アジア開発途上国
気候変動政策情報収集・確認調査

最終報告書

平成 26 年 2 月
（2014 年）

独立行政法人
国際協力機構（JICA）

有限会社クライメート・エキスパーツ
日　本　工　営　株　式　会　社

環境
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第 1 章　調査の背景と目的

1.1　調査の背景

地球温暖化の対応が世界で求められる昨今、途上国における気候変動緩和策は、気候変動枠組条約（UNFCCC）第 15 回締約国会議（COP15）におけるコペンハーゲン合意以降、COP16 カンクン合意、COP17 ダーバン決定を経て、国別緩和行動計画（NAMA）の策定や温室効果ガスインベントリの作成、及び国別報告書に加えてそれらを国際的に報告する隔年更新報告（BUR）の作成を行うことなどが決定されている。そして COP17 では、2020 年以降にすべての国が参加する気候変動対策の法的枠組みについて 2015 年までを目途に議論を進めることが合意され、カンクン合意・ダーバン決定の実施のための作業計画が COP18 において合意された。他方、途上国における気候変動適応策は、マラケシュ合意に基づき後発開発途上国（LDC）において緊急性の高い適応ニーズに対応するための国家適応行動計画（NAPAs）が策定されてきたが、カンクン合意、ダーバン決定を経て、すべての国において中長期的な適応ニーズへの対応を国家開発計画等に主流化していくことを目的とした国家適応計画(NAPs)の検討が進められようとしている。

途上国における NAMA、NAPs 等の様式・内容は定まったものはなく、各国が個々の能力に応じた自主的な取り組みを行い、先進国が必要な支援を行うことが求められている。現在アジア地域等において、NAMA の基礎となる国別報告書（National Communications）や国家気候変動計画/戦略の策定が進められている。特に、著しい経済成長を遂げているアジア諸国は、経済成長と温室効果ガスの排出削減を両立させる低炭素開発を、より早期に開発計画に反映させていくことが求められている。

かかる状況を踏まえ、アジアの開発途上国を対象として、国家開発計画/戦略と整合した NAMA や NAPs の策定及び実施に向けて、アジア開発途上国の能力強化を目的とした基礎情報収集・確認調査を行った。

1.2　調査の目的

本業務では、気候変動に関する国際交渉の状況を踏まえて、アジア開発途上国を対象として、各国における NAMA、NAPs の策定・検討および実施に関する情報を取りまとめ、各国における気候変動対策の推進にあたって必要な課題や能力強化について調査し、提言をまとめる。

調査の主な内容は、文献調査に加えて、対象国から気候変動対策の計画・実施に携わる担当官等を招聘し、セミナーを開催した。また、第 19 回気候変動対策枠組条約締約国会議（COP19）に参加し、アジア開発途上国の関係者との対話・情報収集を行うと同時に、最新の気候変動国際交渉の状況を踏まえた提言を行った。

1.3　調査対象地域

アジア地域の開発途上国のうち、対象国は以下 17 ヶ国である。地域的な内訳として、アセアン諸国が 10 カ国、南西アジア地域は 5 カ国、北東アジア地域が 2 カ国を対象とした。

地域	国名
ASEAN	タイ、インドネシア、フィリピン、マレーシア、ベトナム、ミャンマー、ラオス、カンボジア、シンガポール、ブルネイ
南西アジア	インド，バングラデシュ，ネパール，パキスタン，スリランカ
北東アジア	中国、モンゴル

1.4　調査内容

本調査は、国内調査として文献調査及びセミナーの開催、現地調査として COP19 での情報収集・意見交換等を実施した。調査の詳細は下記のとおりである。

(1)　文献調査

各国が UNFCCC に提出している国別報告書や、国家開発計画、国際機関・ドナーの資料・データ等をもとに、各国における気候変動対策（NAMA、NAPs の計画および実施状況を含む）についての現状を取りまとめた。

また、文献調査の結果は、セミナーにおける資料として、セミナー参加者に配布した。

(2)　セミナーの開催

セミナーについて対象国の政府関係者の招聘、セミナー開催に係る準備を貴機構と協議の上、実施した。対象国の政府関係者を招聘し、日本の有識者等を招き、気候変動対策の計画・実施に関するセミナーを開催、参加者間の意見交換や日本の知見の共有等を踏まえ、課題を整理し、能力向上策を検討した。

セミナー概要

日時：2013 年 8 月 27 日～29 日　3 日間（2 日間：会議、1 日間：現場見学）
場所：グランドアーク半蔵門
参加者：13 ヶ国 14 名

(3)　COP19 への参加

COP19 に参加し、サイドイベント等の場において、アジア開発途上国の関係者との対話・情報収集を行った。本件業務の成果の結果概要をとりまとめ、国際交渉関係者、開発途上国政府関係者に対する情報発信等を行った。また、気候変動国際交渉・国際制度にかかる最新の情報を収集した。

第 2 章　文献調査

2.1　文献調査の目的

各国が UNFCCC に提出している国別報告書や、国家開発計画、国際機関・ドナーの資料・データ等をもとに、各国における気候変動対策（NAMA、NAPs の計画および実施状況を含む）についての現状を取りまとめた。また、文献調査の結果は、セミナーにおける資料として参加者に配布した。

2.2　文献調査の整理方法

本調査の対象国である 17 カ国について、各国の LEDS、NAMA、NAPs 策定及び実施に関する文献分析及び関連用語の整理を行い、各国における LEDS、NAMA、NAPs の計画および実施についての現状を、下記に示す項目ごとに英語にて取りまとめた。

表 2-1　文献調査対象国及び主な調査項目

対象国	タイ、インドネシア、フィリピン、マレーシア、ベトナム、ミャンマー、ラオス、カンボジア、シンガポール、ブルネイ、インド、バングラデシュ、ネパール、パキスタン、スリランカ、中国、モンゴル
主な調査項目	- 国家開発計画 - 気候変動分野に関する制度及び組織概要 - 適応策及び緩和策に関する施策 - 気候変動に関する施策及び制度の整備状況 - GHG インベントリー - 緩和策に関する主要施策 - 適応策に関する主要施策 - 気候変動に関する主要プロジェクト

文献調査の結果は添付資料 1 に整理している。

第 3 章　セミナーの開催

3.1　セミナー概要

2013 年 8 月 27 日から 3 日間、東京において「アジア諸国向け気候変動政策対話」と題した国際会議を開催、アジア地域の 13 ヵ国の気候変動交渉官及び日本政府関係者が、気候変動対策について議論を交わす場として実施した。

People's Republic of Bangladesh	
Mr. Md. Mahbub Hossain	Director (Planning, Development & Negotiation), Bangladesh Climate Change Trust (BCCT), Ministry of Environment and Forests
Brunei Darussalam	
Mr. Eddie Dato Paduka Haji Sunny	Deputy Permanent Secretary, Ministry of Development
Kingdom of Cambodia	
Mr. Ou Chanthearith	Deputy Director Climate Change Department, Ministry of Environment
Republic of Indonesia	
Mr. Mochammad Farhan Helmy	Secretary of Mitigation Working Group, National Council on Climate Change
Republic of Korea	
Mr. Hechul Yoo	Director General, International Cooperation Office,Ministry of Environment
Ms. Seona Kim	Program Officer, Global Environmental Division、 Ministry of Environment
Lao People's Democratic Republic	
Mr. Phouvong Luangxaysana	Director General, Department of Disaster Management and Climate Change, Ministry of Natural Resources and Environment
Mongolia	
Mr. Dorjgurkhem Batbold	Director, International Cooperation Division, Ministry of Environment and Green Development of Mongolia
Republic of the Union of Myanmar	
Mr. Nay Aye	Director-General, Environmental Conservation Department Ministry of Environmental Conservation and Forestry
Federal Democratic Republic of Nepal	
Mr. Vinod Gautam	Section Officer Climate Change Management Division, Ministry of Environment
Islamic Republic of Pakistan	
Mr. Dilshad Ahmad Babar	Joint Secretary Ministry of Climate Change
Republic of the Philippines	
Ms. Mary Ann Limpot Sering	Vice Chairperson & Executive Director, Climate Change Commission
Kingdom of Thailand	
Dr. Sedthapandh Krajangwongs	Head, UNFCCC Coordination Section, Climate Change Office, Office of Natural Resources and Environmental Policy Planning, Ministry of Natural Resources and Environment
Socialist Republic of Viet Nam	
Mr. Tan Van Pham	Deputy Director General, Ministry of Natural Resources and Environment

本セミナーは、外務省及び国際協力機構（JICA）のほか、経済産業省，財務省，環境省からアジア諸国に対し、日本の気候変動対策や支援について紹介するとともに，第 19 回国連気候変動枠組条約締約国会議（COP19）に向けた気候変動交渉に関する意見交換を行うことを目的として開催した。

また，セミナーの 2 日目には日本の先端的な環境技術を活用したスマートビルディングや高効率石炭火力発電所の視察等を行った。

セミナー参加国は、インドネシア，カンボジア，タイ，ブルネイ，フィリピン，ベトナム，ミャンマー，ラオス，バングラデシュ，ネパール，パキスタン，モンゴル，韓国の 13 カ国である。

3.2　セミナー報告

セミナーのアジェンダ及参加者リストは下表に示すとおりである。セミナーは 1 日目及び 3 日目にアジア地域の気候変動交渉官と日本政府関係者等の協議を行い、2 日目に日本の最新省エネ技術を導入した事例見学を行った。

表 3-1　アジア政策対話アジェンダ

8 月 27 日（1 日目）	
Session 1	Each Country' Efforts Towards Low Carbon Growth and Cooperation in Asian Countries
Session 2	Japan's Cooperation on Climate Change through Multi-Framework
Session 3	JICA's Policy on Climate Change
Session 4	Workshop
Session 5	Recent Development and Future Prospect of the Joint Crediting Mechanism (JCM)
8 月 28 日（2 日目）	
Site visit 1	Presentation on climate change projects by private companies and local governments
Site visit 2	Visit to high efficiency thermal power plant (J-Power)
Site visit 3	Visit to Tokyo Skytree
8 月 29 日（3 日目）	
Session 6	Knowledge platform (LoCARNet)
Session 7	Open discussion "The way forward - Future cooperation between Asian countries and Japan, with the involvement of various stakeholders"
Session 8	Closed session (Climate change negotiation toward COP19) and closing remarks

3.3　セミナーまとめ

「アジア諸国向け気候変動政策対話」における議事内容をセッション毎にまとめる。

1 日目（8 月 27 日）

- オープニングリマーク：外務省　地球規模課題審議官　香川剛廣
- 挨拶：JICA 地球環境部　部長　不破雅実

プログラム	Session 1: Each Countries' Efforts Towards Low Carbon Growth and Cooperation in Asian Countries
議長	外務省国際協力局　参事官　南博
発表者 1	外務省国際協力局　参事官　南博
発表内容	
- 日本の GHG 排出量の推移及び日本の気候変動に対する取り組み - アジアにおける低炭素成長に関する支援活動	
発表者 2	Climate Change Commission, Vice Chairperson & Executive Director, Mary Ann Limpot Sering,
発表内容	
- フィリピンにおける気候変動対策に関する組織制度 - フィリピンが考える適応策と緩和策の関連性 - フィリピンの GHG 排出量の現状及びインベントリーの重要性 - 2015 年に決まる新メカニズムの重要性	

＜主な議論＞

1. ネパール
- ネパール政府は NAPA を既に作成済み
- 2011 年に気候変動ポリシーを策定
- ネパール全国において気候変動に脆弱な地域を特定し、2011 年にその適応策プランを策定
- 2nd National Communication の最終案を作成しており、1 カ月以内に最終化予定

2. パキスタン
- 世界における GHG 排出量のうちパキスタンが占めるのは最大でも 0.8%
- 排出量は少ないが、気候変動の影響を最も受ける国の一つ
- 特に氷河から溶け出た水とモンスーンが引き起こす洪水被害が深刻化。2010 年には深刻な洪水が起こり、洪水が収まるまで 3 カ月かかった
- UNFCCC の支援による調査で、パキスタンにおいて 2000 年～2020 年にかけて緩和策に掛かるコストは 97 億ドルと試算された

3. ベトナム
- ベトナム政府は、国家気候変動戦略や Green Growth 戦略、省エネルギーの促進等、気候変動対策に関するいくつかのポリシーを策定
- 低炭素成長に関連し、いくつかの数値目標を設定。例えば、エネルギーセクターからの GHG 排出量を business as usual と比較し 10～20%削減、GDP に対するエネルギー消費量の割合を年間 1～1.5%削減等
- 2013 年 7 月 2 日に日本政府と JCM 実施の署名をした。JCM は低炭素技術の移転に有効である
- ベトナム政府は十分な資金がなく、先進国からの技術移転は重要

4. タイ
- タイ政府は今年、2013～2050 年の気候変動 MP を策定予定
- 緩和策については今年、NAMA をどう実施するか検討中。特にエネルギーと運輸セクターに注力。基準年に比べ 7～15%もしくは 7～20%の GHG 排出量を削減する計画
- 適応策の推進では地域に根付いている知識が重要であり、それを使った地域コミュニティの参加が重要
- 気候変動対策の推進において、研究とキャパシティ・ディベロップメントが重要。日本の支援で Climate Change International Training Center (CITC)を設立し、研究を促進

5. カンボジア
- カンボジアは最も脆弱な国の一つであるが、気候変動対策に関するキャパシティは不十分
- サイクロンの被害が顕在化しており、経済へのインパクトも大きい
- カンボジア政府は 1995 年に国連気候変動枠組条約を批准、2002 年に京都議定書を批准
- 自主的な GHG 排出量削減の取り組みや CDM の実施にも取り組んでいる
- Green Growth Strategy 2013 to 2030 を策定済み

6. ミャンマー
- 洪水や嵐、土砂崩れ等の増加による被害を懸念している
- GHG の排出と吸収、全体で見るとミャンマーは GHG の排出国ではない
- UNEP の支援を受け NAPA を策定済み
- REDD+は持続可能な森林管理に重要である
- 人口増加と農業への依存が気候変動対策において大きな課題
- 引き続き、地域もしくは世界的な気候変動対策への取り組みに積極的に関与したい

7. ラオス
- ラオスからの GHG 排出は非常に少ない一方、気候変動に対して脆弱であり洪水や干ばつが食糧保障や国内インフラに影響を与えている
- 低炭素成長に関するポリシーを策定済み。また 2003 年に京都議定書を批准
- 2nd National Communication を 2013 年 1 月、NAPA を 2009 年に策定
- 国家気候変動戦略を 2010 年に、気候変動アクションプラン 2013～2020 年を 2013 年 4 月に策定
- JCM の実施について 2013 年 8 月に署名
- 気候変動対策においてはキャパシティと資金が不足しており、日本や国際機関との協力が必要不可欠

8. 南参事官
- 日本政府と各国の協力を進めていきたい
- アジアは地域的に多様であり、適応策や緩和策に対する取り組みは様々
- いくつかの国は既に NAMA やアクションプランを策定している
- 気候変動による災害はアジアで頻繁に起こるようになってきている

プログラム	Session 2: Japan’s Cooperation on Climate Change through Multi-Framework
発表者	財務省　開発企画官　緒方健太郎
発表内容	
- 気候変動ファイナンスの概要 - ODA を通した日本の気候変動に関する開発途上国支援 - CIF や GEF、GCF における日本の役割	

＜主な議論＞
1. パキスタン
- 民間から出る資金は義務的なものか、それとも自主的なものか

→緒方開発企画官：自主的なものである。国際社会では気候対策において毎年多額の資金を調達しようとしているが、様々なスキームの有効活用が必要である

2. フィリピン
- 私たちは従来の MDB だけでなく、新しい資金調達スキームが必要である。GCF をどのように運用していく計画なのか

→緒方開発企画官：気候変動対策における開発途上国支援では、日本の納税者の税金を使う。そのため、もっとも明瞭で効果的に使う必要がある。国際社会は GCF の運用をすべきである。その

運用を最も効果的、効果的に実施するには明確で厳しい基準が必要になるだろう。可能な資源を有効活用し、将来的に GCF が効果的、効果的に運用されることを期待している

プログラム	Session 3: JICA's Policy on Climate Change
議長	JICA 地球環境部気候変動対策室　室長　森尚樹
発表者	JICA 地球環境部気候変動対策室　副室長　佐原寿一郎
発表内容	
- 開発途上国における気候変動対策に関する JICA の支援	

＜主な議論＞

1. パキスタン

- JICA のローンを借りるには何か基準はあるのか？　利率は高いのか、低いのか？

→森室長：緩和策に関するプロジェクトでは、優遇条件でローンを貸し出す。適応策でも同様である。ただし、適応策かどうかきちんと確認が必要である

2. バングラデシュ

- 適応策の推進では研究とキャパシティ・ディベロップメントが必要である。キャパシティ・ディベロップメントでは特に気候変動に関する理解を促進することが必要である

→森室長：この分野は支援が難しいが、日本の研究機関からの支援や民間コンサルタントと協力して支援をしていきたい

3. ネパール

- 支援国を選ぶのに何か基準はあるのか？

→森室長：特にはない。ただ、JICA では各国の支援方針を決めており、その方針に沿い各国政府と議論を行い支援する分野を決めている

4. フィリピン

- 開発途上国に対する従来の財政支援では気候変動対策のコストをカバーしきれず、従来の ODA を超えた新たな財政支援が必要である。今、国際的に気候変動ファイナンスをどうすべきか議論されているが、JICA では ODA の枠を超えてどのような財政支援を考えているのか

→森室長：気候変動対策は開発途上国の発展支援の一部であり、区別することはできない。開発途上国の発展支援として気候変動対策支援を行う。特に適応策では優遇条件でローンを行っており、それにより開発途上国の適応策が推進されることを期待している

プログラム	Session 4: Workshop
議長	JICA 地球環境部気候変動対策室　室長　森尚樹
発表者	クライメート・エキスパーツ　代表　松尾直樹
発表内容	
- NAMA をより効果的に実施するために必要な議論及び取り組み	

＜主な議論＞

1. ベトナム

- ポリシーNAMA についてもう少し詳細に説明してほしい

→松尾代表：NAMA が何を含むかは決まりがない。次回の COP において MRV ガイドラインが作られる見込みである。NAMA の一つの考えは、効果をいかに定量化するかであり、政策もその効果の定量化は、CDM ほどの厳格さは難しいものの可能であり、また進捗評価を経た削減努力の拡大のために必須項目である。

2. パキスタン
- NAMA は MRV を行うことで効果が出る。ただ、MRV にはコストがかかるのが開発途上国では問題である

→松尾代表：NAMA ではモニタリングして効果を定量化することが必要項目であり、同時に継続的にパフォーマンスを上げるためには不可欠である。

3. 森室長

NAMA のモニタリングには、実施するための制度やキャパシティが必要である。そのための支援を JICA が行うことも可能である

プログラム	Session 5: Recent Development and Future Prospect of the Joint Crediting Mechanism (JCM)
議長	外務省国際協力局気候変動課　課長　田村政美
発表者 1	外務省国際協力局気候変動課　課長　田村政美
発表内容	
- JCM の概要と狙い - JCM の確立、実施に向けた取り組みや調査	
発表者 2	経済産業省地球環境連携・技術室　室長　八山幸司
発表内容	
- JCM における経済産業省の取り組み	
発表者 3	環境省地球環境局地球温暖化対策課市場メカニズム室　国際企画官　水野勇史
発表内容	
- JCM における環境省の取り組み	
発表者 4	Ministry of Environment and Green Development of Mongolia, International Cooperation Division, Director, Dorjgurkhem Batbold
発表内容	
- 気候変動によるモンゴル国への影響 - 気候変動に対する政策とプログラム - GHG 排出量と削減ポテンシャル - JCM 実施のための組織体制とキャパシティ・ディベロップメント、2013 年度に実施する JCM の構築に関する実現可能性等調査	
発表者 5	Ministry of Environment and Forests, Bangladesh Climate Change Trust, Director (Planning, Development & Negotiation), Md. Mahbud Hossain
発表内容	
- 気候変動によるバングラデシュ国への影響 - 気候変動に対する政策とプログラム - CDM の現状と新メカニズムの必要性 - JCM への期待と実施に向けて今後必要な制度整備、キャパシティ・ディベロップメント	
- クロージングリマーク：外務省国際協力局 気候変動課 交渉官　吉田綾	

＜主な議論＞

1. パキスタン
- JCM は特定のセクターのみを対象としているのか、それともセクターに制限はないのか？

→八山室長：JCM では適格性条件が重要ではあるが、全てのセクターを対象としている

2. ネパール
- モンゴルの発表内容に対して質問だが、モンゴル国内ではどれだけの電力を風力で発電できると推定されているのか？

→モンゴル：現在、風力で 1,100 GW の発電可能性があると考えている。2012 年 6 月、15 MW の風力発電施設の稼働が始まっている

3. 韓国
- JCM のコストの半分は日本政府から補助されるようだが、残りの半分はホスト国が負担するのか

→水野国際企画官：スタディプログラムは全てのコストを日本側が負担する。補助プログラムでは最大 50%を日本政府が負担する。日本企業を含む国際コンソーシアムやホスト国がその補助金を受け取ることができる。残りの半分はその国際コンソーシアムが負担する

4. ネパール
- ネパールは JCM の署名をしていないが、JCM の構築に関する実現可能性等調査をネパールで実施する予定はあるか？

→八山室長：署名をするかどうかはネパール政府からの要請による。要請があれば我々は対応する。ネパールでは JCM の構築に関する実現可能性等調査がないが、始めるならまず FS からになるだろう

5. 八山室長
- 経済産業省では、JCM の構築に関する実現可能性等調査では比較的小規模なものを行っている。これは初期調査として行っており、その後、プロジェクトの本格実施になるだろう。だが、本格実施の際の支援については、経済産業省ではまだどのような内容になるか決めていない

6. 韓国

GCF についての最新動向だが、本部にて既に合意がされており、本部にてセクレタリーも選出されている。GCF によってより気候変動対策が進むことを期待している

2 日目（8 月 28 日）

プログラム	企業及び地方自治体による環境・気候変動分野における取組のプレゼンテーション及び東京ミッドタウンの空調設備の見学
発表者 1	イーソリューションズ　代表取締役　佐々木経世
発表内容	
- イーソリューションズの業務内容 - 気候変動対策における JCM の可能性	
発表者 2	東芝　大佐古佳明
発表内容	
- コミュニティにおける再生可能エネルギーの利用事例（宮古島及び東京都府中市）	
発表者 3	NEC　遊佐道彦
発表内容	
- NEC が取り組む運転管理及び渋滞管理システムによる気候変動への寄与	
発表者 4	北九州市　参与　大上二三雄
発表内容	
- 北九州市における持続可能な都市開発への取り組み	

＜主な議論＞

1. バングラデシュ
- バングラデシュでは交通管理と廃棄物処理が大きな課題になっており、環境管理への投資に関心が集まっている。交通管理による排出削減には非常に関心があり、帰国したら専門家と

も議論したい

2. ブルネイ
- 北九州のエコシティは包括的な取り組みであるが、廃棄物管理のみ等個別に取り組むことはできるのか

→北九州市　大上参与：個別に適用していくことは可能である

3. カンボジア
- 太陽光発電に興味を持った。カンボジアではエネルギーセクターからの排出削減に取り組んでいるが、まだ 65%世帯が電気にアクセスしていない。電化についてはドナーの支援も受けたいと思っている。日本のエネルギー関連企業、特に太陽光発電関連でグループを作り、カンボジアで開催する会議等に来てほしい

4. 韓国
- 韓国ではエネルギーの供給と需要のバランスが課題になっており、特に提供側の不足が問題になっている。スマートグリッドや再生可能エネルギーに関心を持っているが、エネルギーの供給という点で後ほどもっと話を聞きたいと思っている
- エコドライビングについては、GPS や衛星の技術があるので、さほど高度な技術を使わなくても必要なデータを集められるのではと思う。ただ、交通管理による GHG 排出削減は興味深く、もっと技術が進むことを期待したい

5. ラオス
- ラオスでも環境問題や持続可能性､都市化は問題になっている｡持続可能な都市開発では JICA の支援も受けている。紹介頂いた技術の導入ではコストが問題になると思うが、これらの適用可能性等も今後考えていきたい

6. モンゴル
- モンゴルの人口密度は非常に低いが、東芝の離島エネルギー管理モデルは興味深いものであった。北九州モデルもモンゴルに使えるのではと思う。人口の 45%が都市部に住んでいるのでエネルギーの重要と供給や電源の構成の問題はきちんと考えなければならない
- モンゴルと日本は事情が異なるが、一般的に 1 世帯ではどのぐらいのエネルギーを消費するのか？

→東芝　大佐古氏：日本では 1 世帯約 10kWh の電気消費量である。欧州と比べ半分であり、これは既に省電力機器が導入されているからである。もちろん生活スタイルにもよるが、エアコンと冷蔵庫が主な消費源である

7. ミャンマー
- 再生可能エネルギーと持続可能な都市開発に非常に興味を持った。特に廃棄物、水、環境、公害管理は都市開発に重要である
- ミャンマーでは US-AID とも協力して持続可能な都市開発を進めている

8. ネパール
- 北九州モデルについて聞いたのは初めてである。持続可能性という意味で非常に重要と思う
- CDM では 16 のプロジェクトが進んでおり、特に太陽光や風力発電について可能性を検討している

9. パキスタン
- 紹介頂いた技術は興味深いが、その導入コストを検討する必要がある。太陽光は導入コストが高く、水力もコストがかかるが、これらの再生可能エネルギーのコスト比較が分かればより良かったと思う

- 交通管理システムについても、導入コストを知りたいと思った。北九州市でも、今の状態になるまで必要だった時間とコストを教えてほしい

→北九州市　大上参与：時間は 30 年ほどと思う。コストは 2-3 billion USD である。だが、このコストは投資でもあり経済成長に寄与している

10. フィリピン
- 北九州市のツールキットを共有してもらえるか
- フィリピンでも同様のエコシティの取り組みをしているが、資金の面で問題を抱えている。フィリピンでは開発はリスク管理をベースにして進んでいる。また、都市化に加え、都市部への移住が大きな問題になっている
- 北九州市の資金は、民間と公共、どれぐらいの割合か
- フィリピンの都市サイズは日本より小さい。ツールキットは小規模な都市にも適用できるのか

→北九州市　大上参与：ツールキットは共有できる。ただし、ただ共有するだけでなくどう活用するか議論したい。持続可能な都市開発には、自治体と民間、住民の協力が重要である。インドネシアのスラバヤとも協力しており、特にコンポスト化に取り組んでおり、廃棄物管理の良い事例となっている。よって、北九州市モデルは小規模な都市にも適用可能である

11. タイ
- 特にバンコクでは公共交通の整備に力を入れている
- 北九州市のような取り組みはタイでも行っており、知識や経験の共有を進めたいと思う

12. ベトナム
- 運転管理システムは興味深い。ただ、データを集める時に個人情報の管理はどうするのか？

→東芝　大佐古氏：再生可能エネルギーの導入では、いかに投資コストを回収するかを十分検討する必要がある。また、各地域の電力使用状況、例えば 1 日中電気が必要か、数時間の停電は許容できるのか等も加味する必要がある

→NEC　遊佐氏：本日説明したサービスを使うにはユーザーの同意が必要であり、その同意に基づきデータを管理する。既に公共サービスとして、GPS 等からデータを取り渋滞状況を提供している。一方、民間の有料サービスとしては、渋滞データに基づき最適ルートの検索等を提供している

プログラム	J-Power 磯子火力発電所見学
発表者	J-Power 国際営業部　審議役　中畑剛志 J-Power 磯子火力発電所　ISOGO エネルギープラザ 館長　池杉守
発表内容	
- J-Power の業務内容 - 磯子火力発電所の特徴	

＜見学中の質問への回答＞

1. 磯子火力発電所の建設コストは？（池杉館長より建設コストに対して回答）

2. 売電価格は？

→池杉館長：売電価格の約半分は燃料コストである。J-Power は民間会社であり、客との交渉で価格を決める。その後、政府へ報告が必要である

＜見学後の意見交換＞

3. パキスタン
- J-Power が支払っている税金の額はいくらか？

→中畑審議役：固定資産税のみである
- 発電コストは？（池杉館長より磯子火力発電所への投資額について回答）

→池杉館長：発電コストは開示できない

4. バングラデシュ
- 誰に売電していて、その売電先はどのように決めるのか？

→池杉館長：東京電力と東北電力に売電している。これは建設時に既に 15 年に及ぶ売電契約を締結しているためである。その契約時には推定建設費等も加味する。投資額は 15 年で償却するが、燃料費は変動するので時々の価格によって精算する

5. ネパール
- ここで発電した電力は輸出しているのか？

→中畑審議役：国内需要だけである。

6. ベトナム
- グリッドは誰が所有しているのか？

→池杉館長：民生用の配電線は電力会社が持っている。J-Power が所有する送電線は 2,400 km のみである。これはもともと J-Power が国策会社であり、当時は発電所に加え送電線も建設していたからである

7. パキスタン
- 特別損失は何を含むのか？

→中畑審議役：海外における IPP 事業の失敗等が含まれる

8. ミャンマー
- なぜ火力発電所は海岸沿いにあるのか？

→池杉館長：冷却水として海水を利用するからである。空冷に比べ水冷の方が効率は良い

9. ベトナム
- スチームに使う水は海水か、真水か？

→池杉館長：真水である

10. クライメート・エキスパーツ 松尾直樹代表
- 超々臨界はコストがかかる。J-Power の開発途上国での事業展開で、これは選択肢となるのか

→池杉館長：成り得る。実際、インドネシアの中央ジャワ州で導入済みである。だが、500MW 以上の容量がないとコストメリットが出てこない。投資コストも重要だが、ライフサイクルコストも十分検討して技術を決定するべきである。日本の技術やメンテナンス技術、燃料コストの削減等は誇ることができる

11. ミャンマー
- 海岸沿いにある発電所では、リスク管理はどうしているのか？

→池杉館長：揺れに対しては十分な設計をしている。ただ、3m 以上の津波が来ると被害を受ける。ただ、津波に影響を受けても発電所を停止すれば、それ以上の作業は発生しない。ただ、それからいかに短時間で復旧するかがポイントとなる。津波対策はこの発電所だけでなく、東京湾周辺にある他の発電所でも十分検討する必要がある

12. ブルネイ
- 乾式脱硫装置と湿式の違いは？

- 超々臨界技術はもともとどこの国の技術か？

→池杉館長：乾式では脱硫に CaCO3 を使う。磯子火力発電所では 99%以上の脱硫を実現している。超々臨界技術は J-Power で開発した技術であり、もともと石炭の有効活用を考えたものである

13. クライメート・エキスパーツ 松尾直樹代表
- IGCC（石炭ガス化複合発電）は難しい技術である。今後、開発途上国で微粉炭火力と IGCC、どちらの可能性が高いのか？

→池杉館長：日本のように資源がない国では、微粉炭火力で効率向上を図るのがいいだろう。一方、石炭が多く取れる国では、将来的には IGCC プラントを導入して CO2 を分離して H2 を作り輸出することも可能になるだろう。技術だけでなく、国としてのエネルギーポリシーも考える必要がある

14. ミャンマー
- 日本の発電構成を教えてほしい

→池杉館長：原子力が 10%、石炭 25%、LNG14%、重油 15%、水力 8%、揚水 0.9%、再生可能エネルギー1.4%である。

15. バングラデシュ
- J-Power は海外でも投資を行うのか？

→中畑審議役：既に海外で投資して発電事業を行っている。GHG 削減によるクレジットはあくまで追加収益である。当初はその収益を考えずに事業化を検討する
→クライメート・エキスパーツ 松尾直樹代表：J-Power が海外で事業を展開するとしても、JCM を適用するかどうかは別問題である

プログラム	東京スカイツリー見学
発表者	東武エネルギーマネジメント　取締役　技術部長　唐木彰
発表内容	
- 東京スカイツリーや東京スカイツリータウン、東京ソラマチなどの複合施設、周辺地域への熱供給を行う地域冷暖房の概要	

＜主な議論＞
1. ブルネイ
- 水はどうやって冷やすのか

→唐木技術部長：電気でチラーを稼働して動かす。主に夜間電力を使う。地中熱の利用は一部である

2. バングラデシュ

→省電力量や CO2 排出の削減量をモニタリングしているか
→唐木技術部長：従来のシステムと比べ 44%の省エネである。CO2 では 48%の削減である

3. クライメート・エキスパーツ 松尾直樹代表
- 発電機はなぜ入れなかったのか？

→唐木技術部長：東京スカイツリーには発電機が入っており、その電力を使っており信頼性が高いからである。排熱利用はしていない

4. パキスタン
- この技術は日本の技術か？海外でも使っているか？仕様はいくつかあるのか？

→唐木技術部長：日本の技術である。シンガポール等、海外でも同様の技術が入っている。容量等にはいくつかの仕様があり、設計次第である

5. バングラデシュ
- 設備の稼働に必要な電力はいくらか？

→唐木技術部長：契約では 3,500 kWh である

6. 韓国
- どのような仕組みで省エネや CO2 削減を行っているのか

→唐木技術部長：大容量の蓄熱槽を導入している。かつ、最新の高効率設備を入れ、効率的なコントロールシステムも導入している

7. パキスタン
- システムの導入コストは？

→唐木技術部長：答えられない。従来の個別システムと比べると、ランニングコストを含めてコストは低い

8. クライメート・エキスパーツ 松尾直樹代表
- なぜ複数のメーカーの設備を入れているのか？
- 稼働実績は推定値と比べて大きな違いはあったか？

→唐木技術部長：それぞれの設備、例えば冷水生成や温水生成等で最も効率の良いものを選んだためである。事前の推定値を達成している

3 日目（8 月 28 日）

プログラム	Session 6：ナレッジプラットフォーム/LoCARNet
議長	JICA 地球環境部気候変動対策室　室長　森尚樹
発表者 1	外務省国際協力局気候変動課　課長　田村政美
発表内容	
- 東アジア低炭素成長パートナーシップについてのイントロダクション	
発表者 2	JICA 地球環境部気候変動対策室　副室長　佐原寿一郎
発表内容	
- 東アジア低炭素成長パートナーシップの概要	
発表者 3	IGES 研究顧問　LCS-RNet/LoCARNet 事務局長　西岡秀三
発表内容	
- LoCARNet の概要	
発表者 4	NIES 社会環境システム研究センター（持続可能社会システム研究室）　主任研究員　藤野純一
発表内容	
- 低炭素社会実現のための Asia-Pacific Integrated Model（AIM）の紹介	

＜主な議論＞

1. インドネシア
- AIM は政策や投資を検討する上での重要な手法となることが期待できる
- インドネシアにとって 2014 年は重要な年であり大統領選挙がある。また 2015 年には新メカニズムの枠組みが決まり、これは 2020 年以降の長期にわたって重要な仕組みとなる
- インドネシアにも長期的で包括的なビジョンが必要であり、また、科学は政策や投資の検討の際に十分活用されるべきである。インドネシアでは、政策を考える上で人口ダイナミクスや労働人口の増加を加味する必要がある

- ILO と協働しており green job の推進にも力を入れている。だが、従来のビジネスが green job を提供していけるかまだ検討の余地がある

2. ベトナム
- アジア地域には多くの科学モデルがあるが、政策検討には科学データをもっと活用していく必要がある
- ベトナムでは GHG 削減目標を設定しているが、その設定や効果の検証においても科学分野と十分協力していく必要がある

3. バングラデシュ
- 東アジアを中心としたネットワークのようだが、バングラデシュやネパール、パキスタンはどのように関与すればよいのか

→田村課長：東アジア以外を除外するものではない。公式的にはいろいろな外交手続きが必要だが、私の考えとしては、知識や経験等を東アジア以外とも共有していきたいと考えている

プログラム	Session 7：国際交渉を踏まえた日本とアジア諸国の協力の方向性（オープンディスカッション）
議長	外務省国際協力局気候変動課　課長　田村政美

＜主な議論＞

1. 横浜市温暖化対策統括本部　副本部長　森秀毅
- 横浜市の低炭素都市とスマートシティ構築に向けた取り組みについて説明

2. 東京都環境局都市地球環境部国際環境協力課　主任　西田裕子
- 東京都の気候変動対策ではビルディングセクターに力を入れている。主な 3 つの対策のうち一つが、比較的大きなビルに対するキャップアンドトレードである。同プログラムは 2010 年より開始しており、効果を上げている。もう一つが Green Building Rating Program である。最後が、比較的小規模なビルに対するリポートとベンチマーキングプログラムである
- 気候変動対策の
- 国際協力については、開発途上国の自治体等ともネットワークを組み取り組んでいる
- 地方自治体が気候変動に取り組むには、予算と人材、情報が不足しているのが課題である。この点では自治体間のネットワークと中央政府からの支援が必要である

3. コンサベーション・インターナショナル・ジャパン副代表　気候変動プログラム・ディレクター　山下加夏
- 自然は気候変動を和らげる効果がある。自然を緩和策と適応策として活用することができる
- REDD+と JCM の連携を進める、REDD+実施の促進を図るべきである
- 2015 年に向け国際社会が合意促進を図るべきである

4. WWF ジャパン気候変動エネルギー・グループ　気候変動エネルギー・グループ　リーダー　山岸尚之
- 欧州と比べアジア地域は地理的にも資源的にも多様である。そのため、地熱やカーボンマーケットといった各国が関心を持つ特定の分野に焦点を当て、取り組んだ方が効果的である
- アジアでは欧州と比べ民間企業の関与が不足している。WWF では Climate Service というプログラムを実施している。この中では企業と WWF が気候変動対策に関するメモランダムを交わし、企業の取り組みを促進する。また、トップランナー方式を似ているが、Top 10 プログラムを実施しこの中で家電の省エネを評価している

5. インドネシア
- 紹介頂いた事例は、科学と政策立案の関係、企業の関与促進に関する良い事例だと思う

- インドネシアでは包括的な戦略を検討している。その中では実施可能なアクションの検討、適切なガバナンス、新たなマーケットメカニズムの検討が重要となっている。また、キャパシティ・ディベロップメントも重要であり日本の支援を期待している
- REDD+についてだが、インドネシアでは今森林と泥炭地管理に力を入れている
- 民間との協力についてはさらに強化していく必要がある

6. パキスタン
- 知識の共有は非常に重要である。そのためには、trainer's training も重要である
- キャパシティ・ディベロップメントと財政支援、技術移転が開発途上国には重要である

7. 東京都環境局都市地球環境部国際環境協力課　主任　西田裕子
- ビルディングセクターでは技術移転が非常に重要である。ビルのオーナー等に対し、ハードだけでなくソフト面での技術移転が必要である。そのためには現状を把握することが必要であり、MRV システムはその点で重要となる

8. コンサベーション・インターナショナル・ジャパン副代表　気候変動プログラム・ディレクター　山下加夏
- キャパシティ・ディベロップメントや技術移転については JICA に期待したい。ただし、その持続性を確保する努力が必要である
- REDD+の促進により、森林保全対策がきちんと評価されるべきである

9. 横浜市温暖化対策統括本部　副本部長　森秀毅
- PPP は、地方自治体が民間に新たなビジネスチャンスを提供できるいい機会である
- 横浜市の取り組みが開発途上国の他の都市でも広がり、民間の参加が増えることを期待したい

10. 日本テピア　パブリック・アフェアーズ　マネジャー　高山恵
- JCM を含め日本企業が海外で事業展開する際、価格競争力が大きな課題となる。政府からも何らかの支援が必要である

11. 数理計画本部　副本部長　深山暁生
- モンゴルで大気環境改善のため、ボイラーの改善に取り組んできた。これは気候変動にも貢献があると考え、JCM の構築に関する実現可能性等調査を実施している。これはコベネフィットアプローチであり、今後各国で重要な視点となるだろう
- 開発途上国においては MRV の能力強化が必要である

12. IGES グリーン成長とグリーン経済領域　タスクマネジャー（LCS-RNet/LoCARNet 事務局担当）石川智子
- LCS-RNet（G8 諸国の低炭素政策に関わる研究者や研究機関のプラットフォーム）では、第 5 回の年会合を終えたところであり、その中で科学者と政策立案者の連携がとても重要でることが再認識された。また、早急に緩和策を実施していく必要がある

13. NIES 社会環境システム研究センター（持続可能社会システム研究室）　主任研究員　藤野純一
- トップダウンだけでなく、現場の状況に応じた投資や雇用計画を検討するようなボトムアップアプローチも必要と感じる

14. JICA 地球環境部気候変動対策室　室長　森尚樹
- JICA はコーディネーターのような機関で、開発途上国の開発においてニーズとシーズをマッチングする取り組みを行っている

- また、日本と開発途上国の自治体同士の協力促進や資金援助、NGO のコミュニティレベルの支援も行っている

15. WWF ジャパン気候変動エネルギー・グループ　気候変動エネルギー・グループ　リーダー　山岸尚之
- アジアの開発途上国では気候変動に関する議論はまだ一般的でない。一方、エネルギーに関する議論は活発である。日本は開発途上国のエネルギーアクセス改善に貢献できるはずである

16. インドネシア
- 気候変動に関しプロパガンダ等による意識啓発が必要である
- JCMについては当初､警戒していた｡なぜならJCMは日本の企業に対する補助だからである。一方、インドネシアにとっては一つのキャパシティ・ディベロップメントであると考えており、また方法論を作るには資金がかかるので方法論の面でも技術移転であると考えている。ただし、投資等、今後のプロジェクト展開の可能性はあるが、そこまでのスケールアップはまだはっきりしていない

17. モンゴル
- 開発途上国への技術共有はとても重要である

18. 東京都環境局都市地球環境部国際環境協力課　主任　西田裕子
地方自治体は多くのことができる。地自体にとり大気環境や廃棄物管理は重要な課題だが、コベネフィットアプローチのように、そうした従来の課題に気候変動も融合していくことが必要である

オープニングリマークを行う外務省　地球規模課題審議官 香川剛廣氏

1 日目に挨拶を行う JICA 地球環境部部長 不破雅実氏

1 日目には 5 つのセッションを行い、気候変動対策における日本の支援と招聘国の取り組みについて情報交換

Session 3「JICA's Policy on Climate Change JICA」の議長を務めた JICA 地球環境部気候変動対策室室長 森尚樹氏（右）

開発途上国における気候変動対策への JICA の支援について紹介する、JICA 地球環境部気候変動対策室副室長 佐原寿一郎氏

NAMA をより効果的に実施するために必要な取り組みについて紹介する、クライメート・エキスパーツ代表 松尾直樹氏

東京ミッドタウンでは、日系企業の気候変動対策に関する業務の紹介と共に、同施設の省エネ型空調設備を視察

超々臨界技術を採用した磯子火力発電所で煙突を見学する招聘者。同技術の開発途上国での導入可能性について意見が交わされた

磯子火力発電所のタワー型ボイラーの内部を覗く招聘者

磯子火力発電所の排煙脱硫装置。環境負荷を大幅に低減した技術に関心が集まった

東京スカイツリーでは、東京ソラマチ等の複合施設や周辺地域への熱供給を行う地域冷暖房設備を視察

3 日目には気候変動対策における日本とアジア諸国の協力の方向性についてフリーディスカッション

第 4 章　COP19 への参加

気候変動対策の国際枠組みなどについて話し合う「国連気候変動枠組条約 第 19 回締約国会議(COP19)」が、11 月 11～23 日に、ポーランドのワルシャワで開催された。

気候変動枠組条約締約国会議（COP）は、1992 年にブラジルのリオ・デ・ジャネイロで開催された国連地球サミットで採択された「気候変動枠組条約」の締約国が、温室効果ガスの排出量削減策を協議する会議である。

今回のワルシャワ会議で、2020 年以降の新しい枠組み等につき参加国間で議論が交わされた。

4.1　COP19 渡航前対応

COP 19 渡航前に、調査団では事前勉強資料を用意し、貴機構にて関係者に対して COP19 におけるポイント等の説明をするとともに、意見交換を行った（添付資料参照）。COP 19 のポイントとして、開始直前にリリースされた IPCC 第 5 次評価報告書 WG 1 レポート（気候の物理科学的ベース）の影響で、第 4 次評価報告書より人間の活動の影響に関してさらにつっこんだ表現となっている。

また，その前の補助機関会合において，意思決定にかかわる手続き的・法的な問題（コンセンサス方式での意思決定の方法）が再燃し，SBI が事実上開催できなかった。これが、どのような影響を COP 19 に及ぼすかどうかも懸念された.

COP 19 の議論内容は､以下の 4.3 およびその添付資料を参考にされたいが､上記の点に関して、IPCC AR5 (WG 1)の影響は，新たに始まった条約の 2015 年レビューなどで発表があったが、今後の ADB 交渉への影響は現時点では明確ではなかった。また、意思決定の手続き規則問題は、とくに再燃することはなかったが、2015 年のパリ会議に向けて、やはり不安要素となっている一方で、何らかの事前解決（とくに多数決決議の採択）がなされれば、今後の交渉にとって大きな前進となる。

4.2　COP19 参加対応

COP19 会議において、JICA はサイドイベント等や関係機関との会合への参加を通じて、気候変動分野の途上国支援の取り組みを紹介し、各国の関係者と意見交換を行った。

JICA が参加した主なイベント等を下記にまとめる。

National Adaptation Plan and Insurance

日　時：　2013 年 11 月 14 日（木）　9:30 ～ 11:00
場　所：　日本パビリオン
主　催：　環境省、JICA（国際協力機構）
テーマ：　国家適応策と保険
National Adaptation Plan and Insurance
目　的：　国レベルの適応策に対して、COP19 までの国際的な議論を把握した後、インドネシアにおける適応策の具体的な取り組みとして、RAN-API 及び農業セクターにおける保険制度の説明を受けた。そして、結びとして、気候変動適応策に対する保険の必要性を研究者の観点から確認した。
参加者：　約 40 名

1.　発表・概要の概要

- 国立環境研究所の久保田主任研究員によるモデレータにて本イベントが行われた。冒頭、環境省　白石環境審議官による挨拶が行われた。
- 環境省地球環境局国際地球温暖化対策室・浦上室長補佐より、Key Issue on Adaptation in COP19 に関して、これまでの COP での議論の経緯が説明されると共に、UNFCCC における適応策関連議論の構造について説明があった。まとめとして、途上国が本当に求める政策擁護の介在のレベルを見るべきであること、国及び地方レベルにおける適応戦略の政策への主流化等が必要であることが説明された。
- インドネシア DNPI 適応策 WG の Mr. Ari Muhammad より、Update on Climate Change Adaptation Planning, Implementation and Monitoring & Evaluation (M&E) in Indonesia に関して報告があった。インドネシアにおける適応策計画、そしてそのモニタリングと評価について、RAN-API の概要から地方政府の活動までインドネシア政府の取り組みの解説が行われた。RAN-API は、既存の政策を基にセクターターゲットを補強する働きがある点が特徴であり、国・地方レベルでの政策に適応戦略を主流化させることは最優先事項と考えている。
- インドネシア財務省の Dr. Irfa Ampri より Opportunities and Challenges on Implementation of Agricultural Insurance in Indonesia について発表が行われた。その中で適応策の予算の一例として、農業セクターにおける保証スキームの解説が行われた。インドネシア財務省は、保険会社を介して、農民グループへ適応策支援の一つとして保証支援を行っている。2012 年 10 月より、同スキームは東ジャワ、西ジャワ、中央ジャワの 3 カ所で約 1,000 ha のパイロットプロジェクトの実績を行っている。農業セクターでの適応策支援として農民保護と権限委譲がキーとなる要素であること、農業支援は食料安全保障に資すること等が述べられた。
- 国連大学 Dr. Koko より、Contribution to COP19: opportunities and challenges of insurance に関して説明があった。気候変動イベントが 1980 年以降ほぼ継続的に実施れているにもかかわらず、災害被害は右肩上がりであることから、気候変動に対する保険の重要性が説明された。

The NAMA partnership– What has happened and where are we going?

日　時：　2013 年 11 月 14 日（木）13:00 ～ 14:30
場　所：　Room Wroclaw
主　催：　JICA、UNEP、GIZ
テーマ：　NAMA パートナーシップ
The NAMA partnership– What has happened and where are we going?
目　的：　NAMA パートナーシップを形成する関係組織による NAMA パートナーシップの概要と途上国における JICA や GIZ によるプロジェクトベースでの取り組み等が紹介された。
参加者：　約 100 名

1. 発表・概要の概要

- 冒頭、UNEP の取り組みが紹介された。UNEP は”Develop First!”の名の下、NAMA の Sustainable Development (SD) コベネフィットの認識・評価方法をどのように行うのか、政府主導の NAMA において利害関係者や民間企業の補償をどのように行うのか、そして低炭素・持続的な開発に係る GHG 排出削減やコベネフィットの影響をどのように MRV するかを今後の課題として指摘している。
- UNEP は、NAMA を実施するために、次の 5 つのステップを行うとの説明があった。
  ①：国家開発計画における優先課題と低炭素開発戦略の文脈において SD 対象を認識すること
  ②：SD インディケータ、利害関係者、セーフガードを考慮した NAMA の設計
  ③：NAMA ファイナンスの検討
  ④：MRV の実施、そして
  ⑤：新メカニズム又は多様なアプローチによるフレームワークの下でのクレジット NAMA の SD 影響の認証
- GIZ 北京・MRV ワーキンググループより、交通 NAMA に係る説明が行われた。MRV に関して次の 5 つの課題が紹介された。
  ①：緩和行動の幅を広く・柔軟にするため、MRV に利用する情報を精確かつ比較できるものとし透明性を確保すること
  ②：国内 NAMA およびクレジット NAMA に対する MRV の差異を認識すること
  ③：多くの途上国におけるキャパシティ不足
  ④：情報収集に係る関係組織の資金不足
  ⑤：先進国が直面している、拡散された情報の収集、取りまとめ
- GIZ より交通 NAMA の知見から得た今後の交通 NAMA に対する取り組み方針が紹介された。
- JICA 気候変動室・佐原副室長より、JICA による包括的な気候変動支援の概要が説明された後、これまでの実績に一部としてセルビアにて行われた NAMA キャパシティビルディング、

アジア・アフリカにおける NAMA 開発キャパシティ・デベロップメント事業、インドネシアにおける気候変動政策支援、ベトナムにおける民間セクターの省エネ支援等が紹介された。

- kfw の Mr. Sebastian Hach より、”How Development Banks can Finance the Implementation of NAMAs”のプレゼンが行われた。本セッションでは、NAMA パートナーシップにおけるファイナンスグループの活動の説明が行われた後、NAMA ファイナンスの実施として、低炭素開発戦略のフレームワークの構築等が説明され、結びとして適格性要件の予測可能性、NAMA 初期段階でのファイナンス検討、サポート NAMA に対する民間セクターの役割の確認等が必要である点が指摘された。

2. 質疑応答

主なものとして、以下の質疑応答があった。

Q：NAMA パートナーシップのファイナンスについて、どの程度まで適用するのか。
A：（JICA）対象国の知見や計画、展望や新規に導入するもの等に応じて適用すべきと考えている。
A：（GIZ）これまでの案件では対象とならない孤立した案件等にまで、支援が拡大できると考えている。

Q： NAMA 開発に関して、ファイナンスに対する今後の展望を教えて欲しい。
A：（GIZ）NAMA ファイナンスに係る事例等を紹介する等様々な対応が可能と考えている。

Q：（ベトナム）途上国での NAMA 開発について、案件のオーナーシップをどのように考えているのか。
A：（JICA）政府の政策を熟慮して対応すべきと考えている。
A：（GIZ）キャパシティビルディングを通して支援すること等が考えられる。

Q：（GIZ）サブナショナルをどのように NAMA に取り込むのか。
A：（JICA）インドネシアでは、サブナショナルへの NAMA 支援を行っており、中央から地方等といった流れで取り込んでいる。
A：（GIZ）案件をサブナショナルで捉えて支援すること等が考えられる。

3. 会議風景

本イベントの会議風景を以下に掲載する。

Development and Climate Days

日時: 2013 年 11 月 16～17 日（土・日）9:00 ～ 17:00（両日共）
場所: Polonia Palace Hotel
主催: JICA、GEF、iied、Red Cross/Red Crescent、Climate & Development Knowledge Network
テーマ: Development and Climate Days
目　的: 気候変動と開発について、専門家によるプレゼンテーションだけでなく、ハイレベルによるディスカッションや気候変動を題材としたゲーム等、様々な観点から「気候変動と開発」を検討するサイドイベント。
参加者: 約 100 名

1. 発表・概要の概要

- “Development and Climate Days”として、JICA、GEF、赤十字等によるイベントが COP19 期間中の週末を利用し、2 日間に亘って行われた。
- 初日（11/16）は、開会の挨拶として、GEF や赤十字の挨拶と共に、JICA 気候変動室・碓井氏が登檀した。その後、午前中のセッションとして、”Lightning talks : Emerging issues, solutions and actors”と題したパネルディスカッションが行われた。ディスカッションでは、ガンビアの事例を用いた NAPA 優先順位の効果的な実施、適応策に対する気候変動リスクと脆弱性分析の利用、ガーナの事例にみる緩和策と健康、適応策における民間セクターの取り込み等が議論された。
- 午前の最後のセッションとして、プレゼンやパネルディスカッションの間を埋めるように、”Participatory game: Farmers, Scientists and Negotiators”という気候変動を題材としたゲームが行われた。同ゲームでは、気候変動を題材とした参加型のゲームが行われ、気候変動の不確実性に対する立場の異なる者の利害を実感することをゲームにて理解、共有した。
- 午後には、”Challenges and innovations from the field”と題して、次のプレゼンが行われた。

  ①：Building adaptive capacity and resilience to climate change in Afghanistan (UNEP)

  ②：Coastal zone management : experiences from Guinea (LDCF project coordinator)

  ③：Challenges and innovations in SIDS: Expe3riences from Tuvalu

  ④：Effective early warning systems in Ethiopia

  ⑤：Community-based adaptation: A bottom-up approach

  ⑥：How LDCF support is contributing toward long-term adaptation
- 初日最後のセッションとして、”High-level panel: National-level funding of adaptation”が行われた。参加パネリストは、以下の通り。
  - Diann Black-Layne, Director/Ambassador, Govn’t of Antigua and Barbuda
  - Robert Dixon, Climate and Chemicals team leader and head of the GEF delogation
  - Pa Ousman Jarju, Leader negotiator and special climate envoy of the Gambia

・ Mary Robinson, President of MRFCJ and Former president of Ireland

- 翌 11/17 午前は、気候変動を題材としたゲームとして、”Play : Addressing Negotiation Blockages through Participatory Games”が行われた。
- 午後のセッションの冒頭、JICA 気候変動室・森室長によるプレゼン”JICA’s Experiences in Public Awareness and Participation responding to Article 6 of the Convention related to Climate Change”が行われた。プレゼンでは、①東日本大震災及び津波被害からの学び、②適応策に対する JICA アプローチ、③住民啓発・住民参加に対するケーススタディが紹介された。

2. 会議風景




Transportation Day 2013

日　時：　2013 年 11 月 17 日（日）16:15 ～ 17:30
場　所：　Hyatt Hotel, Ball room
主　催：　Partnership on Sustainable Low Carbon Transport (SLoCaT) 2013
テーマ：　低炭素アジア実現に向けて：科学と政策を橋渡しするモデルの役
　　Low Carbon Actions in Asia – Modeling to Bridge Science and Policy
目　的：　緩和策における交通セクターの貢献や気候変動における交通政策の促進、交通セクターに適したファイナンスやキャパビルの構築等について、ワンディセミナーを開催した。
参加者：　約 100 名

本セミナーに係り、Transportation Day のクロージングセッションにのみ参加した。以下に、各ストリーム（セッション）の結論と今後の課題等についてまとめる。

1. 発表・概要の概要

- ストリーム 1 は、交通セクターに係る緩和策ポテンシャルについて議論され、その結果が報告された。低炭素型の交通事業は重要であると認識するも、持続的な開発指標に関して、そのベネフィットを分析することは十分なされていない。このようなに対して、緩和ポテンシャルに適用する効果的なコミュニケーション等が必要である点が指摘された。そして、今後の対応として、SLoCaT パートナーによる持続的な低炭素交通開発のための評価指標の開発等が提案された。
- ストリーム 2 では、途上国における持続的かつ低炭素な交通の政策決定について議論され、技術支援等に係る補助金等の適正価格の設定、異なる交通政策の重みづけ、交通事業における省エネ改善に対する情報技術政策だけでない制度の利用、物流システムの見直し、自転車等の非駆動交通システムの見直し等が必要であることがまとめられた。
- ストリーム 3 では、効果的な交通 NAMA を保証することへの議論が行われ、利害関係者を巻き込んだ検討、持続的な利益追求のための NAMA の活用、判断を迅速に行うための持続的な利益及び GHG 排出量の MRV 化等が必要であることがまとめられた。
- ストリーム 4A では、交通政策における統合適応策について議論された。同ストリームでは、エンジニアリングに係るオプションとして技術基準や仕様書、ベストプラクティス、メンテナンス等の必要性、そして、投資、マルチセクターからの活動、保険等の必要性が説明された。今後の対応としては、適応策ファンドから交通セクターへのアプローチ、キャパビルの実施、lesson & learn の普及、データ欠如への対策等を行うことを提案している。
- ストリーム 4B として持続的な低炭素交通へのファイナンスについて、議論の結果が発表された。主なポイントとして、ニーズにマッチしたファイナンスの実施、民間資金ではない公的資金の活用、長期的な民間資金の流用、コベネフィットの包含と収益化、気候変動フレンドリーなクライテリアの必要性が確認された。そして、今後は交通適応策の実施、費用対効果の追求、交通インフラに対するメンテナンスの実施、クライテリアの設定を行うことが必

要であると報告された。

2. 質疑応答

Closing Plenary であったため、特段の質疑応答はなかった。

3. 会議風景

本イベントの会議風景を以下に掲載する。

Presentation of the NAMA Guidebook

日　時：　2013 年 11 月 18 日（月）13:15 ～ 14:45
場　所：　Room Torun
主　催：　UNFCCC
テーマ：　NAMA ガイドラインの説明
　　Presentation of the NAMA Guideline[1]
目　的：　NAMA 設計に係る UN 関係者からの知見発表
参加者：　約 120 名

1. 発表･議事の概要

- NAMA ガイドブックでは、段階的なアプローチを採用している。
- ガイドラインには 4 つの目的があり、それらは① Reference for orientation and hands-on advice for planner & project implementers from developing countries、② Guidance on how to best support the development of NAMAs through technical cooperation、③ Reflect experiences and lessons learned of existing UNDP projects、④ Overview of the international NAMA regime focus on national NAMA frameworks, strategies and cross-sectional issues である。
- キーセクションとして、NAMA の優先度化のプロセス、NAMA ガバナンスと実施、技術ガイダンスと MRV 設計、NAMA ファイナンスがある。
- NAMA ガイドブックに係る内容説明が行われた。NAMA 構築に関して、ファイナンスと MRV の観点より、UNEP RISO Mr. Soren E. Lutken から発表があった。NAMA ファイナンスを構築

[1] http://www.lowemissiondevelopment.org/docs/resources/Guidance_for_NAMA_Design_2013_.pdf

するためには、既存予算、ファイナンスのタイプと資金源、ファイナンシングバリューチェーン、民間資金の包含等を考慮することが重要であるとのことが説明された。

- 現在、NAMA に対して多くのファイナンススキームが存在し、それらはプライベートに限らず、パブリックセクターへ投融資可能となっている。

2. 質疑応答

Q1：（ベネズエラ）プログラム CDM（POA）と NAMA に関して、類似点等を教えて欲しい？

A1：（UNFCCC）CDM と NAMA のターゲットは同じであるが、CDM はクレジットの獲得を持って GHG 排出削減を達成することを想定している。これに対し、NAMA はポリシー支援を中心に考えており、その点が異なると考えている。

Q2：（南アフリカ）MRV は主に実施段階でのものと考えている。計画段階で MRV があまり良く構築されていない場合でも、実施してしまって良いのか？

A2：（UNFCCC1）計画段階でも MRV の実施可能性を確認すべきである。

A2：（UNFCCC2）MRV はケースバイケースであると考えるため、政府が MRV に対して長期計画にて MRV に取り組むことが必要と考える。

Q3：NAMA は CDM のキャッチアップに利用できると思うか？

A3：（UNFCCC）ファイナンスの点で NAMA が CDM 支援に貢献できると考えている。

Q4：（マレーシア・エネルギー省）CDM だけではカーボンマーケットを動かすことは難しいとの判断から、マレーシアでは FIT 等の政策も構築している。勿論、政府として制限なく支援はできないと思っている。NAMA について政府として複雑なものであると感じており、どのように NAMA に関してスケールアップして良いか？と考えている。

A4：（UNFCCC）カーボンマーケットに対して CDM だけでは不十分であると思っている。そのため、まず考えるべきは、どのようなファイナンスネットワークが望ましいのか？等を検討すべきである。そして、良いスキームを構築することも必要である。そして、スケールアップについて、国際支援を受けることも可能と考える。

Q5：（セネガル）NAMA に関して、方法論の開発、ガイドラインの作成等と色々な支援が昨年だけでも行われており、対応が難しいと感じている。可能であれば、UNFCCC にて統一することはできないか？

A5：（UNFCCC）個々の支援に対してガイドライン等を構築することは非効率である。そのため、コラボレーションについて、まずドラフトを作成することが望ましいと考える。

Q6：ファイナンスアプローチについて、各国の緩和策政策に関連すると感じている。この点についてどのように考えているか？

A6：（UNFCCC）まずは税を考慮した政策等を検討すべきと考えているが、ファイナンスを具体的に行うことは難しいと考えている。

Q7：サポートプロセスについてどのように実施するのか、教えて欲しい。

A7：（UNFCCC）どのようなサポートが利用可能であるかを各ドナーから集めた後、具体的なクライテリアを設けて、検討すべきである。

Japan’s technological contribution to realize a low carbon society

日　時：　2013 年 11 月 20 日（水）13:00 ～ 14:30
場　所：　日本パビリオン
主　催：　日本経済団体連合（経団連）
テーマ：　Japan’s technological contribution to realize a low carbon society
目　的：　低炭素社会の実現に向けた日本産業界、特に経団連の取り組みと今後の展望について、関係者の説明や講演が行われた。
参加者：　約 50 名

1. 発表･議事の概要

- 経団連・地球環境戦略 WG 主査である手塚氏をモデレータとして本イベントの議題が勧められた。
- 経団連・副会長坂根氏より開会の挨拶が寄せられた。坂根氏より、本イベントにて日本の産業界の低炭素社会に資する知見を紹介する旨と共に、経団連による低炭素化への貢献を紹介する旨の説明があった。
- ゲストスピーチとし石原環境大臣より挨拶が寄せられた。同大臣からは、気候変動対策に迅速に取り組むことが喫緊の課題であると触れた上、我が国の産業界の貢献できる点として、攻めの地球温暖化対策を進めて行く点等が説明された。
- 主要経済国ビジネスフォーラム（Major Economies Business Forum : MEF）の Dr. Brian Flannery より、”Role of Business and Technology in Managing Climate Risks”について基調講演が行われた。同氏からは、低炭素社会形成に向けて大規模な投資を進めて行くこと、投資とは一線を画して気候変動政策をビジネス活動の主流化とするよう強化すること、制度化や承認の遅延がコスト増加を招くこと、民間企業の投資観点を考慮すること等が本講演のメッセージとして説明された。
- パネルディスカッションとして”Japan’s technologies contribution to realize a low carbon society on a global scale (challenges, expectation and solution)”について、JICA 気候変動室森室長によるモデレータの下、経団連・手塚氏、インドネシア DNPIMr. Farhan Helmy、ワルシャワ大学 Prof. Krzysztof Klincewicz にて議論が行われた。
- パネルディスカッションでは、手塚氏より京都議定書下での経団連の活動、及び経団連による低炭素社会へのコミットメントについて説明があった。続いて、インドネシアの Mr. Farhan より、”Indonesia’s Climate Change Policy and Implementation Update”としてインドネシアの政策フレームワークや中央・地方レベルでの気候変動活動等について現状が報告された後、2020 年に向けた方針が説明された。
- 本イベントの結びとして、経団連・副会長坂根氏より閉会の挨拶が寄せられた。

本イベントの会議風景を以下に掲載する。

Implementing public climate finance, where do we stand?

