are completed, are being implemented or are planned in Viet Nam from 2010, in each of the key sectors and at cross-sectoral level. New development, changes and updates relating to the mitigation actions reported in the BUR1 are also provided. The sectors are divided into five groups as follows: 1) Energy; 2) Construction and Industrial Processes; 3) Transport; 4) Waste; and 5) Agriculture, Land use, Land use change and Forestry. The chapter specifically focuses on the mitigation actions implemented in Viet Nam after the submission of the BUR1.

3.1.1. General policies and strategies related to mitigation

The general policies and strategies related to GHG emission reduction in Viet Nam are described in Table 3.1. The implementation of these policies/strategies is having a tremendous impact on the whole economy of Viet Nam and should lead to positive progress in the country's pathway towards a low-carbon economy.

[6] http://www.noccop.org.vn/Data/profile/Airvariable_Projects_115693Technical%20report%20INDC.pdf

Table 3.1. The key strategies and policies related to GHG emission reduction in Viet Nam

National Climate Change Strategy
Description: The National Climate Change Strategy (NCCS) was approved and stipulated by the Prime Minister by Decision No. 2139/QD-TTg[7] dated December 05th, 2011. The objectives of the NCCS are to mobilize resources of the whole country to synchronously and effectively design and implement actions both for adaptation to climate change impacts and mitigation of GHG emissions and for: ensuring the safety and security of the people's lives and assets; achieving the established sustainable development goals; strengthening adaptive capacity of the human and natural systems; moving towards the low-carbon economy; protecting people's lives and enhancing well-being; ensuring national security and sustainable development in climate change context; and actively contributing to the international community's effort to protect the global climate system. The strategy also provides a vision to 2050. **Implementing Institution(s):** MONRE, MPI, other relevant line ministries and government institutions, People's Committees of provinces and cities. **Status**: On-going. - The Government of Viet Nam has also approved and stipulated the National Action Plan on Climate Change for the period of 2012-2020; the National Target Program to Respond to Climate Change in the period of 2012-2015; the investment plan for National Target Program for Responding to Climate Change and Green Growth for the period of 2016-2020. - Ten line ministries and 60 out of 63 provinces and cities of the country have developed their respective Action Plans to respond to climate change; Up to May 2017, 52 provinces and cities have already submitted reports on assessment of the implementation of their respective Action Plans during the period of 2010-2015. **Proposed budget:** According to the NCCS, every year MONRE in cooperation with MPI and Ministry of Finance (MOF) shall review, analyze and come up with the annual budget needed for the implementation of the Strategy to submit to the Government for approval.
National Green Growth Strategy
Description: The National Green Growth Strategy (NGGS) was approved and stipulated by the Prime Minister by Decision No. 1393/QD-TTg[8] dated September 25th, 2012. The overall objectives of the NGGS are to lead Viet Nam towards green growth, sustainable development and low-carbon economy and, step-by-step, to make sustainable use and conservation of natural resources an important and compulsory criterion in the socio-economic development of Viet Nam. The strategy also provides a vision to 2050. **Implementing Institution(s):** MPI to take the lead, in cooperation with relevant line ministries and institutions as well as the People's Committees of provinces and cities. **Status**: On-going. - The Government of Viet Nam has approved the National Action Plan on Green Growth for the period of 2014-2020 and the investment plan for the National Target Program for Responding to Climate Change and Green Growth for the period of 2016-2020. - Up to October 2016, five line ministries and 30 provinces and cities have developed and started implementation of their respective Green Growth Action Plans. **Proposed budget:** According to the NGGS, MPI should take the lead, in cooperation with MOF and relevant ministries and institutions, to define and allocate the in-country financial sources and international support as well as enabling policies and mechanisms for the NGGS implementation.

[7] http://vanban.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?class_id=2&_page=67&mode=detail&document_id=152841

[8] http://www.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?class_id=2&mode=detail&document_id=163886

National Target Program for Responding to Climate Change and Green Growth for the period of 2016-2020
Description: The Government of Viet Nam has approved the investment plan for the National Target Program for Responding to Climate Change and Green Growth for the period of 2016-2020 by Resolution No. 73/NQ-CP[9] dated August 26th, 2016. The objectives of the Program are to: implement the NCCS and the NGGS; actively implement Viet Nam's commitments to protect the global climate system together with the international community; and reduce GHG emissions in order to meet the country's commitments after 2020. **Implementing Institution(s):** - MONRE (Climate change component). - MPI (Green growth component). - Related Ministries and People's Committees of provinces and cities. **Status**: On-going. **Proposed budget:** VND 15,866 billion of which VND 470 billion is to come from the State budget for development investment, VND 396 billion from central operational (government) budget and VND 15,000 billion from Official Ddevelopment Assistance (ODA) sources.
2030 Agenda for Sustainable Development
Description: The Prime Minister issued Decision No. 622/QD-TTg[10] dated May 10th, 2017 on the promulgation of the National Action Plan to implement the 2030 Agenda for Sustainable Development, including the integration of climate change and green growth. **Implementing agencies:** - National Council for Sustainable Development and Competitiveness enhancement. - The Ministry of Planning and Investment is responsible for coordinating with ministries, sectors and localities. **Status**: on-going **Funding**: from state budget, investment by business, private sector, community, foreign funds and other sources.

3.1.2. Cross-sectoral mitigation actions

Viet Nam has implemented a number of capacity-building programs, projects, conducted technical studies, developed measures to support the development and implementation of cross-sectoral GHG mitigation actions.

The key cross-sectoral GHG mitigation actions in Viet Nam are described in Table 3.2.

[9] http://www.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?class_id=509&_page=1&mode=detail&document_id=186111

[10] http://www.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?class_id=2&mode=detail&document_id=189713

Table 3.2. Cross-sectoral GHG mitigation actions

Low carbon transition in energy efficiency project
Description: The Low carbon transition in energy efficiency (LCEE) project is a cooperative project between the Governments of Denmark and Viet Nam aiming to support and contribute to achieving the energy-saving targets of 5-8% of the National Energy Efficiency Program (VNEEP). The project comprises two components: 1) Energy efficiency (EE) in small and medium enterprises (SMEs) in three sub-sectors: brick, ceramic production, and food processing; and 2) EE in buildings in order to support MOC to implement the National Technical Standards on EE in Buildings (QC 09:2013/BXD). **Sector:** Cross-sectoral: energy and construction, including i) EE in three sub-sectors: brick, ceramic production, and food processing; and ii) Construction: buildings and construction sites. **GHGs covered:** CO_2 **Implementing Institution(s):** MOIT and MOC **Duration:** January 2013 – July 2017
Quantitative goals/targets: The project does not have quantitative targets on GHG emission reduction. Other quantitative key targets/goals include: i) Capacity is built for 30-50 institutions/organizations working on energy-efficient equipment and services; ii) Improved awareness on EE options and measures for 500-1000 SMEs; iii) Supports to implement EE measures are provided to 150-250 SMEs; iv) Capacity is strengthened for implementation of the QC 09:2013/BXD
Progress indicators: i) Number of SMEs receiving energy audit and capacity-building and trainings on energy efficiency; ii) Number of projects receiving support for transition to new energy-efficient technology/fuel, amount of energy saved and GHG reduction achieved for each project; iii) Number of buildings under project framework applying the National Technical Standards for Energy-Efficient Buildings and amount of energy saved in these buildings.
Budget: Support from the Government of Denmark of DKK 65 million (equivalent to US$ 12 million) through the Green Investment Fund (GIF)
Information on international market mechanisms: Not available
Methodologies: Methodologies for CDM approved by the EB such as: AMS-III.Z; AMS-I.C; AMS-II.D
Assumptions: The baseline of the project is also the baseline given for the VNEEP. The base case is the 2006 forecast on the energy consumption development. The VNEEP sets the energy-saving targets of 5-8% measured against the base case. It is assumed that in order to support VNEEP, the GIF is effectively used to support SMEs to shift to new, more energy-efficient technologies/fuel in three sub-sectors: brick, ceramic production, and food processing.

Low carbon transition in energy efficiency project				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation actions**	**Results achieved**	**Estimated emission reduction potential**	**Co-benefits and other effects**
Component 1a: Strengthen awareness and capacity to apply EE measures in three sub-sectors: brick, ceramic production, and food processing	Steps taken - Develop policies/action plans on EE in the three sub-sectors; - Raise awareness of SMEs on EE potential, strengthen technical solutions and financial resources in the three sub-sectors; - Enhance the capacity of SMEs within the three sub-sectors to provide EE services and provide financial advisory - Demonstrate energy-saving measures in the food processing industry;	- Capacity of 30 SMEs providing EE services and equipment was enhanced. - Awareness of 500 SMEs was raised on EE options/ measures	The total emission reductions from 38 awarded projects and 27 on-going projects up to August 21st, 2017 are as follows: - Total: 286,288.04 tCO_2e. - Brick: 22,281.35 tCO_2e - Ceramic: 14,535.77 tonne CO2e. - Food processing: 30,098.27 tCO_2e. - Others: 219,372.65 tCO_2e.	- Reduce environmental pollution from traditional brick and ceramic production. - Generate more income and jobs for farmers from collecting, transporting and selling biomass - Promote the use of renewable energy (RE)
Component 1b: Financial and technical support to selected SMEs for shifting to EE technologies	Step taken - Provide financial and technical support to the SMEs that have implemented EE measures; - Provide financial and technical support with total budget of US$ 6.5 million to the selected SMEs within 3 sub-sectors for shifting to EE technologies.	- There are in total 38 awarded projects and 27 on-going projects in brick, ceramic production, food processing and other sub sectors (pulp and paper, rubber, plastic, etc.)		

Component 2: Support to implement the Technical Standards QC 09:2013/ BXD	Steps taken - Develop training materials and conduct trainings on EE technical standards for engineers and architects; - Design and demonstrate energy-efficient solutions for two pilot buildings; - Monitoring, evaluating and supporting MOC to update the Code. - Conduct monitoring and evaluation and support the MOC to implement and update the Technical Standards.	- Training sessions were conducted in 5 cities. - Two pilot buildings were demonstrated in 2015.		

Source: http://www.lcee.vn

Partnership for Market Readiness Project

Description:
Viet Nam Partnership for Market Readiness (PMR) project is a part of the International PMR Program funded by developed countries and coordinated by the World Bank. The project aims to: strengthen the capacity of government agencies to develop, implement and disseminate policies and tools for state management of NAMAs; formulate market-based instruments to reduce GHG emissions; pilot NAMAs in the fields of steel production and solid waste management; and develop a roadmap to participate in the domestic and international carbon market.
Sector: All sectors of the economy, focusing on steel production and solid waste management sub-sectors
GHGs covered: CO_2, CH_4
Implementing Institution(s): MONRE in cooperation with the MPI, MOF, MOIT and MOC.
Duration: July 2015-June 2018

Quantitative goals/targets: No concrete quantitative goals have been identified yet.

Progress indicators: No concrete progress indicators defined yet.

Budget: US$ 3.6 million, of which US$ 3.0 million is from the International PMR Program and US$ 0.6 million from counterpart State budgets and in in-kind contribution from the co-implementing agencies.

I**nformation on international market mechanisms:** Develop capacity for Viet Nam in preparing for and applying carbon market tools as well as piloting NAMAs generating carbon credits.

Methodologies: Information on methodologies is not available yet because the project is in the preparation stage.

Assumptions: Assumptions are not defined yet because the project is still in the preparation stage.

Partnership for Market Readiness Project				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation actions**	**Results achieved**	**Estimated emissions reduction potential**	**Co-benefits and other effects**
- Review, develop and promulgate relevant policies and governance instruments related to the carbon market; - Develop a database on GHG emissions, carbon market instruments and a Roadmap to participate in the carbon market for the solid waste sub-sector; - Pilot a NAMA generating carbon credits, establish a reporting system for GHG mitigation actions and a Roadmap to participate in the carbon market for the steel production sub-sector; - Raise awareness, strengthen knowledge and capacity on management, monitoring and implementation of NAMAs and NAMAs generating carbon credits as well as carbon credits trading.	The project is still in the preparation stage (recruitment of consultants for project design).	The project is still in the preparation stage.	The project is in the preparation stage, and so emission reduction potential is not estimated yet.	- Create a basis for future establishment of the domestic carbon market and promoting GHG mitigation actions; - Support the implementation of the NCCS; - Strengthen the coordination between MONRE and relevant ministries and agencies in trading of carbon credits generated by future carbon markets. - Provide resources and up-to-date information for policymakers - Support and strengthen the position and participation of Viet Nam in international climate negotiations
Source: VNPMR project document, MONRE, 2016				

3.1.3. Nationally Appropriate Mitigation Actions

The Nationally Appropriate Mitigation Actions (NAMAs) reported in detail in the BUR1 included: i) Support program for wind power development in Viet Nam; ii) NAMA on Biogas for on-site power generation for medium/large pig farms; iii) Renewable Energy Development Facility (REDF) – GET FiT Viet Nam. Up to May 2017, the first two NAMAs have been officially registered by the NAMA Registry of the UNFCCC as NAMAs seeking funding support. The remaining NAMA has not yet been approved for registration and is currently being improved.

From 2014 to the present, a number of NAMAs have been developed and are seeking support. Information on these NAMAs are summarized in Table 3.3.

Table 3.3. Some NAMAs that have been developed from 2014 to present

Support program for wind power development in Viet Nam
Description: The Support program for wind power development in Viet Nam was developed within the framework of the global project "Facilitating Implementation and Readiness for Mitigation" (FIRM) supported by Danish International Development Agency (DANIDA) and implemented by the United Nations Environment Program (UNEP) in Viet Nam. The overall objective of this NAMA is to promote wind power development in order to contribute to GHG emission reduction in Viet Nam by removing policy, capacity and technological barriers to such development. Specific objectives of the NAMA include: i) Strengthening coordination and participation of relevant line ministries and agencies for the development of wind power in Viet Nam; and ii) Strengthening support to promote investment in wind power projects. **Sector:** Renewable Energy **GHGs covered:** CO_2 **Implementing Institution(s):** The NAMA is developed by MONRE and is expected to be implemented by MOIT **Duration:** The NAMA proposal was finalized in 2015. It was suggested that the NAMA be implemented in two phases: Phase 1: 2016-2020; Phase 2: 2021-2030
Quantitative goals/targets: i) Reduction of 282,700 tonnes of oil equivalent (TOE) converted from imported coal up to 2020 and reduction of 2,011,400 TOE up to 2030; ii) Up to 2020, an expected emission reduction of 5.2 $MtCO_2e$. Up to 2030, emission reduction of 66.6 $MtCO_2e$.
Progress indicators: i) Volume of electricity generated from wind power projects; ii) Fuel consumption for electricity generation; iii) Actual emission reductions.
Budget: Total budget suggested for the NAMA – about US$ 34 million, of which about US$ 14 million for the Phase 1 and about US$ 20 million for the Phase 2.
Information on international market mechanisms: Not available.
Methodologies: Application of LEAP Model
Assumptions: - Electricity generated by the wind power projects of the suggested NAMA will replace the electricity generated by thermal power plants using imported coal, leading to potential GHG emission reduction. Nuclear power generation will start from 2020; the installed capacity of wind power will increase from 135 MW in 2014 up to 200 MW by 2020 and up to 300 MW by 2030. - Baseline scenario: The ratio of electricity produced by coal-fired power plants will increase, leading to increased coal imports for power generation.

Support program for wind power development in Viet Nam				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation actions**	**Results achieved**	**Estimated emissions reduction potential**	**Co-benefits and other effects**
Phase 1 (2016-2020)	Steps taken: The NAMA proposal was finalised and submitted to the UNFCCC; NAMA Registry (October 2015). Steps envisaged: - Establish inter-ministerial dialogue on current subsidy policies for fossil fuels and future policies for RE; - Develop a cost-effective sustainable support mechanism for wind power projects; - Set up a service centre to support the development of wind power; - Provide technical and financial support for the feasibility studies of 48 already registered wind power projects; - Establish a credit system to support the implementation of wind power projects.	No results yet as the NAMA has not yet been implemented.	Estimated GHG emission reduction of 5.2 $MtCO_2e$ by 2020.	i) Social benefits: generate electricity for socio-economic development needs; reduce health care costs and improve the environment. ii) Economic: create jobs and improve the quality of life of local communities; reduce the use of fossil fuels and ensure energy security. iii) Environmental: reduce air pollution and waste, improve the environment and water resources.

Objectives of the mitigation actions	Steps taken or envisaged to achieve the mitigation actions	Results achieved	Estimated emissions reduction potential	Co-benefits and other effects
Phase 2 (2021-2030)	Steps taken: Implementation of the new cost-based support mechanism for the wind power projects; Start operation of the service centre supporting wind power development; Continue to provide technical and financial support for the feasibility studies of newly registered wind power projects; Operate the credit system to support the implementation of wind power projects.	No results yet.	Estimated GHG reduction of 66.6 $MtCO_2e$ by 2030	

Source: NAMA Proposal "Support program for wind power development in Viet Nam" under the FIRM project, MONRE, 2015

Implementing GHG emission reduction initiatives in the chemical fertilizer industry in Viet Nam

Description: This project proposal has been developed under the framework of the Project "Strengthening capacity on climate change initiatives in the industry and trade sectors" (CCIT) supported by the United Nations Development Program (UNDP).
The project aims at energy efficiency and saving, and technology transfer in the field of chemical fertilizer production in order to contribute to achieving a 15% emission reduction compared to the BAU scenario. The project is proposed to be implemented in two phases: Phase 1 from 2018 to 2021 and Phase 2 from 2022 to 2030.
Sector: Energy.
GHGs covered: CO_2.
Implementing Institution(s): MOIT.
Duration: Completion of the project proposal: 2015. Expected implementation period of the project is from 2018 to 2030

Quantitative goals/targets: GHG reduction of 1.479 $MtCO_2e$ during the period of 2018 - 2021.

Progress indicators:
- Average specific energy consumption (GJ/tonne fertilizer);
- Annual reduction of CO_2 emissions from energy efficiency in the chemical fertilizer industrial processes
- Sustainable development indicators No. 9,10 and 11 as set out in the GEF guidelines

Budget: Budget for the project development is supported by the CCIT-UNDP project and MOIT. Total budget for the project implementation is US$ 144.1 million, including US$ 129.4 million co-financing by the enterprises concerned and the government.

Methodologies: Guideline for GHG inventory of the IPCC, adjusted to the enterprise scale.

Assumptions: The baseline scenario was developed based on calculation of actual production and GHG emission estimation of large fertilizer producers with high energy consumption.

Implementing GHG emission reduction initiatives in the chemical fertilizer industry in Viet nam				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation actions**	**Results achieved**	**Estimated emissions reduction potential**	**Co-benefits and other effects**
Removing barriers resulting from the lack of coordinating mechanisms for EE and conservation in the chemical fertilizer industry.	Step taken: The NAMA proposal was finalised in 2015. Step envisaged: Component 1: Building a favorable environment for GHG emission reduction in the chemical fertilizer industry Output 1.1: Develop and implement the Sector Plan for development of low-carbon chemical fertilizer industry (2020 - 2030) Output 1.2: Strengthen management, financial and technical knowledge and capacity to implement the Sector Plan for development of low-carbon chemical fertilizer industry (2020-2030) Output 1.3: Management of data on energy, GHG emissions and the sector MRV system is developed, completed and applied in the industry. Component 2: Replication and upscaling of the implementation of GHG reduction measures in chemical fertilizer industry Output 2.1: Effective implementation of GHG reduction technical measures in the key energy-consuming factories (LAFCHEMCO, VAFCO and Ca Mau) and other key energy users; Output 2.2: Identify the list of GHG mitigation options in the chemical fertilizer industry to be implemented in the project's Phase 2. Output 2.3: Provide opportunities and access to finance to support the implementation of GHG reduction options in the chemical fertilizer industry.	No results yet as the NAMA has not yet been implemented	Estimated GHG reduction of 1.479 $MtCO_2e$ during the period of 2018 - 2021	- Increased productivity of fertilizer production due to improved equipment and technologies. - Reduced environmental pollution and long-term environmental protection costs. - Contribute to the goals of NCCS, NGGS and Sector Development Strategy.

Source: Project proposal "Implementation of GHG emission reduction initiatives in the chemical fertilizers industry in Viet Nam" under CCIT Project, MOIT, 2015.

Capacity-Building and Support for Development of GHG Emission Reduction Action Plan for Cement Production in Viet nam
Description: The project is supported by the Nordic Development Fund (NDF) and managed by MOC, aiming to develop the NAMA Readiness Plan for cement production sub-sector in Viet Nam. Key activities of the project include: 1) Development of a database and MRV system; 2) Develop baseline scenarios and GHG reduction options/ measures; 3) Establish a legal framework and implementation arrangement; 4) Financial arrangement; 5) Consultation and capacity-building for stakeholders. The mitigation measures include: Short-term Action (2016 - 2020): improving operational efficiency and introducing EE practices: 1a) Knowledge on the process, management and control; and 1b) Energy audit; 2) Mixing process: Pozzolana; 3) Mixing process: Limestone Mid-term Action (2021 – 2025):4) Modern automation and monitoring system; 5) Improve the clinker coolers; 6) Improve the modern multi-channel combustion chamber; 7) Mixing process: Coal slag as cement substitute; 8) Mixing process: Ash as cement substitute; 9) Waste-heat recovery system for power generation; 10) The best technologies available for other fuels to replace fossil fuels Long-term Action (after 2025) 11) Adding pre-calorifier equipment to the existing pre-heating system; 12) Adding the preheating towers. **Sector:** Construction **GHGs covered:** CO_2 **Implementing Institution(s):** MOC **Duration:** Capacity-building phase and development of the NAMA Readiness Plan: 2014-2016. Expected implementation period is 2018-2030.
Quantitative goals/targets: Estimated emissions reduction of 20 $MtCO_2e$ by 2020 and 164 $MtCO_2e$ by 2030.
Progress indicators: A comprehensive sub-sector level MRV system has been developed with two components: (i) the MRV of GHG emissions (including 29 monitoring/ progress indicators); (ii) the MRV of non-GHG-emissions indicators including the co-benefits and impacts at two levels: factory level and sub-sector/ industry level (10 progress indicators)[11]
Budget: - US$ 1.41 million from the NDF and US$ 0.1 million from government counterpart co-financing for the capacity-building activities. - Estimated funding need is US$ 3 million for the readiness stage (including the development of related policies, mechanisms and capacity-building) plus annual operational cost of about US$ 0.3 million up to 2030. Funding for piloting the carbon-credit trade scheme is about US$ 10 million.
Information on international market mechanisms: Not applicable
Methodologies: MRV system for Sustainable Cement industry Development Initiative; Methodologies from the IPCC guidelines for GHG inventory; The CDM methodologies approved by the EB; and methodologies of the Gold Standard (GS).
Assumptions: The baseline scenario was developed based on the following references: 1. Socio-economic scenarios (Sources: a) UNDP Study on Green Growth, 2013; b) Research on Low-Carbon Energy Development by the World Bank, 2013; c) ADB Research TA-7779 (NDF C18), 2014 "Supporting the National Target Program to respond to Climate Change, focusing on energy and transportation"); 2. Scenarios of cement production capacity and output (Sources: a) Decision No. 1488/QD-TTg dated August 29th, 2011 of the Prime Minister approving the Master Plan for the development of the Viet Nam Cement Industry for the period of 2011-2020 with view to 2030; b) Decision No. 1469 QD-TTg dated August 22nd, 2014 of the Prime Minister approving the Master Plan for the development of construction materials in Viet Nam up to 2020 with view to 2030; 3. Technological Scenarios (Sources: a) CSI/ECRA 33 Technology Papers, b) European Union (EU) BAT 2013, and c) UNEP/CHW and UNEP/SC, 2011).

