Low-carbon society model capacity building workshop

-bridge simulation scenarios and sustainable LCS policy implementation using AIM (Asia-Pacific Integrated Model) -

November 19, 2010

Pullman Hotel

Bangkok, Thailand

Organized

By

TGO, SIIT-TU, JGSEE, NIES

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Maiko Suda

Kyoto University

Yuzuru Matsuoka
Kei Gomi

Asian Institute of Technology (AIT)

Ram M Shrestha

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- ***Session 6*** How to operate AIM/ExSS to develop national/sub-national LCS scenarios

  By Dr. Kei Gomi

- AIM/ExSS Exercise by participants

  By Dr. Kei Gomi

- ***Session 7*** Ratchaburi LCS scenarios development and its implementation

  Dr. Savitri and Dr. Penwadee (JGSEE-KMUTT)

- ***Session 8*** India and Bhopal LCS scenarios development and its implementation

  Prof. Aashish Deshpande (Maulana Azad National Institute of Technology, Bhopal)

- ***Session 9*** Activities of LCS-RNet

  Dr. Shuzo Nishioka (IGES)

- ***Session 10*** Open discussion on modeling, scenarios, and its policy implementation

  "How to bridge simulation scenarios and sustainable LCS policy implementation"
  Coordinated by *Associate Prof. Dr. Bundit Lim (SIIT-TU)*

- ***Session 11*** Closing Remarks

  By Dr. Mikiko Kainuma (NIES)

- Question and Answers

- Summary of International Participants' Evaluation Form

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Summary of Activities in Low-Carbon Society Model Capacity Building Workshop

- Bridge Simulation Scenarios and Sustainable LCS Policy Implementation using AIM (Asia-Pacific Integrated Model) –

by

Associate Prof. Dr. Bundit Limmeechockchai

Low-Carbon Society Model Capacity Building Workshop
Bridge simulation scenarios and sustainable LCS policy implementation using AIM (Asia-Pacific Integrated Model)

19 November 2010

Summary of Activities in Low-Carbon Society Model Capacity Building Workshop

by
Assoc. Prof. Dr. Bundit Limmeechokchai
Sirindhorn International Institute of Technology (SIIT), Thammasat University (TU)

The Low-Carbon Society Model Capacity Building Workshop: Bridge simulation scenarios and sustainable LCS policy implementation using AIM (Asia-Pacific Integrated Model) in Thailand on November 19, 2010 was aimed at disseminating results of the low-carbon society scenarios in many Asian countries using AIM/ExSS tool. This workshop was the first LCS model capacity building workshop in Thailand including invited international speakers from Japan, India and Malaysia.

The main objectives are i) to introduce of LCS scenario making process to stakeholders for better understanding how to use simulation studies for policy formulation and implementation, ii) to learn to operate LCS simulation model (simple version) and assess the CO_2 reduction possibilities effected by change of driving forces (population, GDP etc.) and countermeasures (energy savings in buildings and industries, modal shift in transportation etc.), and iii) to communicate between policymakers, business, researchers to discuss how to develop feasible LCS scenarios and policy options. In this workshop both English-Thai and Thai-English simultaneous translations were available.

The workshop started with the opening session, chaired by Dr. Junishi Fujino, Senior Researcher from National Institute for Environmental Studies, Japan (NIES). He introduced Mr. Sirithan Pairoj-Boriboon, Executive Director of Thailand Greenhouse Gas Management Organization (TGO), for a speech on opening address. Then he introduced Assoc. Prof. Dr Supachart Chungpaibulpatana, representative of Prof Chongrak Polprasert –Director of SIIT-TU, for welcoming address on “research collaboration between Thailand and Japan on LCS study”. He introduced the LCS study in Thailand and background of the workshop.

The first session of the workshop was on “Introduction to Asian LCS Research Study”, chaired by Assoc. Prof. Dr Supachart Chungpaibulpatana from SIIT-TU. There are 4 speakers in this session. The first speaker was Dr. Junishi Fujino. He introduced the overview and the purpose of the workshop. The second speaker was Prof. Yuzuru Matsuoka from Kyoto University. Prof Matsuoka introduced “Sustainable Low-Carbon Society Modeling and Scenario Making Process” used in development of LCS scenarios in many Asian countries. The last topic in this session was on “Thailand LCS scenarios development and co-benefits” by Prof. Ram M Shrestha from Asian Institute of Technology (AIT) and

Assoc. Prof. Dr. Bundit Limmeechokchai from SIIT-TU. Assoc. Prof. Dr. Bundit Limmeechokchai introduced development of Thailand' LCS scenario 2030 using 2005 as the base year and Prof. Ram M Shrestha presented his 10-year research studies on LCS and co-benefits of CO_2 mitigation in Thailand.

The second session of the workshop was on "Example of bridging LCS scenarios and policy-making process", chaired by Assist Prof. Dr. Savitri Garivait from the Joint Graduate School on Energy and Environment (JGSEE) King Mongkut's University of Technology. She introduced Prof. Ho Chin Siong from Universiti Technologi Malaysia (UTM) as the first speaker in this session. Prof. Ho Chin Siong introduced Malaysia and Iskandar LCS scenarios development. The second speaker was Mr. Boyd Dionysius Joeman from Iskandar Regional Development Authority (IRDA). He introduced how to implement academic LCS scenarios into policy-making process.

The afternoon session started with topic on "capacity building for LCS model simulation run", chaired by Dr. Mikiko Kainuma –The Project Leader of Climate Policy Assessment Project, NIES. The speaker in objective of this session was to train participants how to operate AIM/ExSS to develop national/sub-national LCS scenarios. Dr. Kei Gomi from Kyoto University was lecturer in the session. The AIM/ExSS Exercise by participants was under supervision of Dr. Kei Gomi and many ExSS assistants from Thailand, India and Malaysia supported ExSS hand-on workshop. In this session, participants learnt how to run the ExSS model for development of LCS scenario using the case of Thailand.

The last session in the afternoon of the workshop was on the topic "national and sub-national LCS scenario development in Asia", chaired by Assoc. Prof. Dr. Bundit Limmeechokchai from SIIT-TU. The first presentation in the session was on "Ratchaburi LCS scenarios development and its implementation" by Assist. Prof. Dr. Savitri Garivait from JGSEE-KMUTT. Ratchaburi is a city to the west and 100-km from Bangkok. The second speaker in this session was Prof. Aashish Deshpande from Maulana Azad National Institute of Technology, Bhopal. Prof. Aashish presented on "India and Bhopal LCS scenarios development". Finally Prof. Shuzo Nishioka, from Institute for Global Environmental Strategies (IGES) was the last speaker in this workshop. Porf. Shuzu Nishioka is the Senior Research Advisor and LCS-Rnet Secretary General of iGES. In additional, currently Porf. Shuzu Nishioka is also a Senior Visiting Researcher in NIES. He introduced "How to link AIM LCS scenario development activities to LCS-RNet".

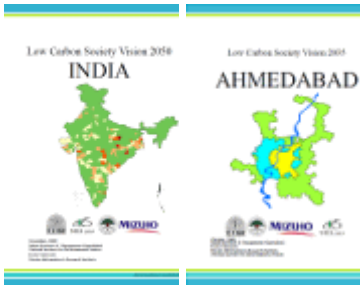
The closing session of the first LCS model capacity building workshop in Thailand consisted of two sessions: Open Discussion and Closing Remarks. The sessions were co-ordinated by Assoc. Prof. Dr. Bundit Limmeechokchai from SIIT-TU. The open discussion on modeling, scenarios, and its policy implementation was aimed at "How to bridge simulation scenarios and sustainable LCS policy implementation". Many participants provided positive response on ExSS tools, modeling techniques, and data requirement for LCS scenario development. In this session, Assoc. Prof. Dr. Sirintornthep Towprayoon from JGSEE-KMUTT provided comments on how to bridge simulation scenarios and sustainable LCS policy implementation. Finally, Dr. Mikiko Kainuma from NIES announced the success of "Low-Carbon Society Model Capacity Building Workshop: Bridge simulation scenarios and sustainable LCS policy implementation using AIM (Asia-Pacific Integrated Model)" in the final closing remarks.

The workshop was closed after the completion of open discussion and closing remarks at 17.00.

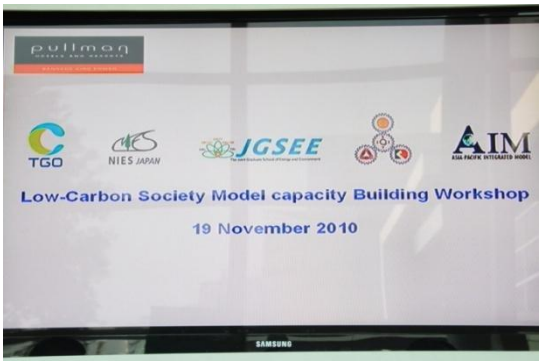
Agenda for Low-Carbon Society Model Capacity Building Workshop

- Bridge Simulation Scenarios and Sustainable LCS Policy Implementation using AIM (Asia-Pacific Integrated Model) -

Opening session		
Chair: Junichi Fujino (NIES)		
9:00-9:05	Welcome Address	Mr. Sirithan Pairoj-Boriboon, Executive Director (TGO)
9:05-9:15	Research collaboration between Thailand and Japan on LCS study	Dr. Supachart Chungpaibulpatana (SIIT-TU)
9:15-9:20	Photo session	
Introduction of Asian LCS research study		
Chair: Dr. Supachart Chungpaibulpatana (TGO)		
9:20-9:30	Overview and the Purpose of this workshop	Dr. Junichi Fujino (NIES)
9:30-10:00	Low-Carbon Society Modeling and Scenario Making Process	Prof. Yuzuru Matsuoka (Kyoto Univ.)
10:00-10:30	Thailand LCS Development and Co-benefits of Carbon MItigation Strategies 	Prof. Ram Shrestha (AIT) and Prof. Bundit Lim (SIIT-TU)
10:30-11:00	Break	
Example of bridging LCS scenarios and policy-making process		
Chair: Dr. Savitri Garivait (JGSEE)		
11:00-11:30	Development of Low Carbon Society Scenarios for Iskandar Malaysia 	Prof. Ho Chin Siong (Universiti Technologi Malaysia (UTM))
11:30-12:00	A GREEN-FOCUSED AGENDA FOR ISKANDAR MALAYSIA : Towards a Low Carbon Society	Mr. Boyd Dionysius Joeman (Iskandar Regional Development Authority (IRDA))
12:00-13:00	Lunch	
Capacity building for LCS model simulation run		
Chair: Mikiko Kainuma (NIES)		
13:00-13:30	Extended Snapshot Tool	Dr. Kei Gomi (Kyoto Univ.)
13:30-15:00	AIM/ExSS Exercise by participants ExSS Demo Manual	
15:00-15:20	Break	

National and sub-national LCS scenario development in Asia		
Chair: Prof. Bundit Lim (SIIT-TU)		
15:20-15:35	Application of ExSS to Ratchaburi LCS scenarios development	Dr. Savitri Garivait and Dr. Penwadee Cheewapongphan (JGSEE-KMUTT)
15:35-15:50	Low Carbon Society: A Green Roadmap for India 	Prof. Aashish Deshpande (Maulana Azad National Institute of Technology, Bhopal)
15:50-16:00	How to link AIM LCS scenario development activities to LCS-RNet	Dr. Shuzo Nishioka (IGES)
16:00-16:25	Open discussion on modeling, scenarios, and its policy implementation "How to bridge simulation scenarios and sustainable LCS policy implementation" Coordinated by Prof. Bundit Lim (SIIT-TU)	
16:25-16:30	Closing Remarks	Dr. Mikiko Kainuma (NIES)

Photographs During the Workshop



Low-Carbon Society Model Capacity Building Workshop

Registration

Registration

Registration, Prof Matsuoka (Kyoto Univ.)

Registration, Dr. Bundit Lim (SIIT-TU)

Registration, Mr. Boyd Dionysius Joeman (IRDA)

Registration, Mr. Martin Brechter, GTZ Advisor

From left: Dr. Nattarika (TGO) , Dr. Fujino (NIES) Prof. Matsuoka (Kyoto Univ.), Dr. Kainuma (NIES)

Registration, Dr. Nattarika Wayuparb

Greeting, from left : Prof Ho Chin Siong, Dr. Fujino, Prof. Matsuoka

Registration, Prof Ram Shrestha (AIT)

Greeting, from left: Prof. Aashish Deshpande, Dr. Kainuma, Mr. Artite

From left: Maiko Suda (NIES), Ms. Pornphimol (SIIT-TU), Ms. Panida (SIIT-TU).