日　時：　2013 年 11 月 20 日（水）20:15 ～ 21:45
場　所：　Room Cracow
主　催：　France, WRI, JICA
テーマ：　Implementing public climate finance, where do we stand?
目　的：　気候変動ファイナンスを司る各国機関が意見交換を行うと共に、今後、気候変動ファイナンスがどの方向に向かうべき等について関係者の知見や意見が紹介された。
参加者：　約 70 名

1. 発表･議事の概要

- 冒頭、Mr. Andrew Steer による本イベントの主旨等が説明された後、Mr. M. Canfin 大臣（フランス）より、WRI へのイベント参加への経緯等が説明された。そしてフランス政府として、パリで開催される COP21 に向け気候変動ファイナンスが検討すべき点として、4 つのポイント（①現状政策・計画への主流化、②適応策への追加資金、③民間・公的資金を適切に利用すること、④方法論）が重要である点が説明された。
- 気候変動開発の主流化に対して、気候変動コベネフィットへの取り組み、AFD のエネルギー戦略、ファイナンシング・インフラの構築等について考え方が紹介された。
- JICA 森気候変動室室長より、”Role of International Development Finance Institutions, Holistic Support Approach to Sustainable Development”についてのプレゼンが行われた。同プレゼンでは、Development Finance Institutes (DFIs)の挑戦や役割として、①官民連携に対する効果的な金融商品、②法的枠組みや制度等の開発、そして③民間資金のモビライゼーションと金融仲介が、歯車のように上手く噛み合うことが重要であると指摘している。
- また、一例として、JICA による気候変動に係る包括的な支援としてインドネシアの事例が紹介された。同支援では、緩和策、適応策と共に、主要な政策問題及び分野横断的な政策問題が柱となっていることが説明された。同国に対する具体的な支援として地熱発電開発事業、独立系発電事業（IPP）等が紹介された。

- 今後の JICA による開発ファイナンスの活動方針として、①途上国の政策や法的枠組み等に通じたインフラ開発における包括的な支援の準備、②事業認識できる DFI 仲介機能及びより大規模民間投資の活用強化、③急速な都市化、エネルギー消費、廃棄物、GHG 排出、自然災害によるリスク集中等を優先とした都市開発の持続的な追及、④途上国と先進国による開発ファイナンスにおけるパートナーシップを深めることが紹介された。
- IDFC の Ms. Castro より、”IDCF’s green and climate finance implementing climate finance”として IDFC の概要、2012 年の気候変動に係る活動についての報告が行われた。特に、IDFC は、近年、緩和策及び適応策に資するグリーンファイナンスに力を入れている点が紹介された。
- CAF の紹介も行われた。CAF は 2011/12 において 190 億 USD を融資等しているが、そのうち 42%に当る約 80 億 USD がグリーンファイナンスとなっているとのこと。
- Green Climate Fund の新 CEO である Ms. Hela より、Green Climate Fund の紹介等が行われた。

2. 質疑応答

本サイドイベントにおける主な質疑応答は、以下の通り。

Q1：途上国の支援にどの程度、グリーンファイナンスが必要であると思うか？
A1：（Green Climate Fund）一例として、アフリカのインフラ投資では、約 3 分の 1 が国際的なファイナンスに依存しており、残りを政府等の国内ファイナンスで賄っている。そのため、グリーンファイナンスのニーズは高いと考えている。

A1：（WB）NAMA ファイナンスに関して、モザンビークやメキシコが関心を持っており、今後もファイナンスへの関心が高まるものと思っている。

Q2：気候変動において公的資金が必要であると思うが、本 COP でのフランスの立場は？
A2：（フランス）グリーンファンドに積極的に参加するつもりであり、EU メンバーとしても何か貢献したいと考えている。

Q3：グリーンファンドやカーボンプライスのポテンシャルについて意見を伺いたい。
A3：（JICA）炭素税について、日本政府は 3 年前より別勘定としてグリーンファンドを導入している。そして、日本政府による国内外のグリーンインベストメントは、ハイブリッド車や省エネルギー等に割かれている。但し、総額は定かではない。

A3：（フランス）カーボンプライスが 2014 年に 10USD、2016 年に 30USD となるよう、EU-ETS だけに留まらず働きかけて行きたいと考えており、GCF や WB 等との協調、またヨーロッパ、ケベックや中国、メキシコ等とカーボンプライズについて協調を図る等といった経済的、政治的な取り組みを行うべきと考えている。

また、数名の傍聴者からグリーンファイナンスに関して、会計方法はどうなっているのか？との質問等もあった。これに対して、IDFC より同機関の会計方法や分類方法等が追加説明された。

4.3 COP19 参加まとめ

COP 期間中現地にて、また事後の 12 月 16 日に、COP 19 の報告会を行った（添付資料参照）。

全体評価として、COP 19 は COP 21 に向かう次期枠組みプロセス ADP の中間 COP であり、この点で大きな決定がなされたわけではない。新しい議定書などの内容としてどのようなものにするか、2020 年までに”ambition“を上げるにはどうするかという点は、とくに前者が 2014 年から具体的交渉テキスト作成プロセスにむかった各国の提案がでてきて、本格化してくることになっている。

ファイナンス面では､条約の新しいファイナンシャルメカニズムである GCF が立ち上がったが、まだ実体がない状況である。2020 年に先進国全体で年間 1000 億ドルの動員を行う長期ファイナンスのロードマップについては具体的なものは合意されなかったが、隔年の情報提供のプロセスが合意された。2013 年までの 3 年間の短期ファイナンス（300 億ドル相当）では、日本の寄与が先進国全体の約 1/2 にのぼったことが明らかになった。

JCM が含まれる新しい市場メカニズム関係は、合意文書を作成することに至らなかった。言い換えると、（個々のメカニズムなどは議論されてはいないが）さまざまなボトムアップ的なアプローチを共通のルールを持った一つの枠組みの下に位置づけることの難しさが浮き彫りにされ、具体的かつトップダウン的に監督するような枠組みに合意することは可能性がかなり低い状況にある。経験を蓄積しそれをシェアし、次に繋げるような合意を行うことが現実性が高そうである。

NAMA に関して、ニーズとシーズのマッチングプラットフォームである NAMA レジストリーが稼働を始めた。ただ、実際のプロジェクトサポートのテンダーを行った英独の NAMA ファシリティーへの注目度合いの方が高いようであった。NAMA は国内 MRV ガイドラインができ、またそのコンサルテーションを行う ICA 専門家に関する手続き等が決定された。

技術も、TEC、CTCN の準備ができ、本格的に稼働してくることになった。

COP 19 の決議事項で大きなものは、REDD+とロス＆ダメージである。

REDD+は、いくつかの COP 決定パッケージと共に、ワルシャワ・フレームワーク for REDD+ ができ、8 年越しでの交渉を経てようやく正式に動き出せることになった。

ロス＆ダメージも、ワルシャワ国際メカニズム for ロス＆ダメージが設立され、当面はカンクン適応枠組みの下で動き出すこととなった。COP 22 で再検討される。

その他、日本政府は 2020 年目標として、2005 年比マイナス 3.8%と、暫定目標を発表し、同時に 2015 年までの 3 年間に 160 億ドル（うち公的資金は 130 億ドル）の途上国支援を約束した。また、Actions for Cool Earth(美しい星への行動)という戦略を発表した。

国際制度として、COP 18 で合意された京都議定書ドーハ改正の批准が進まないこと、CDM の需給関係が回復する見通しが立たないことなどが懸念材料となっている。

COP 国際交渉の外では、新設石炭火力をどうすべきかという主張において、日本を除く先進国や援助機関の非支援決定に対し、懸念を表す勢力の声が聞かれた。

第 5 章　アジア開発途上国における気候変動対策の推進に係る課題と提言

5.1　課題

本調査においてアジア開発途上国における気候変動対策推進に係る課題を下記にまとめる。

1）　*気候変動対策は、緩和策も適応策も、より重要な主目的を達成するためのものである。言い換えると、気候変動対策としての効果を上げるためには、この（背景にある）主目的とのシナジーを最大限に活かすようにすることが必要である。*

気候変動対策は「横糸を通す」クロスカッティングなものであるが、気候変動が主目的になることはほとんどない。言い換えると、「気候」対策としての効果を上げるためには、その主目的をエンハンスする（少なくとも邪魔にならない）ようにデザインすべきである。

2）　*気候変動対策ファイナンスが、途上国との信頼性という点で、また対策の実効性という点で、気候変動国際交渉の背景の大きなものとなっている。*

国際交渉においては、途上国と先進国の対決姿勢が浮き彫りになりがちで、大きな決定を行うときには、最後は資金支援のコミットが必要になることも多い。ただ、その数字がどのようにつくられたかなど不明確な点も多く、先進各国のスタンスにもばらつきがあり、それがまた途上国との信頼関係面で影を落としている。

また、援助する側もされる側も、それを有効に使いたいという思いもあり、資金の MRV という概念も提唱されている。

3）　*MRV の必要な国際制度が増えてきていて、途上国としてそれにどう対処すべきかが大きな課題となってきている。*

国別報告書、隔年アップデート報告書という国としての報告書とそのアセスメントプロセスである ICA、GHG インベントリー、NAMA、各種市場メカニズムなど、とくに緩和部門で（程度の差こそあれ）MRV が要求されるものが増えてきている。

これら MRV は「説明責任」のコンテクストで導入されてきているものであるが、それが途上国政策担当者にとって「負荷」でしかない、どうやって対応すればよいか分からない、対応するリソースがないというのが、現況に近い。MRV を含めることの本来の目的とするところは、それによって「気候変動対策が進む」ということであるはずだが、逆方向になっているところもある。

4）　*ともすれば対決姿勢となりがちな気候変動国際交渉に対比するものとして、二国間での協力は、低炭素社会構築という点でも、信頼感のある国際制度構築という点でもキーとなる。*

JICA は、途上国にとってまさにその二国間協力で、一緒にに対策を進めているパートナーである。かつ実アクションをともなった経験は、非常に価値を持つものでも

ある。それを、2015 年末のパリ会議にむけて対立する国際交渉にどう活かすかが重要な課題となっている。新しい国際制度では、今の Annex I/non-Annex I の再カテゴリー化など、かなり政治的色彩の濃いテーマが不可避であり、「実益」をともなった協力関係というプラスの要素を活かさなければ、合意はむつかしい。

5)　気候変動分野でも、日本の技術に対する期待が大きい。

日本は、技術で気候変動問題に貢献するというスタンスでもあり、また世界から期待されている点も同様の点が大きい。その点をどう活かすかを、JICA としても検討する必要がある。国際的にも TEC/CTCN という組織立てが動き出したこと、日本の提唱する技術指向の JCM も動きだしその underlying finance に ODA の海外投融資を使うファンドが形成されることなど、従来型援助でなく、民間の技術や資金を、いかに JICA を触媒として活かせるかも重要な視点になってくる。

5.2　提言

上記の課題を踏まえた上で、以下の点を提言したい。最後のものを除いて、まずは調査案件として、JICA 関係者も参画した議論を踏まえて議論を深化していくタイプが望ましい。

(1)　<u>JICA の気候ファイナンスおよび削減量効果に関する理論的整理</u>

日本として短期および長期気候ファイナンスをコミットしてきているが、どのように計算するかという点が明確でない。コミットする場合のスタンスの明確化と「定義」を行った上で、数字のコミットを行うことで、不要な誤解も避けられる。加えて、JICA/日本としての「考え方」を明確にできる。

なお、定義は複数あってもよく、その場合には当然ながら数字が異なってくる。

円借款と無償協力の場合のファイナンスの考え方、削減量計算の考え方なども整理しておくべきポイントの一つである。

ここで課題となるのは、（CDM にも関係した）「追加性」の概念をどう定義するかである（緩和策だけでなく適応策にも関連する）。追加性の定義は一般にはきちんと行うことは難しい。言い換えると、それに要する各種リソースをいたずらに割くことは、活動そのものに悪影響を与えうる。ただ、適用可能なシンプルな定義であれば運用上あまり問題がないかもしれない。

いずれにせよ、考え方をきちんと整理しておくことは必要である。そして文書化しておくことが望まれる。

また、ファイナンスにおける考え方と、緩和策の削減量計算における考え方の整理をしておく必要がある。

ひとつのアプローチは、まずは JICA の活動すべてを、

緩和効果あり or ニュートラル or 逆効果 or 不明

適応効果あり or ニュートラル or 逆効果 or 不明

に分類するところからはじめることである。

また、それらをどう文書化して、対外的に（また国内的に）発信するかも重要な点となる。

(2) JICA 活動の GHG 削減効果評価手法の MRV の哲学構築と再検討

キーとなる削減策に関して、削減量定量評価手法がある程度用意されているが、その MRV 化に関して、活動のパフォーマンスを上げる＝フォローアップを含んだ PDCA サイクル化 という視点で再構成を行う方法を検討する。

たとえば、「気候変動対策支援ツール/緩和策」を、どのように使ってもらうべきかという視点で再考・改訂し、いかにすれば実効性の高い＝使って意味のあるものとできるかという方法論を検討する。ここでの「意味のある」ということは、単に CO_2 削減量を計算するだけでなく、それらのモニタリング/計算結果を、いかに有効に活動のパフォーマンスを上げるために活用するかまで含むものとする。

(3) 途上国 NAMA 関連支援の戦略構築

NAMA に関しては、ドナーでは英独が先行する形で動いているが、日本/JICA としての活用方法や戦略がまだ明確化されていない。

既存の案件を活かす方法、これからの案件として組み込む方法などがあるが、それを JICA の開発方針（民間連携も含む）との相乗効果を生むようなアプローチがどのようにありえて、また望ましいのかを検討する。

そして、具体的案件数件を、たとえばインドネシアにおいて支援/協力する形で形成し、その経験も踏まえて JICA のアプローチのあり方を再検討する。

(4) 新しいインディケーターや評価軸の開発スタディー

GHG インベントリーは、その数字を使って何かを実施するには、不十分な情報である。その一方で、たとえば「各種エネルギー消費原単位」や「コスト」などは、政策判断の際に、非常に役に立つ情報となる。絶対値や各国比較を行うことで、自国のポジションを認識し、どの分野を優先するか、効果的となるかなどが、明らかになる。

また時系列（トレンド）情報も重要で、たとえばマクロ経済的な原単位の茅恒等式を用いた推移分析は、本調査のセミナーでも発表した。セクターで分けて分析することも有効である。

これらを掘り下げることで、各国の特徴を明確化し、その国の政策担当者にとって、非常に有効な情報を提供することができる。

できればデータベース化まで行い継続的にスタディーすることが望まれる。

(5) 民間資金や技術の活かし方

まずは、JCM において、ODA をいかに戦略的かつ説明責任を果たせる形で用いるかという点の整理が必要である。どう「切り分け」またどう「機会創出」し「相乗効果」をもたせるかなどがポイントとなる。

いくつかの有望そうな具体的プロジェクトタイプで、きちんと整理しておくべきである。いままで対象となってこなかった超々臨界圧石炭火力などの大型案件や、高効率機器販売を JCM 化する製品なども対象とすべきである。

その他、ODA 案件の JCM 化方法の理論的スタンスの整理も有用である。これも一種のベースライン的な概念の整理となる。

また、民間ビジネスの環境整備も、公的資金の役割でもある。気候変動関連分野で、他の公的資金のケースも含めて、グッドプラクティスのスタディーを行っておくことが望まれる。例えば、ソーラーランタン分野で、IFC/WB が“Lighting Africa”という性能基準を設けるイニシアティブを発足・運営していることなどが挙げられる。

(6) 概念の再整理とスタンスの明確化

上記のファイナンスや緩和策における追加性や、気候変動対策の「主流化」など、概念が明確化されていない（使用する人の独自判断で運用されている）ものがいくつかある。これらを整理しておく必要ある。

これは用語の定義の整理に留まらず、JICA としての「スタンス」にも関連してくる。

そして、「気候変動問題における JICA の協力の方向性」を改訂し、その中に述べられている対応策の「方法論」まで示したものとなることが望まれる。

(7) IPCC 第 5 次評価報告書からの注目すべき情報の整理

IPCC AR5 は、すでに WG1（気候の物理サイエンス面）報告書がリリースされ、今後 3 月、4 月と、WG2（影響と適応）、WG3（緩和）のレポートがリリースされる予定

である。これらは現時点の知見を集約し、厳しいレビュープロセスを経た極めて信頼性の高い情報である。

その中から、JICA にとって有益かつどのような知見が得られるかという点は、きちんと整理・認識しておくべき課題である。

(8) JICA の具体的活動のグッドプラクティスとそのエッセンスの抽出

国際的気候変動の新しい組織立てである CTCN など、さまざまな場で重要となってくるものは、「グッドプラクティス」の共有である。JICA もエネルギー分野などでいくつも事例がある。それらをきちんとまとめ、分類し（分野、発展段階、規模　等）、他国への適用のためそのエッセンスを抽出し、報告書化しておき、また適宜アップデートすることで、気候変動分野において、さまざまなチャンネルで発信するときの非常に有用な資料となる。

加えて、今後の JICA の活動を組成していくにあたっても貴重な資料となる。

(9) COP や SB の場におけるサイドイベント＋ブース

上記で述べたようなスタディーの中身の議論や、JICA の行ってきたグッドプラクティスを共有し、実施国と共同してサイドイベントを行うことで、JICA 活動の広報ならびに、方法論を改良していくための議論などができる。

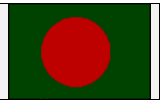
一方的なプレゼンテーションではなく、問題意識を共有し、議論できる場とすることが望まれる。

チャンネルは、サイドイベントとブースの設営がある。ワルシャワではじめて日本パビリオンが設営されたが、今後はこれが拡張されることが期待され、JICA としてこのような場の活用方法（広報活動、JICA 活動へのフィードバック、他国との協調を探る場など）を検討する必要がある。

添付資料 1

文献調査

01 : People's Republic of Bangladesh



1 : Basic Information and Key Indicators

Capital	Dhaka
Area :	144,000 [km^2]
Population	152,500,000 (2013)
GDP, per capita	USD 766.5 (2012)

Source: Basic data, Regional affairs, Ministry of Foreign Affairs of Japan

2 : National Development Strategy/Action Plan

Bangladesh is now in the period of its Sixth Five Year Plan (2011-2015), which has a set of 16 core targets for enhancing economic growth, poverty reduction, employment generation, human capital development, gender balance and environmental protection. Vision 2021 of the current government envisages to eradicate poverty, increase employment opportunities, ensure food security, provide access to energy & power, and achieve economic and social well-being of all citizens of the country. Bangladesh will achieve this goal through a strategy of pro-poor, climate resilient and low carbon development, based on the four building blocks of the Bali Action Plan – adaptation to climate change, mitigation, technology transfer and adequate and timely flow of funds for investment, within an inviolate framework of food, energy, water, livelihoods and health security. In the area of institutional development, the government is setting up new institutions that will help realize the new vision of the government in the coming years. For example, it is in the process of establishing the Sustainable and Renewable Energy Development Authority (SREDA) as the national nodal authority for coordinating all national efforts in taking forward its sustainable energy agenda for energy efficiency and conservation and renewable energy promotion in the country.

3 : Institutional Arrangement of Ministries (and Key Agencies)

1) Ministry of Environment and Forests

The Ministry of Environment and Forests (MoEF) is the key institution to address to issues of environment and degradation occurring naturally and due to human interference. This is more an oversight and coordination ministry, rather than having direct control over the agencies of other ministries. The Department of Environment (DoE) under the MoEF deals with climate change issues nationally and internationally in addition to its normal administrative and regulatory functions oriented toward the environment. The MoEF is further tasked with the implementation of the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009.

2) Climate Change Unit (CCU)

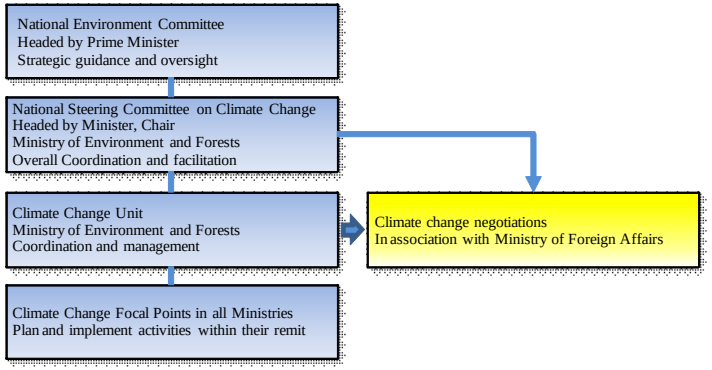
A National Steering Committee on Climate Change has been established to coordinate and facilitate national actions on climate change. The National Steering Committee reports to the National Environment Committee, which is headed by the Prime Minister. A Climate Change Unit has been set up under the MoEF to support the National Steering Committee on climate change and coordinate with other Ministries and departments implementing projects under BCCSAP. Climate change cells have also been established in different Ministries.

3) National Environmental Committee

The National Environmental Committee is headed by the Prime Minister and ensures a strategic overview of environmental issues as well as determines environmental policies.

4) National Steering Committee on Climate Change

Immediately after the Bali Conference (COP13), the Government formed the National Steering Committee on Climate Change. It is headed by the Minister of the MoEF and comprises of secretaries of all relevant Ministries as well as civil society representatives and represents the focal point for developing and overseeing implementation of the BCCSAP. Five functional working groups were also constituted on adaptation, mitigation, technology transfer, financing and public awareness.



Source: Ministry of Environment and Forests, Government of the People's Republic of Bangladesh
Bangladesh Climate Change Strategy and Action Plan 2009

Figure 1 Climate Change Action Plan Organization Chart

4 :Mainstreaming Mitigation/Adaptation Actions in National Strategy

The Bangladesh Climate Change Strategy and Action Plan (BCCSAP) is a part of the overall development strategy of the country. Following COP13 in Bali in 2007, the Government of Bangladesh first submitted its own Bali Action Plan which culminated into the BCCSAP in 2008. The BCCSAP was revised in 2009 to take a few progamme areas under consideration. The BCCSAP outlines the core policy, strategy, and action thrusts as a mechanism to respond to and address the risks related to climate change in the country. The BCCSAP is an integral part of the Government's over-all development strategy – the Sixth Five Year Plan (2011-2015).

The BCCSAP 2009 is offered in two parts; the first one provides background issues related to physical and climatic contexts, core socio-economic realities and policies in the country and the rationale of the vision of future development in the climate change sector. The remaining part of the plan explains a set of programmes under six priority action pillars of the BCCSAP, which encompass 44 programmes listed in the table below. It is a set of 10-year programme (2009-2018) for capacity building and achieving resilience of the country to meet the challenges of climate change over the next 20-25 years. The six pillars of the BCCSAP are as follows:

Table 1 BCCSAP Programmes

Theme	Programme
Food Security, Social Protection and Health	- Institutional capacity for research towards climate resilient cultivars and their dissemination - Development of climate resilient cropping system - Adaptation against drought - Adaptation in fisheries sector - Adaptation in livestock sector - Adaptation in health sector - Water and sanitation programme in climate vulnerable areas - Livelihood protection in ecologically fragile areas - Livelihood protection of vulnerable socio-economic groups (incl. women)
Comprehensive Disaster Management	- Improvement of flood forecasting and early warning system - Improvement of cyclone and storm surge warning - Awareness raising and public education towards climate resilience - Risk management against loss on income and property
Infrastructure	- Repair and maintenance of existing flood embankments - Repair and maintenance of cyclone shelters - Repair and maintenance of existing coastal polders - Improvement of urban drainage

	- Adaptation against floods - Adaptation against tropical cyclones and storm surges - Planning and design of river training works - Planning, design and implementation of resuscitation of river and *khals* through dredging and de-siltation work
Research and Knowledge Management	- Establishment of centre for knowledge management and training on climate change - Climate change modelling at national and sub-national levels - Preparatory studies for adaptation against sea level rise - Monitoring of ecosystem and biodiversity changes and their impacts - Macroeconomic and sectoral economic impacts of climate change - Monitoring of internal and external migration of adversely impacted population and providing support to them through capacity building for their rehabilitation in new environment - Monitoring of impact on various issues related to management of tourism in Bangladesh and implementation in priority action plan
Mitigation and Low Carbon Development	- Improved energy efficiency in production and consumption of energy - Gas exploration and reservoir management - Development of coal mines and coal fired power stations - Renewable energy development - Lower emission from agricultural land - Management of urban waste - Afforestation and reforestation programme - Rapid expansion of energy saving devices - Energy and Water Efficiency in Built Environment - Improvement in energy consumption pattern in transport sector and options for mitigation
Capacity Building & Institutional Strengthening	- Revision of sectoral policies for climate resilience - Main-streaming climate change in national, sectoral and spatial development programmes - Strengthening human resource capacity - Strengthening gender consideration in climate change management - Strengthening institutional capacity for climate change management - Main-streaming climate change in the media

Source: Second National Communication of Bangladesh (October 2012)

Adaptation to the climate change impacts is the main focus of BCCSAP. The basic approach is to address economic development and climate change issues in an integrated fashion so that the resilience of the people is increase and climate change impacts managed through effective adaptive activities. As a part of facilitating the implementation of BCCSAP programmes, the MoEF has already approved 66 projects for implementation in various areas related to management of and adaptation to climate change.

5 : Chronological Development of Climate Change-Related Policies and Framework

Climate change has already been included partially in the national development planning processes. Environment as a concern for development was first addressed in the Forth Five-Year Plan (1990-1995) of the country and received more emphasis in the Fifth Five Year Plan (1997-2002). The major environmental issues identified and addressed in the Fifth Plan were, among others, natural disasters, pollution, health and sanitation, deforestation, desertification, changes in climatic conditions, salinity and biodiversity all of which directly or indirectly are expected to be impacted by climate change.

Bangladesh is moving towards mainstreaming climate change management as an integral part of its national development strategy in the Sixth Five Year Plan (2011-2015).

1) Coastal Zone Policy (2005)

Among very few national policies directly address the climate change risks, the most clear-cut policy statements related to climate change has been made in the Coastal Zone Policy of the Ministry of Water Resources in 2005. The Coastal Zone Policy directly mentions that the coastal area is vulnerable to risks from climate change. It also points out that the majority of households in the coastal area are vulnerable to climate change.

2) Renewable Energy Policy (2008)

Renewable Energy Policy, 2008 of Bangladesh was adopted for, among others, to facilitate reducing global emissions for mitigating climate change. The policy has identified different renewable energy sources like solar, wind energy biomass, biogas, hydro-power and other renewable energy sources include bio-fuels, gasohol, geothermal, river, current, wave and tidal energy. To facilitate the technology transfer process, the Policy prioritizes the option of harnessing the potential of renewable energy resources and dissemination of renewable energy technologies in rural, peri-urban and urban areas. It has also set objectives to create an enabling environment and legal support to encourage the use of renewable energy, promote development of local technology in the field of renewable energy, and promote clean energy for CDM. For institutionalizing the process, the policy proposed establishing a Sustainable Energy Development Agency (SEDA), as a focal point

for sustainable energy development and promotion, where “sustainable energy” comprising renewable energy and energy efficiency with an overall objective to support capacity building, technology and market development.

3) Vision 2021 and Perspective Plan 2010-2021

In 2006, the Government of Bangladesh prepared the Vision 2021, which is based on the principle of sustainable development. The management of climate change for sustainable development is an integral part of the Vision 2021.

The Perspective Plan in 2010 provides the strategy for realizing the Vision 21. Adaptation to the impact of climate change is considered as a cornerstone for sustainable development in the Perspective Plan. The Plan has proposed appropriate adaptation measures to combat the adverse impact of climate change. Along with encouraging adaptation to climate change, the Plan proposes to undertake supportive measures like strengthening regional and national mechanisms for scientific assessment, forecasting and information sharing, etc.

4) The Bangladesh Climate Change Strategy an Action Plan (2009)

The Bangladesh Climate Change Strategy and Action Plan (BCCSAP) (2009-2018) is a part of the overall development strategy of the country, which provides the principle guideline for adaptation and mitigation planning.

6: Characteristics of GHG Inventory

As for national inventory of greenhouse gas, the latest information for 2005 is provided in the “Second National Communication of Bangladesh” published in October 2012.

Table 2 GHG Emission by Sector

Sub-sector	CO_2	CH_4	N_2O	%
Energy	37,949.60	26.03	0.48	35
Industrial process	2,912.72	-	-	3
Agriculture	-	1,215.69	33.94	33
LULUCF	18,205.51	0.00	0.00	16
Waste	0.00	637.58	4.43	13

Unit : 1,000 ton
Source: Second National Communication of Bangladesh (October 2012)

7: Key Mitigation Areas and Related Policies and Measures

General aspects

The Second National Communication considers 21 options for in-depth analysis with potentials of a total reduction of CO2 emission of 7.2mnmt in which the highest potential contribution may come from the introduction of supercritical boilers for coal-fired power plants (1.5mn) and new urea plants (1.3mnmt) which together may reduce about 38-39%. Considering cost-effectiveness and related barriers of such measures, modal shift from road to water transport and solar lantern projects should be more attractive, followed by cogeneration captive power, efficient fan and boilers, improved gas stove and rehabilitation of steel mills.

BCCSAP 2009 also identified key sectors that may be affected or is important from the viewpoint of mitigation. (See Table "BCCASP Programmes" above.)

As part of the new generation expansion initiative in line with growing demand, Government has a plan to enhance national power generation capacity to 16,000MW by 2015. Expected generation from renewable sources should be then at least 800MW as envisioned in National Renewable Energy Policy (at least 5% from renewable sources). However, since solar power has the most potential source among renewables in the country, the government has already undertaken a number of programmes in utilizing solar power. Around 1.5 million Solar Home Systems have been installed throughout the country generating 65MW of electricity. The Government has envisioned achieving 500 MW solar power developments in Bangladesh with the support of bilateral and multilateral development partners. The programmes to be implemented are of following types:

- Installation of Solar Irrigation Pumps
- Roof top Solar Power Solution for Commercial and Residential Buildings, Industries
- Solar Electrification at Railway Stations
- Solar Home Systems in Government and Semi-government Buildings, Remote Education Centres / Schools, Union Information Service Centres, Rural Health Centres, Religious Establishments, etc.
- Solar LED Street lighting under City Corporations and Municipalities

2) NAMA-Specific Aspects

Bangladesh has not yet submitted NAMA to the UNFCCC, but some potential sectors for mitigation identified by Ministry of Environment and Forests are as follows:

Table 3 Potential Sectors for Mitigation

Sector	Possible Measures
Power Sector	- Old plants may be replaced - Improved and new technologies may be introduced - Due to shortage of natural gas as primary fuel, it is becoming necessary to rely more on coal. In this case, use of clean coal technology is needed for mitigation
Transport	- Inefficient vehicles and engines to be replaced - Mass transportation facilities may be expanded
Agriculture	- water efficiency and energy efficiency to be improved
Forestry	- Afforestation, reforestation and forest management as sink
Waste Management	
Residential/Commercial	- Efficient building design as well as more energy efficient devices and equipment for lighting and cooling - Efficient cooking stoves
Industry	- Modernization and rehabilitation of old machinery, for example, in urea fertilizer plants, sugar mills, power plants, cement factories and brick kilns
Renewables	- Use of more renewable energy : solar, wind - Efficient methods of generating renewable energy

Source: Low Carbon Path of Development and NAMA: The Case of Bangladesh, Ministry of Environment & Forests Government of Bangladesh, 4th April 2011 Bangkok

8 : Key Climate-Vulnerability Areas and Related Adaptation Policies and Measures

The sectoral vulnerabilities in Bangladesh are summarized as follows in its second national communication:

Table 4 Vulnerability of Climate Change on Each Sector

Sector	Vulnerability
Water resources	- Water stress will be increased - Water availability will be decreased in dry season and the northwest and southwest regions likely to be suffer the most - Flooded area will be increased by 6% in 2030s and 14% in 2050s respectively - The western parts of the country will be at greater risk for droughts, during both the Kharif (Jan- May) and pre-Kharif (Jun-Oct) seasons due to the effects of climate change - The coastal areas of Bangladesh face salinity intrusion and fresh water scarcity during the dry season which will aggravate due to sea level rise, - From the base condition additional 7% (>5ppt) area will be increased in the coastal area. Among the coastal district Bagerhat, Khulna, Satkhira, Barisal, Patualkhaki and Bhola will be more affected. - Additional 7.6 million people will be exposed to high salinity (>5ppt). - About 0.1 million people become homeless every year in the country due to river erosion.
Crop-agriculture	- Due to carbon fertilization alone Boro production might increase 9.6% with

Sector	Vulnerability
	respect to base year - However, due to temperature and precipitation change over-all production will reduce 13.9% (2050) - Aman and Aus output will reduce at the rates of 0.62% and 1.52% respectively
Fisheries	- Culture fish production (pond fish) would be decreased due to overtopping of flood water - Capture fisheries especially floodplain fish production will be increased by 9% for A2 emission scenario and 7% for B3 emission scenario in 2050 - Sea level rise could also push saline water further into the Ganges-Brahmaputra-Meghna (GBM) delta, reducing habitat for fresh water fish
Livestock	- The increasing temperature and humidity due o climate change will make livestock, especially cattle, more vulnerable - According to model results, there will be around 2.5% decrease in annual milk production by 2030s and by around 5% in the 2050s due to heat stress - Animal protein output such as milk and meat may fall and consequently livelihood of the rural community will be adversely affected. - In the coastal area, livestock are most vulnerable to cyclones and storm surges along with tidal flooding - About 20% of present area suitable for livestock will be reduced in 2050 for livestock due to sea level rise
Human Health	- Total malaria affected area will increase - Some new areas not currently vulnerable to malaria may become so exposed - Spatial distribution of malaria infestation will change and low risk areas will increase - In 2050 the central, eastern and southern parts of Bangladesh will be highly vulnerable to diarrhoeal incidence - Seasonal cholera disease can become a regular phenomenon in future - Incidence and severity of heat stress related diseases may increased - Increased salinity in drinking water will limit the access of people to safe drinking water
Ecosystems and Forests	- The ecosystem and biodiversity of Sundarbans, haor and beel wetlands along with fish and other aquatic life are in mot threat due to climate change induced hazards - Main economic products such as Sundri and Gewa timber output will decline drastically with increase in sea level rise - Sal forest ecosystem at the Madhupur and Barind tract might be affected due to moisture stress during dry period - Chapalish (Artocarpus chaplasha) Garjan (Dipterocarpus spp) will increase 2-7% (in 2030s) and 7-10% (in 2050s) due to increased precipitation. - Climate change induced additional flood will adversely effect jackfruit trees and lower nutritional status of particularly low income people who eat these nutritious fruits
Infrastructure	- 50% of national highways are under medium vulnerability while another 8% are highly vulnerable by 2050 due to flooding - 10% of regional highways and 8% of railways are under high vulnerability by 2050 due to flooding
Urban Area	- Urban flooding caused water logging and drainage congestion due to frequent and excessive rainfall - Flash flood and landslides due to hill cutting and excessive rainfall is a continuous threat for the people living in cities and towns of the hilly areas - Cyclone storm surges accompanied flooding will inundate coastal cities - Heat island effects in the urban area is another major threat for people impairing their health and raising morbidity and also mortality - Poor people specially the slum dwellers will be more affected directly and also will have income losses due to morbidity and loss of income

Sector	Vulnerability
	- Quality of water (surface and drinking) will deteriorate due to flood, cyclonic storm surges and salinity intrusion

Source : Second National Communication of Bangladesh, Ministry of Environment and Forest Government of the People's Republic of Bangladesh,

Bangladesh submitted the National Adaption Programme of Action (NAPA) in 2005 to the UNFCCC. The final list of the priority activities stated in its NAMA are as follows:

Table 5 List of Priority Activities

Project Title	Objective and Activities	Primary Implementing Agency
Reduction of climate change hazards through Coastal afforestation with community participation (Intervention Type)	- Strengthen the adaptive capability further, so as to fact the more vulnerable situation that arises out of climate change scenario - Creation of shelterbelt along the coastal zone - Generation of Employment Opportunities - Enhanced Carbon sink under the global context	Forest Department
Providing drinking water to coastal communities to combat enhanced salinity due to sea level rise (Intervention Type)	- Development of a comprehensive strategy for safe drinking water supply in coastal areas -	Department of Public Health Engineering
Capacity building for integrating Climate Change in planning, designing of infrastructure, conflict management and land-water zoning for water management institutions (Capacity Building Type)	- Incorporation of climate change issues and concerns in water sector policies and plans - Capacity development and networking of water resource sector planners, and professionals to address climate change hazards - Develop mechanisms and tools for both analytical purposes and negotiation, as well as for consideration of more people friendly traditional drainage systems. The development of such tools for negotiation would benefit agriculture, human settlements, forest and fisheries as well as natural and man-made drainage structures. - Delineation of land and water zones considering sustainable use of resources in respect to climate change. - Development of design manuals and identification of vulnerable structures for designing structural adaptation.	Water Resource Planning Organization
Climate change adaptation information dissemination to vulnerable community for emergency preparedness measures and awareness raising on enhanced climatic disasters. (Awareness and Capacity Building Type)	- Protect people from climate change related health problems through awareness programmes - Development of guidelines for awareness and behavioural change programmes	Ministry of Environment and Forest

Project Title	Objective and Activities	Primary Implementing Agency
Construction of flood shelter, and information and assistance centre to cope with enhanced recurrent floods in major floodplains. (Intervention Type)	- Increase the height and strengthening proposed shelters from climate change induced hazards	Disaster Management Bureau and Local Government Engineering Department
Mainstreaming adaptation to climate change into policies and programmes in different sectors (focusing on disaster management water, agriculture, health and industry) (Capacity Building Type)	- To mainstream climate change impact assessment (and adaptation) into sectoral planning and policy in the disaster management, water, agriculture, health and industry sectors	Department of Environment
Inclusion of climate change issues in curriculum at secondary and tertiary educational institution. (Awareness Raising Type)	- To incorporate climate change impacts and adaptation into school curriculum at secondary and primary levels	Board of Education
Enhancing resilience of urban infrastructure and industries to impacts of climate change (Capacity Building Type)	- To enhance resilience to climate change (including floods and cyclones) in urban and industrial sectors in the major cities	Department of Environment
Development of eco-specific adaptive knowledge on adaptation to climate variability to enhance adaptive capacity for future climate change (Intervention Type)	- To develop actions in each of the main ecological regions of the country to adapt to the eco-specific impacts of climate change in those regions - To disseminate the knowledge on eco-specific adaptation to the most vulnerable communities in each eco-region (with emphasis on women, children and the elderly).	NGO consortium
Promotion of research on drought, flood and saline tolerant varieties of crops to facilitate adaptation in future (Research Type)	- To develop new varieties of crops such as rice, wheat etc, to tolerate saline, flood and drought conditions.	Bangladesh Agricultural Research Council
Promoting adaptation to coastal crop agriculture to combat increased salinity (Intervention Type)	- The main objective of the wet bed no-tillage methods maize production is to produce maize, (before next Boro rice crop) for tidal surge flood affected community after loss of Aman rice crop. It will also help to meet fuel and fodder need of community - Produce selected vegetables and fruits on raised bed to meet day-to-day demands of the affected households. Some cash is also generated from sale proceed of the vegetables. - Motivate the affected community to adapt the above technologies to combat with	Bangladesh Agricultural Research Institute

Project Title	Objective and Activities	Primary Implementing Agency
	coastal inundation due to tidal surge after loss of crops or no crop items.	
Adaptation to agriculture systems in areas prone to enhanced flash flooding – North East and Central Region (Intervention Type)	- The main objective of the no-tillage methods potato cultivation is to produce staple food, for flood affected community after loss of Aman rice crop - Produce selected vegetables to meet day-to-day demands of the affected households. Some cash is also generated from sale proceed of the vegetables - Motivate the affected community to adapt the above technologies to combat with inundation due to flood after loss of crops or no crop items	Bangladesh Agricultural Research Institute
Adaptation to fisheries in areas prone to enhanced flooding in North East and Central Region through adaptive and diversified fish culture practices (Intervention Type)	The overall objective of the activity is to reduce the fish crop loss from increased flooding and promote adaptive viable options for fish culture suitable for the flood prone areas of Bangladesh. However, the specific activities would be: - promote/introduce net fencing of ponds to prevent escaping of fishes from culture ponds - promote pen and cage culture of fish in floodplain areas during flood season with as an alternate option for fish culture	Department of Fisheries
Promoting adaptation to coastal fisheries through culture of salt tolerant fishy special in coastal areas of Bangladesh (Intervention Type)	The overall objective of the project is to utilize the saline waters of the coastal areas to boost up fish production. However, the specific objectives of the project would be to: - Develop culture technology for salt tolerant fish species having potential for use in coastal aquaculture - Piloting and promotion of developed aquaculture in the priority areas of coastal region - Develop linkages with weather forecasting agencies through networking - Helping the coastal aquafarmers, particularly the shrimp farmers, in protecting the crops from floods.	Department of Fisheries
Exploring options for insurance to cope with enhanced climatic disasters (Research Type)	- To explore the possibility of insurance market for climate vulnerability in different vulnerable sectors in the country - Inputs and Activities - Experts on insurance and different sectors (incl. infrastructure, agriculture, transport, etc) to be hired to carry out study in consultation with stakeholders from vulnerable sectors	Department of Environment

The BCCASP, as mentioned above, consists of sill pillars encompassing all major aspects of lives where adaptation would be necessary. This provides a framework to determine adaptation needs and to implement adaptation up to 2015.

9 : Major Project List on Climate Change in Bangladesh

Table 6 Major Project List on Climate Change in Bangladesh

Project title	Donor	Year
Livelihood Adaptation to Climate Change Project	FAO	2005-2009
Assitant to Local Community on Climate Change Adaptation and Disaster Risk Reduction	Danish Government	2008-2009
Improving Adaptive Capacity to Climate Variability and Change for Sustainable Food and Livelihood Security in Drought Prone and Coastal Regions of Bangladesh	FAO	2008-2009
Disaster Risk Reduction Programme in Bangladesh	Swiss Government	2008-2010
Strengthening Resilience of Water Sector to Climate Change in Khulna	ADB	2008-2011
Integrated Protected Area Co-management	USAID	2008-2012
Jolobayhoo-O-Jibon Climate Change Program	DFID	2008-2013
Bangladesh Pilot Framework on Research Collaboration on Climate Change and the Land, Water and Food Interface	UK Collaborative on Development Sciences	2009-2010
Supporting Implementation of BCCSAP	ADB, GOB	2009-2011
Community-based Adaption to Climate Change through Coastal Afforestation in Bangladesh	LDCF, UNDP, GOB	2009-2013
Bilateral US government program in Bangladesh	USAID	2010-
Bangladesh Integrated Water Resources Assessment	AusAID, CSIRO, Research for Development	2010-2013
Bangladesh Climate Change Resilience Fund (BCCRF)	UK, EU, Denmark, Sweden	2010-2014
Comprehensive Disaster Management Program Phase II	UK, EU, SIDA, AusAID, UNDP, GOB	2010-2014
Rural Electrification Upgradation Project	JICA	2010
Bheramara Combined Cycle Power Plant Development Project	JICA	2010, 2013
Coastal Climate-Resilient Infrastructure Project	ADB	2012-
Greater Dhaka Sustainable Urban Transport Project	ADB	2012-

Source: Adaptation Fund, Adaptation Partnership, Asia Development Bank, Japan International Cooperation Agency

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URL: https://www.adaptation-fund.org/funded_projects/interactive

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9 Asia Development Bank

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URL: https://libportal.jica.go.jp/fmi/xsl/library/public/data/plan_in_operation_e-p.html

02 : BRUNEI DARUSSALAM

1 : Basic Information and Key Indicators

Capital	Bandar Seri Begawan
Area	5,765[km^2]
Population	0.39 million (2012)
GDP, per capita	166 bilion USD (2010)

Source: Ministry of Foreign Affairs of Japan (June, 2013)

2 : National Development Strategy/Action Plan

Brunei developed the 9th National Development Plan 2007-2012 and currently under preparation of the 10th National Development Plan. Brunei's national vision is referred to "Brunei Danussalam Long-Term Development Plan, Wawasan Brunei 2035" which indicates its vision toward 2035. In the vision, as for an environmental strategy, it ensures the proper conservation of natural environment and cultural habitat that will provide health and safety in line with the highest international practices.

3 : Institutional Arrangement of Ministries (and Key Agencies)

Key organizations and/or institutions dealing with climate change are:

- Department of Environment, Parks and Recreation
- Prime Minister's Office
- Ministry of Energy
- Ministry of Industries and Primary Resources
- Ministry of Communication
- Ministry of Health
- Ministry of Education

4 : Chronological Development of Climate Change-Related policies and Framework

Brunei's chronological development of climate change-related policies is summarized in the following table.

Table 1 Chronological Development of Climate Change-Related Policies and Framework

Year	Policy and Framework
2007	Acceded the UNFCCC in August 2007
2009	Acceded the Kyoto Protocol in August 2009
2010	Established the Brunei National Council on Climate Change
2011	Established the National Energy Efficiency and Conservation Committee

Source: Paper for 5th Meeting of the Southeast Asia Network of Climate Change Focal Points 22 Sept. 2011

As for climate change's policy, Brunei supports the vision towards an ASEAN Community and also takes several initiatives in mitigation and adaptation actions in line with sustainable development through the setup of the National Disaster Management Centre.

5 : Characteristics of GHG Inventory (Sectoral and Temporal Dimensions)

The Initial National Communication is currently under preparation.

6 : Key Mitigation Areas and Related Policies and Measures

Brunei has not prepared NAMA report. The policies related to the mitigation areas are summarized in the following table.

Table 2 Policies Related to Mitigation Areas

Sector	Policies
Energy	- To reduce 2005 energy intensity by 25% in 2030 - To establish energy consumption profile - To develop photovoltaic power generation demonstration project plant - To reduce carbon dioxide emission by 960tonnes, representing the CO2 absorption power of approximately 260 hectares of forest
Waste	- To develop waste minimization policy - To recycle at 15% by 2015 and 20% by 2020 - To reduce the use of 13 million plastic bags per year
Transport	- To reduce excise duties by 5% for all hybrid cars - To increase tax duties by 10% for petrol guzzling vehicles

Source: Paper for 5th Meeting of the Southeast Asia Network of Climate Change Focal Points 22 Sept. 2011

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1 Brunei's National Vision
http://www.bedb.com.bn/why_wawasan2035.html

2 Paper for 5th Meeting of the Southeast Asia Network of Climate Change Focal Points 22 Sept. 2011

03 : KINGDOM OF CAMBODIA

1 : Basic Information and Key Indicators

Capital	Phnom Penh
Area	181,000 [km^2]
Population	13,400,000 (2008)
GDP, per capita	USD 912 (2012)

Source: Ministry of Foreign Affairs of Japan (June, 2013)

2 : National Development Strategy/Action Plan

Key policies and actions indicated in "National Strategic Development Plan (NSDP) 2009-2013" were summarized in the following table. Although Cambodia does not have its national sustainable development programme, a number of programmes have been initiated to support the government strategy for sustainable development which integrates climate change concerns into economic and social development policies and plans.

Table 1 National Development Strategy

Strategy	Sub-Strategy
Good governance	- Fighting corruption - Legal and judicial reform - Public administration reform - Armed force reform
Enhancement of agriculture sector	- Improving agriculture productivity and diversification - Land reform and clearing of mines - Fisheries reform - Forestry reform
Future rehabilitation and construction of physical infrastructure	- Future rehabilitation and construction of transport infrastructure - Management of water resources and irrigation - Development of the energy sector - Development of information and communication technology
Private sector development and employment generation	- Strengthening private sector and attracting investment - Creation of jobs and ensuring improved working conditions - Promoting small and medium enterprises - Creation of social safety nets
Capacity building and human resources development	- Strengthening the quality of education - Enhancing health service - Implementation of gender policy - Implementation of population policy

Source: National Strategic Development Plan 2009-2013

3 : Institutional Arrangement of Ministries (and Key Agencies)

Institutions arrangement for the climate change in Cambodia is summarized as follows according to" published information on NCCC and CCD by the Ministry of the Environment" and "The 9th Workshop on Greenhouse Gas (GHG) Inventories in Asia (WGIA9)[1]".

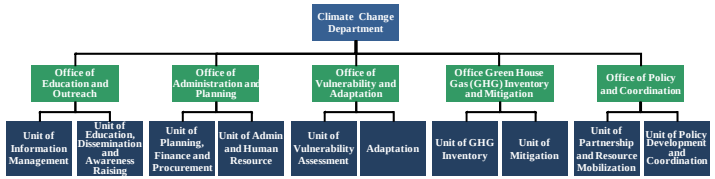
Table 2 Institutions and Functions

Institution	Function
Ministry of the Environment	- To lead the current process of developing the Cambodia Climate Change Strategic Plan (CCCSP), which determines the strategies for adaptation and mitigation - (To integrate the other ministries activities toward climate change)
The other ministries	- To develop sector Climate Change Strategic Plans under the overall framework of the CCCSP
Mandates of National Climate Change Committee	- An inter ministerial and cross-sectoral and multi-disciplinary institution established in 2006 - Highly policy making organization with preparing, coordinating and monitoring the implementation of policies, strategies, legal instruments, plans and programmes of the royal government
Climate Change Department	- To develop, in collaboration with relevant agencies, national strategy, action plan and policy and legal instruments related to climate change - To develop national communications and GHG inventory of the Kingdom of Cambodia under the United Nations Framework Convention on Climate Change (UNFCCC) - To conduct an assessment of potential GHG mitigation and promote the implementation of GHG mitigation projects in the Kingdom of Cambodia with appropriate technology - To conduct assessment of vulnerability and adaptation to climate change and promote implementation of climate change adaptation project in the Kingdom of Cambodia - To promote mainstreaming of climate change in the national development and sectoral plans and coordinate the implementation of clean development mechanism and carbon credit projects in the Kingdom of Cambodia - To promote mainstreaming of climate change in the national development and sectoral plans and coordinate the implementation of clean development mechanism and carbon credit projects in the Kingdom of Cambodia - To promote research, education, dissemination, training, workshop and meeting to promote awareness on climate change and motivate participation of local communities in implementation of climate change response project; - To play role as a focal point for the UNFCCC, Kyoto protocol, CDM, resolutions and IPCC and propose government position for negotiation
Climate change technical team	- To makes technical activities for developing research of climate change and support NCCC

Source: Prepared by the JICA study team summarizing published information on NCCC and CCD by the Ministry of the Environment, the 9th Workshop on GHG Inventories in Asia (WGIA9)

[1] Climate Change Activities in Cambodia presented by SUM Thy, Ministry of Environment, Cambodia in The 9th Workshop on GHG Inventories in Asia (WGIA9) -Capacity building for measurability, reportability and verifiability –13-15 July 2011, Phnom Penh, Cambodia

The relation of the institutions/agencies is that National Climate Change Committee (NCCC), which is composed of members of several ministries, develops climate change policy with supports of Climate Change Department (CCD) and Climate Change Technical Team (CCTT). The other ministries develop strategic plans with help of CCD. The structure of CCD is shown below.



Source : Published information by the Ministry of Environment

Figure 1 Organizational Chart of CCD

4 : Mainstreaming Adaptation/Mitigation Actions in National Development Strategy

According to "Country report April[2]", Cambodia will develop mainstreaming actions plan including recommendations on institutional and financial mechanisms, by the end of 2013, with supported by the CCCA and UNDP. The development of a guideline for mainstreaming climate change into sub-national planning is currently being developed through a consultative process. There is also the opportunity for the CCCSP to be integrated into the NSDP in the next planning cycle.

5: Chronological Development of Climate Change-Related Policies and Framework

1) Climate Change Policy

Cambodia ratified UNFCCC in 1995, and submitted Initial Cambodia's National Communication under UNFCCC (INC) in 2002. National adaptation programme of action (NAPA) was approved in 2006, and The Strategic National Action Plan for Disaster Risk Reduction (2008-2013) (SNAP(2008-2013)) and NSDP(2009-2013) was developed. In order to support realize the implementation for climate change, suggested in NSDP(2009-2013), the first draft of CCCSP (2013-2023) has already been prepared based on advisory letter of "the Council of Ministers No. 433" according to "Workshop on A Systematic and Quantitative Design of Low Carbon Development Plan for Cambodia[3]" .The NCCC, with the support of the CCD/MOE and the Cambodian Climate Change Alliance Result 1 (Policy Framework and Formulation) has developed a first set of sector plans. As a process, the sector plans are designed to be integrated into the

[2] Country report April, Mainstreaming climate change resilience into development planning in Cambodia in XXXX

[3] The Development Process of Cambodia Climate Change Strategic Plan (CCCSP) presented by Mr. CHEA, Chan Thou Deputy Director of CCD, MoE in the Workshop on A Systematic and Quantitative Design of Low Carbon Development Plan for Cambodia 22nd April 2013 Himawari Phnom Penh, Cambodia

upcoming national policy of the royal government of Cambodia according to "the published information on sector plan by the Ministry of Environment".

2) National Efforts/Measures Against Climate Change

According to" NSDP", national efforts/measures against climate change are as follows.

Table 3 National Efforts/Measures Against Climate Change

Areas	Efforts/Measures
Capacity building	- To strengthen the capacity of the secretariat of national committee for climate change management - To disperse the preparation of inventory
Mainstreaming	- To promote and coordinate the mainstreaming of climate change in concerned sectors - To educate and inform the public on climate change. - To carry out the environmental awareness enhancing programmes and the exchange of up-to-date information in order to adapt to climate change
Policy	- To promote the implementation and update the National Action Programme on climate change adaptation - To implement clean development mechanism and GHG reduction projects
Others	- To promote establishment of a national fund for climate change - To continue preparing a Second National Report under the United Nations Convention on Climate Change, National Strategy and Action Plan for Climate Change - To mobilise resources and support to deal with climate change problems

Source: National Strategic Development Plan 2009-2013

6: Characteristics of GHG Inventory (Sectoral and Temporal Dimensions)

1) Sectoral Dimension

GHG inventory by sector in 1994 and 2000 was summarized in "INC" and "WGIA9" as follows.

Land use change and forestry does not include CO_2 adsorption. Adsorbed CO_2 by forest was 52,374 Gg CO_2-eq in 2000.

Table 4 GHG Emissions by Sector

Sector	CO_2 (Gg CO_2-eq)		Share Percentage	
Year	1994	2000	1994	2000
Energy	1,881.35	2,643	0.41	5.55
Industrial Process	49.85	n/a	0.01	0.0002
Agriculture	10,560.15	21,112.16	2.30	44.37
Land use change and forestry	446,943.7	23,600.36	97.22	49.60
Waste	273.39	229.24	0.06	0.48
Total	459,708.4	47,584.86	100	100

Source: Initial National Communication under the United Nations framework convention on Climate Change
The 9th Workshop on GHG Inventories in Asia (WGIA9)

The major GHG emission sources are agriculture and energy except land use change and forestry. The GHG emission by sub –sector of agriculture and energy is shown below.

Table 5 GHG Emissions of Agriculture Sector in 1994

Sub-sector	Total Emissions (Gg CO_2-eq)	Share Percentage (%)
Domestic livestock	5,084	48.1
Rice cultivation	3,158	29.9
Grassland burning	49	0.5
Agricultural residue burning	59	0.6
Agricultural soil	2,209	20.9

Source: Initial National Communication under the United Nations frame work convention on Climate Change

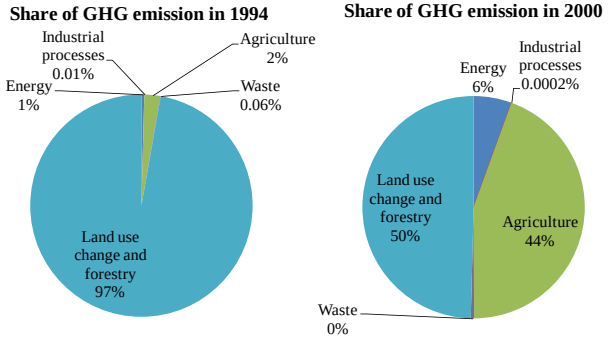
Table 6 GHG Emissions by of Energy Sector in 1994

Sub-sector	Total Emissions (Gg CO_2-eq)	Share Percentage (%)
Energy industries	331.73	3.44
Manufacturing industries	6.53	0.07
Transport	831.29	8.61
Commercial/Service	26.5	0.27
Residential	82.7	0.86
Biomass emissions	8,375.9	86.76

Source: Initial National Communication under the United Nations framework convention on Climate Change

2) Temporal Dimension

The share of GHG emission in 1994 and 2000 is shown in the following figure.



Source: Initial National Communication under the United Nations framework convention on Climate Change, the 9th Workshop on GHG Inventories in Asia (WGIA9)

Figure 2 Share of GHG Emission in 1994 and 2000

7: Key Mitigation Areas and Related Policies and Measures

1) General Aspects

Key mitigation areas are energy, transport, land use change and forestry, agriculture according to "INC".

2) National Appropriate Mitigation Action (NAMA) -Specific Aspects

According to "Overview of NAMA and CDM project implementation in Cambodia[4]", though Cambodia has not yet submitted a list of NAMAs to the secretariat of UNFCCC as of 22 April, 2013, Cambodia has prioritized a number of programme for developing a NAMA in cooperation with Overseas Environmental Cooperation Center of Japan.

3) Mitigation Options

The summary of mitigation options by sector is described in "INC" as follows.

Table 7 Mitigation Options by Sectors

Sector	Mitigation Options
Energy	- Electricity supply improvement using combined cycle gas turbine - Electricity trading with surrounding countries - Rehabilitation of the electricity system - Provincial and rural electrification with introduction of compact fluorescent lamp and improved cook stove - Commercialization of the supply of electricity - Renewable energy introduction such as mini-hydropower or solar plants - Policy and regulatory reforms; establishment of power sector regulatory framework, institutional, legal and regulatory initiatives (establishment of the Electricity Authority of Cambodia, the Council for the Development of Cambodia and the Law on Environmental Protection and Natural Resources Management), implementation of a study on the privatization and restructuring of power utilities, tax relief for renewable energy projects, Funding for renewable energy projects, and encouragement of utilities and industries to voluntarily reduce GHG emissions - Establishment of energy service companies - Enhancing national capacity in the following areas; energy database, classification of energy data with the economic data, wind energy map, energy audit, inter-agency cooperation
Transport	- Improvement of national transmission system introducing Phnom Penh City Shuttles - Energy-efficient mass transit (Rural) - Infrastructure for road traffic management - Enforcement of traffic laws - Road improvement in urban areas - Driver and pedestrian training and education - Energy efficient and pollution control technology - Planting more trees along the roads and preserving existing trees
Land Use Change and Forestry	- To enhance management efficiency of the reserved forests and ensure their appropriate protection and development, including eco-tourism, for employment generation and additional income for the people - To manage protected areas
Agriculture	- Direct seeding - Wet season zero tillage
Education	- Introduction of environmental education and awareness programmes at all levels - Organizing various programmes to promote better understanding among the general public and policy makers about climate change by the Ministry of Environment, NGOs and local media

[4] Overview of NAMA and CDM project implementation in Cambodia presented by Sum Thy, director, climate change department, ministry of environment

Source: Initial National Communication under the United Nations framework convention on Climate Change

4) Mitigation by Sectors

According to the Web site of ministry of environment, Cambodia has drafted a first set of sector strategic plan for climate change disclosure in Cambodian language.

8 : Key Climate-Vulnerability Areas and Related Adaptation Measures

1) Vulnerability to Climate Change

The Vulnerability and Adaptation study was conducted by the National Technical Committee of the CCEAP in order to assess the impacts of climate change on some priority sectors in Cambodia and to identify adaptation options. Impacts of climate change on each sector related in "INC" are summarized as follows.

Table 8 Impacts of Climate Change on Each Sector

Sector	Impact
Climate	According to results of the model studies such as SRESA21 (reference) and SRESB1 (policy) and GCM models CCSR and CSIRO - Increase of rainfall by 3% to 35% from the current condition by 2100 - Increase of temperature within the range of 1.3 ℃-2.5℃
Agriculture	- Increase of yields of wet season rice more than that of dry season rice under elevated CO_2 - More variable rice yield in some provinces than under current conditions due to the increase in flood frequency and intensity in surrounding areas of the Tonle Sap Lake and the Mekong River
Forestry	- Decrease of wet forest area, increase of moist forest - Change of forest productivity and biodiversity - Acceleration of high rate of deforestation
Health	- Increase of malaria
Coastal Zone	- To be permanently under water about 0.4% of the total area of Koh Kong province with sea level rises by 1 m

Source: Initial National Communication under the United Nations framework convention on Climate Change

2) Summary of National Adaptation Programme of Action (NAPA)

NAPA was endorsed by the councils of ministries in October, 2006.

According to "NAPA", the objectives of the Cambodian NAPA

i. To understand the main characteristics of climate hazards in Cambodia
ii. To understand mechanisms of climate hazards and climate change
iii. To understand existing programmes and institutional arrangements for addressing climate hazards and climate change
iv. To identify and prioritise adaptation activities to climate hazards and climate change

According to NAPA, many projects for adaptation were planned. From the planned projects, the 20 high priority NAPA activities are selected by scoring system of projects with the criteria

developed by The Least Developed Countries Expert Group Guidelines for the Preparation of NAPA. The most selected activities are related to agriculture, water resources, rural development and human health. The projects are for example, rehabilitation of a multiple use reservoirs, dams, canals and coastal protection, community activities of community household water supply in coastal provinces, mangrove restoration, irrigation, agricultural soil conservation, and health care against malaria.

3) Adaptation Options

Adaptation options are summarized in "INC" as followings.

Table 9 Adaptation Options by Sector

Sector	Adaptation Options
Agriculture	- Development of new high yielding varieties - Improvement of crop management and cultural practices - Development of capacity to adapt to current extreme climate events such as development of early warning systems for flooding and development of maps showing rice growing areas of provinces prone to flood and drought - Development of irrigation facilities in low land areas - Increasing planting index in suitable areas - Diversification of foods - Increasing rice production continuing the implementation of irrigated-water policies - Expanding irrigated areas from 16-20% of the total cultivated area - Expanding the rice cultivated area up to 2,500,000 ha in year 2010 - Increasing yield and production of rice at a rate of 2.7% per annum and improving the quality of agricultural products - Improving technology application and other infrastructures for reducing dependency on the nature - Promoting agricultural diversification - Increasing planting indexes through crop rotation or inter-cropping
Forestry	- Forest plantation establishment - Conservation of protected areas - Improvement of forest resource management
Health	- Introducing and expanding control measures to reduce malaria cases through early diagnosis and treatment of the diseases - Distribution of pyrethroid-treated mosquito nets to communities living in high-risk areas to control the vectors - Strengthening programme management and supervisory practices and creation of funds for the provision of mosquito nets and insecticide - Health education programmes with a focus on low cost preventive measures such as improvement of personal hygiene, use of bed nets and destroying the insect breeding sites
Coastal Zone	- Develop a national strategic response to sea level rise for the coastal areas - Investigate further potential impacts of sea level rise on biogeophysical, socio-economy, marine resources, freshwater, infrastructure, human settlements, and agricultural production - Formulate a comprehensive adjustment and mitigation policy for sea level rise in the context of integrated coastal zone management - Develop computer-based information systems covering the results of surveys, - assessments and observations in order to minimize the impact of sea level rise resulting from climate change - Increase public awareness on the effect of sea level rise on Cambodia's coast

Sector	Adaptation Options
	- Identify potential donors either multilateral or bilateral sources to assist the country in adaptation to sea level rise - Establish cooperation frameworks, training, technology transfer, surveillance of climate change in case of sea level rise, and the sharing of experiences to assist the government in establishing preparedness response to climate change

Source: Initial National Communication under the United Nations framework convention on Climate Change

4) Adaptation by Sectors

According to published information by the Ministry of Environment, Cambodia has drafted a first set of sector adaptation plan for climate change in Cambodian language.

9: Major Project List on Climate Change in Cambodia

The major projects supported by Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), World Bank (WB), and other donors are summarized the following list.

Table 10 Major projects list in Cambodia

#	Project title	Donor	Year (if available)
1	Climate Resilient Rice Commercialization Sector Development Program	ADB	2013/1
2	Mainstreaming Climate Resilience into Development Planning	ADB	2012/10
3	Flood Damage Emergency Reconstruction Project	ADB	2012/3
4	Strategic Program for Climate Resilience-Phase 1	WB	2012/12
5	Rural Electrification and Transmission Project	WB	2010/7
6	Renewable Energy Development Project	WB	2003/12
7	Rural Electrification and Transmission Project	WB	2003/12

Source: Prepared by the JICA study team with published data by JICA, ADB, and WB

10: References

1 Ministry of Foreign Affairs of Japan (June, 2013)
URL: http://www.mofa.go.jp/mofaj/area/cambodia/data.html

2 Published information on NCCC by the Ministry of the Environment
URL: http://camclimate.org.kh/index.php/nccc-organigram.html#sthash.gKeaoUb2.dpuf

3 Published information on CCD by the Ministry of the Environment
URL: http://camclimate.org.kh/index.php/ccd-structure.html

4 Published information on sector plan by the Ministry of the Environment
URL: http://www.camclimate.org.kh/index.php/nccc-new/44-1st-draft-of-sector-plans.html

5 National Strategic Development Plan 2009-2013

6 Climate Change Activities in Cambodia presented by SUM Thy, Ministry of Environment, Cambodia in The 9th Workshop on GHG Inventories in Asia (WGIA9) -Capacity building for measurability, reportability and verifiability –13-15 July 2011, Phnom Penh, Cambodia
URL: http://www-gio.nies.go.jp/wgia/wg9/pdf/0-3_sum_thy.pdf

7 Country report April, Mainstreaming climate change resilience into development planning in Cambodia
URL: http://pubs.iied.org/pdfs/10047IIED.pdf

8 Initial national economic and social development plan

9 Cambodia's initial national communication under the United Nations framework convention on climate change

10 National adaptation programme of action to climate change

11 Overview of NAMA and CDM project implementation in Cambodia presented by Sum Thy, director, climate change department, ministry of environment
URL: http://lcs-rnet.org/meetings_locarnet/2013/04/pdf/S1_2_Sum_Thy.pdf

12 The Development Process of Cambodia Climate Change Strategic Plan (CCCSP) presented by Mr. CHEA, Chan Thou Deputy Director of CCD, MoE in the Workshop on A Systematic and Quantitative Design of Low Carbon Development Plan for Cambodia 22nd April 2013 Himawari Phnom Penh, Cambodia
URL: http://lcs-rnet.org/meetings_locarnet/2013/04/pdf/S1_1_Chea%20Chanthou.pdf

4 : PEOPLE'S REPUBLIC OF CHINA

1 : Basic Information and key indicators

Capital	Beijing
Area	9,600,000 [km^2]
Population	Approximately 1.3 billion (2011)
GDP per capita	USD 5,417 (2011)

Source: Ministry of Foreign Affairs of Japan (June, 2013)

2 : National development strategy/Action plan

China has developed national development plan, called 12th Five-Year Plan for National Economic and Social Development (2011-2015) (12th FYP) . Three key themes in the 12th FYP are economic restructuring, social equality, and environmental protection. The plans of each themes are as follows.

Table 1 Key themes and plans of the 12th FYP

Key themes	Plan
Restructuring the economy	- 7 percentage of GDP growth target - To plan several preferential tax, fiscal and procurement policies designed to develop new and environmentally-friendly industries such as new energy and energy conservation - To increase household disposable income - Adding value to Chinese industrial output by promoting investments in new manufacturing equipment and technology
Promoting social equality	- To reduce urban/rural divide by focusing on increasing urbanization - To grow the West through preferential policies such as land credit, lower taxes and subsidies for manufacturers looking to locate inland - To help increase income through raising minimum wage
Protecting the environment	- Developing energy-efficiency technology - 15 percent of its energy come from non-fossil fuels by 2020 - To set a cap on domestic coal production - To support nuclear, hydropower and wind power

Source: 12th Five-Year Plan for National Economic and Social Development

3 : Institutional arrangement of the ministries (and key agencies)

Institutions arrangement for the climate change in China is summarized as follows according to" the Department of the Environment" and "China's national climate change programme (CNCCC)".

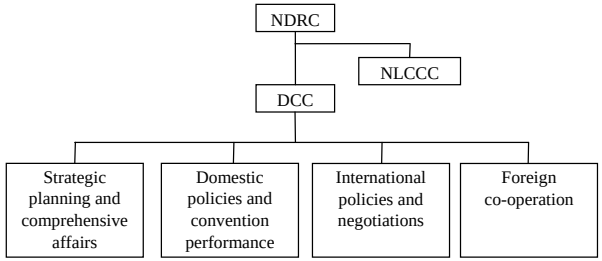
Table 2 Institutions and their Responsibilities

Institution	Responsibilities
National Leading Committee on Climate Change	- Deliberating and determining key national strategies, guidelines and measures on climate change, as well as coordinating and resolving key issues related to climate change
Department of Climate Change	- To analyze climate change's impact on economic and social development and organize the formulation of major climate change strategies, planning and policies - To take the lead in fulfilling China's commitment to the United Nations Framework Convention on Climate Change To coordinate climate change international cooperation and capacity-building work - To organize the implementation of Clean Development Mechanism related work - To support National Leading Group on Climate Change

Source: Prepared by the JICA study team summarizing the published information by the Department of the Environment and China's national climate change programme

According to "the Department of Climate Change", Chinese government established National Leading Committee on Climate Change (NLCCC) in 2007 in order to effectively address climate change issue, based on the former National Coordination Committee on Climate Change (NCCCC). National Development Reform Commission (NDRC) has the Department of Climate Change (DCC) which comprises four divisions (Figure 1).

China intends to establish a regional administration system for coordinating the work in response to climate change.



Source: organization chart made by the JICA study team, based on the web site of the Department of climate change and China's national climate change programme

Figure 1 Organization chart

4 : Mainstreaming mitigation/adaptation actions in the national strategy

According to "12th FYP", one of the key themes is protecting environment which includes GHG emission reductions. China intends to shift its industry to low-carbon. "Second national communication under the United Nations framework convention on Climate Change (SNC)" indicates that China has promoted education and public awareness to the people by several means. The national development plan and policies including strategies against climate change, institutional arrangement for climate change, implementations of projects for mitigation and adaptation, and enhancement of public awareness support the mainstreaming.

5 : Chronological development of climate change-related policies and framework

According to "SNC", China released its first national strategy on climate change, called China's National Climate Change Program (CNCCP) in 2007.

Many of the policies have been laid out as well by the Renewable Energy Law of 2005; the Energy Conservation Law of 2008; the Medium- and Long-Term Development Plan for Renewable Energy issued by NDRC, and the 11th and 12th FYP (2006-2010).

National efforts/measures against climate change

According to "SNC", during the 12th FYP period, China will change its development modes, and take a green and low-carbon development pathway. The major tasks listed in CNCCP include:

(1) enhancing climate system observation
(2) advancing R&D in key fields of climate change
(3) increasing investment in S&T related to climate change
(4) intensifying education, outreach and training on climate change
(5) encouraging participation of general public and increasing their awareness of climate change
(6) extensively conducting international cooperation and exchanges on climate change.

6 : Characteristics of GHG inventory (sectoral and temporal dimensions)

Sectoral dimension

GHG inventory by sector in 1994 and 2000 was summarized in "Initial national communication under the United Nations framework convention on Climate Change (INC)" and "SNC" as follows.

Table 3 GHG emissions by sector

Sector	CO_2 (Gg CO_2-eq)		Share Percentage	
Year	1994	2005	1994	2005
Energy	3,007,780	576,864	73.70	78.72
Industrial Process	282,630	60,270	6.93	8.23
Agriculture	604,776	81,997	14.82	11.19

Land use change and forestry[5]	23,713	2,552	0.58	0.35
Waste	162,120	11,078	3.97	1.51
Total	4,081,019	732,761	100	100

Source: Prepared by the JICA study team based on the Initial National Communication under the United Nations framework convention on Climate Change and the Second National Communication under the United Nations framework convention on Climate Change

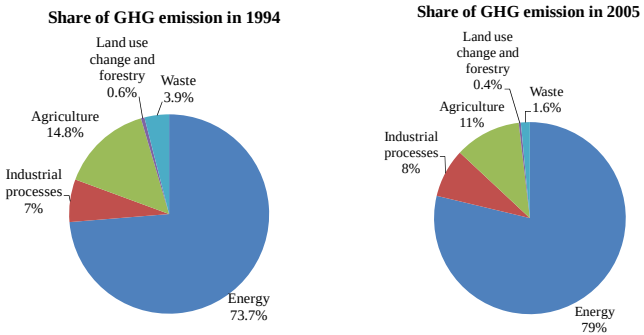
Table 4 GHG emission by sub-sector of energy sector in 2005

Sub-sector	Total emissions (Gg CO_2-eq)	Share Percentage
Fuel combustion	576,864	95.43
Fuel production, processing and conversion	241,758	40.00
Manufacturing industries and construction	211,403	34.97
Transport	43,087	7.13
Business	13,680	2.26
Residents	26,273	4.35
Agriculture fuel combustion	6,673	1.10
Biomass combustion for energy uses	6,396	1.06
Fugitive emissions from fuels	27,594	4.57
Oil and natural gas systems	462	0.08
Coal mining	27,132	4.49

Source: Second National Communication under the United Nations framework convention on Climate Change

Temporal dimension

The share of GHG emission in 1994 and 2005 is shown in the following figure.



Source: Initial National Communication under the United Nations framework convention on Climate Change
Second National Communication under the United Nations framework convention on Climate Change

Figure 2 Share of GHG emission in 1994 and 2005

[5] Land use change and forestry does not include CO_2 adsorption. Adsorbed CO_2 by forest was 431,192 Gg CO_2-eq in 2000 , 44,634 Gg CO_2-eq in 2005.

7 : Key mitigation areas and related policies and measures

1) General aspects

According to "CNCCC", key mitigation areas and main measures are summarized as follows.

Table 5 Key mitigation areas and measures

Areas	Measures
Energy production and transformation	- To formulate and implement relevant laws and regulations - To strengthen institutional innovation and mechanism construction - To intensify relevant policies and measures in energy industry - To strengthen the development and dissemination of advanced and suitable technologies
Energy conservation	- To further carry out the 10 key energy conservation priority programmes in the Medium-and-Long-Term Energy Conservation Plan
Industrial processes	- To encourage the saving of iron and steel, and restrict the export of steel products - To further promote the production of bulk cement and slag cement - To strengthen the emission control of GHG
Agriculture	- To strengthen the establishment and implementation of laws and regulations, e.g. developing farmland and pasture protection, controlling land reclamation in areas with fragile ecosystems - To construct ecological agriculture in highly-intensive production areas - To enhance technology development and transfer
Forestry	- To improve formulation and implementation of laws and regulations including development of regulations on conservation of natural forests, regulations on transfer rights of forest - To strengthen key forestry ecological programs such as natural forest protection program, the conversion of cropland to forest program etc.
Municipal waste	- To strengthen the implementation of relevant laws and regulations, e.g. promoting whole-process management and incorporating the disposal of the municipal domestic waste into the overall planning of the city - Reinforcing technological development and deployment of landfill gas recovery and compost utilization

Source: Prepared by the JICA study team based on the China's National Climate Change Programme, Mitigation policy is stated in CNCCP, INC and SNC

2) NAMA-specific aspects

According to "Letter including autonomous domestic mitigation actions", China will endeavor to lower its carbon dioxide emissions per unit of GDP by 40-45% by 2020 compared to the 2005 level, increase the share of non-fossil fuels in primary energy consumption to around 15% by 2020 and increase forest coverage by 40 million ha and forest stock volume by 1.3 billion cubic meters by 2020 from the 2005 levels. These autonomous domestic mitigation actions are voluntary in nature and will be implemented in accordance with the principles and provisions of the UNFCCC, in particular Article 4, paragraph 7

3) Mitigation options

The summary of mitigation options by sector is described in "SNC", "11th FYP" and "12th FYP" as follows.