[11] https://www.ndf.fi/sites/ndf.fi/files/attach/iii-3_final_readiness_plan_report_0.pdf

Capacity-Building and Support for Development of GHG Emission Reduction Action Planfor Cement Production in Viet nam				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation actions**	**Results achieved**	**Estimated emissions reduction potential**	**Co-benefits and other effects**
Develop the NAMA Readiness Plan for cement production sub-sector in Viet Nam.	Steps taken: The NAMA Readiness has been developed and was finalized in May 2016. Steps envisaged: - Mobilize/seek international funding to implement the NAMA; - Establishment of a NAMA Operational Unit under the MOC - Set up the NAMA MRV system; - Mainstream GHG reduction targets and mitigation measures into cement industry development planning; adjustment and development of incentive policies by: balancing cement supply and demand, improving EE, reducing clinker proportion in cement, in order to contribute to the implementation of the Action Plan on Climate Change and Green Growth of MOC - Disseminate legal provisions and regulations on energy consumption reporting; - Feasibility study of different GHG mitigation actions; - Strategic research on the use of conventional and alternative fuels in Viet Nam; - Introduce and promote the Energy Service Company (ESCO) model in the cement industry; - Develop regulations on management of waste and infrastructure; - Pilot the carbon credit trading scheme through bidding; - Assist in accessing the energy-saving foundations for waste heat recovery systems; - Merge small-scale cement plants into large cement factories and establish energy-saving centres; - Develop a financial incentive policy for GHG emission mitigation actions (in cement sub-sector); - Capacity-building activities	- The NAMA Readiness Plan has been developed - Capacity-building activities conducted	Estimated reduction of 20 $MtCO_2e$ by 2020 and 164 $MtCO_2e$ by 2030	- Reduce fossil fuel consumption - Reduction of land use for landfill - Create more jobs and increase income - Improve health of the population, air quality, quantity and quality of wastewater - Promote technology transfer, hence technology autonomy.

Source: Project Document "Capacity-Building and Support to Development of Action Plan for GHG Emission Reduction in Cement Production in Viet Nam", MOC, 2014

Low-Carbon Bus NAMA
Description: The NAMA was developed under the framework of the project "Creation of an overarching framework for NAMAs and MRV in Viet Nam" (GIZ/IMHEN NAMA Project) supported by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) together with Viet Nam Institute of Meteorology, Hydrology and Climate change (IMHEN). Key activities of the NAMA are structured in three components: 1) Introduction of low-carbon buses (diesel hybrids, plug-in hybrids and electric buses); 2) Improve bus efficiency through various measures such as: using fuel-saving tires, Eco Drive, idle-stop devices and telematics and improvement in operational efficiency of bus operators through measures such as route optimization and bus dispatch. 3) Contribution towards public transport system improvement through measures such as high quality public transport planning, high quality bus services, smart ticketing and system integration. **Sector:** Transport **GHGs covered:** CO_2 **Implementing Institution(s):** MOT **Status:** NAMA proposal completed in 2016. Currently the NAMA proposal is being reviewed and revised in accordance with the results of assessment of NAMA Facility. **Duration:** The NAMA is expected to be implemented in two phases: Phase 1 from 2018 to 2020 and Phase 2 from 2021 to 2030
Quantitative goals/targets: GHG emissions reductions estimated from 2018 to 2030 are 4.9 $MtCO_2e$ compared to BAU.
Progress indicators: Phase 1 (2018-2020): - 200 diesel hybrids. - 50 plug-in hybrids. Phase 2 (2021-2030): - By 2025 all newly acquired buses in Viet Nam will be LCBs with an expected share of 75% hybrids and 25% plug-in hybrids - By 2030 the share of plug-in hybrids of new acquired urban buses will be 30% and electric or opportunity charge units 10%. - Volume of passengers transported (number of passengers); - Volume of passenger traffic/ passenger turnover (number of passengers per km) (travelling distance) - Actual GHG emission reductions
Budget: US$ 4.1 billion including 60% from commercial loans, 32% from equity and 8% from grants.
Information on international market mechanisms: Not available.
Methodologies: CDM methodologies that have been approved by the UNFCCC EB:AMS-III-C; AMS-III-BC; ACM0016; AM0031.

Low-Carbon Bus NAMA				
Assumptions: - Low-carbon buses in Viet Nam will operate similarly to buses in other countries; - Investors will buy low-carbon buses. - Government targets of public transport modal share are achieved				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation action**	**Results achieved**	**Estimated emissions reduction potential**	**Co-benefits and other effects**
To significantly reduce urban transport GHG and pollutant emissions in Viet Nam and contribute to sustainable development in the transport sector. The NAMA actions are structured in the following three components: 1. Introduction of Low-Carbon Buses (hybrids, plug-in hybrids and electric units).	Steps taken: The NAMA Proposal has been completed. Steps envisaged: - Seeking financing source. - Implementing the NAMA, which includes: Phase 1: +Introduction of 200 12m Euro IV diesel-hybrids in Ha Noi (about 150 hybrids) and Can Tho (about 50 hybrids). + Introduction of 50 12m urban Euro IV (minimum) plug-in hybrids in Ha Noi including at least 2 charging stations. 2. Phase 2: + By 2025 100% of new urban buses acquired in Viet Nam shall be LCBs of which 75% will hybrids and 25% plug-in hybrids. + By 2030 the share of old generation buses in the market will be 20%, the share of hybrids 50% with a quarter of the hybrid buses being plug-in hybrids	The NAMA Proposal has been completed. On-going fund-raising process	GHG emission reductions estimated from 2018 to 2030 are 4.9 $MtCO_2$ compared to BAU.	- Reduce diesel consumption, switching to clean fuels, reduce air pollution, contribute to urban environmental protection. - Promote public transport in urban areas, reduce traffic congestion and accidents

2. Improvements in bus efficiency through measures such as efficient tires, Eco Drive, idle-stop devices and telematics and improvement in operational efficiency of bus operators through measures such as route optimization and bus dispatch. 3. Contribution towards public transport system improvement through measures such as high quality public transport planning, high quality bus services, smart ticketing and system integration.				

Source: NAMA Proposal "Bus Transportation", Project "Building the overall framework for NAMAs and measuring, reporting and verifying (MRV) in Viet Nam ", MONRE, 2016

Waste to Resources NAMA
Description: The program aims to support GHG emissions reduction in the field of solid waste management through the implementation of waste management practices in line with the 3R (Reduce, Reuse, Recycle) principle, utilizing resources from waste and contributing to the achievement of sustainable development goals. The design and development of the NAMA proposal was supported by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). **Sector:** Waste **GHGs covered:** CH_4 **Implementing Institution(s):** MONRE **Duration:** The NAMA proposal was completed in 2016. Expected implementation period of the NAMA is 2018-2030
Quantitative goals/targets: Estimated GHG reduction by 71% compared to BAU (equivalent to 41.4 $MtCO_2e$) in the field of solid waste by 2030.
Progress indicators: The MRV plan was developed, in which the progress indicators are: (i) Solid waste management practice (waste collection rate, waste composition), amount of compost generated, power and heat generated through anaerobic digestion (AD), amount of refuse-derived fuel (RDF) produced, amount of recycled wastes; (ii) GHG emission reduction achieved; (iii) Sustainable development benefits.
Budget: Budget for the NAMA proposal development: US$ 60,000 from UNESCAP and US$ 10,000 from counterpart co-financing. Budget for the NAMA: Estimated US$ 750,000 for the NAMA piloting phase (1.5 year) and US$ 110 - 747 million/year for full implementation phase up to 2030.
Information on international market mechanisms: No market mechanism is applied. It is expected that international support will be received in the form of grants or concessional loans.
Methodologies: Revised 1996 IPCC Guidelines for GHG inventory; CDM methodologies approved by the EB: AMS.III.F; AM0025; AMS.III.AJ; AM0075
Assumptions: - The baseline scenario assumes that most of the solid wastes generated in Viet Nam are buried in landfill. - Targets of waste collection ratio: 85% by 2015, 90% by 2020 and 100% by 2025. - Default emission factors of the IPCC guidelines are applied.

Objectives of the mitigation actions	Steps taken or envisaged to achieve the mitigation actions	Results achieved	Estimated emissions reduction potential	Co-benefits and other effects
- 60% of collected solid wastes is used to produce compost; - 10% of collected solid wastes are anaerobically treated; - 10% of collected solid wastes are used to produce RDF; - 20% of collected solid wastes is recycled into raw materials.	Steps taken: The NAMA proposal was completed in April 2016. Steps envisaged: - Preparation and implementation of pilot, focusing on 3 main areas: + Setting up an institutional framework for NAMA; + Capacity-building for stakeholders; + Piloting the key elements of the program, especially the sectoral MRV system. - Expand the scale of implementation.	NAMA proposal completed	- Reduction of 28.49 $MtCO_2e$ by 2030 from compost production; - Reduction of 3.57 $MtCO_2e$ by 2030 from anaerobic decompos-ing; - Reduction of 7.91 $MtCO_2e$ by 2030 from RDF production; - Reduction of 1.44 $MtCO_2e$ by 2030 from recycled materials.	- Energy and resources saving from waste collection and reuse. - Contribute to protection of groundwater and surface water resources and reduce environmental pollution. - Generate additional revenue from selling compost, electricity, heat, RDF. - Reduce dependence on imported raw materials. - Create new jobs and incomes. - Raise public awareness about 3R principle

Source: NAMA Proposals "Waste into resources in cities in Viet Nam", Institute of Meteorology, Hydrology and Climate Change, 2016

NAMA on Biogas for on-site power generation for medium/large pig farms
Description: This NAMA was developed under the framework of the FIRM project supported by UNEP. Biogas generated during waste treatment in medium and large-scale pig farms is used as a renewable fuel source for on-site power generation, which could be connected to the national grid or rural electricity distribution station, thereby contributing to GHG emission reduction, environmental protection and sustainable livestock development. **Sector:** Agriculture **GHGs covered:** CH_4, N_2O, CO_2 **Implementing Institution(s):** MARD **Duration:** The NAMA design/proposal development in 2015. Expected implementation period of the NAMA is 2018-2030
Quantitative goals/targets: i) The biogas generators are installed and operating in 300 farms by 2020 and 1500 farms by 2030; ii) Installed capacity: 30 MW by 2020 and 150 MW by 2030; iii) GHG mitigation: 2.03 $MtCO_2e$ in 2030.
Progress indicators: i) Number of pig farms with installed and operated biogas generator; ii) Amount of electricity generated from the pig farms by installed biogas generators; iii) Actual GHG emission reductions.
Budget: The budget for the NAMA proposal development was supported by the FIRM project. Expected budget for the NAMA implementation stage: US$ 62 million, of which international support will provide US$ 27.44 million, the State budget US$ 23.76 million and the private sector US$ 10.8 million
Information on international market mechanisms: Not applicable
Methodologies: CDM methodologies approved by the EB: AMS – III.D and AMS – ID
Assumptions: (i) The pig farms currently have manure, do not use biogas and emit the generated gas into the atmosphere; (ii) electricity generated from biogas will be connected with the grid; (iii) the grid emission factor will be sourced from the Designated National Authority.

Objectives of the mitigation actions	Steps taken or envisaged to achieve the mitigation actions	Results achieved	Estimated emissions reduction potential	Co-benefits and other effects
1) Improve and develop policies supporting grid connection and investment loans for biogas power generation in medium- and large-scale pig farms. 2) Number of medium- and large-scale pig farms with installed and operated biogas generator: 300 farms with 30MW capaity by 2020; 1500 farms with 150MW capacity by 2030.	Steps taken: The NAMA proposal has been developed and was submitted to UNFCCC in 2015. Steps envisaged: - Develop a policy framework to promote the development of biogas - Select suitable technologies for biogas power generation - Develop a sectoral management system for biogas power sources (integrated with RE management system). - Raise the awareness and increase the participation of relevant stakeholders - Strengthen capacity for management, operation and maintenance of biogas power generation systems - Build up biogas power sources from concentrated pig farms	The NAMA proposal was developed.	Estimated emissions reduction of 2.03 $MtCO_2e$ by 2030	- Reduce environmental pollution - Increase income from power generation - Create more jobs - Reduce public investment in traditional electricity generation. - Development of business services for repair, installation and maintenance of biogas generators.

Source: NAMA Proposals "Biogas for on-site power generation of medium and large pig farms" under the FIRM project, MONRE, 2015

Climate and livelihoods transformation through low-emission beef production in Viet nam
Description: This NAMA is designed to reduce GHG emissions from beef production while improving the competitiveness of domestic cattle. GHG emission reduction is to be achieved through: efficient production systems; capacity-building and investment in areas such as high quality livestock feeds produced locally and organic fertilizer production; measures to ensure productive breeding and good management of waste to improve livestock health and more effective meat production. This NAMA also supports small- and medium-sized slaughterhouses to improve food safety, reduce meat waste and improve the efficiency of the production system. It is estimated that in 10 years (2018-2028), an emission reduction of about 1.5 $MtCO_2e$ will be achieved in the beef production industry. **Sector:** Livestock/Agriculture **GHGs covered:** CH_4, N_2O **Implementing Institution(s):** MARD **Duration:** The NAMA proposal was developed in 2016. Expected implementation period of the NAMA is 2018-2028
Quantitative goals/targets: Estimated emission reduction of 1,474,252 tCO_2e compared to the BAU scenario
Progress indicators: i) Cattle herd structure (percentage of bulls, cows, heifers and calves) in the provinces participating in the NAMA; ii) Genotype of animals; iii) Quality and quantity of feed; iv) Method of manure management; v) Number of training courses, workshops/number of farmers receiving concessional loans; vi) Actual GHG emission reductions
Budget: Estimated budget for implementation of the NAMA is EUR 21.6 million, including EUR 5.2 million from the NAMA Facility, EUR 10.6 million from the State budget and EUR 5.6 million from the private sector.
Information on international market mechanisms: Not applicable.
Methodologies: Methodologies from the 2006 IPCC Guidelines for GHG inventory
Assumptions: - Expected rate of farmers adopting the new approaches: 5%, 10%, 20% and 30%, respectively, for the first four years of piloting in the three provinces of Ha Noi, Binh Dinh and Ben Tre. This rate is projected to increase up to 40% in the pilot provinces and 5% nationwide in the fifth year of the NAMA implementation. After this period, the rate is expected to reach 50% in the pilot provinces and 7%, 10%, 12%, 15% and 18% nationwide respectively, for the following five years. - CH_4 Emission Factors and N_2O Emission Factors for ruminant and livestock manure management follow 2006 IPCC Guidelines for GHG Inventory.

Objectives of the mitigation actions	Steps taken or envisaged to achieve the mitigation actions	Results achieved	Estimated emissions reduction potential	Co-benefits and other effects
- Raise awareness of agricultural extension staff and farmers on low-emission agriculture and highly productive beef production practices. - Improve beef production technology - Improve waste management - Improve beef processing, storage and sale processes - Improve the financial environment for investment in livestock farms and slaughterhouses - Develop the sub-sectoral MRV system	Steps taken: The NAMA proposal has been completed in 2016. Steps envisaged: i. NAMA Piloting Phase: - Develop pilot models for reducing GHG emissions and increasing economic benefits from beef production in selected locations; - Conduct training for staff and training of trainers (ToT) for the provincial Departments of Agriculture and Rural Development (DARDs), local agricultural divisions and agri-extension centres; - Conduct awareness raising campaigns on the benefits of low-emission animal production; - Provide technical assistance and training for farmers; - Support farmers to access low interest loans for large capital investments; - Design and operate MRV system at sub-sector level. ii. Expansion and upscaling of the NAMA implementation	The NAMA proposal has been completed.	Emission redution of 1,474,252 tCO_2e by 2028 compared to BAU	- Increase economic efficiency - Create additional income for farmers from effective manure management - Create leverage to raise public and private funds - Development of new financial schemes for financial institutions to promote investment in beef production and meat processing industries

Source: NAMA Proposal "Climate Change and Livelihoods through Low Emissions of Beef Production in Viet Nam", Department of Livestock Production, MARD, 2016.

3.1.4. Mitigation actions by sectors

a) Energy

Some key sectoral policies related to GHG mitigation in energy sector are summarized in Table 3.4.

Table 3.4. Some key sectoral policies related to GHG mitigation in Energy sector

Green Growth Action Plan of the Industry and Trade sector for the period of 2015-2020
Description: The Green Growth Action Plan (GG-AP) of the Industry and Trade sector for the period of 2015-2020 was promulgated by MOIT under Decision No. 13443/QD-BCT[12] dated December 8th, 2015. The Plan defined concrete details for the key tasks in the industry and trade sector in order to implement the objectives and tasks of the NGGS and the National GG-AP for the period of 2014-2020. The Plan has set the quantitative goal of GHG emission reduction for the entire sector from 8-10% compared to the base-year 2010 by reducing energy consumption per unit of product from 1-1.5% per year. The targets for GHG emission reduction compared to BAU in some of the sub-sectors are as follows: - Coal-fired thermal power: 10-20% compared to BAU (10% voluntary, 10% with international support); - Chemical fertilizers: 9-15% (9% voluntary, 6% with international support); - Steel production: 10-20% (10% voluntary, 10% with international support). **Implementing Institution(s):** MOIT, Department of Industry and Trade (DOIT) of the provinces and cities belonging to the central government. **Status**: On-going. **Proposed Budget:** Mobilized from central and local budgets, private sector and international technical assistance (TA) funding.
National Target Program on Energy Efficiency and Conservation for the period of 2012 – 2015
Description: The National Target Program for Energy Efficiency and Conservation in the period 2012-2015 was approved by the Prime Minister in Decision No. 1427/QD-TTg[13] dated October 2nd, 2012. The Program has set a target of saving 5-8% of total energy consumption for the whole country for the period of 2012-2015 compared with the energy demand forecast in the National Power Development Plan for the period of 2011-2020 with vision to 2030, which is equivalent to 11-17 million TOE during the period of 2012-2015. **Implementing Institution(s):** MOIT as the standing body of the Program's Steering Committee takes leadership of the Program's implementation, in cooperation with the line ministries, provinces, localities and relevant institutions. **Status**: Completed. **Results Achieved:** After 5 years of implementation, the Program has achieved certain good results: 585 projects and tasks have been implemented; over 10 thousand samples of 15 target product groups have been labelled, supporting energy audit for nearly 700 enterprises; over 100 buildings were honoured at the "Energy Efficiency Buildings" competition; support was given for the installation of 30,000 solar water heaters; and 7 million incandescent bulbs were replaced with compact fluorescent bulbs. According to the MOIT, the energy-saving rate in the period of 2011-2015 was 5.65%, equivalent to total energy savings of 11.261 million TOE. **Budget:** VND 930 billion of which VND 350 billion came from the State budget, VND 300 billion from provincial/local budgets, VND 180 billion from international support and VND 100 billion from other sources.

[12] https://thuvienphapluat.vn/van-ban/Thuong-mai/Quyet-dinh-13443-QD-BCT-ke-hoach-hanh-dong-tang-truong-xanh-cua-nganh-Cong-Thuong-301048.aspx

[13] http://www.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?mode=detail&document_id=163946

Viet Nam Renewable Energy Development Strategy to 2030 with an outlook up to 2050
Description: The Viet Nam Renewable Energy Development Strategy (REDS) to 2030 with an outlook up to 2050 was approved by the Prime Minister by Decision No. 2068/QD-TTg[14] dated November 25th, 2015. The objectives of the Strategy are: - GHG emission reduction in energy activities compared to the BAU: about 5% by 2020; about 25% by 2030 and about 45% by 2050. - Contribute to the reduction of imported fuel for energy purposes, with a reduction of about 40 million tonnes of coal and 3.7 million tonnes of oil products imported by 2030 and a reduction of about 150 million tonnes of coal and 10.5 million tonnes of oil products by 2050. - Increase the total amount of RE produced, from about 25 million TOE in 2015 to about 37 million TOE by 2020; about 62 million TOE by 2030 and 138 million TOE by 2050. The proportion of RE in total primary energy consumption in 2015 is about 31.8% and is expected to be about 31.0% by 2020, about 32.3% by 2030 and to have increased up to about 44.0% by 2050. - Increase the amount of electricity produced from RE, from about 50 billion kWh in 2015 to about 101 billion kWh by 2020, about 186 billion kWh by 2030, and about 452 billion kWh by 2050. The ratio of RE production (including large-scale hydropower) in total national electricity production will increase from about 35% by 2015 to around 38% by 2020, about 32% by 2030 and about 43% by 2050. The Strategy also sets out mechanisms and policies to support the development of RE, including: the formation of a market for RE; electricity price policy and investment guarantee; offset mechanism and other incentive policies; and support such as tax incentives, land incentives and research and development priorities. **Implementing Institution(s):** The MOIT performs a unified management function for the development and use of RE in the country. Other relevant ministries shall, according to their respective functions and tasks, carry out the management of the development and use of RE in relevant fields. Agencies performing the function of state management of energy in the provinces and cities under the Central Government are responsible for managing the development and use of RE in their respective territories. **Status**: Implementation is on-going. **Proposed Budget:** The MOIT shall develop a Roadmap to implement this Strategy, including suggestions on budget.

Some key mitigation actions in energy sector (focusing on the mitigation actions which took place after Viet Nam submitted the BUR1) are summarized in Table 3.5.