Participants

Greeting, from lef: Mr.Sirithan (TGO), Dr. Rachanarin, Dr.Supachart (SIIT-TU)

Participants

Opening session, from left: Dr. Fujino, Mr. Sirithan, Dr.Supachart

Welcome Address by Dr. Supachart (SIIT-TU)

During the Workshop

During the Workshop

Participants

Participants

During the Workshop

Participants

Participants

Sustainable Low-Carbon Society Modeling and Scenario Making Process by Prof. Matsuoka

During the Workshop

Introduction of Asian LCS research study

During the Workshop

Dr.Kitti Limsakul (CU)

Dr.Kitti presented memento to Dr. Supachart

Dr. Kitti presented memento to Prof. Ram Shrestha

Dr.Kitti presented memento to Dr. Fujino

Dr.Kitti presented memento to Dr. Bundit Lim

Dr.Kitti presented memento to Prof. Matsuoka

During Coffee Break

During Coffee Break

During Workshop

Dr. Savitri Garivait (JGSEE-KMUTT)

Example of bridging LCS scenarios and policy-making process

Development of Low Carbon Society Scenarios for Iskandar Malaysia

Mr. Santhad Somchevita (Chair, TGO Board)

Capacity building for LCS model simulation run

AIM/ExSS Exercise by participants

Capacity building for LCS model simulation run

AIM/ExSS Exercise by participants

Dr. Kei Gomi

AIM/ExSS Exercise by participants

AIM/ExSS Exercise by participants

During the Workshop

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AIM/ExSS Exercise by participants

Dr. Bundit Lim presented memento to Dr. Komi (NIES)

AIM/ExSS Exercise by participants

Low Carbon Society: A Green Roadmap for India

Dr. Kainuma presented memento to Dr. Bundit Lim(SIIT-TU)

Low Carbon Society: A Green Roadmap for India

How to link AIM LCS scenario development activities to LCS-RNet, Dr. Nishioka (iGES)

Dr. Kainuma presented memento to Dr. Aashish

Dr. Bundit Lim presented memento to Dr. Kainuma

Open discussion on modeling, scenarios, and its policy implementation

Dr. Kainuma presented memento to Dr. Nishioka (iGES)

Open discussion

Open discussion

Open discussion

Open discussion

Open discussion

Open discussion

Closing remarks by Dr. Kainuma

Groups Photo of Low-Carbon Society Model Capacity Building Workshop

List of Participants

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- **Bridge Simulation Scenarios and Sustainable LCS Policy Implementation using AIM (Asia-Pacific Integrated Model) -**

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November 19 (Friday) 2010, Bangkok

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Opening Address

by

Mr. Sirithan Pairoj-Boriboon

Executive Director of Thailand Greenhouse Gas Management Organization

Opening Address (November 19, 2010)

by

Mr. Sirithan Pairoj-Boriboon

Executive Director, Thailand Greenhouse Gas Management Organization

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Distinguished Guests, Ladies and Gentlemen,

It is my great pleasure to preside over the opening ceremony of the workshop on "Low Carbon Society Model Capacity Building Workshop" in Bangkok, Thailand, which is organized by Thailand Greenhouse Gas Management Organization (TGO), National Institute for Environmental Studies (NIES), Japan, and Sirindhorn International Institute of Technology (SIIT) of Thammasat University.

I consider this workshop to be a very important activity in which the climate change problems become more worldwide realized over the decades.

The aim of this workshop is not only to present results of low carbon society (LCS) analyses in Asia but also to enhance capacity building in LCS modeling and development for greenhouse gas (GHG) mitigation.

In addition to the GHG mitigation from LCS development and implementation, this workshop also includes bridge simulation scenarios and policy implementation for sustainable LCS development policy.

This workshop is the first LCS model capacity building workshop in the framework of the Asia-Pacific Integrated (AIM) model under the development of the National Institute for Environmental Studies (NIES), Japan and Extended Snapshot (ExSS) tool developed by Prof. Yuzuru Matsuoka and his research team from Kyoto University.

However, the Thailand Greenhouse Gas Management Organization (TGO) finds this workshop useful to the participants and beneficial to the global and local environment.

At this auspicious moment, I would like to declare this "LCS model capacity building workshop" open and wish the seminar be a successful one.

THANK YOU

Welcome Address

by

Associate Prof. Dr. Supachart Chungpaibulpatana

Sirindhorn International Institute of Technology, Thammasat University

Research collaboration between Thailand and Japan on LCS study

by

Assoc. Prof. Dr. Supachart Chungpaibulpatana (on behalf of Prof. Chongrak)
Sirindhorn International Institute of Technology, Thammasat University

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Distinguished Guests, Ladies and Gentlemen,

I am pleased to welcome you all to the opening ceremony of the first "Low Carbon Society Model Capacity Building Workshop" in Bangkok, Thailand. This workshop has been organized by Thailand Greenhouse Gas Management Organization (TGO) and Sirindhorn International Institute of Technology (SIIT), Thammasat University, in collaboration with National Institute for Environmental Studies (NIES), Japan. I would like to gratefully acknowledge the Institute for Global Environmental Strategies (iGES), Japan for the support to the international speakers.

I would also like to acknowledge Prof. Yuzuru Matsuoka and his research team on the guidance on low carbon society (LCS) modeling with Extended Snapshot (ExSS) tool and National Institute for Environmental Studies (NIES) for the access to the Asia-Pacific Integrated Model (AIM) and Database. I would also like to acknowledge Thailand Greenhouse Gas Management Organization (TGO) on the fruitful management of the workshop.

The next sessions of this workshop will provide you the LCS research studies in Asian countries. The presentations on LCS studies will cover Japan and selected Asian countries as well as Thailand, where several LCS studies with AIM model have been done for a decade by Prof. Ram M Shrestha from Asian Institute of Technology.

The afternoon session will provide you hand-on workshop of LCS modeling and the results of national and sub-national LCS scenario development in India, Malaysia and Thailand, and one open discussion on bridge simulation scenarios and sustainable LCS policy implementation.

Approximately 74 scientists registered to attend the workshop, representing a broad background including governmental institutions, non-government organizations, universities, international organizations and private sectors.

I am sure that the workshop will bring us together in a better understanding of low carbon society development and modeling. It also will increase our efforts in solving the greenhouse gas emission problems that exist now, and in the future, for the benefits of our environment. Not only that for Thailand but also for the region as a whole.

These events are excellent opportunities for those participating to exchange and discuss ideas on LCS development and its implementation.

I should like to thank you all for attending and those who have been working to organize this workshop. Finally, may I wish you all a very warm welcome to what will be a very interesting hand-on LCS modeling workshop.

THANK YOU

Overview and the Purpose of this Workshop

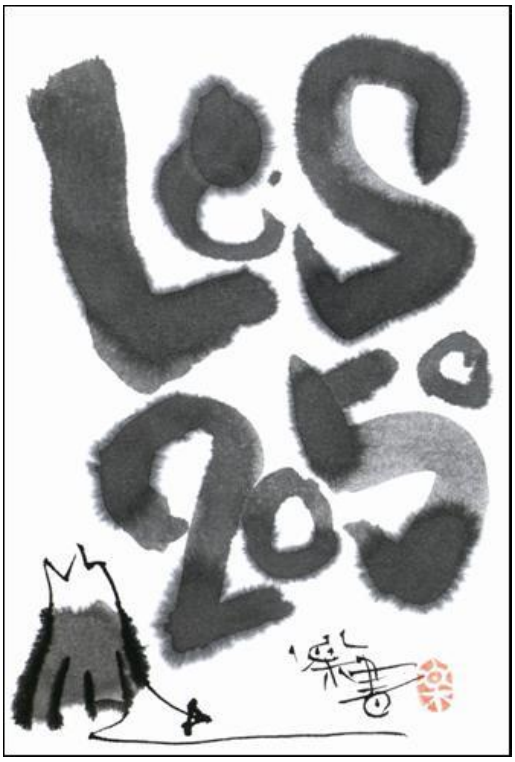
by

Dr. Junichi Fujino

National Institute for Environmental Studies, JAPAN

Japan and Asian Low-Carbon Society Scenarios and Actions

1. If we cannot go to LCS,…
2. LCS offers higher QOL with less energy demand and lower-carbon energy supply
3. LCS needs good design, early action, and innovations



Designed by Hajime Sakai

Junichi FUJINO (fuji@nies.go.jp)

NIES (National Institute for Environmental Studies), Japan

Transition towards Low Carbon Societies in Thailand and Asia

18th November 2010, Bangkok, Thailand

CTC2010 on 19th Aug 2010

JGSEE seminar on 18th Aug 2010

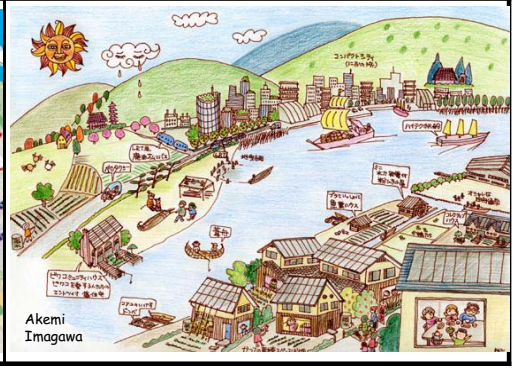
Japan LCS research project

- Japanese target: 25% cut by 2020 and 80% cut by 2050
- Local LCS roadmap development for Shiga, Kyoto and Tsukuba
- International LCS research network Japan-UK -> LCS-RNet

Japan LCS research project

Research project on Japan Low-Carbon Society (LCS) scenarios development
FY2004-2008 sponsored by Ministry of the Environment, Japan

As for LCS visions, we prepared two different but likely future societies

Vision A "Doraemon"	Vision B "Satsuki and Mei"
Vivid, Technology-driven	Slow, Natural-oriented
Urban/Personal	Decentralized/Community
Technology breakthrough Centralized production /recycle	Self-sufficient Produce locally, consume locally
Comfortable and Convenient	Social and Cultural Values
2%/yr GDP per capita growth	1%/yr GDP per capita growth
	

Doraemon is a Japanese comic series created by Fujiko F. Fujio. The series is about a robotic cat named Doraemon, who travels back in time from the 22nd century. He has a pocket, which connects to the fourth dimension and acts like a wormhole.

Satsuki and Mei's House reproduced in the 2005 World Expo. Satsuki and Mei are daughters in the film "My Neighbor Totoro". They lived an old house in rural Japan, near which many curious and magical creatures inhabited.

LCS house in 2050
Comfortable and energy-saving house

Utilizing solar power

Photovoltaic

34-69MW
(25-47% house has PV on roof (now 1%))
and develop high efficiency (<30%) PV

Eco-life education

10-20% energy demand reduction

rooftop gardening

High efficiency lighting
【eg LED lighting】

Reduce 1/2 energy demand
Share 100%

Solar heating

Diffusion rate: 20-60%
(currently 8%)