Table 6 Mitigation options by sectors

Sector	State	Mitigation options
Economic and Industrial Restructuring	Taken	- Promoting and fostering high-tech industries that are energy-saving and emission reduction - To support innovative business growth in the area of energy conservation, environment protection and renewable energy. - Controlling overgrowth of high energy consumption and high emission industries
	To be taken	- To foster and develop strategic emerging industries like energy conservation, environment protection, new generation etc..
Energy Conservation and Improvement of Energy Efficiency	Taken	- Amending The Energy Conservation Law - Establishing and improving energy efficiency systems and standards - Implementing pricing policies for energy conservation; taxation reform of natural gas, oil, mineral products - Issuing a series of capital management measures in support of enterprise energy-saving technological alterations - To encourage purchases of energy-saving and environment-friendly automobiles
	To be taken	- To implement energy-saving retrofit projects such as combined heat and power cogeneration, electric motor system energy efficiency, waste heat and pressure utilizations etc.. - To promote energy-efficiency products - Industrializing the energy-saving technologies such as waste heat and pressure utilizations, high efficiency electric motor product - Capability building for energy conservation
Development of New and Renewable Energy	Taken	- The improvement of The Renewable Energy Law - Fiscal and taxation policies aimed at promoting renewable energy development - Active development of nuclear power
	To be taken	- To develop green and low-carbon energy resources, to promote development of new energy industries, and to adjust or optimize its energy mix
Forest	Taken	- Forest-tenure reform to further motivate farmer's initiatives in afforestation and forest conservation - To conserve and increase forest resources and enlarge urban afforestation - Pursuing sustainable forest management by developing and implementing the technical rules - Developing and released the Forestry Action Plan to address Climate Change
Industrial Processes	Taken	- Introducing alternative technologies to replace limestone with carbide slag for cement clinker production - Improving production processes using blast furnace slag and fly ash as mixed additives to cement production - Recycling waste resources like scrap steel
	To be taken	- To control export of high energy consuming, high polluting and resource products - Accelerate the pilot demonstration projects for clean production and circular economy in agriculture, industry and other key sectors - To control waste production and GHG emissions from their original sources and entire processes

Sector	State	Mitigation options
Agricultural Activities	Taken	- Formulating relevant laws and regulations - Promoting low-emission agricultural technologies - Intermittent paddy field irrigation - Minimum- or non-tillage
	To be taken	- To accelerate transformation of agricultural development models
Waste treatment	Taken	- To improving urban waste-disposal standards - Formulating regulations and intensified technical development and applications - To reform of waste treatment system - Encouraging enterprises to build and use a landfill gas collection and utilization system
	To be taken	- To improve a waste sorting and recycle system - To advocate green and low-carbon consumption concepts
Institutions and Mechanisms	Taken	- To improve energy statistical and energy-saving accounting systems - Development of CDM projects - Promoting enterprises to actively participate in coping with climate change, and provided incentives - To explore the voluntary GHG emission trading
	To be taken	- Improving the statistical system and assessment methods of GHG emission - To enhance construction of relevant technical support systems, expand experience and practices from the pilot programs, and to gradually establish a national carbon trading market - To research on incentive policies including fiscal, taxation, pricing and financial policies and their enforcements

Source: Second National Communication under the United Nations framework convention on Climate Change

8 : Key climate-vulnerability areas and related adaptation measures

1) Vulnerability to climate change

Impacts of climate change on each sector were indicated in "SNC" shown as below.

Table 7 Impacts of climate change on each sector

Sector	Impact
Climate	- Temperature - Increase of temperature within the range of 1.3 -2.5degree Celsius in the northwest, northeast, and north China ➢ Probably increase by 1.5-2.8 degree Celsius by 2030, 2.3-3.3 degree Celsius by 2050, and 3.9-6.0 degree Celsius by 2100 under a certain scenarios - Precipitation ➢ Decrease of the precipitation in spring and autumn significantly at rates of 3.2 mm/decade and 3.6 mm/decade respectively, and increase in summer after 1990s ➢ By the end of the 21st century, increase of annual average precipitation by about 20% under a certain scenarios - Extreme climate event ➢ Extreme-hot/cold events and other weather events(local heavy rain, super typhoons, heat waves and droughts, freezing rain and snow)

Sector	Impact
Water resources	- Runoff ➢ Decrease of annual runoff volume decreased from 0.96% to 36.64% in the past recent 40 years ➢ Decrease of the annual runoffs of major rivers in the next 30 years - Drought ➢ Continuous and longer droughts over North China since 1980s ➢ Under the high GHG emission scenario, Consecutive droughts through summer and autumn - Floods increase - Glaciers reduction - Lakes decrease
Agriculture	- In the middle-altitude and plateau areas the potential growth season would be prolonged - The fertility period would be shortened - Drop of the cultivated area of single cropping system by 23% - Change of the distribution of cropping system; - Yield ➢ Corn decreased by 5% ➢ Rice and soybean yields saw a slight increase under the changing climate in the last 3 decades - Disease and pests will reduce crop yield by 10%-15%, cotton yield by more than 20%, and the total loss will account for about 20%-25% of the gross agricultural output. - Food quality descends trend of the amino acid, crude protein, crude fibre, amylase and total saccharide
Terrestrial ecosystem	- Phenophase period has been advanced in spring in the northeast - Change of distributions of species, vegetation belts and biodiversity decline - Forest productivity decline - The majority of the permafrost in the eastern and southern parts of the Plateau would disappear - Further degradation of wetlands, grassland, and forest - More and wider forest fires in spring and summer
Sea level and sea water intrusion	- In the past 50 years, sea level has risen at an annual rate of 1.0~3.0 mm In the next 30 years, the average rising amplitude ranging from 80 mm to 130 mm - Sea water intrusion expansion
Coast erosion	- About 70% of beaches are in the state of erosion-induced retreat. - In the future, all delta regions will be exposed to more severe erosions
Marine ecosystem	- Serious damage on wetland and low land ecosystem - Coral bleaching
Human health	- High temperature weather and heat waves lead to higher morbidity and mortality - Extension of the malaria transmission season - Schistosomiasis disease will increase significantly around lake and along river

Source: Prepared by the JICA study team based on the Initial National Communication under the United Nations framework convention on Climate Change and Second National Communication under the United Nations framework convention on Climate Change

2) Summary of national adaptation programme of action (NAPA)

China has not submitted NAPA to UNFCCC yet as of June 2013 according to "UNFCCC".

3) Adaptation options

Though China has not submitted NAPA to UNFCCC yet, China has adaptation options according to "SNC" as follows.

Table 8 Adaptation options by sector

Sector	Adaptation options	
Water resources	Adapted	- To alleviate the pressure of lack of water resources - To increase the capacity for preventing floods and reducing disasters
	Adaptive or to be adapted	- Establishing a modern water conservancy management system - Building up a water-saving agriculture and industry - Enhancing the protection and building of ecosystem, restoring vegetation cover, preventing and controlling soil erosion and loss
Agriculture	Adapted	- Expansion of the area of paddy-rice fields - Raising multiple cropping index - Selecting, cultivating and popularizing stress-resistant varieties - Active popularization of water-saving agricultural measures, technologies of optimized fertilization and deep fertilization and technologies of comprehensive prevention and control of soil erosion
	Adaptive or to be adapted	- Change of planting area of each crop - Techniques on optimised fertilization and deep fertilization would be popularised - The techniques for preventing and controlling the plant diseases, pests, overgrowth of weeds and multiplication of mice would be popularized. - Irrigation methods would be improved - The covering rate of grassland would be increased
Terrestrial ecosystem	Adapted	- Various laws and regulations related to the protection of terrestrial ecosystem have been formulated and implemented in order to control and stop the deforestation, establish the natural conservation areas and forest parks.
	Adaptive or to be adapted	- Controlling and stopping the deforestation with implementing the policy for the protection of natural forests - Improving the national network of natural reserves to establish a corridor of natural reserves, and preventing and controlling other human damages and natural disasters - Developing high-quality varieties, developing drought-resistant tree species
Sea level and coastal zone	Adapted	- Constructing monitoring system of marine environment at National-level and local-level - Marine natural protection areas have been established
	Adaptive or to be adapted	- The construction of coastal facilities for the protection against sea level rise would be strengthened. - The existing coastal facilities would be heightened and reinforced.

Source: Prepared by the JICA study team based on the Initial National Communication under the United Nations framework convention on Climate and Second National Communication under the United Nations framework convention on Climate Change

4) Adaptation by sectors

The 11th FYP and the 12th FYP indicated policies and actions taken and to be taken for adaptation as follows.

Table 9 Adaptation by sectors

Sector	State	Adaptation measures and actions
Agriculture	Taken	- Deploying high-efficiency water-saving irrigation and rain-fed water efficiency farming techniques - Implementing regional plans for competitive agricultural product layout, and increasing subsides for improved crop varieties - Actively developing intensive and standard livestock production and aquaculture, and facilitating construction of an animal epidemic disease prevention system - Expanding coverage of grassland by reducing grazing intensity, and enhancing managed grasslands
	To be taken	- To implement soil-fertility engineering and soil test-based fertilization - To develop water-saving irrigation and rain-fed farming with water efficiency - To develop new crop varieties, and promote high-yield and high-quality crop
Water resources	Taken	- Flood control, sedimentation reduction, drought control ,disaster mitigation, water resource development, and urban flood prevention - To build up of a flood/drought control mechanism
	To be taken	- Construction of water conservancy infrastructures - To establish an accountability and assessment system for water resource management
Terrestrial ecosystems	Taken	- Enhancing recovery and rehabilitation of degraded ecosystems - Establishing and improving an integrated terrestrial ecosystem monitoring system at the national level
	To be taken	- To establish nature reserves for typical forest species - To reinforce vegetation protection in desert areas
Coastal zones	Taken	- Heightening seawalls against typhoon-induced storm surges - Improving relevant laws, regulations and policies to constantly enhance marine ecosystem conservation and rehabilitation
	To be taken	- To establish an operational marine climate monitoring system, establish - To enhance research on climate change impact assessment
Human health	Taken	- Establishing a network-based direct reporting system for infectious disease outbreaks and public health emergencies - Increasing investment in public health system to establish a sound public health emergency response system - Conducting research on climate change impacts on human health
	To be taken	- To establish monitoring network to watch, analyze and assess on real-time basis the potential health hazards due to extreme climate events - To capacity building for monitoring weather and human heath to expand monitoring elements - To develop and establish an early warning system for climate change and human health

Source: Second National Communication under the United Nations framework convention on Climate Change

9: Major Project List on Climate Change in India

The recent major projects supported by Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), World Bank(WB), and other donors are summarized the following list.

Table 10 Major projects list in China

#	Project title	Donor	Year (if available)
1	Project on Capacity Building on Climate Change and Public Participation	JICA	2011/12-2014/03

2	Ningxia Irrigated Agriculture and Water Conservation Demonstration Project	ADB	2012/12-
3	Hunan Forest Restoration and Development Project	ADB	2013/6-
4	Gansu Jiuquan Integrated Urban Environment Improvement Project	ADB	2013/6-
5	Enhancing the Energy Regulation System for Low-Carbon Development	ADB	2012/10-
6	China Energy Efficiency Financing III	WB	2011/10-
7	Provincial Energy Efficiency Scale-up Program	WB	2011/3-
8	Shandong Ecological Afforestation	WB	2010/5-
9	Eco-Farming Project	WB	2008/12-

Source: Prepared by the JICA study team with published data by JICA,ADB, and WB

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URL: http://www.mofa.go.jp/mofaj/area/china/data.html
2 Initial National Communication under the United Nations framework convention on Climate Change
3 Second National Communication under the United Nations framework convention on Climate Change
4 China's National Climate Change
Programme
5 UNFCCC
URL:http://unfccc.int/adaptation/workstreams/national_adaptation_programmes_of_action/items/4585.php
6 11th Five-Year Plan for National Economic and Social Development
7 12th Five-Year Plan for National Economic and Social Development
8 Letter including autonomous domestic mitigation actions
URL: http://unfccc.int/meetings/cop_15/copenhagen_accord/items/5265.php
9 China's Policies and Actions for Addressing Climate Change (2012)
URL: http://qhs.ndrc.gov.cn/zcfg/W020121122588539459161.pdf
10 the National Development Reform Commission
URL: http://en.ndrc.gov.cn/mfod/t20081218_252201.htm
11 the Department of climate change
URL: http://en.ccchina.gov.cn/list.aspx?clmId=104
12 Published data by JICA
http://gwweb.jica.go.jp/km/ProjectView.nsf/fd8d16591192018749256bf300087cfd/bb93afc9ceb3e4d94925798a0079db5f?OpenDocument
13 Published data by WB
http://www.worldbank.org/projects/search?lang=en&searchTerm=&countrycode_exact=TH
14 Published data by ADB
http://www.adb.org/projects/search/518,22259?keyword=china%20climate%20change

04 : REPUBLIC OF INDONESIA

1 : Basic Information and Key Indicators

Capital	Jakarta
Area	1,890,000 [km^2]
Population	9,600,000 (2010)
GDP, per capita	USD 3,562.9 (2012)

Source: Basic data, Regional affairs, Ministry of Foreign Affairs of Japan

2 : National Development Strategy/Action Plan

"National Action Plan Addressing Climate Change (RAN-MAPI[6])" was published by state ministry of environment in November 2007. The objective in formulating a national action plan to address climate change is for it to be used as guidance to various institutions in carrying out a coordinated and integrated effort to tackle climate change.

RAN-MAPI mentions Indonesian development strategy and action plan as follows:

- Harmonize all policies and legal instruments to broaden economic activity and maintain the competitiveness of the main production system following the three requirements of socio ecology national development (human/natural wellbeing, productivity and sustainability of natural services);
- The main instrument for compliance is the integration and harmonization of spatial use along with the utilization of public resources to overcome the "status quo" that prevents the implementation of sustainable development in Indonesia;
- The achievement of climate change mitigation targets along with social ecology targets should be achieved through adaptation of consumption pattern and sustainable production from all agents of change;
- Integration of all mitigation and adaptation targets with social-culture aspects through social preparation and social engineering that is conducted based on the specific characters of local community and environment.

3 : Institutional Arrangement of Ministries(and Key Agencies)

Climate change and its impact need to be addressed with what happened to deepen understanding of the scientific process, both the causes and the human impact on Indonesian environment.

[6] RAN MAPI : Rencana Aksi Nasional dalam Menghadapi Perubahan Iklim

Overcoming the problem of climate change should be carried out by various parties, namely the central government, regional government, private sector, civil society, education, individual and other stakeholders.

To coordinate the implementation of the climate change and to strengthen the position of Indonesia in international forums in controlling climate change, the government of Indonesia established the National Council on Climate Change (DNPI[7]) through "Presidential Regulation of the Republic of Indonesia Number 46 Year 2008". In performing its duties DNPI, "Working Group" and "Division" is organized in internal structure of DNPI. Structure of DNPI is in below.

Source: DNPI website

Figure 1 Structure of DNPI

4 : Mainstreaming Adaptation/Mitigation Actions in National Development Strategy

RAN-MAPI descriptions that relating to the mainstreaming of climate change in Indonesia such as;

[7] DNPI : Dewan Nasional Perubahan Iklim

- As an archipelagic state, Indonesia is particularly vulnerable to the impacts of climate change. Furthermore, as a developing country, it does not have the capacity to adapt to climate change as well as a developed country. Therefore, it is a concern that development conducted by the government will be hampered by the impacts of climate change.
- The poor are the group most vulnerable to the impacts of climate change, and they are also the most impacted group because of the obstruction of national development. Therefore any response to climate change should include poverty alleviation. The triple track strategy which is pro-poor, pro-job and pro-growth should become an integral part of the national strategy to address climate change.
- The national strategy addressing climate change should therefore also be directed to social engineering development, so communities can have a systematic, planned and thorough social change in order to get social and ecological benefit.

5 : Chronological Development of Climate Change-Related Policies and Framework

Policies and regulations related climate change in Indonesia are shown in below.

Table 1 Policies and Decrees Related Climate Change

Year	Relevant Policies and Decrees
2005	- Long term national plan (2005-2025)
2007	- National action plan addressing climate change (RAN-MAPI)
2008	- Presidential regulation of the republic of Indonesia No.46 year 2008 on national council for climate change
2010	- Submission of nationally appropriate mitigation actions to United Nations Framework Convention on Climate Change (UNFCC) secretariat - Indonesia climate change sectoral roadmap - 2010-2014 National medium-term development plan - Middle term national development plan
2011	- Presidential regulation of the republic of Indonesia No.61 year 2011 on the National Action Plan for Greenhouse Gas (GHG) Emission Reductions (RAN-GRK)
2012	- Guideline for implementing GHG emission reduction action plan

Source: IGES Market Mechanisms Country Fact Sheet January 2013 version, Indonesia second national communication under the UNFCCC

1) Climate Change Policy

In Indonesia, climate change policy is mentioned in RAN-MAPI. Policies are mentioned separately divided into Mitigation and Adaptation in the table below.

Table 2 Policy of Mitigation and Adaptation

Mitigation Policy	Adaptation Policy
- Management of the economic performance and quality of life of the people should be strongly linked to the reduction of greenhouse gas emissions and reduced energy intensity of economic growth, to be consistent with Indonesia's commitment to global efforts to tackle climate change. - Mitigation targets will remain difficult to	- Sustainable development framework will be consisted by integrates economic, social and ecological aspects. Development that only focuses on economic targets without consideration of natural resource sustainability will increase Indonesian vulnerability to climate change. - Sustainable development framework will be

achieve as long as the barriers to the achievement of wellbeing and social security, and the maintenance of sustainable natural services are also not reduced. The extension of deforestation and land degradation particularly in the last decade is an expensive lesson in the failure of economic management based only on the three fundamental principles above - The strategy to deliver mitigation targets in the priority economic sectors should be formulated not only to take into account each sector on its own, but also to consider a broader framework including human wellbeing, productivity and the sustainability of natural services. - Although this approach is not primarily driven by Indonesia's commitment under the Namely energy (which includes industry, power plant, transportation, as well as domestic and commercial energy use), forestry, agriculture, and infrastructure sectors) targets.	consisted by integrates economic, social and ecological aspects. Development that only focuses on economic targets without consideration of natural resource sustainability will increase Indonesian vulnerability to climate change. - The implementation of adaptation activity should be parallel with poverty alleviation efforts and economic development targets for poor communities, which are the group most vulnerable to the impact of climate change. - The development of capacity to adapt to climate change in the future should be based on experience and capacity building to address the present climate risk. - The adaptation agenda to address climate change should be linked to the National Action Plan on Reduction of Disaster Risk (RAN-PRB). RAN-PRB has been established by the Government of Indonesia as a commitment to United Resolution 63/1999. The RAN-PRB objective is to reduce risk factors that cause disaster including those related to environment and natural resources such as climate change.

Source: RAN-MAPI

2) National Efforts/Measures Against Climate Change

Implementation plan for climate change in Indonesia is mentioned in RAN-MAPI. Summary of the measures is stated in below.

[Medium –Term Action: 2012-2025]

- The achievement of mitigation targets from priority sectors along with the achievement of adaptation target throughout the welfare sectors, from the negative impact of climate change to the welfare supporting system and the sustainability of the natural services throughout Indonesia.
- The basic social culture appropriate to the long term anticipation of climate change must be developed. Specifically, it should achieve disaster risk reduction that can easily be measured, expressed in terms of public knowledge and awareness of the climate change risks, the availability of life supporting infrastructure and vital production systems, among others.

[Long –Term Action: 2025-2050]

- A long term learning period for mitigation and adaptation of climate change, that covers one generation until 2050, should not only ensure the resilience and endurance of the Indonesian nation, but should also be able to improve in a sustainable way all the three socio-ecological requirements such as quantity (growth, birth/mortality), quality (degree of health, productivity

and cohesively) and mobility (distribution/migration) with environment factor (the availability of resource/ level of damage and pollution).

6 : Characteristics of GHG Inventory

As for national inventory of GHG, the latest information is referred in the "Indonesia second national communication" that is published in 14th January, 2011 by Ministry of Environment, Republic of Indonesia. Summary of GHG emissions in 2000 is shown in below.

Table 3 Summary of 2000 GHG Emission and Eemoval (Gg CO2e)

	CO_2	CH_4	N_2O	PFC	Total
Energy	247,522.25	30,174.69	3,240.64	NO	280,937.58
Industrial Process	40,342.41	2,422.73	133.22	145.15	43,043.52
Agriculture	2,178.30	50,800.18	22,441.25	NO	75,419.73
LUCF*	821,173.35	56.35	24.47	NO	821,254.17
Waste	1,622.49	153,164.02	2,501.45	NO	157,327.96
Total	1,112,878.82	236,617.97	28,341.02	145.15	1,377,982.95

Source : Indonesia second national communication
Note: Emission from peat fine was included

7 : Key Mitigation Areas and Related Policies and Measures

1) General Aspects

National Appropriate Mitigation Action (NAMA) is provided 19th January, 2010. GHG emission reduction goal is set as 26% until 2020.

GHG reduction target for these 5 sectors can be seen in below. The additional 15% with international support (supported NAMAs) to the GHG emission reduction target bringing it up to 41% (from 26%) from Business As Usual (BAU), is achieved by choosing additional program / activities whose implementation does not utilize domestic funding sources (including government's debts) and is not for the reduction of GHG emission traded in the carbon market.

Table 4 GHG Emission Reduction Target by Sector

Sector	Emission Reduction Target (1000t-CO_2)	
	26%	41%
Forestry and Peat land	0.672	1.039
Agriculture	0.008	0.011
Energy and Transportation	0.038	0.056
Industry	0.001	0.005
Waste	0.048	0.078

Source : Guideline for Implementing Green House Gas Emission Reduction Action Plan ;Ministry of National Development Planning / National Development Planning Agency (2011)

i) National Action Plan for Greenhouse Gas Emission Reduction (RAN-GRK[8])

RAN-GRK elaborates the GHG emissions reduction target into mitigation actions from 5 main sectors that are considered as main contributors to the GHG emissions in Indonesia. RAN-GRK was

[8] RAN-GRK : Rencana Aksi Nasional Penurunan Emisi Gas Rumah Kaca

published in September 2011 by Ministry of National Development Planning and National Development Planning Agency. It is measurable and can be implemented during the period 2010 – 2020. The overall goal of RAN-GRK is to achieve sustainable development which is mitigation to climate change through the following three RAN-GRK objectives.

1. As a GHG emission reduction implementation reference by priority sectors at the national and local levels
2. As a reference to investment related to GHG emission reduction coordinated at the national and local levels
3. As a reference to GHG emission reduction action plan and strategy development by regions in Indonesia

2) NAMA-specific aspects

In Indonesia, mitigation actions are set in NAMA. The reduction will be achieved, inter alia, through the following action:

1. Sustainable peat land management
2. Reduction in rate of deforestation and land degradation
3. Development of carbon sequestration projects in forestry and agriculture
4. Promotion of energy efficiency
5. Development of alternative and renewable energy sources
6. Reduction in Solid and Liquid Waste
7. Shifting to Low-Emission Transportation Model

In addition, detail of mitigation action is shown in RAN-MAPI. Mitigation measures of each sector are stated in the table below.

Table 5 Mitigation Action by Each Sector

Sector	Responsible Institutions	Measures
LULUCF	Department of Forestry and Local government	- Development of plantation forest - Management of protected forest - Management of conservation forest
	Department of Forestry Ministry of Environment and Local Government	- Forest and land rehabilitation - Forest fire prevention - Illegal logging prevention
	Department of Agriculture, Ministry of Environment and Department of Forestry	- Sustainable peat land management
	Department of Forestry, Department of Finance and National Planning Development Agency	- Evaluation of monitoring of pilot project on quality improvement of incentive program for REDD
	National Planning Development Agency, Department of Finance, Ministry of Environment, Department of Forestry and Department of Agriculture	- Welfare improvement of the community around forest area
Marine	Department of Forestry and Local Government	- Mangrove and coastal vegetation
	Department of Forestry, Ministry of Environment and Local Government	- Coral reef rehabilitation through transplantation and artificial reefs - To extend the marine protected area
Energy (Power Plant)	Ministry of Environment, Department of Energy and Mineral Resources, Department of Finance, Local Government	- Follow up of the inventory and application of low GHG emission - Construct power plant with new and renewable energy sources according to local characteristics - Develop and operate cabon apture storage echnology infrastructure
Energy (Transportation)	Ministry of Transportation, Department of Energy and Mineral Resources, Ministry of Environment, Ministry of Finance, Department of Public Works, Local Government	- Inventory and application of low GHG emission technology. - Build mass transportation system with low GHG emission in big and metropolitan cities - Develop electric and hybrid vehicles - Develop vehicles compatible with bio fuel
Energy (Industry)	Depart of Industry, Ministry of Environment, Department of Energy and Mineral Resources and Department of Finance	- Follow up inventory and implementation of energy saving technology - Increase the number of Clean Development Mechanism (CDM) projects. - Efficiency in water use - Increase the application of new and renewable energy - Increase the application of waste to energy
Energy (Domestic (Household) and commercial))	Ministry of Industry, Department of Energy and Mineral Resources, Ministry of Finance, State Ministry of Environment Department of Publi Works and Local Government	- All government buildings have used energy saving air condition and energy saving light bulbs. - Waste to energy technology has been operated in big cities. - 100% of the population have access to electricity, particularly from renewable energy sources
Energy (others)	Department of Energy and Mineral Resources, Ministry of Environment, National Development Planning Agency, Department of Communication and Information, Ministry of Finance, Department of National Education and Local Government	- Energy saving campaign - Introduce energy saving topics in education curriculum - Implementation of energy saving program in Central and local government - Internalize the external costs (such as environmental impact) into the price of fossil fuel - Increase the utilization of new and renewable energy to 10% of total energy consumption - Realization and continue the CDM program - Increase the application of new and renewable energy sources

Source: RAN-MAPI

8 : Key climate-Vulnerability Areas and Related Adaptation Policies and Measures

1) Vulnerability to Climate Change

Impacts and vulnerabilities to climate change in Indonesia are summarized in National Action Plan for Climate Change Adaptation (RAN-API[9]) .RAN-API was published in November 2012 by Ministry of National Development Planning. RAN-API contains the action plan for adaptation of priority sectors and cross-sectors in the short-term (2013-2014), mainstreaming of the adaptation action plan into the next national medium-term development plan (2015-2019) and adaptation policy direction in the long-term (2020-2025). The objectives of formulating the RAN-API document are to:

- Provide direction for the mainstreaming of issues on climate change adaptation into national development planning process;
- Provide direction for sectoral and cross sectoral adaptation actions that are more integrated in the short-term 2013-2014), medium-term (2015-2019) and long-term (2020-2025);
- Provide direction for priority adaptation actions in the short-term that can be proposed and obtain international funding;
- As direction for sectors and regions in developing adaptation actions that are in synergy and that endeavour to develop a more effective communication and coordination system.

Impact of each sector in Indonesia is in below.

Table 6 Impact of Each Sector in Indonesia

Sector	Impact
Surface Temperature	- Increased evapotranspiration that can lead to drought - Expended vector insects population spread - Increased spread of diseases through the air medium - Change in pattern of population spread and migration of plant diseases - Change in pattern of fish migration due to change in circulation of sea flow - Brooding of sea water inundations in coastal areas that can push back the coastline - Brooding of sea water intrusion areas through ground water and rivers
Rainfall	- Drought caused by a deficit in total precipitation - Reduced availability of water due to deficit in precipitation - Floods from increased total, duration, and intensity of rain - Landslides - Decline of agriculture production due to increased temperature and change in rainfall - Increased mosquito population due to many water inundations - Greater spread of diseases through the air medium and water inundations
Extreme weather occurrence heavy rain, Storm, Strong winds	- Consecutive drought years - Change/shift in seasonal rainfall pattern - Triggered increase of probability increase of heavy rain, strong winds, storm and wave storms

[9] RAN-API : Rencana Aksi Nasional Adaptasi Perubahan Iklim

Source: RAN-API

2) Summary of National Adaptation Programme of Action (NAPA)

National Adaptation Programme of Action (NAPA) is not provided in Indonesia. However, the overall goal of RAN-API is shown in below.

1. Economic Resilience
2. Livelihood Resilience
3. Resilience of Ecosystem
4. Resilience of Special Areas
5. Supporting System

Adaptation strategies in the following sector were prepared in RAN-MAPI.

Table 7 Adaptation Action by Each Sector

Sector	Responsible Institutions	Measures
Water Resource	State Ministry of Environment, Department of Public Works, Office of the Minister of State for Research and Technology, Local Government	- Develop trench dam technology - Develop technology that could enable salt water to become drinking water - Rehabilitate water management in peat land area - Restoration of river watershed area in stages - Water saving movement
Agriculture	State Ministry of Environment, Department of Public Works and Local Government	- Conduct climate anomaly impact analysis toward seasonal shift to decide the beginning of planting season - Conduct research on superior seeds that resistance to climate change - Development of adaptive track husbandry - Research program on government strategy and policy to address climate change in agriculture sector - Formulate detail planning regarding agriculture development policy - Development program to increase farmer income - Improve various existing step and strategy based on evaluation to various concepts, strategy, efforts and technology - Develop various innovative technology, particularly for superior adaptive variation and technology for management of land and water - Food diversification policy that has been evaluated
Marine, Costal and Fisheries	Department of Marine Affairs and Fisheries, State Ministry of Environment, Department of Public Works and Local Government	- Construct the fisherman settlement with the design that already consider sea level rise
Infrastructure	Department of Public Works, State Ministry of Environment, Ministry of Housing and Local Government	- Construct drain age system and water absorption well and water reservoir facilities with trees shaded along the road - Construct the pedestrian and bikers

Sector	Responsible Institutions	Measures
		facilities with trees shaded along the road - Establish human settlement with stack housing system
Health	Department of Health, State Ministry of Environment and Local Government	- Strengthened health surveillance and health protection
Forestry and Biodiversity	State Ministry of Environment, Department of Forestry and Local Government	- Inventory biodiversity in Indonesia - Protection of forest ecosystem
Cross Sector	Office of the Minister of State for Research and Technology, Department of Energy and Mineral Resources and State Ministry of Environment	- Research in term of government and community science in order to increase the adaptive capacity. - Develop early warning system.

Source: RAN-MAPI

9 : Major Project List on Climate Change in Indonesia

#	Project title	Donor	Year (if available)
1	Public Awareness, Training And Education Program On Climate Change Issue For All Levels Of Societies In Mitigation And Adaptation	Indonesia Climate Change Trust Fund (ICCTF)	Not Available
2	Climate Adaptation Strategies For Rural Livelihoods In Indonesia	Aus AID, CSIRO	Not Available
3	Climate Adaptation And Disaster Resilience	USAID	Not Available
4	Indonesia Marine And Climate Support Project	USAID	Not Available
5	Strategic Planning And Action To Strengthen Climate Resilience Of Rural Communities In Nusa Tenggara Timor Province	SCCF, UNDP, West Nusa Tenggara Province	Not Available
6	Policy Advice For Environment And Climate Change	German Federal Ministry for Economic Cooperation and Development	Not Available
7	Sub-Project 1 The Project of Low Carbon Development Strategy Project by Integrating NAMA & Adaptation Into National Development Planning	JICA	Not Available
8	Regional Climate Change Projection Development and Interpretation for Indonesia	AUS AID	14 March 2010 (Final Report)
9	Adapting to Climate Change in Eastern Indonesia	USAID	September 2010-September2013
10	Indonesia Clean Energy Development (ICED)	USAID	March 2011 – September 2014
11	Low-Carbon and Resilient Development Program	ADB	9 November 2011
12	Climate Change Measurement Program・Loan	JICA	2008
13	Climate Change Measurement Program・Loan (II)	JICA	2009
14	Climate Change Measurement Program・	JICA	2010

#	Project title	Donor	Year (if available)
	Loan (III)		
15	Geothermal Development Acceleration Program (Tulehu Geothermal Power Plant Project〈E/S〉)	JICA	2013
16	Indramayu Coal Fired Power Plant Project (E/S)	JICA	2013

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URL: https://libportal.jica.go.jp/fmi/xsl/library/public/data/plan_in_operation_e-p.html

05 : Republic of Korea

1 : Basic Information and Key Indicators

Capital	Soul
Area	100,000 [km^2]
Population	50,000 people (2012)
GDP per capita	USD 115.12 million (2012)

Source: Ministry of Foreign Affairs of Japan (June, 2013)

2 : National Development Strategy/Action Plan

Since President Lee Myung-bag initiated "Low carbon, green growth" as nation's new guiding economic development philosophy in 2008, stressing that environmental stewardship can be an engine for economic growth in Korea.

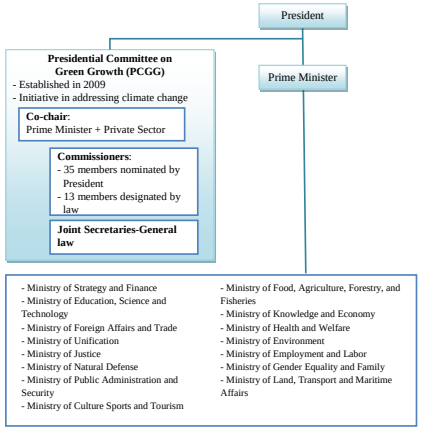
In 2009, the government announced plans to invest US$85 billion in clean energy technologies and implementing its green growth plan, estimated to create more than one million new jobs and bolster a clean tech export industry.

Followed by the President's declaration, as for national strategy related to climate change, Korean government enacts "Framework Act on Low Carbon, Green Growth and enforcement ordinance" in April, 2010. Based on the law, climate change adaption plan(CCA), Green Growth 5-year Implementation Plan, National Climate Change Adaptation Master Plan, Action Plans for Each Sector and Local Government are prepared.

3 : Institutional Arrangement or Ministries (and Key Agencies)

Korea's institutional arrangement is summarized in the following figure. The key organization is Presidential Committee on Green Growth(PCGG) which is established in 2009. PCGG is co-chaired by Prime minister and private sector and includes thirty five commissioners nominated by president.

Under President and Prime minister, fifteen relevant ministries are corporate on climate change issues.



Source: Korea Environment Institute, Republic of Korea's 3rd National Communication to UNFCCC
Press Release on Enforcement Ordinance of ETS Law, PSGG, 13 Nov 2012

Figure 1 Institutional Framework for Climate Change

4 : Mainstreaming Mitigation/Adaptation Actions in National Strategy

According to" 11th NESDP", mainstreaming adaptation/ mitigation actions in Thailand is shown as follows.

- To install the value of social responsibility in the populations in the point of view of energy conservation and adaptation to climate change and disasters so that their consumption behaviour could be environmentally responsible
- To develop to generate resilience in every dimension of Thailand's progress toward balance and sustainability by restoring and utilizing natural resources and environmental capitals as well as toward low-carbon economy

In the strategy for managing natural resources and environment toward sustainability of 11th NESDP, the following strategies for climate change were stated.

- To create resilience so as to prepare for dealing with impacts from climate change and worldwide environmental issues
- To enhance the adaptive capacity to meet climate change challenges and disasters at all levels community, regional, and countrywide
- To build a secure base of natural resources and a sound environment, support community participation, and safeguard people and the nation from the effects of climate change and disasters
- To foster resilience toward trade measures associated with environmental conditions and climate change impacts

5 : Chronological Development of Climate Change-Related Policies and Framework

3) Climate Change Policy

The chronological development of climate change related policies and framework is summarized in the following table. Korea has ratified Kyoto Protocol in 2002. In 1998, it established a Climate Change Committee which is chaired by Prime Minister in order to prepare National Action Plan for UNFCCC. In 2008, the 3rd National Communication is submitted to UNFCCC.

Table 1 Chronological Development of Climate Change Related Policies and Framework

April 1998	Established Climate Change Committee
1999-2001	Prepared 1st National Action Plan for UNFCCC
March 2001	Established Special Committee for Climate Change in National Assembly
October 2002	Ratification of Kyoto Protocol
2002-2004	Prepared 2nd National Action Plan for UNFCCC
2005-2007	Prepared 3rd National Action Plan for UNFCCC
2006	Established National Inventory System
2008	Submitted 3rd National Communication to UNFCCC
2008-2012	Prepared 4th National Action Plan for UNFCCC
February 2009	Established Presidential Committee on Green Growth
November 2009	Set the national mid-term GHG reduction target- 30% reduction below Business As Usual(BAU) scenario by 2020
April 2010	Enforcement of the Framework Act on Low Carbon Green Growth
June 2010	Established the GHG Inventory % Research Centre of Korea(GIR)
November 2012	Enforcement Decree of the Allocation and Trading of GHG Emissions Allowances passed by the Cabinet

Source: Documents prepared by Korea Energy Economics Institute
Paper prepared for the 11th workshop on GHG inventories in Asia by Korea Environmental Corporation (KECO)

6: Characteristics of GHG Inventory (Sectoral and Temporal Dimensions)

1) Sectoral Dimension

National inventory data was summarized in "Korea's third National Communication under the United Nations framework convention on Climate Change (TNC)" that was prepared in 2009. The results of national Green House Gas (GHG) inventory by sector in 2009 were summarized as below. Land use change and forestry used in the following table does not include CO_2 adsorption by forests.

Major emission sector is energy sector in Korea which accounts for approximately 85% of total GHG emissions. GHG emissions by sub-sector of energy sector is also indicated in the table 2.

Table 2 GHG Inventory by Sector in 2009

Sector	CO_2 (CO_2-eq Gg)	Percentage (%)
	2009	2009
Energy	515.85	84.9
Industrial Process	56.50	9.3
Agriculture	20.05	3.3
Waste	15.19	2.5
Total	607.6	100

Source: Korea's Third National Communication under the United Nations framework convention on Climate Change

The share of GHG emission in 2009 shown in the table XX is described as the following figure.

Source: Korea's Third National Communication under the United Nations framework convention on Climate Change

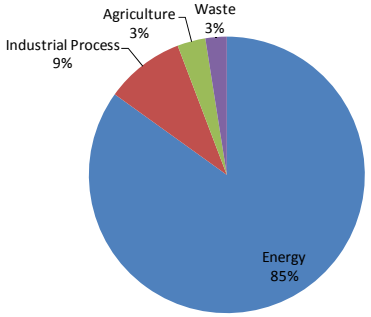


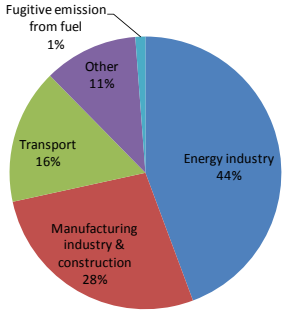
Figure 2 Share of GHG Emission in 2009

Table 3 GHG Emission of Energy Sector in 2009

Sub-Sector	Total Emissions (Gg CO_2-eq)	Share Percentage (%)
Energy industry	228.7	44.3
Manufacturing industry & construction	140.8	27.3
Transport	82.6	16.0
Other	57.6	11.2
Fugitive emission from fuel	6.4	1.2
Total	516.0	100

Source: Korea's Third National Communication under the United Nations framework convention on Climate Change

The share of GHG emission by sub sector in 2009 shown in the table 3 is described as the following figure.



Source: Korea's Third National Communication under the United Nations framework convention on Climate Change

Figure 3 Share of GHG Emission by Sub-Sector in 2009

7: Key Mitigation Areas and Related Policies and Measures

1) National Appropriate Mitigation Action (NAMA) –Specific Aspects

National Appropriate Mitigation Action (NAMA) plan has been submitted to UNFCCC in 2010.

Table 4 Mitigation Action Plan

Mitigation Plan	Action
Emission Reduction Goal	- 30% reduction from Business As Usual(BAU) by 2020

Source: Korea's National Appropriate Mitigation Action (NAMA) in 2010

2) Mitigation Options

Aiming for enhancement of climate change policies to pursue more active, combative measure, Korea developed the Comprehensive Action Plan for climate change 2008-2012, which includes contents related to environment, industry, and a framework for international cooperation. In the plan, mitigation options by sector are summarized as in the following table.

Table 4 Mitigation Option by Sectors in Korea

Sector	Mitigation Options
Energy and industry	- To enhance energy demand management in the industrial sector - To expand new and renewable clean energy supply - To expand high-efficiency equipment supply - To promote early action on GHG reduction
Transport	- To enhance management of transport demand and efficient traffic system - To revitalize low emission vehicles - To establish low carbon distribution system
Agriculture	- To improve agro-daily farming methods
Forestry	- To protect and expand forest carbon sinks - To implement forest carbon offset projects - To promote use of wood bio-energy
Waste	- To minimize waste occurrences and resource recovery

Source: Korea's Third National Communication under the United Nations framework convention on Climate Change

8 : Key Climate-Vulnerability Areas and Related Adaptation Measures

1) Vulnerability to Climate Change

Impacts of climate change in each sector in Thailand were indicated in "SNC" as follows.

Table 5 Impacts of Climate Change in Each Sector in Korea

Sector	Impact
Health	- Increased death and disease from heat waves - Increased death from metrological disasters - Spreading of disease from insects and rodents - Increased patients(e.g. Asthma, allergy
Natural disasters	- Increased in meteorological disasters - Increased in the scale of disaster damage - Increased frequency of extreme weather
Agriculture	- Crop cultivation area moving northward - Change of crop cultivation seasons - Obstacles to productivity and stability of agricultural ecosystem
Forest	- Shift of forest vegetation area - Change of forest ecosystem structure - Increased forest disasters - Change in number of insect pests and disease occurrences
Ocean and fisheries	- Coastal erosion and flooding due to sea level rise - Damage to marine ecosystem and change in fishery resources due to increasing water temperature
Water and management	- Increased damage from floods, droughts and typhoons - Increased damage due to deterioration of quality and quantity of water resources
Ecosystem	- Change in ecosystem due to climate change - Acceleration in domestic inflow of exotic species due to climate change

Source: Korea's Third National Communication under the United Nations framework convention on Climate Change

2) Summary of National Adaptation Programme of Action (NAPA)

Korea's National Adaptation Programme of Action (NAPA) has not been provided, however, "TNC" shows a part of adaptation measures as below.

Table 6 National Adaptation Program of Action in Each Sector in Korea

Sector	Adaptation Measures
Health	- Investigation of damages from heat waves - Measures to prevent harm to those vulnerable to heat waves - Monitoring and management of infectious dieses - Monitoring and management of infectious dieses from insects and rodents - Expand allergy monitoring and response facilities
Natural disasters	- Analysis of vulnerable areas and higher disaster prevention standards - Maintain disaster risk facility, build disaster information system - Climate-friendly land use management system
Agriculture	- Development and dissemination of crop cultivation technologies and new crops - Stable water supply for agricultural use - Prevent storm and flood damage - Forecast and develop system to prevent spread of disease and insect pests and livestock disease
Forest	- Biodiversity conservation in situ and ex situ - Maintenance and increase of forestry productivity - Prevention policy of forest fire, landslides, and disease and insect pests
Ocean and fisheries	- Management and adaptive response to sea level rise - Monitoring and forecasting charges in fisheries, ensure future fishery resources - Measures to reduce infectious diseases on fisheries and damage from acidification
Water and	- Create infrastructure with reduced vulnerability and improve facilities

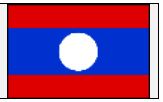
management	-	The four major river restoration project
	-	Improved water quality and preservation of river ecosystem
Ecosystem	-	Monitoring system and evaluate vulnerability
	-	Conservation of species and genetic resources and restoration of ecological connection
	-	Preservation and management of damage from foreign species and unexpected outbreaks

Source: Korea's Third National Communication under the United Nations framework convention on Climate Change

References

1 Republic of Korea's 3rd National Communication to UNFCCC
2 Press Release on Enforcement Ordinance of ETS Law, PSGG, 13 Nov 2012
3 Documents prepared by Korea Energy Economics Institute, Dr.Seung Jick Yoo
4 Paper prepared for the 11th workshop on GHG inventories in Asia by Korea Environmental Corporation (KECO)
5 Korea's National Appropriate Mitigation Action(NAMA) in 2010

06 : Lao People's Democratic Republic



1 : Basic Information and Key Indicators

Capital	Vientiane
Area :	240,000 [km^2]
Population	6,390,000 (2011)
GDP, per capita	USD 1,7281 (2011)

Source : Basic data, Regional affairs, Ministry of Foreign Affairs of Japan

2 : National Development Strategy/Action Plan

To improve public awareness and understanding of various stakeholders about climate change, vulnerabilities and impacts, including Greenhouse Gas (GHG) emission sources and their relative contributions, and of how climate change will affect the country's economy. Specific guiding principles show in below.[10] These guiding principles are mentioned in "National Strategy on Climate Change of the Lao PDR" that is published in March, 2010 by Department of Environment, Watershed Resource and Environment Administration.

1) **Climate Change Mainstreaming as Core Element:** Ensure that climate change adaptation and mitigation are incorporated as a priority into the 7th National Biodiversity Strategy and Action Plan (NBSAP) 2011-2015, as well as into strategies, programmes and projects at all levels of Government, institutions, businesses and local communities, within the framework of sustainable development. Social and economic development and poverty eradication are intended as overriding priorities.

2) **International Partnerships:** Work with and seek support from international partners for capacity building and development and transfer of technology to support the implementation, adaptation and mitigation strategies and actions for low-carbon growth.

3) **Capacity Building as Pressing Priority:** Build national capacities in Government agencies, technical institutions, the private sector and local communities to develop and implement climate change adaptation and mitigation for policies and actions

[10] National Rio+20 Report for Lao PDR ; Ministry of Natural Resources and Environment Vientiane (June 2012)

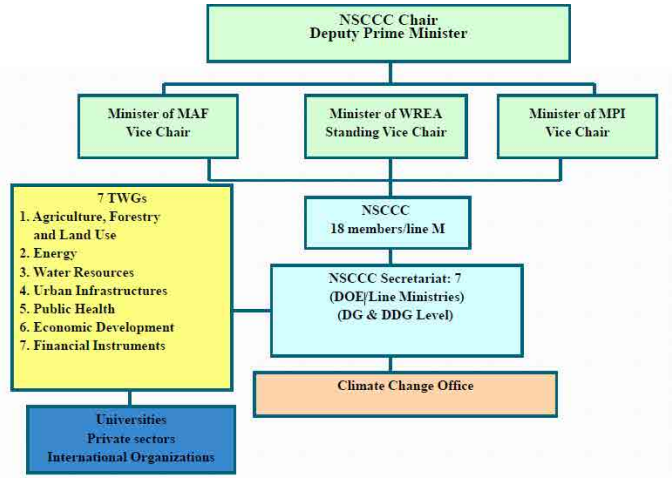
4) Integrated solutions and co-benefits: Develop and implement integrated adaptation and mitigation solutions that are low-cost, improve energy efficiency, promote cleaner production, build adaptation/ mitigation synergy and generate economic, environmental and socioeconomic benefits

5) Innovative financial instruments: Elaborate appropriate financial packages to ensure optimal implementation of adaptation and mitigation action plans

6) Awareness, education and community participation leading the way: Increase public awareness and understanding of climate change impacts and the need for mindset transformation toward adaptation and mitigation, to mobilize communities to implement climate change adaptation and mitigation actions

3 : Institutional Arrangement of Ministries (and Key Agencies)

National Steering Committee on Climate Change (NSCCC) and the Technical Working Group (TWG) is established in 2008.[11] Climate change management structure is in below.



Source: WGIA8
Note : MAF : Ministry of Agriculture and Forestry (MAF), WREA : Water Resources & Environment Administration, MPI : Ministry of Planning and Investment, DOE: Designated Ope あ rational Entity

Figure 1 Structure of Climate Change Management in Lao PDR

[11] The 8th Workshop on GHG Inventories in Asia (WGIA8), July 2010

4: Mainstreaming Mitigation/Adaptation Actions in National Strategy

"National Strategy on Climate Change of the Lao PDR" is published 2010 to secure a future where the Lao PDR is capable of mitigating and adapting to changing climatic conditions in a way that promotes sustainable economic development, reduces poverty, protects public health and safety, enhances the quality of Lao PDR's natural environment, and advances the quality of life for all Lao people. Major descriptions relating to the mainstreaming in the strategy are stated below.

- Reinforce sustainable development goals of the Lao PDR, including measures to achieve low-carbon economic growth
- Increase resilience of key sectors of the national economy and natural resources to climate change and its impacts;
- Enhance cooperation, strong alliances and partnerships with national stakeholders and international partners to implement the national development goals
- Improve public awareness and understanding of various stakeholders about climate change, vulnerabilities and impacts, GHG emission sources and their relative contributions, and of how climate change will impact the country's economy, in order to increase stakeholder willingness to take actions.

5: Chronological Development of Climate Change Related Policies and Framework

Since 1995, when Lao PDR joined the global community by ratifying the United Nations Framework Convention on Climate Change (UNFCCC), a series of policies and law are arranged in Lao PDR. Policies and law that related climate change are in below.

Table 1 Climate Change Policies and Law

Year	Policies and Law
1996	Water Law
1996	Forest Law
1996	Land Use Law
1997	Electricity Law
1997	Mining Law
1997	Road Transportation Law
1998	Agriculture Law
1999	Environment Law
1999	Urban Planning Law
2005	Policy on Sustainable Hydro-power Development
2010	Decree on Social and Environment Impact Assessment
2010	Strategy on Climate Change of the Lao PDR
2011	Renewable Energy Development Strategy in Lao PDR

Source: WGIA8

1) Climate Change Policy

"Strategy on Climate Change of Lao PDR" is approved by Government of Lao PDR in March 2010. Strategy a framework document has identified seven priorities areas for mitigation and adaptation such as;[12]

- Agriculture and Food Security
- Forestry and Land Use Change
- Water Resources
- Energy and Transport
- Industry
- Urban Development
- Public Health

2) National Efforts/Measures Against Climate Change

Implementation plan such as activities by period for climate change in Lao PDR is not mentioned in any materials.

6 : Characteristics of GHG Inventory

As for national inventory of GHG, the latest information are referred in the "Lao PDR the first National Communication on Climate Change", is published in November, 2000.

The net annual CO_2 removal is of the order of 121641 Gg, which is much larger than the total fuel based CO_2 emissions of 414.9 Gg. The total CH_4 emission in the economy is 312 Gg, of which agriculture accounts for 81% of emissions and forestry and waste sectors for the rest.

Table 2 Summary of GHG Inventory (Gg)

Sector	CO_2	CH_4	N_2O
Fossil fuel consumption	414.9		
Traditional biomass burned for energy Agriculture		22.75	0.12
Enteric fermentation		97.92	
Manure management		14.38	
Rice cultivation		158.97	
Change in forest and woody biomass	-121,614		
Forest conversioin Aboveground CO_2 released from on-site burning	6752.67	29.5	0.2
Forest conversion Aboveground CO_2 released from off-site burning	628.16		
Aboveground release from decay Waste	9247.84		
Landfills		11.20	
Waste water		0.32	
Grand Total	-104570	312	0

Source: Lao PDR the first National Communication to the UNFCCC

7 : Key Mitigation Areas and Related Policies and Measures

1) General Aspects

[12] WGIA8

National Appropriate Mitigation Action (NAMA) is not provided in Lao PDR at this moment (as of June 2013). GHG reduction target is not set in Lao PDR.

2) NAMA-Specific Aspects

In Lao PDR, mitigation actions are stated in the 'Strategy on Climate Change of the Lao PDR' that is provided as the Prime Minister Decree in July 2010. Mitigation measures of each sector are stated in the table in below.

Table 3 Mitigation Measures in Lao PDR

Sector	Mitigation Measures
Agriculture and Food security	- Reducing methane emissions from paddy fields by exercising water management, soil amendments, organic matter management, different tillage, rotation, and cultivar selection - Reducing methane emissions from enteric fermentation by improving production efficiency - Reducing emissions from livestock manure through balanced feeding, lowering the Nitrogen content of the animal feeds, anaerobic digestion for methane production for use as a source of cleaner energy, waste application (dosing and injection) and the introduction of household-based, community-based and animal farm-based biogas facilities - Promoting new technology transfers such as biogas digester for electricity and bio-ethanol production as a means of wastewater treatment generated from agro-processing industries
Forestry and Land Use Change	- Stop "slash and burn" agriculture by forest management, afforestation of degraded forest and reforestation to increase the forest cover to 65% by 2015 and 70% by 2020; Enhance carbon sink by making sustainable agriculture land available and encouraging alternative livelihood opportunities such as eco-tourism, non-timber forest products and handicraft - Reducing off-site burning by providing alternative fuels for forest dependent communities, such as biogas, small hydro, energy-saving stoves, use of harvest residues and community-based fuel-wood plantations - Reducing forest fires by setting regulations and necessary measures to intercept and stop forest fires, and providing awareness building and training to villagers on the harmful effects of forest fires and fire prevention - Integrating forest management: including forest-food production systems, use of NTFP (Non-Timber Forest Products) and community-based forest management - Effectively mapping and planning the land use for different purposes over medium and long terms to minimize the issue of land encroachment into the National Protected Area - Pursuing carbon market opportunities and early introduction of pragmatic, flexible mechanisms, particularly the REDD-plus (Reduced Emissions from Deforestation and Forest Degradation and Conservation in developing countries) by implementing more reforestation and afforestation programmes
Energy and Transport	- Electrification: reaching the target of 70% by 2010 and 90% by 2020, as set in the National Growth and Poverty Reduction Strategy (NGPES) - Renewable energy: accelerating the development of such renewable

Sector	Mitigation Measures
	energy sources such as solar and wind as well as hydropower including mini-hydro — household-based, institution-based and/or community-based — especially for remote communities - Cleaner energy: by making use of the coal-bed methane and coalmine methane, and seeking cleaner technologies for the development of the country's abundant lignite resources - Energy efficiency and savings: by introducing energy-efficient lighting and appliances, and energy-efficient buildings - Low-carbon transport: by promoting the use of alternate energy operated motor vehicles, including cars and motorcycles and pursuing environmental sustainable transport strategy - Improving the public awareness on energy saving through implementing initiatives such as car free day, Earth Day and World Environment Day - Seeking the opportunities under the Clean Development Mechanism (CDM) or other flexible, pragmatic financing mechanisms to undertake the development of climate-friendly renewable resources, including hydropower (including mini-hydro), biogas, solar, coal-bed and coal-mine methane, non-emission transport, and energy-efficient lighting and buildings
Industry	- Improving energy efficiency during the production process - Reducing wood waste through the enhancement of furniture manufacturing skills - Promoting the use of waste biomass or agricultural residues to produce renewable energy or thermal energy for drying and heating products through combustion, gastification or pyrolysis
Urban Development	- Reduction of GHG emissions from the solid waste sector in Lao PDR through applying the 3Rs (reduces, reuse and recycle) - Upgrading solid waste collection services for full coverage of the major urban centers and neighbourhoods, so as to avoid GHG releases from open burning and decomposition - Building recycling facilities in order to reduce the amount of wastes to be disposed in landfills - Composting organic contents to manufacture organic fertilizers - Effectively managing sewage sludge removed from the domestic septic tanks and slurry removed from the waste treatment plants - Constructing new landfill facilities that can capture methane; if financially viable, retrofitting the existing landfill - Promoting environmental sustainable urban development, integrating the issues of waste management, low carbon transportation - Encouraging the participation of the private sector and international partners in GHG emission reduction from wastes under the CDM and other financing mechanisms

Source: Strategy on Climate Change of the Lao PDR

8 : Key Climate Vulnerability Areas and Related Adaptation Policies and Measures

1) Vulnerability to Climate Change

National Adaptation Programme of Action to Climate Change (NAPA) is provided in March 2009. According to NAPA, national statistics on disasters that have occurred over the last three decades, it has been observed that both the severity and frequency of floods and droughts have increased.

Floods and droughts have significant impacts on agriculture, forestry, water resources, health and economic growth, and therefore on the livelihoods of the Lao people.[13]

2) Summary of National Adaptation Programme of Action (NAPA)

NAPA revealed that in Lao PDR there are four main sectors which are directly and severely affected by climate change: agriculture, forestry, water and water resources, and public health. In this regard, the NAPA working under government of Laos identified needs and priority activities for climate change adaptation in four main sectors.

Table 4 Adaptation Measures in Lao PDR

Sector	Measures
Agriculture	- Strengthen the capacity of the National Disaster Management Committees. - Promote secondary professions in order to improve the livelihoods of farmers affected by natural disasters induced by climate change. - Land use planning in hazard prone and affected areas. - Promotion of short-duration paddy and other cash crops in natural hazard prone areas. - Technical capacities of local agricultural officers in natural hazard prone areas strengthened. - Improve and develop crop varieties and animal species that are better adapted to natural hazard prone areas. - Improve and construct crop and animal disease laboratories at central and local levels and build related capacity of technical staff. - Train farmers on the processing and storing of human and animal food stuffs. Establishment and strengthening of farmers groups in natural hazard prone areas. - Promote soil improvement using locally available organic fertilizer and existing agricultural waste. - Develop appropriate bank erosion protection systems for agricultural land in flood prone areas. - Promote integrated pest management (IPM) and use of herbal medicines in pest management and livestock treatment. - Develop the capacity of technical staff in organic fertilizer research.
Forestry	- Continue the slash and burn eradication programme and permanent job creation program. - Strengthen capacity of village forestry volunteers in forest planting, caring and management techniques as well as the use of village forests. - Carry out surveys and identify and develop forest areas suitable for supporting seed production. - Promote and establish tree nurseries to provide saplings to areas at high risk from flooding or drought. - Raise public awareness on wildlife conservation and forest-fire prevention. - Set up and further strengthen the technical capacity of the forest fire management teams at provincial, district and village levels. - Public awareness campaign to disseminate information on forest and wildlife regulations and laws, and strengthen the implementation of these regulations. - Develop agro-forestry systems for watershed protection and erosion reduction in steep areas. - Development of small reservoirs in upland areas in order to provide water for wildlife/ aquatic animals and plants during the dry season. - Public awareness campaign on pest and disease outbreaks in wildlife caused by

[13] National Adaptation Programme of Action to Climate Change (NAPA)

Sector	Measures
	natural disasters, and associated preventive measures. - Extension campaign on integrated forest plantation management for crop pest and disease control. - Conduct research and select seeds of plant species suitable for flood and drought prone areas. - Construct bush fire barriers / forest-fire protection buffer zones in forest conservation areas. - Build research capacity on wildlife pests /diseases and outbreaks of animal diseases.
Water	- Awareness raising on water and water resource management. - Mapping of flood-prone areas. - Establish an early warning system for flood-prone areas, and improve and expand meteorology and hydrology networks and weather monitoring systems. - Strengthen institutional and human resource capacities related to water and water resource management. - Survey underground water sources in drought prone areas. - Study, design and build multi-use reservoirs in drought prone areas. - Conservation and development of major watersheds. - Build and improve flood protection barriers to protect existing irrigation systems. - Improve and protect navigation channels and navigation signs. - Repair/rehabilitate infrastructure and utilities damaged by floods in agricultural areas.
Public Health	- Improve systems for the sustainable use of drinking water and sanitation with community participation in flood and drought prone areas. - Improve knowledge and skills of engineers who design and build water and sanitation systems.

Source :National Adaptation Programme of Action to Climate Change

9 : Major Project List on Climate Change in Lao PDR

#	Project title	Donor	Year(if available)	Category	URL
1	Climate Impact And Adaptation Sectoral Strategy For Rural Infrastructure In Lao PDR	ADB	Not Available	Adaptation	http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=LAO&ThisTab=Adaptation
2	Improving The Resilience of The Agriculture Sector In LAO PDR To Climate Change Impacts	UNDP and GEF	Not Available	Adaptation	http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=LAO&ThisTab=Adaptation
3	Capacity Enhancement For Coping With Climate Change : Lao People's Dem Rep	ADB and the Nordic Development Fund	Not Available	Capacity development	http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=LAO&ThisTab=Adaptation
4	Improving The Resilience Of The Agricultural Sector In Lao PDR To Climate Change Impacts	LDCF	Not Available	Adaptation	http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=LAO&ThisTab=Adaptation
5	Climate Impact And Adaptation Sectoral Strategy For Rural Infrastructure In Lao	ADB Small Grants	Not Available	Adaptation	http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=LAO&ThisTab=Adaptation

#	Project title	Donor	Year(if available)	Category	URL
	PDR				
6	National Adaptation Programme of Action to Climate Change	United Nations Development Programme (UNDP), Water Resources and Environment Administration (WREA)	2009	Adaptation	http://www.monre.gov.la/wrea/the-news/local-news/100-un-launches-climate-change-programmes-in-laos.html
7	National Capacity Needs Self Assessment for Global Environment Management	UNDP, WREA	2009	Capacity Development (Adaptation)	http://www.monre.gov.la/wrea/the-news/local-news/100-un-launches-climate-change-programmes-in-laos.html
8	Vulnerability Assessment of Climate Risks in Attapeu Provinc, Lao PDR	UNDP – IUCN – Mekong River Commission (MRC) GEF-FUNDED Programme	January 2005	Adaptation	http://www.mekongwetlands.org/Common/download/Laos_Vulnerability_Assessment_w_cover.pdf
9	MANAGING CLIMATE CHANGE RISKS FOR FOOD SECURITY IN LAO PDR	European Union	July 2011	Adaptation	http://www.foodsec.org/fileadmin/user_upload/eufao-fsi4dm/docs/Lao%20PDR%20-%20RIMES%20(2011-07)%20Managing%20Climate%20Change%20Risks%20for%20Food%20Security%20copy.pdf
10	Improvement of Capabilities to Cope with Natural Disasters Caused by Climate Change in Laos	JICS	August 2011 – October 2011	Capacity Development (Adaptation)	https://www.devex.com/en/projects/improvement-of-capabilities-to-cope-with-natural-disasters-caused-by-climate-change-in-laos http://www.mofa.go.jp/policy/oda/data/pdfs/laos.pdf
11	The Programme for Introduction of Clean Energy by Solar Electricity Generation System	JICS	Not Available	Mitigation	http://www.jics.or.jp/jics_html-e/profile/pdf/scheme_environment.pdf

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http://www.mofa.go.jp/mofaj/area/laos/data.html

2 The 8th Workshop on GHG Inventories in Asia (WGIA8)
http://www-gio.nies.go.jp/wgia/wg8/pdf/0-3_syamphone_segchandala.pdf

3 Strategy on Climate Change of the Lao PDR
http://www.forestcarbonasia.org/other-publications/strategy-on-climate-change-of-the-lao-pdr/

4 National Rio+20 Report for Lao PDR
http://sustainabledevelopment.un.org/content/documents/1017laonationalreport.pdf

5 National Adaptation Programme of Action to Climate Change
http://unfccc.int/resource/docs/napa/laos01.pdf

07 : MONGOLIA

1 : Basic Information and Key Indicators

Capital	Ulaanbaatar
Area	1,564,100 [km^2]
Population	281,1600 (2011)
GDP, per capita	USD 2,562 (2011)

Source : Basic data, Regional affairs, Ministry of Foreign Affairs of Japan

2 : National Development Strategy/Action Plan

"The Mongolia National Action Programme on Climate Change (NAPCC)" approved in 2000 by Minister for Nature, Environment and Tourism. NAPCC aims not only to meet the United Nations Framework Convention on Climate Change (UNFCCC) obligations, but also to set priorities for action and to integrate climate change concerns into other national and sectoral development plans and programmes. The NAPCC is based on the pre-feasibility studies on climate change impact and adaptation assessment, Greenhouse Gases (GHG) inventories, and GHG mitigation analysis. Goal of NAPCC is in below.[14]

- To maintain ecological balances
- To develop social and economic resilient to climate change
- To reduce vulnerabilities and risks
- To mitigate GHG emissions through improvement of economic productivity and efficiency
- To support implementation of 'Green growth' policies

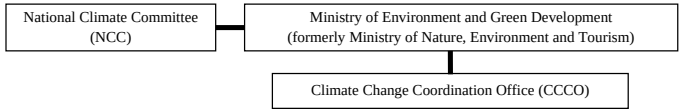
3 : Institutional Arrangement of Ministries (and Key Agencies)

Climate change organization charts in Mongolia shows in below.

The Government has established an inter-disciplinary and inter-sectoral National Climate Committee (NCC) led by the Minister for Nature, Environment and Tourism, to coordinate and guide national activities and measures aimed to adapt to climate change and to mitigate GHG emissions.

The NCC approves the country's climate policies and programmes, evaluates projects and contributes to the guidance of related activities. Also, the Government has established the Climate Change Coordi-nation Office (CCCO) under the supervision of the Chairman of the NCC.

[14] Source: Mongolia second national communication
Market Mechanisms Country Fact Sheets, January 2013 (IGES)



Source: Mongolia second national communication
Market Mechanisms Country Fact Sheets, January 2013 (IGES)

Figure 1 Organizational Chart

4 : Mainstreaming Mitigation/Adaptation Actions in National Strategy

The Millennium Development Goals-based Comprehensive National Development Strategy (MDG-based CNDS) of Mongolia approved in January 2008 by the Government of Mongolia. MDG-based CNDS identifies the need "to create a sustainable environment for development by promoting capacities and measures on adaptation to climate change, halting imbalances in the country's ecosystems and protecting them".

In addition, the MDG-based CNDS includes a Strategic Objective to promote capacity to adapt to climate change and desertification, and to reduce their negative impacts.[15]

5 : Chronological Development of Climate Change-Related Policies and Framework

The parliament of Mongolia has passed several laws directed toward environmental protection which forms the legal basis for the protection of the environment and Mongolia's natural resources. Climate change related policies and laws are shown in below.

Table 1 Relevant Policies and Laws of Climate Change

Year	Relevant Policies and Laws
1995	The Mongolian Action Program for the 21st Century(MAP21)
1995 and 2010	The Law on Air
1995 and 2007	The Law on Environmental Protection
1997	The State Policy on the Environment
July 2000	The Mongolia National Action Programme on Climate Change (NAPCC)
June 2005	The National Renewable Energy Program (2005-2020)
2006	The LPG Programme
January 2007	The Renewable Energy Law
2007	Law on Forest
2008	The MDG-based Comprehensive National Development Strategy of Mongolia
May 2008	The Transit Mongolia Programme
2009	The Nuclear energy law
2010	NAPCC 2011-2020 (Updated)
2010	New Reconstruction Mid-term (development) Program 2010-2016

Source: Mongolia second national communication

[15] Mongolia second national communication

1) Climate Change Policy

NAPCC is updated in 2010. Major tasks and solutions in the NAPCC are stated in below.[16]

- Set the legal environment, structure, institutional and management frameworks for addressing on climate change.
- Ensure environmental sustainability is maintained and reduce socio-economic vulnerabilities and risks through strengthening the national climate change adaptation capacity.
- Mitigate GHG emissions and establish a low carbon economy through the introduction of environmentally friendly technologies and improvement in energy effectiveness and efficiency.
- Enhance the national climate observation, research and monitoring network and strengthen employee's capacity
- Conduct public awareness campaigns and support citizen and community participation in actions against climate change

2) National Efforts/Measures to Climate Change

The NAPCC includes a set of measures actions and strategies in the two periods; 1st Phase (2011 -2016) and 2nd Phase (2017-2021). Summary of the indicators is stated in the table below.

Table 2 Indicators of Each Phase

First Phase (2011 - 2016)	Second Phase (2017 - 2021)
- Specific fuel consumption of power plants for electricity generation will not exceed 340gJ/kWh	- Specific fuel consumption of power plants for electricity generation will not exceed 340gJ/kWh.
- Specific fuel consumption of thermal energy production will be reduced by 20 kgJ/gCal compared to 2010.	- Specific fuel consumption of thermal energy production will be reduced by 30 kgJ/gCal compared to 2010.
- Renewable energy will account for 10% of the total national energy production. Heat use will be reduced by 25%.	- Renewable energy will account for 20% of the total national energy production. Heat use will be reduced by 30%.

Source: Market Mechanisms Country Fact Sheets, January 2013 (IGES)

6 : Characteristics of GHG Inventory (Sectoral and Temporal Dimensions)

- As for national inventory of GHG, the latest information is referred in the "Mongolia second national communication" that is published in 10th December, 2010 by Ministry of Nature, Environment and Tourism, Mongolia. Summary of GHG emissions in 1990-2006 is shown in below.

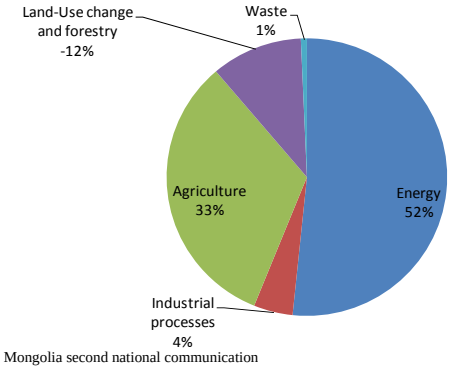
[16] Mongolia second national communication
Market Mechanisms Country Fact Sheets, January 2013 (IGES)

Table 3 Summary of GHG Emission (Gg CO_2e)

Characteristic	1990	1995	2000	2002	2004	2005	2006	Average Annual Growth Rate (%)		
								1990 -2000	2000 -2006	1990 -2006
Total emissions (source)	23,645	17,205	16,896	16,405	16,910	17,582	18,868	-3.3	1.9	-1.4
Energy	12,529	8,710	8,865	9,418	9,247	9,635	10,220	-3.4	2.4	-1.3
Industrial processes	326	166	276	451	972	862	892	-1.7	21.6	6.5
Agriculture	7,695	6,964	6,748	5,338	5,518	5,854	6,462	-1.3	-0.8	-1.1
Land-use change and forestry	1,887	-906	-1,762	-1,386	-2,112	-1,966	-2,083	-	2.8	-
Waste	96	110	120	124	131	134	138	2.3	2.4	2.3
Net emission (source and sink)	22,535	15,044	14,247	13,944	13,755	14,519	15,628	-4.5	1.6	-2.3

Source : Mongolia second national communication

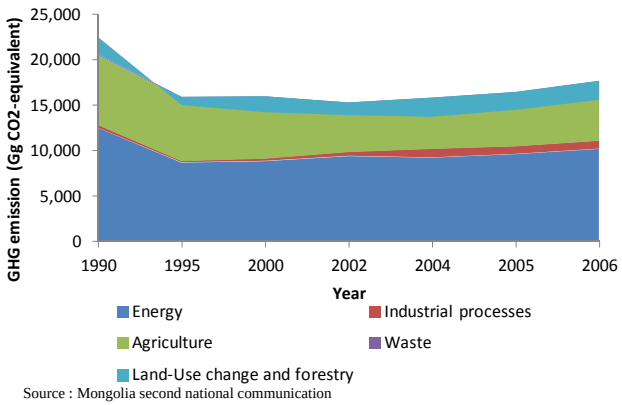
The share of GHG emission in 2006 shown in the table 3 is described as the following figure.