[14] http://www.chinhphu.vn/portal/page/portal/chinhphu/noidungchienluocphattrienkinhtexahoi?_piref135_16002_135_15999_15999.strutsAction=ViewDetailAction.do&_piref135_16002_135_15999_15999.docid=3858&_piref135_16002_135_15999_15999.substract=

Table 3.5. Some key mitigation actions in Energy sector

Development and promotion of LED technology for general lighting in Viet Nam
Description: The goal of the project is to reduce GHG emissions through converting the lighting market towards LED lighting products made in Viet Nam. This goal will be achieved by removing barriers to increased production and use of LED products through two components: i) Transfer of skills, knowledge and technologies of LED production; and ii) Demonstration of cost-effective practice of domestic production of commercial LED lighting equipment in Viet Nam. **Sector:** Energy **GHGs covered:** CO_2 **Implementing Institution(s):** Viet Nam Academy of Science and Technology; MOIT, MOC, and MOST; Large companies manufacturing products for lighting in Viet Nam; Viet Nam Lighting Association, Viet Nam Physical Society. **Duration:** 2016 – 2019
Quantitative goals/targets: (i) Direct emission reduction of 623 tCO_2e from demonstration projects; (ii) Direct emission reduction of 69,380 tCO_2e from LED lighting product applications during the 10 years after the end of Project; (iii) Indirect emission reductions of 6,000 tCO_2e (bottom-up method) and 5,145,000 tCO_2e (top-down method) during the period of 2019-2028.
Progress indicators: 1) Number of factories producing LED lamps meeting the regulation Vietnamese Standards (TCVN); 2)Number of retailers of labelled LED lighting products in the country; 3) Number of categories of LED lighting products reaching TCVN; 4) Ratio (%) of urban, rural households and commercial units purchasing domestically produced LEDs; 5) Ratio (%) of market share of domestically produced LEDs in Viet Nam lighting market; 6) Direct and indirect GHG emission reduction.
Budget: US$ 8,146,794, of which: (i) US$ 1,517,400 is from GEF grant, ii) US$ 100,000 is from UNDP; (iii) US$ 440,000 is from State budget as counterpart funding; and (iv) US$ 6,089,394 is from private sector funding.
Information on international market mechanisms: Not yet available.
Methodologies: - CDM methodologies approved by the EB: AMS-II.L. - Using the top-down and bottom-up approach for emission reduction calculation from the project completion time up to 2028 (10 years after project completion). Indirect emission reductions (bottom-up method) will also be estimated from the results of the LED market survey and the number of LEDs sold before the project completion.
Assumptions: The assumptions for calculation of the project scenarios include: * General assumptions: 1) The annual growth rate of sales of all lamps/bulbs is 2%; 2) The nationwide use of incandescent lamps > = 60W ended in 2014 and was replaced by the corresponding CFLs; 3) Total consumption of CFLs of all capacity levels in 2010 is about 40 million lamps. 4) The total consumption of all FTLs in 2010 was about 60 million lamps; 5) The suggested LED replacement rate is 1.6% for 2017 and from 2018 onwards will be 10% per year; 6) Power losses on transmission lines are about 10%; 7) Time of use: (i) residential area is 5 hours/day; (ii) street and construction sites are 11 hours per day; and (iii) commercial and office facilities are 8 hours per day. *EFs: (i) EF used for the Viet Nam Energy Efficiency Public Lighting (VEEPL) Program is 0.43 $kgCO_2/kWh$; (ii) EF of the national grid issued by MONRE is 0.6244 $kgCO_2/kWh$

Objectives of the mitigation actions	Steps taken or envisaged to achieve the mitigation actions	Results achieved	Estimated emissions reduction potential	Co-benefits and other effects
Reduce GHG emissions through full conversion to using LED products in the lighting market in Viet Nam. Component I: i) Two LED manufacturing factories meeting TCVN; ii) 200 retailers of domestic quality-labelled LED products; iii) Six types of LED products reach TCVN; iv) Four types of LED products are quality-labelled. Component II: i) 10% of households and businesses buy domestically manufactured LEDs; ii) 15 million domestically produced LED products that met TCVN sold annually; iii) 7% share of LED lamps are produced domestically in Viet Nam lighting market.	Component I: - Develop a roadmap for development of the national LED lighting industry up to 2025; - Develop standards for LED products meeting international standards; - Organize training courses and workshops, seminars to raise the capacity to measure and test the LED products; - Establish EE certification and labelling programs for LED products; - Develop LED lighting standards for urban public works; - Strengthen capacity of the R&D units on LED products; - Enhance the design and production capacity of LED product manufacturers in Viet Nam Component II: - Conduct feasibility study of the LED lighting pilot projects in houses, alleys and streets; - Implement pilot projects on domestically produced LED lights in houses, alleys and streets; - Develop MRV system for LED lighting projects; - Develop awareness-raising programs and organize dissemination workshops.	Component I: 1. Complete the two draft standards TCVN for the LED products; 2. Complete the proposal for strengthening the capability for testing the LED products; 3. Complete the survey to determine the training and R&D needs in LED lighting technology; develop and improve the training program on LED lighting technologies; 4. Support the largest lamp-producing joint-stock companies, namely Rang Dong and Dien Quang companies, including support for software packages. Component II: 1. Complete the data collection and evaluation of LED lighting industry 2. Realize the idea to establish the MRV system for LED lighting systems	1. Direct emission reduction of 623 tCO_2e from demonstration projects; 2. Direct reduction of 69,380 tCO_2e from LED lamps applications within project's life cycle (after its completion). 3. Indirect reductions of 6,000 tCO_2e (bottom-up method) and 5,145,000 tCO_2e (top-down method) during the period of 2019-2028 (10 years after project completion).	- Promote the transition of lighting systems in Viet Nam. - Develop the lighting industry, stabilize the market with high quality and competitive prices. - Reduced power consumption and reduced costs for households, commercial, industrial facilities and offices. - Improve the quality of urban lighting. - Reduced electricity shortage thanks to reduced demand from national grid; - Improve trade performance by reducing power outages.

Source: Project Document "Developing and Promoting Led Technology for General Lighting in Viet Nam", Viet Nam Academy of Science and Technology, 2016

Energy Efficiency for Industrial Enterprises Project in Viet Nam
Description: The project Energy Efficiency for Industrial Enterprises in Viet Nam (VEEIE) is being implemented under a cooperation framework between the Government of Viet Nam and the World Bank (WB), and aims to improve EE for industries, contributing to national targets on EE and GHG emission reduction. The project consists of two components: i) Energy efficiency investment loan (US$ 156.3 million), ii) Supporting the project implementation (US$ 1.7 million). **Sector:** Energy. **GHGs covered:** CO_2. **Implementing Institution(s):** MOIT. **Duration:** 2017 – 2022
Quantitative goals/targets: Estimated emission reduction of 5.027 $MtCO_2e$/year from 2022
Progress indicators: - Number of EE/energy-saving projects implemented. - Annual GHG emission reduction (tCO_2). - National EE database and MRV tools for industry sector are developed.
Budget: US$ 158 million, of which US$ 101.7 million is concessional loan from WB and US$ 56.3 million is co-financing from State budget
Information on international market mechanisms: Not yet available.
Methodologies: IPCC Guidelines for GHG inventory
Assumptions: Energy efficiency measures are implemented effectively in large energy-consuming industries such as cement, steel, textiles, paper and pulp, food processing, brick and ceramic production.

Objectives of the mitigation actions	Steps taken or envisaged to achieve the mitigation actions	Results achieved	Estimated emissions reduction potential	Co-benefits and other effects
To save about 1.86 million TOE and reduce GHG emissions. Other goals include: - 37,822 direct project beneficiaries; - 60 EE projects were developed; - The national EE database of industries is built. - The circular on EE for key industries is developed and completed.	Component I: EE investment lending – US$ 156.3 million over 5 years. Currently two Private Finance Initiative (PFIs): Vietcombank and BIDV have been selected; Develop an Operational Manual on selection criteria for borrowers and project beneficiaries, and on the approval process. The PFIs will lend the funds to industrial enterprises and energy service companies for EE investment subprojects. Component II: Provide technical assistance and capacity-building for MOIT to oversee the project, including auditing and project implementation assurance; Advise and coordinate with VietinBank to identify suitable capacity support mechanisms for PFIs to implement the project; Submit a technical assistance project proposal to the Green Climate Fund, in collaboration with other international donors.	Two PFIs selected; Operational Manual developed	Estimated emissions reduction of 5.027 $MtCO_2e$/ year from 2022.	Social safeguards: to reduce oter pollutants; positive impacts on consumers: lowering cost of products and services, ensuring job security. Environmental safeguards: to encourage the promotion of environmentally good industry practices.

Source: Project Document " Viet Nam Energy Efficiency for Industrial Enterprises (VEEIE)", MOST, 2016

b) Construction and Industrial processes

Some policy actions related to GHG emission reduction in this sector (including construction material production) are summarized in Table 3.6.

Table 3.6. Some policy actions related to GHG emission reduction in Construction and Industrial Processes sector

Action Plan to Respond to Climate Change in Construction sector for the period of 2016-2020
Description: The Action Plan to Respond to Climate Change in Construction sector for the period of 2016-2020 was issued by the MOC by the Decision No. 811/QD-BXD[15] dated August 18th, 2016. Objectives of the Plan are to: strengthen the response capacity of the construction sector to the impacts of natural disasters, climate change and sea level rise; use resources and energy efficiently, and hence contribute to climate change mitigation; and develop the construction industry in a green and sustainable manner. **Implementing Institution(s):** MOC **Status**: On-going **Proposed Budget:** Funding sources from: State budget for the National Target Programs, state budget for scientific and technological activities, non-business economic capital, private sector as well as international organizations.
National Technical Standards for Energy Efficient Buildings
Description: The National Technical Standards for Energy Efficient Buildings (QC 09:2013/BXD) was approved and promulgated by the MOC by Circular No. 15/2013/TT-BXD[16] dated September 26th, 2013 to replace the "Viet Nam Construction Regulations – Energy-Efficient Buildings" (QCXDVN09:2005). This standard specifies the technical requirements that must be followed when designing, building or renovating civil works (office, hotel, hospital, school, and commercial, service or apartment buildings) with a total floor area of 2500 m^2 or more. **Implementing Institution(s):** The MOC (management agencies), other ministries and ministerial-level agencies attached to the Government, the People's Committees of the provinces and cities, and all the concerned organizations and individuals. **Status**: On-going **Proposed Budget:** No budget is suggested since compliance to the standard is compulsory.
Green Growth Action Plan of Construction sector by 2020, with vision to 2030
Description: The GGAP of Construction sector was promulgated by MOC by the Decision No. 419/QD-BXD[17] dated May 11st, 2017 with objectives to concretize the tasks and objectives of the construction industry as stated in the NGGS. The specific tasks of the GGAP include urban planning adjustment, technical infrastructure improvement, construction technology and techniques reform, development of green buildings and green building materials and EE and saving in construction sector. Implementing Institution(s): MOC, Department of Construction, Department of Architecture Planning and Construction Enterprises **Status**: On-going **Proposed Budget:** From state budget, private sector and international organizations.

[15] http://www.xaydung.gov.vn/web/guest/home/-/legal/2pBh/vi_VN/18/307962/37
[16] http://vbpl.vn/TW/Pages/vbpq-toanvan.aspx?ItemID=32448
[17] http://www.xaydung.gov.vn/web/guest/home/-/legal/2pBh/vi_VN/18/353648

Action Plan to Reduce Greenhouse Gas Emissions in the Cement Industry until 2020, with vision to 2030
Description: The Action Plan to Reduce GHG emissions in the Cement industry until 2020, with vision to 2030 was issued by MOC by the Decision No. 802/QD-BXD[18] dated July 26th, 2017. Objectives of the Plan are to: - Reduce 20 $MtCO_2e$ by 2020 and 164 $MtCO_2e$ by 2030 compared to BAU. - Improve institutional arrangement, mechanisms and policies to support and encourage cement manufacturers to invest in technology and production management in order to reduce GHG emissions. - Improve the management capacity of the MOC on GHG emissions in the cement production sector. **Implementing Institution(s):** MOC. **Status:** On-going. **Proposed Budget:** Funding sources from: State budget, private sector as well as international organizations.

Some mitigation actions in the field of construction and industrial processes are presented in Table 3.7.

[18] http://www.xaydung.gov.vn/web/guest/home/-/legal/2pBh/vi_VN/18/372418/37

Table 3.7. Some mitigation actions in the field of Construction and Industrial Processes

Energy-Efficiency Improvement in Commercial and High-Rise Residential Buildings in Viet Nam
Description: This project is funded by the Global Environment Facility (GEF) and includes three components: 1) Improve and implement the standard QC 09:2013/BXD; 2) Initiatives to support the development of the construction market; 3) Demonstration and replication of energy-saving technologies and options in the construction industry and in buildings, such as using solar water heaters, insulation material and high efficiency air conditioners. The project activities will reduce energy consumption for the buildings, and hence reduce CO_2 emissions. **Sector:** Construction **GHGs covered:** CO_2 **Implementing Institution(s):** MOC **Duration:** 2016 – 2019
Quantitative goals/targets: Direct emission reduction of 37,383 tCO_2e in the period of 2016-2019. Indirect emission reduction (10 years after the project completion) of 197,512 tCO_2e.
Progress indicators: - Number of buildings participating in the project; - Number of training courses, workshops, seminars and participants attended/trained; - The amount of energy saved - Actual GHG emission reductions
Budget: US$ 33,562,459, of which: US$ 3,198,000 from GEF; US$ 2,070,000 from the ongoing UNDP project; US$ 2,700,000 from the Government; and US$ 25,594,459 from other sources (for demonstration projects).
Information on international market mechanisms: Not yet available.
Methodologies: GEF methodologies for calculation of GHG emission reduction benefits in EE projects, version 1.0[19], (announced by GEF March 2013), and GEF EE Tool (GEF EE Tool), version 1.0[20].
Assumptions: - The BAU power consumption is 190 kWh/m^2; projected power consumption is 155 kWh/m^2 - The floor area ratio in line with the Standard in BAU is 20%. This rate will increase gradually to 25%, 30%, 40% and 50% over the four years of project implementation.

[19] https://www.thegef.org/sites/default/files/publications/GEF_EE_Methodology_v1.0_2.pdf
[20] https://www.thegef.org/sites/default/files/documents/GEF6_CBIT%20Tracking%20Tool.xlsx

Objectives of the mitigation actions	Steps taken or envisaged to achieve the mitigation actions	Results achieved	Estimated emissions reduction potential	Co-benefits and other effects
Component 1: Improve and implement the standard QC 09:2013/BXD and the related legal documents	Steps taken: - Organize workshops to introduce energy-saving solutions for buildings; - Thematic studies to review and adjust the standard QC 09:2013/BXD - Develop the database - Conduct research on specific energy consumption Steps envisaged: Develop the compliance toolsets (software, web tools) and guidelines - Develop the standards and databases for building materials and energy-saving products and equipment - Develop a measurement and verification plan (M&V) - Develop a certification/labelling program for comparative energy consumption	- Project implementation started in 2016. - 3 workshops have been conducted to introduce the project and the energy-saving solutions for buildings	Direct emision reduction of 37,383 tCO_2e in the period of 2016-2019. Indirect emission reduction of 197,512 tCO_2e (10 years after the project completion)	Promote investments in EE in buildings, thereby creating more jobs and income.
Component 2: Initiatives to support the development of the constrution market;	Steps envisaged: - Develop financial support mechanisms and toolkits for financial evaluation - Establish Energy Efficiency Centres for buildings - Capacity-building and training for beneficiaries - Conduct survey on energy consumption in 100 commercial buildings and condominiums			

Energy-Efficiency Improvement in Commercial and High-Rise Residential Buildings in Viet Nam				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation actions**	**Results achieved**	**Estimated emissions reduction potential**	**Co-benefits and other effects**
Component 3: Demonstration and replication of energy-saving technoogies in construction sector.	Steps envisaged: - Develop a five-year plan for EE and savings for the 16 selected commercial buildings and condominiums. - Conduct demonstration of the design, application, operation of equipment, construction materials and energy monitoring, management and control systems in 16 selected commercial buildings and condominiums based on the standard QC 09:2013/ BXD.			

Source: Project Document "Improving Energy Efficiency in Commercial Buildings and High-Rise Buildings in Viet Nam", MOC, 2015

Promotion of Non-Fired Brick Production and Utilization in Viet Nam

Description:
The project is funded by GEF and includes four components:
1) Policy support for the development of Non-Fired Brick (NFB) technology;
2) Technical capacity-building for the application and operation of NFB production and the use of NFB products;
3) Sustainable finance support for the application of NFB production technology;
4) NFB production technology demonstration, investment and replication.
Sector: Industrial Processes
GHGs covered: CO_2
Implementing Institution(s): MOC and MOST
Duration: 2016 – 2019

Quantitative goals/targets: Estimated emission reduction of 1,652,532 tCO_2e by 2028.

Progress indicators:
Component 1: Number of NFB plants complying with NFB's new quality control regulations and standards and number of projects adopting new building codes that require NFB;
Component 2: Number of construction contractors and project owners using NFB as building materials and number of visitors to the NFB website and information centre at Viet Nam Association for Building Materials
Component 3: Number of SMEs and NFB enterprises receiving funding from incentive financial mechanisms for NFB projects;
Component 4: Number of NFB plants replicated after the project completion
* Actual GHG emission reductions

Budget: US$ 38,880,000, comprising: a) ODA grant from GEF through UNDP: US$ 2,800,000. b) Counterpart budget by the Ministry of Science and Technology: US$ 140,000. c) Co-financing: - Functioning of the Viet Nam coordinating agencies - equivalent to US$ 10,190,000. - UNDP: US$ 550,000 (in kind) - Co-financing by financial institutions of US$ 25,200,000 - including: US$ 3,000,000 from the Viet Nam Environment Protection Fund (VEPF) (concessional loan); US$ 1,000,000 from the National Science and Technology Development Fund (NAFOSTED); and US$ 21,200,000 from VietinBank (commercial loan).
Information on international market mechanisms: Not applicable
Methodologies: CDM methodologies approved by the EB: AMS-III.Z
Assumptions[21]**:** - Emission rate of coal-fired brick production in BAU is 0.3485 kgCO_2e/standard brick, calculated from the average of the demonstration projects. - Emission rate for the production of the primarily concrete block brick (CBB) is 0.146 kgCO_2e/standard brick; and the autoclaved aerated concrete brick (AAC) is 0.1189 kgCO_2e/standard brick - The total capacity of the 4 demonstration projects is 165 million standard bricks/year, of the 24 replicated projects is 800 million standard bricks/year.

[21] https://info.undp.org/docs/pdc/_layouts/WopiFrame.aspx?sourcedoc=/docs/pdc/Documents/VNM/PIMS%204546%20VIE%20NFB%20ProDoc%2006Feb14_final.docx&action=default

Promotion of Non-Fired Brick Production and Utilization in Viet Nam				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation actions**	**Results achieved**	**Estimated emissions reduction potential**	**Co-benefits and other effects**
- Replace coal-fired brick kilns with NFB production lines - Reduce energy consumption and reduce GHG emissions	Step taken: 1) Policy support for the development of NFB technology; 2) Technical capacity-building for the application and operation of NFB production and the use of NFB products; 3) Sustainable finance support for the application of NFB production technology; 4) Demonstration of NFB production technology for three primarily concrete block brick (CBB) factories - Demonstration project for an autoclaved aerated concrete brick (AAC) factory Step envisaged: - Invest in and replicate the results achieved for 24 other plants	- Completed four training programs; - Successfully organized eight training courses for 352 trainees; - Successfully implemented three NFB production demonstration projects with vibrated pressure technology with a total capacity of 155 million bricks per year. Emission reductions from three demonstration projects of 37,000 tCO_2 per year. - Technical assistance and access to capital for the five replication projects. - Organized nine communication seminars to promote the technologies, equipment and production techniques of NFB.	Estimated emission reduction of 1,652,532 tCO_2e by 2028.	- Reduce environmental pollution from traditional clay bricks production - Promote the use of environmentally friendly technologies

Source: Project Document "Strengthening production and use of non-fired bricks in Viet Nam", MOST, 2015

c) Transport

Some policy actions related to GHG emissions reduction in transport sector are summarized in Table 3.8.

Table 3.8. Some policy actions related to GHG emission reduction in Transport sector

Action Plan for Responding to Climate Change and Green Growth of Ministry of Transport for the period of 2016-2020
Description: The Action Plan for Responding to Climate Change and Green Growth of MOT for the period of 2016-2020 was promulgated by MOT by Decision No. 1456/QD-BGTVT[22] dated May 11st, 2016, aiming to actively develop transport sector in a synchronous, sustainable and environmentally friendly manner, reducing GHG emissions. The Action Plan defined six groups of tasks and solutions as follows: - Develop the transport infrastructure system towards improving its resilience to climate change impacts and reducing environmental pollution; - Manage transport operations in a low-emission, energy-efficient manner; - Promote the application of environmentally friendly technologies, promote the use of RE sources and clean energy in transport; - Synchronous implementation of measures for motorized vehicle emission control; - Raise awareness for relevant organizations and individuals on climate change and green growth in the transport sector; - Strengthen international cooperation and diversify resources to implement activities on climate change and green growth in transport sector. **Implementing Institution(s):** MOT and underlying agencies such as: Investment Management Board of Public-Private Partnerships (PPP), Directorate for Roads of Viet Nam, Viet Nam Register, Viet Nam Inland Waterways Administration, Viet Nam Maritime Administration, Transport Engineering Construction and Quality Management Bureau and Departments of Transport (DOT) of provinces and cities, and transportation enterprises. **Status**: On-going **Proposed Budget:** As proposed by the MOT annually.
Action Plan to Reduce CO_2 emissions in Civil Aviation of Viet Nam for the period of 2016-2020
Description: The Action Plan to Reduce CO_2 emissions in Civil Aviation in Viet Nam for the period of 2016-2020 was approved by MOT by Decision No. 4206/QD-BGTVT[23] dated December 28th, 2016. This Action Plan has identified six groups of measures to reduce CO_2 emissions in the civil aviation of Viet Nam, including: - Tasks and technical solutions for aircraft; - Flight management measures; - Improvement of operations at airports; - Gradual shift to alternative fuels and energy-efficient application of vehicles and equipment; - Market-based solutions for emissions management; - Management solutions, international cooperation. **Implementing Institution(s):** MOT, Civil Aviation Authority of Viet Nam, Vietnam Airlines Corporation and the other airlines, Vietnam Flight Management Corporation, aviation fuel supply companies and related agencies. **Status**: On-going **Proposed Budget:** As proposed by the MOT annually.

The key mitigation action in transport sector is summarized in Table 3.9.

[22] http://www.caa.gov.vn/van-ban/1456-qd-bgtvt-98.htm
[23] http://www.caa.gov.vn/van-ban/4206-qd-bgtvt-133.htm

Table 3.9. Key mitigation action in Transport sector

Green Transport pilot project under Core Environment Program (Phase 2 funded by the Asian Development Bank)				
Description: This project is a part of the Core Environment Program and Biodiversity Corridors Conservation Initiative managed by the ADB and implemented in Viet Nam, Lao PDR and Thailand. The project aims to test a decentralized model for the implementation of green transport initiatives for SMEs involved in road transport in Lao PDR and Viet Nam. **Sector**: Transport **GHGs covered:** CO_2 **Implementing Institution(s):** MOT **Duration**: 2015 – 2016				
Quantitative goals/targets: Reduce fuel consumption by 10-13% per vehicle per year and reduce emissions by 11-15 tCO_2e per vehicle per year.				
Progress indicators: - Fuel consumption and vehicle mileage; - Number of trucks equipped with Low Rolling Resistance (LRR) tires; - Number of trucks equipped with aerodynamic equipment; - Number of drivers and teachers trained in eco-driving skills; - Actual GHG emission reductions.				
Budget: Grant from ADB				
Information on international market mechanisms: Not applicable				
Methodologies: - Compare fuel efficiency of trucks before installing technology with fuel consumption after installation; - Compare the fuel efficiency of the project's trucks and the reference truck				
Assumptions: The reference truck is the truck with similar total vehicle weight, brand and materials, year, Euro standard and is managed by the same company.				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation actions**	**Results achieved**	**Estimated emissions reduction potential**	**Co-benefits and other effects**
- Experiment some green technologies with low investment costs. - Practice eco-driving skills. - Study financial mechanisms to promote the use of green technologies in freight convoys.	**Step taken:** - Green transport technology trials within the framework of the project include: + Installing the aerodynamic equipment. + Using LRR tires for the entire tire system. + Check tire pressure. - Training in eco-driving skills for long-distance truck drivers.	- 11 trucks equipped with LRR tires; - 15 trucks equipped with aerodynamic equipment; - 100 drivers and 15 teachers trained in eco-driving skills; - Two freight forwarders were awarded the "Green Freight Label". - Two dissemination workshops conducted.	Emission reduction of 11-15 tCO_2e per vehicle per year	- Reduce traffic accidents - Reduce environmental pollution - Reducing fuel cost
Source: Green Transport Project Document, MOT, 2015				

d) Waste

In waste sector, the main sources of GHG emissions are from: solid waste landfills, biological treatment of solid waste, waste incineration, domestic and industrial waste water treatment.