Monitoring system
equipped with appliances

High-insulation

Reduce 60% warming energy demand, share 100%

Super high efficiency air conditioner

COP (coefficients of performance=8), share 100%

Fuel cell

share 0-20%

Heat-pump heating

COP = 5
share 30-70%

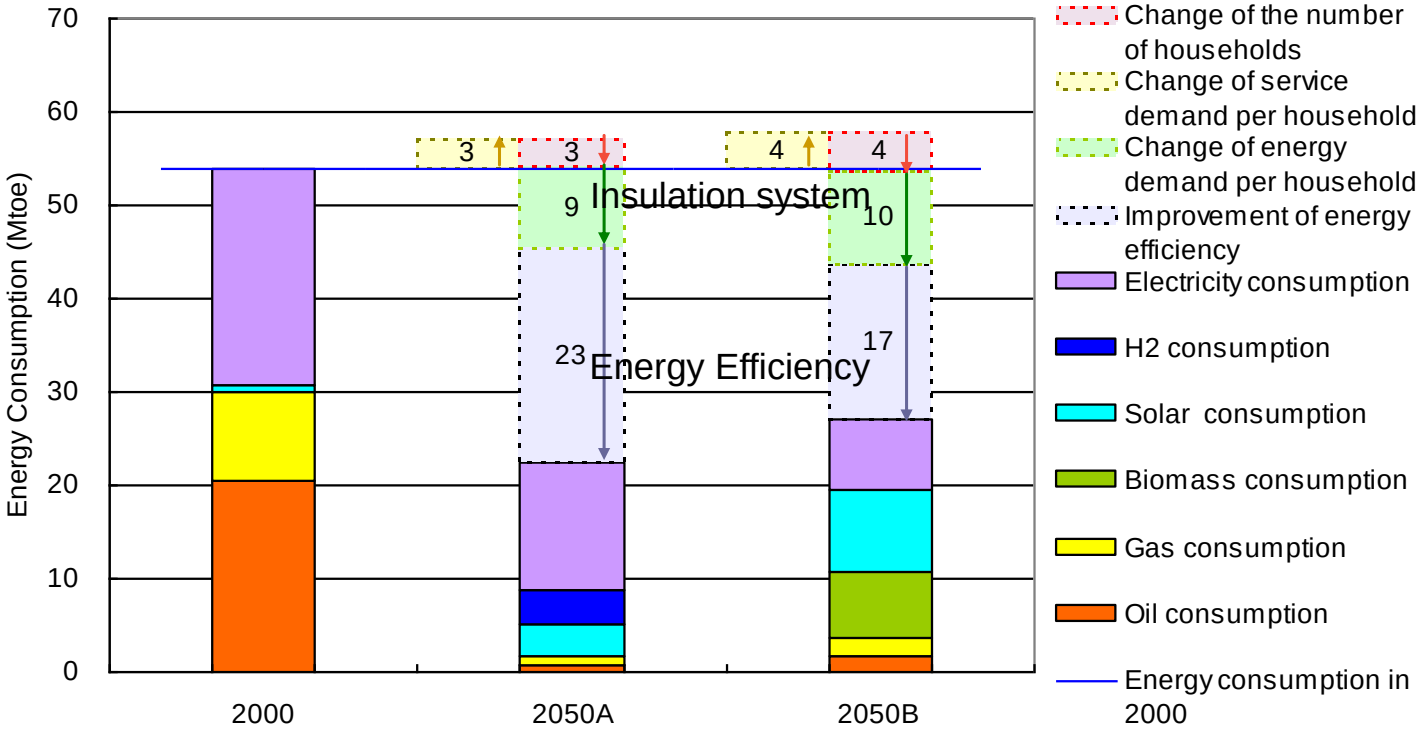
Stand-by energy reduction

Reduce 1/3 energy demand, share 100%

Good information for economy and environment makes people's behavior low-carbon

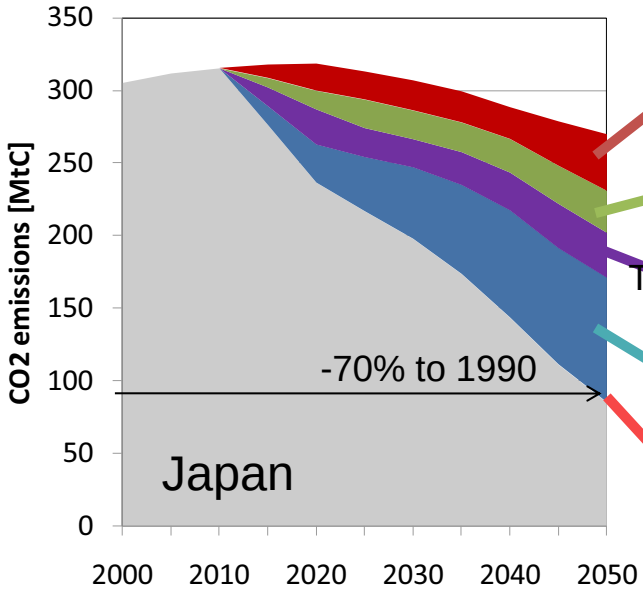
High efficiency appliances reduce energy demand and support comfortable and safe lifestyle

Residential sector
Energy demand reduction potential: 50%



Change of the number of households: the number of households decrease both in scenario A and B
Change of service demand per household: convenient lifestyle increases service demand per household
Change of energy demand per household: high insulated dwellings, Home Energy Management System (HEMS)
Improvement of energy efficiency: air conditioner, water heater, cooking stove, lighting and standby power

A dozen actions make it possible to reduce 70% CO2 emissions by 2050



Residential/ commercial

Industrial

Transportation

Energy supply

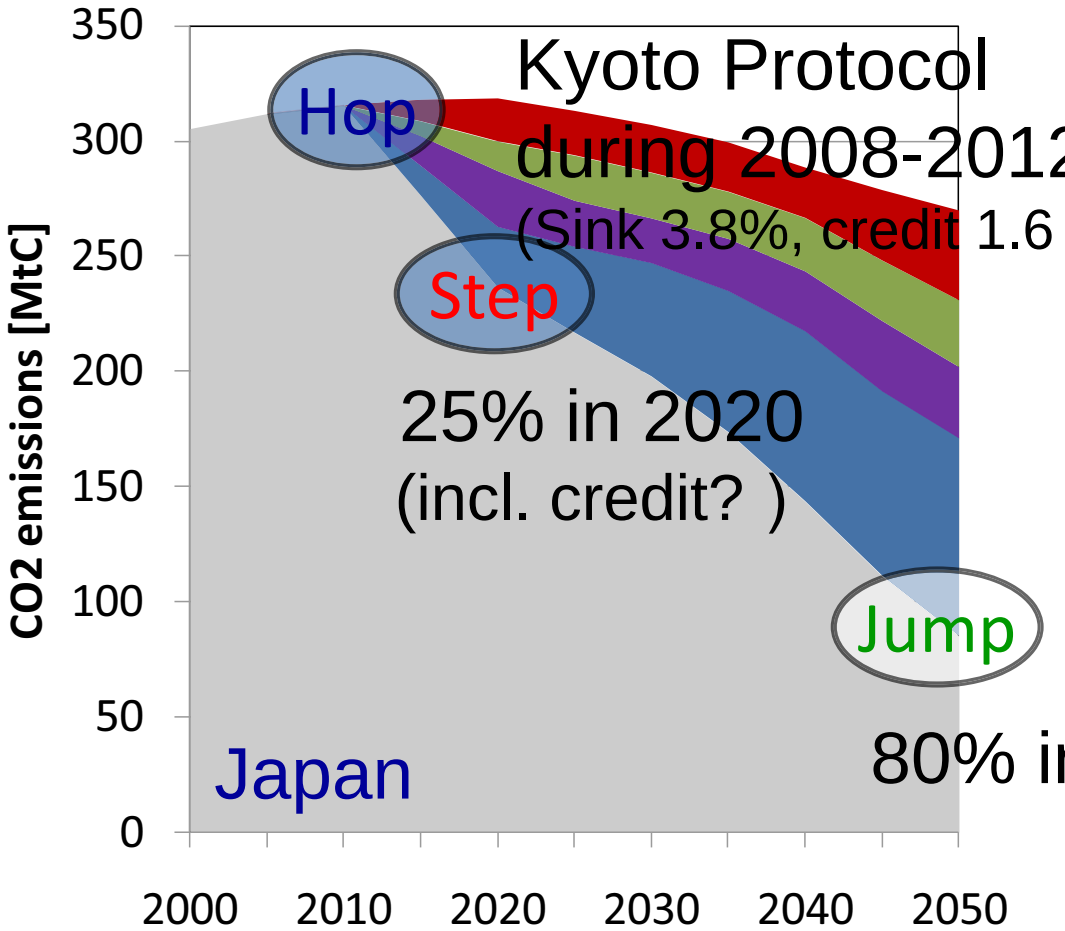
Cross-sector

Japan

A Dozen Actions

1. Comfortable and Green Built Environment
2. Anytime, Anywhere Appropriate Appliances
3. Promoting Seasonal Local Food
4. Sustainable Building Materials
5. Environmentally Enlightened Business and Industry
6. Swift and Smooth Logistics
7. Pedestrian Friendly City Design
8. Low-Carbon Electricity
9. Local Renewable Resources for Local Demand
10. Next Generation Fuels
11. Labeling to Encourage Smart and Rational Choices
12. Low-Carbon Society Leadership

Japanese Targets towards 2050



Former Prime Minister Hatoyama 鳩山由紀夫

Japan

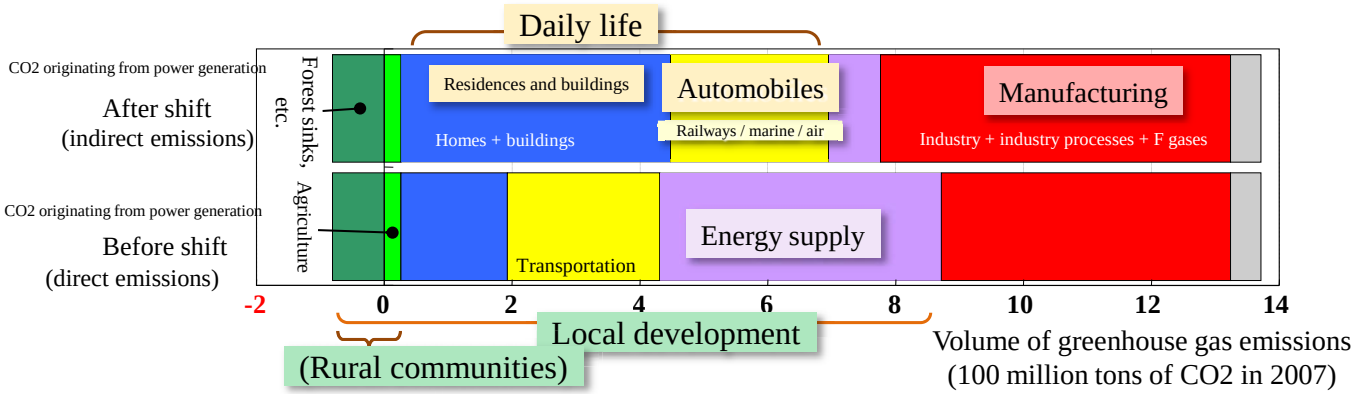
Structure of Mid- and Long-Term Roadmap Review Panel since Dec 2009

- The review panel is implemented as an operation commissioned by the Ministry of the Environment. A total of 29 review panel meetings have been held bringing together 52 experts from various fields.

< Working groups >	< Assigned area >	< Chairman >
Residences and Buildings WG	Daily life – field of residences and buildings	Building Research Institute　Shuzo Murakami
Automobiles WG	Daily life – field of automobiles	Waseda University　Yasuhiro Daisho
Local Development WG	Local development	Tokyo Institute of Technology　Tetsuo Yai
Rural Communities Sub-WG	Local development (rural communities)	Forestry and Forest Products Research Institute　Mitsuo Matsumoto
Energy Supply WG	Energy supply	Waseda University　Tadashi Otsuka
Overall Review Panel	Overall and manufacturing	National Institute for Environmental Studies　Shuzo Nishioka

(Honorary titles omitted)

◆ Relationship between assigned areas of working groups and emission sectors



KEY CONCEPT FOR RESIDENTIAL AND COMMERCIAL SECTOR

- Diffusion of ZEB and ZEH
- Collaboration among central and local governments
- Labeling to encourage smart and rational choice

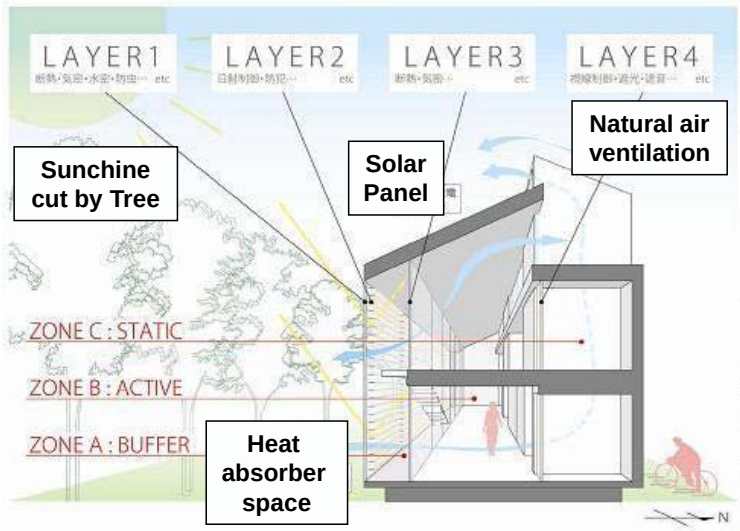
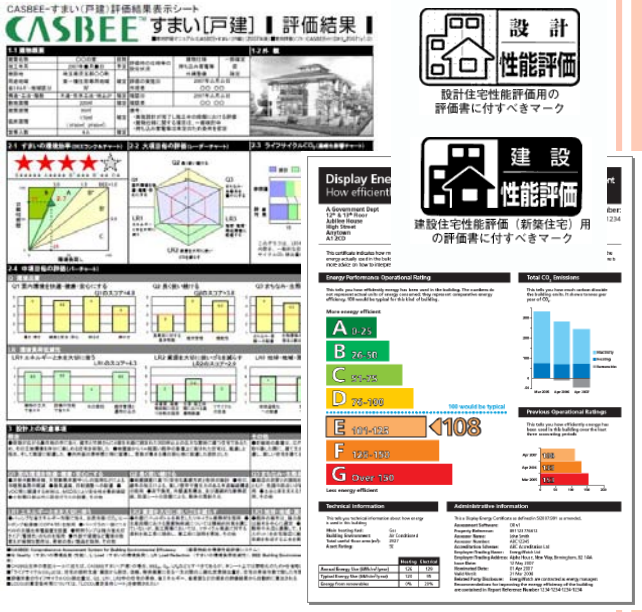