Source : Mongolia second national communication

Figure 2 Share of GHG Emissions in 2006

The share of GHG emission/ adsorption from 1990 to 2006 shown in the table 3is described as the following figure.



Source : Mongolia second national communication

Figure 3 GHG Emission from 1990 to 2006

7 : Key Mitigation Areas and Related Policies and Measures

1) General Aspects

Mongolia is a developing country and not assigned greenhouse gas emission reduction targets. Therefore GHG reduction target is not set in Mongolia at this moment (as of August 2013).

2) NAMA-Specific Aspects

National Appropriate Mitigation Action (NAMA) is provided by Minister of Nature, Environment and Tourism in 28th January 2010. Mitigation measures of each sectors are stated in the table below.

Table 4 Mitigation Measures in Mongolia

Sector	Classification	Actions
Energy supply: Increase renewable options	Photovoltaics (PV) and solar heating	Mongolia is located in a region with abundant sunshine, typically between 2,250 to 3,300 hours per year. The PV systems have been shown to be the less expensive option compared to small gasoline generators. At present, small-scale PV systems (10 to 1,000 W) are used in remote areas. It has been assessed that PV power systems are competitive with conventional energy sources for small power applications for nomadic families and communities in Mongolia. The installation of large scale PV systems in the Gobi region of Mongolia, may contribute to both protecting against air pollution and supporting regional development. It is necessary to implement pilot research projects in the areas along the railways and consider PVs in the Mongolian Gobi desert and steppe areas in the future.
	Wind power generators and wind farms	As in the case of solar energy, there is a potential to supply nomadic herders and farmers in rural areas with small, portable wind generation systems. Renewable energy development is included in the Government Action Program, and it will serve as the principal way to provide electricity to remote areas and nomadic families. Turbine generators (100-150 kW) could be placed in provincial centers in the southern part of Mongolia. The most promising sites should be prioritized according to technical and economic feasibility of operating 100-150 kW wind turbine generators in parallel with existing diesel generators. Also, large scale wind farm projects could be implemented in Mongolia. Mongolia has an experience for establishing a wind farm with total capacity of 50 MW in Mongolia.
	Hydropower plants	Hydropower development is one of the best options for electricity supply in remote and consumers with limited demands. A number of promising hydropower sites have been identified in Mongolia. Currently Taishir (11 MW) and Durgun (12 MW) hydropower plants are in operation, and more than 20 hydropower sites have been identified, with capacities ranging from 5 MW to 110 MW. Developments of these plants are in moderate feasible in Mongolia. The Government of Mongolia encourages the use of small and medium sized hydro developments. The emissions reduction potential of this option is high, and its local benefits are expected to outweigh the negative impacts. Taishir and Durgun Hydro Power Plants (HPPs) were registered as Clean Development Mechanism (CDM) projects with Certified Emission Reductions (CER) of 29600 and 30000 tons CO_2 per year respectively. In near future, the 220 MW Egiin gol Hydroelectric power generation project.
Energy supply: Improve coal quality	Coal beneficiation	Mongolia has substantial coal reserves. Coal will continue in the future to be the most economic fuel for power and heat generation in the Central Energy System (CES) and for heat generation in provincial centers. There exists no provision for coal preparation at mining sites, and as a result there is no quality control in the supply system. Coal quality often does not meet the minimum standard requirements, and in many cases, emergency situations at the power stations are caused by the low quality of coal. Coal washing can be introduced at the biggest coal mines in Mongolia, such as Baganuur, Shivee-Ovoo and Tavantolgoi. This option is technically feasible; there are low institutional barriers. This option is already included in the Mongolian Environmental Action Plan.
	Coal briquetting	Coal is one of the significant sources of environmental pollutions, especially air pollution. Therefore, to introduce the coal briquetting technology may well be an efficient way to mitigate GHG emissions and reduce air pollution. Some studies and investigations on conventional formed coal briquettes have been carried out by several Mongolian organizations. But the quality of coal briquettes does not meet standards. Feasibility study on production of conventional coal briquettes which carried out by the Mining Institute of Mongolia with support of United Nations Development Programme (UNDP), shows that production cost was estimated at 14000 tug/tonne i.e 13.5 US$/tonne. According to estimations by Hashimoto Sangyo Company of Japan in Mongolia, the initial capital cost for small scale (5-6 thousand tons per year) coal briquetting plant runs about 9.6 million US$. Compared with other technologies (e.g. liquidification and gasification) for production of clean fuel from coal, the coal briquetting technology has several advantages such as less investment is required and lower life cycle cost.
Energy Supply: Improve efficiency of heating boilers	Improve efficiency of existing coal-fired heat-only Boilers (HOBs) and install boilers with new design and high	One of climate features of Mongolia is that long lasting winter season with extreme cold temperatures which typically drops to (-30) - (-40)℃. Hence heating is an absolute requirement for sustaining life. Typical small heating boiler in provincial centers use 800-1200 tonnes of coal a year in average in order to produce 0.8-1.2 MW power and heating. These boilers provide heating for schools, hospitals, kindergartens and other public institutions with very low efficiency (0.4-0.5) due to outdated

Sector	Classification	Actions
	efficiency	equipment. Use of 12 efficient boilers with capacity of 25 MW will give 91000 tons/year of CO_2 emission reduction. Installation of 260 new boilers with capacity of 1MW will reduce CO_2 emissions by 340000 tons/year.
	Convert hot water boilers into small capacity thermal power plants	This option will convert hot water boilers to thermal power plants with capacity of 5-10 MW. This will allow heating and power supply for the province centers
Energy Supply: Improve household stoves and furnaces	Change fuels for household stoves and furnaces	Stoves of households in cities have poor energy efficiency, and pollute environment and threaten human health due to insufficient fuel burning. One of potential options to reduce environment pollution and greenhouse gas emission is to change raw coal used in stoves by Liquefied Petroleum Gas (LPG) and Coal briquette.
	Modernize existing and implement the new design for household stoves and furnaces	The modernization of 250000 stoves and furnaces will reduce CO emissions by 920,000 tons/year.
Energy Supply: Improve combine heat and power plant (CHP) plants	Improve efficiency and reduce internal use	At present, 6 Combined CHP are operating in Mongolia with total installed electrical capacity of 824 MW, steam production capacity of 7100 tonne/h and annual load factor of 71.4 %. Station own use for electricity is 22.3% and for heat production is around 15%. Total CO_2 emissions by the CHP sector amounted to 6,372 Gg. Therefore, CHPs contribute an important part to total national GHG emissions. Especially efficiency improvement including reduction of own use should be seriously considered for greenhouse gas mitigation. Implementation of this options will give 185,000 tons CO_2 reductions per year.
Energy Supply - Increase use of electricity for local heating in cities	Use of electricity from grid for individual households in cities	The main purpose of this option is to reduce air pollution and GHG emissions in Ulaanbaatar city. The government of Mongolia pays attention on reduction of air pollution in Ulaanbaatar and investigates many alternative options including use of electricity for heating in ger (traditional tent houses) districts. But there are no detailed research and projects have been carried out yet.
Building - Building Energy efficiency Improvement	Improve district heating system in buildings	Energy loss is high in heat distribution systems of Mongolia. Urgent actions are required to reduce the loss such as minimizing leakage and replacement of valves and compensators. Also, residential consumers need to save energy by regulating room temperatures.
	Install heat and hot water meters in apartments	In Mongolia, about 30 percent of population lives in apartment complexes which connected to the central heat supply network. Many apartments have not heat meters and their heating fee and price is calculated based on fixed tariff that does not reflect the actual amount of heat used.
	Make insulation improvements for existing buildings and implement new energy efficient standards for new buildings	The study on heat losses concluded that nearly 40% of the heat supply for houses and buildings are lost. The heat losses occur through windows, walls and doors. To compare these parameters with current standards, it is lower by 2-3 times; this fact shows that most of the houses have a higher than average rate of heat loss.
	Improve lighting efficiency in buildings	This demand-side management option concerns the use of energy-efficient compact fluorescent lamps (CFL) to replace inefficient incandescent light bulbs (ILB). Lighting demand of households and service sectors accounted

Sector	Classification	Actions
		for 380 GWh and it is expected to increase in future. Currently, most households and about 30% of service and commercial buildings have incandescent bulb lamps and rests are using fluorescent bulbs.
Industry - Energy Efficiency Improvement in Industry	Improve housekeeping practices	Mongolian industries have big potential to save energy through energy use management. The energy saving potentials in industries can be divided into “easy” (no- and low-cost) savings, medium-cost savings and long-term possibilities. Energy saving potential by “easy” (good housekeeping and energy management) savings is 15-25 % with a pay- k period less than 1 year. Implementation of this option could give about 300000 tons of CO_2 reductions per year.
	Implement motor efficiency improvements	Mongolia is relying very much upon motor systems to power the operations of industrial sectors. Motor systems consume about 70% of industrial electricity in Mongolia. These motor systems are often less efficient than the ones in industrialized countries. Motor efficiency improvement technology includes energy-efficient motors; variable speed drives; improved operation and maintenance; correction of previous over-sizing; improved mechanical power transmission, efficiency of driven equipment. It is estimated that the electricity saving potential equals 20 % of electricity consumption by industrial motors. Implementation of this option could give about 240000 tons of CO_2 reductions per year.
	Introducing dry-processing in cement industry	Changing the wet-processing of cement to dry-processing saves a large amount of energy. Feasibility studies show that 25% of all industrial coal is used for cement production. Wet-processing of cement requires of 1,500 to 1,700 kcal/kg.cl of heating whereas dry processing may require 1,000 to 1,200 kcal/kg.cl. This shows that saving potential of coal consumption in the cement sector is about 40%. The reduction of CO_2 emissions from implementation of this option will be about 147,000 tons per year.
Transport	Use more fuel efficient vehicles	Total of 200,288 vehicles were registered in Mongolia only in 2007 which has significant increase of 1.9 times more than the registered vehicles in 2000. This rapid growth of traffic and transportation load have intensified negative impacts on the public health and environment pollution. To promote import of fuel efficient vehicles, it can be used economic measures such as implementation of used vehicle import standards and vehicle registration tax to improve overall fuel efficiency of vehicles.
Agriculture	Limit the increase of the total number of livestock by increasing the productivity of each type of animal, especially cattle.	Mongolia is one of the few countries with a pastoral nomadic economy with historical traditions of animal husbandry. Pastureland is the primary source of the forage and feed needed to support extensively managed livestock in Mongolia. One of the features of Mongolian animal husbandry is seasonal movement among different pastures so the manure of the animals is managed under aerobic conditions or just as a solid on pastures and ranges. Animal breeds are small and less productive than breeds in other countries. Mongol livestock program is under discussion at the parliament. The program includes five directions such as ensuring sustainable development and creating a good governance at animal husbandry’s sector by arranging a good environment of economics and infrastructure for the sector; making products and raw materials of biological high quality and improving the market competitiveness by refining upon livestock breeding and service in accordance with social needs; ensuring health of Mongolian livestock and protecting the social health by bringing the veterinary works and service into international standards; developing livestock husbandry adapted to various changes of climate, nature and ecology and improving the abilities of bearing risks; creating a network of meat procurement and sale by developing the goal-directed market of livestock, livestock raw materials and products,

Sector	Classification	Actions
		and accelerating the economic circulation.
Forestry	Improve forest management	Mongolian forests provide a multitude of services in regard to climate change and other environmental problems, including serving as carbon sinks, sources of renewable energy, watershed protection and soil erosion protection. Many of these services have been lost, or will be lost, due to the extreme pressure exerted on Mongolia's forest resources. The following major mitigation options are identified for the forestry sector. • Natural regeneration • Plantation forestry • Agro-forestry • Shelter belts • Bioelectricity
	Reduce emissions from deforestation and forest degradation, improve sustainable management of forests and enhance forest carbon stocks in Mongolian forest sector.	There are a certain amount of potential of reduction of GHG emissions from deforestation and forest degradation in Mongolia. Therefore, it is possible to initiate and implement a Reducing Emissions from Deforestation and forest Degradation (REDD) project in Mongolia through reforestation activities by community based forest management improvement and sustainable use of forest resources.

Source: Mongolia Nationally appropriate mitigation actions of developing country Parties

8 : Key Climate-Vulnerability Areas and Related Adaptation Measures

1) Vulnerability to Climate Change

Impacts and / or vulnerabilities to climate change in Mongolia are summarized in the "Mongolia second national communication" stated in the table below.

Table 5 Vulnerability and Adaptation of Socio-Economic Sectors and Natural Systems

Sector	Vulnerability and Impacts
Animal Husbandry	- Decreased weight and productivity of sheep - Shortened grazing time due to biophysical abilities of animals
Rangeland and ecosystems	- Decreased biomass of pasture - Intensifying pasture degradation and desertification - Increase of pasture harmful insects, locusts and rodents - Deterioration of biodiversity and rare species
Arable farming	- Decreasing trend of crop yield - Shortened development stages
Forestry	- Increasing frequency of forest fires - Extension of forest insects
Human health	- Increased tendency of cardiovascular diseases - Expansion of food borne diseases - New contagious diseases outbreak (tropical)
Water resource	- Increasing scarcity of surface water resources - Deterioration of cryosphere - Increased tendency to flooding
Natural disaster	- Increasing frequency and magnitude of natural disasters

Source : Mongolia second national communication

2) Summary of National Adaptation Programme of Action (NAPA)

National Adaptation Programme of Action (NAPA) is not provided in Mongolia. However, adaptation strategies in the following sectors are mentioned in the "Mongolia second national communication". Each strategy has Policies and measures that are shown in below.

Table 6 Strategies of Adaptation in Each Sectors

Sector	Strategy	Policies and Measures
Animal husbandry	Reducing land degradation and desertification	- Improving legislation of pasture leasing, utilization and ownership - Conservation of natural grassland through proper management - Cultivation of forage plants and introduction of irrigation technologies - Introduction new varieties of plants resistant to droughts and pets
	Improved livestock quality and livestock management	- Development of legal and economic leverages in other to control number of livestock and herd structure according to pasture capacity and resources - Improving the quality of biological capacity of livestock - Improving risk management of pastoral livestock and strengthen livestock insurance system - Expanding research and experiment on livestock production and efficiency - Enhancing artificial insemination techniques and veterinary services - Supplementary feeding of animals - Planting of forage and pasture production improvement
	Improved herders' Livelihood	- Capacity building of agricultural managers and herders - Promoting household and community group based enterprises to process livestock products - Supply herdsmen with portable and renewable energy sources - Promoting value added chains of livestock products and improving market competitiveness - Improving communication system in rural areas
	Increased urban food supply	- Promoting food processing enterprises - Increasing export of meat and meat products - Expanding farms of milk and meat (cattle, pig, chicken and etc) production in suburban areas
Arable farming	Improved agricultural technologies	- Changing sowing period - Introducing new varieties of crop - Expanding application of fertilizers - Extension of irrigated croplands
	Increased agriculture Production	- Implementing agriculture campaign- 'ATAR3' in order to meet wheat and vegetables demand of the country - Recovering and vegetating abandoned crop fields unused since 1990 - Developing infrastructure using market economy leverages - Strengthening agricultural research institution focused on upgrading grain variety, agro chemistry, sowing, technology, agricultural equipments, marketing, pests and diseases, and etc - Improving the structure of information exchange between local and international agricultural institutions and farmers
Water resource	Improved water resource	- Developing and implementing integrated river basin management policy and plans in the basins and at national level, coping with desertification

Sector	Strategy	Policies and Measures
	management	- Reinforcing national policy on coverring upper part of runoff formation zones by the protected area network and protect it's ecosystems - Construct water reservoirs harvesting glacier melting water, lakes and rivers for multipurpose, as regulation of water flows, hydropower generation, drinking and industrial water supply, pasture watering and etc - Reinforcing water storage policy in the upper river basins
	Increased urban water supply	- Encouraging efficient and economic use water resources through water saving technologies, water metering systems, and reuse of water at household and industrial levels - Maintaining promotional activities on water saving and protection - Imposing appropriate and modernized tariff system on water
	Increased pastureland and agriculture water supply	- Building up an oasis network based on the balance of pasture land and heads of livestock - Maintaining, equipping and restoring old wells through proper solution of issues pertaining ownership of wells - Improving efficiency of irrigation system and introducing water saving technologies such as lowflow showers, drip irrigation and night irrigation - Improving the effectiveness of ground water utility
	Improved water quality	- Advancing the level of water purification and sewage water treatment plants in urban areas - Intensification of water substances and sanitation monitoring
	Changed behavior of population to use water efficiently	- Educating public and changing their attitude towards water resource, usage and protection - Implementing the policy on providing equality on water use
Human health	Reduced risks to human health caused by natural disasters, communicable diseases and climate change	- Implementing 'Healthy Mongolian' programme in order to change public behavior to prevent health risks and treats - Setting up early warning system of human health risks and improve response capacity - Improving of research capacity of climate change impact on public health
Forestry	Ensured sustainability of forest resources	- Strengthening forest resource protection and conservation management - Expanding green areas and trees in urban areas - Supporting tree -planting initiatives of individuals and organizations and introduction of advanced technologies - Increased resource of shrubs and bushes in the Gobi desert area through appropriate solutions of household fire fuels

Source : Mongolia second national communication

9 : Major Project List on Climate Change in Mongolia

Major project list in Mongolia is in below.

Table 7 Project List on Climate Change in Mongolia

No	Project Title	Donor	Year (Approval date)
1	Ecosystem Based Adaptation Approach to Maintaining Water Security in Critical Water Catchments in Mongolia	United Nations Development Programme (UNDP)	Jun 2012 - May 2018
2	The Project for Introduction of Clean Energy by Solar Electricity Generation System	Japan International Cooperation Agency (JICA)	Dec 2009 - Jun 2010
3	Urban Transport Development Investment Program	Asia Development Bank (ADB)	Sep 2012
4	Updating the Energy Sector Development Plan	ADB	Oct 2010
5	Ulaanbaatar Low Carbon Energy Supply Project Using a Public-Private Partnership Model	ADB	Feb 2010
6	Ulaanbaatar Clean Air	ADB	Dec 2009
7	Capacity Building Program on Clean Development Mechanism	ADB	Oct 2009
8	Demonstration Project for Improved Electricity Services to the Low-Income Communities in Rural Areas	ADB	Sep 2009
9	Energy Conservation and Emissions Reduction from Poor Household	ADB	Sep 2008 –Mar 2013
10	Sustainable Water Management as a Climate Change Adaptation Strategy in Western Mongolia	World Wide Fund for Nature (WWF) Mongolia	Aug 2008

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2 Mongolia second national communication
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3 Market Mechanisms Country Fact Sheets, January 2013 (IGES)
http://pub.iges.or.jp/modules/envirolib/upload/984/attach/mongolia_final.pdf
4 Adaptation fund
https://www.adaptation-fund.org/project/1630-ecosystem-based-adaptation-approach-maintaining-water-security-critical-water-catchment
5 Japan International Cooperation Agency (JICA)
http://gwweb.jica.go.jp/km/ProjectView.nsf/VIEWParentSearch/7E0170478CAC1BCD492576D40037007C?OpenDocument&pv=VW02040104
6 Asian Development Bank (ADB) http://www.adb.org/
7 World Wide Fund for Nature (WWF) Mongolia http://mongolia.panda.org/en/

08 : REPUBLIC OF THE UNION OF MYANMAR

1 : Basic Information and Key Indicators

Capital	Naypyidaw
Area	680,000 [km^2]
Population,	62,420,000 (2011)
GDP, per capita	USD 702 (2010)

Source: Ministry of Foreign Affairs of Japan (June, 2013)

2 : National Development Strategy/Action Plan

According to "National sustainable development strategy for Myanmar (August, 2009)", national development strategy is summarized as follows.

Table 1 Summary of National Sustainable Development Strategy

Goal	Areas	Example Activities to be Completed/Ongoing
Sustainable management of natural resources	Forest resources management	- To formulate and implement a national land-use policy - Determine the annual allowable cut - To provide mechanism for involvement of international /local institutions, local communities, NGOs - To discourage clear cutting system - To impose effective law on illegal logging - Encourage RIL application - To reforest the watershed areas - To promote ecologically sustainable development such as buffer zone management - To establish mechanisms for benefit sharing in the community forest - To expand participatory forestry / agro-forestry - To encourage urban planting
	Biodiversity conservation	- To increase 10 percent of the total areas of the country in key biodiversity areas - To implement conservation actions for priority species - To promote conservation education programme - Formulating Myanmar biodiversity strategy and action plan - To participate actively in the ASEAN working group - To monitor loss of biodiversity outside the protected areas
	Freshwater resources management	- To implement the integrated water resource management - To protect and restore all bodies of surface and ground water - To establish proper sewage treatment system and constrict waste water treatment - To raise public awareness of water issues
	Environmental quality management and enhancement	- To enact the drafted Myanmar environmental protection law - To promote pollution monitoring - To educate and develop public awareness - Networking with other ASEAN countries for cleaner technologies - To establish a sustainable national inventory system on POPs
	Management of land resources	- To establish land use commission - To review and strengthen laws and policies

Goal	Areas	Example Activities to be Completed/Ongoing
		- To increase knowledge of desert and mountain ecosystems
	Management of coastal marine and island ecosystems	- To protect and survey environmental damage to coastal areas - To ban destructive fishing methods - To prepare a strategy for sustainable management of island ecosystems - To adopt polluters pay policy and reward those using cleaner methods
	Management of ecotourism	- To introduce conservation awareness and environmental education into the syllabus - To develop an ecotourism policy - To include visitor programmes with conservation issues - To train stuffs
	Management for mineral resources utilization	- To introduce environmental impact assessment in exploration - To use clean technologies in new concession areas, - To identify appropriate locations of solid waste management
	Management of agriculture, livestock and fisheries	- To conduct environmental analysis as part of land use planning - To monitor the use of chemical fertilizers and pesticides - To promote protection of fisheries in sustainable development
	Sustainable energy production and consumption	- To integrate environmental concerns in the formulation of energy policies - To develop hydropower resources - To increase use of the renewable energy
	Sustainable industrial, transport and communication	- To encourage the production of green products that are able to recycle - To promote establishment of waste treatment facilities
Integrated economic development	Reasonable macroeconomic performance	- To make several actions for economic growth, price stability, employment opportunity, and international trade
	Agriculture, livestock and fisheries	- To encourage the followings; sustainable increase of overall agricultural production, surplus in paddy production, self sufficiency, increased production and export of industrial crops etc..
	Forest development	- To develop forest sector - To promote efficiency in production of goods and services from the forests
	Mining ,Transportation and communication development	- To boost electric power installation, generation and consumption - To prolong sufficient reserve of mineral resources, green products
	Tourism development	- To open the entry points to Myanmar for tourists - To arrange various tours
Sustainable social development	To create a knowledge-based society	- To provide opportunities for all citizens to have access to basic education achieving fender equality and parity
	Vulnerable group	- To reduce violence against women - To promote to facilitate women's access to resources, employments, markets and trade
	Uplift of health	- To reduce child mortality with strengthening rural health department, increase access to emergency care, appropriate health care
	Culture	- To promote the public especially young people to aware needs to preserve and protect Myanmar cultural heritage
	Social development and tourism	- To alleviate poverty through tourism
	Strengthening	- To increase the literacy rate up to 99 percent by 2015

Goal	Areas	Example Activities to be Completed/Ongoing
	development of border areas and national races	- To increase number of community learning centre and to activate the already established centres

Source: National sustainable development strategy for Myanmar

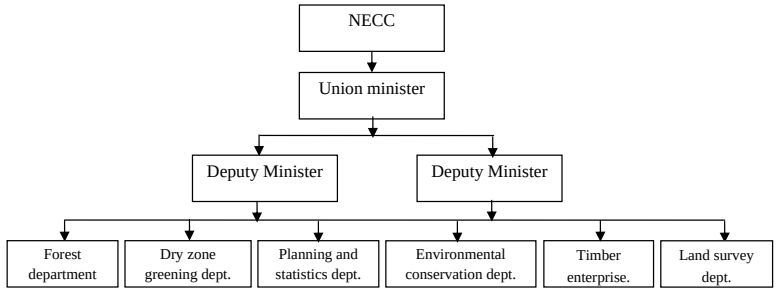
3 : Institutional Arrangement of Ministries (and Key Agencies)

Institutions arrangement for the climate change in Myanmar is summarized as follows according to "the 11th workshop on GHG inventories in Asia (WGIA11)[17]"and "Environmental conservation law".

Table 2 Institutions and Their Functions

Institution	Functions
National environmental conservation committee (NECC)	- Reformed in April 2011 - Central organization to carry out the national environmental management and to implement effective environmental conservation and protection such as education, accepting technological aids, donations, suggestions and encouragements relating to environmental conservation etc..
Ministry of environmental conservation and forestry (MOECAF)	- Upgraded in place of the Ministry of forestry in September 2011 for as the focal point for the overall environmental management - Coordinating agency for environmental matters and promoting environmentally sustainable development
The environmental conservation department	- Started in 2012 under MOECAF for the effective implementation of environmental conservation and management

Source: Prepared by the JICA team based on the 11th workshop on GHG inventories in Asia and the presentation on Myanmar conservation law and status of environmental rules and guidelines preparation



Source: The 11th workshop on GHG inventories in Asia

Figure 1 Organizational Chart

4 : Mainstreaming Mitigation/Adaptation Actions in National Strategy

[17] Presentation on Myanmar National Communication Report by Than Aye, Director of the department of environmental conservation, the Ministry of environmental conservation and forestry, in the 11th workshop on GHG inventories in Asia(WGIA11) 5-2 July 2013, Tsukuba, Japan

National sustainable development strategy (NSDS), Myanmar's National Appropriate Mitigation Action (NAPA) and environmental law have been developed. Those policies indicate that education and public awareness are parts of the actions to be implemented.

5 : Chronological Development of Climate Change-Related Policies and Framework

Climate Change Policy

According to " WGIA11", chronological development of climate change-related policies is as below.

Table 3 Climate Change-Related Policies and Their Summaries

Year	Policy/ Framework	Summary
1994	Environmental policy	No available data
1997	Agenda 21	To outline programmes and activities for sustainable consumption and/or production patterns which focuses on environmental, economic, social or cultural aspects of sustainable consumption and production included the following issues ➢ Increasing energy and material efficiency in production processes ➢ Reducing wastes from production and promoting recycling ➢ Promoting use of new and renewable sources of energy ➢ Using environmentally sound technologies for sustainable production ➢ Reducing wasteful consumption ➢ Increasing awareness for sustainable consumption Among the major programmes contained in the Myanmar Agenda 21 are these: ➢ Public education and participation; ➢ Food and Nutrition; Food Production; ➢ Essential consumption items; ➢ Production methods; ➢ Research and Studies and Institution building
2009	National sustainable development strategy (NSDS)	Summarized in the second theme in this report
2012	Environmental conservation law	Including following contents; objectives, formation of environmental conservation committee, duties and powers of minister, environmental quality standards, management of urban environment, etc.. Objectives are including as follows: ➢ To implement the Myanmar national environmental policy ➢ To lay down the basic principles and give guidance for systematic integration of the matters of environmental conservation in the sustainable development process ➢ To manage and implement for decrease and loss of natural resources and for enabling the sustainable use beneficially ➢ To promote public awareness and cooperation in educational programmes

Source: Prepared by the JICA study team based on the 11th workshop on GHG inventories in Asia and the published information by the UN

Policy guidelines for environmental conservation in Myanmar is consist of the following seven concepts; (1) To conserve forest and biodiversity (2) To reduce air and water pollution (3) To control of industrial waste (4) To extend renewable energy (5) To mobilize participation of people and social organization (6) To lay down new policy for economic development in parallel with environmental conservation (7) To review and amend laws and enact new laws on environmental conservation.

1) National Efforts/Measures Against Climate Change

According to" WGIA11", national efforts/measures against climate change are as follows.

6 : Characteristics of GHG Inventory (Sectoral and Temporal Dimensions)

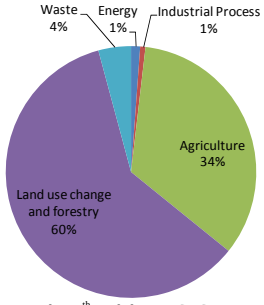
Sectoral Dimension

GHG inventory by sector in 2000 was summarized in "Initial national communication under the United Nations framework convention on Climate Change (INC)" according to "WGIA11" as follows.

Table 4 GHG Emissions and Absorption in Myanmar in 2000

Sector	CO_2 (Gg CO_2-eq)			Share Percentage
	Removal	Gross emission	Net emission	Gross emission
Energy	0	786	786	1.2
Industry	0	463	463	0.3
Agriculture	0	22,843	22,843	17.1
Land use change and forestry	142,221	40,405	-101,816	36.5
Waste	0	2,826	2,826	4.0
Total	142,221	67,323	-74898	100

Source: The 11th workshop on GHG inventories in Asia



Source: The 11th workshop on GHG inventories in Asia

Figure 2 Share of GHG Gross Emissions in 2000

7 : Key Mitigation Areas and Related Policies and Measures

1) General Sspects

According to "WGIA11", key mitigation areas are seemed to be land use change and forestry, and agriculture because they are main GHG emission sources. Mitigation-related policies are environmental policy, agenda 21, NSDS, and environmental conservation law.

2) Summary of National Appropriate Mitigation Action (NAMA) Plan

Myanmar has not developed NAMA yet as of July, 2013.

8 : Key Climate-Vulnerability Areas and Related Adaptation Measures

5) Vulnerability to Climate Change

Impacts of climate change in "NAPA" are summarized as follows.

Table 5 Impacts of Climate Change on Each Sector

Sector	Impact
Climate	- Extreme events such as cyclones, strong winds, flood, strong surge, intense rains, extreme high temperature, drought, El Nino ➢ Temperature Increase particularly from December - May with the central and northern regions - Rainfall - Increase from March – November, decrease from December - February ➢ Drought longer period
Agriculture	- Yield reduction of desirable crops (e.g. rice, wheat, maize, soybean and groundnut) - Weed and pest proliferation - Increase of the likelihood because of the precipitation pattern change - Low-lying coastal rice/local crop cultivation areas for cultivation would be shrunk
Forest	- Deforestation and deforestation-induced soil degradation/loss - Distribution and composition change such as conversion from forest to less productive grassland
Public health	- Spread of infectious disease - Increase of heat stress, heat exhaustion, dehydration, cardio-respiratory disease - Increase of transmission rate of mosquito-borne disease such as malaria and dengue
Water resources	- Diminishing water resources, which cause degradation of vegetation cover - Deterioration of water quality, quantity , and accessibility - Flooding, contamination of water resources, erosion and limited replenishment of waterways - Salt water intrusion - Increase of evaporation rate
Coastal zone	- Sea-levels rising - Decline of coastal ecosystems, agriculture, and infrastructure
Biodiversity	- Decrease of biodiversity because of change of species distribution, extreme climate events,
Energy ,Transport and Industry	- Decrease of hydropower potential because of flood and drought

Source: Myanmar's NAPA 2012

6) Summary of National Adaptation Programme of Action (NAPA)

Myanmar developed Myanmar's National Appropriate Mitigation Action (NAPA) to climate change is published in 2012. According to "NAPA", Myanmar selected 32 priority activities for eight main sectors, namely; (1) Agriculture; (2) Early warning; (3) Forest; (4) Public health; (5) Water resources; (6) Coastal zone; (7) Energy and industry; (8) Biodiversity, following the guideline outlined by the UNFCCC.

7) Adaptation Options

Adaptation options are summarized in "NAPA" as followings.

Table 6 Adaptation Options

Sector	Priority Adaptation Project Title
First priority level sectors: Agriculture, Early warning systems and Forest	
Agriculture	- Reduced climate change vulnerability of rural and subsistence farmers through locally relevant technologies, climate-resilient rice varieties, and ex/in-situ conservation of plant genetic resources.
	- Increased climate change resilience of rural and subsistence farmers in the Dry and Hilly Zones through legume crop diversification and climate-resilient varieties.
	- Increasing the climate change resilience of Dry Zone communities by diversifying and intensifying home-gardens through solar-power technology, high-income fruit crops and climate-smart agriculture approaches.
	- Reducing the vulnerability of livelihoods in agro-ecological zones to climate change through the transfer of a wide range of high-yielding and climate-resilient rice varieties.
Early warning system	- Improving weather observation capacity through a mobile/deployable weather radar system for providing early warning systems against extreme weather events.
	- Developing a flood early warning system for reducing the vulnerability of local communities to climate change impacts.
	- Assessing the hydrological impact of climate change on river systems.
	- Developing a drought early warning system for reducing the vulnerability of local communities to climate change impacts.
Forest	- Building the resilience of degraded/sensitive forest areas to climate change impacts through reforestation.
	- Community-based reforestation for climate-resilient ecosystems and rural livelihoods in degraded watershed areas of the Central Dry Zone.
	- Community-based mangrove restoration for climate-resilient ecosystems and rural livelihoods in vulnerable and degraded coastal regions.
	- Enhancing the climate change resilience of rural livelihoods through community-based restoration at the Indawgyi and Inle Lake watershed areas in the Northern Hilly Region.
Second priority level sectors: Public health and Water resources	
Public health	- Adaptation to climate change through climate-resilient health facilities in the Rakhine State and Ayeyarwady region
	- Integration climate change adaptation strategies into the prevention of heat-related disorders in agricultural and industrial workers
	- Reducing the vulnerability of local communities to climate induced water-related health hazards through the provision of safe water supplies and sanitary latrines
Water resources	- Assessing the status of dams for providing sustainable water supplies and withstanding flood risks under future climate change
	- Constructing small-scale water impoundments in Naypyidaw for flood control and increasing water supplies for local communities
	- Protecting human life and property against extreme climate in the Ayeyarwady river system through channel improvement and adaptation structures
	- Estimating regional rainfall-runoff relationships for supporting the development of flood early warning systems and ensuring sustainable water management
Third priority level sector: Coastal zone	
Coastal zone	- Adaptation to climate change through integrated coastal zone management
	- Community-based mangrove reforestation

Source: Myanmar's NAPA 2012

9: Major Project List on Climate Change in Myanmar

The recent major projects supported by Asian Development Bank (ADB) are summarized the following list.

Table 7 Major Project List in Myanmar

#	Project title	Donor	Year
1	Institutional Strengthening of National Energy Management Committee in Energy Policy and Planning	ADB	2013/4-
2	Support for Myanmar's Reforms for Inclusive Growth	ADB	2013/1-
3	Capacity Building Support for Project Identification	ADB	2012/12-
4	Capacity Development and Institutional Support	ADB	2012/12-
5	Support for Improving the Business Climate	ADB	2012/6-

Source: Prepared by the JICA study team with published data by ADB

References

1 Myanmar's initial national communication under UNFCCC (submitted December 26, 2012)

2 Myanmar's National Appropriate Mitigation Action (NAPA) to climate change is published in 2012

3 National sustainable development strategy for Myanmar (August, 2009)

4 The published information by the UN
URL: http://www.un.org/esa/agenda21/natlinfo/countr/myanmar/eco.htm

5 Presentation on Myanmar National Communication Report by Than Aye, Director of the department of environmental conservation, the Ministry of environmental conservation and forestry, in the 11th workshop on GHG inventories in Asia(WGIA11) 5-2 July 2013, Tsukuba, Japan

6 Myanmar Environmental Conservation Law, and Status of Environmental Rules and Guidelines Preparation presented by Hla Maung Thein, Deputy Director General, Environmental Conservation Department, MOECAF
URL:http://www.gms-eoc.org/uploads/resources/144/attachment/3a_Thein_MOECAF_Myanmar_Env_Law_and_rules.pdf

7 Published information by ADB
http://www.adb.org/projects/search/501?keyword=myanmar+climate+change

09 : FEDERAL DEMOCRATIC REPUBLIC OF NEPAL

1 : Basic Information and Key Indicators

Capital	Kathmandu
Area	14.7 [km^2]
Population	180 (2011)
GDP, per capita	USD 735 (2011)

Source: Ministry of Foreign Affairs of Japan (June, 2013)

2 : National Development Strategy/Action Plan

According to the initial national communication to the conference of the parties of the United Nations Framework Convention on Climate Change (INC), in 1957, His Majesty's government of Nepal (HMG) has developed national development plans summarized as follows.

Table 1 National Development Strategy/Action Plan

Type of Policy/ Action Plan	Policy/Action Plan
National sustainable development policy	- National Economic and Social Development Plans (NESDP)(1957) - Eighth-Plan (1992-1997) - Ninth Plan (1997-2002) - Tenth Plan (2002-2007) - Sustainable development agenda for Nepal
Environmental policy	- National conservation strategy (NSC) (1990) - Nepal environmental policy action plan (1993) - Environment protection act (1996) - Environment protection rules (1997)
Climate change	- Rural energy policy (2006) - Subsidy policy for renewable (rural) energy (2009) - Climate change policy (2011)

Source: The initial national communication to the conference of the parties of the United Nations Framework Convention on Climate Change

3 : Institutional Arrangement of Ministries (and Key Agencies)

Institutions arrangement for the climate change in Nepal is summarized as follows according to" published information the Ministry of the Environment".

Table 2 Institutions and Their Functions

Institution	Summary
Climate change council (CCC)	- Representative: Premier - CCC consists of the premier, vice premier, ministers, specialists - Functions ➢ Development of policies related climate change, and implementation of the policies ➢ To incorporate measures for climate change into national development agenda ➢ International negotiation on climate change ➢ Additional fund support for program/project on climate change ➢ Coordination
Multi-stakeholder climate change initiatives coordination committee (MCCICC)	- Representative: Secretary, Ministry of Environment - MCCICC consist of NAPA working group coordinators, Minister's of secretariat, Minister's meeting, representatives of national plan committee, NGO, sub-national government, aid agency - Functions ➢ To establish and improve the communication among agencies in climate change areas ➢ To contribute to the consensus formation in international negotiations ➢ Financial arrangement for actions including NAPA ➢ Coordination of the projects/program

Source: Prepared by the JICA study team with published information by the Ministry of the Environment

4 : Mainstreaming Mitigation/Adaptation Actions in National Strategy

Nepal developed national sustainable development plan and climate change policy to deal with climate change issues.

According to INC, Nepal has promoted education and public awareness on climate change in various means to increase understanding of climate change issues, and promoted research as well.

5 : Chronological Development of Climate Change-Related Policies and Framework

4) Climate Change Policy

Nepal has developed climate change policy in 2011. The summary of the policy is as follows.

Table 3 Summary of Nepal Climate Change Policy

	Outline
Overall goal	- Establishment of a Climate Change Center within one year for conducting climate change research and monitoring, and regularly providing policy and technical advice to the Government of Nepal - Initiation of community-based local adaptation actions as mentioned in the National Adaptation Programme of Action (NAPA) through managing financial resources by 2011 - Preparation of a national strategy for carbon trade in order to benefit from the Clean Development Mechanism by 2012 - Formulation and implementation of a low carbon economic development strategy that supports climate-resilient socio-economic development by 2014. - Assessment of losses and benefits from climate change in various geographical areas and development sectors by 2013 - Promotion of climate adaptation and adoption of effective measures to address adverse impacts of climate change through technology development and transfer, public awareness raising, capacity building and access to financial resources

	Outline
Objectives	- To establish a Climate Change Center as an effective technical institution to address issues of climate change and also strengthen existing institutions; - To implement climate adaptation-related programmes and maximize the benefits by enhancing positive impacts and mitigating the adverse impacts; - To reduce GHG emissions by promoting the use of clean energy, such as hydro-electricity, renewable and alternative energies, and by increasing energy efficiency and encouraging the use of green technology; - To enhance the climate adaptation and resilience capacity of local communities for optimum utilization of natural resources and their efficient management - To adopt a low-carbon development path by pursuing climate-resilient socio-economic development; - To develop capacity for identifying and quantifying present and future impacts of climate change, adapting to climate risks and adverse impacts of climate change - To improve the living standard of people by maximum utilization of the opportunities created from the climate change-related conventions, protocols and agreements
Policy	- Climate adaptation and disaster risk reduction - Low carbon development and climate resilience - Access to financial resources and utilization - Capacity building, peoples' participation and empowerment - Study and research - Technology development, transfer and utilization - Climate-friendly natural resources management

Source: Climate change policy

5) National Efforts/Measures Against Climate Change

Policies related climate change is summarized as follows according to" INC".

Table 4 National Efforts/Measures Against Climate Change

Sector	Efforts/Measures
Energy	- To maximize the development of indigenous energy resources - To promote fuel efficient stoves with a strategy to minimize fuel wood consumption - To promote cost effective and environmentally sensitive energy conservation and demand management practices - To devise appropriate mechanisms for financing hydropower projects through commercial sources, as well as encouraging other means of financing - To formulate rational energy pricing so that it reflects the social costs without - compromising overall national goals - To enter into energy import/export agreement keeping in mind the national interest - To give authority to the respective ministries to solve the environmental problems associated with energy supply and demand - To examine the possibility of transferring ownership of government-owned energy sector utilities to the private sector. - Coordinated approach to rural energy development - Establishment of rural energy development fund at the village and district levels
Forest	- Forest act 1993 - 18% of the total land areas as conservation forests
Water resource	- Preparation of water management plan
Agriculture	- Breeding strong drought/paste/disease resistant varieties - Soil and water conservation

Source: The initial national communication to the conference of the parties of the United Nations Framework Convention on Climate Change

6 : Characteristics of GHG Inventory (Sectoral and Temporal Dimensions)

Sectoral Dimension

- GHG inventory by sector in 1994 was summarized in"INC" as follows. Land use change and forestry does not include CO_2 adsorption. Adsorbed CO_2 by forest was 14,778 Gg CO_2-eq.

Table 5 GHG Emissions by Sector in 1994

Sector	Emissions (Gg CO_2-eq)	Share Percentage
Energy	3,266	7.2
Industrial Process	165	0.4
Agriculture	18,546	40.9
Land use change and forestry	22,895	50.4
Waste	520	1.2
Total	45,392	100

Source: the initial national communication to the conference of the parties of the United Nations Framework Convention on Climate Change

- The major GHG emission source is agriculture except land use change and forestry.
- The GHG emission by sub –sector of agriculture is shown below.

Table 6 GHG Emission of Agriculture Sector in 1994

Sub-sector	Emissions (Gg CO_2-eq)	Share Percentage (%)
Enteric fermentation	11,067	59.7
Manure management	1,334	7.2
Rice cultivation	6,426	34.6
Agricultural soil	8,370	45.1
Total	18,546	100

Source: the initial national communication to the conference of the parties of the United Nations Framework Convention on Climate Change

7 : Key Mitigation Areas and Related Policies and Measures

1) General Aspects

Key mitigation areas are Residential, commercial and industrial, Transport, Forestry, Agriculture, Waste according to" INC". In Nepal, the main policy on mitigation is NAPA, which has been developed in 2010. Mitigation policies by ministries have also been developed. Mitigation options/measures are emission reduction by energy conservation, renewable energy development, and improvement of agriculture and waste management, and sink increase by afforestation/ reforestation.

2) National Appropriate Mitigation Action (NAPA)-Specific Aspects

Nepal has developed NAPA in 2010. NAPA is summarized as below.

Table 7 Contents of NAPA

No.	Activities
1	Promoting community-based adaptation through integrate management of agriculture, water, forest and biodiversity
2	Building and enhancing adaptive capacity of vulnerable communities through improved system

	and access to service related to agricultural development
3	Community based disaster management for facilitating climate adaptation
4	Monitoring and disaster risk reduction
5	Forest ecosystem management for supporting climate led adaptation innovations
6	Adapting to climate change in public health
7	Ecosystem management for climate adaptation
8	Empowering vulnerable communities through sustainable management of water resource and clean energy supply
9	Promoting climate smart urban settlement

Source: National appropriate mitigation action

3) Mitigation Options

The summary of mitigation options by sector is described in "INC" as follows.

Table 8 Mitigation Options by Sectors

Sector	Mitigation Options
Residential , commercial and industrial	- To enhance relevant technology and fuel replacement - Demand- side management; curbing demand - Improving supply and efficiency; improvement in the supply or increase of low carbon fuels such as natural gas, as well as greater use of renewable energy sources and more efficient technologies for power generation - To develop renewable energy (e.g. solar energy, biomass energy, wind energy, and others)
Transport	- Increase in vehicle performance efficiency - Switch to less greenhouse gas-intensive fuels and transportation modes - Decrease travel distance - Increase occupancy of public vehicles
Forestry	- Improved technology to reduce fuel wood consumption - Rehabilitating the degraded lands through afforestation and reforestation; - To promote sustainable forest management in leasehold and community forests particularly in the middle hills and the Siwaliks; - Increasing of the CO2 uptake from the atmosphere (by converting low productive land into grassland and range lands); - To promote habitat management for the protected wild animals and plants with particular focus on buffer zones development and management; - To explore opportunities for carbon trading both at domestic and international level, and develop accounting framework for measuring potential changes in forest biomass stocks. - Agroforestry
Agriculture	- Adoption of reduced tillage practice (zero till or no till or minimum till) in the rice-wheat system to reduce large amounts of carbon emissions. - Adoption of agro-forestry practice to convert unproductive croplands and grassland into another form if agro-forestry sector where maximum atmospheric CO_2 build up is absorbed - Minimizing Methane and Nitrous oxide emission in rice field through improvement in the efficient use of fertilizers such as sulphur coated urea and slow releasing fertilizer, and improvement in irrigation management such as alternate flooding and drying the rice field. Selection of rainfed crop varieties would help to reduce Methane emission - Popularize Biogas plants amongst the rural communities since biogas has been proved as an efficient alternative technology for the rural area to supplement the energy and for environment protection - Improved water management through soil aeration and periodic drainage of paddy fields - Incorporation of pre-fermented farm residues in organic matter amendment. - Proper selection of rice cultivators - Crop rotation - Change in traditional planning practices - Make use of mineral supplements to reduce the amount of feed having the minimum nutrient

Sector	Mitigation Options
	requirements - Supplement the poor quality roughage with urea-molasses, legume and/ or low cost agriculture by-products - Carry out chemical treatment of low-quality roughage particularly with urea solution in order to improve its digestibility and to increase the non-protein nitrogen contents of fibrous feed - Expand and conserve pasture forage for dry season feeding particularly for dairy - cattle - Improve ruminant's digestion through better feeding to minimize Methane emission
Waste	- Recovery and use of landfill gas: The landfill Methane generated in the site should be extracted or collected and used for energy purposes. Possible options for using the gas include: (i) Electric generation and co-generation, (ii) Use the gas for heating purposes including cooking, or steam generation for industrial processes and industrial boilers, (iii)Piped supply for using it as natural gas - Reduction of Methane generation: Encouraging minimization of solid waste and proper management en-masse of recycling, incineration and composting can reduce Methane production - Reduction of waste generation at source: Encourage reduction of waste disposal and the recycling of waste at the source itself

Source: The initial national communication to the conference of the parties of the United Nations Framework Convention on Climate Change

8 : Key Climate-Vulnerability Areas and Related Adaptation Measures

Vulnerability to Climate Change

Impacts of climate change on each sector related in "INC" are summarized as follows.

Table 9 Impacts of Climate Change on Each Sector

Sector	Impact
Climate	- 0.41 degrees rise during pre-monsoon, monsoon and 0.37 degrees rise in winter periods - 4 degrees rise - 20% increase in precipitation
Agriculture	- Soil loss - Yield change Under rise in 4 degrees and 20% precipitation,7% of rice yield potential decrease Under doubled CO_2, the wheat yield increases by 60%, maize yield increases 7% - Livestock decrease such as Yaks, which are not tolerant to the high temperature
Water resources	- Glaciers decrease from 58% to 70% under 4 degree rise - Surface water potential increase by 13% in the Karanali river basin - Water shortage in most of the months because of great variation in seasonal precipitation - Erosion
Forestry	- Vegetation change - Distribution change
Biodiversity	- Biodiversity loss Subtropical and warm temperate dry forest will change to warm temperate moist forest in Jumla, cool temperate, steppe and thorn steppe will emerge in warm temperate and desert bush in existing cool temperate regions of Mustang, and forest cool temperate moist forest of this area will convert into warm temperate moist forest.
Health	- Increase of malaria, Japanese Encephalitis

Source: The initial national communication to the conference of the parties of the United Nations Framework Convention on Climate Change

Adaptation Options

Adaptation options are summarized in "INC" as followings.

Table 10 Adaptation Options by Sector

Sector	Adaptation Options
Agriculture	- Development of new high yielding varieties - To promote d crop diversification - Conservation of drought resistant crop - Hybrid maize program in a full-scale production sytem - Promotion of organic based farming - To discourage the slash and burn agricultural system - Development of early warning system - Agro-forestry and forage development - Comprehensive land use policy - To manage the methane emission and livestock production - Promotion of biogas as a source
Water resources	- Understanding of water resources system: - Testing of new innovative models - Promotion of research on case studies in different geographical regions within the country - Promotion of research based bilateral, regional, and international collaboration in the sector to understand the problems in the regional and global contexts - Studies on strategies regarding the sustainability of programs including the sustainability of institutional and financial aspects - More efficient management of existing poor water supply infrastructures - Institutional arrangement to limit water demand - Establishment of efficient hydrological forecasting system - Strengthening of watershed management programs - Introduction of improved water management technologies - Introduction of drip irrigation scheme - Introduction of less water intensive crops - Coordination of water resources development among government and NGOs avoiding duplication - Systematic reduction on government subsiding and donor dependencies - Encouragement and incentives on water conservation - Promotion of groundwater recharge technologies - Promotion of indigenous and sustainable technologies - Water harvesting - Development of disaster mitigation measures
Forestry	- Forest plantation establishment - Conservation of protected areas - Reforestation in a sensitive areas with drought, heat and flood tolerant species
Biodiversity	- To refine meteorological projection and increase the understanding of how climate affects species. Such studies allow to identify those areas, where communities will be most stressed, as well as alternate areas where they might be saved - Extensive planting of trees particularly in mid-hills to absorb Carbon dioxide could help mitigate Carbon dioxide concentration - Adaptation measures in land use and landscape management, agro-forestry and species-selection, silvi-culture in different ecological zones need to be planned. - Promotion and protection of natural regeneration is required at to be emphasized local levels. - To identify/prioritize species that are relatively vulnerable to Climate Change (endangered species, endemic species) and reforest sensitive areas with drought, heat, flood tolerant varieties - To develop regional plans for non-reserve habitats to conserve populations and resources lying outside protected areas.

Sector	Adaptation Options
	- Development and implementation of new and efficient management techniques are needed in reforestation and transplantation programs. - Ecological research and monitoring will yield information on vulnerability and adaptation. Such studies would provide scientific basis for the flexible regional planning to derive and to develop appropriate adaptation measures.
Health	- To increase cleanliness - Health education - Research and development - To strengthen quarantine program

Source: The initial national communication to the conference of the parties of the United Nations Framework Convention on Climate Change

9: Major Project List on Climate Change in Nepal

The recent major projects supported by Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), World Bank(WB), and other donors are summarized the following list.

Table 11 Project Lists in Nepal

#	Project Title	Donor	Year
1	Mainstreaming Climate Change Risk Management in Development	ADB (Asia development bank)	2011/12-
2	Building Climate Resilience of Watersheds in Mountain Eco-Regions	ADB	2011/10-
3	Strengthening climate network in Nepal	Development Fund, Norway	Not available
4	Strengthening capacity for managing climate change and environment	ADB	Not available
5	Implementing climate change adaptation in Nepal	WWF-Nepal	Not available
6	Nepal climate change support programme	United kingdom	Not available
7	Supporting government planning in building climate resilience	ADB/WB(strategic climate fund)	Not available
8	Community based vulnerability assessment, risk mapping, and adaptation planning	ADB	Not available

Source: Prepared by the JICA study team with published data by ADB and WB

References

1 Ministry of Foreign Affairs of Japan (June, 2013)
URL: http://www.mofa.go.jp/mofaj/area/nepal/data.html
2 Published information by the ministry of environment
http://www.moenv.gov.np/newwebsite/?view=msc
3 the initial national communication to the conference of the parties of the United Nations Framework Convention on Climate Change
4 National appropriate mitigation action
5 Climate change policy
http://www.ccnn.org.np/uploaded/Climate%20Change%20Policy%20-%20Eng%20nep.pdf
6 Published data by the world bank
http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=NPL&ThisTab=Adaptation
7 Published information by the ADB
http://www.adb.org/projects/search/499

10: ISLAMIC REPUBLIC OF PAKISTAN

1 : Basic Information and Key Indicators

Capital	Islamabad
Area	796,000 [km^2]
Population	180,710,000 (2011/2012)
GNI, per capita	USD 1,372 (2011/2012)

Source : Basic data, Regional affairs, Ministry of Foreign Affairs of Japan

2 : National Development Strategy/Action Plan

The Medium Term Development Framework (MTDF) 2005-2010 launched by the Government of Pakistan in July 2005 presented the Vision of a "developed, industrialize, just and prosperous Pakistan through rapid and sustainable development, in a resource constrained economy by deploying knowledge inputs", which is envisaged by the Vision 2030.

Planning Commission of Pakistan, which was authorized to prepare development plans, is working on country's development strategy, 2013-18 in partnership with stakeholders with a focus on revival of the economy for achieving the goal of "Strong Economy - Strong Pakistan". The strategy is aimed at stabilizing the economy through minimizing fiscal deficit, adopting self-reliance, focusing on tax reforms, increasing investments; reviving the economy for balanced and sustainable growth through promoting private sector and transforming productive sectors towards value addition through innovation, enhancing quality and productivity; achieving energy security through addressing energy crisis and inefficiencies, adding cheap power to the national grid and replacing expensive dependence on fuel oil to cheaper alternatives to provide affordable energy to citizens, through an integrated energy policy; building modern infrastructure for high growth economy which serves as a corridor and hub of regional trade through efficient transport networks by reducing production and transaction costs for providing a stimulus to economic growth; restoring peace and security through strengthening country's relations with all countries of the world in particular the international economic blocks as well as improving security through initiating various social and entrepreneurial programs in under developed areas; achieving good governance through institutional and governance reforms with a focus on transparency, accountability, merits in appointments, involvement of citizens at all stages of planning, implementation and monitoring, and providing speedy solution through e-governance; and developing enterprising social capital with focus on

human development, poverty alleviation and youth empowerment to achieve inclusive growth for a happy and harmonious society.

3 : Institutional Arrangement of Ministries(and Key Agencies)

Climate Change Division is the focal point for National Policy, Legislation, Plans, Strategies and programmes with regard to Disaster Management, Climate Change including environmental Protection and preservation. The Division also deals with other countries, international Agencies and Forms for coordination, Monitoring and Implementation of Environmental Agreements.

4 :Mainstreaming Mitigation/Adaptation Actions in National Strategy

The National Climate Change Policy 2012 provides a framework for addressing the issues that Pakistan faces or will face in future due to the changing climate. In view of Pakistan's high vulnerability to the adverse impacts of climate change in particular extreme events, adaptation effort is the focus of this policy document. The vulnerabilities of various sectors to climate change have been highlighted and appropriate adaptation measures spelled out. These cover policy measures to address issues in various sectors such as water, agriculture, forestry, coastal areas, biodiversity and other vulnerable ecosystems. Notwithstanding the fact that Pakistan's contribution to global GHG emissions is very small, its role as a responsible member of the global community in combating climate change has been highlighted by giving due importance to mitigation efforts in sectors such as energy forestry, agriculture and livestock.

Furthermore, appropriate measures relating to disaster preparedness, capacity building, institutional strengthening; technology transfer; introduction of the climate change issue in higher education curricula; ensuring environmental compliance through EIAs, etc.; addressing the issue of deforestation and illegal trade in timber; promoting CDM, and raising Pakistan's stance regarding climate change at various international forums, have also been incorporated as important components of the policy.

The policy provides a comprehensive framework for the development of Action Plans for national efforts on adaptation and mitigation. Its goal is to ensure that climate change is mainstreamed in the economically and socially vulnerable sectors of the economy and to steer Pakistan towards climate resilient development. The main objectives of the Policy include:

- To pursue sustained economic growth by appropriately addressing the challenges of climate change;
- To integrate climate change policy with other inter-related national policies;
- To focus on pro-poor gender sensitive adaptation while also promoting mitigation to the extent possible in a cost-effective manner;

- To ensure water security, food security and energy security of the country in the face of the challenges posed by climate change;
- To minimize the risks arising from the expected increase in frequency and intensity of extreme weather events such as floods, droughts and tropical storms;
- To strengthen inter-ministerial decision-making and coordination mechanisms on climate change;
- To facilitate effective use of the opportunities, particularly financial, available both nationally and internationally;
- To foster the development of appropriate economic incentives to encourage public and private sector investment in adaptation measures;
- To enhance the awareness, skill and institutional capacity of relevant stakeholders;
- To promote conservation of natural resources and long term sustainability

5 : Chronological Development of Climate Change-Related Policies and Framework

1) Pakistan Environment Protection Act (1997)

Pakistan's environmental policy and management framework is based on the Pakistan Environment Protection Act 1997 (PEPA), which in turn replaces the Pakistan Environmental Protection Ordinance promulgated in 1983. PEPA has two important responsibilities – the creation of institutions and the regulation of activities covering the environment. This legislation has been responsible for the establishment of Pakistan Environmental Protection Council (PEPC), and the Pakistan Environmental Protection Agency. The National Environmental Quality Standards (NEQS) finalized in 1993 further provide standards for industrial and municipal effluents and air emissions.

2) National Conservation Strategy (1992) and National Environmental Action Plan (2001)

Major policy initiative in the environment sector have been the enactment of National Conservation Strategy (NCS) in 1992, Forestry Sector Master Plan and NCS plan of Action and the finalization of a National Environmental Action Plan (NEAP) in February 2001. The NCS lays out the 14 key priority areas for policy formulation and intervention, while NEAP outlines four priority areas for development and implementation of environmental conservation programs – clean air, clean water, solid waste management and ecosystem management. Both the NEAP and NCS have indirect relevance to climate change issues.

Other climate change related policies of Pakistan are as follows:

Table 1 Major Regulations Relevant to Climate Change

Date	Policy
March 2002	National Resettlement Policy
August 2005	National Environmental Policy
January 2006	Clean Development Mechanism (CDM) National Operational Strategy
September 2009	Drinking Water Policy
January 2010	National Rangeland Policy
May 2010	National Forest Policy
October 2011	National Water Policy
May 2012	National Sustainable Development Strategy
August 2012	National Sanitation Policy
September 2012	National Climate Change Policy 2012

Source: Ministry of Climate Change, Government of Pakistan

6 : Characteristics of GHG inventory

As for national inventory of greenhouse gas, the information for Year 1993-94 is provided in the "Pakistan's Initial National Communication", published in November, 2003.

Table 2 GHG Inventory

Sub-sector	CO_2	CH_4	N_2O	%
Energy	77,171.80	281.40	0.606	50
Industrial process	11,269.60	NA	NA	7
Agriculture	NA	2,507.90	29.92	37
LULUCF	6,527.10	NA	NA	4
Waste	NA	101.90	6.40	2

Unit : 1,000 ton

Source : Pakistan's Initial National Communication, November 2003, Government of Islamic Republic of Pakistan, Ministry of Environment

7 : Key Mitigation Areas and Related Policies and Measures

1) General Aspects

Pakistan's greenhouse gas (GHG) emissions are low compared to international standards. In 2008 Pakistan's total GHG emissions were 310 million tons of CO2 equivalent. These comprised: CO2 54%; CH4 36%; N2O 9%; CO 0.7%; and NMVOC 0.3% (Source: National GHG inventory 2008).

The energy sector is the single largest source of GHG emission in Pakistan; it accounts for nearly 51% of these emissions and is followed by the agriculture sector (39%), industrial processes (6%), LULUCF (3%) emissions and waste (1%) (Source: National GHG inventory 2008). As such, the most important targets for mitigation efforts focused on reduction of GHG emissions are the energy and agriculture sectors.

Policy measures for key mitigation areas for Pakistan stated in its National Climate Change Policy 2012 are as follows:

Table 3 Measures in Mitigation

Sector	Policy Measures
Energy	- Give preferential status to the development and promotion of hydropower generation; - Ensure that the negative impact of hydropower projects on the environment as well as local communities are properly assessed and addressed; - Promote the development of renewable energy resources and technologies such as solar, wind, geothermal and bio-energy - Promote futuristic building designs with solar panels for energy self sufficiency, especially in public sector buildings;

Sector	Policy Measures
	- Plan the necessary expansion of nuclear power for Pakistan's energy security while ensuring the highest safety standards; - Explore the possibility of obtaining technological know-how and its transfer for installation of clean coal technologies such as pressurized-fluidized-bed-combustion and near-zero emission technology for the vast coal reserves in the south of Pakistan, and their inclusion in future pulverized coal integrated IGCC systems; - Ensure that new coal-fired power stations perform at high-efficiency level and are designed in such a way that they can be easily retro-fitted for CCS; - Install plants to generate power from municipal waste; - Consider introducing carbon tax on the use of environmentally detrimental energy generation from fossil fuels; - Promote and provide incentives for activities required for increasing the energy-mix and switching to low-carbon fossil fuels, and develop indigenous technology for CCS, Waste Heat Recovery, Co-generation; coal bed methane capture, and combined cycle power generation; - Give priority to the import of natural gas, LNG and LPG over import of oil and coal, except for meeting specific fuel requirements, e.g. liquid fuel for transportation, cooking coal for the steel industry.
Energy Efficiency and Energy Conservation	- Strive to conserve energy and improve energy efficiency in all energy using devices and processes; - Examine the gradual introduction of "Green Fiscal Reforms" in different sectors of the economy, including energy, water and waste/sewage to achieve the objectives of carbon emission reductions; - Incentivize CDM projects in the field of energy efficiency and energy conservation; - Enact and enforce energy conservation legislation and audit standards; - Ensure high quality management of energy production and supply, including reduction in transmission and distribution losses; - Improve energy efficiency in building by standardizing building and construction codes and legislating/creating incentives for retrofitting, maximum use of natural light, better insulation and use of energy efficient lights, boilers, appliances and groundwater pumping units; - Promote and gradually make it mandatory to specify the energy efficiency / fuel consumption rates of energy using equipment and devices of common use.
Transportation	Road Transport - Sensitize the public to the importance of proper vehicle maintenance for fuel efficiency enhancement and reduction of emissions; - Ensure the provision of a fuel efficient public transport system in the country; - Set up and strictly enforce vehicle emission standards; - Examine and implement actions required for the use of b io-fuel for local transport; - Plan and develop mass transit systems in metropolitan cities; - Promote the scope of CDM projects in the transport sector; - Support the private transport sector by providing incentives for reducing emissions and environmentally friendly transport services; - Promote the development and adoption of environmentally friendly transport technologies and efficient management techniques; - Promote greater use of CNG in the transport sector to the extent consistent with the availability of CNG in the market; - Secure financing for technology innovations for urban planning ad the transport sector, specifically to address mitigation issues; - Promote the development of new pipelines for efficient transport of oil in the country - Encourage non-motorized modes of travel, such as bicycle and walking for

Sector	Policy Measures
	shorter distances. Aviation - Encourage the national airline to give due consideration to new fuel efficient aircrafts, causing minimum carbon emissions, while planning fleet up-gradation; - Support the ICAO's initiative for carbon emission reduction through improved air traffic management, which includes improved weather services and free flight air routes, instead of defined routes, that hold the potential for reduced flight time and thus fuel consumption; - Participate actively in ICAO's activities and initiatives and ensure that new strategies and policies of ICAO do not hurt the economic interests of developing countries' aviation industries. Railway - Ensure the provision of an efficient railway system in the country; - Upgrade and expand the railway network in the country, as the advantages of railway over road travel in terms of carbon emissions are well recognized - Inland Waterways Transport - Develop and promote inland waterways transportation
Town Planning	- Make installation of wastewater treatment plants an integral part of all sewage schemes; - Ensure separate collection, disposal and re-use of recyclable, composite and biodegradable waste, preferably at source; - Update town planning design principles for lower carbon footprints; - Utilize the potential of CDM by designing zero emission buildings through renewable energy technology; - Make installation of solar water heaters mandatory in commercial and public buildings where water heating is necessary; and - Others*
Industries	- Incorporate economic incentives to promote emission-reduction by upgrading industrial processes and technologies; - Prepare voluntary CSR guidelines and encourage the corporate sector to create a CSR fund to cover carbon emission reduction efforts in industrial sector; - Promote integration of the "Cleaner Production" strategy in the industrial sector by making more efficient use of inputs such as energy, water and raw materials; - Promote the use of energy efficient motors in the industrial sector; - Encourage the industrial sector to have periodic "Energy Efficiency Audits"; - Develop capacity to monitor and estimate emissions locally for each industry; - Ensure that technology transfer is accelerated for industries like cement manufacturing, to control emissions without hampering the production process.
Agriculture and Livestock	- Explore methods to reduce nitrous oxide release from agricultural soils, e.g. by changing the mix of chemical fertilizers commonly used; - Promote development of biogas and manure digester for methane reduction and energy production through CDM support - Encourage famers to use appropriate feed mixes and additives to reduce methane production from enteric fermentation/digestion in cattle; - Manage water in rice paddies to control releases of methane from agricultural soils and introduce low water dependent rice varieties; - Promote no till farming for methane abatement; - Promote cultivation of crops used for bio-fuel production, to the extent feasible without threatening the country's food security; and - Others*
Carbon	- Set annual afforestation and reforestation targets to increase the country's forest

Sector	Policy Measures
Sequestration and Forestry	cover; - Strictly prohibit illegal forest cutting and conversion of forest land to non-forest uses; - Enact and enforce laws and regulations required for addressing illegal trade in timber and de-forestation; - Use the vast mass of cultivable wasteland as a carbon sink and to build up organic soil matter; - Provide incentives and alternative fuel and livelihood options to forest dependent communities to prevent deforestation; - Establish linkages with regulated and voluntary carbon markets to promote and encourage forestry mitigation projects in Pakistan; - Secure financial assistance from the World Bank7s Forest Carbon Partnership Facility (FCPF) and UN-REDD (Reducing Emissions from Deforestation and Forest Degradation) program as well as from other international sources to formulate a national program for avoiding deforestation and promoting forest restoration; - Prepare the framework for a national REDD strategy on priority basis and ensure its implementation in accordance with international conventions/ processes; - Develop the legal and institutional framework for improved forest management, investment clearly specifying rights to REDD+ credits; - Restore and establish the blue carbon sequestration capacity of mangroves, sea-grasses and tidal marshes; and - Others*

Note: Those with adaptation aspects are excluded from this table.
Source: National Climate Change Policy, Government of Pakistan, Ministry of Climate Change, September 2012

2)NAMA-Specific Aspects

Pakistan has not yet submitted its NAMA to the UNFCCC.

8 : Key Climate-Vulnerability Areas and Related Adaptation Policies and Measures

The important climate change threats to Pakistan stated in its National Climate Change Policy are as follows:

Table 4 Potential Impacts by Climate Change

Sector	Impact
Water resources	- Considerable increase in the frequency and intensity of extreme weather events, coupled with erratic monsoon rains causing frequent and intense floods and droughts - Projected recession of the Hindu Kush-Karakoram-Himalayan (HKH) glaciers due to global warming and carbon soot deposits from trans-boundary pollution sources, threatening water inflows into the Indus River System (IRS) - Increased siltation of major dams caused by more frequent and intense floods - Increased stress between upper riparian and lower riparian regions in relation to sharing of water resources
Coastal Zones	- Increased intrusion of saline water in the Indus delta, adversely affecting coastal agriculture, mangroves and the breeding grounds of fish - Threat to coastal areas due to projected sea level rise and increased cyclonic activity due to higher sea surface temperatures
Agriculture	- Rising temperatures resulting in enhanced heat and water-stressed conditions, particularly in arid and semi-arid regions, leading to reduced agricultural productivity
Forestry	- Further decrease in the already scanty forest cover from too rapid change in

Sector	Impact
	climatic conditions to allow natural migration of adversely affected plant species
Human health	- Increased health risks and climate change induced mitigation

Specific policy measures stated in the National Climate Change Policy for each vulnerable sector are as follows:

1) Water Resources

- Water storage and infrastructure (rehabilitation of existing irrigation infrastructure, dam construction, etc.)
- Water conservation strategies (providing incentives for adoption of more efficient irrigation techniques, etc.)
- Integrated water resource management (protecting groundwater, water treaty with Afghanistan, etc.)
- Legislative framework (to protect water resources, etc.)
- Enhancing capacity (for sea water utilization, remote sensing and GIS for monitoring, etc.)
- Awareness raising

2) Agriculture and Livestock

- Research (developing models, new crops, etc.)
- Technology (to improve crop productivity and energy efficiency)
- General management
- Risk management

3) Human Health

- Assess the health vulnerabilities of communities in areas most likely to be affected by the adverse impact of climate change, and build their capacities to reduce these vulnerabilities;
- Ensure that appropriate measures to address health related climate change issues are incorporated into national health plans
- Inform, sensitize, educate and train health personnel and the public about climate change related health issues
- Ensure that preventive measures and resources such as vaccines, good quality medication and clean drinking water are available to the general public easily and cost effectively particularly during climate related extreme events

- Upgrade and extend disease outbreak monitoring and forecasting systems to counteract possible climate change health impacts and support prior planning for effective interventions.