Some policies related to GHG mitigation in the waste sector include:

- Decree No. 59/2007/ND-CP dated April 9th, 2007 of the Government on management of solid waste and Decree No. 38/2015/ND-CP dated April 24th, 2015 on waste management and waste are the two most comprehensive documents on solid waste management from investment planning to classification, transportation, handling and management costs.

- The National Strategy on integrated solid waste management up to 2025 with a vision to 2050 was approved by the Prime Minister in Decision No. 2149/QD-TTg dated December 17th, 2009. According to the Strategy, by 2020, all types of generated solid wastes will be collected, reused, recycled and thoroughly treated with advanced and environment-friendly technologies appropriate to the conditions of each locality. The volume of buried solid waste in landfill sites must be reduced to the lowest level.

- The National Climate Change Strategy was approved by the Prime Minister in Decision No. 213/QD-TTg dated December 5th, 2011, which encouraged waste reduction, waste recycling and reuse, and application of advanced solid waste treatment technologies to mitigate GHG emissions from waste sector.

- The Plan on GHG emission Management; Management of Carbon credit trading activities to the world markets was approved by the Prime Minister in Decision No. 1775/QD-TTg dated December 21st, 2012, which sets a target to reduce GHG reduction from waste sector by 5% by 2020. The Project is being implemented.

Some mitigation actions in waste sector were presented above, in Sections 3.1.2 and 3.1.3. They include:

- Partnership for Market Readiness (PMR) Project in Viet Nam;

- Waste to Resources NAMA in cities of Viet Nam.

e) Agriculture, Land Use, Land Use Change and Forestry

Table 3.10 describes some of the policy actions related to GHG mitigation in Agriculture, Land Use, Land Use Change and Forestry sector. Concrete mitigation actions of specific programs and projects will be reported under two sub-sectors, namely:

- Agriculture sub-sector, and

- Land Use, Land Use Change and Forestry (LULUCF) sub-sector.

Table 3.10. Some policy actions related to GHG emission reduction in Agriculture, Land Use, Land Use Change and Forestry sector

"Reduce GHG emissions in agriculture and rural development sector by 2020" Plan
Description: This Plan was approved by MARD by Decision No.3119/QD-BNN-KHCN[24] dated December 16th, 2011 aiming to: i) promote green, safe and low-carbon agriculture production towards sustainable development, ensuring national food security and contributing to poverty reduction and effective response to climate change; ii) by 2020, reduce GHG emissions by 20% in agriculture and rural development sector (18.87 $MtCO_2e$) compared to 2010, while ensuring sector growth and a reduction in poverty rates. iii) implement measures for GHG reduction in the key sub-sectors such as: cultivation, livestock, forestry, fisheries, irrigation and rural development. **Sector**: Agriculture **GHGs covered:** CH_4, N_2O, CO_2 **Implementing Institution(s):** MARD **Status**: On-going (from 2011) **Proposed Budget:** VND 2,740 billion, VND 540 billion is from the State budget and VND 2,200 billion is from ODA loans.
Action Plan to Respond to Climate Change of Agriculture and Rural Development sector for the period of 2016-2020 with vision to 2050
Description: This Action Plan was promulgated by MARD by Decision No. 819/QD-BNN-KHCN[25] dated March 14th, 2016. It was developed based on the positive results of implementation of the previous Action Plan to Respond to Climate Change in agriculture and rural development sector for the period of 2011-2015, aiming to: improve the integration and mobilizing of all resources, integrate CC adaptation and mitigation, and restructure projects and schemes to reduce GHG emissions in agriculture and rural development to 2020. **Objective**: To mobilize all resources and participation by domestic and international organizations and individuals to implement activities to adapt to climate change and mitigate GHG emissions in all sub-sectors, including cultivation, animal husbandry, aquaculture, forestry, irrigation, salt production and rural development; To maintain a 20% sector growth rate, reduce the poverty rate by 20%, and reduce GHG emissions by 20% in each 10-year period. **Sector**: Agriculture **GHGs covered:** CH_4, N_2O, CO_2 **Implementing Institution(s):** MARD **Status**: On-going (from 2016) **Proposed Budget:** Total planned budget for the whole period of 2016 - 2020: - For the tasks: VND 6,950 billion, of which VND 4,850 billion is sourced from the state budget, and VND 2,100 billion from international donors and other sources. - For Projects: VND 41,200 billion.

[24] http://occa.mard.gov.vn/Portals/0/Documents/QuyetDinh/3119_Q%C4%90_BNN_KHCN.pdf?ver=2016-01-06-174402-603
[25] http://occa.mard.gov.vn/Portals/0/Documents/QuyetDinh/KHHD_1620_approved_2016.pdf?ver=2011-04-14-161644-860

Green Growth Action Plan of Agriculture and Rural Development sector up to 2020
Description: This Action Plan was approved by MARD by Decision No. 923/QD-BNN-KH[26] dated March 24th, 2017 and aims to: - Effectively implement the NGGS; develop green agriculture while ensuring social and environmental issues and EE, using natural resources for low-carbon economy, reducing emissions and enhancing livelihoods enhance GHG absorption capacity in line with resources and the real situation; buildeco-friendly lifestyles, contributing to adaptation to climate change; - Reform farming techniques and improve agricultural management to reduce GHG emission in agro-forestry and fishery production, thereby achieving by 2020 a 20% reduction of GHG emissions from agriculture and rural development sector, compared to 2010. **Implementing Institution(s):** MARD, Department of Agriculture and Rural Development (DARD) of provinces and cities. **Status**: On-going **Proposed Budget:** State budget for regular expenditures.

Agriculture

Some of the key mitigation actions in agriculture sub-sector are summarized in Table 3.11.

[26] https://thuvienphapluat.vn/van-ban/Linh-vuc-khac/Quyet-dinh-923-QD-BNN-KH-duyet-Ke-hoach-hanh-dong-tang-truong-xanh-den-2020-2017-346546.aspx

Table 3.11. Some key mitigation actions in Agricultural sub-sector

Biogas program for the Livestock sector in Viet Nam
Description: The program was widely implemented in 58 provinces/cities of Viet Nam and was supported by the Netherlands Government. The overall objective of the program is to support the use and development of biogas technology to manage manure and animal waste while producing clean and low-cost fuel for energy, hence reducing GHG emissions. **Sector:** Agriculture (and Energy) **GHGs covered:** CH_4, N_2O, CO_2 **Implementing Institution(s):** MARD **Implementation time:** Phase 1: 2003-2005. Bridging phase: 2006. Phase II: 2007-2015
Quantitative goals/targets: i) support to build 160,000 biogas systems for the two phases, ii) Emission reduction of 800,000 tCO_2e/ year for the two phases.
Progress indicators: i) Number of biogas systems that received support for installation and operation; ii) number of training courses conducted; iii) Annual Project Monitoring Report; iv) GHG emission reduction amount.
Budget: EUR 41.806 million, from which EUR 9.58 million is by grant from the Netherlands Government; additional sources from other donors and GHG emission reduction credits selling.
Information on international market mechanisms: Voluntary Golden Standard mechanism (VGS)
Methodologies: Gold Standard (GS) emission reduction calculations methodology in "Technology and practice to replace fugitive heat energy consumption, Version 2.0"[27]
Main assumptions: - CO_2 emission factor and net calorific value apply 2006 IPCC Guidelines - Installing biogas units of volumes between 4 to 50 m^3 in households - The installment of biogas units implemented in 58 provinces - Baseline scenario: animal wastes discharged into the surrounding environment, households have not built biogas system and no waste management - Project scenario: GHG emission reduction from the shift by household to biogas fuel and change in livestock waste management.

[27] https://www.goldstandard.org/sites/default/files/revised-tpddtec-methodology_april-2015_final-clean.hpdf

Objectives of the mitigation actions	Steps taken or envisaged to achieve the mitigation actions	Results achieved	Estimated emissions reduction potential	Co-benefits and other effects
- Support construction of 160,000 biogas facilities; - Reduction of 800,000 tCO_2e/year.	Steps taken: i. Conduct installation and operation of the system ii. Organize training capacity-building iii. Carry out some research using biogas slurry in animal husbandry and cultivation.	- Support for building 158,000 biogas systems - Conducted training for 1,064 technicians, 1,668 biogas builders and organizing 140,000 dissemination and training workshops. - Provide clean energy source equivalent to 2,800 TJ/yr. - EUR 1.3 million received from the sale of 1,290,876 VGS credits	Emission reduction of 788,000 tCO_2e per year	- Reduction of environmental pollution caused by animal waste - Reduction in the use of firewood in cooking thus reducing fuel costs of farm households and reducing deforestation - Creation of more jobs - Increasing incomes from selling carbon credits. - Promotion of the use of organic fertilizer. - Reduction in the time women spend in kitchens by 1.75 hours/day/person.

Source: http://www.snv.org/project/vietnam-biogas-programme

System of Rice Intensification Program

Description:
This program aims at development and application of an innovative rice cultivation technique "System of Rice Intensification" (SRI).
This system includes new technical measures as follows: i) replanting of young rice (11-15 days); ii) replanting one line/cluster or sowing thinly; iii) alternate irrigation and drainage of exposed fields; iv) increasing the amount of organic fertilizer as much as possible to maximize air permeability of the soil and reduce the use of pesticides and chemical fertilizers. These measures will save investment costs, ensure increased rice yield and reduce GHG emissions from rice cultivation
Sector: Agriculture
GHGs covered: CH_4, N_2O, CO_2
Implementing Institution(s): MARD
Duration: 2007 –2016

Quantitative goals/targets:
i) Implementation of SRI for 500,000 ha of rice; ii) Reducing production inputs (seed, fertilizer, pesticides, irrigation water); iii) Reducing emissions by 2 $MtCO_2e$/year

System of Rice Intensification Program				
Progress indicators: i) Rice area using SRI technology; ii) Number of farmer households trained and participating; iii) GHG emission reduction amount				
Budget: VND 15 billion, of which VND 10 billion comes from the local budget, VND 5 billion from ODA				
Information on international market mechanisms: Not available				
Methodologies: Measure GHG emissions at typical points, extrapolate to calculate the amount of GHG reduction on a large scale				
Main assumptions: - GHG mitigation measures were not implemented in previous rice cultivation practice. - Water-saving irrigation and field drying will reduce CH_4 emissions from rice cultivation, while reducing the use of chemical fertilizers (nitrogen) will reduce N_2O emissions.				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation actions**	**Results achieved**	**Estimated emission reduction potential**	**Co-benefits and other effects**
- Reduce production inputs (seeds, fertilizers, pesticides, water for irrigation); - Reduce emissions by 2 million tCO_2e/ year - Implement SRI on 0.5 million hectares of rice	- Complete the pre-feasibility study. - Develop the SRI model for testing and replication in Viet Nam. - Replication of the SRI model - Field surveys to improve the measurements and assessment of GHG emission reduction	- Emission reduction of 4.68 tCO_2e/ha per crop from SRI implementation - 394,894 ha of rice fields in 23 provinces have applied SRI technology in 2015. - Increased average farmer income by US$ 200/ha per crop compared to traditional farming.	Reduction of emissions by 2 $MtCO_2e$/year	- Increase rice productivity. - Environmental protection due to reduced use of pesticides and chemical fertilizers. - Protection of water resources. - Reduction of costs and increase in productivity, thereby increasing income for rice production by US$ 200/ha per crop - Promoting the production of organic fertilizer
Source: http://www.icerdvietnam.com				

Low Carbon Agriculture Support Program
Description: The Low Carbon Agriculture Support Program (LCASP) project is an ADB loan project, implemented in 10 provinces, aiming to: improve the management of livestock waste and agricultural by-product waste; produce biogas to generate clean energy sources and reduce environmental pollution; and replicate successful models of cost-effective low-carbon agricultural production which reduce GHG emissions. **Sector:** Agriculture (and Energy) **GHGs covered:** CH_4, N_2O, CO_2 **Implementing Institution(s):** MARD **Duration:** 2013 – 2019
Quantitative goals/targets: i) Support to build 65,000 small scale biogas systems, 40 medium and two large scale biogas systems; ii) Emission reduction of 150,000 tCO_2e/year; iii) Six studies on low-carbon agriculture and agricultural waste management; iv) Seven demonstration models.
Progress indicators: - Number of biogas systems supported; - Amount of concessional loans/credits provided; - Number of studies conducted and demonstration models implemented; - Number of biogas users and number of builders, technicians, engineers and contractors trained; - GHG emission reduction amount.
Budget: US$ 84 million, of which US$ 74 million is from an ADB loan.
Information on international market mechanisms: Not yet available; is currently being considered.
Methodologies: Gold Standard (GS) emission reduction calculations methodology in "Technology and practice to replace fugitive heat energy consumption, Version 2.0"
Assumptions: - CO_2 emission factor and net calorific value apply 2006 IPCC Guidelines - Installing biogas units of volumes between 4 to 50 m^3 in households - The installment of biogas units implemented in 10 provinces - Baseline scenario: livestock waste discharged freely into the surrounding environment - Project scenario: Livestock waste is treated by technologies used in the project.

Low Carbon Agriculture Support Program				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation actions**	**Results achieved**	**Estimated emissions reduction potential**	**Co-benefits and other effects**
Support to build 65,000 small scale biogas systems, 40 medium and two large scale biogas systems; - Reduce GHG emissions by 150,000 tCO_2e/year at full-scale implementation; - Conduct six studies on low-carbon agriculture and agricultural waste management; - Implement seven demonstration models.	The following provides on-going activities of the project: - Support the construction of small, medium and large biogas systems. - Conduct training for farmer households, builders, technicians and contractors. - Provide concessional credits/loans to farmers. - Support for research in the management of low-carbon agricultural and agricultural waste management. - Information and communication on the application of low-carbon agricultural waste management	By the end of 2016: - Supported the construction of 43,157 small, 8 medium and 2 large scale biogas systems. - Training conducted for 45,775 farmers using small biogas plants, 375 masons, 1,125 technicians, 10 contractors; organized 1,500 training courses. - Development of the database. - Concessional loans provided to 335 households with a total amount of VND 135 billion (as of August 2016)	Emissions reduction of 426,000 tCO_2e by 2019	- Savings in fuel costs - Reducing the use of firewood in cooking, thus reducing deforestation and limiting air pollution - Promoting economic development - Creation of jobs for farmers - Promotion of gender equality, as women are freed from cooking time. - Promoting the carbon credit market.
Source: http://lcasp.org.vn/				

Land Use, Land Use Change and Forestry

Some key mitigation actions in LULUCF sub-sector includes:

- Viet Nam Forest and Delta Project: The project was funded by USAID aiming to support Viet Nam's transition towards sustainable development, low emissions, and enhanced adaptation to climate change in Agriculture, Land Use, Land Use Change and Forestry sector.

The project contributed to the implementation of climate change-related national strategies and policies, focusing on reducing emissions from the forestry and agriculture sectors as well as enhancing climate-smart agriculture and livelihoods. The main objective of the project is to address long-term climate change risks, taking into account gender issues, in both forest and delta landscapes. The project was implemented during the period of 2012-2017 in six pilot provinces: Bac Kan, Lao Cai, Ha Tinh, Binh Thuan, Lam Dong and Ca Mau

- Sustainable forest and bio-diversity management to reduce CO_2 emissions: The project is designed to enhance biodiversity in forest ecosystems and the integrity of landscape ecosystems in the northern mountainous region of Viet Nam and to strengthen climate change adaptive capacity while supporting local livelihoods. The project is being implemented during the period of 2014-2021 in Lao Cai, Lai Chau, Ha Giang, Yen Bai and Bac Kan provinces.

- The United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation in Viet Nam (UN-REDD Viet Nam Program) Phase II: Information about this Program is summarized in Table 3.12.

Table 3.12. Mitigation actions in LULUCF sub-sector

UN-REDD Viet Nam Program Phase II
Description: The second phase of UN-REDD Viet Nam Program was approved by MARD in Decision No.1724/QD-BNN-HTQT dated July 29th, 2013 and aims to: i) strengthen Viet Nam's capacity to potentially benefit from the incomes generated from future GHG reductions from REDD+; ii) contribute to the successful implementation of the National Action Plan on REDD+ and the forest sector restructuring program. The first phase of UN-REDD Program was implemented with key activities on institutional capacity-building, REDD+ management capacity and pilot implementation in Lam Dong province. **Sector:** LULUCF **GHGs covered:** CO_2 **Implementing Institution(s):** MARD, People's Committees of the following provinces: Bac Kan, Lao Cai, Ha Tinh, Binh Thuan, Lam Dong and Ca Mau **Duration:** 2013 – 2018
Quantitative goals/targets: Pilot implementation of REDD+ in six provinces: Bac Kan, Lao Cai, Ha Tinh, Binh Thuan, Lam Dong, and Ca Mau
Progress indicators: - Scope of implementation of the National Action Plan on REDD+ and implementation of the project "GHG emission reduction in agriculture and rural development up to 2020" - Effectiveness of REDD+ governance mechanisms in ensuring accountability, transparency and equity. - The REDD+ Action Plan is issued and implemented in the pilot provinces
Budget: US$ 30.926 million including support from the Norwegian Government and state budget co-financing.
Information on international market mechanisms: REDD+ related mechanisms
Methodologies: Following REDD+ methodologies
Assumptions: - Emission factor of natural forest: 1.5 tCO_2/m^3 - Emission factor of planted forest: 1.2 tCO_2/m^3

Objectives of the mitigation actions	Steps taken or envisaged to achieve the mitigation actions	Results achieved	Estimated emissions reduction potential	Co-benefits and other effects
- Ensure the capacity to operate REDD+. - Develop and implement the REDD+ activities in six pilot provinces - Operate the National Forest Inventory and Monitoring System and the National REDD+ Informtion System for MRV implementation. - Develop mechanisms and policies to ensure social and environmental security under the Cancun Agreement. - Expand regioal cooperation on REDD+ implementation in the Greater Mekong Sub-region.	Steps taken and ongoing: i. Review of the National REDD+ Program. ii. Strengthen capacity of staff of the Technical Working Group and the REDD+ national and provincial networks. iii. Strengthen the activities of the Technical Working Group iv. Establish National REDD+ Fund. v. Assess the implementation of Forest Law in the localities to integrate into the provincial REDD+ action plan. vi. Raise awareness about REDD+ and collaborate with other projects to develop the provincial REDD+ action plans in the project-site provinces. vii. Establish the REDD+ Executive Board in the six project provinces. viii. Carry out activities to reduce emissions and enhance GHG removal in Lam Dong province. ix Develop the REDD+ Portal. x. Develop a database of historical activity data for updating on the FORMIS website for 15 provinces.	- The capacity to operate the National Action Plan on REDD+ was strengthened; - Technical and institutional capacity was strengthened for REDD+ implementation in the six pilot provinces and REDD+ was integrated into the provincial Forest Protection and Development Plan; - The national forest inventory and monitoring system and information system on safety policies was established and is operating; - The national benefit sharing system was established; - The mechanisms and policies to ensure social and environmental security for REDD+ implementation under the Cancun Agreement was established; - Regional cooperation was enhanced on REDD+ implementation, particularly in the Greater Mekong Sub-region	Emissions reduction of 2,056,277 tCO_2e/year in Lam Dong province. Not yet estimated for other provinces.	- Improved forest protection and biodiversity. - Create jobs, increase income for local people; - Promote gender equality; - Promote local eco-tourism.

UN-REDD Viet Nam Program Phase II				
Objectives of the mitigation actions	**Steps taken or envisaged to achieve the mitigation actions**	**Results achieved**	**Estimated emissions reduction potential**	**Co-benefits and other effects**
	xi. Aggregate FRLs data and unify methodologies, based on adjustment to national forest variations. xii. Strengthen cooperation activities with related organizations and projects, especially those in the Greater Mekong Sub-region. Steps envisaged: i. Strengthen the capacity to operate and implement the National Action Plan on REDD+. ii. Build up the technical and institutional capacity needed to implement REDD+ in the six pilot provinces and integrate REDD+ into the provincial forest protection and development plan. iii. Implementation of the National Forest Inventory and Monitoring System as well as National REDD+ Information System as part of the MRV system. iv. Develop a national benefit sharing system. v. Develop mechanisms and policies to ensure social and environmental security under the Cancun Agreement. vi. Strengthen regional cooperation on REDD+ implementation, particularly in the Greater Mekong Sub-region.	- Awareness was raised on climate change and REDD+, forest protection and management. - Conducted technical training and community planning on REDD+ implementation. - Conducted consultation on the development of provincial and community REDD+ Implementation Plans - Organized 243 training courses and distributed 36 publications		
Source: http://vietnam-redd.org/Web/Default.aspx?lang=vi-VN				

3.2. Market mechanisms under implementation

3.2.1. Clean Development Mechanism

Up to March 31st, 2017, Viet Nam has had 255 Clean Development Mechanism (CDM) projects and 10 CDM Programs of Activities (PoAs) registered by the EB with an expected total annual amount of GHG reduction of 19,653,872 tCO_2e. Among those projects, 69 projects (including 68 CDM project and one CDM PoA) have received 17,793,032 CERs, of which 59 projects are from energy sector and 10 projects are from waste sector.

In comparison with the BUR1, there are two newly registered CDM projects that belong to biomass energy and hydropower sub-sectors. The amount of additionally issued CERs are 9,584,885.

The proportion, by sub-sectors, of CDM projects registered and of those already received/issued CERs are presented in Figures 3.1 and 3.2.