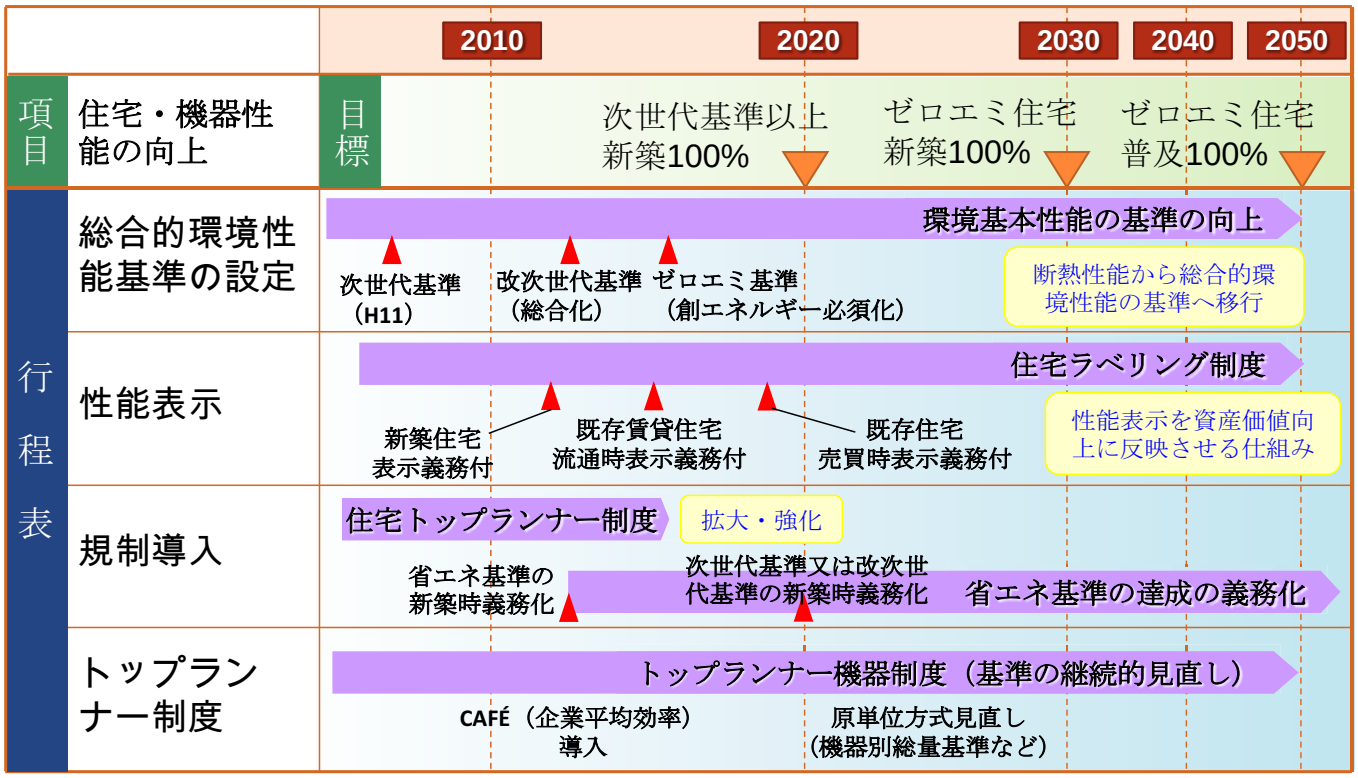
Image of Zero Emission House
（「ＬＣＣＯ２配慮建築物小委員会」資料、国交省）



"CASBEE"
building labeling system in Japan

Roadmap for residential and commercial sector

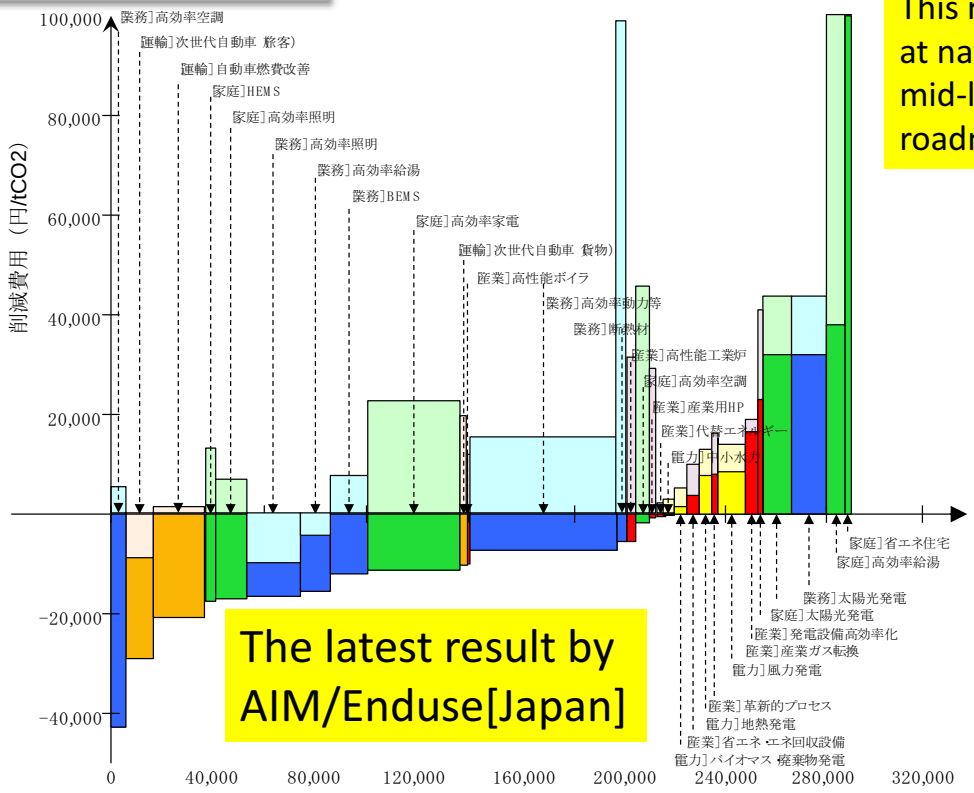
- 性能基準⇒性能表示⇒規制導入の流れで、住宅の環境基本性能の向上を図る仕組みを構築。



Mitigation cost curve in Japan to achieve 25% GHG emissions reductions by 2020 compared with 1990 level

各主体に任 や社会費用 も加味して

削減費用と削減量の関係



The latest result by AIM/Enduse[Japan]

This result was reported at national committee on mid-long term GHG mitigation roadmap on 15th Oct, 2010

家庭部門・投資回収年数 3年
業務部門・投資回収年数 3年
運輸部門・投資回収年数 5年
再エネ発電・投資回収年数 9年

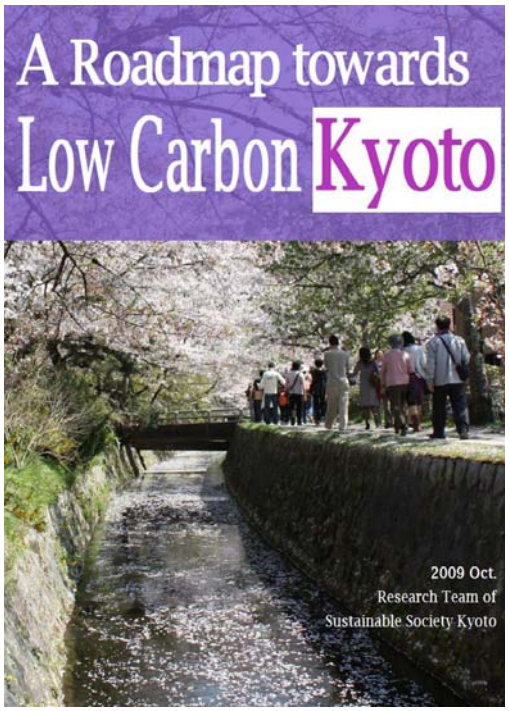
社会的観点

産業部門・投資回収年数 12～15年
家庭部門・投資回収年数 8年 (*1)
業務部門・投資回収年数 8年 (*2)
運輸部門・投資回収年数 8年
再エネ発電・投資回収年数 12年

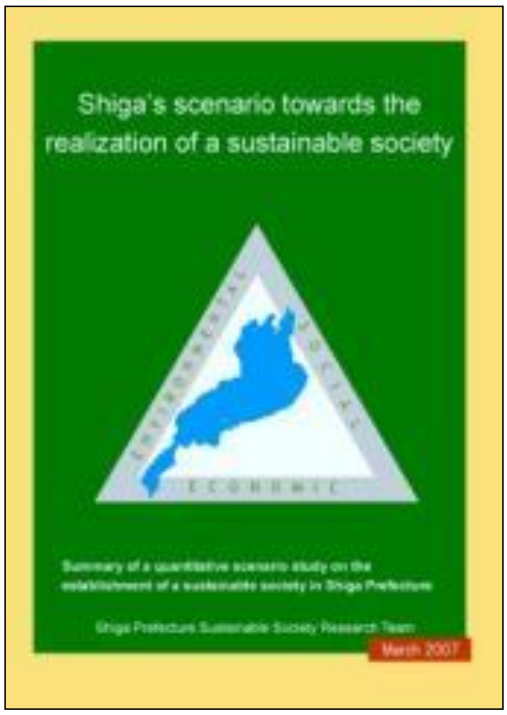
*1 住宅は17年, *2 建築物は15年

参考
- 事務所用建物 22～50年
- 鉄鋼業用設備 5～14年
- 家庭用冷暖房機器 6年
- 建物附属 冷房・暖房設備 13～15年
- 自動車 3～5年
- 汽力発電設備 15年
- その他発電設備17年

Local initiatives in Japan



GHG reduction ordinance (25% cut by 2020 and 40% by 2030) is proposed on 7th July 2010 and adopted on 30th Sep 2010

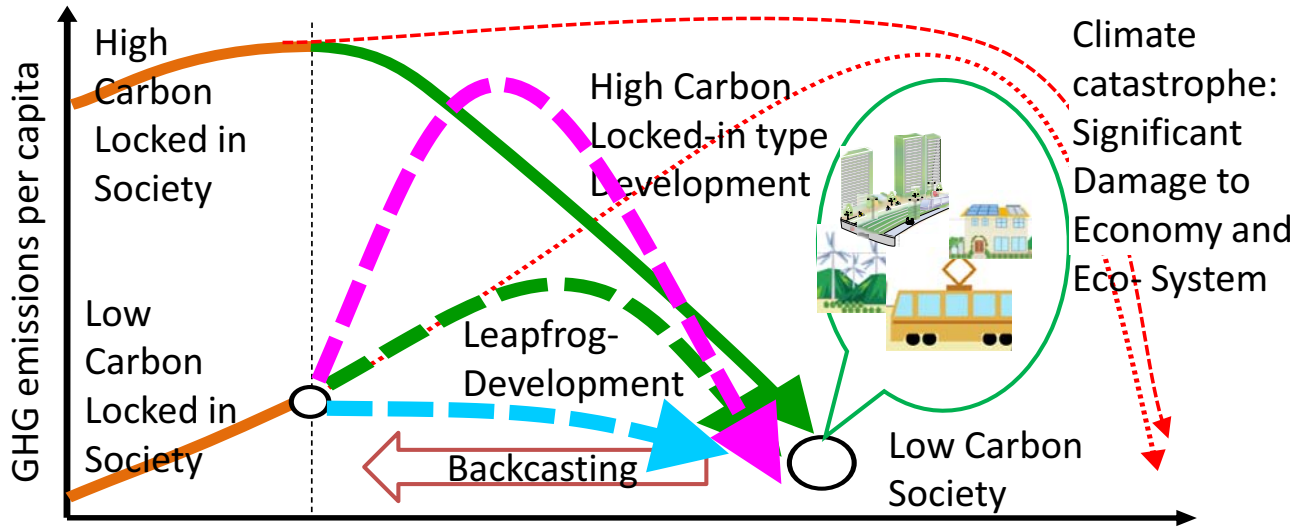


Mitigation roadmap is discussed at local congress and stakeholders dialogue

Japan LCS

Low-Carbon Asia

How to reach to Low Carbon Society in Asia ?