4) Forestry

- Awareness raising (creating environmental and forest protection clubs at community level)
- Research (encouraging empirical research on adaptation of forests, biodiversity and forest management systems to climate change, etc.)
- Reforms in governance (to streamline forest ownership structures, etc.)
- Enhancing adaptive capacity (to ensure the availability of sufficient and properly trained forest workers with enhanced capabilities to fact the challenges of climate change, etc.)
- Forest management (to pursue afforestation and reforestation programs, etc.)
- Arresting soil erosion
- Reducing forest fires, disease outbreaks and other damages

5) Biodiversity

- Encourage empirical research on flora and fauna in the context of their responses to current and historical climatic changes
- Set National Biodiversity Indicators and provide the requisite financial resources for implementation of Biodiversity Action Plan
- Establish gene banks, seed banks, zoos and botanical gardens to conserve the biological diversity of valuable species
- Integrate conservation and protection of biological diversity into various disciplines such as forestry and marine pastures
- Encourage involvement of local communities in conservation and sustainable use of biodiversity
- Take necessary measures to establish nature reserves in areas that are rich in biodiversity to preserve their existence
- Establish protected areas in all vulnerable ecosystems, particularly in coastal and marine areas
- Ensure that “ecosystem based adaptation is part of an overall climate change adaptation strategy at al levels (national and local)
- Assist genetically impoverished species or those that have important ecosystem functions by providing natural migration corridors as well as assisted migration

There are also policy measures provided for other vulnerable ecosystems, such as mountain areas, rangelands and pastures, arid and hyper-arid areas, coastal and marine ecosystems, wetlands and disaster preparedness

9 : Major Project List on Climate Change in Pakistan

Table 5 Major Project List on Climate Change in Pakistan

Project Title	Donor	Year
Promotion of Rural Livelihoods through Adaptation Support Programme	SCCF	2011-2014
Integration and Harmonization of Sustainable Development Interventions in the Central Karakorum National Park, Pakistan	Italy	Ongoing
Reducing Risks and Vulnerabilities fro Glacier Lake Outburst Floods in Northern Pakistan	Adaptation Fund	2011-2015
Floods from the Roof of the World: Protection thanks to applied research	Swiss Development Corporation	1999-2012
Mangrove for the Future (MFF)	Norway, Sweden, UNEP, UNDP, etc.	2006-present
Management of Flash Floods: Capacity building and awareness raising in the Hindu Kush Himalayas	USAID	2006-2010
Glacial Melt and Downstream Impacts on Indus-dependent Water Resources and Energy	ADB Small Grant for Adaptation Project	2007-2009
Adaptation to Climate Change in the Hindu Kush Himalayas and Central Asia	Norway (through UNEP)	2007-2011
Protection of Sustainable Policy Initiatives in the Management of Natural Resources in the Hindu Kush Himalayas	BMZ	2008-2012
South Asia Water Initiative	DFID, Australia, Norway	2009-2013
Climate Risk Management Technical Assistance Support Project: Phase II	Sweden and SIDA through UNDP, UNDP core finance	2010-2011
Support to Policy Consultation and Action to boost Sustainable Use of Water and Energy Resources for Agricultural Production and Livelihood Improvement in the Near East and North Africa Region in the context of Climate Change	FAO	2010-2011
Vulnerability to Climate Change: Adaptation Strategies and layers of resilience	ADB	2010-2012
The Project for Improvement of Training Capacity on Grid System Operation and Maintenance	JICA	2011-2014
Strategic Strengthening of Flood Warning and Management Capacity	JICA	2011
Flood Emergency Reconstruction Project	ADB	2011-
Renewable Energy Development Sector Investment Program - Tranche 2	ADB	2010-

Source: Adaptation Fund, Adaptation Partnership, Asia Development Bank, Japan International Cooperation Agency

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2 Website of Planning Commission, Government of Pakistan
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Islamic Republic of Pakistan, Ministry of Environment
URL : http://unfccc.int/resource/docs/natc/paknc1.pdf
4 National Climate Change Policy 2012, Government of Pakistan Ministry of Climate Change
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6 Website of Adaptation Fund, Interactive Map of Projects and Programmes
URL: https://www.adaptation-fund.org/funded_projects/interactive
7 Adaptation Partnership, Review of Current and Planned Adaptation Action: South Asia, November 2011
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8 Asia Development Bank
9 Website of Japan International Cooperation Agency Library
URL: https://libportal.jica.go.jp/fmi/xsl/library/public/data/plan_in_operation_e-p.html

11 : REPUBLIC OF PHILIPPINES

1 : Basic Information and Key Indicators

Capital	Manila
Area :	299,404 [km^2]
Population	94,010,000 (2010)
GDP, per capita	USD 2,345 (2011)

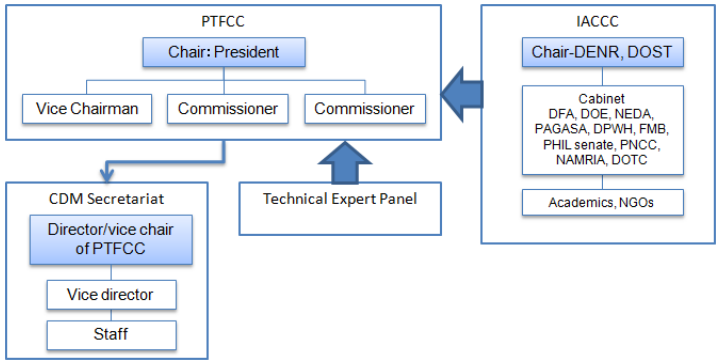
Source: Ministry of Foreign Affairs of Japan (June, 2013)

2 : National Development Strategy/Action Plan

The Philippine Development Plan 2011-2016 was formulated in accordance with the Constitutional provision of Section 9, Article VII, directing the Government's economic and planning agency to "implement a continuing integrated and coordinated programs and policies for national development". In the development plan, it sets up a strategic goal for enhanced resilience of natural systems and improved adaptive capacities of human communities to cope with environmental hazards including climate related risks. In order to pursue the goal, it includes enhancement of the resilience of natural systems, implementation of crosscutting strategies for effective environmental governance, and implementation of research, development, extension and knowledge management such as clean and energy efficient technologies.

3 : Institutional Arrangement of Ministries (and Key Agencies)

Institutional arrangement of the ministries and key agencies on climate change in Philippines is indicated in the following chart.



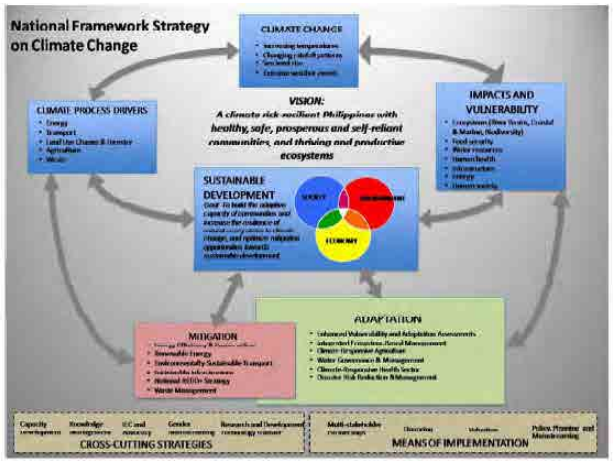
Source: http://www.climate.gov.ph/ , Republic Act No. 9729, An Act Mainstreaming Climate Change Into Government Policy Formulations, Establishing The Framework Strategy And Program On Climate Change, Creating For This Purpose The Climate Change Commission, And For Other Purposes "Climate Change Act Of 2009", Administrative Order No. 2010 – 01 January 20, 2010 Subject : Implementing Rules And Regulations Of Republic Act 9729

Figure 1 Organizational Arrangement of Climate Change in the Philippines

4 : Mainstreaming Mitigation/Adaptation Actions in National Strategy

The fundemental strategy on climate change in Philippines is National Framework Strategy on Climate Change published in 2010. The national strategy indicates national level's visions and missions on climate change including growth targets for mitigation and adaptation. The national framework strategy on climate change set up in the strategy is summarized in the following chart.

As for action plan for mitigation and adaptation of climate change at national level, National Climate Change Action Plan (NCCAP) is developed in 2009 based on the National Framework Strategy on Climate Change.



Source：National Framework Strategy on Climate Change 2010-2022

Figure 2 National Framework Strategy on Climate Change

Table 1 Sumamry of Philippines' National Strategy on Climate Change

#	Policy	Summary
1	National Framework Strategy on Climate Change 2010-2022	<Vision> A climate risk-resilient Philippines with healthy, safe, prosperous and self-resilient communities, and thriving and productive ecosystems ＜Goals＞ To build the adaptive capacity of communities and increase the resilience of natural ecosystems to climate change, and optimize mitigation opportunities towards sustainable development ＜Growth target for mitigation＞ Long term goal：Shift to low-GHG emissions for sustainable development - Energy efficiency and conservation - Renewable enegy - Environmentaly-sustainable Trasport - Sustainable infrastructure - National REDD +Strategy - Waste Management ＜Growth target for adaptation＞ Long term goal：Development of adaptation ability of community and

#	Policy	Summary
		scale up of resilience of natural ecosystem - Enhanced vulunerability and adapation assessment - Integrated ecosystem –based management - Climate responsive agriculture - Water governance and management - Climate-responsive health sector - Disaster risk reduction and management
2	National Climate Change Action Plan 2011-2028	＜Action Plan Period＞ 2011 - 2028. ＜Outcome to be pursued＞ Consistent with the National Framework Strategy, the ultimate goal is to build the adaptative capacities of women and men in their communities, increase the resilience of vulnerable sectors and natural ecosystems to climate change, and optimize mitigation opportunieis towards gender-responsive and rights-based sustainable development. <Priotrity sector＞ 1. Food security 2. Water sufficiency 3. Ecological and Environmental stability 4. Human security 5. Climate-friendly industries and services 6. Sustainable energy 7.Knowledge and capacity development

Source:National Framework Strategy on Climate Change 2010-2022), National Climate Change Action Plan: NCCAP)

5 : Chronological Development of Climate Change-Related Policies and Framework

The chronological development of climate change related policies and framework is summarized in the following table. Philippines has ratified UN Framework convention on climate change from 1994 and also signed Kyoto protocol in 1998. The fundamental national policy on climate change is Republic Act No.97729 “Climate Change Act of 2009” which entrusts to establish a Climate Change Commission, Climate Change office, and advisory committee.

Table 2 Chronological Development of Climate Change Related Policies and Framework

May 1991	Establishment of The Inter-Agency Committee on Climate Change(IACCC)
Aug. 1994	Ratification of UN Framework Convention on Climate Change
April 1998	Signing of Kyoto Protocol
1999	Development of GHG Inventory
November 2003	Ratification of Kyoto Protocol

June 2004	Establishment of DNA
2009	Enactment of Republic Act No. 9729“Climate Change Act of 2009
2010	Development of National Framework Strategy on Climate Change 2010-2022
2011	Development of National Climate Change Action Plan: NCCAP

Source: Prepared based on various official information

6 : Characteristics of GHG Inventory (Sectoral and Temporal Dimensions)

The Philippines has conducted two national greenhouse gas inventories, one for 1990 and the other, for 1994. The latest GHG inventory which is official provided is the GHG inventories in 1994 based on the revised 1996 IPCC Guidelines. The characteristics of GHG inventory of Philippines is indicated in the following chart. The major sector for GHG emission is energy and agriculture sectors which accounts for 50% and 33% respectively. The energy sector’s sub categories are shown in the table 3.

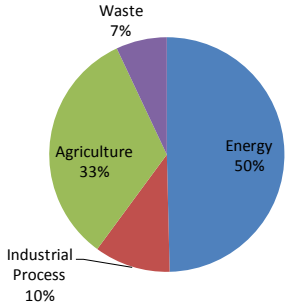
Table 3 GHG Inventory by Sector in 1994

Unit: kiloto

Sector	CO_2 (ktons)	Percentage (%)
Energy	50,038	49.61%
Industrial Process	10,603	10.51%
Agriculture	33,130	32.85%
Waste	7,094	7.03%
Total	100,864	100%

Source: The Philippines’ Initial National Communication on Climate Change 1999

The share of GHG emission in 1994 shown in the table 3 is described as the following figure.



Source: The Philippines’ Initial National Communication on Climate Change 1999

Figure 3 Percentage of Sectors in GHG Emission in 1994

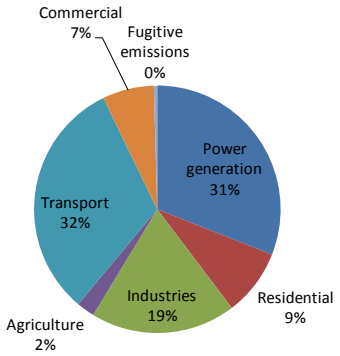
Table 4 GHG Emission of Energy Sector in 1994

Sub-Sector	Total Emissions (kiloton)	Share Percentage (%)
Power generation	15,508	30.99%
Residential	4,359	8.71%

Industries	9,497	18.98%
Agriculture	1,189	2.38%
Transport	15,888	31.75%
Commercial	3,370	6.73%
Fugitive emissions	227	0.45%
Total	50,038	100%

Source : The Philippines' Initial National Communication on Climate Change 1999

The share of GHG emission by sub sector in 1994 shown in the table 3 is described as the following figure.



Source : The Philippines' Initial National Communication on Climate Change 1999

Figure 4 Percentage of GHG Emissions by Sub-Sector in 1994

7 : Key Mitigation Areas and Related Policies and Measures

1) General Aspects

National Appropriate Mitigation Action (NAMA) plan has not been developed in Philippines.

Under the Low Emission Capacity Building (LECB) Programme, financed by the EU, Germany, and AusAID, Philippines has implemented capacity building activities at the national level. This includes formulating Low-Emission Development Strategies (LEDS) and/or Nationally appropriate Mitigation Actions (NAMAs), as well as establishing the underlying data collection systems.

The focus under the Programme is on building capacities in the transport, waste management, and agriculture sectors.

2) NAMA-Specific Aspects

According to NCCA, priority sector for mitigation aspects are targeted as in the following table.

Table 5 Mitigation Option by Sectors in the Philippines

Sector	Mitigation Options
Agriculture (food security)	- To enhance site-specific knowledge on the vulnerability of agriculture and fisheries - To establish gender-responsive, climate climate-smart policies, plans, and budgets, the priority activities
Industries & services	- To promote climate-smart industry such as utilizing resources more efficiently, providing renewable sources of energy, lowering greenhouse gas emissions or otherwise minimizing environmental impact. - To create green jobs which help protect the environment, ensure a shift to a low carbon development - To develop sustainable cities and municipalities with protection of ecosystems and minimizing waste outputs.
Energy	- To promote and implement energy efficiency and conservation nationwide - To enhance the development of sustainable and renewable energy - To promote and adopt environmentally sustainable transport

Source: National Climate Change Action Plan: (NCCAP)

8 : Key Climate-Vulnerability Areas and Related Adaptation Measures

1) Vulnerability to Climate Change

Impacts of climate change in each sector in Philippines were indicated in "NCCA".

Table 6 Impacts of Climate Change in Each Sector in the Philippines

Sector	Impact
Agriculture (food security)	- Approximately 50.3% of the country's total land area and 81.3% of its population are vulnerable to natural disasters. - A large proportion of damages from disasters such as typhoon, drought, and floods which are generally climate-related, are borne by agriculture.
Water resources	- Climate change during the wet season and drier climate will impact on stream flow, dam operation and water allocation, domestic water supply, irrigation, hydro power generation, depth and recharge of aquifers which expect to affect food, human security, and economy
Eco-systems	- Climate change such as the El Nino impacts on eco-systems that coral got damage of bleaching by El Nino in 1998.

Source: National Climate Change Action Plan: (NCCAP)

3) Summary of National Adaptation Programme of Action (NAPA)

Philippines' National Adaptation Programme of Action (NAPA) has not been provided, however, "SNC" shows a part of adaptation strategy as below.

Table 7 Adaptation Strategies of the Philippines

Sector	Strategy
Agriculture (food security)	- To conduct provincial level of vulnerability and risk assessments for agriculture and fisheries based on site specific adaptation interventions - To establish resource network that can provide technical assistance on adaptation planning to local communities and appropriate adaptation approaches - To integrate gender-responsive climate change adaptation in agriculture and fisheries plans, programs, and budgets - To conduct training on adaptation and disaster risk reduction for farming and fishing communities
Water resources	- To restructure water governance to be better responsive to climate change - To conduct vulnerability and risk assessment of water resources, infrastructures and communities - To formulate a roadmap for climate-proofing critical water infrastructure based on the results of the vulnerability and risk assessments - To rehabilitate water distribution infrastructure to avoid leakages and contamination
Eco-systems	- To manage and conserve protected areas and key biodiversity areas improved - To make environmental laws strictly implemented

Source: National Climate Change Action Plan: (NCCAP)

9 : Major Project List on Climate Change in the Philippine

The major projects supported by Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), World Bank (WB), and other donors are summarized the following list.

Table 8 Major projects list in Philippine

#	Project title	Donor	Year (if available)
1	Forestland Management Program	JICA	2012
2	Capacity building survey for CDM promotion	JICA	2005/11～2006/11
3	Market Transformation through Introduction of Energy-Efficient Electric Vehicles Project	ADB	2012/12
4	Integrated Natural Resources and Environmental Management Project	ADB	2012/12
5	Rural Community-Based Renewable Energy Development in Mindanao	ADB	2011/2
6	Climate Change Adaptation Program	WB	2010
7	Chiller Energy Efficiency Project	WB	2010
8	Methane Recovery from Waste Management Project	WB	2010

Source: Prepared by the JICA study team with published data by JICA, ADB, and WB

References

1 The Philippines' Initial National Communication on Climate Change December 1999
2 National Framework Strategy on Climate Change 2010-2022)
3 National Climate Change Action Plan: NCCAP)
4 The Low Emission Capacity Building Programme, UNDP/EU/BMU
5 UNDP news-Philippines' second national communication in progress

12 : Republic of Singapore

1 : Basic information and key indicators

Capital	Singapore
Area :	7,160,000 [km2]
Population	5,310,000 (2012)
GDP per capita	USD 52,051(2012)

Source : Basic data, Regional affairs, Ministry of Foreign Affairs of Japan

2 : National Development Strategy/Action Plan

Since independence in 1965, long before climate change became a global issue, Singapore has pursued concurrent goals of growing the economy and protecting the environment.

The **Singapore Green Plan,** setting out early goals and initiatives balancing developmental needs with environmental considerations, was issued in 1992 as Singapore's first formal environmental blueprint. In 2002, **Singapore Green Plan 2012 (SGP 2012)** was released taking into account new ideas and concerns that had emerged since 1992, then followed by its revised edition released in March 2006.

Today, many of the SGP 2012 targets have already been met. However, in order to ensure that Singapore can achieve sustainable development for future decades and beyond, the Inter-Ministerial Committee for Sustainable Development (IMCSD) unveiled the **Sustainable Singapore Blueprint** in April 2009, which will serve as a guide for sustainable development strategies for the next two decades until 2030.

The Blueprint holds10 goals to be achieved by 2030:

TEN GOALS BY 2030

Improving our resource efficiency

1. Achieve 35% reduction in energy intensity (consumption per dollar GDP) from 2005 levels.
2. Achieve domestic water consumption of 140L per person per day, down from 156L per person per day.
3. Raise overall recycling rate to 70%.
4. Increase public transport modal share to 70% through doubling our rail network and developing a more integrated and seamless public transport system.

Enhancing our urban environment

5. Improve air quality by reducing ambient PM 2.5 (fine particles) levels to an annual mean of 12?g/m3 and capping ambient SO2 (sulphur dioxide) levels at an annual mean of 15 ?g/m3.

6. Reach a park provision of 0.8ha per 1000 persons and increase skyrise greenery by 50ha. Park connectors will be lengthened from 100km to 360km.
7. Increase blue spaces by opening up 900ha of reservoirs and 100km of waterways for recreational activities.
8. Increase accessibility and convenience for pedestrians and cyclists by expanding our covered linkways and cycling networks.

Building capability and expertise

9. Build Singapore into an international knowledge hub in sustainable development solutions.

Building an environmentally responsible community

10. Achieve a community in Singapore where environmental responsibility is a part of our people and business culture.

NEW INITIATIVES

- Buildings will be made more energy efficient.
- $100mil Green Mark Incentive Scheme for existing buildings to undergo energy efficiency retrofitting.
- Green Mark GFA Incentive Scheme for new buildings that can attain Green Mark GoldPlus and Platinum ratings
- Green Mark GoldPlus and Platinum requirements will be incorporated as part of land sales requirements.

- **Eco-friendly public housing.** Solar technology will be piloted at 30 public housing precincts nationwide. HDB will reduce energy use of HDB common areas by 20% to 30% and build more eco-friendly HDB housing starting with developments along Punggol Waterway.
- **Minimum performance standards for electrical appliances** will be set to remove inefficient models from the market. The government will introduce minimum energy performance standards for household air-conditioners and refrigerators by 2011.
- **A National Biodiversity Strategy and Action Plan** has been formulated to protect natural heritage and biodiversity in Singapore. Singapore will champion the development of a City Biodiversity Index under the Convention on Biological Diversity.
- **A greater push for clean transport** including conducting clean transport technology trials and putting in place more cycling infrastructure. The trials will cover diesel hybrid buses, electric vehicles, as well as diesel particulate filters. More than $43 million will be invested into implementing cycling networks in selected HDB towns over the next 5 years.
- **New schemes to promote skyrise greenery will be introduced.** These include a pilot grant scheme to co-fund the installation of green roofs, and bonus commercial Gross Floor Area for outdoor refreshment area use on landscaped rooftop. New developments in selected areas will have to provide landscape areas equivalent to their overall site area.

- **Clean technology and urban solutions will be promoted as new growth sectors.** Jalan Bahar Clean Tech Park will be developed as the first business park to support R&D and test bedding of clean technologies.
- **Marina Bay and the Jurong Lake District will be developed as Singapore's new generation of sustainable high-density districts,** through requirements for Green Mark GoldPlus and Platinum buildings, landscape replacement policies, sustainable urban design etc.

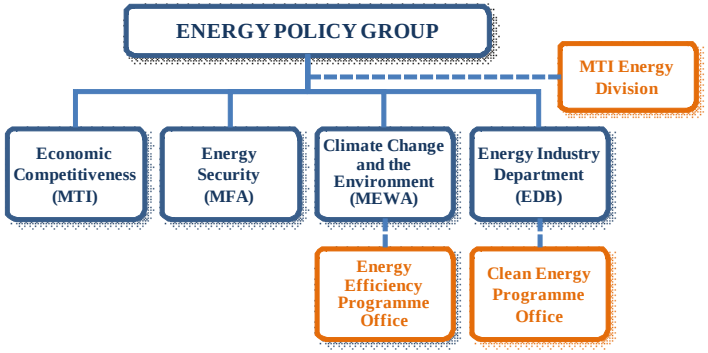
- **District Sustainability Programmes** will be implemented by each of the five Community Development Councils.
- **The public sector will adopt a range of new sustainable development initiatives.** New medium and large air-conditioned public buildings are to achieve Green Mark Platinum standard while existing large air-conditioned public buildings are to attain Green Mark GoldPlus by 2020. All government agencies are to implement recycling programmes by 2009 and achieve PUB's Water Efficient Building label for their buildings by 2010.

3 : Institutional Arrangement of the Ministries(and key agencies)

Climate change and energy issues are complex and cut across different sectors and industries, and involve policies from different ministries and agencies. The Singapore government minimizes the need to have an integrated approach to dealing with energy and climate change, and has adopted a whole-of-government approach led by the Energy Policy Group (EPG) since Mar 2006. The EPG consists of representatives from the:

- Ministry of Trade and Industry (MTI)
- Ministry of Finance (MOF)
- Ministry of Foreign Affairs (MFA)
- Ministry of the Environment and Water Resources (MEWR)
- Ministry of Transport (MOT)
- Agency for Science, Technology and Research (A*STAR)
- Building and Construction Authority (BCA)
- Economic Development Board (EDB)
- Energy Market Authority (EMA)
- Land Transport Authority (LTA)
- National Environment Agency (NEA)

The EPG has four working groups on Economic Competitiveness, Energy Security, Climate Change and the Environment, and Energy Industry Development, headed by the different agencies shown below:



Source: Website of Low Carbon Singapore, http://www.lowcarbonsg.com/category/issues-and-policies/

Recognising that climate change affects the work and responsibilities of many Ministries and government agencies, the Government formed the National Climate Change Secretariat (NCCS) as a dedicated unit in July 2010 under the Prime Minister's Office to provide coordination at the highest level for Singapore's domestic and international policies, plans and actions on climate change. The NCCS also supports the work of the Inter-Ministerial Committee on Climate Change.

4 :Mainstreaming mitigation/adaptation actions in the national strategy

Singapore has developed over the years in a sustainable manner. **The National Climate Change Strategy (NCCS-2012)** builds on the country's past efforts in this area, including the Sustainable Singapore Blueprint and the Singapore Green Plan. However, unlike the previous plans, NCCS-2012 also specifically addresses carbon emission targets and strategies to reduce emissions. For sectoral measures to reduce emissions up to 2030, see Section 7.

To accelerate the growth of the environmental industry and to maintain Singapore's image as a clean and green city, the government has initiated several funding and incentive schemes related to energy efficiency, clean energy, green buildings, water and environmental technologies, green transport, waste minimisation, environmental management system, environmental initiatives and clean development mechanism. Here are some examples of such government funding and incentives for the environment:

- Energy Efficiency Improvement Assistance Scheme (EASe)
- Grant for Energy Efficient Technologies (GREET)
- Design for Efficiency Scheme (DfE)
- SCEM Training Grant

- Clean Energy Research and Testbedding Programme (CERT)
- Clean Energy Research Programme (CERP)
- Solar Capability Scheme (SCS)
- Market Development Fund
- Green Mark Incentive Scheme for Existing Buildings (GMIS-EB)
- Green Mark Incentive Scheme for New Buildings (GMIS-NB)
- Green Mark Gross Floor Area Incentive Scheme (GM-GFA)
- MND Research Fund for the Built Environment
- Pilot Incentive Scheme for Green Roofs
- Gross Floor Area Incentives for Outdoor Refreshment Area on Rooftops
- Water Efficiency Fund (WEF)
- Fast-Track Environmental and Water Technologies Incubator Scheme (Fast-Tech)
- Technology Pioneer (TechPioneer) Scheme
- Incentive for Research and Innovation Scheme (IRIS)
- Environmental Technology Capability Development Programme (EnviroTech CDP)
- Innovation for Environmental Sustainability (IES) Fund
- Green Vehicle Rebate (GVR)
- 3R (Reduce, Reuse, Recycle) Fund
- Local Enterprise Technical Assistance Scheme (LETAS)
- 3P Partnership Fund
- Clean Development Mechanism Documentation Grant

-

5 : Chronological development of climate change-related policies and framework

National Energy Policy Report (Nov 2007)

The report outlines how Singapore's energy policies will evolve in tandem so as to address the global energy challenges and to capitalize on the opportunities to sustain the long-term economic growth. It specifies 6 strategies as follows:

- Promote Competitive Markets
- Diversify Energy Supplies
- Improve Energy Efficiency
- Build Energy Industry and Invest in Energy R&D
- Step Up International Cooperation
- Develop Whole-of-Government Approach

Sustainable Development Blueprint (Apr 2009)

The Blueprint holds the "Singapore Way" of pursuing long-term economic growth and environmental sustainability, by upholding the three principles: Long-term, integrated planning; Pragmatic and cost-effective manner; and Flexibility. See Section 2 for details.

National Climate Change Strategy 2012 (NCCS-2012)

The NCCS-2012 builds on the country's past efforts in this area, including the Sustainable Singapore Blueprint and the Singapore Green Plan. However, unlike the previous plans, NCCS-2012 also specifically addresses carbon emission targets and strategies to reduce emissions.

Singapore's approach to addressing climate-related challenges is four-fold:

(1) to reduce emissions in all sectors;
(2) to be ready to adapt to the effects of climate change;
(3) to harness green growth opportunities; and
(4) to forge partnerships on climate change action.

Energy Conservation Act (Apr 2013)

Under the Energy Conservation Act (ECA), large energy users are required to implement energy management practices. This includes appointing an energy manager, monitoring and reporting energy use and greenhouse gas emissions, and submitting energy efficiency improvement plans.

6 : Characteristics of GHG inventory

National inventory of greenhouse gas

As for national inventory of greenhouse gas, the information for Year 2000 is provided in the "Singapore's Second National Communication", published in November, 2010.

[Unit : 1,000 ton-CO2]

Sub-sector	CO2	CH4	N2O	%
Energy	37,755.81	-	189.26	99.3
Industrial process	-	-	-	0.0
Agriculture	-	-	-	0.0
LULUCF	-	-	-	0.0
Waste	-	111.72	145.61	0.7

Source : Singapore's Second National Communication, November 2010, Government of Singapore, National Environment Agency

7 : Key mitigation areas and related policies and measures

General aspects

The predominant greenhouse gas in Singapore is carbon dioxide (CO2) that arises from the combustion of fossil fuels. Given Singapore's limited access to renewable energy, energy efficiency is the country's core strategy to reduce emissions. Singapore needs to further enhance energy

efficiency across all sectors of the economy. The country's objective is to achieve, by 2030, a 35% reduction in economy-wide energy intensity, i.e., the amount of energy required to produce each S$GDP.

Sectoral measures to reduce emissions (up to 2020) stated in NCCS-2012 are as follows:

Table 1 Sectoral Measures to Reduce Emissions (Up to 2020)

Sector	Policy Measures
Power Generation	- Switch fuel mix away from fuel oil to natural gas for power generation - Encourage more solar test-bedding and research
Waste/Water	- Incinerate sludge rather than dispose in landfills - Reduce plastics incineration
Households	- Tighten Minimum Energy Performance Standards (MEPS) for household air-conditioners an refrigerators (2013) - Extend MEPS to lighting (2014) and more appliances
Buildings	- Require Green Mark Certification for all new buildings - Require Green Mark Certification for existing buildings when retrofitted (2013) - Audit of building cooling systems every three years in new and existing buildings that have undergone retrofitting (2013) - Submit energy consumption and energy-related building data (2013)
Transport	- Achieve 70:30 modal split between public and private transport - Implement Carbon Emissions-based Vehicle (CEV) Scheme to encourage purchase of low carbon emissions cars (2013)
Industry	- Extend the Grant for Energy Efficient Technologies (GREET) scheme (2012) - Develop and support energy efficiency financing pilot schemes (2012) - Encourage new co-generation pants in energy intensive sectors

Source: Singapore's National Climate Change Strategies 2012, National Climate Change Secretariat, Prime Minister's Office, Singapore

2)NAMA-Specific aspects

Singapore submitted its NAMA to the UNFCCC as follows in January 2010.

- Mitigation measures leading to a reduction of greenhouse gas emissions by 16% below BaU levels in 2020, contingent on a legally binding global agreement in which all countries implement their commitments in good faith.

The footnote below is attached to the statement above:

Although a legally binding agreement has yet to be achieved, Singapore will nonetheless begin to implement the mitigation and energy efficiency measures announced under the **Sustainable Singapore Blueprint** in April 2009. These measures are an integral part of the measures to achieve a 16% reduction below BAU referred to in (1). When a legally binding global agreement on climate change is reached, Singapore will implement additional measures to achieve the full 16% reduction below BAU in 2020.

8 : Key climate-Vulnerability areas and related adaptation policies and measures

Vulnerability to climate change

As a relatively low-lying, densely populated island in the tropics, Singapore is vulnerable to the impacts of climate change. Much of the island is less than 15m above sea level, with a generally flat coast. With a population of about 4.8 million, Singapore is one of the most densely populated countries in the world. In addition, Singapore has a relatively high uniform temperature and abundant rainfall, and is also situated in a region where vector-borne diseases such as dengue are endemic.

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13 : DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

1 : Basic Information and Key Indicators

Capital	Sri Jayawardenapura Kotte
Area :	65,607 [km^2]
Population	20,280,000 (2012)
GDP, per capita	USD 2,836 (2011)

Source : Basic data, Regional affairs, Ministry of Foreign Affairs of Japan

2 : National Development Strategy/Action Plan

In pursuant to the commitments under the World Summit on Sustainable Development, the government had developed Sri Lanka Strategy for Sustainable Development, in 2008 (MNER 2008b) with a vision of achieving sustained economic growth that is socially equitable ad ecologically sound, with peace and stability. The Government in 2009 established the National Council for Sustainable Development (NCSD) with a view to address the issues and challenges of long-term sustainability of the development process and thereby sustainable development. A National Action Plan (NAP) for Haritha (Green) Lanka Programme (HLP) was developed for this purpose by a high level committee of ministry secretaries facilitated by the Ministry of Environment. The NAP/HLP includes short medium and long-term targets spanning the period 2009-2016 performance indicators (NCSD 2009). The HLP had 10 broad mission areas which are:

- Clean Air – Everywhere
- Saving the Fauna, Flora and Ecosystems
- Meeting the Challenges of Climate Change
- Wise Use of the Coastal Belt and the Sea Around
- Responsible Use of the Land Resources
- Doing Away with the Dumps
- Water for All and Always
- Green Cities for Health and Prosperity
- Greening the Industries
- Knowledge for Right Choices

The Department of National Planning had formulated a 10-year Development Policy Framework (DPF) outlining a Vision for the Future with projections of the performance of key economic sectors up to 2020 (DNP, 2010). It has taken into consideration the development that had taken place in the country during the period 2005-2009 as demonstrated by various socio-economic indicators such as real economic growth (6%), per capita income (from US$ 1,000 to US$ 2,000), access to telecommunication (from 23% to 86%) and reduction of unemployment (from 7.4% to 5.0%) and poverty (from 15.7% to 7.6%), as well as improvements in other social infrastructure indicators.

Policy directions have been made for undertaking further development in key sectors such as agriculture, plantations, fisheries, livestock, irrigation, energy, transport, and industry among others, and projections made for targets to be achieved by 2015 and 2020. These are to be attained through rapid economic growth and a change in the structure of the economy to a modern, environmentally friendly and well connected rural-urban economy that can create better remunerated employment opportunities, with the ultimate goal of achieving a better quality of life for people in all strata of the society.

3 : Institutional Arrangement of Ministries (and Key Agencies)

The government in 2008 established the Climate Change Secretariat (CCS) with the objective of strengthening the institutional capacity to undertake tasks that would help in complying with the Climate Change Convention. These tasks included preparation of the greenhouse gas inventory assessing needs for technology transfer and identifying measures for mitigation emissions and options for adaptation to climate change. The objectives of the Climate Change Secretariat are as follows:

- Provide a rational platform to address climate change issues at the national level for incorporation into the development process.
- To function as the form of dedicated institutional mechanism to undertake climate change responses including development of relevant policies and programs.
- Liaise with sectoral agencies at national and sub-national levels for identifying priorities and developing mechanisms to implement national policies on Climate Change
- Facilitate undertaking climate change related research and distribution of research results to trigger policy reforms and actions.
- To establish a mechanism to monitor impacts of national responses to Climate Change.
- Liaise with the Secretariat to the UNFCCC and be responsible for preparing documentation in connection with Sri Lanka's preparation at meetings of COP and other climate change related meetings.

- Serve as Secretariat for the Designated National Authority (DNA) for the approval of CDM projects.
-

4 :Mainstreaming Mitigation/Adaptation Actions in National Strategy

In November 2011, a comprehensive National Climate Change Adaptation Strategy (NCCAS) was issued, which lays out a prioritized framework for action and investment for the 2011-2016 period aimed at systematically moving Sri Lanka and its people towards a climate-change resilient future. Under each of the Strategic Thrusts listed below, key Thematic Areas for action, along with priority Adaptation Measures, have been identified:

- Mainstream Climate Change Adaptation into National Planning and Development
- Enable Climate Resilient and Healthy Human Settlements
- Minimize Climate Change Impacts on Food Security
- Improve Climate Resilience of Key Economic Drivers
- Safeguard Natural Resources and Biodiversity from Climate Change Impacts

Under each thrust area, key thematic areas for action, along with priority adaptation measures have been identified, and individual project concepts have been developed. Altogether 51 project concepts have been identified including the led agencies responsible for their implementation. In order to implement these project over the 6-year (2011-2016) duration of NCCAS, additional expenses necessary, beyond current and on-going expenditure, have bee estimated at Rs. 47.7billion (US$427 million).

Details of the NCCAS are as given below:

Table 1 Details of NCCAS

Strategic Thrust: Mainstream CC Adaptation into National Planning and Development		
A	***Strengthening national climate-adaptation planning and implementation capacity***	
	i	Strengthen and restructure CCS
	ii	Develop of sector specific training programmes on CC adaptation measures
	iii	Introduce climate change studies at university level
B	***Ensure future investments/economic plans are climate resilient***	
	i	Incorporate CC concerns into SEA processes
	ii	Increase knowledge and understanding of CC among planners and senior technical staff
	iii	Quantity economic costs of CC on specific sectors
C	***Systematically research climate change-adaptation options and disseminate knowledge***	
	i	Establish coordinated multidisciplinary research programme with widespread dissemination
	ii	Model possible future climate scenarios
	iii	Conduct regular national forums on climate impacts on various sectors
	iv	Capture, evaluate and disseminate traditional knowledge on adaptive measures

- ***D*** ***Increase financing for CC adaptation***
  - i Strengthen NPD/FRD to pursuit financing for climate change adaptation
  - ii Establish CC adaptation small grant facility
  - iii Establish a multi-sectoral climate negotiation team for Sri Lanka
  - iv Support CC adaptation regulations with incentives, wherever possible
- ***E*** ***Inform and mobilize stakeholders at multiple levels in support of climate adaptation***
  - i Effectively engage education system, media and other information 'multipliers'
  - ii Make information about adaption options available at community level
  - iii Promote policy change for CC adaption through small group engagement
  - iv Engage existing institutional and community-based mechanisms for coordination of adaption activities
  - v Combat negative anthropogenic activity (such as sand mining)

Strategic thrust 2: Enable Climate Resilient and Healthy Human Settlements

- ***A*** ***Mobilize stakeholders for CC adaptation of settlements***
  - i Establish coordination body/mechanism for CC adaptation of settlements
  - ii Promote improved climate resilient construction methods
  - iii Support CC adaptation interventions with incentives
- ***B*** ***Improve planning to include CC consideration***
  - i Develop detailed local-level hazard maps for key settlements
  - ii Upgrade drainage in key settlements
  - iii Stimulate greening and increase of canopy cover in settlements and preserve natural ecosystems
  - iv Promote land use planning and monitoring for both urban and rural areas
  - v Research CC impacts on human settlements and link to planning
- ***C*** ***Ensure adequate quality and quantity of water for settlements***
  - i Promote water saving technologies including rainwater harvesting
  - ii Improve monitoring/surveillance and sharing of data across sectors
  - iii Promote integrated water resources and watershed management
  - iv Research climate impacts on water availability and develop scalable adaptation models
- ***D*** ***Combat climate change-related health concerns in settlements***
  - i Monitor and control vector borne diseases
  - ii Facilitate data sharing and compatibility between Ministry of Health and other sectors
  - iii Engage health sector experts in local level planning
  - iv Research health impacts of CC in Sri Lankan context
- ***E*** ***Increase Awareness on vulnerabilities and adaptation of settlements***
  - i Improve the gathering, processing and dissemination of information related to human settlements
  - ii Enhance awareness and demand for climate resilient construction
  - iii Improve coordination/dissemination through existing institutional mechanisms
  - iv Engage media more proactively with messaging tailored fro stakeholders

Strategic thrust 3: Minimize CC Impacts on Food Security

- ***A*** ***Ensure ability to meet food production and nutrition demand***
  - i Promote alternative options to meet nutrition requirements
  - ii Improve weather forecasting and information dissemination
  - iii Ensure easy access to seedstock alternatives/advice to counter rainfall variability
  - iv Research climate impacts/adaptive measures for agriculture, livestock and fisheries sectors
  - v Conserve genetic resources for future crop and livestock improvement
- ***B*** ***Ensure adequate water availability for agriculture***
  - i Promote water-efficient farming methods and crops

  - ii Improve maintenance of existing tanks and reservoirs including their watersheds and catchments
  - iii Adopt and promote the principles of IWRM
  - iv Contract new new reservoirs and trans-basin diversions to meet demand
- ***C*** ***Mitigate food security-related socioeconomic impacts***
  - i Encourage development of risk transfer methods
  - ii Research climate impacts on long-term food security and agriculture value chains
  - iii Identify and help vulnerable fishing communities to adapt or relocate
- ***D*** ***Increase awareness and mobilize communities for CC adaptation***
  - i Increase awareness on climate impacts on food security and on the potential adaptive measures
  - ii Pilot test and scale up community level agriculture/livestock/fisheries adaptation models
  - iii Improve utilization of field level coordination mechanisms and civil society organizations
  - iv Promote risk transfer indicatives

Strategic Thrust 4: Improve climate Resilience of Key Economic Drivers

- ***A*** ***Minimize impacts of CC on infrastructure***
  - i Identify CC risks on transport infrastructure, and invest in adaptive measures
  - ii Update standards/guidelines for infrastructure design and development
  - iii Include CC adaptations in tourism planning guidelines
- ***B*** ***Minimize impacts of CC on plantation sector***
  - i Research climate impacts and adaptive measures in plantation sub-sectors
  - ii Pilot test and scale-up sub-sector specific adaptation measures
  - iii Evaluate and exploit potential productivity benefits due to CC
- ***C*** ***Assist key industries in coping with CC impacts***
  - i Make sector-specific climate vulnerability information available to investors/regulator
  - ii Encourage CC risk transfer options for key industries
  - iii Research potential C impacts/adaptive measures for key industries
  - iv Offer incentives for industrial energy saving practices and renewable energy usage
- ***D*** ***Raise awareness about climate vulnerability in key economic sectors***
  - i Increase CC awareness at all levels
  - ii Build capacity for CC adaptation in key economic sectors
  - iii Engage wider stakeholders in dialogue on climate adaptation

Strategic thrust 5: Safeguard Natural Resources and Biodiversity from CC impacts

- ***A*** ***Ensure adequate quality and quantity of water for human wellbeing and ecosystem services***
  - i Promote efficient water resource use and development using IWRM
  - ii Promote research partnerships on good practices for varied water uses
  - iii Strengthen/establish an institution to coordinate management of water resources
- ***B*** ***Enhance CC resilience of terrestrial ecosystems and their services***
  - i Link/restore/conserve, forests and other habitat refugee to increase resilience of ecosystems and species
  - ii Convert monoculture forest plantations into mixed species plantations
  - iii Promote land use planning for biodiversity conservation and limit inappropriate vegetation conversion
  - iv Establish and/or effectively manage PAs and other important wildlife refuges in all climatic zones
- ***C*** ***Enhance the resilience of coastal and marine ecosystems and associated vulnerable species***
  - i Promote integrated coastal resource management, particularly as SAM sites
  - ii Restore and rehabilitate degraded coastal ecosystems and depleted coastal species
- ***D*** ***Enhance CC resilience of natural inland wetlands and associated species***
  - i Protect marshes/flood retention areas in urban areas and limit land conversion
  - ii Prevent discharge of industrial effluents and solid waste into inland wetlands

	iii	Control and manage salt water intrusion into coastal freshwater wetlands
	iv	Strengthen coordination and streamline management of wetlands across relevant agencies
E		***Address socioeconomic concerns resulting from CC impacts on biodiversity***
	i	Identify and address CC impacts on biodiversity that affect local communities
	ii	Help communities to adapt to changes in livelihoods or to relocate when necessary
F		***Research, monitor and address impacts of CC on biodiversity***
	i	Research and monitoring programs to strengthen knowledge base on CC and terrestrial biodiversity
	ii	Research and monitoring programs to strengthen knowledge base on CC aquatic biodiversity
	iii	Minimize entry, establishment and spread of IAS
G		Raise awareness & mobilize stakeholders for conservation of biodiversity and ecosystem svcs.
	i	Focus on minimizing current stresses on ecosystems
	ii	Promote training and awareness on use of the ecosystem approach for conservation
	iii	Build capacity for climate adaptation research among students and staff of conservation agencies
	iv	Increase public awareness about the value of aquatic and marine ecosystems
	v	Engage in dialogue with wider stakeholders

Source: National Climate Change Adaptation Strategy for Sri Lanka (2011-2016), Climate Change Secretariat, Ministry of Environment Sri Lanka

The National Climate Change Policy issued in December 2011 also stipulates adaptation and mitigation measures for Sri Lanka, which are explained in Sections 7&8 of this paper.

5 : Chronological Development of Climate Change-Related Policies and Framework

1) National Environment Policy (2003)

In the Article NO. 2.2.10 Reducing the Risk of Climate Change, The Government of Sri Lanka stated as follows:

- "Review the effect of climate change on Sri Lanka through the development of impact scenarios and response strategies
- For sea level change
- For changing water resource available including storm and drought frequency on agricultural production and the economy as a whole
- For disaster response
- Develop policy scenarios for the use of Clean Development Mechanism and its application for Sri Lanka
- Evaluate the needs to enter into future potential trading system for carbon reduction including the necessity for clear and secure property rights or entitlements to land and carbon
- Develop an information database through the Ministry in charge of Environment

2) Haritha (Green) Lanka Programme (2009)

The Programme identifies *meeting the challenge of climate change* as one mission among its 10 missions. The Programme has recommended a number of measures to be undertaken by 2016 on mitigation and adaptation. Among these are introducing bio-fuels in the transport sector, improving efficiency in industrial and energy sectors and increasing forestation coming under mitigation. For adaptation, the Programme has recommended carrying out health surveillance and identifying health risk areas when exposed to climate change and taking control measures, promoting growth of crop varieties not sensitive to temperature rise and responding positively for carbon dioxide increase, encouraging rain water harvesting, discouraging development activities near coast and encouraging carbon trading.

3) Adaptation Strategy for Sri Lanka – 2011-2016 (2010)

A study has been undertaken by a team funded by ADB in association with the Ministry of Environment in formulating a National Climate Change Adaptation Strategy (NCCAS) to increase Sri Lanka's resilience to climate change impacts whilst pursing sustainable economic development (MoE, 2010). In the development of the NCCAS, first Sector Vulnerability Profiles (SVP) were prepared for the five key sectors – agriculture and fisheries; water; health; urban development, human settlements an economic infrastructure; and biodiversity and ecosystem services. These were then subject to a detailed consultative process and the findings were next synthesized into a national adaptation strategy. For more details, see Section 4 of this paper.

4) The National Climate Change Policy of Sri Lanka (2011)

The National Climate Change Policy of Sri Lanka has been developed to provide guidance and directions for all the stakeholders to address the adverse impacts of climate change efficiently and effectively. It contains a vision, mission, goal and a set of guiding principles followed by broad policy statements under Vulnerability, Adaptation, Mitigation, Sustainable Consumption and Production, Knowledge Management and General Statements.

- Vision: A future where climate change will have no adverse consequences on Sri Lanka
- Mission: Addressing climate change issues locally while engaging in the global context
- Goal: Adaptation to and mitigation of climate change impacts within the framework of sustainable development
- Objectives:
- Sensitize and make ware the communities periodically on the country's vulnerability to climate change.
- Take adaptive measures to avoid/minimize adverse impacts of climate change to the people,

their livelihoods and ecosystems

- Mitigate greenhouse gas emissions in the path of sustainable development
- Promote sustainable consumption and production
- Enhance knowledge on the multifaceted issues related to climate change in the society and build their capacity to make prudent choices in decision making
- Develop the country's capacity to address the impacts of climate change effectively and efficiently
- Mainstream and integrate climate change issues in the national development process

For Adaptation and Mitigation, details are stated in Sections 8&7 in this paper. In its Sustainable Consumption and Production Section, the policy promotes the responsible use of natural resources and biological diversity as well as environmental friendly consumption and lifestyles. It also promotes and encourages 1) education, awareness creation and capacity building, 2) cooperation and partnerships, 3) creation of a climate change sensitive generation under Knowledge Management Section. Under General Statements Section, the Policy encourages research and development at national level, explores national and international technology transfer, strengthen legal and regulatory framework, promotes market and non-market based mechanisms and ensures resource mobilization.

6 : Characteristics of GHG Inventory

1) National Inventory of Greenhouse Gas

As for national inventory of greenhouse gas, the information for Year 2000 is provided in the "Sri Lanka's Second National Communication", published in 2011.

Table 1 Inventory of GHG

Unit : 1,000 ton-CO2

Sub-sector	CO2	CH4	N2O	%
Energy	10,430.01	881.37	251.10	61.4
Industrial process	492.40	NA	NA	2.6
Agriculture	NA	3,887.94	821.50	25.0
LULUCF - Emission	10.34	35.07	NA	0.2
Waste	NA	2,033.22	NA	10.8
LULUCF - Removal	- 6,253.99			-

Source : Sri Lanka's Second National Communication, 2011, Democratic Socialist Republic of Sri Lanka, Ministry of Environment

7 : Key Mitigation Areas and Related Policies and Measures

1) General Aspects

Sri Lanka's National GHG Inventory of 2000 shows that the highest CO2 emission from fossil fuels combustion is from the road transport sub-sector with a contribution of 44%, followed by the power sub-sector of 27%, where many of mitigation options exist.

Policy measures for key mitigation areas for Sri Lanka stated in the National Climate Change Policy are as follows:

Table 2 Policies of Key Mitigation Areas

Sector	Policy Measures
Energy	- Explore the potential of clean and renewable energy sources of the country and enhance their production, accessibility and affordability - Encourage the utilization of clean and renewable energy sources taking into account the local absorption capacity and long term sustainability - Take action to improve demand and supply side management to maximize the efficiency of energy utilization - Introduce economic incentives for less carbon intensive fuels and energy efficient technologies while imposing appropriate fiscal policy to combat detrimental practices
Transportation	- Take action to promote integrated transportation systems, low emission fuels and improved fuel efficiency taking into consideration the long term sustainability of the existing resources
Industry	- Take action to improve the environmental performance in industry and to reduce greenhouse gas emissions - Establish green reporting systems to promote proactive behavioral changes by self evaluation so as to mitigate emissions at all levels and in all sectors
Waste Management	- Adopt integrated waste management systems for all types of waste assigning priority for prevention of waste generation with nationally appropriate low greenhouse gas emission technologies
Agriculture and Livestock	- Encourage environmentally sound and socially acceptable agriculture and livestock practices within framework of sustainable development - Promote appropriate innovative technologies while encouraging the utilization of appropriate traditional knowledge and practices

2)NAMA-Specific Aspects

Sri Lanka has not yet submitted its NAMA to the UNFCCC.

8 : Key Climate-Vulnerability Areas and Related Adaptation Policies and Measures

1) Vulnerability to Climate Change

Under future climate change, it is projected that the country will receive more rain in areas where there is already a surplus of water, and less rain where there is a deficit of water. The increase in temperature and shortage of water will affect people's health in many ways; direct impacts due to heat stress, increased vector population, deaths and injuries caused by increasing extreme events and resulting spread of disease, illnesses brought about due to non-availability of clean water. One of the direct impacts on the coastal zone is its inundation due to sea level rise. It is expected that coastal erosion which is already causing damage will become severe. Intrusion of salinity into low lying agriculture land and water ways are expected to limit agricultural activities and usage of water, particularly where water is sourced for municipal water supplies from rivers at locations close to the sea.

2) Adaptation Policies and Measures

Adaptation policies stated in the National Climate Change Policy are as follows:

- Food Production and Food Security:
- Take timely action to address the adverse impacts on crop and animal production and fisheries sectors due to climate change and to minimize the impacts on food production and to ensure food security
- Encourage climate resilient-environmental friendly and appropriate innovative technologies while recognizing and promoting the utilization of appropriate traditional knowledge and practices in food production.
- Conservation of Water Resources and Biodiversity:
- Take action to minimize the impacts on water resources due to erratic precipitation patterns temperature rise and sea water rise caused by climate change.
- Promote integrated watershed and water resources management and efficient water use through technologies and behaviors adaptive to changing weather patterns and trends.
- Enhance climate change resilience of natural ecosystems and its diversity.
- Human Settlement and Land Use Planning:
- Incorporate nationally appropriate low emission strategies and technologies and appropriate adaptive strategies in human settlement, land use planning, and urban development.
- Infrastructure Design and Development:
- Integrate adaptive measures in the design, development and maintenance of infrastructure.
- Coastal Resources Management:
- Incorporate adaptive measures in coastal zone management specifically considering the potential of sea level rise.

3) The National Climate Change Adaptation Strategy

In 2009, responding to a request from the Government of Sri Lanka, the Asian Development Bank (ADB) initiated a technical assistance project titled “Strengthening Capacity for Climate Change Adaptation”. Working with and through the Climate Change Secretariat, the project aims to increase Sri Lanka’s resilience to climate change impacts, whilst pursuing sustainable economic development and natural environment conservation, and Sector Vulnerability Profiles were prepared for five key sectors, reviewing the main climate change risks in:

- Agriculture and Fisheries
- Water

- Human Health
- Urban Development, Human Settlements & Economic Infrastructure
- Biodiversity and Ecosystem Services

These sector based analysis were then synthesized into a cohesive National Climate Change Adaptation Strategy, which includes a clear, time-bound programme for future action and investment.

9 : Major Project List on Climate Change in Sri Lanka

Table 3 Major Project List on Climate Change in Sri Lanka

Project Title	Donor	Year
Addressing Climate Change Impacts on Marginalized Agricultural Communities Living in the Mahaweli River Basin of Sri Lanka	WFP	2013
Strengthening Capacity for Climate Change Adaptation	ADB	2009-2010
Participatory Coastal Zone Restoration and Sustainable Management of in the Eastern Province of Post-tsunami Sri Lanka	GEF Trust Fund, IFAD, IUCN etc.	2007-2012
Mangrove for the Future (MFF)	Norway, Sweden, UNEP, UNDP, etc.	2006-present
Strengthening Adaptive Capacities to the Impacts of Climate Change in Small-scale Aquaculture	NORAD	2009-2011
Adaptation Knowledge Platform	SIDA	2009-2012
Asia-Pacific Community-based Adaptation Small Grants Program	Australian Development Agency	2009-2013
Cities and Climate Change Initiative Asia Pacific	UN-Habitat	2010-?
Vulnerability to Climate Change: Adaptation Strategies and layers of resilience	ADB	2010-2012
Asia Pacific Climate Change Adaptation Project Preparation Facility (ADAPT)	USAID	2011-2016
Flood Management Project - GAMPAHA DISTRICT	JICA, DMC	
The Project for Development Planning on Optimal Power Generation for Peak Power Demand in Sri Lanka	JICA	2013-2014
Upper Kotmale Hydro Power Project	JICA	2010
Habarana-Veyangoda Transmission Line Project	JICA	2012
Greater Colombo Transmission and Distribution Loss Reduction Project	JICA	2013
Green Power Development and Energy Efficiency Improvement Investment Program	ADB	2013-
Clean Energy and Network Efficiency Improvement Project	ADB	2012-

Source: Adaptation Fund, Adaptation Partnership, Asia Development Bank, Japan International Cooperation Agency

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6 Website of Adaptation Fund, Interactive Map of Projects and Programmes
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URL: https://libportal.jica.go.jp/fmi/xsl/library/public/data/plan_in_operation_e-p.html

14 : KINGDUM OF THAILAND

1 : Basic Information and Key Indicators

Capital	Bangkok
Area	514,000 [km^2]
Population	65,930 thousand (2010)
GDP per capita	USD 5,382 (2012)

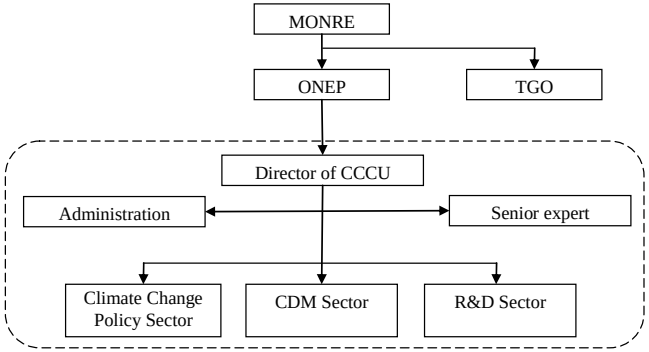
Source: Ministry of Foreign Affairs of Japan (June, 2013)

2 : National Development Strategy/Action plan

According to "the 11th national economic and social development plan (2012-2016) (11th NESDP)", national development strategies include the followings; promoting to enhance socio-economic security, strengthen agricultural, food, and energy security, sustainable economic growth, creating regional connection, and managing natural resources and environment. Overall the national development strategy, the importance of mitigation and adaptation of climate change is emphasized with underlying the negative impact on food security and natural disaster in order to realize sustainable development. Strategies for climate change are mainly related in the part of managing natural resources and environment. One of the principal mitigation measures in the development strategy is expansion of forest areas, capacity building, and substitution to renewable energy so that Thailand could transit to low-carbon society.

3 : Institutional Arrangement or Ministries (and Key Agencies)

The organization chart of Thailand's institutions for climate change is shown in the following figure. The Ministry of Natural Resources and Environment (MONRE) has the Office of Natural resources and Environmental Policy and Planning (ONEP), which organizes the Climate Change Coordination Unit (CCCU). CCCU is the focal point for climate change implementation and is consist of three sectors; policy, clean development mechanism (CDM), and research and development (R&D). MONRE organizes another agency, Thailand greenhouse gas management organization (TGO), which is a public organization designated a national authority of CDM to promote GHG emission reduction.



Source: National Strategy on Climate Change Management: Modelling and Data Application, "Data Democracy Workshop on Climate Change" Geo-Informatics and Space Technology Development Agency 7-10 June, 2010 Bangkok, Thailand.

Figure 1 Institutional Framework for Climate Change

4 : Mainstreaming Mitigation/Adaptation Actions in National Strategy

According to" 11th NESDP", mainstreaming adaptation/ mitigation actions in Thailand are shown as follows.

- To install the value of social responsibility in the populations in the point of view of energy conservation and adaptation to climate change and disasters so that their consumption behaviour could be environmentally responsible
- To develop to generate resilience in every dimension of Thailand's progress toward balance and sustainability by restoring and utilizing natural resources and environmental capitals as well as toward low-carbon economy

In the strategy for managing natural resources and environment toward sustainability of 11th NESDP, the following strategies for climate change were stated.

- To create resilience so as to prepare for dealing with impacts from climate change and worldwide environmental issues
- To enhance the adaptive capacity to meet climate change challenges and disasters at all levels community, regional, and countrywide
- To build a secure base of natural resources and a sound environment, support community participation, and safeguard people and the nation from the effects of climate change and disasters
- To foster resilience toward trade measures associated with environmental conditions and climate change impacts

5 : Chronological Development of Climate Change-Related Policies and Framework

1) Climate Change Policy

According to the presentation on Thailand climate policy: perspectives beyond 2012[18], Thailand ratified UNFCCC in 1994 and the Kyoto Protocol in 2005. Thailand has two types of policies; one is Thailand Climate Change Master Plan (CCMP) (2012 – 2050) and the other is National Strategy on Climate Change (NSCC) (2008-2012). NSCC (2013-2017) is under preparation. CCMP is a framework of integrated policies and action plans relating to climate change. Its purpose is to support economic growth with preparation for actions against climate change. NSCC indicates national strategies for climate change.

2) National Efforts/Measures Against Climate Change

According to "NSCC (2008-2012)" , national measures against climate change based are as follows.

Table 1 National Strategies and Measures

Strategy	Goal and Example Measures
1. To build capacity to adapt and reduce vulnerabilities to climate change impacts	Goal Reserving, or adding value to the natural resources, and improving environmental quality and standard of living from the negative impact of climate change Measures - Developing databases on climate and weather forecast systems so as to accurately forecast the climatic conditions of all regions of the country - Providing infrastructure, information, and human resources, and developing technological capabilities in order to develop models of climate change - Developing impact assessment models/technologies/assessment devices
2. To promote greenhouse gas mitigation activities based on sustainable development	Goal To reduce greenhouse gas emission and promote clean technologies Measures - Encouraging the private sector, especially the paper pulp industry - Promoting preservation and increase of mangrove areas in order to increase Greenhouse Gas (GHG) sequestration, and reduce coastal erosion - Promoting efficient use of wood, and substitution of wood with other materials - Encouraging farmers to plant substitute forests by adopting the principle of "3 types of forest with 4 uses; edible trees, construction trees, multi-use trees, and conservation trees" - Encouraging increases natural forest areas outside - conservation areas, by motivating communities to use their common land as community forest areas - Monitoring and assessing reforestation managed by the private sector and communities in order to determine approaches traditional forest expansion
3. To support research and development to better understand	Goal Supporting research, develop knowledge, and provide useful information for policy planning, management and operation Measures - Developing a climatic database to meet international standards, creating a

[18] Presentation on Thailand climate policy: perspectives beyond 2012 presented by Mrs. Nirawan Pipitsombat, Acting director, the office of climate change coordination, MONRE

Strategy	Goal and Example Measures
climate change, its impacts and adaptation and mitigation options	network of databases - Studying models of climate conditions in Southeast Asia from regional climate scenarios - Simulating Thailand's future climate change scenarios, relating them to the projected information on global GHG emissions - Developing models of fresh water eco-systems, as well as surveying and monitoring changes in fresh water eco-system caused by climate change - Developing models to assess the risk of natural disasters, to predict outbreaks of insect diseases, rice pests, dengue fever and malaria when climate changes
4. To raise awareness and promote public participation	Goal Promoting public awareness, consciousness of climate change and public participation in reducing GHG emission Measures - Setting public relation activities in order to increase awareness in public sector, and to suggest appropriate way to participate - Promoting awareness of climate change in the educational sector - Creating mechanisms of monitoring and evaluation of the public relation activities
5. To build capacity of relevant personnel and institutions and establish a framework of coordination and integration	Goal To integrate personnel and agencies involved in climate change implementation and promote their skills up Measures - To support continuous training and skill development - To create mechanisms to transfer knowledge and share experience among different agencies
6. To support international cooperation to achieve the common goal of climate change mitigation and sustainable development	Goal To build capacity of relevant personnel and agencies and to promote international cooperation relevant to climate change at the global and regional level Measures - To integrate implementations under different international frameworks such as UNFCCC, ASEAN, Bilateral or Multilateral agreements - To promote skills development and experience sharing among relevant agencies

Source: National Strategic Plan on Climate Change B.E. 2551 - 2555 (2008 - 2012)

6: Characteristics of GHG Inventory (Sectoral and Temporal Dimensions)

1) Sectoral Dimension

National inventory data was summarized in "Thai second National Communication under the United Nations Framework Convention on Climate Change (SNC)" that was published in February 2011. The results of national greenhouse gas (GHG) inventory by sector in 2000 were summarized as below.

Table 2 GHG Inventory by Sector in 2000

Sector	CO_2 (CO_2-eq Gg)		Percentage	
Year	1994	2000	1994	2000
Energy	129,867.7	159,381.5	40.0	56.6
Industrial Process	15,976.91	16,379.7	4.9	5.8
Agriculture	77,393.3	51,871	23.8	18.4

Land use change and forestry[19]	100,955.4	44,483.5	31.1	15.8
Waste	739.62	9316.1	0.2	3.3
Total	324,932.9	28,1431.8	100	100

Source: Thailand's second National Communication under the United Nations Framework Convention on Climate Change

The major GHG emission sectors are agriculture and energy except land use change and forestry. The detailed GHG emission of the two major emission sectors is shown below.

Table 3 GHG Emissions of Agricultural Sector in 2000

Sub-Sector	Total Emissions (Gg CO_2-eq)	Share Percentage (%)
Domestic livestock	5,084	48.1
Rice cultivation	3,158	29.9
Grassland burning	49	0.5
Agricultural residue burning	59	0.6
Agricultural soil	2,209	20.9

Source: Thailand's second National Communication under the United Nations Framework Convention on Climate Change

Table 4 GHG Emissions of Energy Sector in 2000

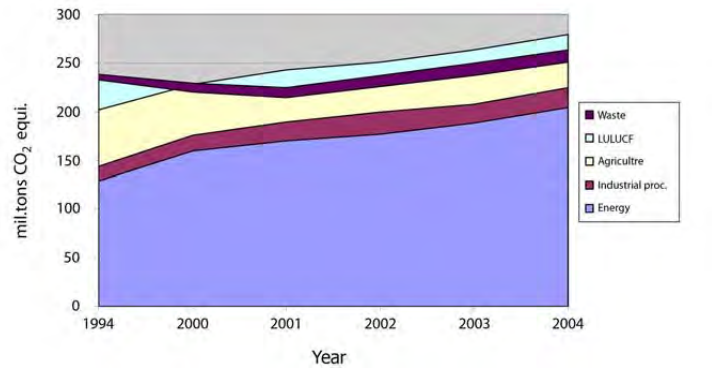
Sub-Sector	Total Emissions (Gg CO_2-eq)	Share Percentage (%)
Energy industries	66,441.4	41.7
Manufacturing industries and construction	30,773.3	19.3
Transport	44,701.3	28.0
Other sub-sectors	12,234.3	7.7
Fugitive emissions from fuels (solid fuels, oil and natural gas)	5,231.1	3.3

Source: Thailand's second National Communication under the United Nations Framework Convention on Climate Change

2) Temporal Dimension

The latest available and detailed data of GHG emission was the inventory in 2000, though SNC was submitted in March, 2011. The emissions by sector from 1994 to 2004 were described in the following figure. Emissions from Energy significantly increased within the period.

[19] Land use change and forestry used does not include CO_2 adsorption by forests. The adsorption by forests was 39,101.6 CO_2-eq Gg in 1994, 52,374 CO_2-eq Gg in 2000.



Source: Thailand's second National Communication under the United Nations framework convention on Climate Change

Figure 2 Emissions by Sectors from 1994 to 2004

7: Key Mitigation Areas and Related Policies and Measures

1) General Aspects

According to "SNC","NAMA" and "11th NESDP", it seems that key mitigation areas are sector of energy, agriculture and forestry because they are major GHG emission and Thailand prepared many mitigation policies and actions for the sectors. Mitigation policies are indicated in "SNC", "NSCC", "CCMP". Mitigation measures/actions are described in "SNC" and "11th NESDP". Major mitigation measures are eco-balanced agricultural development, enhancement of forest conservation and reforestation, energy efficiency improvement, renewable energy introduction.

2) National Appropriate Mitigation Action (NAMA) -Specific Aspects

National Appropriate Mitigation Action (NAMA) has not been developed in Thailand, however, in SNC, the basis for the design of approaches to mitigate GHGs in different sectors is shown as follows.

Table 5 Mitigation Action Plan

Mitigation Plan	Action
To reduce emissions	- Reducing from from industrial production processes, agriculture, waste, and energy consumption
To increase sinks from forest areas	- Protection of 17 million hectares of conserved forest - Rehabilitation of 240,000 hectares of forest land - Conservation and rehabilitation of 2,150 hectares of watershed areas and deteriorated - Maintenance of 3,000 hectares of forest gardens in conserved areas with a survival rate of 80% or more
To generate CDM project	- Generating CDM projects with a value of at least 2,000 million Baht (US$320 million) to reduce GHG emissions up to 2 million tons of CO2 equivalent

Source: National Strategic Plan on Climate Change B.E. 2551-2555 (2008-2012)

3) Mitigation options

Mitigation options indicated in "SNC" and "11th NESDP" were summarized as follows

Table 6 Mitigation option by sectors in Thailand

Sector	Mitigation options
Agriculture	- To develop socio-economic scenarios based on Thailand's development vision for the next 20 years. Possible scenarios were developed as follows; - Emphasis on (1) food production, (2) renewable energy and (3) integration of 1 and 2 and the demand for eco-balanced development
Forestry and wildlife	- To conserve and expand forest areas and community forests To promote reforestation in watershed areas - Local community participation in reforestation activities
Energy and transportation	- Energy efficiency enhancement and energy conservation - Renewable energy and human resources development - Introduction of a mass transit development plan in the Bangkok Metropolitan Region and other provincial capital cities.
Education	- Education curriculum development - Capacity building, training specific technical training, such as inventory, mitigation and vulnerability and adaptation analysis - Holding a public campaigns for public awareness

Source: Prepared by the JICA study team based on Thailand's second National Communication under the United Nations Framework Convention on Climate Change and The 11th national economic and social development plan (2012-2016)

4) Mitigation by Sectors

Mitigation measures of each ministry were summarized in "SNC" and "Policy Statement of the Council of Ministers[20]" as follows.