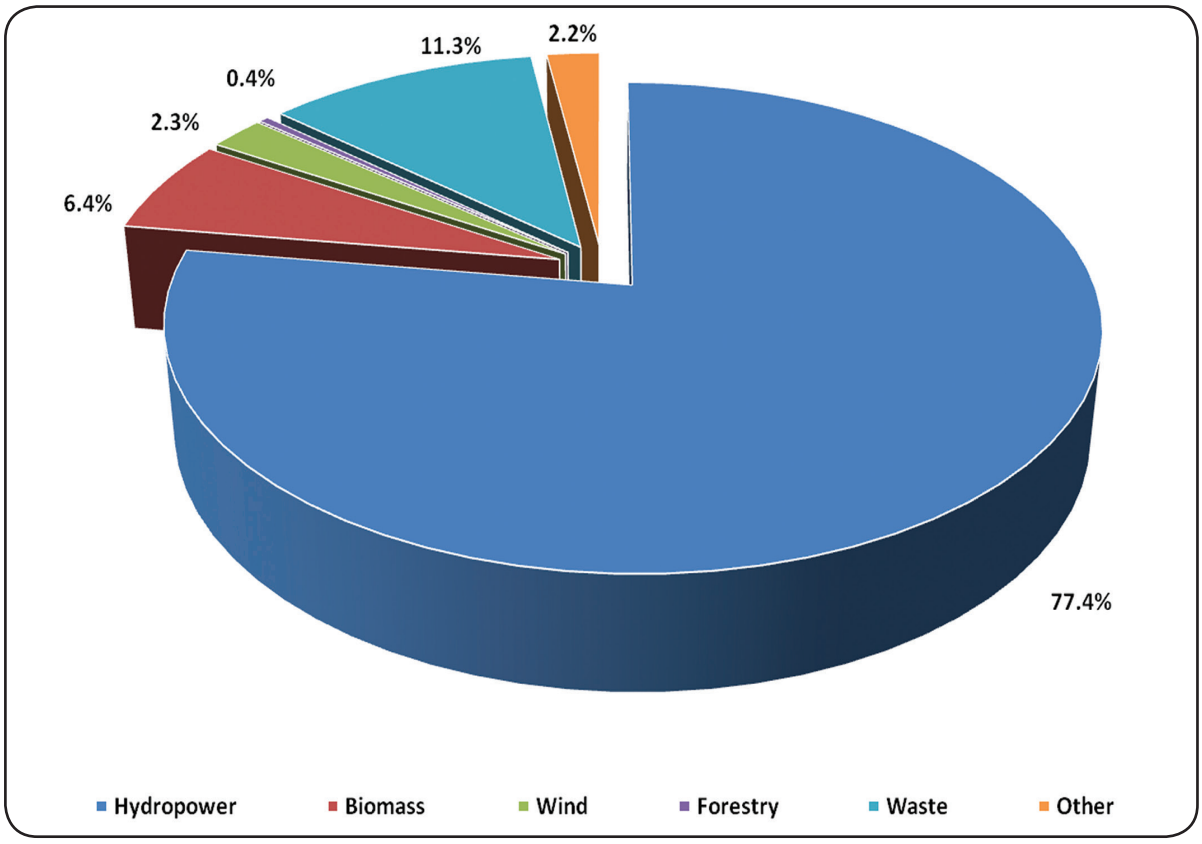

Figure 3.1. Distribution of Viet Nam's registered CDM/PoA by sub-sectors

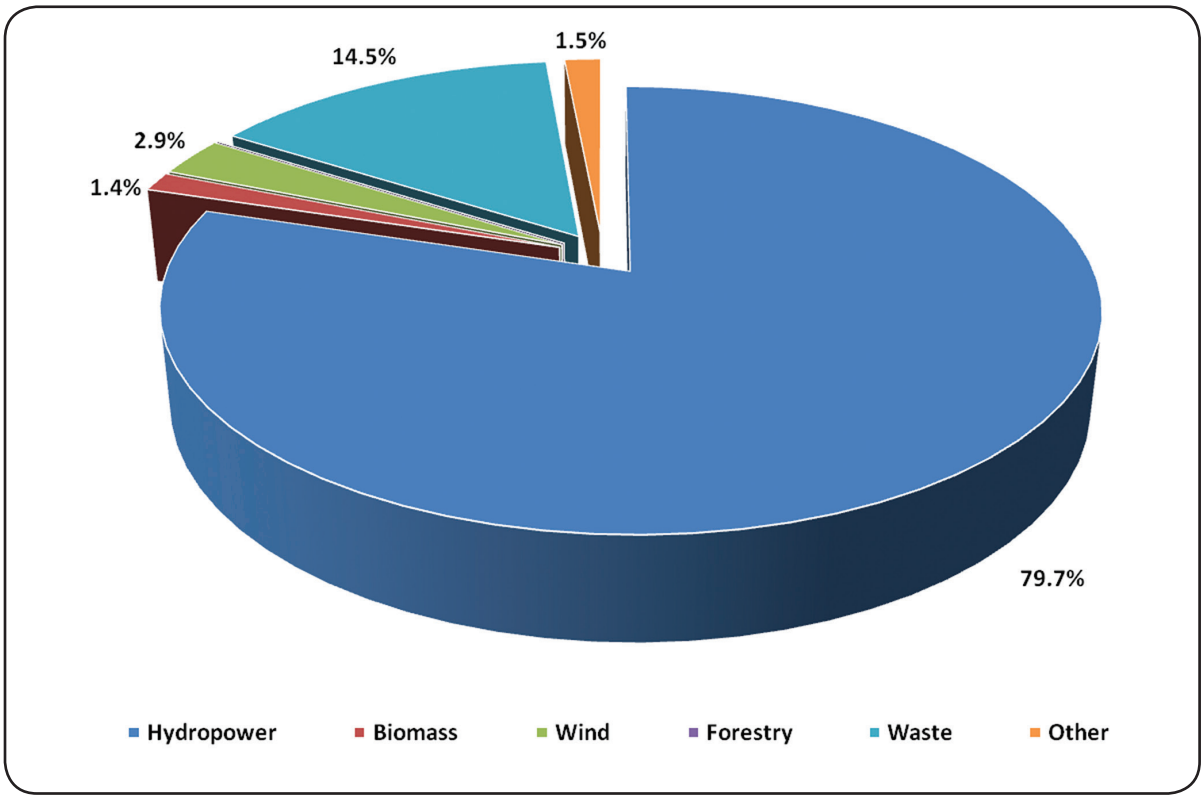

Figure 3.2. Distribution of Viet Nam's CDM projects received CERs by sub-sectors

3.2.2. Joint Crediting Mechanism

In order to promote the development and implementation of projects through Joint Crediting Mechanism (JCM), MONRE has issued Circular No. 17/2015/TT-BTNMT dated April 6th, 2015 stipulating the development and implementation of the JCM projects under the framework of cooperation between the governments of Viet Nam and Japan on low-carbon growth.

Up to March 2017, the Viet Nam-Japan Joint Committee has issued and approved five methodologies for JCM projects, four of which are related to energy sector and one to waste sector. Four projects have been registered with the GHG mitigation potential of about 14,469 tCO_2e by 2020.

3.2.3. Other mechanisms

Besides the implementation of projects through CDM and JCM mechanisms, there are number of GHG emission reduction projects in Viet Nam registered under Verified Carbon Standard (VCS) and Gold Standard (GS).

Verified carbon standard

Up to March 2017, there are 15 projects developed and registered under Verified Carbon Standard (VCS). All these projects are from the energy sector, including one EE project, two biomass projects and 12 hydropower projects. The total amount of Verified Carbon Units (VCU) issued to those projects is 603,417 tCO_2e.

Table 3.13. List of VCS projects registered and issued VCU
(up to March 31st, 2017)

No	Project name	Sub-sectors	GHG reduction potential (tCO_2e/ year)	VCU issued (tCO_2e)
1	Nam Chim Hydro Power Project	Hydropower	26,748	54.061
2	Dak Psi 3 and 4 Hydropower Project	Hydropower	89,961	79,544
3	Dak Srong 2 Hydropower Project	Hydropower	44,466	16,200
4	Za Hung Hydropower Project	Hydropower	69,309	151,331
5	Dak Pone Hydropower Project	Hydropower	31,778	25,538
6	Nam Cong and Nam Soi Hydropower Project	Hydropower	40,296	17,382
7	Ban Coc Hydropower Project	Hydropower	40,010	42,149
8	Song Ong Hydropower Project	Hydropower	21,416	41,255
9	Nam Ngan Hydropower Project	Hydropower	29,322	43,150
10	Tra Linh 3 Hydropower Project	Hydropower	15,083	8,138
11	Dak Rung Hydropower Project	Hydropower	7,136	14,272
12	Coc Dam Hydropower Project	Hydropower	16,472	21,133
13	Cai Be Rice Husk Thermal Energy Generation Project	Biomass	22,321	41,114
14	Rice Husk Based Thermal Energy Generation Project at Thot Not	Biomass	44,232	15,253
15	01 million Compact Fluorescent Lamps (EVN-2010) Project in Viet Nam	Energy efficiency	20,258	32,897
Total			518,808	603,417

Source: http://www.v-c-s.org/project/vcs-program/

Gold Standard

Up to March 2017, 18 projects have been implemented through the Gold Standard (GS) mechanism; three of them are from the waste sector, two from wind power and 13 from hydropower. The total amount of GS certificates issued is 1,321,174 tCO_2e.

Table 3.14. List of GS projects registered and received GS certificates
(up to March 31st, 2017)

No	Project name	Sector/ Sub-sectors	GHG reduction potential (tCO_2e/year)	Amount of GS certificates issued (tCO_2e)
1	Avoided methane emissions through aerobic composting at Vietstar municipal solid waste treatment facility	Waste	106,225	141,746
2	Biogas Program for Animal Husbandry Sector of VN	Waste	589,125	779,924
3	Bac Lieu Province Wind Power Plant	Wind power	143,761	104,110
4	Wind Power Plant No.1 - Binh Thuan 30MW	Wind power	57,988	92,535
5	Dak Pone Hydropower Project	Hydropower	34,541	53,984
6	Nam Hong Hydropower Project	Hydropower	35,960	56,287
7	Za Hung Hydropower Project	Hydropower	69,309	92,588
8	DAKFOCAM Wastewater project	Waste	17,557	--
9	Chi Khe Hydropower Project	Hydropower	91,939	--
10	La La Hydropower Project, Viet Nam	Hydropower	6,905	--
11	Nam Mo 3 Hydropower Project	Hydropower	21,817	--
12	Nam Pong Hydropower Project	Hydropower	66,008	--
13	Song Bung 5 Hydropower Project	Hydropower	122,699	--
14	Song Bung 6 Hydropower Project	Hydropower	64,199	--
15	Song Chung Hydropower Project	Hydropower	26,337	--
16	Viet Nam Small Hydro Program of Activities	Hydropower	192,078	--
17	Vinh Son 5 Hydropower Project	Hydropower	55,091	--
18	Yan Tann Sien Hydropower Project	Hydropower	39,751	--
Total			1,741,290	1,321,174

Source: http://www.goldstandard.org

CHAPTER 4. MEASUREMENT, REPORTING AND VERIFICATION SYSTEM

4.1. National Measurement, Reporting and Verification System

The development and operation of the national MRV system is one of the primary missions indicated in the Plan for Implementation of PA, issued by the Prime Minister under Decision No. 2053/QD-TTg dated March 28th, 2016 (Mission 51 of the Plan). Regulations and responsibility of agencies in the national MRV system are summarized as follows.

4.1.1. Regulations for the national MRV system

Regulations for the MRV:

- Jurisdiction: the right of a government agency to review and to make decisions concerning the MRV system.

- Responsibility: Responsibilities of stakeholders in the MRV system to perform assigned tasks.

- Verification: verification activities of an independent agency within the MRV system.

- Compliance: keep and comply with the regulations of an MRV system.

- Report: reporting process of information on measurement methods, measurement results, and results of verification of mitigation actions.

- Issuance of certification: confirmation by the authorities of the compliance and performance of a MRV-related project or program.

- Sanctions: sanction regulations in case the project or program does not comply with regulations and requirements for MRV operation.

4.1.2. Responsibility of agencies in the national MRV system

Currently, a background study for the establishment of the national MRV system is being carried out. Accordingly, a number of missions of relevant agencies within this system are proposed as follows:

1. Developing methodology and to establish relevant documents on the implementation of monitoring, reporting and verification of climate actions;

2. Establishing and to maintain the registry system for climate actions as required;

3. Implementing monitoring and supervising activities of climate change programs and projects;

4. Reporting on progress and outcomes of the implementation of climate change projects and programs periodically based on monitoring and verification outcomes for certification of achievements.

4.1.3. Regulation framework for the operation of national MRV system

a) Measurement

The regulation framework for the operation of the measuring system includes two main components:

- Approval of measurement methods;

- Implementation of quantitative GHG reduction measurement.

Approval protocol of measurement methods is shown in Figure 4.1.

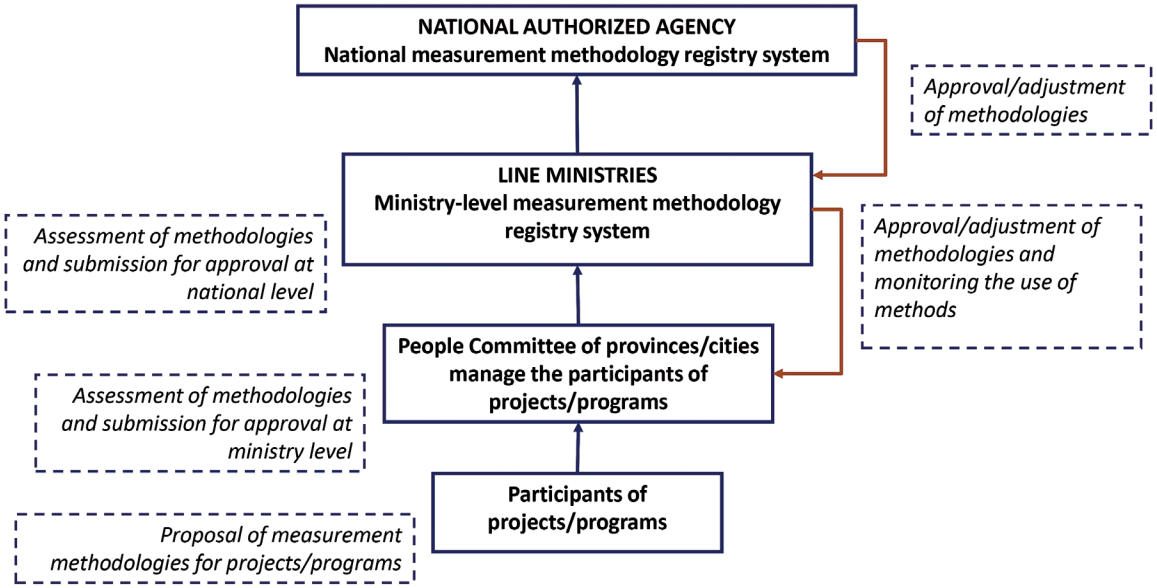

Figure 4.1. Proposal for approval of measurement methods

Source: Support the Planning and Implementation of NAMAs in a MRVable manner (SPI-NAMA)project, MONRE, 2016

Measuring activities of quantitative GHG reduction are shown in Figure 4.2.

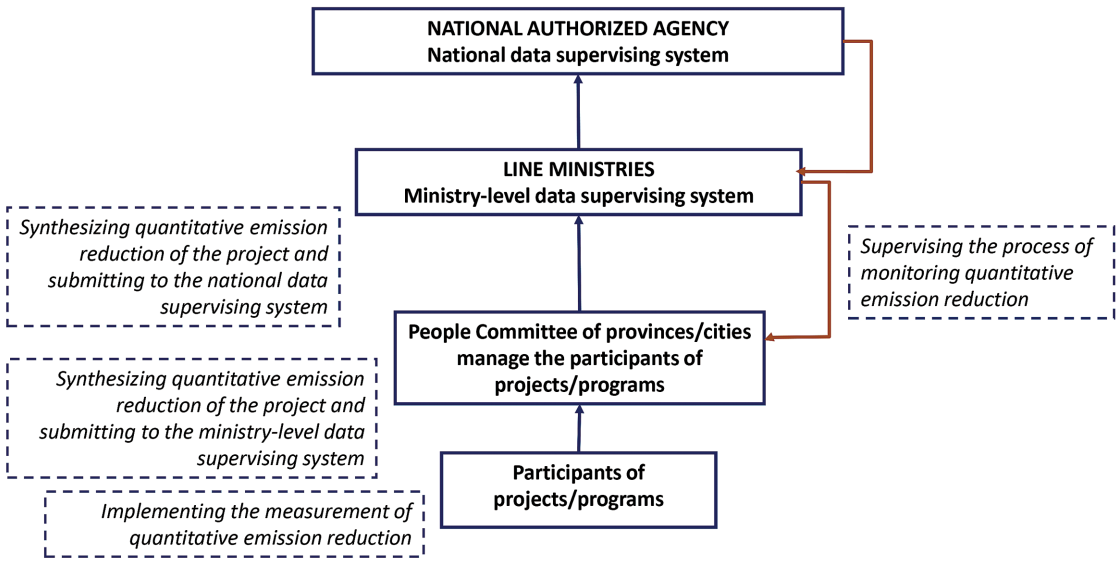

Figure 4.2. Proposal for implementation of measuring of quantitative GHG reduction

Source: SPI-NAMA project, MONRE, 2016

b) Reporting

Reporting activities of quantitative GHG reduction are shown in Figure 4.3.

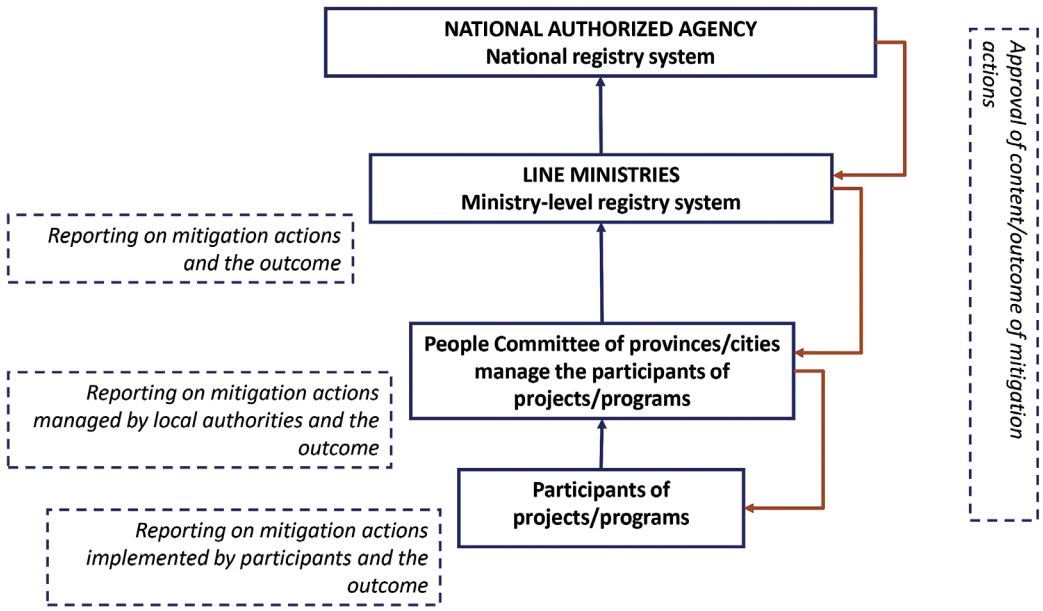

Figure 4.3. Proposal for reporting of mitigation actions

Source: SPI-NAMA project, MONRE, 2016

c) Verification

Verification activities of the quantitative GHG reduction are shown in Figure 4.4.

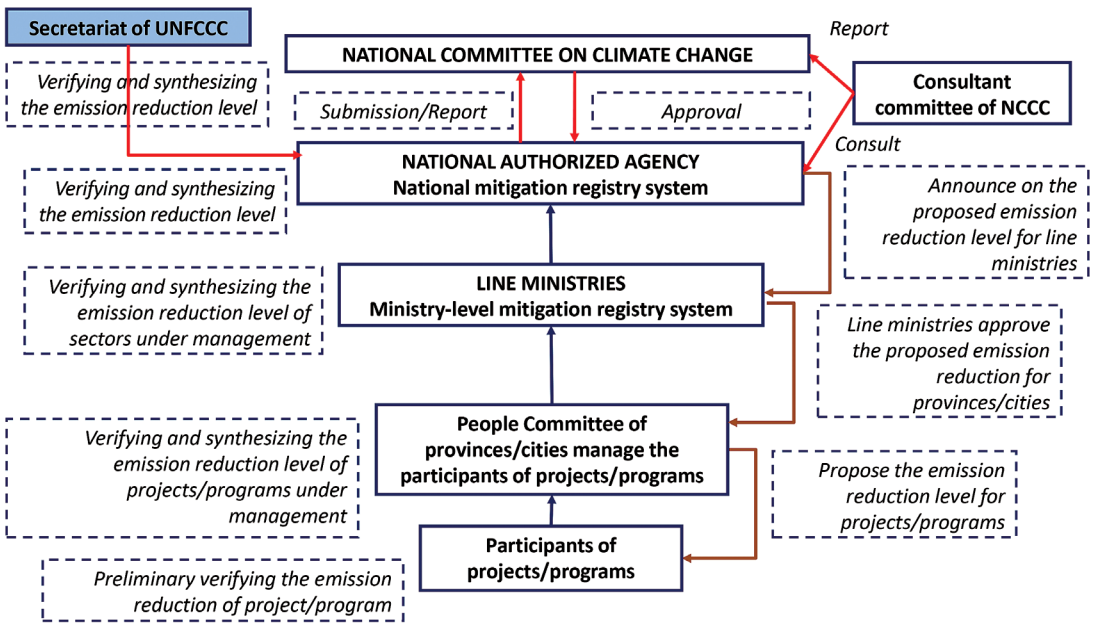

Figure 4.4. Reporting/Verification process on quantitative GHG reduction of project

Source: SPI-NAMA project, MONRE, 2016

4.1.4. Development of National Communications and Biennial Updated Reports

Viet Nam developed and submitted the Initial National Communication (INC) to the Secretariat of UNFCCC in 2003, the Second National Communication (SNC) in 2010 and the Initial Biennial Updated Report (BUR1) in 2014. With GEF's support through UNEP, Viet Nam has completed the Second Biennial Updated Report in 2017. The Third National Communication is under development and will be completed by the end of 2018.

The institutional arrangements for the development of BUR2 is shown in Chapter 1 of this report.

4.2. The National GHG Inventory System

The Prime Minister has issued Decision No. 2359/QD-TTg dated December 22nd, 2015 on the approval of Viet Nam National GHG Inventory System.

The model of the National GHG Inventory System under the above mentioned decision is a centralized management model in which GSO of MPI collects and provides operational data from relevant agencies. MONRE, the focal point of the National GHG Inventory System, is responsible for carrying out the GHG inventory and for developing a GHG inventory technical report.

The National GHG Inventory System includes:

a) Focal point of the National GHG inventory system: Ministry of Natural Resources and Environment.

b) Coordinating agencies include:

- Ministry of Planning and Investment,
- Ministry of Industry and Trade,
- Ministry of Transport,
- Ministry of Agriculture and Rural Development,
- Ministry of Construction,
- Ministry of Finance,
- People's Committees of provinces, and centrally controlled cities.

The National GHG Inventory System is shown in Figure 4.5.