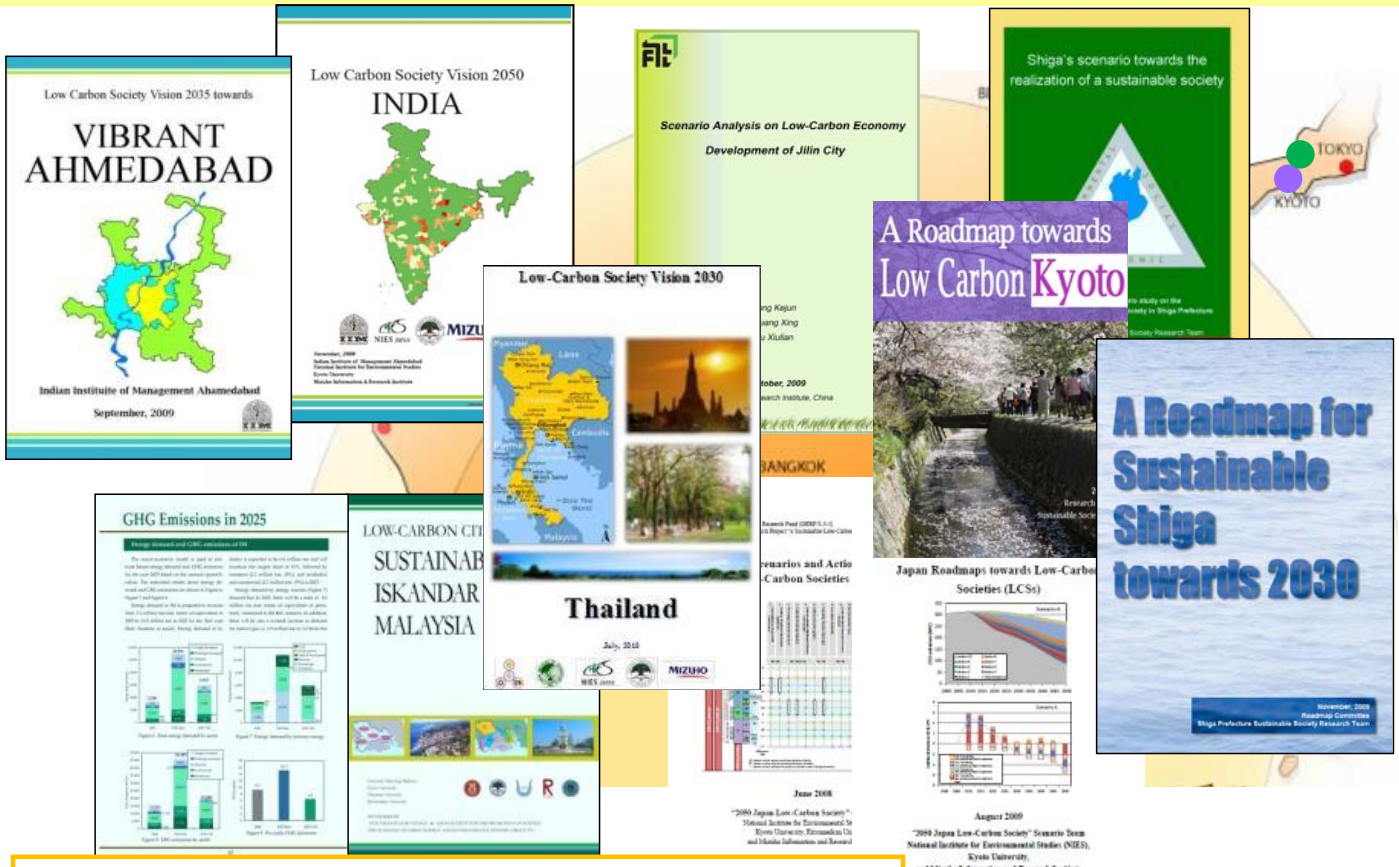
Development of Asia LCS Scenarios

(1) Depicting narrative scenarios for LCS
(2) Quantifying future LCS visions
(3) Developing robust roadmaps by backcasting

Policy Packages for Asia LCS

Funded by Ministry of Environment, Japan (GERF, S-6) and NIES

Low-Carbon Scenarios for countries and sub-countries in Asian

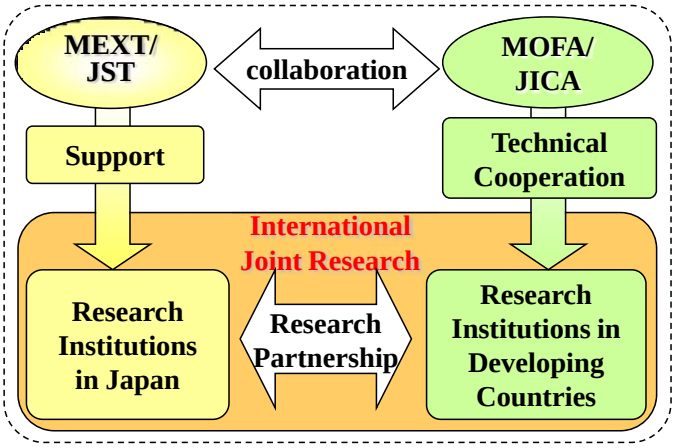


We will hold COP16 side-event with IGES and ADB

http://2050.nies.go.jp/LCS

Science and Technology Research Partnership for Sustainable Development (SATREPS)

- JST supports international joint research cooperation between Japan and developing countries for resolving global issues such as: environment/energy, natural disaster prevention and infectious diseases control.
- Such research cooperation is conducted in collaboration with JICA, an organization that implements ODA technical cooperation.
- Objectives of the program are
 to strengthen the international science and technology (S&T) cooperation between Japan and developing countries
 to advance scientific knowledge and technology for resolving the global issues we face, and
 to build capacities of counterpart researchers and research institutes.



MEXT: Ministry of Education, Culture, Sports, Science and Technology
MOFA: Ministry of Foreign Affairs
JST: Japan Science and Technology Agency JICA: Japan International Cooperation Agency

<No. of projects adopted in FY2008 ~ FY2010>

Research Areas	Region			FY		
	Asia	Africa	Others	2008	2009	2010
Research contributing to adaptation to or mitigation of climate change	25	13	11	4	4	0
Research contributing to energy systems for low carbon society				—	—	4
Research contributing to the resolution of global-scale environmental issues				3	2	4
Research contributing to sustainable utilization of bio-resources				—	6	5
Research on natural disaster prevention measures attuned to the needs of developing countries				3	4	2
Research on measures to address infectious diseases control attuned to the needs of developing countries				2	4	2
Total				12	20	17
				49		

SATREPS

Outline of the proposal

Title: Development of Low Carbon Society Scenarios for Asian Regions

Target country: Malaysia

Institutes expected to be involved:

- Universiti Teknologi Malaysia (UTM)
- Federal Department of Town and Country Planning Malaysia (JPBD)
- Iskandar Regional Development Authority (IRDA)
- Pusat Tenaga Malaysia (PTM)
- Kyoto University (KU)
- National Institute for Environment Studies (NIES)
- Okayama University (OU)

Project period: 2010-2014

Expected Total budget: 190 Million JPY to Japan's group and less than 300 Million JPY as ODA "technical cooperation"

LCS study by AIM team

- 1990 start AIM (Asia-Pacific Integrated Model) project
- 2000 provide IPCC/SREN A1B maker scenario
  2003 UK released "Low-Carbon Economy" Paper
- 2004.4-2009.3 "Japan LCS research project" coordinated by AIM/NIES funded by MOEJ and provide 70% CO2 cut scenario by 2050
- 2006.2-2008.3 "Japan-UK joint LCS research project" submitted "call for action" to G8 Japan summit
- 2009.4-2014.3 "Low-Carbon Asia research project" coordinated by AIM/NIES funded by MOEJ
- 2010.4-2015.3 SATREPS "Development of Low Carbon Society Scenarios for Asian Region" especially focused on Iskandar and Malaysia funded by JST/JICA

Low-carbon society model capacity building workshop

- Bridge simulation scenarios and sustainable LCS policy implementation using AIM (Asia-Pacific Integrated Model) -

Organized by TGO, SIIT-TU, JGSEE, NIES

November 19 (Friday) 2010 at Pullman King Power Hotel, Bangkok

(Simultaneous translation is available)

Objectives:

1) Introduce LCS scenario making process to stakeholders for better understanding how to use simulation studies for policy formulation and implementation

2) Learn to operate LCS simulation model (simple version) and assess the CO_2 reduction possibilities effected by change of driving forces (population, GDP etc.) and countermeasures (energy savings in buildings and industries, modal shift in transportation etc.)

3) Communicate between policymakers, business, researchers to discuss how to develop feasible LCS scenarios and policy options

Opening session

Chair: Junichi Fujino (NIES)
9:00-9:05 Welcome Address
Mr. Sirithan Pairoj-Boriboon, Executive Director (TGO)
9:05-9:15 Research collaboration between Thailand and Japan on LCS study
Dr Supachart Chungpaibulpatana(SIIT-TU)
9:15-9:20 Photo Session

Introduction to Asian LCS Research Study

Chair: Dr Supachart Chungpaibulpatana (TGO)
9:20-9:30 Overview and the Purpose of this workshop
Dr. Junichi Fujino (NIES)
9:30-10:00 Sustainable Low-Carbon Society Modeling and Scenario Making Process
Prof. Yuzuru Matsuoka (Kyoto Univ.)
10:00-10:30 Thailand LCS scenarios development and co-benefits
Prof. Ram Shrestha (AIT) and Prof. Bundit Lim (SIIT-TU)
10:30-11:00 Break

Capacity building for LCS model simulation run

Chair: Mikiko Kainuma (NIES)
13:00-13:30 How to operate AIM/ExSS to develop national/sub-national LCS scenarios
Dr. Kei Gomi
13:30-15:00 AIM/ExSS Exercise by participants

15:00-15:20 Break

National and sub-national LCS scenario development in Asia

Chair: Prof. Bundit Lim (SIIT-TU)
15:20-15:35 Ratchaburi LCS scenarios development and its implementation
Dr. Savitri Garivait and Dr. Penwadee Cheewapongphan (JGSEE-KMUTT)
15:35-15:50 India and Bhopal LCS scenarios development
Prof. Aashish Deshpande (Maulana Azad National Institute of Technology, Bhopal)
15:50-16:00 How to link AIM LCS scenario development activities to LCS-RNet
Dr. Shuzo Nishioka (IGES)

16:00-16:25 Open discussion on modeling, scenarios, and its policy implementation
“How to bridge simulation scenarios and sustainable LCS policy implementation”
Coordinated by Prof. Bundit Lim (SIIT-TU)
16:25-16:30 Closing Remarks
Dr. Mikiko Kainuma (NIES)

Requirements:
Every participant needs to bring her/his personal computer with Microsoft Excel (ver 2003 or higher).
Please charge battery fully for two hours exercise.

Presentation materials:
The presentations can be downloaded from the following website:
http://2050.nies.go.jp/sympo/101119/

LCS research materials including Thailand LCS 2030 scenarios can be downloaded from the following website:
http://2050.nies.go.jp/LCS

Contact:
Ms. Maiko Suda (NIES)
NIES Assistant Fellow
E-mail: suda.maiko@nies.go.jp

LCS is not only to avoid dangerous climate change, but also to…

- Avoid energy resource battles by using resources in efficient ways
- Develop many innovations to support global sustainable development
- Build safe and sound society considering appropriate land-use and city planning
- And our happy life!

We need good systems to pledge people's activity for LCS

What do you want to do now for our future?