Table 7 Mitigation Measures of Each Ministry in Thailand

Ministry	Mitigation Measures
Ministry of Agriculture and Cooperatives	- Campaign to plough 20,000 thousand hectares of land for rice planting - Planting 72,000 hectares with permanent trees - Reduction of agricultural field burning by 24,000 hectares, particularly in northern Thailand
Ministry of Natural Resources and Environment	- Creating new forest and reforested areas, covering 3.18 million hectares - Rehabilitating watershed forest areas, covering 160,000 hectares - Planting trees in commercial forest areas, covering 448,00 hectares - Establishing 20 CDM projects for water reuse or recycling - Supporting 120 research and development projects in GHG management at the national level - Promoting 120 communities that surround research and development projects on community health and social development - Promoting and raising public awareness and consciousness of natural resources

[20] Policy Statement of the Council of Ministers Delivered by Prime Minister Yingluck Shinawatra to the National Assembly Tuesday 23 August B.E. 2554 (2011)

Ministry	Mitigation Measures
	and the environment - Promoting comprehensive water management through efficient above and below ground water management at the national level - Building immunity and readiness in confronting the effects of climate change and natural calamities through cultivating knowledge and developing a database on the effects of climate change - Protection and conservation of marine and coastal resources through local involvement in marine reef and grass rehabilitation
Ministry of Energy	- Promoting renewable energy industries as a new industry strategy; and, enable these industries to generate income from domestic demand and increase employment - Supporting develop renewable and alternative energy sources, with the objective of replacing 25% of the energy generated by fossil fuels within the next decade
Ministry of Transport and Communications	- Development of basic transportation and public utilities infrastructure to adequately service all regions and save energy
Ministry of Industry	- Development of the eco- friendly industrial sector by improving production technology, reducing resource use and lowering greenhouse gas emissions - To increase use of renewable energy in the industrial sector in order to encourage producers to earn extra income from selling carbon credits and reduce global warming - Community participation in problem solving and environmental inspection; and, develop towns or eco-industrial towns accordingly to the aforementioned approaches to become a low-carbon society - Development of IT infrastructure which help promote the reduction of energy consumption

Source: Prepared by the JICA study team based on Thailand's second National Communication under the United Nations Framework Convention on Climate Change and Policy Statement of the Council of Ministers Delivered by Prime Minister Yingluck Shinawatra to the National Assembly Tuesday 23 August B.E. 2554 (2011)

8 : Key Climate-Vulnerability Areas and Related Adaptation Measures

1) Vulnerability to Climate Change

Impacts of climate change in each sector in Thailand were indicated in "SNC" as follows.

Table 8 Impacts of Climate Change in Each Sector in Thailand

Sector	Impact
Water resources	- Climate change could reduce water flow into the Bhumibhol dam by the middle of the century, while there will be no impacts on the Sirikit dam. By the end of the century, water flow into the two dams is expected to increase substantially. - Mekong River tends to increase due to increased rainfall on the other hand, during the dry season, water flow will be lower than normal. - Potential flash floods could happen in the eastern region.
Agriculture	- Crop yields of rice, maize and cassava vary substantially according to the projection used different models in selected areas. - The uncertainties of the impact evaluations were too high to be used in policy formulation partly because of the lack of study on socio-economic scenarios - The north of Thailand tends to have higher production risks in the rainy season compared with other regions. - Results applied scenarios generated using a regional climate model imply the moderate impact on rice, maize, sugarcane and cassava production.
Forestry and	- The change of the type and structure of the forest, forest ecosystem, and

Sector	Impact
wildlife	biological diversity of fauna and flora, which cause loss of the agricultural genetic resources
Marine and coastal resources	- Sea level along the coast of Krabi rise by 11 to 22 cm in 25 to 30 years due to global warming. - Loss of coastal areas; about 10 to 35 meters of the coastline will be inundated.
Human health	- Global warming will enhance the potential spread of malaria within the first half of the century.

Source: Thailand's second National Communication under the United Nations framework convention on Climate Change

2) Summary of National Adaptation Programme of Action (NAPA)

Thailand's National Adaptation Programme of Action (NAPA) has not been provided, however, "SNC" shows a part of adaptation strategy as below.

Table 9 National Adaptation Program of Action in Each Sector in Thailand

Sector	Strategy
Human health	- Promoting awareness of global warming and health among all personnel in hospitals under the technical department monitoring
Agriculture	- Development of agricultural technology of high yield species that need little water and resilient to climate change - Emphasis of agricultural research and development, especially involving flora and fauna species that are adaptive and able to respond to the impact of climate change.
Meteorology	- Development the Climate Data Management System (CDMS) for weather forecast - Monitoring and verifying climate information and actual events to strengthen forecasting reliability
Natural disaster	- Mapping of risk areas at the national, regional and provincial levels - To upgrade the efficiency of disaster management - To develop databases and a telecommunication system - To prepare local communities for natural disasters and climate change

Source: Prepared by the JICA study team based on Thailand's second National Communication under the United Nations Framework Convention on Climate Change and The 11th national economic and social development plan (2012-2016)

Besides the adaptation plans above, to upgrade the ability to adapt to climate change is addressed in 11th NESDP. This should be achieved by enhancing knowledge and management tools to handle and respond to challenges from climate change.

9: Major Project List on Climate Change in Thailand

The major projects supported by Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), World Bank (WB), and other donors are summarized the following list.

Table 10 Major Project List in Thailand

#	Project Title	Donor	Year
1	Capacity Building on Climate Change Adaptation and Mitigation for Implementation in Bangkok	JICA	2009/06-2012/05
2	Project for Capacity Development on Mitigation/Adaptation for Climate Change in the Southeast Asia Region	JICA	2013/06-2016/05

3	Chiang Mai Sustainable Urban Transport Project	WB	2011/7-
4	Thailand: Bioenergy Sugar Ethanol Wastewater Management Project	WB	2009/5-
5	Accounting and Financial Management System Reform of Thailand's Railway Sector	ADB	2012/10-

Source: Prepared by the JICA study team with published data by JICA, ADB, and WB

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URL: http://www.goes.msu.edu/apn_arcp_2009_09/pdf/Keynote_Nuntapotidech.pdf
- National Strategy on Climate Change Management : Modeling and Data Application Ms. Tubtim Limsoontorn Office of Natural Resources and Environmental Policy and Planning (ONEP) Ministry of Natural Resources and Environment(MNRE), Thailand
URL: www.gistda.or.th/gistda_n/index.php/dl-presentation/doc
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URL: http://www.jgsee.kmutt.ac.th/seminar_programme/DAY%201/Saksit_Presentation.pdf

4 Thailand's second National Communication under the United Nations Framework Convention on Climate Change

5 Policy Statement of the Council of Ministers Delivered by Prime Minister Yingluck Shinawatra to the National Assembly Tuesday 23 August B.E. 2554 (2011)
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10 Published data by ADB
http://www.adb.org/projects/search/488,22259

15 : SOCIALIST REPUBLIC OF VIET NAM

1 : Basic Information and Key Indicators

Capital	Hanoi
Area :	329,241 [km^2]
Population	88,800,000 (2011)
GDP, per capita	USD 1,374 (2011)

Source : Basic data, Regional affairs, Ministry of Foreign Affairs of Japan

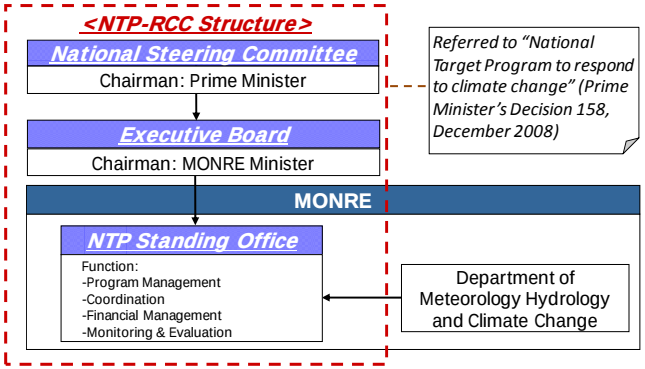
2 : National Development Strategy/Action Plan

National Target Program to Respond to Climate Change (NTP-RCC) was set in "The prime minister decision No. 158/2008/QD-TTg (Decision No. 158/2008)" in 2nd December, 2008. NTP-RCC has been implemented in order to develop feasible action plans to effectively respond to climate change in the short-term and long term. In order to advance the quantitative measures, the following national programs will be implemented in NTP-RCC.

- The national target programs to respond to climate change, development of extended plan for 2016-2025
- The national science programme on climate change
- The hydro-meteorological observation network and forecasting technology modernization programme by 2020
- The Green House Gas (GHG) emission inventory, reduction and management of emission reduction activities
- The water resources management and climate change adaptation programmes for Mekong and Red Rivers Delta
- The climate change response programme in megacities
- The sea dyke and river embankment up-gradation and rein forcement programme under climate change and sea level rise conditions
- The public healthcare improvement programme in the climate change and sea level rise conditions
- The socio-economic development programme in inhabited island to cope with climate change and sea level rise
- The pilot programme for community's effective response to climate change with and aim for further expansion.

3 : Institutional Arrangement of Ministries (and Key Agencies)

To implement NTP-RCC, institution and flow of governments in Viet Nam shows in below. The National Steering Committee for the United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol constitutes 18 members from 13 ministries. National Steering Committee is an inter-ministerial committee responsible for assisting the minister of MONRE in instructing, managing and coordinating the UNFCCC and Kyoto Protocol implementation activities, and Clean Development Mechanism (CDM) projects in Viet Nam.



Source : Support program to respond climate change in Viet Nam for smooth and effective implementation of National Target Program to Respond to Climate change (NTP-RCC) ;September 2009, Japan International Cooperation Agency (JICA)

Figure 1 Structure of NTP-RCC

4 :Mainstreaming Mitigation/Adaptation Actions in National Strategy

"No: 2139/QD-TTg Decision on approval of the national climate change strategy (Decision No:2139)." is mentioned strategy of national climate change that is provided by prime minister office on 5th December, 2011. National major descriptions relating to the mainstreaming in the strategy are stated below.

- Developing the capabilities of the country, carried out simultaneously solutions to adapt to the impacts of climate change and mitigation of GHG missions, ensuring the safety of people's lives and property, aims to sustainable development.
- Strengthening the capacity to adapt to climate change, human and natural systems, developing low-carbon economy in order to protect and enhance the quality of life, security and sustainable development countries in the context of global climate change and actively with the international community to protect the global climate system.

5 : Chronological Development of Climate Change-Related Policies and Framework

The national assembly of Viet Nam has been issued a number of environmental protection laws and prime minister decisions related to climate change as follows.

Table 1 Laws and Decisions that Address Climate Change (as of July 2013)

Date	Law No.	Contents of Law
6th July 1993 (amended twice on 9th June 2000 and 3rd June 2008)	No. 10/2008/QH12	Petroleum
1st September 1996 (amended on 27th June 2005)	No. 2/1996/QH9	Minerals
20th May 1998	No. 08/1998/QH10	Water resources
3rd December 2004 (replaces the 1991 law on forest protection and development)	No. 29/2004/QH11	Forest protection and development
3rd December 2004	No. 28/2004/QH11	Electricity
29th November2005	No. 52/2005/QH11	Law on environmental protection
28th June 2010	No. 50/2010/QH12	Safe and efficient use of energy
Date	**Decision No.**	**Contents of Decision**
20 June 2005	150/2005/QÑ-TTg	Planning on restructuring the national agricultural, forestry and fishery production until 2010 with vision until 2020
29th January 2007	16/2007/QÑ-TTg	Master plan of the national resources and environmental observation network until 2020
2nd August 2007	130/2007/QÑ-TTg	Several financial mechanisms and policies applied to clean development mechanism investment projects
2nd December 2008	158/2008/QÑ-TTg	National target program to respond to climate change
5th December 2011	2139/QD-TTg	National climate change strategy
25th September 2012	1393/QD-TTg	National strategy on green growth
21th November 2012	1775/QD-TTg	GHG emission management, management of carbon credit business activities to the world market

Source : Viet Nam's second national communication to the UNFCCC

1) Climate Change Policy

NTP-RCC is implemented in order to develop feasible action plans to effectively respond to climate change in the short-term and long term to ensure sustainable development of Viet Nam. Major tasks and solutions in the NTP-RCC are stated in below.

1. Assessment of climate change impacts in Viet Nam
2. Mainstreaming climate change issues into socio-economic, spectral and local development strategies and planning to identify measures of responding to climate change
3. Development of science and technology program on climate change

4. Strengthening the capacities of organization, institutions and policy on climate change
5. Awareness raising and human resources development
6. Enhancement of international cooperation
7. Development of action plans of ministries, sectors and localities to respond to climate change
8. Develop and implement projects under the climate change program

2) National Efforts/Measures Against Climate Change

Implementation plan for climate change in Viet Nam is provided by the prime minister in 21st November, 2012 as" No: 1775/QD-TTg Decision on approval of project of GHG emission management; management of carbon credit business activities to the international market (Decision No.1775)", that is mentioned in the two periods; 2012 to 2015 and 2016 to 2020. Summary of the measures is stated in the table below.

Table 2 Implementation Plan (Period of 2012 -2015)

Category	Contents
Institutional framework	- Establishing the steering committee - Developing framework of NAMA program in Viet Nam - Developing relevant national and sectoral –level MRV system, related for NAMA - Developing mechanisms and fiscal policies to form and operate the carbon markets
Regal framework	- Reviewing, assessing and completing the legal system for CDM projects - Establishing regulations governing the programs and projects of carbon credit trading outside the Kyoto Protocol.
Research and database development	- Setting up the system of national GHG inventory - Developing database on GHG inventory of year 2005 under the guidance of the IPCC - Preparing the basic emission scenarios by 2020 for the areas of energy, agriculture, LULUCF and waste - Studying, developing and disseminating technologies to reduce/sink GHG emissions in the areas of energy, transportation, agriculture, LULUCF and waste - Studying the preparation of methodology, registration and pilot implementation of NAMA - Developing database for the management of carbon credit trading under Kyoto Protocol
Awareness rising and capacity building	- Awareness raising and identifying a responsibility of GHG emissions for all level of sector, localities and entrepreneur - Awareness raising for the implementation of carbon credit trading activities in accordance with the of national and international provisions - Enhancing the capacity of policy makers, management staff of ministries, sectors and localities in managing carbon credit trading activities

Source : :Decision No.1775
Note :NAMA : National Appropriate Mitigation Action
MRV: Measurement, Reporting and Verification
IPCC: Intergovernmental Panel on Climate Change
LULUCF: Land Use, Land-US Change and Forestry

Table 3 Implementation Plan (Period of 2016 -2020)

Category	Contents
Institutional framework	- Developing and applying system of standard and target of energy consumption and emissions
Research and database development	- Preparing periodic reports on emission and reduction of GHG emission - Summarizing and assessing the efficiency of project implementation - Making report to the Prime Minister on the results of implementation of the project and proposing a appropriate work for the next stage
Awareness raising and capacity building	- Raising awareness, responsibility, strengthening the capability for the implementation of the reduction of GHG emissions - Strengthening the capacity of organization, institution, policy of managing and monitoring of GHG emissions - Strengthening the management of carbon credit trading activities to the international market in accordance with the domestic and international context
Implementation	- Implementing a number of targets to reduce emissions and increase capacity of sinks, specifically in the areas of energy, transportation agriculture, LULUCF and waste - Periodically inventorying GHG - Registering and widely deploying NAMA on the basis of the successful results of the pilot NAMA

Source :Decision No.1775

6 : Characteristics of GHG Inventory

1) National Inventory of Greenhouse Gas

As for national inventory of GHG, the latest information are referred in the "Second national communication to the UNFCCC", is published in 7th December, 2010.

Table 4 GHG Emission in 2000

Unit : 1,000 ton

Sub-Sector	CO2	CH4	N2O	%
Energy	45,900.00	308.56	1.27	35.0
Industrial process	10,005.72	0.00	0.00	6.6
Agriculture	0.00	2,383.75	48.49	43.1
LULUCF	11,860.19	140.33	0.96	10.0
Waste	0.00	311.48	3.11	5.3

Source : Viet Nam's second national communication to the UNFCCC

7 : Key Mitigation Areas and Related Policies and Measures

1) General Aspects

National Appropriate Mitigation Action (NAMA) is not provided in Viet Nam at this moment (as of July 2013). However, GHG emission reduction target is set in Decision No.1775. GHG reduction target by 2020 in each sectors are in below.

Table 5 GHG Reduction Target by 2020

Sector	GHG Reduction Target [%]
Energy and transportation	8
Agriculture	20
LULUCF	20
Waste	5

Note: The base year of the target is year 2005
Source : Decision No.1775

2) NAMA-Specific Aspects

In Viet Nam, mitigation actions are stated in the Decision No.1775 which set to achieve above target by prime minister. Mitigation measures of each sector are stated in the table below.

Table 6 Mitigation Measures in Vietnam

Sector	Measures
Energy and transportation	- Increase efficiency and save energy conservation - Development of renewable energy - Use associated gas in oil - Development of public transport - Using Liquefied Petroleum Gas (LPG) to replace gasoline, diesel oil for transport of passengers - Production of building materials, urban infrastructure
Agriculture	- Application of advanced rice farming practices in the direction of saving water and reducing input costs - Application of technical measures to improve fertilizer use efficiency, reduce emission of N_2O in rice cultivation - Applying solutions to save energy and fuel in soil preparation , watering industrial plants - Collecting, recycling, re-using, of agricultural by-products, Development and application of organic waste treatment technology in the cultivation of vegetables, sugar cane, short and long-term industrial crops - Change the diet of livestock and poultry. Provide multi-nutrient blocks for dairy cows - Application process good agricultural practices in Viet Nam in animal husbandry - Use of antibiotics to intestinal bacteria to reduce the level of GHG emissions from livestock - Development of biogas technology and collection systems, storage and handling of manure of livestock and poultry
Land Use and Change and Forestry	- Forest Protection - Afforestation and reforestation - Promote reforestation and natural regeneration - Reduce GHG emissions through efforts to limit deforestation and forest degradation, sustainable management of forest resources, conserve and enhance forest carbon stocks (REDD)
Waste	- Recovery and use of methane (CH_4) from landfills - Industrial wastewater treatment

Note :REDD: Reduction Emission from Deforestation and forest Degradation
Source : Decision No.1775

To achieve the above target, the following governmental agencies are assigned to take a proper action in the Decision No.1775.

Table 7 Governmental Agencies and Actions

Governmental Agencies	Task or Name of Projects
Ministry of Natural Resources and Environment	- To propagate, raise awareness of education, responsible for implementing GHG emission reduction and trading of carbon credits at all levels, sectors, localities, communities and businesses in accordance with the provisions of domestic and international - Establish an inventory system of national GHG - Research and development of mechanisms and policies to support the reduction of GHG project priorities in the field of building energy,

Governmental Agencies	Task or Name of Projects
	transportation, agriculture, LULUCF and waste - Construction of the NAMA framework Viet Nam. Research methodology development, registration and pilot NAMA - Construction of Viet Nam's MRV system for NAMA - Build a database, process management programs, business projects and carbon credits - Strengthening institutional capacity, institutional, policy management, monitoring GHG emissions, manage business operations carbon credits in international markets in accordance with national and conditions International - GHG inventory periodically - Review, evaluate and improve the legal system of policies and mechanisms for CDM projects - Building national MRV system / sector level for all relevant areas - Preparation and construction of periodic reports on emissions and reduce GHG emissions - Testing, monitoring, evaluation and implementation of the project management
Ministry of Transportation	- Research, develop and evaluate a number of options to achieve the objective of reducing GHG, specifically in the field of transportation - Capacity building policy and management in managing the business operations of carbon credits in the field of transportation
Ministry of Industry and Trade	- Research, develop and evaluate a number of options to achieve the objective of reducing GHG emissions in particular the energy sector (including industry) - Capacity building policy and management in managing the business operations of carbon credits in the energy sector (including industry) - Develop and apply a system of standards and norms for energy consumption, emissions
Ministry of Agriculture and rural development	- Research ,develop and evaluate a number of options to achieve the objective of reducing emissions and increasing absorption of GHG specified in agriculture and LULUCF - Research, develop and promulgate guidelines for local agencies, organizations and joint ventures, business links carbon credits from forests in markets outside the Kyoto Protocol - Capacity building policy, management of business operations carbon credits in the areas of agriculture, forestry
Ministry of Construction	- Research, develop and evaluate a number of options to achieve the objective of reducing GHG emissions, specifically in the field of waste, construction materials manufacturing and urban infrastructure - Capacity building policy and management in managing the business operations of carbon credits in the field of waste
Ministry of Finance	- Develop mechanisms to finance policy formation and operation of carbon markets

Source: Decision No:1775

8 : Key Climate-Vulnerability Areas and Related Adaptation Policies and Measures

1) Vulnerability to Climate Change

Impacts and/or vulnerabilities to climate change in Viet Nam are summarized in the second national communication stated in the table below.

Table 8 Impact of Climate Change in Each Sector

Sector	Impact
Water resources	- Annual flows of rivers in the north and northern area of north central coast are set to increase. In contrast, annual flows of rivers in the southern area of north central

Sector	Impact
	coast to the northern area of south central coast are bound to decrease. - Flood flows in most rivers tend to increase while flows during dry season are declining - Annual potential evapotranspiration rapidly scales up in the south central coast and the Mekong Delta regions, reflecting the highest level of increase. - After 2020, the groundwater level may drop drastically.
Coastal Zones	- With rising sea level, the annual flood-ridden area will expand. The Mekong River Delta would be most impacted, containing as much as 90% of the national floodplain area. - Sea-level rise may also lead to higher risks of saltwater intrusion of rivers and underground water resources, causing serious social and economic losses. - Climate change may have serious impacts on coastal ecosystems, reserves and mangrove forests. - By the year 2100, climate change will affect approximately 4.4% of Viet Nam's population, cause the loss of 5,469 km^2 of arable land and the submersion of 168 km^2 of aquaculture area and 320 km^2 of forest land would be submerged.
Agriculture	- Total annual temperature is projected to increase between 8% and 11% by 2100. - In most regions, the number of days when temperatures exceed 25oC will increase notably while the number of days when temperatures drop below 20oC will decrease. - Water demand for agriculture may increase two or three-fold compared with that of 2000. - Tropical plants will tend to shift further north and towards higher altitudes. - Crop water shortage would be exacerbated with decreased coverage of hygrophytes and rising evapotranspiration rates - Spring crop outputs are set to decline at a faster rate than summer crop outputs. - Winter maize productivity may increase in the Red River Delta but decrease in central coast and the Mekong River Delta. - Climate change may also threaten the life cycle (i.e. growth and reproduction) of cattle and increase the incidence and spread of diseases.
Forestry	- By 2100, native forest cover comprised of closed tropical moist semi-deciduous forests and closed evergreen forests, amongst others, will decrease. The ecosystems of closed tropical moist semi-deciduous forests are likely to be most affected by climate change. - In 2100, Chukrasia tabularis forests are projected to cover only 0.3 million ha, a decrease of 70% decrease. Pinus merkusii forests, are projected to cover approximately 2.3 million ha, equivalent to a fall of 58%. - Climate change will heighten risks of forest fires in all regions, primarily during the dry-hot season. In addition, warmer conditions will facilitate the spread of forest pests, hampering the growth of forest ecosystems.
Aquaculture	- Climate change adversely impacts the ecosystems of coral reefs, maritime and estuarine sea grass beds, and causes reductions in fish stocks. - Sea-level rise would exacerbate salinization in coastal zones, causing the retreat of mangrove forests with accompanying losses in habitat for numerous species. - The advance of saltwater leads to the replacement of freshwater species by their brackish and saline water counterparts in estuaries and coastal lagoons. - Rising temperatures weaken aquatic species and foster the growth of harmful microorganisms.
Energy and transportation	- Electricity transmission and distribution networks, along with oil-rigs, oil and LNG pipelines and shipments will be negatively impacted by rising sea levels and extreme weather. - Hydroelectric power generation will be affected by changing river flows, posing new challenges to the management of reservoirs. - Due to rising sea levels, industrial facilities, equipments, power stations and transmission lines in coastal zones face the risk of flooding.

Sector	Impact
	- This would increase maintenance and repair costs, and affect energy supply, consumption, and national energy security. - A rise of 100 cm in sea level could lead to the submersion of 11,000 km of road infrastructure, paralyze the country's transportation activities and cause considerable damage to the economy.
Human health	- Indirectly, rising sea level and temperature affect agricultural land, food security, and increase the risks of food shortages while warmer conditions facilitate the spread of infectious diseases and epidemics. - Adaptation measures need to focus on reviewing and developing new standards and regulations for urban wind load, heat load and drainage. In vulnerable areas, urban planning must be updated to take into consideration impacts of natural disasters.

Source: Viet Nam's second national communication to the UNFCCC

2) Summary of National Adaptation Programme of Action (NAPA)

National Adaptation Programme of Action (NAPA) is not provided in Viet Nam. However, adaptation strategies in the following sectors are prepared in the "Viet Nam's second national communication to the UNFCCC". Strategies of adaptation in Viet Nam are shown in below.

Table 9 Strategies of Climate Change in Each Sector

Sector	Strategy
Water resources	- Adaptation measures must focus on planning for the sustainable development of water resources in river basins and prioritize the review of existing, and the development of new systems of reservoirs, dams, and dykes, to incorporate climate change factors.
Coastal Zones	- Adaptation strategies for Viet Nam are classified into three categories: full protection, adaptation and withdrawal.
Agriculture	- Short-term measures (controlling erosion, building reservoirs, picking crops and crop growing seasons that suit new climate conditions, developing new cropping and stockbreeding techniques, etc.). - Long-term measures (developing alternative cropping patterns, crossbreeding; modernizing cultivation techniques). - Management and planning (developing new crop-livestock systems, designing new agricultural incentive systems, setting up insurance policies for crops and cattle, etc.).
Forestry	- Adaptation measures for forestry focus on promoting the sustainable management and development of forests, undertaking research, selecting and expanding coverage of drought and pest resistant species, and establishing a forest fire management and prevention program.
Aquaculture	- Adaptation measures must focus on developing specific aquaculture planning for different eco-regions, preserving marine biodiversity and ecosystem, cultivating species more tolerant to higher water temperatures, and building capacity in aqua-farming management.
Energy and transportation	- Adaptation measures focus on mainstreaming climate change issues into national development strategies, planning in energy and transportation, enhancing energy efficiency and conservation, and making improvements, reinforcements and modification to energy and transportation infrastructure in regions vulnerable to climate change.

Sector	Strategy
Human health	- Capacity building for local community health care institutions needs to be strengthened. - Weather forecasts, and more importantly disaster and disease break-out warnings, need to be improved and their accessibility enhanced. - Research and development should be encouraged and information on climate change and epidemics should be widely disseminated.

Source: Viet Nam's second national communication to the UNFCCC

9 : Major Project List on Climate Change in Vietnam

#	Project title	Donor	Year(if available)
1	Climate Change And The Impacts On Water Resources In Viet Nam	Government of Denmark	Not Available
2	Ho Chi Minh City Adaptation To Climate Change	United Kingdom and Japan through the ADB Small Grant for Adaptation Project	Not Available
3	Strengthening National Capacities To Respond To Climate Change In Viet Nam, Reducing Vulnerability And Controlling Greenhouse Gas Emissions	United Nations Environment Programme (UNEP)	Not Available
4	Development Of A Prototype System For Dam And Disaster Management in Vietnam	New Zealand	Not Available
5	Nordic Development Fund Support For National Target Program On Climate Change	Nordic Development Fund, Government of Viet Nam	Not Available
6	Climate Change And Costal Ecosystem Program	Germany and Australia	Not Available
7	Renewable Energy, Energy Efficiency and Climate Change Mitigation Projects	European Investment Bank (EIB)	31 October 2012 -
8	Technology Needs Assessment for Climate Change Mitigation	UNEP, Global Environment Facility, UNEP Risoe Center, Asian Institute Technology (AIT)	June 2012
9	Vietnam Disaster Risk Management Project	WB	Not Available
10	Nordic Partnership Initiative on Up-schaled Mitigation Action	Nordic countries	2012
11	Energy Efficiency and Renewable Energy Promoting Project	JICA	2009
12	Support Program to Respond to Climate Change（I）	JICA	2010
13	Support Program to Respond to Climate Change（II）	JICA	2011
14	Protection Forests Restration and Sustainable Management Project	JICA	2012
15	Support Program to Respond to Climate Change（III）	JICA	2013

References

1 Ministry of Foreign Affairs of Japan
URL : http://www.mofa.go.jp/mofaj/area/vietnam/data.html
2 The Prime Minister, Decision No. 158/2008/QD-TTg dated 2nd December, 2008 by the Prime Minister on
3 approval of the National Target Program to respond to climate change
Support program to respond climate change in Viet Nam for smooth and effective implementation of
4 National Target Program to Respond to Climate change (NTP-RCC) ;September 2009, Japan International Cooperation Agency (JICA)

URL:http://www2.ir3s.u-tokyo.ac.jp/icssasia2011/pdf/presentation_paralel/Odajima.pdf
Viet Nam's second national communication to the united nations framework convention on climate change
The Prime Minister No: 2139/QD-TTg Decision on approval of the national climate change strategy
5 Viet Nam's second national communication to the united nations framework convention on Climate change
URL:http://unfccc.int/essential_background/library/items/3599.php?such=j&symbol=VNM/COM/2%20E#b
6 eg
7 The Prime Minister No.1775/QD-TTg Decision on approval of project of greenhouse gas emission management; management of carbon credit business activities to the international market

添付資料 2

セミナー資料

Agenda ／List of Participants

Agenda

1st Day: August 27th					
Time			Program	Chairs	Venue
9:30	～	9:40	Opening remarks	MOFA	Hotel Grand Arc Hanzomon
9:40	～	9:50	JICA greetings	JICA	
9:50	～	10:00	General guidance about the dialogue program	JICA	
10:00	～	11:30	Session 1 : Each countries efforts towards low carbon growth and cooperation in Asian countries	MOFA	
11:30	～	12:00	Session 2 : Japan's cooperation on climate change through multi framework	MOF	
12:00	～	13:30	Lunch		
13:30	～	14:00	Session 3 : JICA's policy on climate change	JICA	
14:00	～	15:00	Session 4 : Workshop (JICA consultant)	JICA consultant	
15:00	～	15:30	Break		
15:30	～	17:00	Session 5 : Recent Development and Future Prospect of the Joint Crediting Mechanism (JCM)	MOFA, MOE, METI, Forest agency	
2nd Day: August 28th					
9:15	～	12:00	Presentation on climate change projects by private companies and local governments	E-solutions	Roppongi (Midtown)
13:30	～	15:30	Visit to high efficiency thermal power plant (J-Power)	J-Power	Isogo, Yokohama
17:00	～	18:30	Visit to Tokyo Skytree	JICA	Tokyo Skytree
3rd Day: August 29th					
9:30	～	10:30	Session 6 : Knowledge platform (LoCARNet)	JICA, IGES, NIES	Hotel Grand Arc Hanzomon
10:30	～	12:30	Session 7 : Open discussion "The way forward - Future cooperation between Asian countries and Japan, with the involvement of various stakeholders"	MOFA	
12:30	～	14:30	Lunch hosted by JICA	JICA	
14:30	～	15:30	Session 8 : Closed session (Climate change negotiation toward COP19) and closing remarks	MOFA	

List of Participants

Overseas Participants, In Alphabetical order

People's Republic of Bangladesh	
Mr. Md. Mahbub Hossain	Director (Planning, Development & Negotiation), Bangladesh Climate Change Trust (BCCT), Ministry of Environment and Forests
Brunei Darussalam	
Mr. Awang Eddie bin Dato Paduka Haji Sunny	Deputy Permanent Secretary, Ministry of Development
Kingdom of Cambodia	
Mr. Ou Chanthearith	Deputy Director Climate Change Department, Ministry of Environment
Republic of Indonesia	
Mr. Mochammad Farhan Helmy	Secretary of Mitigation Working Group, National Council on Climate Change
Republic of Korea	
Mr. Hechul Yoo	Director General, International Cooperation Office
Ms. Seona Kim	Program Officer, Global Environmental Division
Lao People's Democratic Republic	
Mr. Phouvong Luangxaysana	Director General, Department of Disaster Management and Climate Change, Ministry of Natural Resources and Environment
Mongolia	
Mr. Dorjgurkhem Batbold	Director, International Cooperation Division, Ministry of Environment and Green Development of Mongolia
Republic of the Union of Myanmar	
Mr. Nay Aye	Director-General, Environmental Conservation Department Ministry of Environmental Conservation and Forestry

Federal Democratic Republic of Nepal	
Mr. Vinod Gautam	Section Officer Climate Change Management Division, Ministry of Environment
Islamic Republic of Pakistan	
Mr. Dilshad Ahmad Babar	Joint Secretary Ministry of Climate Change
Republic of the Philippines	
Ms. Mary Ann Limpot Sering	Vice Chairperson & Executive Director, Climate Change Commission
Kingdom of Thailand	
Dr. Sedthapandh Krajangwongs	Head, UNFCCC Coordination Section, Climate Change Office, Office of Natural Resources and Environmental Policy Planning, Ministry of Natural Resources and Environment
Socialist Republic of Viet Nam	
Mr. Tan Van Pham	Deputy Director General, Ministry of Natural Resources and Environment

Government of Japan

Ministry of Foreign Affairs	
Mr. Takehiro Kagawa	Ambassador

	Director-General for Global Issues
Mr. Hiroshi Minami	Chief Negotiator, Ambassador for Civil Society Deputy Director-General for Global Issues
Mr. Masami Tamura	Director, Climate Change Division, International Cooperation Bureau
Ms. Aya Yoshida	Negotiator, Climate Change Division, International Cooperation Bureau, Ministry of Foreign affairs
Ms. Naoko Ueda	Principal Deputy Director, Climate Change Division, International Cooperation Bureau, Ministry of Foreign affairs
Ministry of Finance	
Mr. Kentaro Ogata	Director for Development Issues, International Bureau, Ministry of Finance
Ministry of Economy, Trade and Industry	
Mr. Noriyuki Mita	Deputy Director-General, Environmental Affairs, Ministry of Economy, Trade and Industry
Mr. Koji Hachiyama	Director, Global Environmental Partnership and Technologies Office, Industrial Science and Technology Policy and Environment Bureau, Ministry of Economy, Trade and Industry
Ministry of the Environment	
Mr.Akira Nitta	Director, Office of International Strategy on Climate Change, International Strategy Division, Global Environment Bureau
Mr.Yuji Mizuno	Director, Office of Market Mechanisms, Climate Change Policy Division, Global Environment Bureau
Mr. Yoshihiro Mizutani	Negotiator for Climate Change Office of International Strategy on Climate Change, International Strategy Division, Global Environment Bureau
Forestry Agency	
Mr. Satoshi Akahori	Director, International Forestry Cooperation Office Forestry Agency, Ministry of Agriculture, Forestry and Fisheries

Participants in Day 3 (in Program order)

Institute for Global Environmental Strategies (IGES)	
Mr. Shuzo Nishioka	Senior Research Advisor, Institute for Global Environmental Strategies
Ms. Tomoko Ishikawa	Senior Researcher, Task Manager (Research Network for Low-carbon Societies); Senior Policy Researcher, Climate Change Group, Institute for Global Environmental Strategies
National Institute for Environmental Studies (NIES)	
Mr. Junichi Fujino	Senior Researcher, Sustainable Social Systems Section, Center for Social and Environmental System
Ms. Yumiko Asayama	Research Associate, Sustainable Social Systems Section, Center for Social and Environmental System
Tokyo Metropolitan Government	
Ms. Yuko Nishida	Planner, Urban and Global Environmental Division, Bureau of Environment, Tokyo Metropolitan Government
City of Yokohama	
Mr. Hideki Mori	Deputy Executive Director, Climate Change Policy Headquarters, City of Yokohama

Conservation International	
Ms. Kana Yamashita	Deputy Director, Climate Security Program Conservation International Japan
WWF Japan	
Mr. Naoyuki Yamagishi	Climate and Energy Group Leader, WWF Japan
Tepia Corporation Japan Co., Ltd.	
Ms. Megumi Takayama	Manager, Public Affairs, Tepia Corporation Japan Co., Ltd.
SUURI-KEIKAKU Co., Ltd.	
Mr. Akeo Fukayama	Director, Environment Division SUURI-KEIKAKU Co., Ltd.

Organizer

Ministry of Foreign Affairs	
Ms. Maki Kawamura	Deputy Director, Climate Change Division, International Cooperation Bureau
Mr. Itaru Kitaichi	Researcher, Climate Change Division International Cooperation Bureau, Ministry of Foreign affairs
Mr. Masaya Konishi	Official, Climate Change Division International Cooperation Bureau
Japan International Cooperation Agency (JICA)	
Mr. Masami Fuwa	Director, General, Global Environment Department
Mr. Naoki Mori	Director, Office for Climate Change, Global Environment Department
Mr.Juichiro Sahara	Deputy Head and Advisor Office for Climate Change, Global Environment Department
Ms. Mihoko KAWAMURA	Climate Change Officer, Office for Climate Change, Global Environment Department
Consultants	
Mr. Naoki Matsuo	CEO, Climate Experts Ltd.
Ms. Asako Yamamoto	Climate Experts Ltd.
Mr. Masaru Ishikawa	Nippon Koei Co., Ltd
Ms. Sachiyo Shimizu	Nippon Koei Co., Ltd

添付資料 3

セミナー資料

政策対話広報資料

JICA's Cooperation toward Climate Compatible Development in Asian Countries

Policy Dialogue on Climate Change in Asian Countries

hosted by the Government of Japan and organized by JICA
August 27 – August 29, 2013 / Tokyo, Japan

- ***Two-day Policy Dialogue*** and ***Site Visit*** to learn from Japanese experiences in mitigation and adaptation
- ***Representatives from 13 Asian countries*** and government officials, academics, business leaders and researchers in Japan attended the meeting.
- Dialogue held in the context of the ***19th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 19, Nov. 2013)*** in Warsaw, Poland
- JICA and the Japanese government indicated their ***further efforts in assisting Asian countries.***



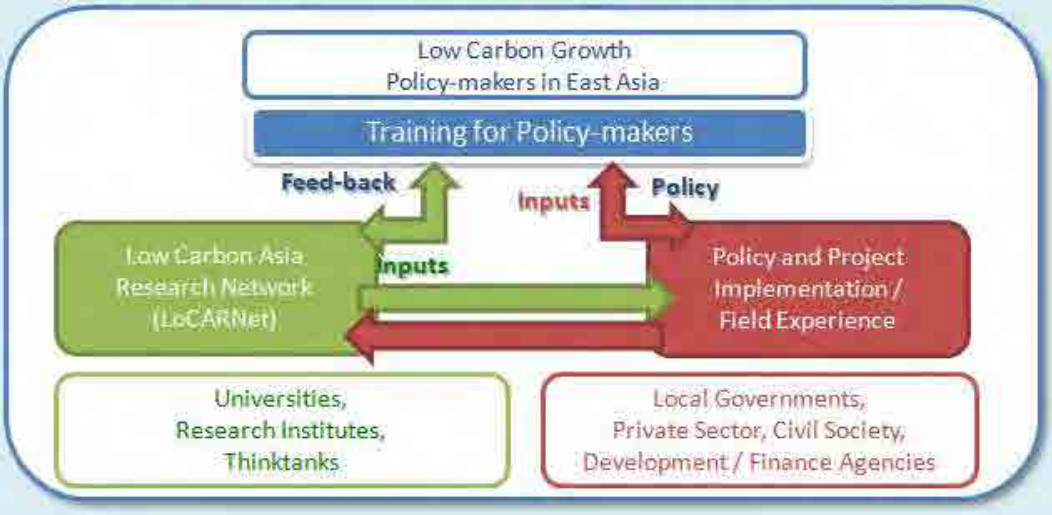
JICA's Assistance to Asian Countries through Regional Network

East Asia Knowledge Platform for Low Carbon Growth

East Asia Knowledge Platform for low Carbon Growth was developed in 2012 with 3 pillars such as

i) to develop their own low-carbon growth strategies in each country,
ii) importance of technology, market and non-market mechanisms,
III) importance of cooperation among various stakeholders including the establishment of "East Asia Knowledge Platform for Low-carbon Growth"

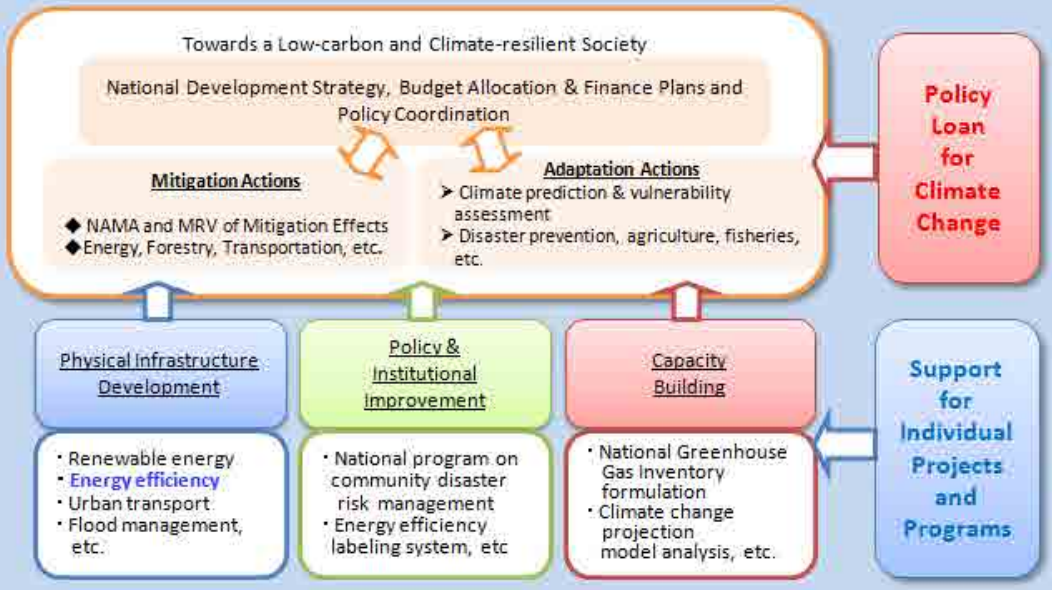
Provide opportunities for researchers, policy makers and development practitioners to (i) originate & share policy oriented research skills and outputs, (ii) digest & translate research outputs and best practices into policy proposals, and (iii) train & assist policymakers to create and implement strategies.



JICA's Recent Cooperation with Asian Countries for low carbon development

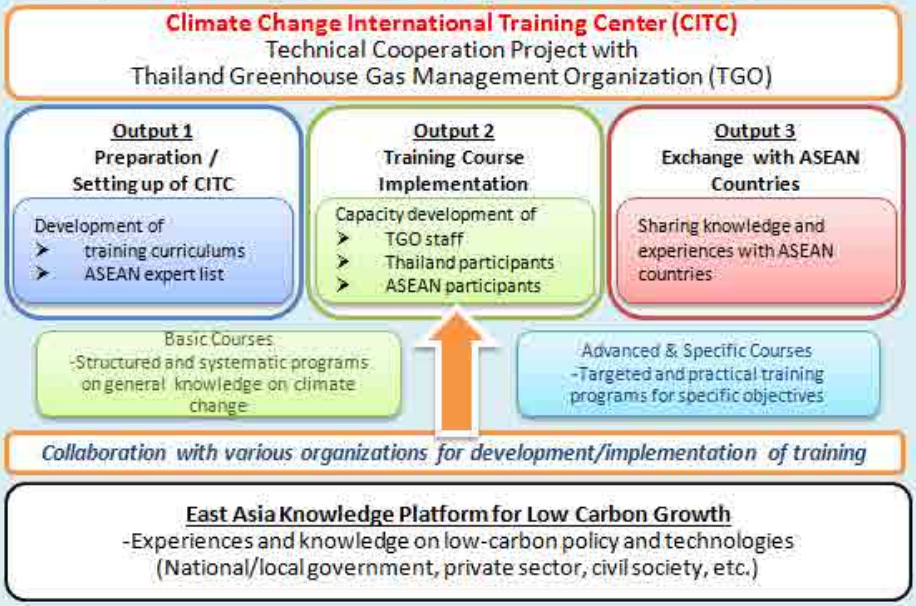
Holistic Approach in Vietnam :
Structured, Multi-layered Support from Policy to Actions

Support Vietnam toward a low carbon and climate-resilient society from multi-layered approaches such as physical infrastructure development, policy & institutional improvement, and capacity building.



Thailand: Project for Capacity Development on Climate Change Mitigation/Adaptation in the Southeast Asia Region (2013-2016)

Provide Technical cooperation project with Thailand Greenhouse Gas Management Organization(TGO) at Climate Change International Training Center(CITC) in collaboration with various organizations



Office for Climate Change
Global Environment Department
Japan International Cooperation Agency (JICA)
www.jica.go.jp/english

添付資料 4

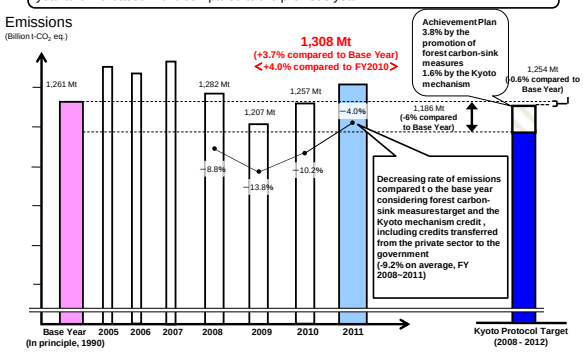
セミナー資料

セッション 1

Each Countries' Efforts Towards Low Carbon Growth and Cooperation in Asian Countries
外務省　地球環境部

Japan's Greenhouse Gas Emissions

Japan's greenhouse gas emissions in FY2011 increased 3.7% compared to the base year and increased 4.0% compared to the previous year.



Tentative Direction on Measures Against Climate Change

(2013 March Global Warming Prevention Headquarters Decision)

Ⅰ. Basic Direction on Measures Against Climate Change in FY2013 and Beyond

- Based on the Cancun Agreement under the UNFCCC, Japan will register its reduction target for 2020 and report its progress according to the requirements for reporting and reviewing, and will sustain strong action on tackling climate change in FY2013 and beyond.
- The zero-based review of the 25% reduction target by COP19 in November.
- The Central Environment Council and Industrial Structure Council, as well as other relevant Councils will consider various policies and measures to be included in the new Climate Change Plan to achieve the new target.
- The Plan will be finalized by the Global Warming Prevention Headquarters, followed by a Cabinet Decision.

Ⅱ. Formulation of the new Climate Change Plan

- The policies and measures to be included in the Plan are expected to (i) draw on the experience and knowledge gained through the implementation and assessment of the Kyoto Protocol Target Achievement Plan, (ii) take into account the development of future energy policies, and (iii) contribute to the stimulation of our economy.
- Measures regarding renewables and energy efficiency are to be maximized by further accelerating the dissemination of such measures by businesses and citizens since the Great East Japan Earthquake, utilizing our technology and wisdom, and thereby contributing to the shift towards a low carbon society.

Direction by Prime Minister Shinzo Abe (January 2013)

- Japan is, based on the instruction given by Prime Minister Abe on the occasion of the meeting of the Headquarters for Japan's Economic Revitalization, in the process of formulating the "Proactive Diplomatic Strategy on Global Warming (provisional name)" by COP19 in November ,which contributes to international society with Japanese technologies, while following the zero-based review of 25% reduction target.

Major Policies to Counter Climate Change

○Carbon Tax

- Tax rate corresponding to the amount of CO2 emissions for all fossil fuels (JPY 289/t-CO2)
- **Enforced from Oct. 2012** and increases in the tax rate gradually over 3 and a half years
- All the tax revenue will be allocated for curbing energy-oriented CO2 emission.

○Feed-in Tariff for Renewable Energy

- **Launched on July 1, 2012.**
- Purchase rate and period shall be decided every year corresponding to the type, form of installation and scale of renewable energy sources. Specifically, the price and the period shall be decided based on the opinion from an independent committee (members shall be appointed after authorization by the Diet) after consultation with the ministers concerned.

○ Keidanren's Voluntary Action Plan

- Each industry sets its own target to reduce emissions and makes an effort to achieve it. The government regularly evaluates/verifies the plans through advisory councils in order to secure the achievement.

○ Top Runner Program

- Energy conservation standards under the so-called "Top Runner Program" have been implemented for automobiles and household electrical appliances in accordance with the Energy Conservation Law as amended in 1998.
- As of 2012, 23 equipment are subject to these standards.

Japan's contribution toward realization of low carbon growth in Asia

In December 2009, Japan committed to provide $15 billion up to the end of 2012 to support mitigation and adaptation in developing countries. By December 2012, Japan achieved $17.6 billion, $10.8 billion of which was provided for Asian countries(*). Japan continues to make contributions, utilizing various schemes such as ODA loan, grant, technical cooperation, OOF and private finance toward realization of low carbon growth in Asian countries.

Disaster Prevention

□ Strengthening developing countries' capabilities to address natural disasters such as flood, drought and typhoon caused by climate change

✓**Projects for the Improvement of capabilities to cope with Natural Disasters** implemented in Cambodia, Laos, Philippine, Vietnam, Indonesia.
Japan significantly contributed to the efforts for flood prevention in Mekong countries.

✓ **Infrastructure Rehabilitation projects for typhoon damage**
In the region severely damaged by typhoon in Philippines, Japan improved and reinforced infrastructure, such as the flood controlling institutions and the damaged roads and bridges.

✓Moreover, Japan promoted the climate change measures by using the satellite in Vietnam and constructed drain to control the flood damage in Cambodia.



Source: JICA Source: JICA

Renewable Energy

□ Promoting the introduction of renewable energy, including solar, geothermal and wind power

✓**Solar Power generation projects** implemented in Cambodia, Laos and Philippines

✓**Hydro electric power generation projects**
In Vietnam, Japan supported the project of constructing a hydro electric power plant using trade insurance with the cooperation between public and private sectors.

✓Moreover, Japan contributed to the construction of geothermal power plants in Indonesia and cooperated with Indian Renewable Energy Development Agency (IREDA).

REDD+ (Forest)

□ Supporting the research on forest resource, forest management, forestation for the sustainable use and forest preservation

✓**Forest Conservation projects** implemented in Cambodia, Laos, Vietnam, Thailand and Indonesia

✓Moreover, Japan implemented forest management project in Philippines and forestation projects in Vietnam, India and China.

Energy saving

□ Promoting technical cooperation as well as the introduction of energy saving facilities

□ Cooperation on the construction of a low carbon city in the urbanized countries

✓**Technological cooperation related to energy saving**
In Vietnam, Indonesia, India, China and Singapore, Japan supported to introduce energy saving law/standard.


Source: JICA

✓**Super efficient thermal power generation**
In Indonesia, Japan supported the construction of coal thermal power plants, which uses Japan's clean coal technology.

✓**Cooperation toward Low Carbon City**
In Thailand, Vietnam and India, Japan supported the introduction of metro. Also, Japan strengthened the cooperation on low carbon city, such as energy saving of commercial buildings in Thailand, smart grid in Vietnam and Cambodia.

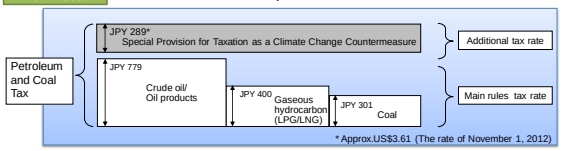
✓Moreover, Japan utilized the schemes including "Green" of JBIC to promote environmental cooperation, such as financing renewable energy and energy efficiency projects in India with ICICI Bank Limited.

* Bangladesh, Brunei, Cambodia, China, India, Indonesia, Laos, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Republic of Korea, Sri Lanka,

Carbon Tax (Special Provision for Taxation as a Climate Change Countermeasure)

- Tax rate corresponding to the amount of CO2 emissions for all fossil fuels (JPY 289/t-CO2)
- Enforced from Oct. 2012 and increases in the tax rate gradually over 3 and a half years
- All the tax revenue will be allocated for curbing energy-oriented CO2 emissions

Tax Rate — Tax Rate of CO2 Emissions per Ton



Enforcement Stage

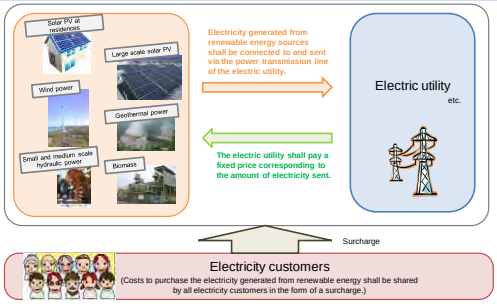
Object of Taxation		Main rules Tax Rate	From Oct. 1, 2012	From Apr. 1, 2014	From Apr. 1, 2016
Crude oil/Oil products	[per kl]	JPY 2,040	+ JPY 250 (JPY 2,290)	+ JPY 250 (JPY 2,540)	+ JPY 260 (JPY 2,800)
Gaseous hydrocarbon	[per t]	JPY 1,080	+ JPY 260 (JPY 1,340)	+ JPY 260 (JPY 1,600)	+ JPY 260 (JPY 1,860)
Coal	[per t]	JPY 700	+ JPY 220 (JPY 920)	+ JPY 220 (JPY 1,140)	+ JPY 230 (JPY 1,370)

Tax Revenue — [1st year] **JPY 39.1 billion** ; [Normal year] **JPY 262.3 billion** (about US$3.27 billion)

To be used for introduction of renewable energy and enhancement of energy-saving measures, etc.

Feed-in Tariff for Renewable Energy

- This is a scheme to foster renewable energy in Japan with the help of all electricity customers.
- Electric utilities will be obliged to purchase electricity generated from renewable energy sources such as solar PV and wind power on a fixed-period contract at a fixed price. This will promote the introduction of renewable energy.
- Costs of purchased electricity generated from renewable energy shall be transferred to electricity customers all over Japan in the form of a nationwide equal surcharge. They shall pay the surcharge for renewable energy proportional to electricity usage.



添付資料 5

セミナー資料

セッション 2

Japan’s Cooperation on Climate Change through Multi-Framework
経済産業省

Japan's cooperation on climate change through multi-framework

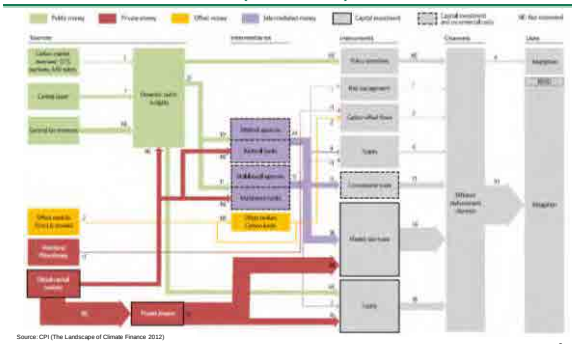
Kentaro OGATA
Ministry of Finance, Japan

Aug 27th, 2013

Outline

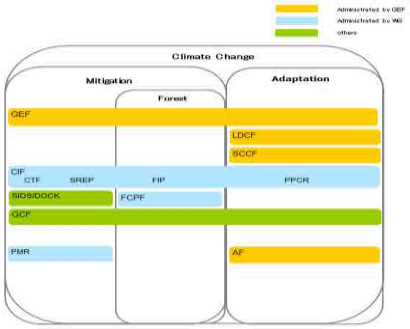
1. Effort by the MDBs for Climate change
2. Japan's cooperation on climate change through MDBs
3. Japan's cooperation on for climate change through CIF, GEF and GCF

Current climate finance flows(in USD billion)



Source: CPI (The Landscape of Climate Finance 2012)

Multilateral Funds related to global environment



MDB Adaptation and Mitigation Finance According to the Joint Approach, 2011 (USD millions)

Adaptation

MDB	MDB resources		External resources	
	Investments and technical assistance	Policy-based instruments	Investments and technical assistance	Policy-based instruments
AfDB	593	-	2	-
ADB	585	-	172	-
EBRD	181	-	16	-
EIB	225	-	65	-
IDB	13	275	1	3
WB	2,080	224	85	-
TOTAL	3,677	499	341	3

Mitigation

MDB	MDB resources		External resources	
	Investments and technical assistance	Policy-based instruments	Investments and technical assistance	Policy-based instruments
AfDB	859	-	185	-
ADB	2,196	-	224	-
EBRD	1,900	-	132	-
EIB	2,687	-	-	-
IDB	1,284	457	134	3
IFC	1,664	-	17	-
WB	8,592	1,588	412	-
TOTAL	16,482	2,045	1,104	3

Sector	MDB resources		External resources	
	Investments and technical assistance	Policy-based instruments	Investments and technical assistance	Policy-based instruments
Energy	11,324	1,550	534	-
Transp.	3,795	191	25	-
AFOLU	545	100	110	-
Others	818	224	435	3
TOTAL	16,482	2,045	1,104	3

Source: ADB, IDB and IFC(Joint MDB report on Adaptation Finance 2011 and Joint MDB report on Mitigation finance 2011)

Efforts for Climate change by MDBs

Funding Sources	Role/Scope
	MITIGATION
CDM Value of Primary CDM transactions: US$7.4 billion in 2007, estimated to leverage US$36 billion	Improves financial returns through long-term purchase agreements for the GHG emissions reductions resulting from climate-friendly projects
GEF TF US$250 million p.a. (2006-2010)	Finances incremental costs of removing barriers to market development of near commercial technologies, institutional development, innovation, piloting, and demonstration
Other Trust Funds and Partnerships housed in MDBs	Grant financing for climate change knowledge products, capacity building, upstream project work or pilots
Adaptation Fund - US$80 million to US$1 billion million per annum by 2012 (best estimate:US$300 to US$600 million)	Funding for the Adaptation Fund will mainly come from a 2 percent levy on revenues generated by the CDM
UNFCCC Special Funds (administered by GEF) Least Developed Countries Fund (LCDF)=US$180 million	LDCF helps in the preparation and financing of implementation of national adaptation programs of action (NAPAs) to address the most urgent adaptation needs in the least developed countries
Special Climate Change Fund (SCCF)=US$90 million	SCCF supports adaptation and mitigation projects in all developing countries, with a large emphasis on adaptation
GEF TF Strategic Priority to Pilot an Operational Approach on Adaptation (SPA) US$50 million till 2010	SPA is a funding allocation within the GEF Trust Fund whose objective is to support pilot and demonstration projects that address local adaptation needs and generate global environmental benefits in all GEF focal areas
Global Facility for Disaster Reduction and Recovery (GFDRR) US$8 million FY07 + US$40 million FY08	Partnership within the UN International Strategy for Disaster Reduction (ISDR),focusing on building capacities to enhance disaster resilience and adaptive capacities in changing climate
UNDP Adaptation facilities for Africa: US$90-120 million	

Efforts for Climate change by MDBs(cont.)

Funding Sources	Role/Scope
ADAPTATION	
Other **ADB**: US$40 million initial capitalization Bilateral resources(e.g. adaptation programs run by national development assistance institutions) **CGIAR**: Climate-related research for agriculture US$77 million (€50million) Trust Funds and partnerships housed in MDBs)	Grants for climate change knowledge products, capacity building, upstream project work or pilots
BLENDED RESOURCES FOR MITIGATION & ADAPTATION	

Climate Investment Funds=US$6 billion
Two trust funds will be created under the Climate Investment Funds:

- The Clean Technology Fund will provide new, large-scale financial resources to invest in projects and programs in developing countries which contribute to the demonstration, deployment, and transfer of low-carbon technologies. The projects or programs must have a significant potential for long-term greenhouse gas savings.
- The second fund, the strategic Climate Fund, will be broader and more flexible in scope and will serve as an overarching fund for various programs to test innovative approaches to climate change. The first such program is aimed at increasing climate resilience in developing countries.

EC Global Climate Change Alliance = (GCCA)US$450 million (€300 million)
- Thematic Program for Environment and Sustainable Management of Natural Resources (including Energy) managed by the European Commission DG Development / EuropeAid (€110 million)
- European Development Fund managed by DEV/AIDCO budget framework 2008-13 (€280 million)

Efforts for Climate change by the WB

Financial products	Activities
Carbon Funds and Facilities	• The WB is currently establishing two new facilities: I. the Forest Partnership Facility (FCPF), to pilot an output-based market mechanism to provide incentives for reducing emissions from deforestation and land degradation, II. the Carbon Partnership Facility (CPF), to use carbon finance to catalyze a transformation toward low-carbon economic development. • Through its Carbon Finance Unit (CFU), manages US$2.1 billion, through 10 funds and facilities pooling (CDM, JI, stakes from 16 governments and 66 private companies, and AAU/GIS) • IFC also gained significant experience from managing Dutch governmental carbon funds (US$135 million committed in 12 transactions).
IFC Carbon Delivery Guarantee	• IFC essentially provides a credit enhancement and guarantees the delivery obligation of projects for a risk-based guarantee fee. • The premium in pricing obtained by an AAA-rated seller in the secondary markets is passed on to the projects net of guarantee fees.
MIGA Carbon Insurance Product	• MIGA developed an innovative instrument to mitigate a series of risks to carbon finance project performance, including host country political risk

Efforts for Climate change by the WB

Financial products	Activities
Global Facility for Disaster Reduction and recovery	• Partnership within the UN International Strategy for Disaster Ongoing for Disaster Reduction (ISDR), focusing on building capacities to enhance Reduction and disaster resilience and adaptive capacities in changing climate.
Climate Risk Management Products	• The WBG has been assisting countries develop risk financing, increase penetration of insurance and access to under Products re-insurance markets. • Select examples include index-based development insurance schemes for farmers or catastrophe property insurance as well as the Caribbean Catastrophe Risk Insurance Facility (CCRIF), offering parametric insurance against hurricanes and earthquakes, or the Global Catastrophe Mutual Bond, pooling risks of several countries and transferring them to capital market (on going).
Bonds Issuance	• Examples of recent initiatives include the first Certified Ongoing Emissions Reductions (CER)-linked Uridashi Bond, nicknamed / under the "Cool Bond," with Daiwa Securities Group, and the World develop-Bank Eco-3Plus Note - by ABN AMRO for investors in the Netherlands, Belgium, and Luxembourg.
Trust Funds	• Examples of trust funds that can support climate-related activities include: ESMAP, Japan PHRD, Norwegian TF for Private Sector and Infrastructure, Bank Netherlands Partnership Program, Public-Private Infrastructure Facility, TF for Environmentally and Socially Sustainable Development, Japan Social Development Fund, Institutional Development Fund.

Efforts for Climate change by the ADB

Type	Financial program
Mobilizing concessional resources	• Internal funds: Climate Change Fund, Clean Energy Financing Partnership Facility • External funds: CIF, GEF, looking ahead to GCF
Maximizing market mechanism	• Carbon Market Program: upfront carbon finance and technical assistance
Catalyzing private capital	• Direct project finance (lending, guarantees) • Equity investments

ADB's CP3: Mobilizing Equity Capital at Scale

Efforts for Climate change by other IDB and AfDB

MDBs	Major initiative/funds	Activities
IDB	**SECCI** (Sustainable Energy and Climate Change Initiative)	• Alternative energy, sustainable agriculture, climate-friendly transportation and climate resilient resource management are just some of the many areas in which the IDB is leading the way in setting high sustainability standards. These standards are part of the IDB's commitment of providing countries in LAC with the best available technologies and practices to ensure economic viability, social equity, and environmental integrity. • The goals of the Sustainable Energy and Climate Change Initiative are centered around the provision of comprehensive sustainability options in areas related to the energy, transportation, water and environmental sectors as well as building climate resilience in key priority areas vulnerable to the impacts of climate change.
AfDB	**CBFF** (Congo Basin Forest Fund), **AWF** (African Water Facility), **RWSSI** (Rural Water Supply and Sanitation Initiative)	• As the AfDB implements its Climate Change Action Plan, investing up to USD 6.4 billion between 2011 and 2015, the resources will be drawn from the Bank's own internal funding, bilateral trust funds and climate finance instruments. • The AfDB will further enhance its investments through a more streamlined and efficient use of its various climate related financing instruments. The AfDB will also support other innovative approaches including the mobilization of domestic resources by countries.

Efforts for Climate change by other EBRD

Sustainable Energy Initiative (SEI)	• The EBRD addresses energy efficiency and climate change through its Sustainable Energy Initiative. The SEI was launched in 2006 with the aim of scaling up sustainable energy investments in our region, improving the business environment for sustainable investments and removing key barriers to market development. • To achieve this, the EBRD has developed a unique business model to finance sustainable energy projects, combining investments with technical assistance and policy dialogue. • The SEI uses the full range of the EBRD's financial instruments to finance energy efficiency and renewable energy projects across the Bank. These projects can take advantage of technical assistance including activities ranging from market analysis and energy audits to training and awareness raising. As part of its policy dialogue activities, the SEI works with governments to support the development of strong institutional and regulatory frameworks that incentivize sustainable energy investments. • The combination of these three activities provides strong support for sustainable energy investments. To enable these projects, the EBRD has an in-house Energy Efficiency and Climate Change Team of more than 30 specialists, including engineers, finance specialists and policy experts who work directly on projects with bankers and clients.

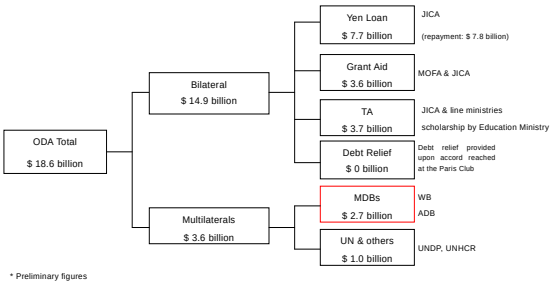
Outline

1. Efforts by the MDBs for Climate change

2. Japan's cooperation on for climate change through MDBs

3. Japan's cooperation on climate change through CIF, GEF and GCF

Overview of Japan's ODA in gross terms (2012)



* Preliminary figures

Japan's Contributions to Trust Funds Managed by MDBs

World Bank	**PHRD** (Policy and Human Resources Development Fund)	• **PHRD**: The Japan Policy and Human Resources Development Fund (PHRD) was established in 1990 as a partnership between the Government of Japan and the World Bank. • The scope of the Fund is described in the Arrangement for the Administration of the Fund (as revised in March 1999) as follows: "The Fund may be used for the purposes of financing technical assistance and other grant activities in respect of the formulation and implementation of Bank-supported projects and programs and activities to develop human resources in developing member countries of the Bank, to assist developing member countries of the Bank to formulate and implement development policy and to strengthen the partnership between the Government of Japan and the Bank." • As of end-June 2012, the Government of Japan has contributed US$2.7 billion to the PHRD Fund. It is one of the largest Trust Funds managed by the World Bank and is recognized as making a unique contribution to the member countries' capacity building efforts. • **Japan has contributed CEPF, SIDS-DOCK through PHRD.** 1. **CEPF**: The Critical Ecosystem Partnership Fund (CEPF) aims to provide at least $150 million over five years to support preserving the most biologically significant and threatened areas of the world. The CEPF is a joint initiative of Conservation International, the Global Environment Facility, the MacArthur Foundation, the Government of Japan, and the World Bank. These leading institutions have each committed $25 million to the Fund, recognizing that strategic alliances and elimination of duplicate efforts are critical to better safeguard threatened ecosystems. Japan contributed $5million last year. 2. **SIDS-DOCK**: The Program support the Small Island Developing States (SIDS) to transition to low carbon economies through development and deployment of renewable energy (RE) resources and promotion of greater energy efficiency (EE). At COP17 in Durban, the Government of Japan announced a new contribution of US$15 million to the SIDS-DOCK Program subject to the Parliamentary approval.

Japan's Contributions to Trust Funds Managed by MDBs

MDBs	Japan trust funds	Activities supported by trust funds
ADB	**JFPR** (Japan Fund for Poverty Reduction)	• **JFPR**: The Japan Fund for Poverty Reduction (JFPR) was established in May 2000 • Providing direct grant assistance to the poorest and most vulnerable groups in developing member countries (DMCs) of the Asian Development Bank (ADB) while fostering long-term social and economic development. • Contributions totaling $446 million have been received from the Government of Japan as of 30 December 2010. This brochure provides general information on the Japan Fund for Poverty Reduction (JFPR).
	ACEF (Asian Clean Energy Fund)	• **ACEF**: The Asian Clean Energy Fund (ACEF) was established under the Clean Energy Financing Partnership Facility in 2008. • ACEF is a single-donor fund supported by Japan for clean energy projects in ADB's DMCs. Total ACEF funds made available up to 31 December 2012 amounted to approximately $57.1 million.
IDB	**JSF** (Japan Special Fund)	• Capacity building of regional developing countries including trade facilitations • Japan contributed JSF $9.8 million. • **In addition, Japan contributed SECCI (Sustainable Energy and Climate Change Initiative) 1million April, 2009 and 1million December 2012.**
EBRD	**JECF** (Japan EBRD Cooperation Fund)	• Technical Assistance to Early Transition Countries in Central Asia and Mongolia. • Japan will contribute JECF in the near future. • **In addition, Japan contributed €3m on the SEI (Sustainable Energy Initiative).**

What are the strong points of the MDBs?

--- Wide ranging expertise and extensive network are at the core ---

1. Wide ranging expertise and extensive network

➢As the cornerstone of the international development architecture, MDBs has a pool of talented resources. Backed by field offices, MDBs provide adequate policy advises from development perspectives.

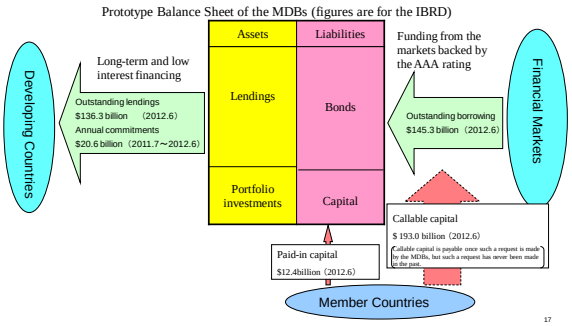
2. Japan has been actively collaborating with the MDBs.

➢The TICAD (Tokyo International Conference on African Development) process has been leveraging on the convening power of the World Bank.
➢Japan has been co-financing projects formulated by the African Development Bank Group through concessional ODA loans under the joint Japan-AfDB EPSA (Enhanced Private Sector Assistance for Africa) Initiative.

3. MDBs can mobilize large amount of resources with minimal taxpayers' money from their member countries.

➢MDBs can mobilize large amount of resources in a timely manner through international financial markets, backed by their AAA rating with strong commitment from shareholders including the G7 countries.
➢In the full blown crisis after the "Lehman Shock", World Bank announced its readiness to increase by 3 times its annual commitments (from USD 13.5 billion to USD 35.0 billion).