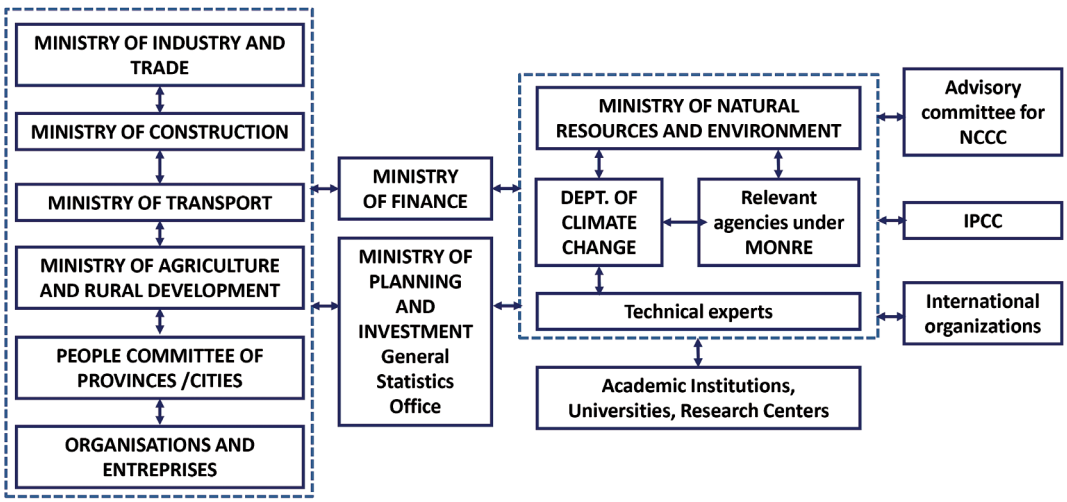

Figure 4.5. The National GHG Inventory System

4.3. Measurement, reporting and verification for mitigation actions

4.3.1. Measurement, reporting and verification at sectoral level

The establishment of sectoral MRV systems in Viet Nam is being studied by line ministries. In Decision No. 2053/QD-TTg dated October 28th, 2016 of the Prime Minister on the approval of the Implementation Plan of PA, line ministries have been assigned to develop the sectoral MRV systems. These missions are described in Table 4.1.

Table 4.1. Missions for the establishment of sectoral MRV systems

No	Mission	Governing/ Coordinating agency	Time for implementation	Financial resources
1	Establishment of the MRV system for mitigation actions in Industrial Processes sector	MOIT	2018	State budget and international support
2	Establishment of the MRV system for mitigation actions in LULUCF sector	MONRE, MARD	2018	State budget and international support
3	Establishment of the MRV system for mitigation actions in Agricultural sector	MARD	2018	State budget and international support
4	Establishment of the MRV system for mitigation actions in Construction sector	MOC	2018	State budget and international support
5	Establishment of the MRV system for mitigation actions in Transport sector	MOT	2018	State budget and international support

4.3.2. Measurement, reporting and verification at local level

At present, the establishment of the MRV system at local level is being studied by local authorities. With support from SPI-NAMA project, Ho Chi Minh City has been the first to propose the development of an MRV system at city level and it is expected to start from 2019. This system is implemented in three steps as shown in Figure 4.6.

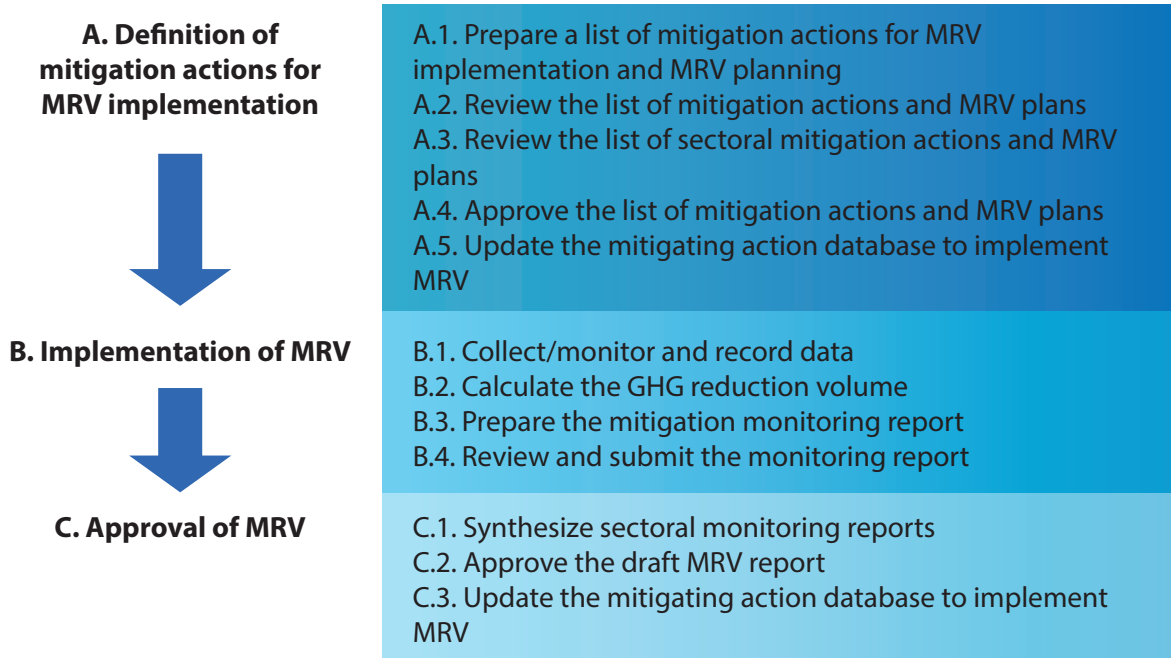

Figure 4.6. Operational procedure of the MRV system for mitigation actions

Source: SPI-NAMA project, MONRE, 2016

4.3.3. Measurement, reporting and verification at project level

For each type of project, an MRV system at project level will be developed by project stakeholders in accordance with the guideline of the mechanism, such that for:

a) CDM projects, the MRV system will be applied according to the guidelines of the CDM Executive Board;

b) JCM projects between Japan and Viet Nam, the MRV system will be applied according to the Joint Committee's guidelines.

4.4. Measurement, reporting and verification for support received

Programs and projects supported by international organizations have a management mechanism developed by program/project owners. These mechanisms must be strictly followed using the guidelines of Decree No. 16/2016/ND-CP dated March 16th, 2016 of the Government on management and use of ODA and concessional loans granted by international donors.

Over the last few years, the Government of Viet Nam has received financial supports for climate change through the SP-RCC.

The SP-RCC is an initiative of the Government of Viet Nam and development partners to create a forum for policy exchange between government agencies and international development partners on climate change-related issues in Viet Nam. The SP-RCC sets out "target groups" based on the strategic objectives of two important national policies: National Target Program to Respond to Climate Change and NCCS. To achieve these objectives, policy actions are designed in the following forms: (i) development of policies, strategies and legislation; (ii) technical activities such as the establishment of standards, methodologies, database and mechanisms; and (iii) research activities.

MRV for SP-RCC is described at Figure 4.7:

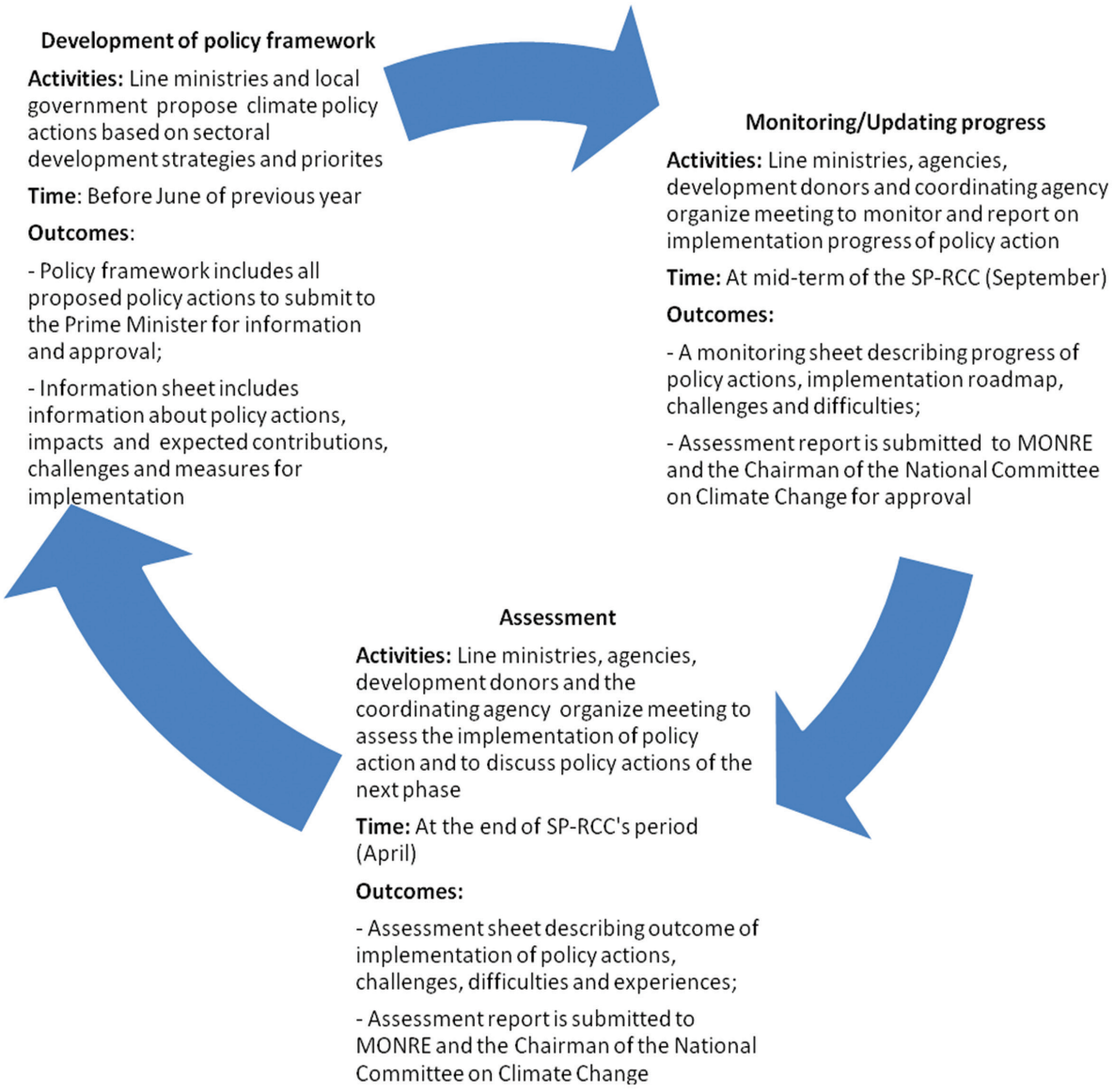

Figure 4.7. MRV for SP-RCC

CHAPTER 5. NEEDS FOR FINANCE, TECHNOLOGY, CAPACITY-BUILDING, AND SUPPORT RECEIVED

The needs for finance, technology and capacity-building for responding to climate change in Viet Nam were described in BUR1, submitted to UNFCCC in 2014. A number of those difficulties and gaps related to climate change activities in Viet Nam mentioned in BUR1 were overcome, in part, as follows:

a. National GHG inventory:

- The National GHG Inventory System which was established by the Prime Minister under Decision No. 2359/QD-TTg dated December 22th 2015, facilitated the following activities: i) Collecting data for the GHG inventory by GSO of MPI; ii) Planning and executing the GHG inventory and developing the GHG inventory report by the Department of Climate Change (formerly Department of Meteorology, Hydrology and Climate Change); iii) Strengthening the cooperation between the focal point agency on the GHG inventory and relevant agencies and organizations within the system.

- QA/QC activities have been improved. QA for the 2013 National GHG inventory was carried out by the ISPONRE of MONRE.

- The result of the 2010 National GHG inventory was reviewed and upgraded to ensure consistency and comparability with the result of the 2013 National GHG inventory.

b. Nationally appropriate mitigation actions:

- Central and local officials' awareness of NAMA has been strengthened.

- A number of relevant policies have been established to facilitate NAMAs of line ministries and local governments, such as the Implementation Plan of PA, the Plan for Implementation of NCCS and the Plan for Implementation of the NGGS.

c. Application of technologies responding to climate change

In order to prepare technology resources for responding to climate change, a number of priority-related tasks for the period from now to 2020 have been identified in the Implementation Plan of PA. Tasks to be completed in 2019 include: technology needs assessment for some sectors to respond to climate change in Viet Nam; enhancing cooperation with regional and global Climate Technology Centre and Network (CTCN); and piloting several technologies to respond to climate change. By 2020, Viet Nam will complete reviewing and proposing mechanisms for encouraging, researching and transferring technology on climate change and will consolidate leading research institutions on climate change as well as strengthening engagement in international cooperation in research and technology transfer.

In addition to a number of incentive mechanisms and policies for the development of RE such as wind power, biomass and waste electricity, the Government or Viet Nam has issued Decision No. 11/2017/QD-TTg dated March 4th, 2017 on the mechanism for encouragement of the development of solar power projects in Viet Nam to enhance the application of RE technologies. According to this Decision, a number of regulations on planning, investment and several incentive mechanisms for solar power projects will be implemented by the end of June 2019.

5.1. Needs for finance, technology and capacity-building

5.1.1. Financial needs

Total financial needs for climate change activities in the period of 2016-2020 are summarized in Table 5.1.

Table 5.1. Total financial needs for climate change

Unit: US$ billion

Year	2016	2017	2018	2019	2020	Period of 2016-2020
GDP	207.76	220.23	233.44	247.450	262.29	
Minimum investment (0.2%)	0.42	0.44	0.47	0.49	0.52	2.34
Average investment (0.5%)	1.04	1.10	1.17	1.24	1.31	5.86
Investment (1.5%)	3.12	3.30	3.50	3.71	3.93	17.57
Maximum investment (4-6%)	8.31-12.46	8.81-13.21	9.34-14.01	9.90-14.85	10.49-5.74	46.85-7.27

Source: http://chuyentrang.monre.gov.vn/ngaykhituongthegioi/thong-bao/tin-tuc-hoi-nghi/tai-chinh-cho-bien-doi-khi-hau.html.

The Government of Viet Nam has issued Resolution No.73/NQ-CP dated August 26th, 2016 on the approval of the investment orientation of target programs in the period of 2016-2020, including the Target Program to Respond to Climate Change and Green Growth for the period of 2016-2020. This program aims to implement NCCS and NGGS; to actively implement the commitment made with the international community to protect the global climate; to attract investment from the international community; and to reduce GHG emissions toward the ongoing implementation of the GHG mitigation commitment after 2020, in line with the NDC.

Financial needs for the implementation of the Target Program to Respond to Climate Change and Green Growth for the period of 2016-2020 are summarized in Table 5.2.

Table 5.2. Financial needs for the implementation of the Target Program to Respond to Climate Change and Green Growth for the period of 2016-2020

Unit: VND billion

Total needs	Climate change component	Green growth component	Central State Budget	ODA
15,866	11,300	4,566	866	15,000

Source: Resolution No. 73/NQ-CP dated August 26th, 2016

Viet Nam has identified the financial needs for implementation of the GHG mitigation targets to which the Government committed in its NDC for the period of 2021-2030. As identified, total domestic financial needs to implement the voluntary commitment of reducing GHG emissions by 8% (compared to BAU) by 2030 is about US$ 3.2 billion. To reach the target of reducing GHG emissions by 25% (compared to BAU) by 2030, an additional US$ 17.9 billion from international support is needed. Currently, Viet Nam is reviewing and updating the NDC; this process is expected to be completed by the beginning of 2019, with additional financing needs in combination with green growth activities.

Financial resources will be mobilized from all economic sectors as well as maximizing international support, including bilateral and multilateral support, to effectively implement the GHG mitigation targets.

5.1.2. Technology needs

Following the result of the technology needs assessment for responding to climate change in BUR1, MONRE has coordinated with relevant agencies to carry out the RE technology needs assessment within the project "Facilitating Implementation and Readiness for Mitigation" (2012-2015) in collaboration with the United Nations Environment Program and Technical University of Denmark Partnership (UNEP-DTU Partnership). The primary objective of that technology assessment is to define priority alternatives of RE technology to deliver the target of increasing the percentage of new and RE sources to 5% of the total primary commercial energy in 2020 in the National Strategy on Climate Change, issued by the Prime Minister on December 5th, 2011.

The Prime Minister has issued Decision No. 2068/QD-TTg dated November 25th, 2015 on the development strategy of RE of Viet Nam by 2030 with vision to 2050 and Decision No. 428/QD-TTg dated March 18th, 2016 on the approval of revisions to the national power development plan from 2011 to 2020 with vision to 2030. According to these policies, the above RE technology needs assessment has been upgraded to meet the target to raise the RE percentage to 6.5% in 2020 and 15% in 2030. A multi-criteria assessment method has been applied with criteria of (i) GHG mitigation, (ii) compliance with technology and policy priorities, (iii) economic benefits, (iv) social benefits, and (v) environmental benefits. The results of the technology assessment using the above five criteria are in ascending order from 0 to 1. The combined results of each technology are the sum of the five criteria assessed. Table 5.3 presents the results of the evaluation of priority RE technologies, showing the emerging priority technologies as wind power, connected solar power and solar water heating.

Table 5.3. Result of priority technology assessment for renewable energy

Technology	GHG mitigation	Compliance with technology and policy priorities	Economic benefits	Social benefits	Environ mental benefits	Total
Wind power	0.99	0.82	0.64	0.63	0.80	3.88
Grid connected solar power	0.93	0.79	0.68	0.63	0.80	3.83
Solar water heaters	0.79	0.75	0.57	0.55	0.73	3.39
Substitution of biogas for coal	0.88	0.71	0.55	0.52	0.66	3.33
Small hydro power plant	0.93	0.69	0.61	0.47	0.44	3.14
Biogas power	0.76	0.58	0.53	0.56	0.69	3.12
Substitution of biogas for LPG	0.78	0.61	0.60	0.49	0.59	3.07
Biomass electricity	0.84	0.56	0.49	0.45	0.53	2.86
Substitution of ethanol for gasoline in transport	0.52	0.54	0.41	0.45	0.49	2.40

Source: Update of the Low Carbon Development Strategy - Component for Renewable Energy Development in Viet Nam, MONRE, 2017

To implement GHG emission reduction targets set in the NDC of Viet Nam, the technologies are shown in Table 5.4.

Table 5.4. Technologies to be applied for the implementation of the NDC

Sectors	Technologies
Energy	- Using high performance household air conditioners - Using high performance refrigerators - Using energy-saving lighting - Using solar water heaters - Transforming the technology of cement production - Technological innovation in the production of bricks - Using high-performance air conditioning in commercial service - Developing biomass electricity - Developing small hydropower - Developing wind power - Developing biogas - Developing supercritical thermoelectricity technology - Developing solar power

Sectors	Technologies
Transport	- Use Ethanol in Transportation - Transition from personal to public - Change the mode of transportation of goods
Agriculture	- Development of biogas use - Reuse straw as an organic fertilizer - Wet and dry irrigation systems and improved rice cultivation system - Biochar - Integrated crop management for rice production (ICM) - Integrated crop management (ICM) - Replacement of urea with SA fertilizer (Sulfate amon - $(NH_4)_2SO_4$) - Re-use by-products of crop residues annually - Wet and dry irrigation systems and improved rice cultivation system - Improved feed ration - Improving the quality and services of breeds, feeds and materials for aquaculture - Improving technology in aquaculture and waste treatment - Improving irrigation technology for coffee production - Improvement of processing and processing technology of agro-forestry-fishery processing
Forestry	- Protection of natural forests - Protection of coastal forests - Plantation of coastal forests - Natural forest regeneration - Plantation of large timber production forests
Waste management	- Production of organic fertilizer - Landfill gas recovery to generate electricity and heat - Recycling of solid waste - Anaerobic digestion of organic waste with methane recovery for power generation and heat supply

Source: Technical Report of the Viet Nam Nationally Determined Contribution, MONRE, 2015

5.1.3. Capacity-building needs

The demand for capacity-building in responding to climate change in BUR1 continues to be considered for the next phase. Special capacity-building activities for the private sector, businesses and communities will be the focus of the Implementation Plan of PA.

The task of preparing human resources for the period of 2016-2020 under the Implementation Plan of PA of Viet Nam includes:

- Development and implementation of training courses for officials and staff;

- Development and implementation of education programs and knowledge upgrading on climate change in accordance with PA requirements in the national education system;

- Raising awareness on PA implementation in Viet Nam.

5.2. Supports received

Viet Nam's actions to respond to climate change have received bilateral and multilateral supports from the international community, through various forms of financial resources, including technical assistance, grant, and preferential loans.

Information on received supports is more detailed in BUR2 than in BUR1.

5.2.1. Supports for the development of BUR2

Viet Nam has received international supports from multiple sources for the development of BUR2. Information on these supports is shown in Table 5.5.

Table 5.5. Supports received for the development of BUR2

Form of support	Activities	Time	Sources	Information on received support
Finance	Development of BUR2	2016 - 2018	GEF	Collecting and synthesizing information and activity data for GHG inventory, NAMA activities, national circumstance and etc., while developing BUR2
Capacity -building, technical suport	Technical support and 02 workshops	2016, 2017	Information Matters Project, GIZ BMUB	Providing technical guidelines for development of BUR2, technical support for reporting the mitigation actions and supports received
Capacity -building	02 technical workshops	2016, 2017	Australia, Singapore, GSP	- Enhancing capacity for implementation of ICA and development of BURs - Enhancing capacity on MRV issues

5.2.2. Other international supports for climate change response actions

Supports received have been categorized as finance, technology and capacity-building for actions to respond to climate change.

Information about supports for climate actions received through SP-RCC has been updated and synthesized in Table 5.6.

Table 5.6. Financial supports through SP-RCC

DONORS	POLICY MATRIX FOR THE YEAR OF								
	2008-2009	2010	2011	2012	2013	2014	2015	2016	2017
LOAN									
JICA	US$ 110 million	US$ 110 million	US$ 153 million	US$ 100 million			US$ 100 million	US$ 100 million	
AFD	EUR 20 million	EUR 20 million	EUR 20 million	EUR 20 million	EUR 20 million				US$ 50 million
WB		US$ 70 million	US$ 70 million	US$ 70 million				US$ 90 million	US$ 90 million
KEXIM			US$ 30 million	US$ 20 million	US$ 10 million				
GRANT									
CIDA			AU$ 4.45 million						
AusAID/ DFAT			AU$ 8 million	AU$ 6 million					

Source: Report on Financing Commitments to Implement SP-RCC Policy Matrix, SP-RCC Office, 2017

Information on supports received by central agencies for finance, technology and capacity-building from 2010 are shown in Table 5.7. A number of activities that received support commitments from international donors is shown in Table 5.8.