Christmas Concert of Yoko Fujino's Piano Class on Dec 23, 2005

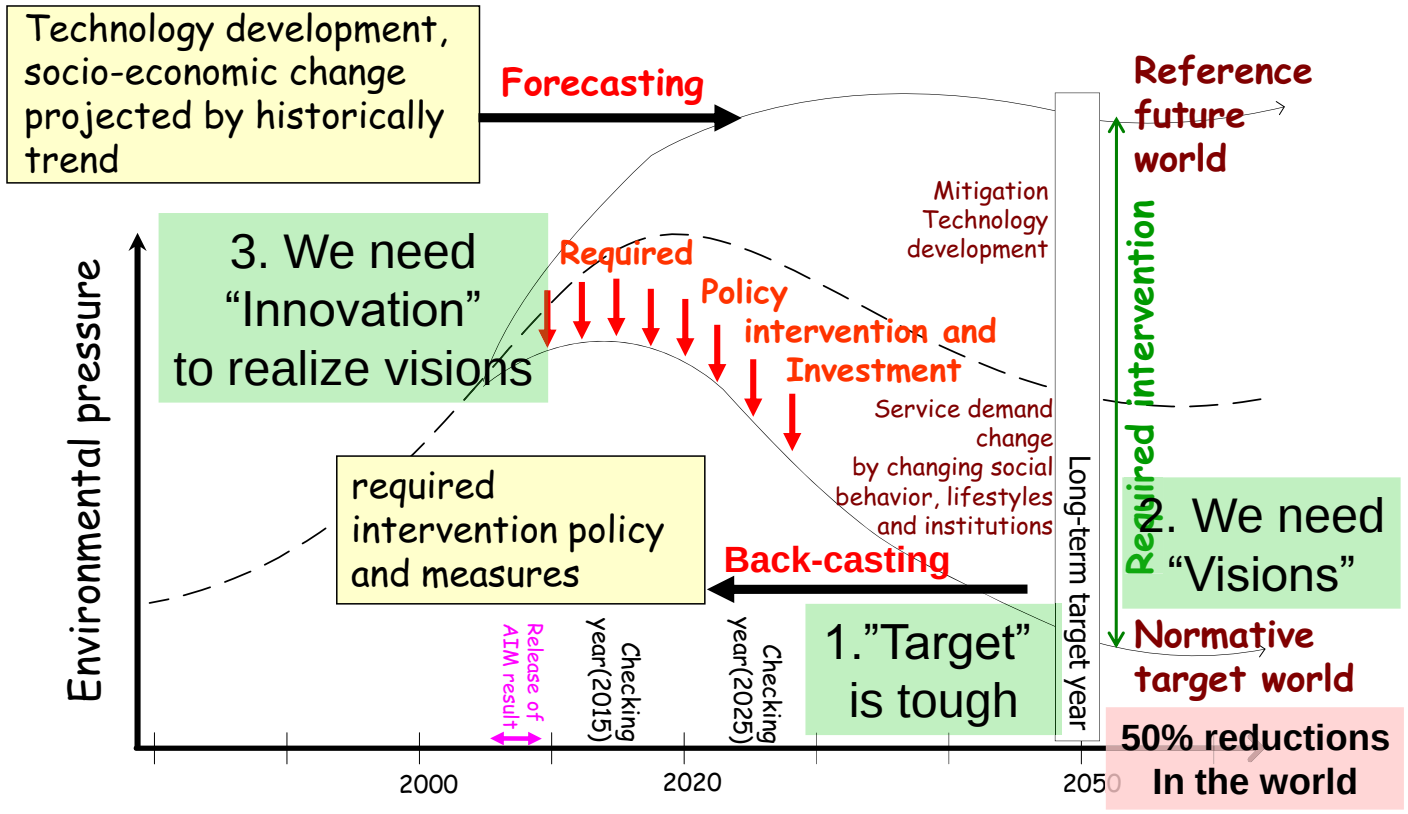
CTC2010 on 21st Aug 2010

Concept comes true by planning and actions. Let's realize happy LCS by imagination, creativity, and our actions.

Junichi Fujino

fuji@nies.go.jp

Forecasting from now and Backcasting from future prescribed/normative world



Japan Low Carbon Society Scenarios toward 2050

Japan Low Carbon Society 2050

Study environmental options toward low carbon society in Japan

Advisory board : advice to project

Techno-Socio Innovation Study

Green buildings
Self-sustained city
Decentralized services

Eco awareness
Effective communication
Dematerialization

Next generation vehicles
Efficient transportation system
Advanced logistics

Urban structure | **IT-society** | **Transportation system**

Reduction Target study

Develop socio-economic scenario, evaluate counter-measures using econ-techno models

GHG emission

Energy saving
Tech. innovation
EE improvement
Structure chang
New energy
Life-style change

BaU scenario

GHG reduction target
(eg. 60-80% reduction by 1990 level)

Intervention scenario

1990 2000 2010 2020 2050

Middle-term Target year

Loge-term Target year

Valid 5 3 1 -1
Effective
Equity
Suitable

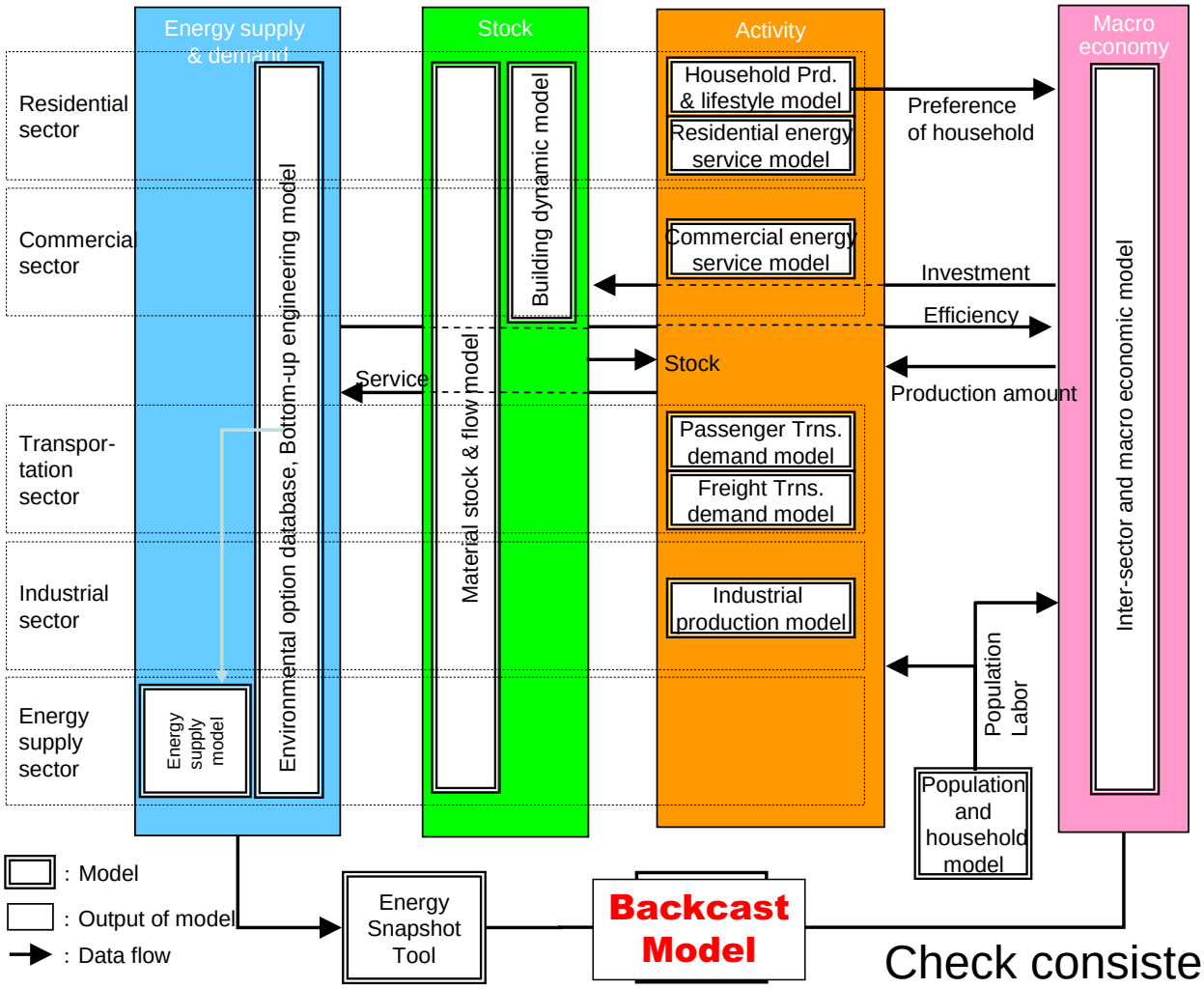
Evaluate feasibility of GHG reduction target

Long-term Scenario Development Study

60 Researchers

Propose the direction of long-term global warming policy

[FY2004-2008, Global Environmental Research Program, MOEJ] http://2050.nies.go.jp



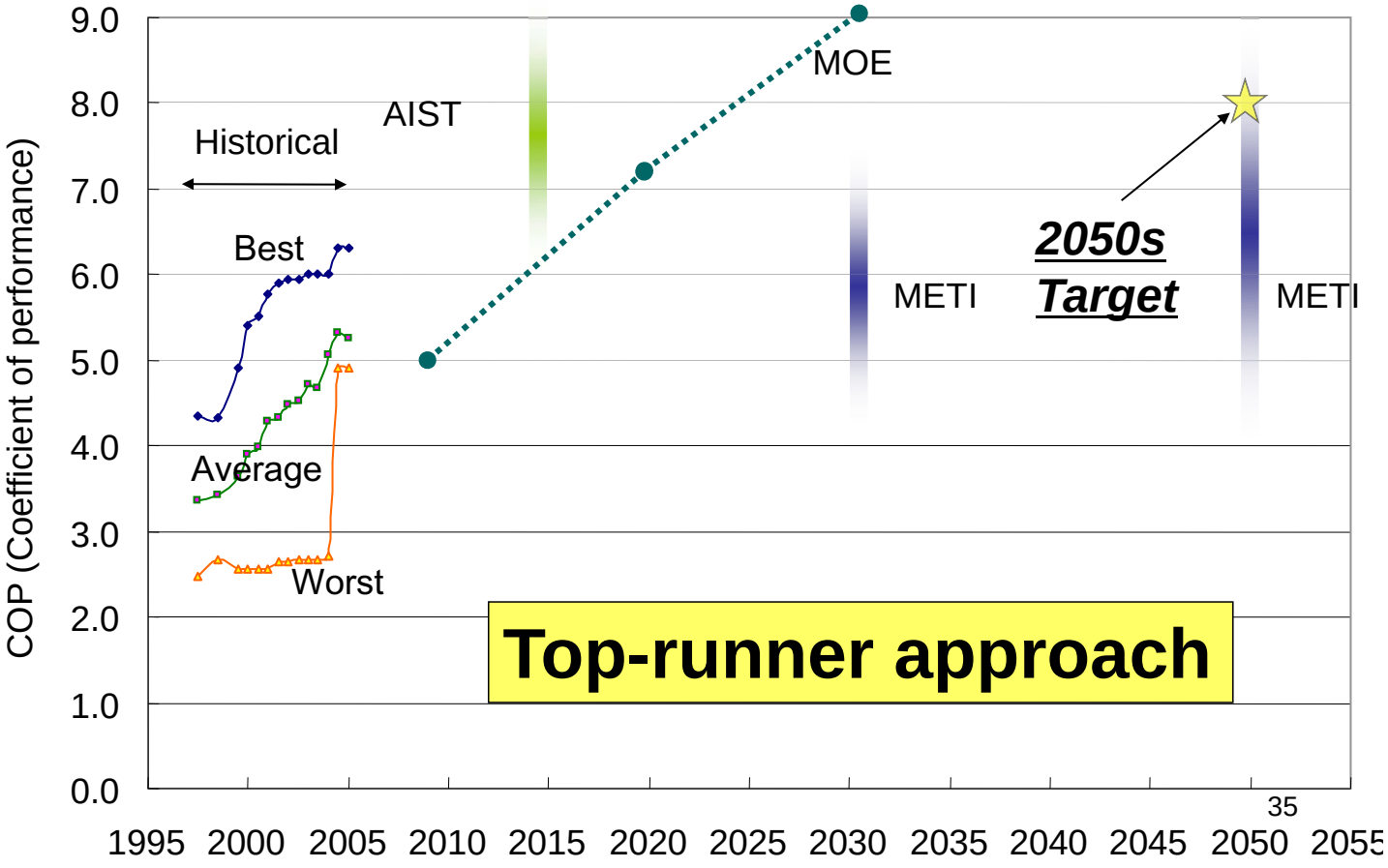
AIM (Asia-Pacific Integrated Modeling) for Japan LCS scenarios