MDBs' Mobilizing substantial resources with minimal financial contribution from member countries



Outline

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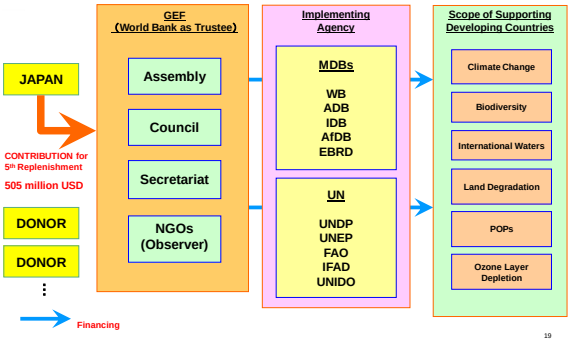
2. Japan's cooperation on climate change through MDBs

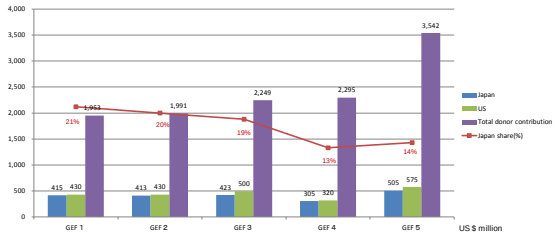
3. Japan's cooperation on climate change through CIF, GEF and GCF

Financial Resources: Global Environment Facility (GEF)

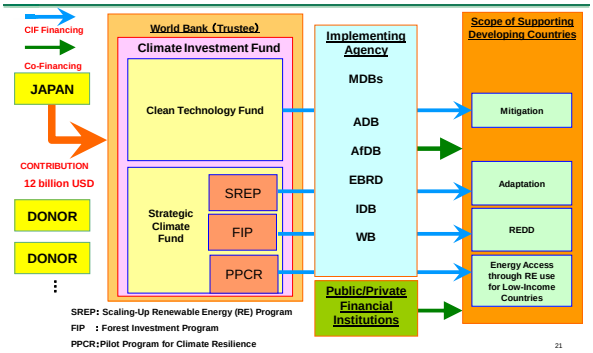


GEF donor contribution

The total amount pledged by countries to the GEF5 is US$ eq. 3,542 million



Financial Resources: Climate Investment Fund (CIF)



SREP: Scaling-Up Renewable Energy (RE) Program
FIP : Forest Investment Program
PPCR:Pilot Program for Climate Resilience

CIF donor contribution

The total amount pledged by 14 countries to the CIF Trust Funds (CTF and SCF) is US$ eq. 6.5 billion.*

*exchange rates on September 25, 2008, initial CIF pledge date

Country	US$M equiv.
Australia	135
Canada	97
Denmark	38
France	300
Germany	813
Japan	1,200
Korea	3
Netherlands	76
Norway	194
Spain	152
Sweden	92
Switzerland	20
UK	1,414
US	2,000
Total	$6.5 billion

Green Climate Fund :GCF

- Objective

  ◆COP17 decision (2011 in Durban)
  "In the context of sustainable development, the Fund will promote the paradigm shift towards low-emission and climate-resilient development pathways by providing support to developing countries to limit or reduce their greenhouse gas emissions and to adapt to the impacts of climate change, taking into account the needs of those developing countries particularly vulnerable to the adverse effects of climate change."

- Operation
  - Adaptation
  - Mitigation (including REDD-plus),
  - Technology development and transfer
  - Capacity-building
  - The preparation of national reports by developing countries

- Financial Instruments
  - ◆ The Fund will provide financing in the form of grants and concessional lending, and through other modalities, instruments or facilities as may be approved by the Board
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Ministry of Finance, The Japanese Government

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Tel 81-3-3581-4111 (9:00-18:30 JST)

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添付資料 6

セミナー資料

セッション 3

JICA's Policy on Climate Change
JICA

Policy Dialogue on Climate Change in Asian Countries
27 - 30 August 2013
Tokyo, Japan

JICA Assistance for Climate Compatible Development in Asian Countries

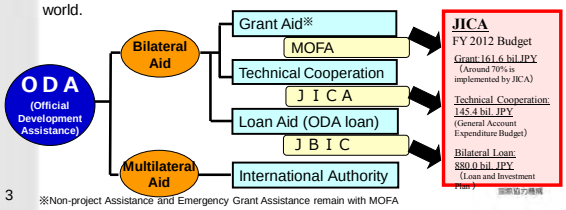
Juichiro Sahara
Deputy Head and Advisor
Office for Climate Change, Global Environment Department,
Japan International Cooperation Agency (JICA)

1. Introduction: JICA's Role for Climate Change and Development

About JICA

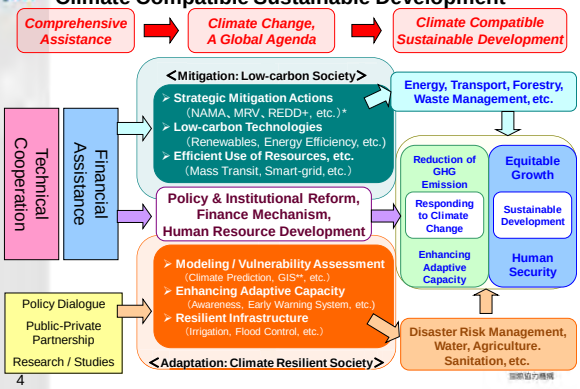
The current JICA was inaugurated in October 2008 with a merger of
1) Technical Cooperation of the existing JICA,
2) Loan Aid operation (ODA loans and Private Sector Investment Finance (PSIF)) of the Japan Bank for International Cooperation (JBIC)
3) a large portion of Grant Aid implementing operation of the Ministry of Foreign Affairs (MOFA).

JICA provides strategic and effective ODA through integrated, comprehensive and seamless implementation of Technical Cooperation, Loan Aid and Grant Aid as one of the largest ODA executing agency in the world.



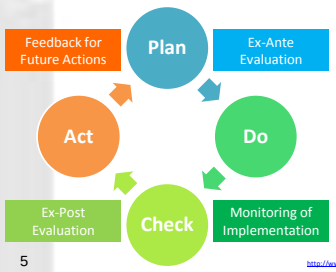
※Non-project Assistance and Emergency Grant Assistance remain with MOFA

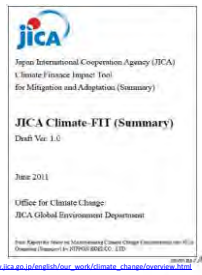
JICA's Approach: Development Cooperation for Climate Compatible Sustainable Development



Screening tool and process for mainstreaming

- JICA assisted activities are monitored and evaluated under the PDCA cycle to manage results, enhance transparency and accountability.
- JICA Climate Finance Impact Tool (Climate-FIT) is used for mitigation and adaptation projects.





http://www.jica.go.jp/english/our_work/climate_change/overview.html

2. Good Practice in JICA's Assistance

Holistic Approach in Vietnam : Structured, Multi-layered Support from Policy to Actions

Towards a Low-carbon and Climate-resilient Society

National Development Strategy, Budget Allocation & Finance Plans and Policy Coordination

Mitigation Actions
- **NAMA* and MRV of Mitigation Effects**
- **Energy, Forestry, Transportation, etc.**

Adaptation Actions
- Climate prediction & vulnerability assessment
- Disaster prevention, agriculture, fisheries, etc.

Policy Loan for Climate Change

Physical Infrastructure Development	Policy & Institutional Improvement	Capacity Building	Support for Individual Projects and Programs
・Renewable energy ▪**Energy efficiency** ・Urban transport ・Flood management, etc.	・National program on community disaster risk management ・Energy efficiency labeling system, etc	・National Greenhouse Gas Inventory formulation ・Climate change projection model analysis, etc.	

国際協力機構

Mitigation

Loan Aid ("Two-Step" Loan) + Technical Cooperation
Vietnam: Energy Efficiency and Renewable Energy Promotion

Project	Loan Agreement	Loan Amount (Million Yen)	Interest rate	Amortization / grace period
Providing medium- and long-term loans to the private sector through the Vietnam Development Bank (VDB) (called two-step loan) required to promote the use of energy-saving devices and renewable energy by companies in energy-intensive industries (iron & steel, cement, food processing, etc.)	**Preferential condition (Climate Change Japanese ODA Loan)**			
	November 2009	4,682	0.25% (0.01% for consulting services)	40/10 Year

- Technical Assistance to VDB provided for
  1) capacity building of evaluating energy-related finance based on Japan's experiences
  2) creating and managing energy-saving and renewable energy device lists

Photo: from recent training course for Vietnam power engineers

Press release
http://www.jica.go.jp/english/news/press/2009/091110_ref2.html

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Master Plan: Bangkok Master Plan on Climate Change 2013 – 2023

Bangkok Metropolitan Administration (BMA)

<Background>
- Total GHG emission of Thailand is ranked 23th in the world (IEA, 2009)
- GHG emission of Bangkok accounts for 24% of total emission in Thailand, and per capita emission is as high as that of NY
- High potential of GHG reduction, especially in Energy and Transport Sector

Steering Committee chaired by Deputy-Governor of BMA
Participants: Representatives from the participating departments of BMA, TGO, OTP, PCD, NESDB, ONEP, DEDE, etc.

Secretariat (Department of Environment, BMA)

Inter-Organizational Coordination

Working Groups
- Environmentally Sustainable Transport
- Energy Efficiency and Alternative Energy
- Efficient Solid Waste Management and Wastewater Treatment
- Green Urban Planning
- Adaptation Initiatives

Yokohama-City ('Future City Initiative')

Japanese Expert Team

Experiences of Low-Carbon Policy-Planning and Implementation in JAPAN

Local Consultants

Project Purpose: The Bangkok Master Plan on Climate Change 2013-2023 is prepared with strengthened capacity for implementation.

Output 1: Preparation of Bangkok Master Plan on Climate Change
- Assessment of the Bangkok Action Plan on Global Warming Mitigation 2007 – 2012
- Improvement of Data Collection, Methodologies for Estimation and Monitoring of GHG Emission
- Development of Sectoral Strategies
- Public consultation, Workshops and Seminars
- Dissemination of the Master Plan

Output 2: Strengthened Capacity of BMA officials
- Training Programs for BMA officials
- Seminars/Workshops for Related Stakeholders
- Development of Educational Materials

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Mitigation

SATREPS

Malaysia: Project for Development of Low Carbon Society Scenarios for Asian Regions

Technical Cooperation

Period: 2011- 2016 Place: Iskandar, Johor
Main Counterparts: Universiti Technologi Malaysia,
Iskandar Regional Development Authority

Objective:
Development of the method to establish low carbon society scenarios and disseminate the achievement to Asian regions
"Science and Technology Research Partnership for Sustainable Development" (SATREPS)

Output:
- Development of technology manual about establishment of low carbon society scenarios
- Development of low carbon society scenario and reflection to policy
- Quantitative evaluation of co-benefit effect of air pollution and recycle based society through low carbon society measures
- Establishment of training system and network for the development of low carbon society scenarios in Malaysia and Asian region

Project booth in COP 17

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Thailand: Project for Capacity Development on Climate Change Mitigation/Adaptation in the Southeast Asia Region (2013-2016)

Training for Various Stakeholders

Climate Change International Training Center (CITC)
Technical Cooperation Project with
Thailand Greenhouse Gas Management Organization (TGO)

Output 1 Preparation / Setting up of CITC	Output 2 Training Course Implementation	Output 3 Exchange with ASEAN Countries
Development of ➢ training curriculums ➢ ASEAN expert list	Capacity development of ➢ TGO staff ➢ Thailand participants ➢ ASEAN participants	Sharing knowledge and experiences with ASEAN countries

Basic Courses
-Structured and systematic programs on general knowledge on climate change

Advanced & Specific Courses
-Targeted and practical training programs for specific objectives

Collaboration with various organizations for development/implementation of training

East Asia Knowledge Platform for Low Carbon Growth
-Experiences and knowledge on low-carbon policy and technologies (National/local government, private sector, civil society, etc.)

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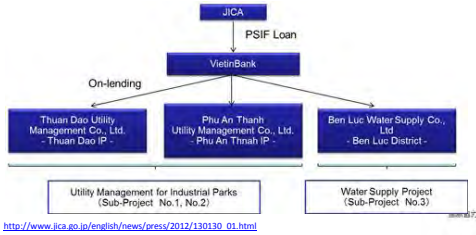
Private Sector Investment Finance (PSIF)

Title	Utility Management for Industrial Parks and Water Supply Project (Vietnam)
Agreement	January 2013
Outline	Wastewater treatment, water supply (surface water), energy supply in industrial parks (Phu An Thanh & Thuan Dao II)
Scheme	JICA → VietinBank → 3 Special Purpose Companies
Private sector	- Kobelco Eco-Solutions Co., Ltd. , Shinsho Corporation, local enterprises - Kobe City



http://www.jica.go.jp/english/news/press/2012/130130_01.html

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添付資料 7

セミナー資料

セッション 4

Workshop
クライメートエキスパーツ

What NAMA is all about and how to use it

— NAMA for meeting your *true* objectives —

Climate Experts, Ltd.
Naoki Matsuo

n_matsuo@climate-experts.info
http://www.climate-experts.info

- NAMA: Action package of climate mitigation measures with *quantification and reporting* (*MRV*)
- Question 1: Is MRV an *additional burden* for non-Annex I countries which can be an 'obstacle' for implementing the action?
- Basic approach of the Convention: Fostering actions by "pledge & review" (bottom-up action-oriented)
  - Basic approach of the KP: Top-down regulation-oriented with stringent MRV for accountability
- Question 2: How to utilize NAMA to foster the actions for better performance?

2

- Possible types
  - Economy-wide/Sectoral goals (*e.g.*, for BaU deviation, intensity, ...)
  - (Focus Area (*e.g.*, sustainable management of natural resources, ...))
  - Policies (*e.g.*, regulation/standards, carbon tax, feed-in tariff, ...)
  - Specific programs (*e.g.*, solar-home system promotion program, ...)
  - Specific actions/projects (*e.g.*, __ coal fired plant, __ BRT system, ...)
- Any types of actions are pledged by the country *voluntarily*, but once it is pledged, the country *shall* quantify its effects (amount of emission reductions) by preparing the *domestic MRV scheme* and report them in the BUR (biennial update report) internationally.

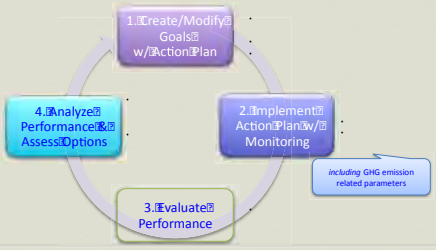
3

- Existing schemes with MRV:
  - National GHG Inventory
    - Lack of information, *e.g.*, "What are promising sources for reduction and why? "How to realize them (*i.e.*, mitigation options/measures/costs, ...)?"
  - CDM
    - Strict MRV procedures and methodologies are required to guarantee transparency and accountability, but the burden impairs the performance of actions (*incl.* makes the action not feasible)
- NAMA
  - Quantify "emission reductions = *effect* of action", rather than "emission amounts"
  - Strictness of MRV is *not* necessary because it is not a crediting mechanism
  - Use of MRV to *improve performance* of the relevant action

"Intensities" can have such information

4

- Established processes for continuous improvement of performance



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- Key points:
  - Methodology to calculate emission reductions should be designed not to impair the actions
    - No need to consider conservativeness and strict accuracy
    - Use of ambitious methods (without approval by int'l regulatory body), if other methods are not appropriate (such as simulator)
  - Monitoring items should be only those for *PDCA* that is necessary to *improve performance* of the actions

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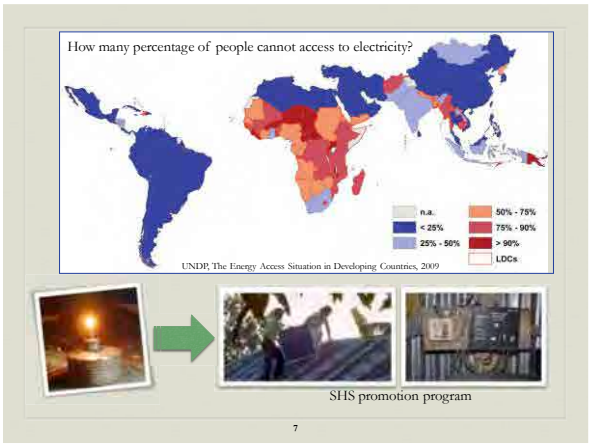

- NAMA: SHS (PV) promotion program in off-grid areas
- (Emission Reductions)
  = (Functioning SHSs) × (Kerosene consumption per household)
  × (CO_2 emission factor of kerosene)
  - (Functioning SHSs) = (Installed SHSs to date) × (Functioning ratio)

Survey Study

Database (most important)

Annual Survey

- For check the *performance* for PDCA, other indicators are monitored, *e.g.*, loan payment status per household, income, maintenance record, Wattage, usage purposes, usage pattern, satisfactory rate, cost/benefit analysis, health, education, ..., additionally.

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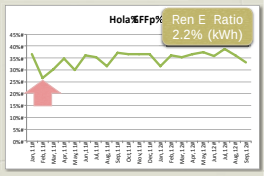
1. Measurement
2. Recording
3. Reporting
4. Evaluation
5. Assessing
6. Counter-Action

- Q: Simpler (by using default values) is better?
- Example: Diesel-based Mini-Grid + PV/Wind
- (Diesel Fuel Saved [kL]) Monitored
  = (Generation by Ren.E [kWh]) × (Conversion from kWh to kL)
  / (Diesel Power Efficiency [%])

Key parameters used for PDCA cycle should be monitored!

Calculated as (Diesel Power Generated [kWh]) / (Diesel Fuel Consumption [kWh])

Key parameter to judge whether diesel generator is efficiently operated



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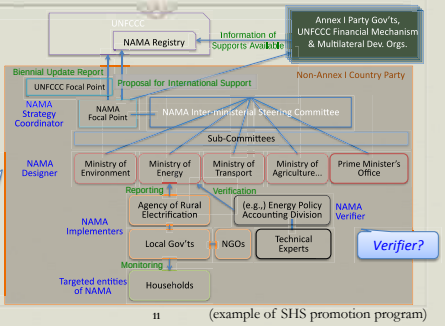
NAMA is "national" actions

- NAMA approver
- NAMA developer

Climate actions are cross-cutting among ministries and have primary objective(s)



(example of SHS promotion program)

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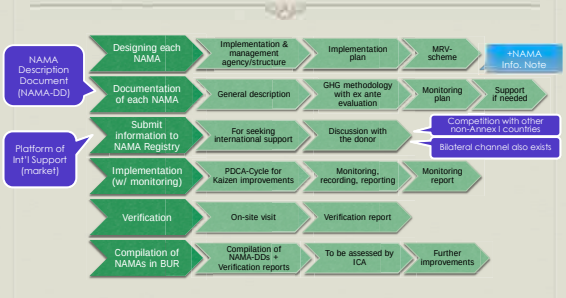

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- The result of course correction of a NAMA will be fed back to the implementer through the PDCA Cycle.
- There might be trial and error and failures sometimes, but you can improve the total performance of an action for sure through such experiences.
- Such experiences, at the same time, will serve as very important information for other countries. The system based on National Communication under the UNFCCC was established in the spirit of sharing experiences and facilitating actions, rather than setting overall emissions with mandatory target.
- NAMA, under the UNFCCC, should be contemplated in the same spirit so that it could serve as a process to create "South-South Cooperation" by sharing and transferring good practices from a developing country to other developing countries (supported by developed countries).

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- NAMA
  - NAMA-DD template
  - NAMA Information Note (for Seeking Support)
    - An example of Indonesian NAMA "Sustainable Urban Transport Initiative"
- Simple Factor Analysis of National Energy-Related CO_2 Emissions—How to Grasp Characters of CO_2 Emissions of my Country
- Compilation of Each Country's National Actions

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What NAMA Is All About and How to Use It

—NAMA for meeting your true objectives—

August 2013

Climate Experts

Naoki Matsuo

Table of Contents

0. The Purpose of This Paper

This paper explains how non-Annex I countries can use the Nationally Appropriate Mitigation Actions (NAMAs), which is an instrument for such countries to implement their mitigation actions under the UNFCCC through the quantification of GHG emission reductions, in order to support achieving their own sustainable development.

The mitigation of climate change usually is one of the co-benefits and cannot be the *primary objective* of the action. They have "their own primary objectives which are more important for them than climate change mitigation", although they can reduce CO_2 *at the same time*. The main purpose of this paper is how you can use the NAMA for performance improvement so that you can achieve your *primary objective*, which is based on an idea that NAMA is not an additional burden but a useful tool for you.

Especially for MRV, the paper will highlight its aspect as a tool to "improve the performance of your actions", which is far more important than transparency and accountability usually recognized as the objectives of MRV.

At the same time, the paper briefly explains the points in meeting the requirements of the related UNFCCC processes, and how Non-Annex I countries can deal with them.

I. Awareness: What NAMA Should Aim at

Is the following understanding of NAMA correct?

NAMA should be recognized as just an "action package of climate change mitigation measures together with their quantification and reporting",
or "additional burden for non-Annex I countries".

Based on a doubt on the validity of the above understanding, this paper is going to discuss "rather, how you can effectively take advantage of MRV/quantification".

The paper especially focuses on the performance improvement of national policy actions in non-Annex I countries.

I.1. NAMA in the COP Processes

I.1.1. Background

NAMA, having its origin in the Bali Action Plan, has been formulated under the UNFCCC, in the context of quantifying the effect of action by non-Annex I countries as well, increasing transparency, as well as clarifying accountability.

Negotiations have been progressed at Conferences in Copenhagen, Cancun, and Durban, and the coming Conference in Warsaw is expected to see the establishment of guidance on national MRV for NAMAs and the full-scale operation of the NAMA Registry.

It would be the common understanding that NAMA will serve as an important tool for climate change mitigation policies in developing countries, but still there is no shared image of how to deal with the procedures for NAMA, and the most importantly, "how to make use of the NAMA as an instrument to serve for national sustainable development".

I.1.2. Categorization of NAMAs

The second "A" for NAMA stands for "action", but there are no restrictions on the types of action for climate change mitigation measures, and various types of "actions" have already been proposed as follows (Table 1):

Scope		Example to illustrate the scope	Countries
Economy-wide Goals	Absolute reduction target	Antigua and Barbuda: reduce GHG emissions by 25 per cent below 1990 levels by 2020.	Antigua and Barbuda, Bhutan , Costa Rica, Maldives, Marshall Islands, Papua New Guinea, Republic of Moldova
	BAU Deviation Target	South Korea: reduce national GHG emissions by 30 per cent from the 'business as usual' emissions in 2020.	Brazil, Chile, Indonesia, Israel, Mexico, Singapore, South Africa, South Korea
	Intensity target	India: reduce the emissions intensity of GDP by 20–25 per cent by 2020 compared with the 2005 level.	China, India
Sectoral Goal		Togo: increase forest cover from 7 per cent in 2005 to 30 per cent in 2050.	Central African Republic, Columbia, Peru, Togo
Focus areas		Energy efficiency, sustainable management of natural resources, promotion of renewable energy…for example: Madagascar - draw up and implement an action plan to develop renewable energies.	Eritrea, Macedonia, Madagascar, Mauritania, Mongolia, San Marino, Sierra Leone, Tajikistan, Togo, Tunisia
Measures		Standards in the building sector, promotion of low energy light bulbs, development of an institutional and legal framework for REDD+…for example: Tunisia - diffusion and development of the use of energy-saving light bulbs.	Armenia, Botswana, Central African Republic, Chad, Congo, Gabon, Ghana, Ivory Coast, Jordan, Macedonia, Peru, Sierra Leone,Togo, Tunisia
Specific actions		Ethiopia: 450 MW Tekeze Hydro power project. Morocco: Urban transportation development projects - the Casablanca Regional Express Network.	Benin, Ethiopia, Jordan, Macedonia, Morocco
Others		Afghanistan: NAMAs would include the preparation of initial national communication, including national greenhouse gas (GHG) inventory. Mauritius: comprehensive Sustainable Development Programme, which prioritizes renewable energy and energy efficiency.	Afghanistan, Algeria, Argentina, Cambodia, Cameroon, Georgia, Mauritius

Table 1: Example of Categories for Proposed NAMAs[1]

[1] UNEP RISØ Centre, "Understanding the Concept of Nationally Appropriate Action", May 2013

A wide variety of actions can be possible under NAMA from the economy-wide goal to specific projects or programs.

The choice and implementation of actions for NAMA is up to a country's discretion, but once they get declared as the NAMAs, the government of the country shall choose and implement the followings:

- Quantification of emission reductions with MRV;
- Establishment and operation of liability system by the government of the country.

Unlike CDM, "policy" itself, such as the establishment of energy efficiency standard, the introduction of feed-in tariff system, or the introduction of carbon tax can be counted as NAMA. In such cases, the government does not implement specific emission reduction activities *per se*. on the other hand, the government is to manage such activities as a whole through "the introduction of regulations" or "the provision of incentives", and quantify their effect.

When the country set the economy-wide goal as the/a NAMA, its government will be responsible for the entire actions covered by the relevant NAMA. However, for the sake of management and operation, it would be useful and may be required to subdivide them into smaller activities. This paper discusses the quantification of GHG emission reduction, mainly for the subdivided activities.

I.1.3. NAMA Design → Implementation → BUR → ICA →...

The processes of NAMA are as follows ("Registration to NAMA Registry" is voluntary):

> Construction of national system for NAMA
> → Design of individual NAMAs → (Registration to NAMA Registry)
> → Implementation (+ Monitoring)
> → Preparation of reports (BUR) → International Consultation/Analysis (ICA)[2]

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[2] BUR: Biennial Update Report; ICA: International Consultation and Analysis. Both are required to include not only NAMAs but also national GHG Inventory.

"Construction of national system for NAMA", "Design of individual NAMAs", "Implementation (+Monitoring)", (and "Preparation of BUR") must be addressed nationally, which also requires the national MRV system.

NAMA is also an international system, which requires international reporting and verification (RV) processes such as "Preparation of reports (BUR)" and "International Consultation/Analysis". This means NAMA requires a *two-tiered system for MRV* – national and international.

The attraction of NAMA is that it may draw supports from developed countries[3], if successful. Figure 1 below is a flow of processes for that purpose. NAMA-DD is a description document for a given NAMA, while serving as a proposal document to ask/seek supports from developed countries at the same time.

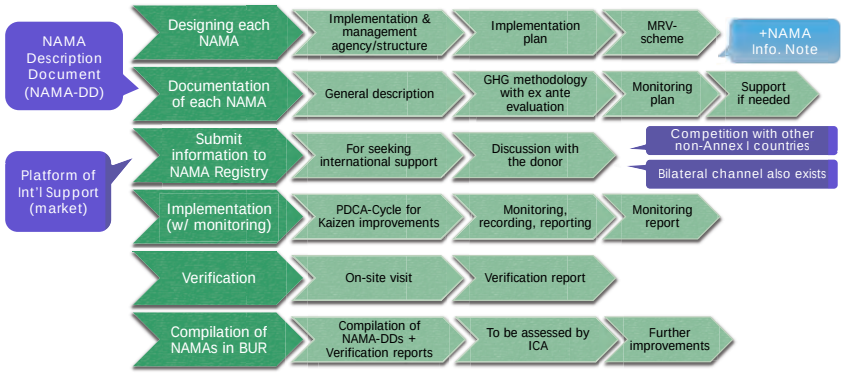

Figure 1: Flow of National Processes for NAMA

The five lines from the top (until "Verification") of the above figure represent processes required for individual NAMAs, but the last one must be applied to entire NAMAs in the relevant country.

[3] Supports from developed countries are not always available. In other words, whether you can write *attractive* proposal for them will be the key. (See below)

I.2. Role of MRV

I.2.1. Experiences of GHG Inventory and CDM

Systems that require the MRV of GHG emissions and reductions under the UNFCCC and the Kyoto Protocol include National GHG Inventory and CDM. In this section, let us compare MRV for such systems and for NAMA, and see how MRV for NAMA is different from that for the others (or how it complement that for the other systems).

National GHG Inventory is a MRV database to show where and how much GHGs have been emitted and absorbed in a given country, but it does not answer to the following questions:

How and how effectively can we reduce GHGs? How much GHG reduction has been achieved by a given measure?

In other words, it is important as a starting point to know the current status of emission, but is useless as information for implementing mitigation measures and knowing their effects.

CDM requires MRV for *ex ante* estimation and *ex post* verification of individual projects or programs, but it has the following tendency:

Strict MRV procedures and methodologies are required to guarantee transparency and accountability, but the burden impairs the performance of actions.

Therefore, there have been so many potential projects unrealized as CDM. This is because CDM is a credit mechanism *for emission offset*, and it adheres to that purpose by forcing project proponents to meet the requirements strictly. It also faces with the following problem, for example, for transportation modal shift-type projects:

Difficulty in the implementation of strict MRV *hampers* the implementation of many actions.

On the other hand, NAMA has the following characteristics:

Quantify “emission reductions = effect of action”, rather than “emission amounts”.

Strictness of MRV is not a necessary condition because it is not a crediting mechanism.

Plus, the other characteristics is:

Use of MRV to improve performance of the relevant action.

not to mention that transparency and accountability is important for NAMA.

The discussion of this paper focuses on the last point, which is often left unnoticed, but is very important.

I.2.2. Experiences in Japan – KAIZEN

Not only for GHG emission reduction actions but also for any other continuous actions, PDCA (Plan-Do-Check-Act) Cycle is effective in improving their performances.

In Japanese manufacturing industries, this has been implemented in the name of KAIZEN, supporting the performances of Japanese world-leading manufacturing businesses. It has also come to be emphasized in capacity development activities by JICA in developing countries. This system has also been introduced in Japanese Energy Conservation Law, serving as the base for plant energy efficiency in Japan to maintain the highest level in the world.

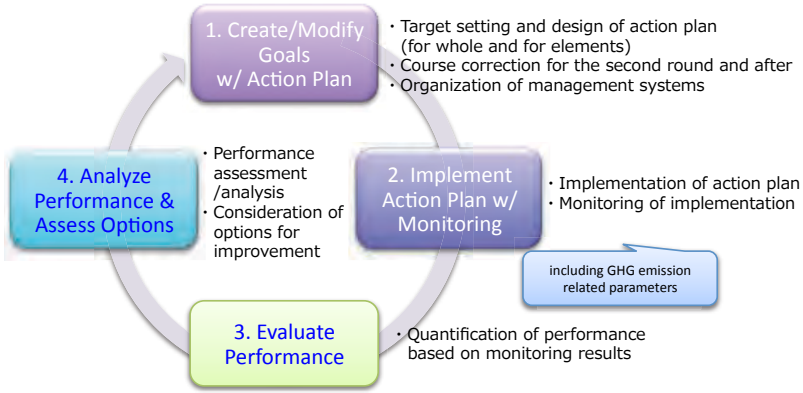

Figure 2: Example of PDCA Cycle

This method also works well for policy programs like NAMA. Rather, it should be essential for performance improvement. “MRV for actions” is indeed the key element of this PDCA Cycle process.

Below, let us consider key points for designing PDCA Cycle in the context of NAMA and implementing it.

II. MRV: What Are Required?

II.1. PDCA Cycle

II.1.1. Goal Setting for PDCA Cycle

For PDCA Cycle as shown in Figure 2, first, “target” and then “action plan” to achieve it is to be developed.

For example, in the case of a solar home system (SHS) promotion program in off-grid areas, the annual target number of households to be equipped with SHS will be set, and then the action plan – development of diffusion system and designing of loan scheme – will be designed. In many cases, an overarching target is broken down into smaller targets by element.

II.1.2. PDCA Cycle and Monitoring

Based on the target and the action plan, the action is to be actually implemented, where monitoring of the action (or status assessment) is a very important.

What should be monitored is an important question and must be designed in the action plan mentioned above. Basically, monitoring should be done for parameters that are necessary to measure the *performance* of the relevant action.

Items to be monitored should include, *e.g.*, the number of households equipped with SHSs; the type of SHS most popular; the regional distribution of installation points; the percentage figure of working SHS; the reasons for not working; the workability of maintenance system; for what purpose SHS is used; the level of satisfaction; the cost reduction effect compared with that for kerosene lampas; the loan repayment status, *etc*.

The monitoring results are periodically reported and centrally managed domestically.

II.1.3. Course Correction

In light of the *ex ante* plan, the monitoring results should be checked and assessed periodically. And if they have not reached the target level, the results should be analyzed for the revision of the plan. Additional monitoring may be implemented as applicable.

Based on the result of such analysis, the action plan is to be revised for the next year (course correction).

Such PDCA Cycle, if implemented every year, can improve the performance of the actions year by tear.

II.2. MRV for NAMA (GHG Emission Reductions)

PDCA Cycle mentioned in the previous section was that for "performance", where monitoring also plays an important part.

On the other hand, what NAMA requires is not PDCA for performance but "MRV for GHG emission reductions". Guidance for national MRV for NAMA is expected to be developed at COP19. Here, the paper considers GHG MRV from the perspective of performance improvement.

II.2.1. Methodology for GHG Emission Reductions

As for how to calculate GHG emission reductions, CDM has already accumulated a lot of examples. As mentioned above, since NAMA is *not* a crediting mechanism for offsets, its methodologies should be *flexible* as follows:

- No requirement for *strict accuracy* compared with that for CDM, allowing greater simplicity;
- No need for taking *conservativeness* into consideration; and

- Use of *ambitious* methods[4] not allowed in CDM.

What this paper would like to maintain is:

- Methodology should be designed *not to impair the actions*.

To this end, monitoring that is "*only for* GHG emission reduction calculation" should be avoided as much as possible.

In other words, for desirable NAMA methodologies to calculate GHG emission reductions,

> Monitoring items should be only those for PDCA
> that is necessary to improve performance of the actions

and usually, it should be possible.

In the case of SHS promotion program, for example, emission reductions can be calculated with three parameters[5], which are "the number of households having equipped with SHS", "the ratio of working SHS", and "the kerosene consumptions before SHS introduction". These parameters should also be monitored, no matter whether the program is under NAMA or not, because they also are key monitoring parameters to evaluate the performance of the program.

Simplification to reduce monitoring burdens is not always desirable. It would be better to monitor "the parameters required for performance evaluation" in a proper way, instead of applying default values. However, there should be various ways available for monitoring, such as sampling, *etc*. See an example in the framed section below:

> Introduction of PV/Wind Power to Diesel-based Mini-Grid in Kenya
>
> KPLC, which is a power distribution and transmission company in Kenya, has introduced several diesel-based mini-grids (approx. 1MW each) in order to electrify off-grid areas that cannot be covered by the main grid. Some of them (6) has introduced solar and/or wind power generation.

[4] For example, macro-economic models and simulators may be used. However, both *ex ante* estimation and *ex post* verification are important, and using either of them should not be desirable.

[5] To be exact, "the CO_2 emission factor for kerosene" should be necessary for calculation, but there is no need for monitoring this parameter.

Suppose this introduction of renewable energy is counted as NAMA. The CO_2 emission reduction from the project is provided by the replacement of diesel by renewable energy, and the reduction amount is calculated by multiplying renewable power generations by the CO_2 emission intensity of diesel power generation. (This CO_2 intensity inversely relate to the efficiency of diesel generator.)

In CDM, a table of default values of the CO_2 emission intensity for diesel generators is provided for different capacity and usage conditions. For NAMA as well, this kind of table for default values might be suitable for "simplification of monitoring".

Usually, however, the consumption amount of diesel oil (=purchased amounts) should be an important monitoring item in a normal operation of mini-grids, and so is its power generation amount. Therefore, (although it is not usually calculated,) it is possible to calculate the efficiency of the diesel generators as indicated below:

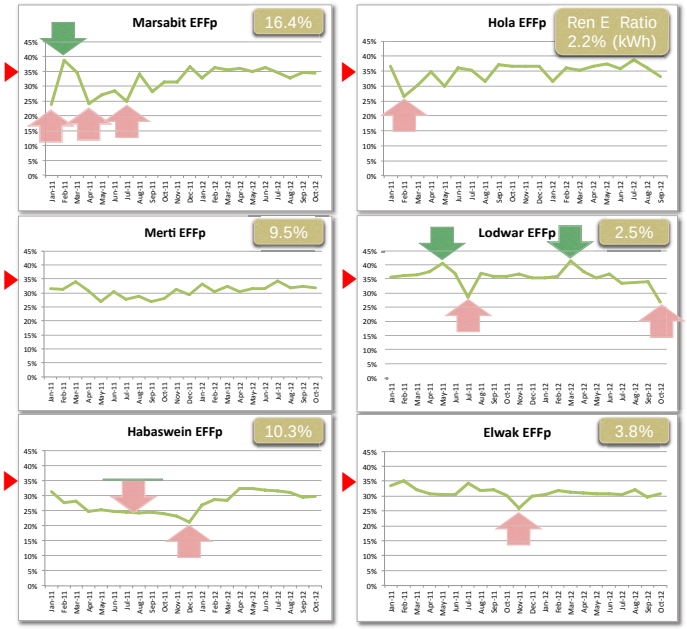

Figure 3: Trend of Average Efficiency of Diesel Generator for Different Mini-Grids

These charts provide very important information such as average efficiency and decreases in efficiency in some specific times, which can be fed back to the operation of the generators. (The generation efficiency can ben improved if you get the operating rate closer to the level of steady operation.) For example, if you could improve the average generation efficiency from 32% to 34%, it would be equivalent with the introduction of renewable energy by 6%(!), the impact of doubling emission reductions (redefining the project to energy efficiency project of diesel (hybrid)).

II.2.2. Management System

Robust management system is essential for successful actions. For example, in the SHS promotion program in Bangladesh, the governmental financial institution, IDCOL, has established an excellent management system, having successfully introduced SHSs to 2 million households so far.

This management system has PDCA Cycle, including "parameters for performance evaluation" stated above, integrated in its database by using annual survey method, *etc*.

If you have management system well designed/developed and working properly, it is not so much difficult to include MR(V) for evaluating GHG emission reductions in the same system, *i.e.*, can be integrated in the system with few cost.

However, while PDCA Cycle should undergo just an internal evaluation/verification process, NAMA should be verified by a third party, which may require an additional verification (V) process.

III. National Implementation System

III.1. National System for NAMA

NAMA is defined within the international framework, but its substance is a "domestic measure". Therefore, how you can prepare such system in your country will be a key to actually implement and enjoy the merit of the NAMAs.

Given its nature as governmental actions, it would be necessary to have cross-ministerial system (see Figure 4 for example):

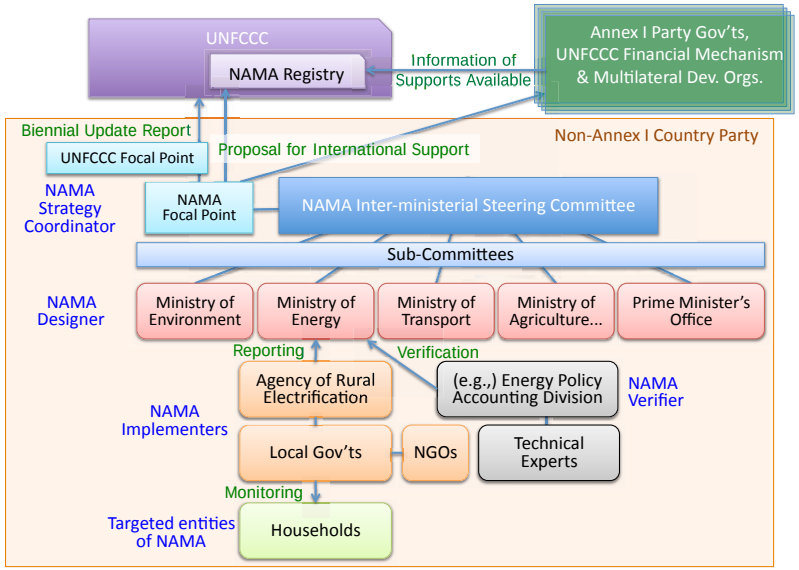

Figure 4: Example of National System for NAMA (for SHS program in off-grid areas)

Recently, the NAMA Registry uses the following terminology by access level:

- NAMA approver: full access to country's NAMAs
- NAMA developers: create NAMAs, edit/delete NAMAs, search queries (*e.g.*, project formulators)

NAMA approver, which is supposed to be the unique body for a country, should serve as the NAMA focal point. However, it seems that entities other than the focal point are allowed to input information to the NAMA registry, having relatively open access to the system.

Anyway,

Paradoxically, the mitigation of climate change usually cannot be the primary objective of "mitigation action". They have their own primary objectives which are more important for them, although they can also reduce CO_2 at the same time.

Therefore, many existing, planned and new action by various line ministries can be counted as a NAMA. The establishment of such inter-ministerial system (such as shown in Figure 4) should be a new challenge. But the domestic MRV process will be useful in reviewing various national actions from the perspective of climate mitigation, which is their common denominator, as well as in letting PDCA Cycle work for a policy.

Figure 4 shows an example of such NAMA national system, *i.e.*, Steering Committee consisting of line ministries, is responsible for all decisions. Each ministry will bring its existing/planned/new actions appropriate to be NAMAs on the table. Sub-committee(s) may be established under the Steering Committee. Each line ministry designs its actions (with PDCA processes for performance improvements). NAMA MRV for GHG accounting will be integrated in the design. The Steering Committee also decides which organization(s) would play as the role of verifier(s) with relevant principles and processes. NAMAs will be implemented by agencies under the relevant ministry or by the local governments, *etc*. The ministry will obtain the report from the implementers, manage them to run the PDCA cycle. The results will be reported to the Steering Committee periodically and compiled as the biennial update report (BUR) for report to the COP.

One of the new challenges is the preparation of national verification process and the

nomination of domestic verifiers. In general, since the verification of NAMA is the verification of national policy program, it is supposed to be verified also by a governmental agency. A verifier should be a third party, but you do not have to set up a designate national agency. A separate agency in the implementing ministry may serve as a verifier. Organizations in charge of accounting audit or environmental assessment may be possible candidates.

III.2. Designing Stages for Individual NAMA

In designing each NAMA as indicated in Figure 1, of course, you need to review and include PDCA Cycle in the action plan to improve performance of the relevant action, first and foremost.

And then, you will consider whether the action can be implemented as a NAMA. The quantification of GHG emission reductions in the relevant action (which is specific to NAMA) needs to be documented. Let us call the document NAMA Description Document (NAMA-DD) for convenience. It would be better to prepare the Information Note for NAMA. Examples of these documents (templates) are attached to this paper (latter is the official one to seek support to be uploaded on the NAMA Registry).

This NAMA-DD, at the same time, will be the attachment to BUR, and also serve as a proposal document for asking/seeking developed countries' support.

In asking supports from developed countries, it is important to describe the followings in the document from the viewpoint of investing countries:

- The degree of completeness of the action plan (Inclusion of PDCA Cycle is also important);
- The reason and justification for separation of domestically feasible part and difficult part to enhance the performance of the action; and
- The explanation and reason why the action can be done successfully if it gets support for the difficult part.

It is better to describe precise implementation structure and financial plan including identification and analysis of the problems for possible solutions. These are for

demonstration of high probability for successful implementation. Experiences of failures can be good information if it includes analysis of the reasons and how to overcome them.

NAMAs are voluntary domestic actions by developing countries and should be based on their proactive efforts. However, they can also seek supports from developed countries if they cannot find solutions for difficult part by themselves. It is important to clarify what they can and cannot do and why, so that supporting developed countries can easily judge the appropriateness and the method of the required supports (with higher accountability within their aid agencies). The NAMA-DD can also be the basic information document for discussion between the developing and developed countries for seeking solutions through support.

Then, the section for the design of the NAMA-specific quantification of GHG emission reductions follows.

III.3. Stage of BUR

Developing countries shall biannually report the progress of their NAMA in the form of BUR (together with national GHG Inventory).

This will require few additional works as long as the above-mentioned NAMA-DD has been prepared and periodical PDCA Cycle has got ready. You just have to summarize the result of PDCA to make a report.

A detailed NAMA-DD and a PDCA assessment report for each NAMA will be attached to the BUR. These can be very important information for ICA process.

III.4. Stage of KAIZEN and Sharing Experiences to Other Countries

The result of course correction will be fed back to the implementer through the PDCA Cycle.

There might be trial and error and failures sometimes, but you can improve the total performance of an action for sure through such experiences.

Such experiences, at the same time, will serve as very important information for other

countries. The system based on National Communication under the UNFCCC was established in the spirit of sharing experiences and facilitating actions, rather than setting overall emissions with mandatory target.

NAMA, under the UNFCCC, should be contemplated in the same spirit so that it could serve as a process to create "South-South Cooperation" by sharing and transferring good practices from a developing country to other developing countries (supported by developed countries).

IV. Attachments

Examples of NAMA-DD template and a NAMA information note (official template for seeking support; an example of Indonesian NAMA, seeking support for implementation) are attached.

NAMA Description Document (NAMA-DD) Template (draft)

Version 2.0
15/08/2013

prepared by Naoki Matsuo, Climate Experts, Ltd.

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(3) Emission reduction formula

(4) Estimation of emission reductions per typical scenario

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(4) Monitoring Plan

(5) How the performances are checked and assessed?

(6) Historical improvement practices

6. Contact Information

(1) Focal point for NAMA in the country

(2) Ministry/Department responsible for the NAMA

(3) Implementation agency of the NAMA

(4) Writer(s) of the NAMA-DD

7. Annexes

(1) References

(2) Other information (if necessary)

– — oOo — –

[Note] This NAMA-DD is expected to be the document not only for designing the NAMA but also for seeking international support bilaterally or through the NAMA Registry, which is a platform where developing countries will submit the NAMA with information for seeking international support. NAMA-DD is attached to the summary document which has the official template.

[Note] It is anticipated that the NAMA-DD development is followed by the Monitoring Report preparation and Verification process.

1. Description of the NAMA

(1) Title and version number of the NAMA-DD

Title:	Title of the NAMA comes here...
	Version:
	Date:

[Note] The title should describe the contents of the action briefly. The NAMA can be a governmental or semi-governmental single sort of action, a package of actions or incentivization/ regulation instrument for private sectors.

(2) Categorization/Characteristics the NAMA (check all that apply)

Type:	☐ National/sectoral goal, ☐ Strategy, ☐ Project type, ☐ Programmatic-type, ☐ Incentivization/regulation-type
Stage:	☐ Existing, ☐ Pilot, ☐ Planned, ☐ New
Measures:	☐ Single measure, ☐ A package of measures
Sector:	☐ Energy supply, ☐ Industry, ☐ Building, ☐ Transportation, ☐ Waste, ☐ Agriculture, ☐ Forestry, ☐ Rural development, ☐ Others
Technology:	☐ Bioenergy, ☐ Hydro power, ☐ Solar, ☐ Wind, ☐ Other renewables, ☐ Energy efficiency, ☐ GHG capture, ☐ Tree planting, ☐ Others

[Note] Double click and check the appropriate option(s) in each category to characterize the NAMA. "Project"-type means that the action is fixed in its scale like installation of single power plant. "Programmatic"-type is flexible to expand the activities year-by-year.

(3) Objectives and general description of the NAMA with ex-NAMA state

[Note] Objectives of the NAMA are specified. Among them, what is the most principal one for the host country? General description should provide the reader of the NAMA-DD to grasp the whole sketch of the NAMA easily. Pictorial explanation is preferable. How the NAMA will change the state? More detailed explanation of "co-benefits" are provided in the following sub-section.

(4) How it contributes to the sustainable development of the country

[Note] How the NAMA is situated in more broader national development policy and/or sectoral policy. List up and explain "co-benefits" associated with the NAMA. In case some study/reports are present, specify them in "7. (1) References" and summarize them here. Quantified estimation of the benefits is preferable but not necessary.

(5) Detailed description of the measure/project/programme and, for a programmatic type project, description of each action under the programme

[Note] The detailed description should include following information: (i) definition and scope of the (itemized) activities under the NAMA, (ii) technology applied, (iii) schematic chart or other figures of the NAMA, (iv) management structure including coordinating and/or implementation agency (details are specified in (7) and (8) below). The 'stage' of the NAMA and chronological development plan can be shown in (9) in detail.

(6) Location of the site and/or geographical boundary with map

[Note] Physical location or geographical boundary of the activities. Please attach a map specifying the place(s).

(7) Coordination/management, implementation structure and roles of each stakeholder (incl. policy-maker (policy-designer), implementer and auditor)

[Note] Specify the coordination/management structure for implementation by schematic chart. The policy-designer may be some line ministry and the implementer may be an agency under the ministry or local government(s) for some case. NGOs and/or other private sector may contribute.

(8) MRV scheme with roles and responsibilities

[Note] Process chart is specified for "monitoring/recording/reporting" → "data compilation/monitoring report preparation" → "auditing/verification". Specify who is responsible for each process. In case some breakdown or additional process is present, please specify them. This MRV process is for data to evaluate GHG emission reductions. In addition, it is recommended to show MRV process flow for implementation of the activities, if any.

(9) History and chronological development plan or scenario including timeframe

[Note] Specify the 'stage' of the NAMA, i.e., whether the NAMA is new, planned, pilot-project level, or existing (and trying to expand)? Specify what has been done so far, current status and what is expected in the future (e.g., expansion plan). Timeframe (which may be dependent on the scenarios with several assumptions) is required for the NAMA seeking international support.

2. Financial Information

(1) Expected cost for preparation (for new/planned/pilot stage NAMA)

[Note] This part is to estimate the costs for preparation of the NAMA if it has not yet started its operation. Preparation may includes several elements, including market survey, capacity building, design of the action and its management system, etc. It is required to show the cost estimation by element and its explanation/rationale.

(2) Expected/real full cost-benefit analysis for implementation

[Note] The full cost for implementation is dependent on assumptions and scenarios for expansion (for programmatic type). Initial investment and annual operation/ maintenance costs are separately shown (especially for project type).

(3) Expected incremental cost for implementation (for existing stage NAMA)

[Note] If the NAMA is an exiting/on-going action and is intended to expand the actions, the relevant cost should be shown here with how to expand it and its rationale.

(4) Budgetary/financial arrangements/sources identified/planned

[Note] Whether and how the host government will prepare the budget? This is not only for implementation but also for its preparatory stages. Scenarios for annual development may be projected. This part links to the Section 3.

(5) Financial cost-benefit analysis for each stakeholder concerned

[Note] The action can influence many stakeholders also. The relevant financial analysis is provided for such stakeholders.

(6) Non-monetary co-benefits analysis

[Note] The action can also require/provide implicit (non-monetized) costs/benefits. Qualitative analysis can be provided for such indirect effects.

3. International Cooperation and Support

(1) Historical and current status

[Note] If the action was supported through some international cooperation in the past (pre-NAMA stage) (and/or at present), please specify them. What kind of support and how it (has) contributed to the implementation of the measure.

(2) Key obstacle(s) which cannot be overcome by the host country

[Note] In order to implement (and expand) the scale of actions, what are the most essential obstacles? What can the host country do for that? What 'else' is needed? Please specify them as precise as possible.

(3) International support(s) required

Title:

Type: ☐ Financial, ☐ Technical, ☐ Capacity building

Stage: ☐ Preparation/Planning, ☐ Pilot, ☐ Full implementation

Description:

Title:

Type: ☐ Financial, ☐ Technical, ☐ Capacity building

Stage: ☐ Preparation/Planning, ☐ Pilot, ☐ Full implementation

Description:

[Note] Based on the above analysis (2) and 2. (4), what kind of international support is required? It is essential to specify what the host country can do and what it cannot do. Please look at this point from the viewpoint of the supporter. In case the host country requires the support from designing stage of the NAMA, specify what you have studied/analyzed so far. Tables can be added.

4. Estimation of GHG Emission Reductions and/or Carbon Sequestration

(1) Narrative explanation of GHG emission reductions/carbon sequestration

[Note] Specify why GHG emissions are reduced by implementation of the NAMA. For example, biogas power generation activity using municipal waste avoids methane emissions which would be released from landfill site otherwise and also replaces grid electricity (to which fossil fired power plants are connected). The details are shown in (2) below.

(2) Reference (baseline) scenario

[Note] Specify what would occur without the NAMA for each component of emission reductions. (It is not necessary to consider so-called "additionality".) For example, in the case of biogas power generation in the above [note], the reference scenario for the methane part is that 'Methane (landfill

gas) would be released by the decay of organic compounds of the municipal waste'. Electricity displacement part is: 'the fossil fuel power plants connected to the grid would generate power (i.e., emit CO_2) which is equivalent to the amount of power supplied by the biogas power plant'.

(3) Emission reduction formula

[Note] Emission reductions ER_y is expressed as $ER_y = RE_y - PE_y$, where RE_y is the reference emissions and PE_y is the project emissions. The suffix 'y' denotes that the parameter is dependent on time. RE_y is an expression of the reference scenario shown in (2) above. The final formula shall be a function of monitored parameters (= variables) (and fixed parameters). The leakage emissions (net emissions outside of the project boundary) are not necessary to be estimated because they are minor in most cases.

(4) Estimation of emission reductions per typical scenario

[Note] Evaluate the emission reductions ex ante assuming some typical scenario(s) for implementation of the NAMA as shown in sub-section 1 (9) above. This estimation of emission reductions (which may be dependent on the scenarios with several assumptions) is required for the NAMA seeking international support.

5. Monitoring and Revision Procedures

(1) Fixed parameters

Parameter name (*e.g., EF*)	
Description of the parameter	
Value with unit	
Source of the value	
Comments (if any)	

Parameter name (*e.g., EF*)	
Description of the parameter	
Value with unit	
Source of the value	

Comments (if any)	

Parameter name (*e.g., EF*)	*WC*
Description of the parameter	Wooden fuel consumption per household per year in rural area for conventional use (average)
Value with unit	3.5 ton
Source of the value	Average value of the regional value specified in the survey report "..." (2005). (p. XX, Table YY). [Ref. 1] The survey was undertaken as a comprehensive study covering most areas covered by this NAMA. It is anticipated that the consumption has been almost stable for conventional use (mostly for cooking) in rural areas.
Comments (if any)	The value is consistent with other survey reports such as... [Ref. 2–5].

[Note] Some parameters shown in the formula of emission reductions ER_y are fixed parameters, i.e., non-variable. Specify them in a tabular form above. "Source of the value" shall include justification of the appropriateness of the source. Table can be added as appropriate. The last table is an example

(2) Monitoring parameters (variables) for GHG emission reduction calculations

Parameter name (*e.g., FC_y*)	
Description of the parameter	
Unit	
Source of the data	
Measurement methods and procedures applied	
Measurement/reporting structure, frequency and QA/QC procedures	
Comments (if any)	

Parameter name (*e.g., FC_y*)	
Description of the parameter	
Unit	
Source of the data	
Measurement methods and procedures applied	
Measurement/reporting structure, frequency and	

QA/QC procedures	
Comments (if any)	

Parameter name (*e.g.*, FC_y)	r_y
Description of the parameter	Ratio of PV SHS (solar home system) under proper operation in the year *y*
Unit	No dimension
Source of the data	Maintenance record for SHS of each household
Measurement methods and procedures applied	A local maintenance center is assigned to each SHS. The maintenance center records all malfunctions and complaint about the SHS. This record is used to calculate the ratio of malfunction of the system and how long does it take to fix it. r_y is calculated as: $r_y = 1 -$ (number of SHS not in use) $\cdot$ (mean days of the not-in-use period) / 365 / (number of SHS sold in the year) by using the maintenance records.
Measurement/reporting structure, frequency and QA/QC procedures	The summary of maintenance records are reported to and compiled by the rural energy section of the Ministry of Energy *every month*. In addition, a random survey is conducted by the Ministry of Energy staff for 100 households who installed SHS in the year *y*. The survey identifies the reason for not-in-use of the SHS system, level of satisfaction, opinions/comments by the households as well as the not-in-use period of the SHS for redesigning the NAMA for better performance in the next year. The Ministry of Energy will check the consistency between the maintenance records and the survey results.
Comments (if any)	This parameter is used to calculate the number of SHS under proper operation NOP_y by the formula: $NOP_y = N_y \cdot r_y$ where N_y is the number of SHS sold (= settled).

[Note] Some parameters shown in the formula of emission reductions ER_y are fixed parameters, i.e., non-variable. Specify them in a tabular form above. Table can be added as appropriate. The last table is an example.

(3) Other monitoring parameters/information for improvement of performance

[Note] For 'Kaizen' improvement through PDCA-cycle, monitoring is essential starting point. For revising the design of the NAMA, what else (key indicator and information) should be monitored?

In the above SHS case, in addition to r_y, a survey is conducted to analyze the reasons for not-in-use more precisely. Another survey can be undertaken targeting not-yet-installed households for the barriers (e.g., upfront investment burden) and possible solution to overcome them (e.g., micro-financing/loan scheme introduction).

(4) Monitoring Plan

[Note] Based on 1 (7) and (8) as well as 5 (2) above, monitoring management structure and roles are specified in a chart. In addition, the schedule/timing related to monitoring and reporting as well as preparation of monitoring report is provided.

(5) How the performances are checked and assessed?

[Note] Based on the monitoring, the policy-maker (designer) will re-design the NAMA by assessing the results. How this review processes will be done?

(6) Historical improvement practices

[Note] What efforts are undertaken in the past (pre-NAMA stage)? Based on 1 (9), this is the record of design of the measure (including the stage to be assigned as a NAMA).

6. Contact Information

(1) Focal point or approver of NAMA in the country

[Note] Specify the contact information of the country.

(2) Ministry/Department responsible for the NAMA

[Note] Under the coordination by the focal point or another committee, a Ministry (or joint Ministries) may be assigned for design/implement the NAMA. Specify the contact information of the relevant section and person in charge in the Ministry.

(3) Implementation agency of the NAMA

[Note] Specify the contact information of the relevant section and person in charge in the implementation Agency.

(4) Writer(s) of the NAMA-DD

[Note] Specify the contact information of the person(s) in charge for drafting this NAMA-DD.

7. Annexes

(1) References

[Ref. 1]

[Ref. 2]

[Ref. 3]

[Note] The reference should include the feasibility studies of the NAMA (if available).

(2) Other information (if necessary)

[Note] If there is information not specified in the main part of NAMA-DD, please specify them here.

United Nations Framework Convention on Climate Change

NAMA Seeking Support for Implementation

A.1 Party	Republic of Indonesia
A.2 Title of Mitigation Action	Sustainable Urban Transport Initiative
A.3 Description of mitigation action	This Programme promotes sustainable urban transport in Indonesian Cities by implementing and monitoring measures in order to halt the increasing motorisation and reduce externalities of transportation. The pilot phase will start with the implementation of low-carbon mobility plans in three cities (Medan, Menado, Batam) as well as supporting activites on national level that aim at upscaling the policies of the pilot phase to more Indonesian cities. The NAMA covers the following activities:
	At national level, development of a Policy Framework for Sustainable, Low-carbon Urban Transport, comprising a regulatory framework, co-financing of local measures, capacity building, practical guidelines for local planning, and overall MRV of the actions.
	At the local or provincial level, development, implementation and MRV of Comprehensive Urban Low-carbon Mobility Plans. The sustainable transport policies covered include a tailor-made mix of 'push' and 'pull' measures for each city, including high quality public transport, non-motorised transport, parking management, traffic management, spatial planning, alternative fuels and vehicle efficiency.
	The preparation of the NAMA is ongoing and further details will be added during the next months.

A.4 Sector	☐ Energy supply	☒ Transport and its Infrastructure
	☐ Residential and Commercial buildings	☐ Industry
	☐ Agriculture	☐ Forestry
	☐ Waste management	
A.5 Technology	☐ Bioenergy	☒ Cleaner Fuels
	☒ Energy Efficiency	☐ Geothermal energy
	☐ Hydropower	☐ Solar energy
	☐ Wind energy	☐ Ocean energy
	☐ Carbon Capture and Storage	☒ Other Transport policies & measures
A.6 Type of action	☐ National/ Sectoral goal	
	☐ Strategy	
	☒ National/Sectoral policy orprogram	
	☐ Project: Investment in machinery	
	☒ Project: Investment in infrastructure	
	☒ Other: Local Governments involvement	

B National Implementing Entity

B.1 Name Ministry of Transportation Indonesia (MoT)

B.2.1 Contact Person Mr. Wendy Aritenang
B.2.2 Address Staf Ahli Menteri Perhubungan, Jl Medan Merdeka Barat No. 8, Jakarta Pusat 10110, Indonesia
B.2.3 Phone +62811997391
B.2.4 Email aritenangwendy@yahoo.com

B.3.1 Contact Person Mr Harry Boediarto
(alternative Contact Person 1)
B.3.2 Address Kepala Pusat PPKJT Kementerian Perhubungan, Jl Medan Merdeka Barat No. 8, Jakarta Pusat 10110, Indonesia
B.3.3 Phone +6281382121938
B.3.4 Email haiboediarto@gmail.com

B.4.1 Contact Person Mr Djoko Sasono
(alternative Contact Person 2)
B.4.2 Address Direktur BSTP, DitJen HubDar, Kementerian Perhubungan, Jl Medan Merdeka Barat No. 8, Jakarta Pusat 10110, Indonesia
B.4.3 Phone +628128348677
B.4.4 Email djokosas@dephub.go.id , and, djokosas@gmail.com

C. Expected timeframe for the implementation of the mitigation action
C.1 Number of years for completion 8
C.2 Expected start year of implementation 2013

D.1 Used Currency million US$

E Cost
E.1 Estimated full cost of implementation 400 million USD to 800 million USD

E.2 Estimated incremental cost of implementation 0.00

F Support required for the implementation of the mitigation action

F.1.1 Amount of financial support 300.00

F.1.2 Type of required financial support

☐ Loan (sovereign)	☐ Loan (Private)
☐ Concessional loan	☐ Debt Swap
☒ Grant	☐ Equity
☐ Guarantee	☐ Carbon finance
☒ FDI	☐ Others:<Pls enter Other text here>

F.1.3 Comments on Financial Support The required amount of financial support is still an indicative figure, it can not be accurately determined

at this state of the process. The design of the local mitigation plans is ongoing and more accurate financing figures will be available by mid 2013.

F.2.1 Amount of Technological Support 20.00

F.2.2 Comments on Technological Support Development of transport models for emission monitoring, promotion of efficient vehicles, alternative fuels such as CNG, LPG, biofuels or electric vehicles, intelligent transport systems, gas converters, catalytic converters.

F.3.1 Amount of capacity building support 10.00 ☒ $ (Dollars) ☐ man/hours

F.3.2Type of required capacity building support ☒ Institutional development ☒ Human capital ☒ Systemic (policies, legislative, regularatory,etc)

F.3.3 Comments on Capacity Building Support Capacity building is required for sound transport planning and integration, for operation and management, for surveys and data management for MRV, and for the development of guidelines. Sharing best practices nationally and internationally is another component. To strengthen the capacity of technical staff and decision makers workshops and trainings are required.

The preparation of the NAMA is supported by the International Climate Initiative (ICI) of the German Ministry for the Environment (BMU). It is envisaged to continue this technical cooperation with the Ministry of Transport and to support local governments in three pilot cities to support the implementation of local mitigation actions. Furthermore the NAMA can benefit from ongoing international support from various donors being active in Indonesian cities.

G Estimated emission reductions

G.1 Amount 5.00

G.2 Unit MtCO2e

G.3 Additional information (e.g. if available, information on the methodological approach followed):
This estimation is based on a top-down calculation using national transport statistics and development prognosis (National Mitigation Action Plan). The implementation of a comprehensive package of policies has a mitigation potential up to 25%. The calculation is based on the assumption that 10% of the urban population benfit from the NAMA and 15% of the emissions will be reduced until 2020 compared to BAU. At the time of submission a study is undertaken to further elaborate emission scenarios for the pilot cities. The estimated costs apply to the pilot phase only.

H.1 Other indicators of implementation Quality, capacity and accessibility of public transport (e.g. ridership, travel speed, information, network coverage, level of service), quality of walking and cycling facilities (km of high quality bicycle lane, modal share, parking management, no of on-street/of-street parking spots, regulation, enforcement), emissions per vehicle and kilometer (to be completed)

I.1 Other relevant information including benefits for local sustainable development

The sustainable development benefits of this programme are substantial and include contribution to:

Air quality: reduction in emissions of air pollutants will at least be comparable to the CO2 reduction, and can be significantly larger in case alternative fuels are used.

Accessibility: the 'avoid' and 'shift' measures will significantly reduce congestion and improve accessibility, however for the longer term rebound effects should be taken into account. Therefore fuel price and parking strategies are required to counter such effects.

Equity: high quality and affordable public transport and non-motorised transport improve opportunities for poor people to access jobs (reduction in individual costs for transportation).

Road safety: the policies proposed may reduce accidents, however this requires careful planning and monitoring, e.g. for safe walking and cycling facilities.

City livability: the current transport infrastructure and its use have a substantial negative impact on quality of life due to fragmentation of neighbourhoods, noise and air pollution. The measures in this NAMA will significantly reduce such impacts and improve the living conditions for all city dwellers.

J Links to National Policies and other NAMAs

J.1 Relevant National Policies National Development Plan, National Transport Master Plan (Land, Railways, Maritime, Aviation), RAN-GRK (National Mitigation Actions), RAD-GRK (Local Government Mitigation Actions)

Simple Factor Analysis of National Energy-Related CO_2 Emissions

—How to Grasp Characters of CO_2 Emissions of my Country—

August 2013

Climate Experts, Ltd.

Naoki Matsuo

Table of Contents

1. Objectives

1.1. Objectives of the Paper

This paper is intended to provide an opportunity for policy-makers to understand his/her country's whole CO_2 and energy profiles better.

In the context of the United Nations Framework Convention on Climate Change (UNFCCC), each country shall prepare its national GHG inventory. However, GHG inventory is lack of information "whether the economy is efficient or not" and "how to implement effective actions to reduce CO_2". Therefore, the policy-makers cannot utilize the inventory for this purpose. Such information is included in various *intensities*, *e.g.*, energy consumption needed to produce one tonne of iron (GJ/ton-iron), a kind of indicator to specify an *energy efficiency*.

In this paper, we focus on macroeconomic perspectives of such intensities in order to grasp the *overall characteristic picture* of the energy use and CO_2 emissions of the country.

Macro-economic indicators/intensities are shown to analyze relative relations among countries (participatory countries to the Policy Dialogue) current level and also chronological trends of each country through *factor-analysis*.

The analysis method is very simple, but it can provide key information *how efficient the country's economy is* in comparison to others and *how CO_2 has been growing*. It can provide useful information for decision-makers to design the policies in an effective manner in the sense of climate mitigation and other purposes.

1.2. Characteristics of the Analysis and How to Utilize It

1.2.1. How to make use of this analysis

The analysis can be categorized into two perspectives:

(1) Current level analysis (among countries); and

(2) Trend analysis (for each country)

for each country by specifying (1) the absolute value of the intensities among countries, and (2) the growth/declining rate of the indicators of the country.

The indicators for this analysis are:

- Economic level (GDP per capita and electrification rate);
- Energy consumption per capita;
- CO_2 emissions per capita;
- Energy consumption per unit of GDP; and
- CO_2 emissions per unit of energy consumption.

Through such analyses, the policy-makers can identify

(1) current objective performance or situation among various countries (related to the above indicators); and

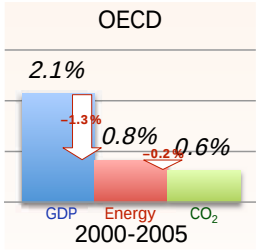
(2) what factor has been dominating in its CO_2 emissions growth trend.

These are based on real numbers and provide important information to grasp the real situation of the country's CO_2 emissions profile.

The analysis (2) is to factorize the CO_2 growth trend into several parts recognizing that the economic (GDP) growth is the overall driving factor of CO_2 growth:

1. GDP drives energy consumption;
2. Energy consumption grows at a lower rate if *energy efficiency* is improving (in a macrocosmic sense); and
3. CO_2 emissions trend reflect energy consumption trend. If the energy mix is shifting to *less carbon-intensive energy mix*, CO_2 emission grows lower than that of energy consumption (de-carbonization).

As an example, we take a look at whole OECD case as shown in the right figure, and we find:



1. GDP (blue bar) grew 2.1%/yr in average during the period of 2000–2005.
2. On the other hand, energy consumption (red bar) grew only 0.8%/yr. This means that energy efficiency of the economy improved 1.3%/yr.
3. Finally, CO_2 emissions (green bar) grew 0.6%/yr. This means the energy switching to less carbon fuels was 0.2%/yr (*i.e.*, little switching was observed during the period).

You can easily grasp which factor has influenced to the CO_2 emissions and how much.

If you want to see the effects of population growth factor, you can divide "GDP growth" into "Population growth" and "GDP per capita growth". In the case of above example of OECD, population growth rate is 0.7%/yr during the period and GDP per capita grew 1.4%/yr (*i.e.*, GDP grew 2.1%/yr as the sum of these growth rates).

The analysis is dependent on how to choose the period or milestone year. For example, 1973—start year of the First Oil Crisis (*i.e.*, sharp hike of oil price)—and 1986—sharp decline of oil price—are milestone years for OECD countries. Such milestone years—when some key event occurred—may be different by country. In this analysis, we choose common four 5-year periods: 1990–1995, 1995–2000, 2000–2005 and 2005–2010 for simplicity. You had better to choose your own periods for the analysis.

We shall take note several other limits of this simple analysis.

For example, we must take care that the magnitude of GDP is dependent on the exchange rate and its relative relation (in (1)) is less informative than its trend (in (2)). These limits are discussed in sub-section 1.3.2.

1.2.2. Indicators for "economic level"

Now we take a look at the indicators.

In order to see the international comparisons, we used the indicator of "GDP per capita" (using market exchange rate) to show the "economic level" of the countries.

In this analysis, we are interested in GHG emissions and focus on fossil fuel-related CO_2 emissions among various GHGs since this is the leading GHG. For this purpose, we choose market exchange rate[1] to specify the GDP (US_{2005}$) (real) since fossil fuel price is determined internationally and CO_2 emissions is driven by the energy transformation and industry sectors (not by the household sector).