Table 5.7. Climate change projects having received international support since 2010

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal informa-tion
		Currency	US$ equivalent						
I. Public finance support – bilateral support									
1.	Support for nationally appropriate mitigation actions (NAMA) in Viet Nam (NAMA project)	EUR 4,600,000	5,060,000	On-going	ODA from Goverment of Gemany (Internation-al Climate Initiative - IKI- of BMUB) through GIZ	Grant	Mitigation, technical and policy assis-tance, capaci-ty-building	MONRE	2014-2018
2.	Program "Integrated management of coastal area and mangroves to adapt to climate change in Mekong Delta provinces" (ICMP)	EUR 23,570,000	25,927,000	On-going	ODA from Goverment of Gemany (IKI) and from Goverment of Austral-ia (DFAT) through GIZ	Grant	Adaptation, technical assis-tance, capaci-ty-building	MARD and People's Committee of Mekong Delta provinces	2011-2018
3.	Mainstreaing of ecosystem-based measures in the national climate adaptation policy frawork and land use plan in Viet Nam (EbA project)	EUR 4,000,000	4,400,000	On-going	ODA from Goverment of Gemany (IKI) through GIZ	Grant	Adaptation, technical assis-tance, capaci-ty-building	MONRE	2014-2018

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal informa-tion
		Currency	US$ equivalent						
4.	Flood protection and urban drainage system to adapt to climate change at medium-sized coastal cities (Phase 1: 2012-2016; Phase 2: 2017-2019)	EUR 10,200,000	11,220,000	On-going	ODA from Goverment of Gemany (BMZ) and from Goverment of Switzer-land (SECO) through GIZ	Grant	Adaptation, technical assistance, capacity-build-ing	MOC and People's Committee of coastal cities	2012-2019
5.	Support to up-scaling of wind-power in Viet Nam	EUR 6,900,000	7,590,000	On-going	ODA from Government of Germany (IKI) through GIZ	Grant	Mitigation, technical assistance, technology transfer	MOIT	2014-2018
6.	Renewable energy and energy efficiency project (project 4E)	EUR 3,000,000	3,300,000	On-going	ODA from Government of Germany (IKI) through GIZ	Grant	Mitigation, technical assistance, technology transfer	MOIT	2015-2018
7.	Support the development of renewable energy in Viet Nam	EUR 3,012,168	3,313,385	Finished	ODA from Government of Germany (IKI) through GIZ	Grant	Mitigation	MOIT	Dec. 2010-Aug. 2015
8.	Renewable energy development program	EUR 282,000	310,200	On-going	ODA from Government of Germany (BMWi) through GIZ	Grant	Mitigation, technical assistance	MOIT	2015-2018

9.	Support program for Climate Finance Readiness in energy sector	EUR 911,000	1,002,100	On-going	ODA from Goverment of United States of America (USAID) through GIZ	Grant	Mitigation, policy and technical assistance	MOIT	2015-2018
10.	Macroeconoic reforms and green growth program (MACRO project)	EUR 9,500,000	10,450,000	On-going	ODA from Goverment of Germany (BMZ) and European Union (EU) through GIZ	Grant	Mitigation, technical assistant, green growth, capacity-building	MPI, MOF and the State Bank of Viet Nam	2015-2018
11.	Program on conservation and sustainable use of forest biodiversity and ecosystem services in Viet Nam	EUR 4,500,000	100,000	On-going	ODA from Goverment of Germany (BMZ) through GIZ	Grant	Technical assistance, mitigation through REDD+	MARD	2014-2017
12.	Wastewater and solid waste management in provincial centres in Viet Nam	EUR 3,500,000	3,850,000	On-going	ODA from Goverment of Germany (BMZ) through GIZ	Grant	Mitigation, policy and technical assistance, technology transfer	MOC	Jan. 2015-Dec. 2017
13.	Advancing understanding of forest carbon stock enhancement as part of REDD+ (Viet Nam component)	EUR 1,080,000	1,188,000	Finished	ODA from Goverment of Germany	Grant	Mitigation, technical assistance	MARD	2012-2014

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
14.	Cultivation of bio-energy crops on set-aside mining sites in Viet Nam - pilot project	EUR 1,375,000	1,512,500	On-going	ODA from Goverment of Germany (IKI) through International Institute for Environmental Issues (UFU) of Germany	Grant	Mitigation, technical assistance	MONRE	2015-2018
15.	Information Matters project (IM): capacity-building for ambitious reporting and facilitation of international mutual learning through peer-to-peer exchange	EUR 5,575,000 globally	132,000 for technical assistance in Viet Nam	On-going	ODA from Goverment of Germany (IKI) through GIZ	Grant	Mitigation, technical assistance, capacity-building	MONRE	May 2013-Nov. 2017
16.	Cool contributions fighting Climate Change (C4)	EUR 4,700,000 globally	187,000 for technical assistance in Viet Nam	On-going	ODA from Goverment of Germany (IKI) through GIZ	Grant	Mitigation, technical assistance, capacity-building	MONRE	Jan. 2016-Jun. 2021
17.	Advancing climate strategies in rapidly motorizing countries (IKI/TRACS project)	EUR 2,500,000 globally	550,000 for technical assistance in Viet Nam	On-going	ODA from Goverment of Germany (IKI) through GIZ	Grant	Mitigation technical assistance, capacity-building, GHG inventory	MOT and MONRE	Feb. 2016-Jan. 2019

18.	Scaling up Mangrove Eco-system-based Adaptation in the Mekong Delta	EUR 1,492,384	1,678,932	On-going	ODA from Goverment of Germany (IKI) through GIZ	Grant	Adaptation, capacity-building	People's Commitee of Ben Tre, Ca Mau and Tra Vinh province	Apr. 2016-Feb. 2020
19.	Adaptation to climate change through the promotion of biodiversity in Bac Lieu province	EUR 3,528,706	3,881,576	Finished	ODA from Goverment of Germany (IKI) through GIZ	Grant	Adaptation, capacity-building	People's Committee of Bac Lieu province	Dec. 2010-Dec. 2014
20.	New financial model to enhance climate change resilience capacity of coastal communities	EUR 1,237,918	1,392,658	Finished	ODA from Goverment of Germany (IKI) through GIZ	Grant	Adaptation, capacity-building, climate finance	MARD	Jan. 2011-Jan. 2014
21.	REDD+ across Southern Lao and Central Viet Nam	EUR 7,000,000	7,700,000	Finished	ODA from Goverment of Germany through the KfW Development Bank	Grant	Mitigation	Forestry, MARD	From Oct. 2011
22.	Improvement of energy efficiecy in rural areas	EUR 120,000,000	132,000,000	Finished	ODA from Goverment of Germany through the KfW Development Bank	Preferential loan	Mitigation	Energy, MOIT	From Jul. 2010

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
23.	Management and conservation of mangroves to adapt to climate change in coasal provinces of Mekong Delta	EUR 18,000,000	19,800,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Preferential loan	Mitigation	MARD and People's Commitees of Mekong Delta provinces	From Oct. 2012
24.	Encourage sustainable foest management and biodiversity as a measure to reduce CO_2 emissions	EUR 20,500,000	22,550,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Loan US$ 16,500,000 and grant US$ 6,050,000	Mitigation	Forestry, MARD	From Nov. 2014
25.	Phu Lac wind power project	EUR 35,000,000	38,000,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Preferential loan	Mitigation	Energy, MOIT	From Jul. 2013
26.	Reduce emision intensity in Electric power supply system	EUR 80,000,000	88,000,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Preferential loan	Mitigation	Energy, MOIT	From Nov. 2013
27.	Energy effciency and energy-saving in Viet Nam urban area	EUR 100,000,000	110,000,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Preferential loan	Mitigation	Energy, MOIT	From Dec. 2014

28.	Smart Grid – Enhance the efficiency of electricity distribution system	EUR 65,000,000	71,500,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Preferential loan	Mitigation	Energy, MOIT	From Apr. 2016
29.	Support for the development of wind power	EUR 3,600,000	3,960,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Grant	Mitigation	Energy, MOIT	From Dec. 2014
30.	500kw Son La-Lai Chau Transmission Line and 500KW Transmission Line and Son La Station	EUR 87,000,000	95,700,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Preferential loan	Mitigation	Energy, MOIT	From Jun. 2014
31.	Protect and manage forest ecosystems with participation of community in Central of Viet Nam	EUR 8,000,000	8,800,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Grant	Mitigation	Forestry MARD and Provincial People's Commitees	From Nov. 2014
32.	Effective grid at medium and small cities	EUR 200,000,000	220,000,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Preferential loan	Mitigation	Energy, MOIT and People's Commitees of Cities	From Oct. 2016

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
33.	Sustainable urban transportation system/railway system in Ho Chi Minh City	EUR 240,750,000	264,825,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Loan US$ 170,500,000 and grant US$ 94,325,000	Mitigation	Energy and transportation, People's Committee of Ho Chi Minh City	From Mar. 2011
34.	Reduce GHG emission intensity in grid	EUR 40,000,000	44,000,000	On-going	ODA from Goverment of Gemany through the KfW Development Bank	Preferential loan	Mitigation, technology support	Energy	From Oct. 2013
35.	Facilitating implementation and readiness for mitigation (FIRM)	US$ 300,000	300,000	Finished	ODA from Danida and UNEP	Grant, Countepart fund: US$ 30,000	Mitigation, capacity-building and tech-ncal assistance	MONRE	2012-2015
36.	Low-carbon transition in Energy Efficiency (LCEE)	DKK 65,000,000	12,000,000	On-going	ODA Danida	Grant	Mitigation, technical assistance, technology support	MOIT and MOC	2013-2017
37.	Support the Planning and implementation of NAMA (SPI-NAMA project)	JPY 384.148 billion	4,500,000	On-going	JICA	Grant	Mitigation, policy assistance, capacity-building, technology need assessment	MONRE	2015-2018 (extended to Jan. 2019

38.	REDD+ Dien Bien		1,600,000	Finished	JICA	Grant	Mitigation REDD+	Depament of Agrculture and Rural Development of Dien Bien province, General Deparment of Forestry	2012-2013
39.	Strengthening the capacity for GHG inventory in Viet Nam		2,586,781	Finished	JICA	Grant	Technical assistance, capacity-building	MONRE	2011-2014
40.	Support the establishment of Centre of enegy management training		4,881,818	Finished	JICA	Grant	Technical assistance, capacity-building	MOIT	2011-2015
41.	Technical assistance and capacity-building for development of standardized energy-saving labels		4,205,236	Finished	JICA	Grant	Technical assistance, capacity-building	MOIT	2013-2016
42.	Project: Climate change adaptation for sustainable agriculture and rural development in the coastal Mekong Delta in Viet Nam		2,140,000	Finished	JICA	Grant	Adaptation	MARD, People's Committees of Mekong Delta provinces	2011-2013

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
43.	Building Disaster Resilient Societies in Viet Nam (Phase II)		4,170,000		JICA	Grant	Adaptation, natural disaster prevention	People's Commitees of Hue, Nghe An, Ha Tinh and Quang Binh province	2013-2016
44.	Multi-beneficial Measure for Mitigation of Climate Change in Viet Nam, Indonesia and China by Development of Biomass Energy		7,300,000	Finished	JICA	Grant	Mitigation, technical assistant, technology transfer	Viet Nam National University, Ha Noi	2011-2016
45.	Establishment of carbon-cycle system with natural rubber		5,000,000	Finished	JICA	Grant	Mitigation Technical assistance, technology transfer	Ha Noi University of Science and Technoogy	2011-2016
46.	Development of Landslide Risk Assessment Technology along Transport Arteries in Viet Nam (SATREPS project)		4,085,070	Finished	JICA	Grant	Adaptation, Technical assistance, technology transfer	Institute of Transport Science and Technolgy, MOT	2011-2016

47.	Project of Emergency reservoir operations and effective flood management using water-related disaster management information system		18,440,000	On-going	JICA	Grant	Adaptation, natural disaster prevention and capacity-building	MARD, Thua Thien Hue province	2017-2021
48.	Sustainable Natural Resource Management Project		10,000,000	On-going	JICA	Grant	Adaptation, natural disaster prevention, technical assistance, capacity-building	MARD	2015-2020
49.	Capacity development on integrated management of municipal solid waste		6,290,900	On-going	JICA	Grant	Mitigation, technical assistance, capacity-building	MOC	2014-2018
50.	Green Growth Promotion in Ha Long Bay area, Quang Ninh province		3,099,000	On-going	JICA	Grant	Mitigation, technical assistance, capacity-building	People's Committee of Quang Ninh province	2016-2019
51.	Strengthening the capacity to cope with natural disaters caused by climate change	VND 476.291 billion	22,000,000	On-going	ODA from Japan	Loan VND 434.94 billion; counterpart fund VND 41.351 billion	Adaptation	MONRE	2014-2017

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
52.	Support to build Green Growth Fund	EUR 5,000,000	5,500,000	On-going	ODA from Belgium (BTC)	Grant, Counterpart fund: US$ 550,000	Mitigation, Green growth, Climate Finance	MPI	2014-2019
53.	Program for integrated water resources management and urban development in relation to climate change in Viet Nam	EUR 25,000,000	27,500,000	On-going	ODA from Belgium (BTC)	Grant	Adaptation, , piloting investment, urban planning, water resources planning	MONRE, People's Commitee of Ha Tinh, Binh Thuan and Ninh Thuan province	2014-2019
54.	Modernizing disaster forecasting and warning systems in Northeastern region	VND 96.248 billion		On-going	ODA from Republic of Korea	Loan: VND 86.638 billion Counterpart fund: VND 9.61 billion	Adaptation	MONRE	2016-2019
55.	Strengthening food forecasting and warning system in Viet Nam (phase 2)	VND 177.940 billion		On-going	ODA from Italy	Loan VND 111.2 billion; Counterpart fund: VND 66.74 billion	Adaptation	MONRE	2016-2020
56.	Upgrading the capacity to measure rain, forecast storms and lightning for National Centre for Hydrometeorology Forecasting	VND 716.517 billion		On-going	ODA from Finland	Loan: VND 548.179 billion; Counterpart fund: VND 168.338 billion	Adaptation, technical assistance, natural disaster prevention	MONRE	2017-2020

57.	Strategy for climate change adaptation in power sector and GHG mitigation	EUR 136,000	149,600	Finished	ODA from France (AFD)	Grant	Adaptation, mitigation, technical assistance	People's Committee of Da Nang city	2013-2014
58.	Pilot Program for Supporing Up-scaled Climate Change Mitigation Action in Viet Nam's Cement Sector		1,000,000	Finished	ODA from Finland (NDF)	Grant	Mitigation, technical assistance and capacity-building	MOC	2014-2016
59.	Support for the National target program on energy efficiecy and conservation		97,000	Finished	ODA from Denmark	Grant	Mitigation, technical assistance	MOIT	2006-2011
60.	Component: clean prodution in industry	DKK 55,000,000	8,415,000	Finished	ODA from Denmark	Grant	Mitigation, technical assistance, technology transfer	MOIT	2006-2011
61.	Research on mechanism to enhance preservation of biodiversity through REDD		1,400,000	Finished	ODA from Norway (NORAD)	Grant	Mitigation, REDD+, technical assistance and capacity-building	MARD	2010-2013

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
62.	Viet Nam Calculator pathway 2050 project: Developing and transferring a 2050 pathway for Viet Nam to support policy decision and enforcement on GHG mitigation		230,000	Finished	ODA from United Kingdom (DECCUK)	Grant	Mitigation, technical assistance, technology transfer	MOIT	2013-2015
63.	Biogas program for animal husbandry sector in Viet Nam		11,550,000	Finished	Netherlands through SNV	Grant	Mitigation, technical assistant, technology transfer	MARD	2003-2014
64.	Advancing Understanding of natural forest carbon stock enhancement as part of REDD+ (Regional project in Lao PDR and Viet Nam)	EUR 2,575,272	1,082,000 for activities in Viet Nam	Finished	ODA from Goverment of Gemany (IKI) through SNV	Grant	Mitigation, REDD+, awareness-raising	MARD	2012-2014
65.	Lowering emissions in Asia's Forest (Asia regional project)		3,582,000	Finished	USAID	Grant	Mitigation, capacity-building, technical assistance	MARD	2011-2015

66.	Strengthening capacity and institutioal reform for green growth and sustainable development in Viet Nam		3,900,000	On-going	USAID	Grant, Counterpart fund: US$ 228,000	Mitigation, capacity-building, policy development	MPI	2015-2018
67.	Ha Noi Urban Railway Project, Cat Linh - Ha Dong (route 2A)		868,040,000	On-going	China	Loan US$ 669.62 million, Counterpart fund: US$ 198,42 million	Mitigation	MOT	2011-2018
II. Public finance support – Multilateral									
II.1. Multilateral public finance support – Global Environment Facility (GEF)									
1.	Viet Nam preparation of the third national communication to the UNFCCC		480,000	On-going	UNEP/GEF	Grant	Finance	MONRE	2015-2018
2.	Energy efficiecy improvement in commercial and high-rise residential buildings		3,198,000	Finished	UNDP/GEF	Grant	Capaci-ty-building	MOC	2013
3.	Barrier Removal to the Cost-Effective Development and Implementation of Energy Stanards and Labelling Project (BRESL project)		650,000	Finished	UNDP/GEF	Grant. Domestic investment capital is US$ 3,085,000	Capaciy-building	MOIT	2009-2014

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
4.	National HCFC phase-out management plan		2,145,000	Finished	UNDP/GEF	Grant	Mitigation, Capacity-building	MONRE	2014-2016
5.	Implementation of Eco-industrial Park Initiative for Sustainable Industrial Zones in Viet Nam (phase 1)		53,121,265	Finished	UNDP/GEF	Grant	Adaptation, mitigation, technology transfer, capacity-building	MPI, MOIT	2012-2016
6.	Viet Nam Clean Production and Energy Efficiecy Project (3972 Project)		29,694,407	Finished	UNDP/GEF	Grant	Mitigation, capacity-building, technology transfer	MOIT	2012-2016
7.	Promoting Energy Conservation in Small- and Medium-Scale Enterprises (PECSME Project)		28,700,000	Finished	UNDP/GEF	Grant	Mitigation, capacity-building, technology transfer	MOIT	2006-2011
8.	Promoting Industrial Energy Efficiency through System Optimization and Energy Management Standards		859,091	Finished	GEF/ UNIDO	Grant	Mitigation, capacity-building	MOIT	2011-2015

9.	Implementation of Eco-industrial Park Initiative for Sustainable Industrial Zones in Viet Nam (phase 2)		7,524,000	On-going	GEF/ UNIDO	Grant	Mitigation, policy improvement, capacity-building	MPI	2017-2020
II.2. Multilateral public finance support – Green Climate Fund (GCF) and Clean Technology Fund (CTF)									
10.	Improving the resilience of vulnerable coastal communities to climate change related impacts in Viet Nam (Project GCF/PF013)		40,500,000	On-going	GCF	Grant, Counterpart fund (MOC): US$ 0.8 million; MARD: US$ 1.4 million	Adaptation, natural disaster prevention	MPI, MARD, MOC	2017-2022 (Approved Jun. 2016)
11.	Sustainable urban transport for Ho Chi Minh City – MRT line 2 project		48,950,000	On-going	CTF through ADB	Preferential loan from CTF, Counterpart fund US$ 6.05 million	Mitigation, technical assistance, technology transfer	People's Committee of Ho Chi Minh City	2015-2020
12.	Strengthening sustainable urban transport for Ha Noi Metro line 3 project		48,950,000	On-going	CTF through ADB	Preferential loan from CTF, Counterpart fund: US$ 5.8 million	Mitigation, technical assistance, technology transfer	Ha Noi People's Committee	2015-2019
13.	Ha Noi mero rail system project (line 3: Nhon - Ha Noi station)		50,000,000	On-going	CTF through ADB	Preferential loan from CTF,	Mitigation, technical assistance, technology transfer	Ha Noi People's Committee	2015-2020
14.	Distribution efficiency project		30,000,000	On-going	CTF through WB	Preferential loan from CTF	Mitigation, technology transfer	MOIT (EVN)	2012-2018

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
15.	Finance for sustainable energy finance program		58,000,000	On-going	CTF through IFC	Preferetial loan from CTF for climate finance through some commercial banks,	Mitigation, climate finance	The State Bank of Viet Nam and relevant commecial banks	Approved in 2010
16.	Mainstreaming climate change mitigation into national infrastructure – (TA 9055-VIE)		1,052,000	On-going	CTF through ADB	Grant; Counterpart fund: US$ 100,000	Mitigation, Technical assistance, capacity-building	MONRE (Department of Climate Change)	2017-2019
II.3. Multilateral public finance support – United Nations organizations – FAO, UNEP and UNDP									
17.	Viet Nam Technology needs assesment program (TNA)		120,000	Finished	UNEP	Grant, Countepart fund: US$ 12,000	Adaptation, mitigation, technology transfer	MONRE	2010
18.	Promoting energy conservation in small and medium scale enterprises (PECSME)		2,870,000	Finished	UNDP	Grant	Mitigation, technical assistance, technology transfer	MONRE	2006-2011
19.	Support the program to reduce GHG emissions in agriculture in Viet Nam		250,000	Finished	UNDP	Grant	Mitigation, technical assistance, technology transfer	MARD	2011

20.	Study on GHG emission dynamics on wet rice cultivation systems		923,000	Finished	UNDP	Grant	Mitigation, technical assistance	MARD	2011
21.	Capacity-building for industry and trade of Viet Nam to control GHG emissions and strengthen the capacity to adapt to climate change,		3,050,000	Finished	UNDP	Grant, Countepart fund: US$ 15,000	Mitigation, capacity-building	MOIT	2012-2016
22.	Capacity-building for implementtion of national climate change strategy		4,747,000	Finished	UNDP	Grant	Adaptation, mitigation, policy assistance, capacity-building	MONRE	2014-2016
23.	Strengthening national capacity to respond to climate change, Reducing vulnerability and controlling greenhouse gas emissions		4,660,000	Finished	UNDP	Grant	Adaptation, mitigation	MONRE	2009-2013
24.	UN-REDD Viet Nam program		4,384,756	Finished	UNDP	Grant	Mitigation, capacity-building, technical assistance, REDD+	MARD	2009-2013

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
25.	Energy efficiecy improvement in commercial and high-rise residential buildings in Viet Nam		3,198,000	Finished	UNDP	Grant	Mitigation, technical assistance	MOIT	2013
26.	UN-REDD Viet Nam program phase II		697,000	Finished	UNDP	Grant	Mitigation, capacity-building, technical assistance	MARD	2013-2015
27.	Enhance the readiness for nationally appropriate mitigation actions (NAMA): Development of Integrated Food-Energy system		700,000	Finished	FAO	Grant	Mitigation, capacity-building, technical assistance	MARD	2014-2016
28.	Program "Improvement of child-centered disaster risk prevention"		4,000,000	On-going	ODA of Japan: US$ 2,500,000 and United Nations CERF Fund: US$ 1,500,000	Grant	Adaptation, disaster management, humanitarian relief	MARD	2015-2021

II.4. Multilateral public finance support – Asia Development Bank (ADB), World Bank (WB)									
29.	Piloting green transportation (Component 3 of regional project: "Core environment program - phase 2)		400,000	Finished	ADB	Grant	Mitigation, technical assistance, technology transfer	MOT	2015-2016
30.	Component: development of biogas program – under "Quality and Safety Enhancement of Agricultural Products and Biogas Development" project (QSEAP-BD)		22,250,000	Finished	ADB	Grant	Mitigation, technical and financial assistance, technology transfer	MARD	2009-2015
31.	Support for low-carbon agriculture project		84,000,000	On-going	ADB	Preferential loan	Mitigation, technical technology assistance	MARD	2013-2019
32.	Support the implementtion of national target program to respond to climate change in energy and transport sector		2,750,000	Finished	ADB	Grant, Countepart fund: US$ 25,000	Adaptation, mitigation, technical assistance	MOIT, MOT	2012-2014
33.	Carbon finance program		257,000	Finished	WB	Grant	Mitigation, technical assistance, climate finance	MOIT	2009-2016