Socio-Economic Scenarios in Japan, 2050

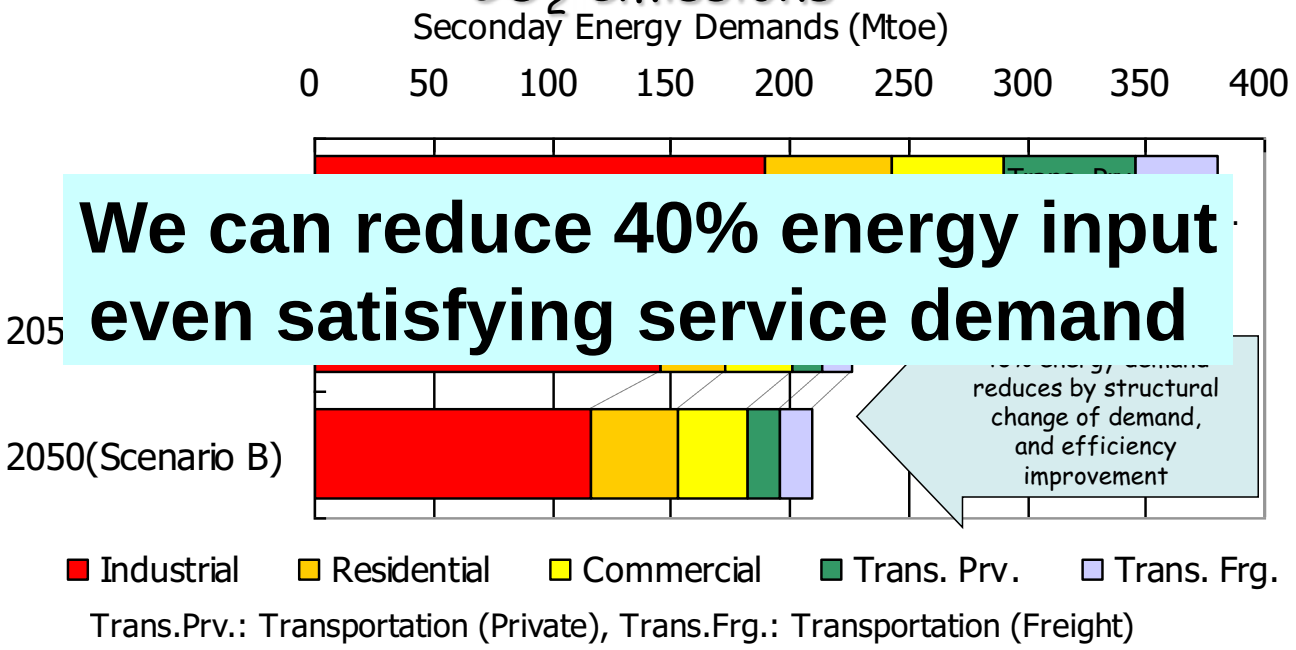
year	unit	2000	2050 A		2050 B		model
Population	Mil.	127	94	(74%)	100	(79%)	
Household	Mil.	47	43	(92%)	42	(90%)	Population and Household model
Average number of person per household		2.7	2.2		2.4		
GDP	Tril.JPY	519	1,080	(208%)	701	(135%)	
Share of production							Inter-sector and Macro Economic Model
primary	%	2%	1%		2%		
secondary	%	28%	18%		20%		
tertiary	%	71%	80%		79%		
Office floor space	Mil.m^2	1654	1,934	(117%)	1,718	(104%)	Building dynamics Model & Inter-sector and Macro Economic Model
Travel Passenger volume	bill. p·km	1,297	1045	(81%)	963	(74%)	
Private car	%	53%	32%		51%		Transportation demand model & Inter-sector and Macro Economic Model
Public transport	%	34%	52%		38%		
Walk/bycycle	%	7%	7%		8%		
Freight transport volume	bill. t·km	570	608	(107%)	490	(86%)	
Industrial production index		100	126	(126%)	90	(90%)	
Steel production	Mil.t	107	67	(63%)	58	(54%)	Inter-sector and Macro Economic Model
Etylen production	Mil.t	8	5	(60%)	3	(40%)	
Cement production	Mil.t	82	51	(62%)	47	(57%)	
Paper production	Mil.t	32	18	(57%)	26	(81%)	

(%) is a percentage compared with year 2000

Projected energy efficiency improvement: Air-conditioners for cooling and heating



Energy demands for achieving 70% reduction of CO_2 emissions

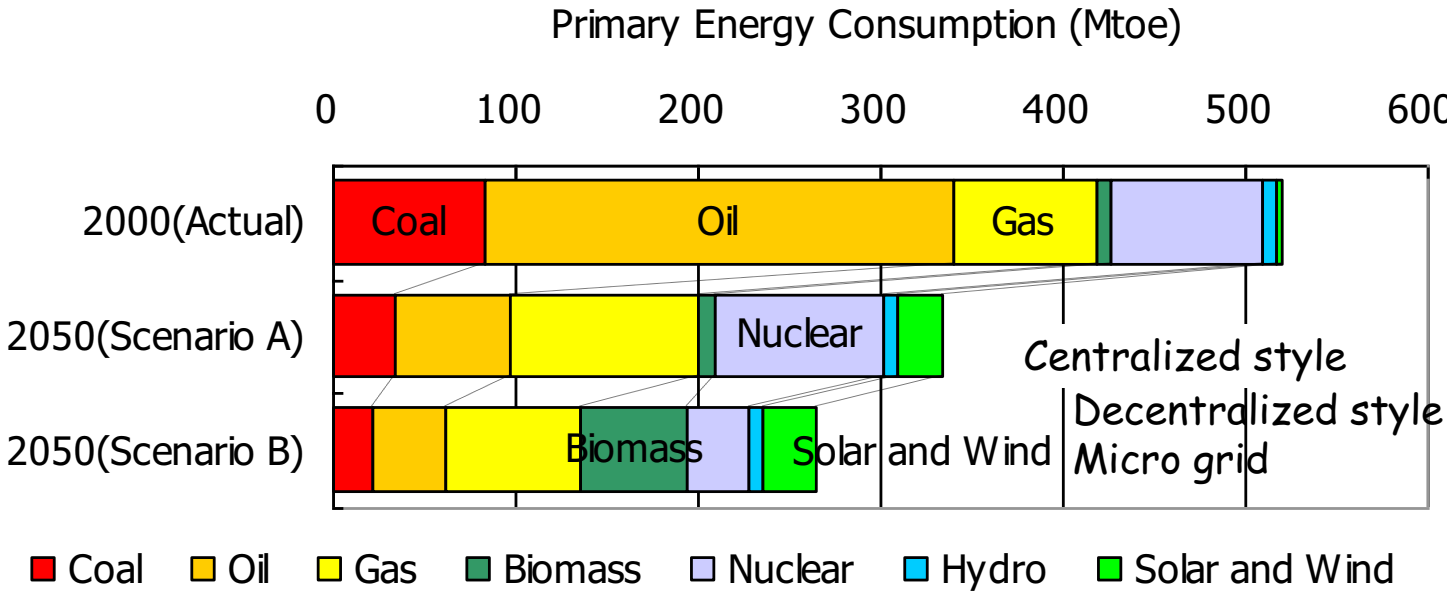


We can reduce 40% energy input even satisfying service demand

Trans.Prv.: Transportation (Private), Trans.Frg.: Transportation (Freight)

Possible energy demands reductions for each sector:
Industry : structural change and introduction of saving energy tech. 20 ~ 40%
Passenger Transport :land use, saving energy, carbon-intensity change 80%
Freight Transport :efficient transportation system, energy efficient 60 ~ 70%
Residential: high-insulated and energy-saving houses 50%
Commercial: high-insulated building and energy saving devices 40%

Energy supply for achieving 70% reduction of CO_2 emissions



1. Comfortable and Green Built Environment

Contribution of Building Owners	Selection of residential buildings with high environmental efficiency. Commission of low carbon design to architects and construction companies.
Contribution of Architects, etc.	Development of low carbon architectural design methods. Investing for technology development in insulation technologies, etc. Sustenance of regional worker skills.

Standardization Period → Environmental Efficiency Labeling Introduction Period

Barriers

Residential household energy demand : -40% (from FY2000 level)
Building floor area energy demand : -40% (from FY2000 level)

Future Objectives

Complex energy-saving performance metrics, high calculation costs, insufficient personnel

Insufficient incentives for choosing energy-saving residences and buildings

- Dissemination of diagnosis practitioners for energy-saving and CO_2 reduction efficiencies
- Establishment of simplified evaluation method for environmental efficiency of residences and buildings
- Organizing training classes and events for passing on knowledge of architectural technologies
- Introduction and expansion of residence and building labeling system for environmental efficiency (new building, renovation, mandatory indication upon leasing)
- Implementation and expansion of tax breaks and low interest loan financing based on the environmental efficiency label
- Establishment and review of long-term energy-saving standard targets for buildings.

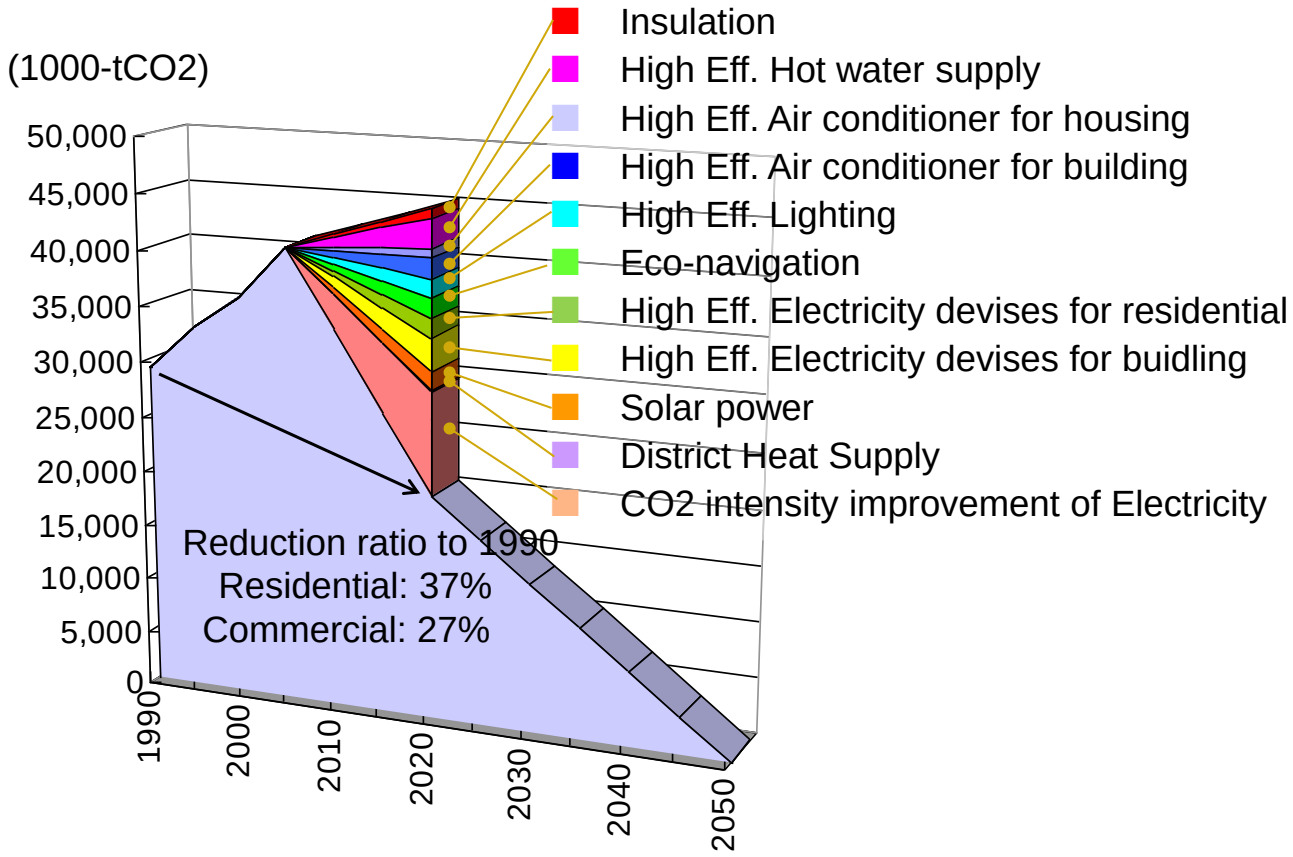
Solar and wind utilization design

Finance-friendly environmental efficiency

Nurturing of worker skills & information transmission

2000 2010 2020 2030 2040 2050

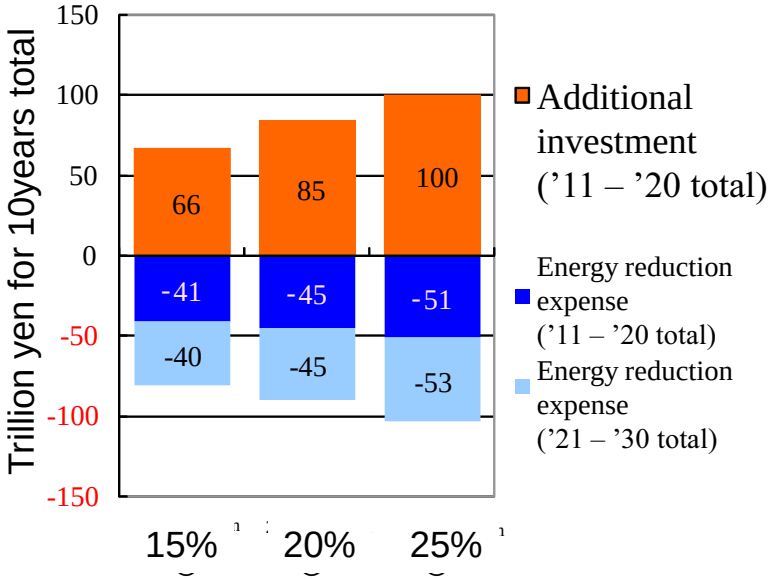
Low-Carbon Pathway and Mitigation Options for Residential and Commercial Sector

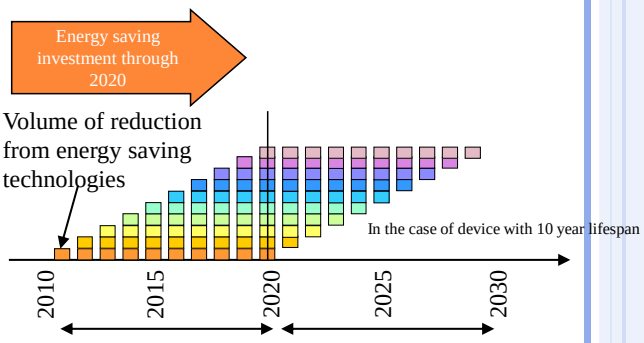


Relationship between low-carbon investment amount and energy reduction expense

- As for the investment amount for global warming, half of the overall investment amount will be collected by 2020 and an amount equal to the investment amount will be collected by 2030 based on energy expenses that can be saved through technologies introduced.