In addition, we see the relationship between "electrification rate" and "GDP per capita". The electrification rate can be another indicator to show the economic level from the perspectives of energy access.

You can try other indicators such as GDP per capita using PPP, income per capita, human development index, literacy rate, .. for your purpose.

1.2.3. "Per capita" energy consumption

Due to the statistical acceptability, we use "total primary energy supply (TPES)" to show the energy consumption. TPES can be a very good approximation of domestic primary energy *consumption*.

[1] On the other hand, for the purpose to specify the living standard (in the household sector), purchasing power parity (PPP) might be a better unit as the exchange rate.

Per capita energy consumption (= energy intensity of people) is influenced by many factors, in general, such as temperature, energy price, *etc*. In this analysis, we focus on the relationship between GDP in order to analyze the energy efficiency of the economy.

1.2.4. "Economic efficiency" for energy consumption

In general, larger economy tends to use larger amount of energy. This is true in many countries in its time-series but not always true among the countries which have various values of "TPES/GDP" (= *energy intensity* of economy).

It cannot be said straightforwardly also that the countries with large "TPES/GDP" is inefficient *physically* in its energy use and has a larger potential to reduce its energy consumption.[2] But its policy-maker can have some insights in this comparison.

It is true if a country will build more efficient economy with less "TPES/GDP", it can grow its GDP with lower energy cost and more resilient in its energy security than before.

1.2.5. "Low-carbonization" of energy mix

In the context of CO_2 emissions, low carbonization of energy mix is important. The indicator "CO_2/TPES" (= *carbon intensity* of energy) shows how much CO_2 is emitted when a unit of energy is consumed. Coal-rich country tends to have its higher value. Hydro and natural gas-rich countries have smaller value. Other renewables can be important energy sources to reduce this intensity as well as to strengthen the energy security.

1.3. Theoretical Basis of the Factor Analysis

1.3.1. Core element of the factor analysis

This sub-section 1.3 provides theoretical basis of the factor analysis for (2). Some mathematical expressions are shown, so you can skip this part if you are unfamiliar with them.

However, what you should understand is the following core elemental formula:

(CO_2 growth rate)	=	(GDP growth rate)
		– (Energy efficiency improvement rate)
		– (Energy switching rate to less carbon energies)

Typically, the first "GDP growth" dominates the "CO_2 growth" as the driving factor. The factors to decrease CO_2 growth from GDP growth are "energy efficiency improvement" and "energy switching to less carbon energy mix". All of these factors are shown as annual rates.

[2] Shifting to the industry sectors to service sectors reduces the value of "TPES/GDP".

1.3.2. Theoretical basis

CO_2 emissions can be factorized into several elements:

$$CO_2 = GDP \cdot \frac{TPES}{GDP} \cdot \frac{CO_2}{TPES}$$

or

$$CO_2 = Pop \cdot \frac{GDP}{Pop} \cdot \frac{TPES}{GDP} \cdot \frac{CO_2}{TPES}$$

as identities (*TPES* stands for "total primary energy supply" and *POP* stands for "population"). The latter divides *GDP* into two factors.

If CO_2 is factorized into several factors such as

$$CO_2 = P \cdot Q \cdot R \cdot S,$$

(Annual) variation/growth (%) of CO_2 is given as the sum of variations of each factor by taking a logarithmic differential of this equation, where Δ specifies a small variation of the variable (in a year), and ($\Delta P/P$) implies the annual growth *rate* of the variable *P*:

$$\frac{\Delta(CO_2)}{CO_2} = \frac{\Delta P}{P} + \frac{\Delta Q}{Q} + \frac{\Delta R}{R} + \frac{\Delta S}{S}$$

In short, if $X = A \cdot B$, its annual growth rate is *sum* of the annual growth rates of *A* and *B*. If $Y = C/D$, its annual growth is the *difference* between the growth rates of *C* and *D*.

For the second factorization above, each component implies:

- Population growth rate;
- Per capita GDP growth rate; (these two can be combined as the GDP growth rate)
- Minus of (macro-economic) energy efficiency improvement rate; and
- Minus of energy switching rate to less carbon energies.

In short (the first two factors are combined to the factor *GDP*),

(CO_2 growth rate)	=	(GDP growth rate)
		– (Energy efficiency improvement rate)
		– (Energy switching rate to less carbon energies)

It is noted that

(Growth rate of *TPES/GDP*) = (Growth rate of *TPES*) – (Growth rate of *GDP*), and

(Growth rate of CO_2/*TPES*) = (Growth rate of CO_2) – (Growth rate of *TPES*).

1.3.2. Originated data and limits of the analysis

The data used in this paper is basically comes from the statistics of the International Energy Agency (IEA), especially "CO_2 Emissions from Fuel Combustion 2012", except for some missing data and electrification rate. The latter is provided in "Human Development Report 2013" by UNDP. USDOE/EIA data supplemented the missing data.

We should take note that the analysis has several limits:

- Original data may be wrong or inconsistent, especially for old data;
- Discontinuity of the data may happen if the statistical base changed;
- We analyzed the data for 5-year interval. Therefore it does not include some topical year's events. As mentioned before, you had better to choose some milestone year for better analysis; and
- For small countries, error may be relatively large by rounding of the data with less significant digits.

You may find some strange figures in the charts. The paper did not pursue the reasons. It may be a good exercise to consider and investigate the reasons. And this can be a good trigger for more in-depth study and analysis to understand the precise structure of its energy and CO_2, by, *e.g.*, undertaking sectoral analysis.

2. How Your Country Situates by Factor of CO_2 among Others

2.1. Objectives of this Section

This chapter is for the "current level comparison among countries" for various indicators/ intensities. All figures are those in 2010.

As mentioned 1.2.2., the value of GDP has less meaningful if we compare it among countries. Nevertheless, it can provide some important implications.

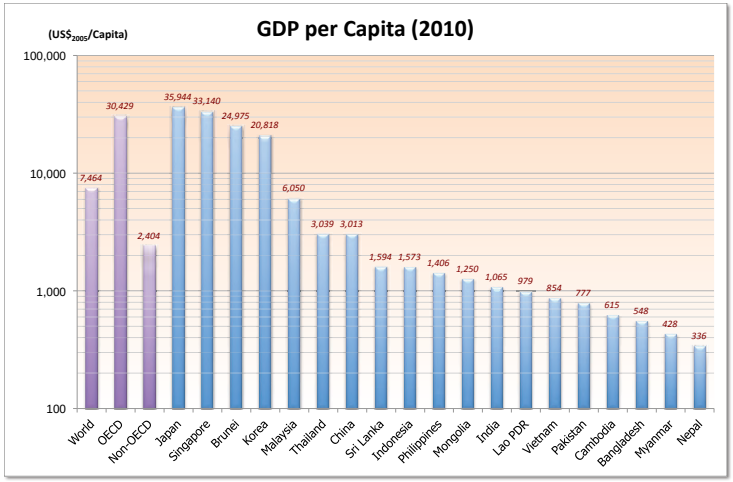
In addition to the countries arranged in a line of the magnitude of "per capita GDP", the world average, the OECD average and non-OECD average are shown for comparison.

Seven graphs are provided, namely,

- "GDP per capita" to specify the economic level of the countries (in logarithmic scale);
- "Electrification Rate" shown in comparison to "GDP per capita" to know the positive correlation with some specific situation among countries;
- "TPES per capita" as the positive correlation to GDP per capita;
- "CO_2 per capita" also shows the similar relation to "TPES per capita" except for some countries;
- "TPES per GDP" shows "efficiency" of the economy, *i.e.*, how much energy is required to generate a unit of GDP;
- "CO_2 per TPES" shows the carbon-intensive situation of the energy-mix of the country. We can find this is mostly independent of other indicators; and
- "Portion of OECD and non-OECD" shows the relative portion of these two categories in the world for GDP, population, TPES and CO_2 emissions.

Here we try to see the findings of each graph.

2.2. GDP per Capita (2010)

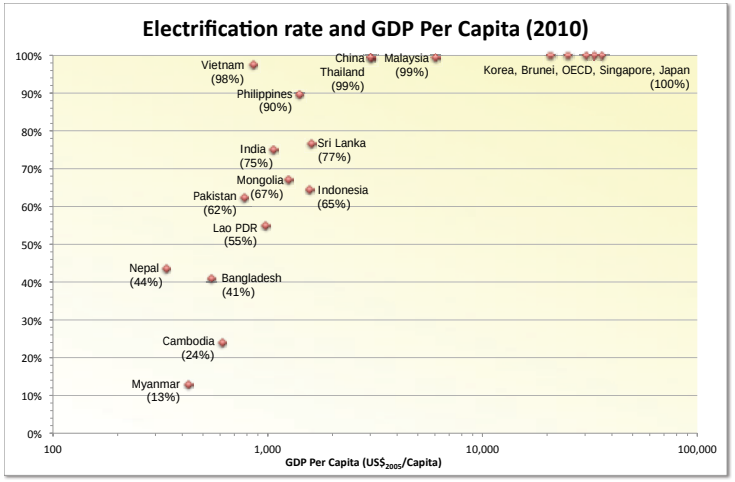


"GDP per capita" varies significantly among countries.

Among the targeted countries, Japan, Singapore, Brunei and Korea are in the highest group over US$$_{2005}$ 20,000 per capita in 2010. Malaysia follows this group. Thailand and China follows as well. Other countries are lower than the non-OECD average. Although not shown in the figure, it is noted that many of the targeted countries are enjoying very rapid economic growth (see the analysis by country).

As specified before, this international comparison figure is very much dependent on the value of exchange rate. Market exchange rate in 2005 is applied as the base year in this analysis, but this does not reflect current situation fully. As an alternative, purchasing power parity (PPP) is more appropriate to analyze the relationship to standard level of life. The paper tries to analyze CO_2 emissions mainly driven by fossil fuels which have international market prices. Therefore, market exchange rate is applied for the scale to specify GDP.

2.3. Electrification Rate (2010)



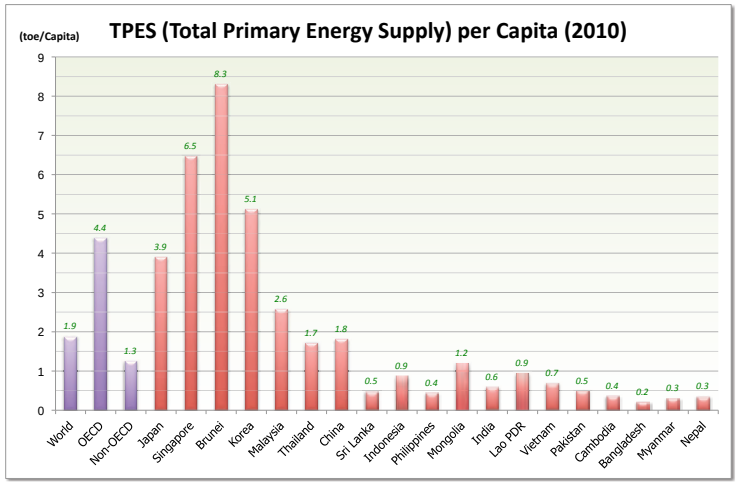
"Electrification rate"—accessible populatioin rate to electricity—is an important indicator for developing countries in its development. Electrification is mainly for lighting (and cell phone charging) in rural areas which can be the basis of literacy/education level development as well as other channels for modern life.

The graph shows that the countries with US$$_{2005}$ 3,000 per capita or more has already solved this problem. It is noted that Vietnam and Philippines also achieved high rate of electrification. Nepal has been successful. In general, countries with small islands face difficulties for rural electrification as shown in the Indonesian case, but Philippines' experience may provide good insights in this direction.

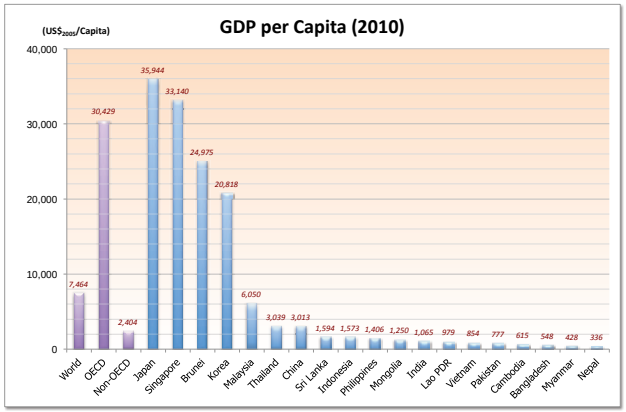
On the other hand, Myanmar and Cambodia are struggling how to increase this rate.

Bangladesh recently achieved installation of 2 million solar home systems (SHS) and its program in the off-grid area can be a good practice in LDCs including African countries which has been in difficult situation to expand its power grid and develop power plants.

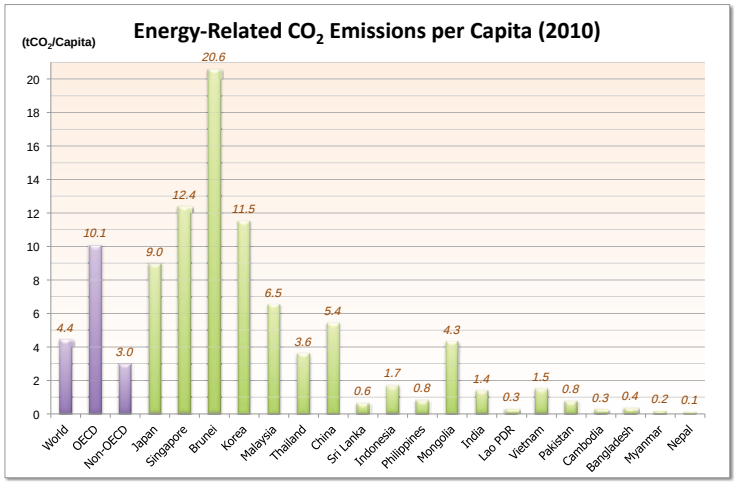
2.4. TPES per Capita (2010)



"TPES per capita" is, first, dependent on its GDP per capita level and, second, its efficiency. The efficiency will be discussed in the sub-section 2.6 "TPES/GDP". GDP per capita shown in sub-section 2.2 was in a logarithmic scale. On the other hand, this TPES is correlated with GDP in linear scale as shown below. However, we see several differences between them, which are shown as the differences in efficiencies specified as "TPES/GDP" quantitatively.



2.5. CO_2 per Capita (2010)



Amount of energy-related CO_2 emissions correlates with TPES (shown in sub-section 2.4).

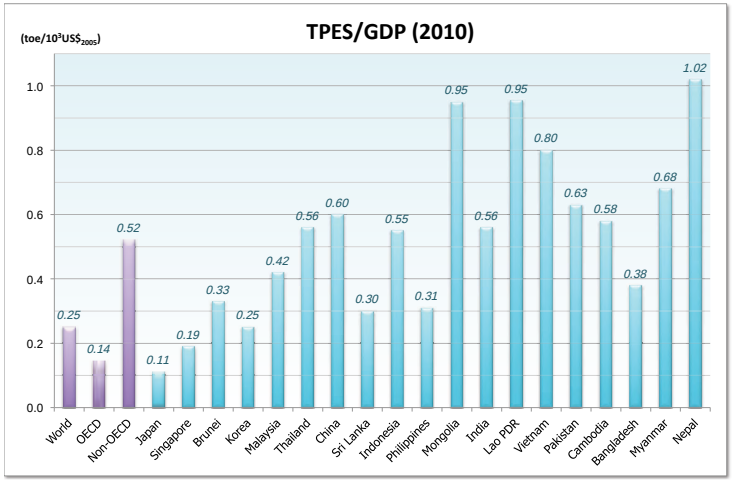
On the other hand, we see several differences between them, *e.g.*, Lao PDR's CO_2 emissions is comparatively low. Such differences can be explained as the energy-mix difference. This factor is quantitatively specified as "CO_2/TPES" as shown in sub-section 2.7.

In developed countries, natural gas and nuclear are the leading low carbon energy sources. In developing countries, hydropower and natural gas (and biomass) are such sources. In both cases, other renewable sources are emerging but still small portion.

On the other hand, coal-rich countries tend to show large CO_2 emissions.

In some cases, strengthening energy security and climate mitigation may have conflict in choosing energy sources. However, energy efficiency improvement is always good for energy security, energy cost saving and climate mitigation.

2.6. TPES per GDP (2010)



"TPES/GDP" is the key indicator to show the efficiency of energy use to generate GDP. Although the figures are much influenced by the exchange rate, we get important information.

It should be noted that such efficiency includes not only physical efficiency, *e.g.* energy use per one kilo-liter of beer production, but also shift to less carbon economy structure such as shifting from industry to service sectors.

It is noted that OECD, especially Japan has achieved very energy efficient economy. For example, it needs only 20% of energy in comparison to non-OECD average to generate a unit of GDP, which makes Japan to enjoy an energy-resilient economy and allows to grow its economy with much lower energy costs.

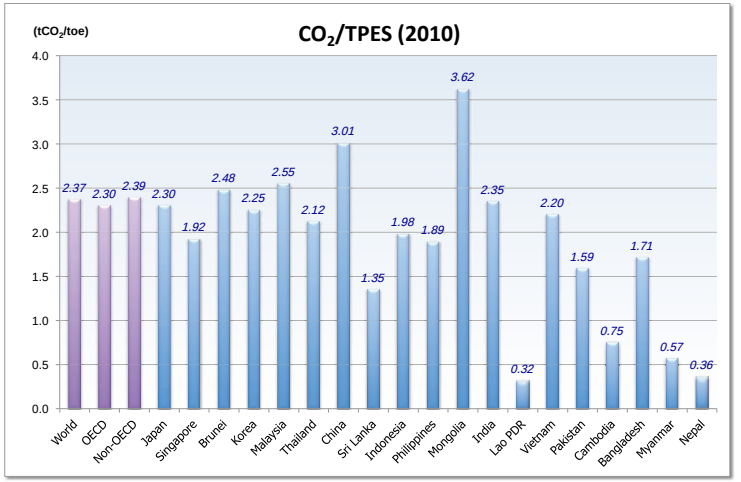
In general, lower income countries requires larger amount of energy except for Bangladesh.

The figures do not show the reasons why some country's efficiency is good or bad. However, this might be a good trigger to investigate the reasons which are dependent on several factors:

- Economic structure including the ratio of energy-intensive sectors with energy prices;
- Physical intensities in the key energy, industry and commercial sectors with applied technologies; and
- Historical efforts and system to strengthen the energy (and production) efficiencies.

Japan is happy to share its experiences/practices such as energy conservation law, technologies, *etc*. with other countries through many existing and new channels.

2.7. CO_2 per TPES (2010)

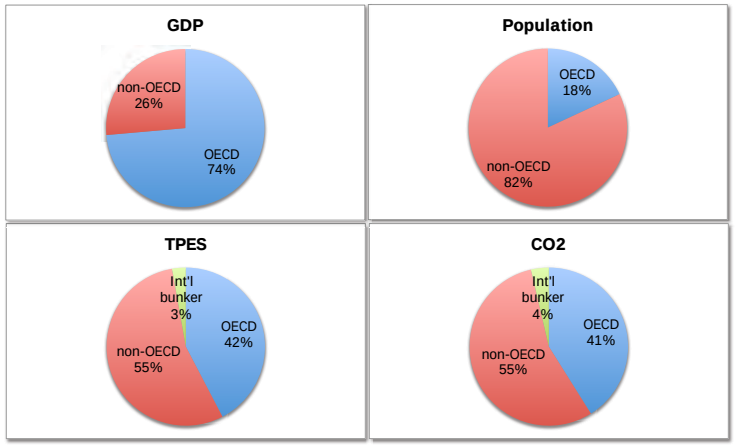


In comparison to other indicators, "CO_2/TPES" does not have correlation with the economy level. This intensity is determined by the energy-mix of the country, *i.e.*, coal-rich country tends to have higher value.

In general, lower income countries with smaller CO_2/TPES are mainly based on hydropower for electricity and biomass for heat use. There are several countries which are rich in natural gas also.

Each country chooses its optimal mix of the energy sources, considering energy costs, energy security including reserves of the domestic fuels, employment aspect of domestic energy resources, ... Nowadays, climate mitigation aspect should be a new element to consider.

2.8. Portion of OECD and non-OECD (2010)



It is interesting to see the portion of OECD and non-OECD.

Although OECD's GDP consists of 3/4 of world total in 2010, its TPES (and CO_2 emissions) is around 40%. This shows that OECD is much more efficient in energy use than non-OECD (sub-section 2.6).

On the other hand, since CO_2/TPES is almost the same (sub-section 2.7), the portion in TPES and CO_2 is almost identical.

It is noted that international bunker fuels (marine and aviation) cannot be neglected as significant sources of CO_2. It is also noted that these bunker fuels has been growing rapidly (around 2.7% per annum for both bunker fuels for 2000–2010).

3. Trend Analysis of CO_2 Emissions of Your Country

3.1. Objectives of this Section

This chapter provides chronological trends of factors affecting CO_2 emissions. The common periods 1990–1995, 1995–2000, 2000–2005 and 2005–2010 are chosen, while we do not intend to compare with countries, but to consider each country's domestic development profile of the factors.

As shown in 1.3.2, we have

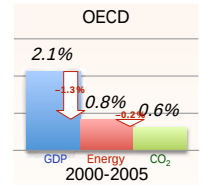
(CO_2 growth rate) = (GDP growth rate)
– (Energy efficiency improvement rate)
– (Energy switching rate to less carbon energies)

and

(Growth rate of *TPES/GDP*) = (Growth rate of *TPES*) – (Growth rate of *GDP*), and

(Growth rate of CO_2/*TPES*) = (Growth rate of CO_2) – (Growth rate of *TPES*).

For example, as shown in sub-section 1.2.1., we see the case of whole OECD during the period of 2000–2005 such as:



1. GDP (blue bar) grew 2.1%/yr in average.
2. On the other hand, energy consumption (red bar) grew only 0.8%/yr. This means that energy efficiency of the economy improved 1.3%/yr.
3. Finally, CO_2 emissions (green bar) grew 0.6%/yr. This means the energy switching to less carbon fuels was 0.2%/yr (*i.e.*, little switching was observed during the period).

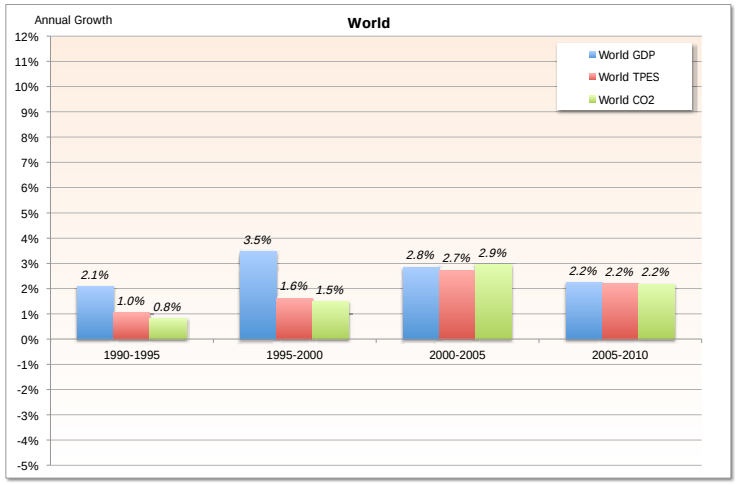
We should note that gap between the neighbor bars is the change of intensities (large minus value (down arrow) is better for energy efficiency improvement and de-carbonization).

In order to reduce CO_2 emissions, "energy efficiency improvements TPES/GDP" plus "energy switching CO_2/TPES" must compensate GDP growth. It is unusual to switch the energy-mix continuously over decades; therefore, efficiency improvement rate must overcome the GDP

growth rate to reduce CO_2.

The analysis investigates how the country's CO_2 emissions has grown over time historically.

3.2. World



World CO_2 emissions (in total or in average) has been steadily increasing at around 1–3% per annum during latest four 5-year intervals.

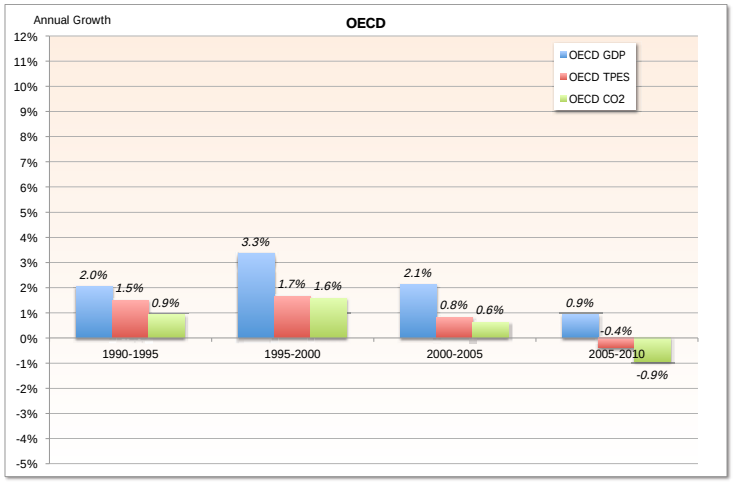
For 1990–1995 and 1995–2000, energy efficiency (TPES/GDP) improved 1.1% and 1.9% per annum, respectively. On the other hand, we observe almost no such improvements for 2000–2005 and 2005–2010 in spite of the growing crude oil price. It is interesting to note the energy efficiency has been improved in OECD (sub-section 3.3) and non-OECD (sub-section 3.4), but it has been *not* in total.[3] This paradox can happen due to the small but rapid growth of non-OECD parts.

Low carbonization of energy mix (CO_2/TPES) has been almost the same during these periods.

If we expect that the GDP growth will be around 2% per annum in the future, energy efficiency improvements should be around the same level (2% per annum) in order to stabilize CO_2 emissions, if we do expect continuous de-carbonization trends.

[3] For example, during 2000–2005, OECD improved its efficiency 1.3% per annum and non-OECD improved 1.0%. However, sum of OECD and non-OECD (world) achieved only 0.1%.

3.3. OECD



OECD consists of 74% (GDP), TPES (42%), CO_2 (41%) of the world in 2010, while its population is 18%.

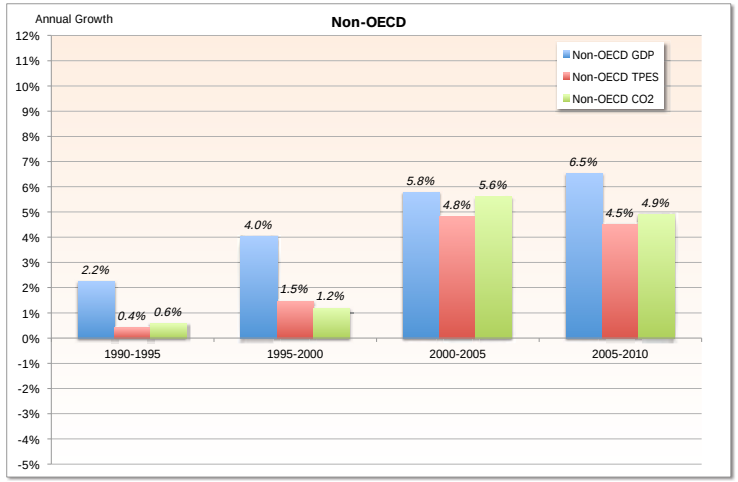
Its CO_2 emissions growth has been low but positive for the periods before 2005. On the other hand, it turned to be negative (–0.9% per annum) for 2005–2010.

The energy efficiency has improved 0.5% (1990–1995), 1.6% (1995–2000), 1.3% (2000–2005) and 1.3% (2005–2010). In addition, we see de-carbonization of energy-mix of around 0.5% per annum for 1990–1995 and 2005–2010, while only little improvement between them (1995–2005).

Steady and strengthened improvement of energy efficiency is the key for OECD to achieve reductions in CO_2.

It is noted that de-carbonization can occur by increasing the portion of natural gas and nuclear in OECD countries. There exists strong political aspects for nuclear and it requires a long-range time frame for construction. Therefore, gas price in the market can be the determinant for de-carbonization. Recent development of shale gas would influence a lot in many countries, including shift to imported cheap coal from the US.

3.4. Non-OECD



Non-OECD consists of 26% (GDP), TPES (55%), CO_2 (55%) of the world in 2010, while its population is 82%.

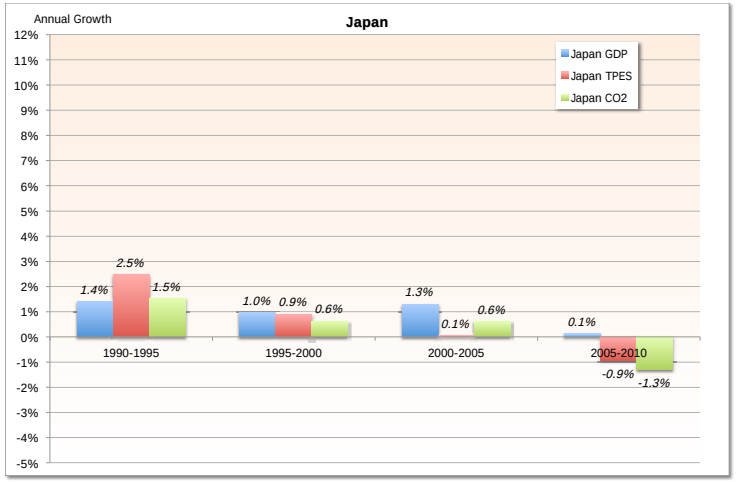
It has improved energy efficiency 1.8% (1990–1995), 2.5% (1995–2000), 1.0% (2000–2005) and 2.0% (2005–2010). However, CO_2 emissions has been driven by steady and strong GDP growth.

We do not see the de-carbonization of energy-mix, rather getting worse after 2000 driven by growing use of fossil fuels.

Strong economic growth is important for non-OECD countries, while energy efficiency is also important for energy security, energy cost saving taking a look at the graph of sub-section 2.6 for TPES/GDP to decouple from energy vulnerable country.

Some non-OECD countries have been achieving high level of energy efficiency improvements by introduction of effective policies and programmes. Such practices and others (especially Japan's experiences) should be shared for mutual benefits.

3.5. Japan



Japan already achieved very energy efficient economy (see sub-section 2.6) by introduction of many policies and measures after the first oil crisis in 1973 (it is noted that Japan relied around 80% of its primary energy on oil in 1973).

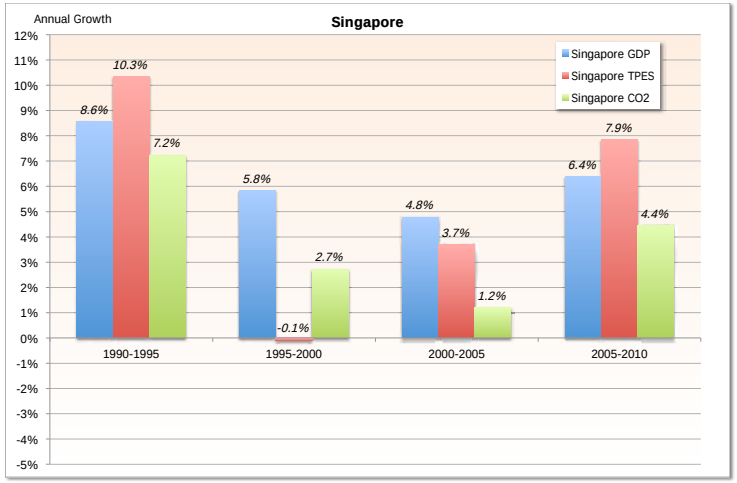
However, energy efficiency got worse for 1990–1995 and almost no improvement for 1995–2000. This trend turned better for 2000–2005 and 2005–2010, when energy efficiency improved 1.2% and 1.0% per annum, respectively.

Since Japan has achieved highly energy efficient economy, it requires comparatively higher cost to strengthen its energy efficiency and there are less rooms for minus/low cost options. On the other hand, this situation as well as its high energy cost structure, is suitable to develop new and innovative technologies as the pioneer.

De-carbonization of energy-mix was seen 1.0% per annum for 1990–1995 but 0.3% for 1995–2000, –0.5% for 2000–2005 and 0.4% for 2005–2010 mainly by promoting nuclear and gas.

However, due to the Great East Japan Earthquake and Fukushima Accident in 2011, we will see strong *carbonization* definitely. Nuclear cannot be a solution in Japan anymore and Japan will face much more difficult situation to reduce its CO_2 emissions. Energy efficiency improvements should compensate the growth of GDP and also carbonization of energy-mix. Tentative statistics by the Institute of Energy Economics shows that CO_2 grew 3.0% in 2011 and 3.3% in 2012.

3.6. Singapore



Singapore has rather high TPES and CO_2 per capita (see sub-sections 2.4 and 2.5). While its energy efficiency level is rather good in its performance but worse than OECD average (sub-section 2.6). This might be due to the fact that Singapore is service sector-oriented country and international bunker fuel consumption is outside of the statistics, although petro-chemical and oil refining industry requires a large amount of energy.

Singapore has shown strange behavior in the statistics of its chronological trends.

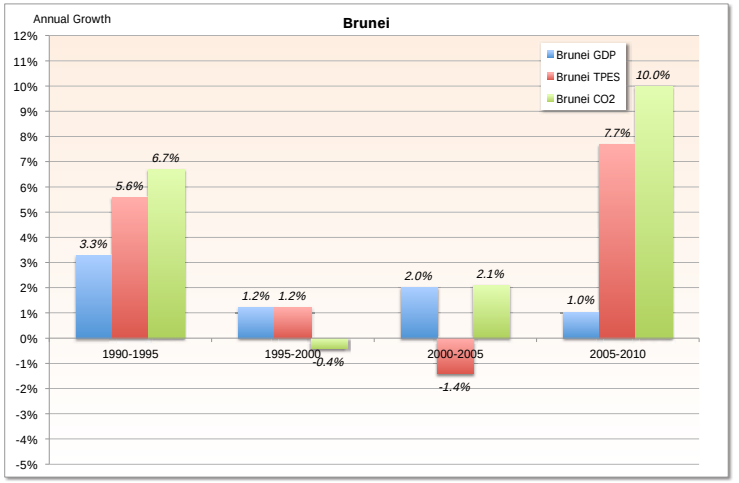
Energy efficiency got worse 1.7% per annum for 1990–1995 while improved 5.9% for 1995–2000 and 1.1% for 2000–2005, but got worse 1.3% again for 2005–2010.

This might happen due to statistical inconsistencies and/or difference between energy supply and consumption (*i.e.*, changes in stocks), since Singapore's economy is small and service-sector oriented.

Taking its energy-mix dominated by oil and gas constantly in mind, it looks strange as well that de-carbonization is found for 3.1% per annum (1990–1995), 2.5% (for 2000–2005) and 3.5% (for 2005–2010) while –2.8% (for 1995–2000). Shifting of its power generation fuel to gas might have contributed this trend recently.

Import/export of energy, especially electricity as the carbon neutral energy for importer, might have influenced a lot on such behavior of intensities. Further investigation is needed to clarify these points.

3.7. Brunei



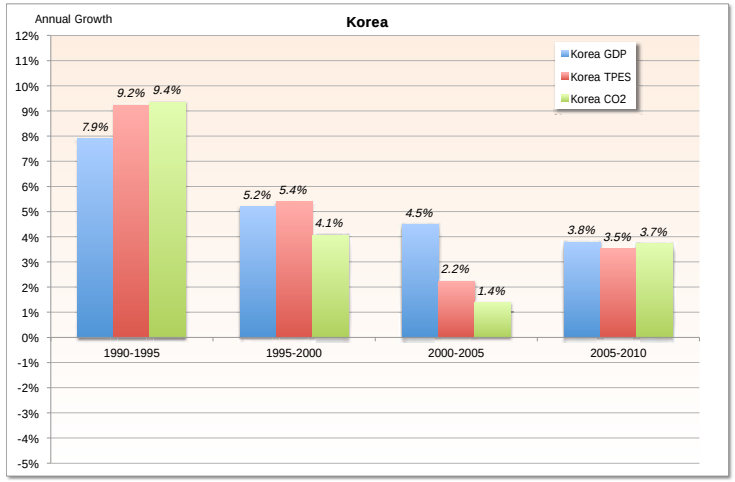
Brunei is an oil and gas producing country. It has very high TPES and CO_2 per capita (see sub-sections 2.4 and 2.5) which is the similar level of the US (twice of Japan). Its energy efficiency level is more than twice of OECD average as well (sub-section 2.6). This might happen because Brunei's energy price is low and it is much dependent on energy facilities for export. Brunei may have little concern about its energy security issue.

We see strong trends to getting worse of its energy efficiency for 1990–1995 (2.3% per annum) and 2005–2010 (6.7%) in Brunei, while better for 2000–2005 (3.4%).

It looks strange the carbon intensity varied a lot (1.1% per annum for 1990–1995; –1.6% for 1995–2000; 3.5% for 2000–2005; 2.3% for 2005=2010) even if it is dependent on oil and gas constantly.

Like Singapore, import/export of energy, especially electricity as the carbon neutral energy for importer, might have influenced a lot on such behavior of intensities. Further investigation is needed to clarify these points.

3.8. South Korea



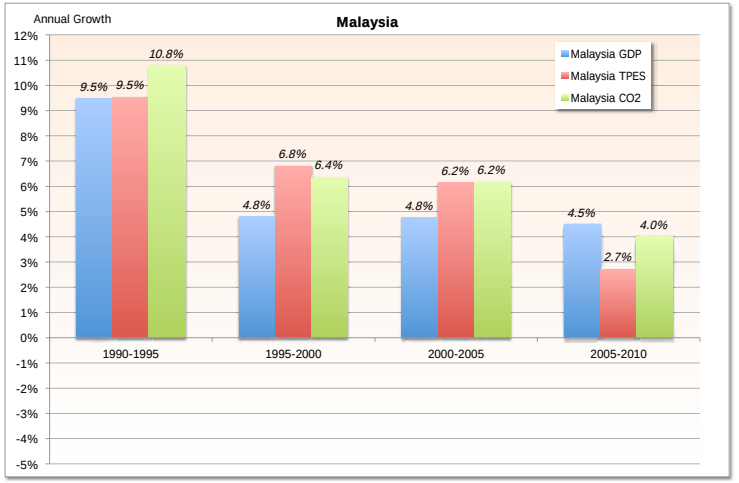
South Korea, similar to Japan as an industrial and energy-scarce country, has somewhat higher TPES and CO_2 per capita than Japan (see sub-sections 2.4 and 2.5). This is due to the lower energy efficiency which is worse than OECD average (sub-section 2.6).

Chronological trend showed that energy efficiency was not improved except the period of 2000–2005 (2.3% per annum).

On the other hand, de-carbonization was found 1.3% per annum (1995–2000) and 0.8% (2000–2005). Since 70% of its electricity is by thermal power plants which took the incremental part as well, de-carbonization will rely on nuclear power introduction.

We see that the period 2000–2005 achieved good energy efficiency improvements and also de-carbonization. Further analysis is needed what happened in this period and why the performance was lost in 2005–2010.

3.9. Malaysia



Malaysia is an oil and gas producing country. Malaysia is approaching to high-income counties with GDP more than 10,000 USD per capita (see sub-section 2.2). Per capita TPES and CO_2 is slightly larger than world average (subsections 2.4 and 2.5). Energy efficiency is better than non-OECD average but worse than the world average (sub-section 2.6).

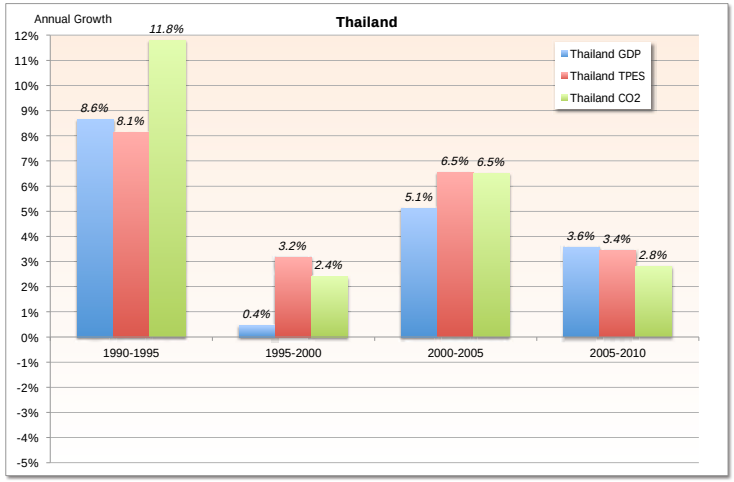
Malaysia has shown its GDP growth more than 4% per annum after the periods of 1995.

Energy efficiency got worse until the periods before 2005, while it turned to the improvement stage for 2005–2010 (1.8% per annum).

However, in this period, we see that carbonization compensates partly this trend in the sense of CO_2 emissions growth.

Whether it can continue its trend of energy efficiency improvement after 2010 is the key aspect for Malaysia to be in the next stage as a developed country with resilient economy of energy.

3.10. Thailand



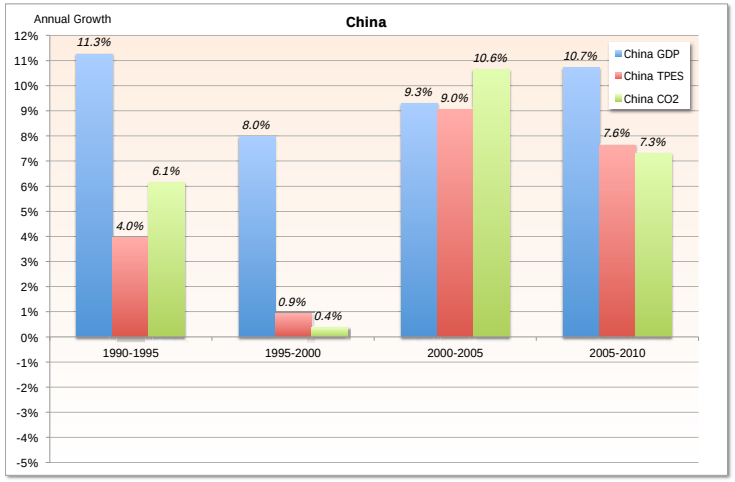
Thailand is a net importer of oil and natural gas, although the country is a growing producer of natural gas and it has lignite resource. Although it has experienced steady economic growth recently, its energy efficiency level is worse than non-OECD average (see sub-sections 2.6).

For the periods 1995–2000 and 2000–2005, the energy efficiency got worse (2.8% and 1.4% per annum, respectively), while it slightly improved for 2005–2010 (0.2% per annum). Whether this is the turning point or not is important aspect for Thailand to decouple its GDP and energy use to build energy-resilient economy. Further investigation is needed to clarify this point.

We see slight de-carbonization after 1995, which might be due to the expansion of natural gas fired power generation system and growing import of electricity. This trend may be continued if introduction of nuclear and renewables will continue.

Thailand is the leading producer of biofuels in Southeast Asia. This may support this trend.

3.11. China



China is the world's most populous, the largest energy consuming and CO_2 emitting country in the world. Rapidly increasing energy demand has made China (driven by its economic growth) in a very influential position in world energy markets. It is the largest producer and consumer of coal.

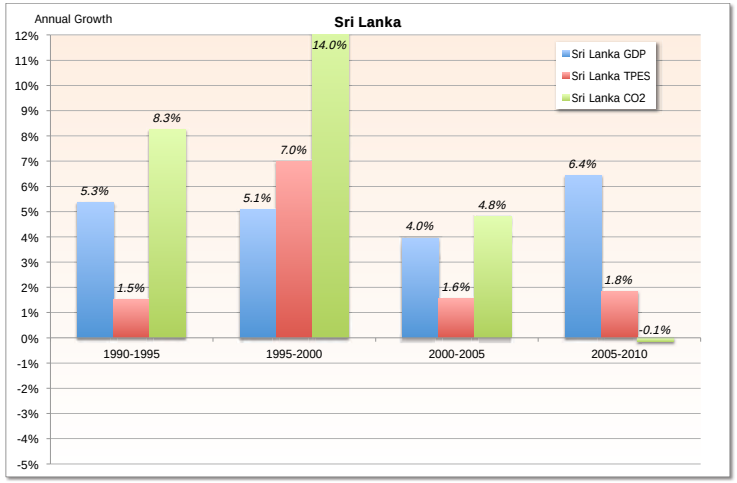
China has experienced strong economic growth (8–11% per annum for the recent four 5-year periods) steadily. Since its energy mix is dominated by coal, its per capita CO_2 is relatively large (see sub-sections 2.4 and 2.5). Its energy efficiency level is still worse than non-OECD average in spite of introduction of strong policies to increase its efficiency.

In the graph above, we see strange figures for 1990–1995 and 1995–2000, very large energy efficiency improvements around 7% per annum. This might come from the discontinuity of energy statistical base of IEA and expected to be revised in the near future.

For 2005–2010, China achieved its energy efficiency improvement of 3.1% per annum. China is continuing to strengthen its policies to improve the physical energy efficiencies. In addition, we observe the shift of its economy structure to the service sectors. Therefore we may be able to expect that this trend will continue for some periods in the future.

It may not be easy to decouple its coal-dependent economy in the short term but China intends to extend its share of natural gas and renewables (*incl*. hydro). This will be shown as the de-carbonization factor.

3.12. Sri Lanka



Sri Lanka uses relatively less energy and emits less CO_2 than non-OECD average because its per capita GDP is lower than the level of non-OECD average (see sub-sections 2.4 and 2.5).

It is noted that its energy efficiency level is relatively high (sub-section 2.6) and its carbon intensity is low (sub-section 2.7) due to its high dependence on hydro for electricity and biomass for heat.

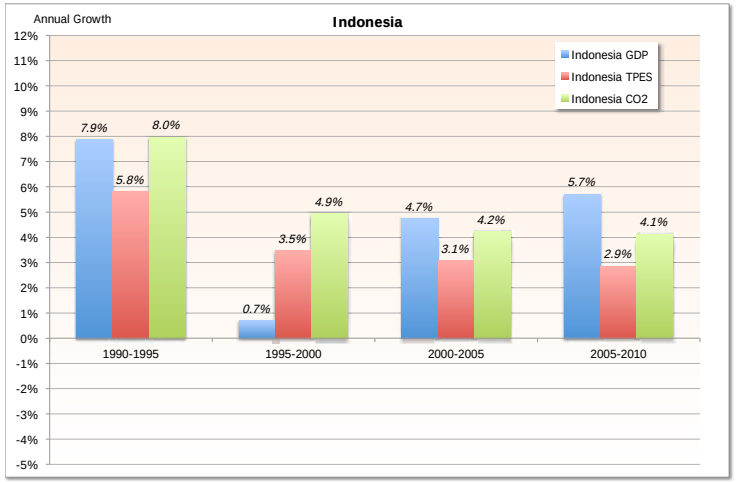
For chronological aspects, we observe steady energy efficiency improvements recently for 2000–2005 (2.4% per annum) and for 2005–2010 (4.6%).

Carbon intensity got worse significantly for the periods before 2005, while we see de-carbonization of 1.9% per annum for 2005–2010.

If Sri Lanka will continue its trend of energy efficiency improvement and de-carbonization of the period 2005–2010, it can experience an ideal low-carbon development path.

On the other hand, it still has to challenge its electrification in the rural areas from current level (77%) to almost 100% (sub-section 2.3).

3.13. Indonesia



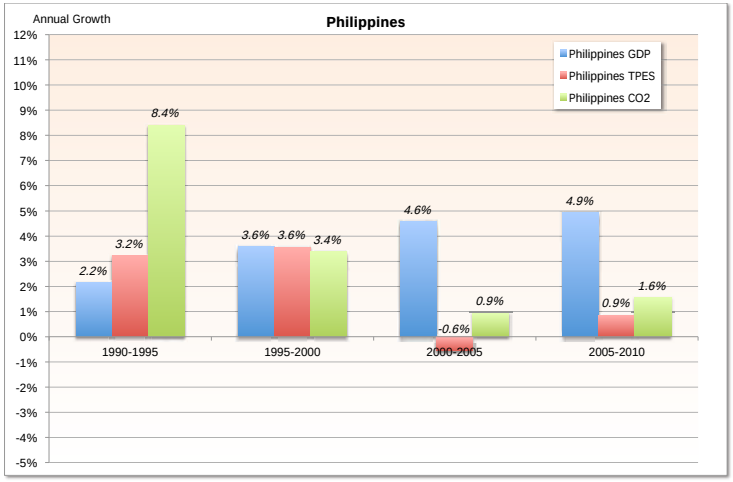
Indonesia, a populated and fossil fuels (oil, gas, coal) producing country, uses less energy and less CO_2 emissions per capita than non-OECD average given its GDP per capita is lower than non-OECD average (see sub-sections 2.4, 2.5). It has similar (but slightly better) level of energy efficiency of Thailand, China and non-OECD average (sub-sections 2.6).

Chronological trend of the energy efficiency improvement was good for these two 5-year periods (1.6% for 2000–2005 and 2.8% for 2005–2010). It is preferable to continue this trend in the following years.

On the other hand, carbon intensities are getting worse for all periods (2.2% for 1990–1995; 1.4% for 1995–2000; 1.1% for 2000–2005; 1.2% for 2005–2010). This might be because Indonesian government has been encourages the use of coal in the power sector, due to relatively abundant domestic supply and as a way to reduce the use of expensive diesel and fuel oil. Gas and geothermal power development may relax this trend.

One more challenge of Indonesia is to increase its electrification rate (currently 65%) which reflects the fact that it consists of around 13,000 islands (sub-section 2.3).

3.14. Philippines



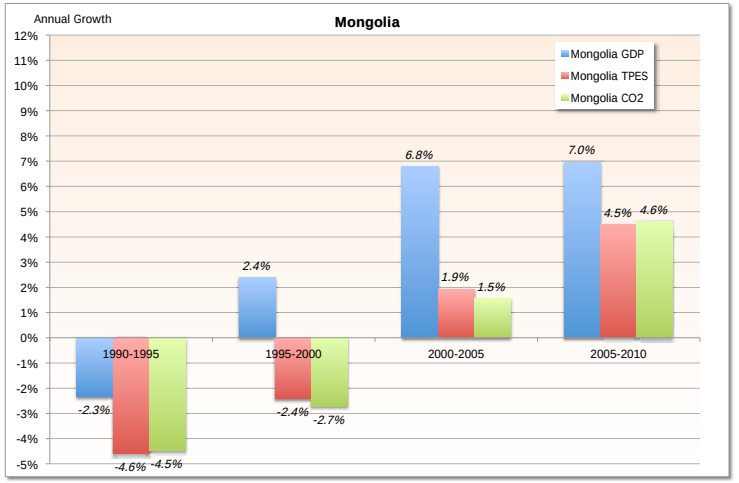
Philippines shows relatively small energy consumption and CO_2 emissions per capita (see sub-sections 2.4 and 2.5) among other countries with the similar level of GDP per capita. It is noted that although it consists of more than 7,000 islands, its electrification rate reaches 90% (sub-section 2.3).

It is noted that geothermal consists of more than 1/5 of its primary energy and other renewables shares the same level as well. This is the reason because its carbon intensity is low (sub-section 2.7). In addition, its energy efficiency is relatively good (sub-section 2.6).

Chronologically, Philippines has achieved very high level of energy efficiency improvement for 2000–2005 and 2005–1010 (5.2% and 4.0% per annum, respectively).

On the other hand, carbon intensity increased 1.5% and 0.7% per annum for these periods. Increasing the share of renewables and nuclear may relax this trend.

3.15. Mongolia



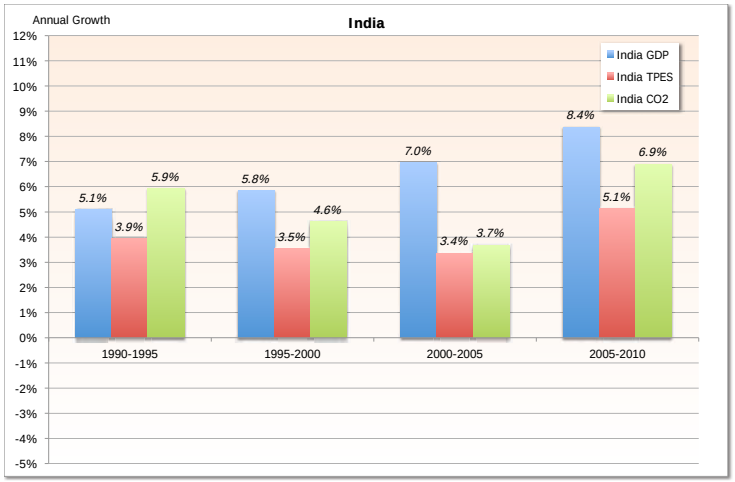
Mongolia, coal and oil producing country, shows relatively large energy use and CO_2 emissions per capita (see sub-sections 2.4 and 2.5) although they are lower than non-OECD average given its GDP per capita level is lower than that of the non-OECD average. This is because of its very cold winter season and high dependence on coal and low energy efficiency (sub-section 2.6 and 2.7).

On the other hand, Mongolia has improved its energy efficiency steadily such as 2.3% (1990–1995), 4.8% (1995–2000), 4.9% (2000–2005) and 2.5% (2005–2010). Continuation of this trend will derive Mongolia to be much more energy efficient economy. New large coal fired plant with heat distribution system and strengthening insulation are expected to promote this trend.

On the other hand, carbon intensity has been almost stable, since its coal-dependent economy has not been changed without promising options for energy shift.

One more challenge of Mongolia is to increase its electrification rate (currently 67%) in the scarcely populated areas (sub-section 2.3).

3.16. India



India is the second populated after China and fourth largest energy consumer in the world after the US, China and Russia. Coal is India's primary source of energy and the power sector (211 GW in 2012) makes up the majority of coal consumption. On the other hand, it produces natural gas as well.

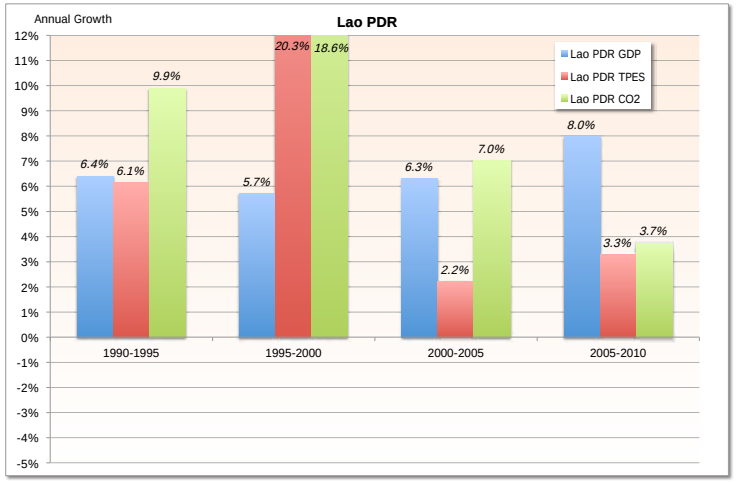
It has relatively low per capita energy consumption and CO_2 emissions (see sub-sections 2.4 and 2.5) in comparison to other non-OECD countries and shows typical energy efficiency and carbon intensity level among the countries with similar economic level.

Chronologically, India has been achieving steady improvement of its energy efficiency, namely, 1.2% (1990–1995), 2.3% (1995–2000), 3.6% (2000–2005) and 3.3% (2005–2010). Recently, India started an innovative regulation called PAT for industry sectors to improve their efficiencies (*i.e.*, intensities). Therefore it is expected to continue this trend for a while.

On the other hand, carbon intensity has been getting worse during the periods. This might be due to the growing coal fired power generation. Introduction of very efficient coal fired plants as well as introduction of renewables and nuclear may contribute to mitigate this trend in the following years.

India is challenging to electrify the rural areas from current level (75%) to 100% (sub-section 2.3).

3.17. Lao PDR



Lao PDR shows very small CO_2 emissions per capita while its energy consumption is a typical one (see sub-sections 2.4 and 2.5) among non-OECD countries. As shown in sub-sections 2.6 and 2.6., Lao PDR's energy efficiency level is not good but its carbon intensity is very low due to its high dependence on hydropower.

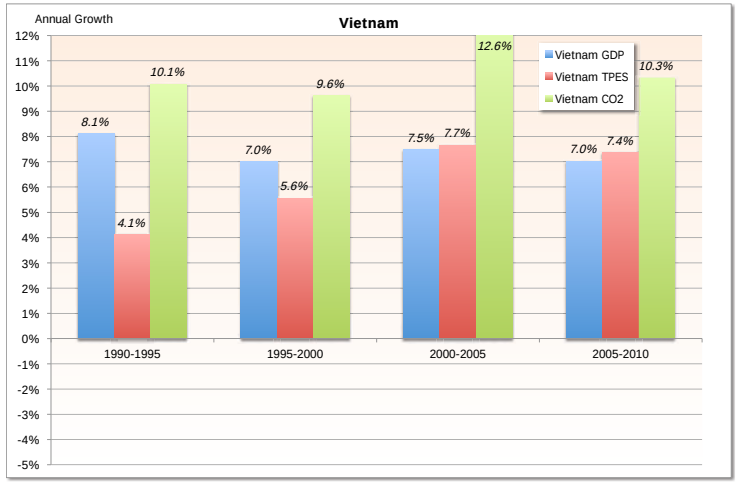
Chronological analysis shows a strange figure for 1995–2000 which might be due to some statistical issues.

For recent periods 2000–2005 and 2005–2010, Lao PDF achieved the large energy efficiency improvement of 4.2% (2000–2005) and 4.7% (2005–2010) per annum. Continuation of this trend will derive Lao PDE to be much more energy efficient economy which requires less cost for energy.

Since energy mix is already dependent on hydro, there is little room to de-carbonize more. However, promotion of renewable energy (biomass) for heat and transportation fuel can relax that it will get worse by fossil fuel use especially in the transportation sector.

On the other hand, electrification of off-grid area (currently 55%) is an important challenge for Lao PDR for its sustainable development (sub-section 2.3).

3.18. Vietnam



Over the past few decades Vietnam has emerged as an important oil and natural gas producer in Southeast Asia. It also produces coal.

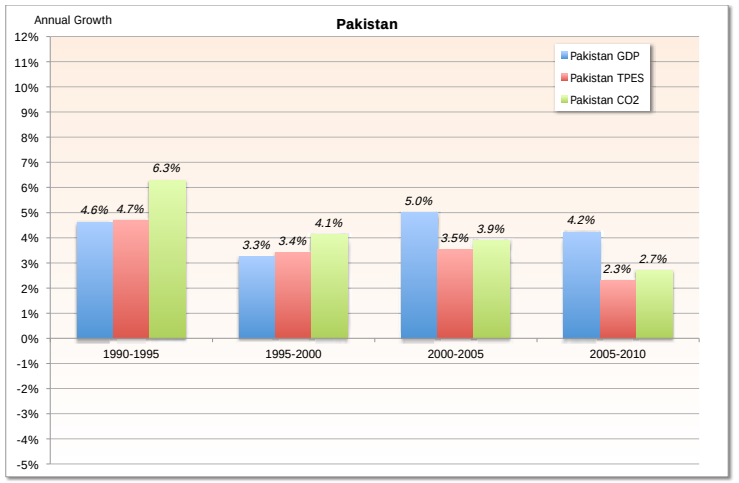
Its per capita energy consumption and CO_2 emissions are slightly larger than other countries with similar economy-level (see sub-sections 2.4 and 2.5) but lower than non-OECD average given its level of per capita GDP. Its energy efficiency is not good but its carbon intensity is relatively better (sub-sections 2.6 and 2.7).

For its chronological trends, the energy efficiency was improved for 1990–2000 significantly (4–6% per annum), but we see almost no improvement for 2000–2010. There have introduced several policies for energy efficiency but it looks better to revise and strengthen them.

Moreover, we see significant carbonization throughout the periods (3–6% per annum).

It must be noted that Vietnam has already achieved the full-electrification of the country (98%) which is important for its sustainable development especially for people in rural areas (sub-section 2.3).

3.19. Pakistan



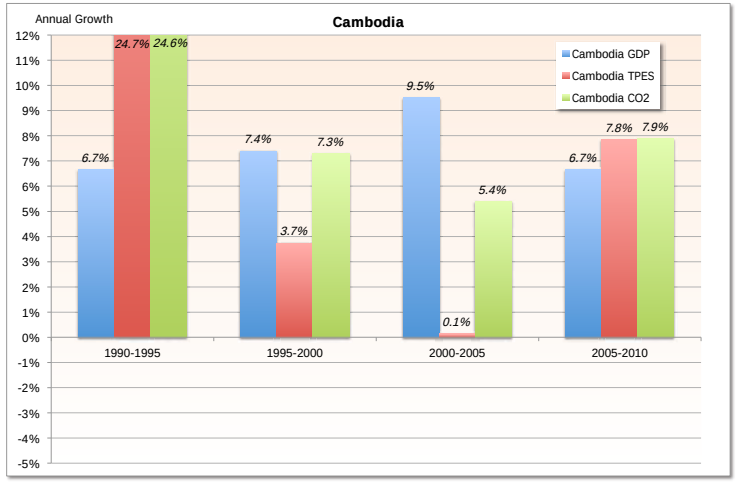
Pakistan shows its per capita energy consumption and CO_2 emissions lower than those of non-OECD average given that its GDP per capita is lower than that level (see sub-sections 2.4 and 2.5). Its energy efficiency is slightly worse than non-OECD average but its carbon intensity is lower (subsection 2.6 and 2.7) possibly because 30% of its electricity consumption is provided by hydro.

Chronological trend of Pakistan shows that the energy efficiency was not improved for 1990–2000, while it has been improving a lot for 2000–2005 and 2005–2010 (1.5% and 1.9% per annum, respectively). If Pakistan will continue this trend steadily, it will build more energy-resilient economy. This is essential because Pakistan imports around a half of its primary energy from abroad.

On the other hand, carbon intensity has shown its positive values (after 2000, it shows 0.4% per annum), given the energy-mix is slightly shifting to more carbon-intensive structure.

Pakistan faces its challenge to electrify its off-grid areas since its current rate is 62%, in addition to improve its electricity shortage in the on-grid areas (sub-section 2.3).

3.20. Cambodia

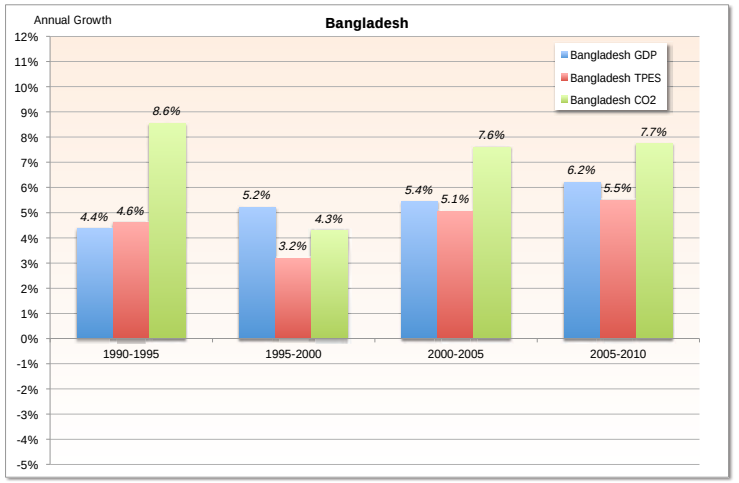


Cambodian per capita energy use and CO_2 emissions is lower than those of non-OECD average (see sub-sections 2.4 and 2.5) given its GDP per capita is lower than that of non-OECD average. Its energy efficiency level slightly worse than non-OECD average, but its CO_2 emissions per capita is much lower reflecting its high dependence on hydropower and biomass.

Statistics may have problems since GDP and energy consumption decoupled completely in the opposite direction for 1990–1995 and 2000–2005 and we find huge change of energy mix for 1995–2005. If we rely on 2005–2010 figures, energy efficiency is getting worse 1.1% per annum, and energy-mix is almost stable. Therefore we see high CO_2 growth (7.9% per annum) driven by its GDP growth (6.7%) directly.

Electrification of off-grid areas is also a big and important challenge for Cambodia given its rate is only 24% (sub-section 2.3). Renewable energy sources such as solar PV and micro-hydro may be technical solution but management/operation system of the program may be the key.

3.21. Bangladesh



Bangladesh has some energy resources (mainly natural gas) but its large population requires more than the production. Its energy consumption and CO_2 emissions per capita is much lower than non-OECD average given its low GDP per capita (see sub-sections 2.4 and 2.5).

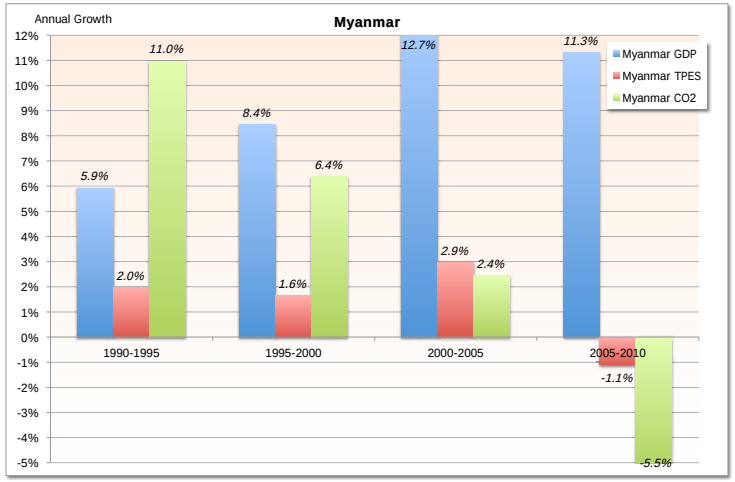
On the other hand, its energy efficiency is rather good especially among the countries with similar economic level (sub-section 2.6). Its carbon intensity is also lower reflecting the fact that Bangladesh is a natural gas rich country and biomass use in rural areas mainly for cooking.

Chronologically, Bangladesh has achieved its energy efficiency improvement steadily after 1995 (2.0% per annum for 1995–2000, 0.3% for 2000–2005, 0.7% for 2005–2010). Promotion and strengthening of this trend will make Bangladesh much more energy-resilient country. Renovation of current old-fashioned natural gas fired power plants may be effective to utilize valuable natural gas more effectively and foster this trend.

On the other hand, carbonization has been continuing throughout the periods. It shows more than 2% per annum recently. This may reflect the limit of natural gas supply and reliance of coal for its new power stations.

Bangladesh faces challenges for rural electrification (sub-section 2.3). Although current electrification rate is 41%, it has the most successful program of solar home system (SHS) which has already installed to 2 million households. This experience can be a good practice to be transferred to other LDCs.

3.22. Myanmar



Myanmar is an important new natural gas producer within Southeast Asia. Many U.S. and European Union sanctions were eased or suspended in 2012 in response to political and economic reforms in Myanmar.

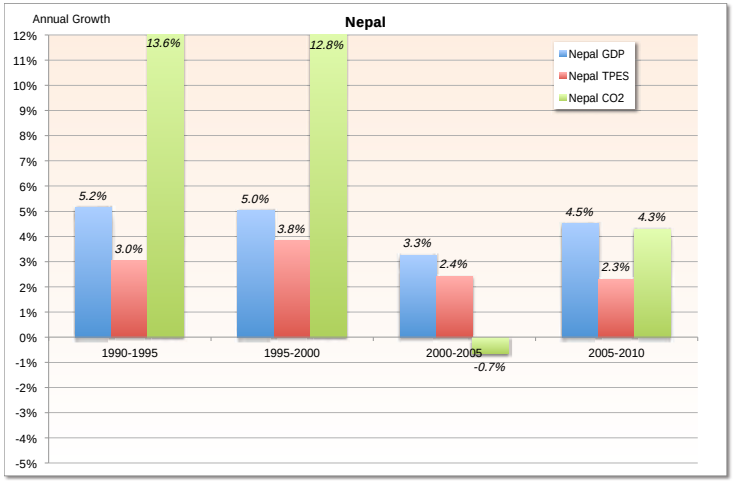
Reflecting its low GDP per capita, its energy use and CO_2 emissions is much lower than non-OECD average (see sub-sections 2.4 and 2.5). Energy efficiency shows a typical value among the similar economic level countries, while its carbon intensity is quite low reflecting its high dependence on hydropower (around 70% of its generation) and biomass for heat (sub-sections 2.6 and 2.7).

Statistics of Myanmar may have several problems. But if we believe it, significant energy efficiency improvement has been achieved such as 3.9% (1990–1995), 6.8% (1995–2000), 9.8% (2000–2005) and 12.4% (2005–2010) per annum. This might happen because Myanmar is drastically changing its economy.

Since its carbon intensity is quite low, it may be less useful to consider its trend. It can be said that shift to carbon-intensive energy mix in the past (1990–2000) has changed to less carbon energy mix (4.4% per annum for 2005–2010) drastically driven by hydropower development.

Myanmar has been facing a big challenge to electrify the rural areas given its electrification rate is only 13% (sub-section 2.3). Probably experience of Bangladesh (its neighbor) can give some insights noting Myanmar has additional options like micro-hydro to SHS.

3.23. Nepal



Nepal shows its per capita energy consumption and CO_2 emissions are much lower than non-OECD average (see sub-sections 2.4 and 2.5). However, its energy efficiency is quite low (sub-section 2.6). On the other hand, its carbon intensity is very low reflecting its high dependence on hydropower and biomass use.

Chronological trend shows that Nepal has improved its energy efficiency steadily (2.2% for 1990–1995, 1.2% for 1995–2000, 0.9% for 2000–2005, 2.2% for 2005–2010 per annum) in spite of its high magnitude. Continuation and strengthening this trend is the key to make Nepal much more energy resilient country.

On the other hand, we see shift to carbon-intensive energies except for the period 2000-2005. Since carbon intensity of Nepal is quite low, this is not a big matter. On the other hand, realization of its high potential of indigenous renewable no-carbon energies is the key of its development.

Rural electrification is still challenging considering its electrification rate is 44% (sub-section 2.3). On the other hand, it has been operating a rather successful model of domestic biogas program.