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
34.	Prtnership for market readiness in Viet Nam (ViNPMR)		3,600,000	On-going	WB	Grant, Counterpart fund: US$ 600,000	Mitigation, climate finance, capacity-building	MONRE	2015-2018
35.	Clean production and Energy efficiency project		2,374,407	Finished	WB	Grant	Mitigation, capacity-building	MOIT	2011-2016
36.	Climate Change partnership (VN-CLIP project)		4,200,000	Finished	WB	Grant	Adaptation, mitigation, capacity-building	MONRE	2012-2015
37.	Support for REDD+ readiness preparation in Viet Nam		3,800,000	Finished	WB	Grant	Mitigation, capacity-building, REDD+	MARD	2013-2015
38.	Support for REDD+ readiness preparation in Viet Nam - phase 2		5,700,000	On-going	WB	Grant	Mitigation, capacity-building,	MARD	2016-2019
39.	Sub-project "Strengthening capacity for flood monitoring and waring in Mekong delta " (WB4) of Natural Disater Mitigation Project of World Bank	VND 180 billion	4,800,000	Finished	WB	Grant: VND 161 billion; Countepart fund: VND 19 billion	Adaptation, capacity-building	MONRE	2007-2012

40.	Enhancing flood forecasting and early warning in Viet Nam - phase 1	VND 102.439 billion	28,760,000	Finished	WB	Grant: VND 71.314 billion Countepart fund: VND 31.125 billion	Adaptation, capacity-building	MONRE	1999-2010
41.	Enhancing weather forecasting and early warning system	VND 632.75 billion	28,680,000	On-going	ODA WB	Preferential loan: VND 580.25 billion; Countepart fund: VND 52.5 billion	Adaptation, capacity-building	MONRE	2013-2017
42.	Mekong Integrated Water Resources Management (M-IWRM)	VND 631.08 billion	51,660,000	On-going	ODA WB	Preferential loan: VND 525 billion; Countepart fund: VND 105.18 billion	Adaptation, capacity-building	MONRE	2014-2018
43.	Component 1: Enhancing monitoring, analytics and information system - Project "Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods"	VND 1,136.62 billion	7,090,000	On-going	ODA WB	Preferential loan VND 1,023 billion; Counterpart fund: VND 113.62 billion	Adaptation, capacity-building, technology transfer	MARD	2017-2021

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
44.	Development of water resources monitoring network and enhancing the coordination of inter-reservoir operation in the Vu Gia - Thu Bon river basin and the Ca river basin – sub-project of "Dam rehabilitation and safety improvement project (WB8)	VND 156 billion	37,950,000	On-going	ODA WB	Preferential loan: VND 150 billion Counterpart fund: VND 6 billion	Adaptation, capacity-building, technology support	MARD	2017-2022
45.	Viet Nam - Improved Land Governance and Database (VLIG)	VND 835 billion	4,800,000	On-going	ODA WB	Preferential loan: VND 700 billion; Countepart fund: VND 135 billion	Adaptation	MONRE	2017-2021
46.	BRT route 1 (Yen Nghia - Kim Ma)		53,600,000	Finished	WB, GEF	- Loan from WB - GEF grant	Mitigation	MOT	2013-2016

47.	Study and develop sustainable solutions to protect the coastal zone in Quang Nam, Tien Giang and Ca Mau provinces	EUR 1,070,000	1,177,000	Finished	EU-France through AfD	Grant	Adaptation	People's Commitees and related departments of Quang Nam, Tien Giang and Ca Mau provinces	2016-2017
48.	Support grid-connected policies to replicate solar power from roofs in Viet Nam	EUR 160,000	176,000	On-going	EU and some member countries: Austria, Finland, Gemany, Italy, Swden and Netherlands	Grant	Mitigation	MOIT, Electricity Regulatory Authority (ERAV)	2017
49.	Support for Non-Governmental Organizations Access to RenewableEnergy and Energy Efficiency (E-Enhance Project)	EUR 600,000	660,000	On-going	EU-GreenID Việt Nam	Grant	Mitigation	Local NGO	2017-2021
50.	Solar energy development in HCMC Da Nang (DSED)	EUR 393,000	432,300	On-going	EU-Da Nang Energy Conservation Center (DECC)	Grant	Mitigation	Da Nang PPC, Da Nang Energy Conservation Center (DECC)	2017-2020

No.	Project	Climate finance		Status	Financial resources	Financial instrument	Objectives	Executive agencies	Additioal information
		Currency	US$ equivalent						
51.	Sustainable and equitable shrimp production and value chain development in Viet Nam (under the SWITCH Program)	EUR 2,500,000	2,750,000	On-going	EU-Oxfam	Grant	Mitigation	Shrimp processing enterpries, local authorities, extension agencies (nationwide)	2016-2020
52.	Replication of sustainable biotech initiatives in the field of Phyto-pharma in Viet Nam (under the SWITCH Program)	EUR 2,000,000	2,200,000	On-going	EU- Helvetas	Grant	Mitigation	Small and medium enterpries, local authorities, extension agencies (nationwide)	2016-2020
53.	Establish a sustainable Pangasius supply chain in Viet Nam (under the SWITCH Program)	EUR 2,300,000	2,530,000	Finished	EU-Viet Nam Cleaner Production Center (CPC)	Grant	Mitigation	Local businesses and goverments, cleaner production centers (natiowide)	2013-2017
54.	Viet Nam Action Plan for Green Growth		1,605,016	Finished	ODA from Global Green Growth Inatitute (GGGI)	Grant	Green Growth, Capacity-Building, technical assistance	MPI, MoC	2014-2016

55.	Water resources and green growth in the Mekong Delta		395,923	Finished	ODA from GGGI	Grant	Green Growth, Capacity Building, technical assistance	Mekong River Commission of Viet Nam	2014-2016
56.	Replication of the Biomass Refuse Turning Model into Energy in Viet Nam		702,000	On-going	ODA from GGGI	Grant	Green Growth, Capacity Building, Mitigation, technical assistance	MOIT	2017-2018
57.	Policy support to promote Green Finance in Viet Nam		677,000	On-going	ODA from GGGI	Grant	Green Growth, Capacity Building, technical assistance	MPI, VDB Bank	2017-2018
58.	Viet Nam is acting for green growth in urban areas		1,119,000	On-going	ODA from GGGI	Grant	Green Growth, Capacity Building, technical assistance	Ministry of Construction	2017-2018

Table 5.8. Support received for climate change projects, commitment by international donors

No	Project	Climate Finance		Status (Comitted/ Signed)	Financial Resources (ODA, OOF, etc.)	Financial Instrments (Grant, Preferential Loan, Non-preferential loans, other)	Type / Objective (Mitgation, Adapttion, Multi-purpose, other)	Fields/ Miistry, sector	Addtioal information
		Currency	US$ equivalent						
I. Public finance support – bilateral support									
1.	Supporting Viet Nam to implement the Paris Agreement (SIPA project)	EUR 10,300,000	11,330,000	Committed	ODA from Government of Germany (IKI) through GIZ	Grant	Mitigation, capacity-building, technical and policy assistance	MONRE	2017-2021
2.	Support for planning and implementation of Nationally Determined Contribution in Viet Nam	JPY 400,000,000	4,000,000	Committed	JICA	Grant	Mitigation	MONRE	2019-2022
3.	Protect climate through the sustainable biomass energy market in Viet Nam	EUR 4,000,000	4,400,000	Committed	ODA from Government of Germany (IKI) through GIZ	Grant	Mitigation, capacity-building, technical assistance	MOIT	2017-2021
4.	Smart grid for renewable energy and energy saving	EUR 5,000,000	5,500,000	Committed	ODA from Government of Germany (BMZ) through GIZ	Grant	Mitigation, capacity-building, technical assistance	MOIT	2017-2021

5.	Ecosystem based adaptation through restoration and co-management of sand dunes and mangroves in North-Central of Viet Nam	EUR 1,892,000	2,081,200	Committed	ODA from Government of Germany (IKI) through "UNIQUE forestry and land use GmbH"	Grant	Adaptation	MARD and People's Committee of Quang Tri province	2017-2021
6.	REDD+ project with PPP and PPF model at Cat Tien national park	EUR 1,749,351	1,924,286	Committed	ODA from Government of Germany (IKI) through GIZ	Grant	Mitigation REDD+	People's Committee of Lam Dong province	2017-Dec. 2020
7.	Smart grid system for efficiency grid	EUR 95,000,000	10,450,000	Committed	ODA from Government of Germany through the KfW Development Bank	Preferential loan	Mitigation	MOIT	NA
8.	Efficiency grid at medium and small city (phase 2)	EUR 150,000,000	165,000,000	Committed	ODA from Government of Germany through the KfW Development Bank	Preferential loan	Mitigation	MOIT	NA
9.	Reform the vocational training program (Project VTP 2013): Develop the Green Vocational Training Centre	EUR 9,100,000	10,010,000	Committed	ODA from Government of Germany through the KfW Development Bank	Preferential loan	Mitigation	MOLISA	NA

No	Project	Climate Finance		Status (Comitted/ Signed)	Financial Resources (ODA, OOF, etc.)	Financial Instrments (Grant, Preferential Loan, Non-preferential loans, other)	Type / Objective (Mitgation, Adapttion, Multi-purpose, other)	Fields/ Miistry, sector	Addtioal information
		Currency	US$ equivalent						
10.	Rehabilitation and Sustainable Management of Forest Areas in Central and Northern Viet Nam	EUR 20,240,000	22,264,000	Committed	ODA from Government of Germany through the KfW Development Bank	Preferential loan and Grant	Mitigation	MARD	NA
11.	Renewable energy development Fund in Viet Nam	EUR 14,500,000	15,950,000	Committed	ODA from Government of Germany through the KfW Development Bank	Grant	Mitigation	MOIT	NA
12.	Responding to climate change in Transportation		550,000	Committed	WB	Grant	Mitigation and adaptation	MOT	2017-2019
13.	Conservation and management of coastal wetland ecosystems in the Red River Delta	EUR 30,000,000	33,000,000	Committed	EU-Germany through KfW	Grant: EUR 10 million, loan: EUR 20 million	Adaptation	People's Committees of coastal provinces in Red River delta and MONRE	From 2018

14.	Promoting private sector investment in renewable energy	EUR 29,500,000	32,450,000	Committed	EU-Germany through KfW	Grant	Mitigation	MOIT, VCCI and enterprises	From 2018
15.	EU-Viet Nam Energy Fund	EUR 8,000,000	8,800,000	Committed	EU-Germany through KfW	Grant	Mitigation	MOIT, MOF	From 2018
16.	Promoting solar energy in Viet Nam	EUR 112,000,000	123,200,000	Committed	EU-Germany through KfW	Grant: EUR 12 million, loan: EUR 100 million	Mitigation	MoC and provinces	From 2018
17.	Conservation and management of coastal wetland ecosystems in the Red River Delta	EUR 30,000,000	33,000,000	Committed	EU-Germany through KfW	Grant: EUR 10 million, loan: EUR 20 million	Adaptation	People's Committees of coastal provinces in Red River delta and MONRE	From 2018
18.	Promoting private sector investment in renewable energy	EUR 29,500,000	32,450,000	Committed	EU-Germany through KfW	Grant	Mitigation	MOIT, VCCI and enterprises	From 2018

No	Project	Climate Finance		Status (Comitted/ Signed)	Financial Resources (ODA, OOF, etc.)	Financial Instrments (Grant, Preferential Loan, Non-preferential loans, other)	Type / Objective (Mitgation, Adapttion, Multi-purpose, other)	Fields/ Miistry, sector	Addtioal information
		Currency	US$ equivalent						
II. Public Finance support – Commitment for regional climate change project									
1.	Using seasonal climate forecast and new insurance instruments to manage climate risks in agriculture in Southeast Asia	EUR 678,839 for Viet Nam, Lao PDR, Cambodia, Myanmar	746,723	Committed	ODA from Government of Germany (IKI) through WMO	Grant	Adaptation, technical assistance	MARD	2017-Sep. 2020
2.	City Climate Commitment: Commitment for low-carbon development at 4 large cities in Southeast Asia	EUR 3,101,000 for 4 cities	3,411,100	Committed	ODA from Government of Germany (IKI) through GIZ	Grant	Mitigation, capacity-building, technical assistance	MONRE	2017-Jun. 2020
3.	Forest restoration based on REDD+ forestry through Community and Business Cooperation in Southeast Asia	EUR 2,317,710 for Viet Nam, Lao PDR, Cambodia, Myanmar	2,549,481	Committed	ODA from Government of Germany (IKI) through RECOFTC	Grant	Mitigation, REDD+, technical assistance	MARD	2017-2022

AFTERWORD

Viet Nam's Second Biennial Updated Report (BUR2) to the United Nations Framework Convention on Climate Change (UNFCCC) updated the contents of the Viet Nam's Initial Biennial Updated Report (BUR1) to UNFCCC in 2014. The main contents of the BUR2 include results of the 2013 national GHG inventory; nationally appropriate mitigation actions; preparations for the development of the MRV system in the country; and the main supports received in the past and committed supports for the coming time.

The GHG inventory for BUR2 to the UNFCCC was, for the first time, implemented by the National Greenhouse Gas Inventory System, which was established in December 2015. This GHG inventory has made some improvements compared to the BUR1, including: (i) estimated HFCs emissions; (ii) recalculation of the 2010 National GHG inventory; (iii) implementation of both quality control and quality assurance.

It is expected that the updated information in Viet Nam's BUR2 to the UNFCCC will serve the process of planning and developing a number of policies, plans, programs and projects on GHG mitigation and green growth, and at the same time, will contribute to Viet Nam's goals on sustainable development and to the Nationally Determined Contribution (NDC).

The Ministry of Natural Resources and Environment expresses sincere thanks for the active participation and cooperation of line ministries, sectors and agencies, the timely and effective supports of some international organizations as well as valuable contributions of experts and scientists in the process of developing the BUR2.

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ANNEXES

Annex 1. Energy Sector Report for the 2013 National GHG Inventory

Unit: kt

CATEGORIES	CO_2	CH_4	N_2O	NO_x	CO	NMVOC	SO_2
Total	126,914.63	935.91	3.66				
A. Fuel Combustion Activities (Sectoral Approach)	125,364.91	154.77	3.65				
A.1. Energy Industries	43,527.92	0.71	0.41				
A.1.a. Electricity Production	41,429.34	0.63	0.40				
A.1.b. Petroleum Refining	2,098.57	0.09	0.02				
A.2. Manufacturing Industries and Construction	40,233.16	8.31	1.12				
A.2.a. Iron and Steel	1,609.40	0.15	0.02				
A.2.b. Chemicals and Oil	4,350.65	0.39	0.02				
A.2.c. Cement and Building Materials	17,992.75	3.11	0.43				
A.2.d. Food and Tobacco	2,936.24	3.51	0.47				
A.2.e. Textile and Leather	5,610.35	0.56	0.08				
A.2.f. Pulp, Paper and Print	1,355.22	0.13	0.02				
A.2.g. Other sectors	6,378.55	0.45	0.08				
A.3. Transport	29,492.65	4.97	0.27				
A.3.a. Civil Aviation	1,219.88	0.01	0.03				
A.3.b. Road Transportation	26,815.04	4.86	0.23				
A.3.c. Railways	109.31	0.01	0.00				
A.3.d. Navigation	1,348.42	0.09	0.01				
A.4. Other Sectors	11,346.81	140.70	1.82				
A.4.a. Commercial/Institutional	3,312.70	0.43	0.04				
A.4.b. Residential	6,608.86	139.89	1.77				
A.4.c. Agriculture/Forestry/Fishing	1,425.25	0.37	0.01				
A.5. Other (Non-energy use)	764.36	0.08	0.03				
B. Fugitive Emissions from Fuels	1,549.72	781.14	0.01				
B.1. Solid Fuels		92.76					
B.1.a. Coal Mining		72.99					
B.1.b. Solid Fuel Transformation		19.78					
B.2. Oil and Natural Gas	1,549.72	688.38	0.01				
B.2.a. Oil	862.77	572.92	0.01				
B.2.b. Natural Gas	686.95	115.46	0.00				

Annex 2. Industrial Processes Sector Report for the 2013 National GHG Inventory

Unit: $ktCO_2e$

CATEGORIES	CO_2	CH_4	N_2O	NO_x	CO	NMVOC	SO_2	HFCs		PFCs		SF_6	
								P	A	P	A	P	A
A. Mineral Products	**28,780.86**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A.1. Cement Production	28,207.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A.2. Lime Production	573.76	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A.3. Limestone and Dolomite Use	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A.4. Soda Ash Production and Use	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A.5. Asphalt Roofing													
A.6. Road Paving with Asphalt													
B. Chemical Industry	IE, NE, NO	NA, NO, NE	NA, NO, NE	NA, NO, NE	NA, NO, NE	NA, NO, NE	NA, NO, NE	NA, NO, NE	NA, NO, NE	NA, NO, NE	NA, NO, NE	NA, NO, NE	NA, NO, NE
B.1. Ammonia Production	IE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B.2. Nitric Acid Production	NE	NA	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA
B.3. Adipic Acid Production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
B.4. Carbide Production	NE	NE	NA	NA	NE	NA	NA	NA	NA	NA	NA	NA	NA
C. Metal Production	**1,018.90**	NE, NO	NA, NO	NA, NO	NE, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C.1. Iron and Steel Production	1,018.90	NE	NA	NA	NE	NA	NA	NA	NA	NA	NA	NA	NA
C.2. Ferroalloys Production	NE												
C.3. Aluminium Production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C.4. SF_6 Used in Aluminium and Magnesium Foundries	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

CATEGORIES	CO_2	CH_4	NO_x	NO_x	CO	NMVOC	SO_2	HFCs		PFCs		SF_6	
								P	A	P	A	P	A
D. Other Production													
D.1. Pulp and Paper													
D.2. Food and Drink													
E. Production of Halocarbons and Sulfur Hexafluoride	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E.1. By-product Emissions	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E.2. Fugitive Emissions	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Consumption of Halocarbons and Sulfur Hexafluoride								1,967.63					

Notes:
P = Potential emissions based on Tier 1 Approach. A = Actual emissions based on Tier 2 Approach.

Annex 3. Waste Sector Report for the 2013 National GHG Inventory

Unit: kt

CATEGORIES	CO_2[1]	CH_4	N_2O	NO_x	CO	NMVOC
Total Waste	**254.93**	**739.78**	**6.50**			
A. Solid Waste Disposal on Land	NE	297.43				
B. Wastewater Handling	NE	442.34	6.50			
B.1. Industrial Wastewater		64.92				
B.2. Domestic and Commercial Wastewater		377.42	6.50			
B.3. Other (please specify)						
C. Waste Incineration	254.93		NE			
D. Other (please specify)						

Note:
[1] CO_2 from waste disposal and incineration should only be included if it stems from non-biological or inorganic waste sources.

Annex 4. Agriculture Sector Report for the 2013 National GHG Inventory

Unit: kt

CATEGORIES	CH_4	N_2O	NOx	CO	NMVOC
Total Agriculture	**2,365.25**	**101.60**	**50.35**	**1,658.20**	
A. Enteric Fermentation	413.12				
A.1. Cattle	237.33				
A.2. Buffalo	140.77				
A.3. Sheep	0.51				
A.4. Goats	6.83				
A.5. Camels and Llamas	0.00				
A.6. Horses	1.42				
A.7. Mules and Asses	0.00				
A.8. Swine	26.26				
A.9. Poultry	0.00				
A.10. Other (please specify)	NO				
B. Manure Management	83.50	19.52			
B.1. Cattle	17.03				
B.2. Buffalo	17.26				
B.3. Sheep	0.02				
B.4. Goats	0.26				
B.5. Camels and Llamas	0.00				
B.6. Horses	0.13				
B.7. Mules and Asses	0.00				
B.8. Swine	42.51				
B.9. Poultry	6.29				
B.10. Anaerobic		0.15			
B.11. Liquid Systems		NO			
B.12. Solid Storage and Dry Lot		NO			
B.13. Other (please specify)		19.36			
- Daily spread		0.00			
- Anaerobic treatment		19.11			
- Anaerobic Digester		0.26			
C. Rice Cultivation	1,789.67				
C.1. Irrigated	1,702.44				
C.2. Rain-fed	87.23				
C.3. Deep Water	0.00				
C.4. Other (please specify)	NO				

CATEGORIES	CH_4	N_2O	NOx	CO	NMVOC
D. Agricultural Soils		80.69			
E. Prescribed Burning of Savannas	0.04	0.00	0.02	1.00	
F. Field Burning of Agricultural Residues	78.91	1.39	50.34	1,657.20	
F.1. Cereals	75.02	1.24	44.69	1,575.45	
F.2. Pulse	0.90	0.01	1.52	18.91	
F.3. Tuber and Root	2.07	0.10	3.61	43.51	
F.4. Sugar Cane	0.92	0.01	0.52	19.33	
F.5. Other (please specify)	NO	NO	NO	NO	
G. Other (please specify)	NO	NO	NO	NO	

Annex 5. LULUCF Sector Report for the 2013 National GHG Inventory

Unit: kt

CATEGORIES	CO_2 Emissions	CO_2 Removal	CH_4	N_2O	NO_x	CO
A. Forest Land	63,171.69	-97,678.26	0.31	0.03	0.08	2.74
A.1. Forest Land Remaining Forest Land	63,171.69	-75,188.59	0.31	0.03	0.08	2.74
A.2. Land Converted to Forest Land	NE	-22,489.67	IE	IE		
B. Cropland	3,321.46	-5,660.54	1.94	0.01	0.48	16.98
B.1. Cropland Remaining Cropland	55.68	-5,557.93				
B.2. Land Converted to Cropland	3,265.78	-102.60	1.94	0.01	0.48	16.98
C. Grassland	980.23	-440.51	1.59	0.01	0.39	13.95
C.1. Grassland Remaining Grassland		NE				
C.2. Land Converted to Grassland	980.23	-440.51	1.59	0.01	0.39	13.95
D. Wetlands	965.64		0.16	0.01	0.04	1.41
D.1. Wetlands Remaining Wetlands	NE					
D.2. Land Converted to Wetlands	965.64		0.16	0.01	0.04	1.41
E. Settlements	965.61		0.03	0.00	0.01	0.28
E.1. Settlements Remaining Settlements	NE					
E.2. Land Converted to Settlements	965.61		0.03	0.00	0.01	0.28
F. Other Land	15.16		0.00	0.00	0.00	0.04
F.1. Other Land Remaining Other Land						
F.2. Land Converted to Other Land	15.19		0.00	0.00	0.00	0.04

Notes:
(1) Please do not provide an estimate of both CO_2 emissions and CO_2 removals. You should estimate "net" emissions of CO_2 and place a single number in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

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Licence No:79/QD-TMBIN dated November 1st, 2017 - 3781-2017/CXBIPH/04-790/BaD
Printed at Viet Nam Publishing House of Natural Resources, Environment And Cartography
ISBN: 978-604-952-187-4 - Copyright deposit in November 2017