<Low-carbon investment amount and energy reduction expense>





Energy reduction expense from energy saving investment = approx. 51 trillion yen (25% reduction (3))

Energy reduction expense from energy saving investment = approx. 53 trillion yen (25% reduction (3))

Progress in *Climate change*

- "Basic Act on Global Warming Countermeasures" , approved by cabinet on March 2010
- Progress toward a Cap and Trade domestic emission trading scheme
  - ✓ Japan's Voluntary Emissions Trading Scheme (MOE) (2005 ~)
- Promotion of green taxation systems
  - ✓ Eg. Reduction of tax on low-emission-vehicles and energy efficient houses
  - ✓ Progress in the discussion towards the introduction of carbon taxes
- 3 Revisions of the "Act on Promotion of Global Warming Countermeasures"
  - ✓ Creation of the system for the calculation, reporting and publication of data on greenhouse gas emissions
  - ✓ Strengthening of regional action plans
  - ✓ Else

But basic act has been rejected on July 2010…

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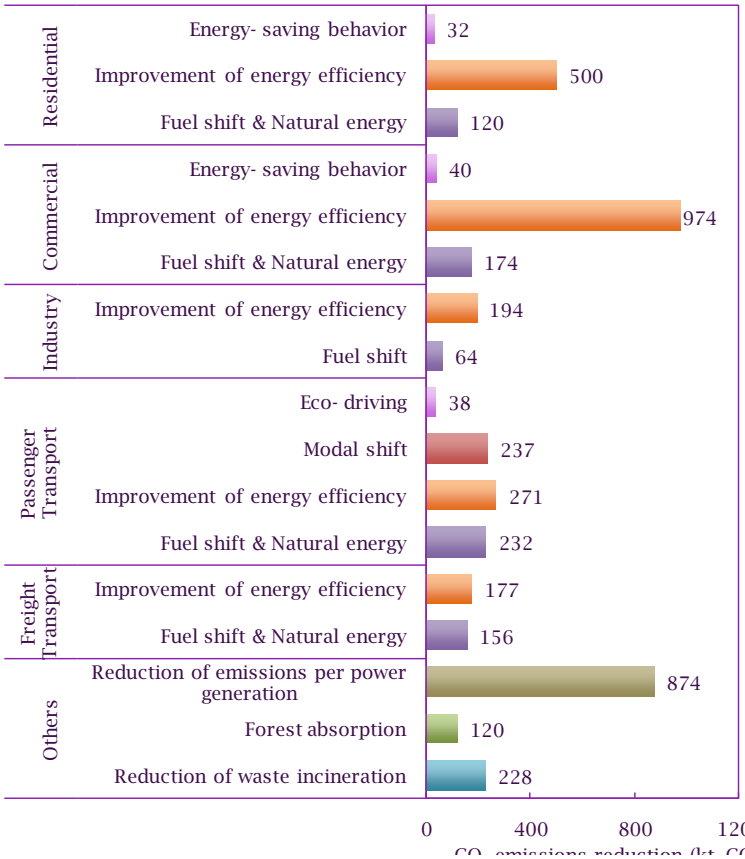
LOW-CARBON DIRECT MEASURES

Contribution to CO2 emissions reduction (compared to Frozen)

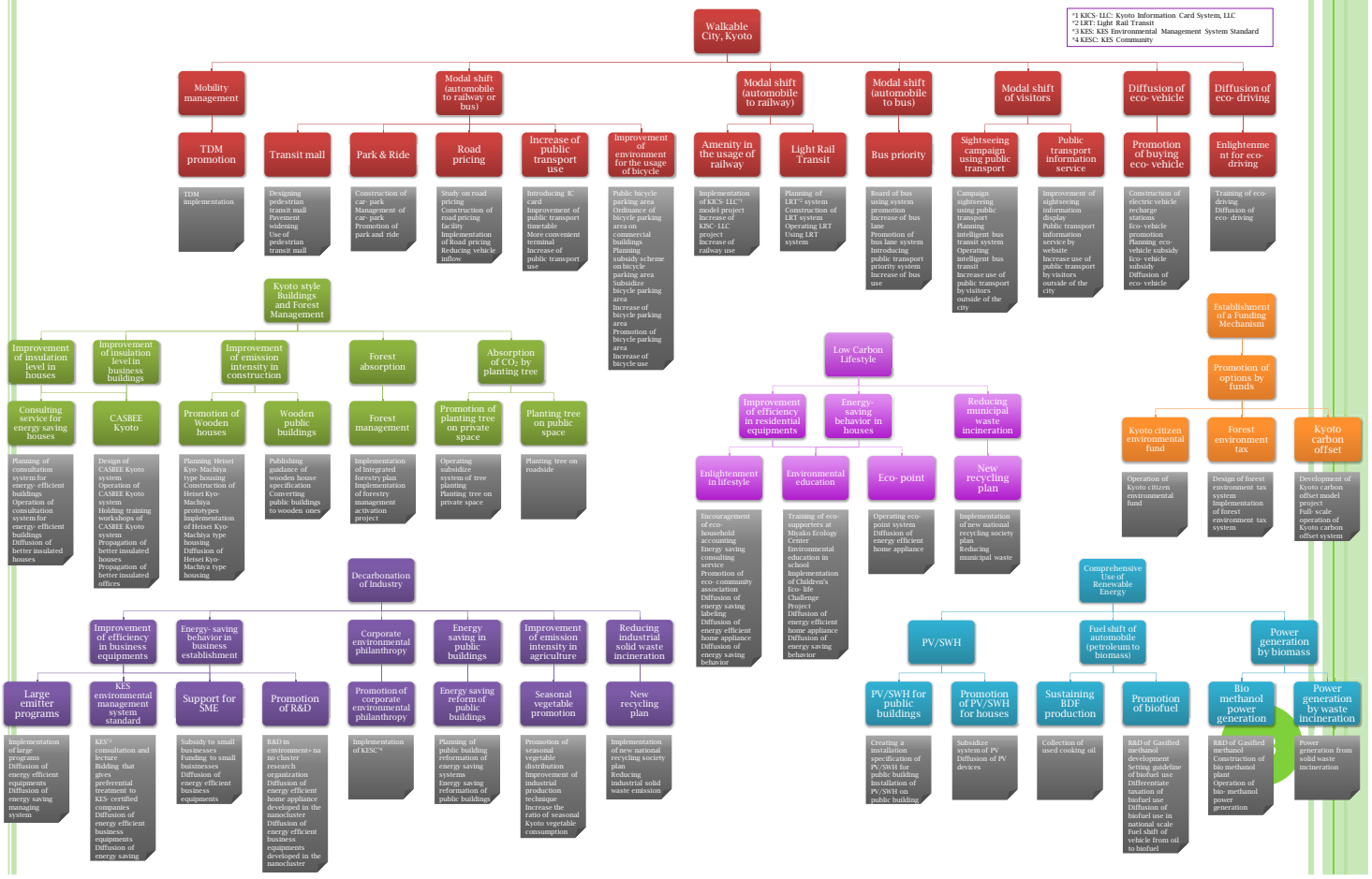


Direct measures

Sector	Low- carbon countermeasure	Data	Source	Category (*)	Identified implementation intensity		Emissions reduction (kt-CO_2)	Action (**)
Household sector	Air conditioner							54.1 3(***)
	Highest energy efficiency air conditioner	COP	6.60	2 E	Diffusion ratio (cooling and heating)	50%		
	High energy efficiency air conditioner	COP	2.54	1 E	Diffusion ratio (cooling and heating)	50%		
	High energy efficiency kerosene heating	COP	0.88	1 E	Diffusion ratio (heating kerosene)	80%	12.9	3
	High energy efficiency gas heating	COP	0.88	1 E	Diffusion ratio (heating gas)	80%	25.8	3
	High energy efficiency oil water heater	COP	0.83	1 E	Diffusion ratio (hot water: oil)	70%	6.1	3
	Gas water heater						55.0	3
	Latent heat recovery- type water heater	COP	0.83	1 E	Diffusion ratio (hot water: gas)	50%		
	High energy efficiency gas water heater	COP	0.83	1 E	Diffusion ratio (hot water: gas)	50%		
	Heat pump water heater	COP	4.50	3 E	Diffusion ratio (hot water: electricity)	70%	48.9	3
	High energy efficiency gas cooker	Thermal efficiency (base year- 1)	0.55	1 E	Diffusion ratio (cooking: gas)	70%	12.3	3
	High energy efficiency IH cooker	Thermal efficiency (base year- 1)	0.86	1 E	Diffusion ratio (cooking: electricity)	70%	8.0	3
	Fluorescent light							
	LED (substitute fluorescent light)	Electricity consumption (conventional type- 1)	2.67	1 E	Diffusion ratio	50%	24.1	3
	IH inverter fluorescent light	Electricity consumption (conventional type- 1)	1.33	1 E	Diffusion ratio	50%		
	Incandescent light						51.5	3
	LED (substitute incandescent light)	Electricity consumption (conventional type- 1)	8.70	1 E	Diffusion ratio	50%		
	Balls- type fluorescent light	Electricity consumption (conventional type- 1)	4.35	1 E	Diffusion ratio	50%		
	Refrigerator						72.1	3
	Super high energy efficiency refrigerator	Electricity consumption (conventional type- 1)	2.92	1 E	Diffusion ratio	50%		
	Highest energy efficiency refrigerator	Electricity consumption (conventional type- 1)	2.33	1 E	Diffusion ratio	50%		
	TV						31.9	3
	LCD TV	Electricity consumption (conventional type- 1)	2.27	1 E	Diffusion ratio	50%		
	Highest energy efficiency TV	Electricity consumption (conventional type- 1)	1.54	1 E	Diffusion ratio	50%		
	House insulation						100.7	2
	Next generation level	Thermal loss (base year- 1)	0.36	4 E	Diffusion ratio	40%		
	New standard	Thermal loss (base year- 1)	0.43	4 E	Diffusion ratio	40%		
	Energy- saving behavior	Energy service demand reduction ratio	10%	5 B	Diffusion ratio	25%	32.4	3
	Photovoltaic power generation	Potential(ktoe)	295	6 S	Diffusion ratio	10%	26.9	5
	Solar water heating	Potential(ktoe)	1037	6 S	Diffusion ratio (hot water: all)	10%	38.8	5
	Other energy efficiency improvement			E			6.2	3
	Other fuel shifting			S			27.3	3
	Total						625.1	
Commercial sector	Air conditioner (cooling only)						41.3	4
	Super high energy efficiency air conditioner (cooling only)	COP	5.00	2 E	Diffusion ratio (cooling: electricity)	50%		
	Highest energy efficiency air conditioner (cooling only)	COP	4.07	1 E	Diffusion ratio (cooling: electricity)	50%		
	Cooling (gas)						19.1	4
	High energy efficiency gas heat pump	COP	1.60	8 E	Diffusion ratio (cooling: gas)	40%		
	High energy efficiency absorption chiller (gas)	COP	1.35	7 E	Diffusion ratio (cooling: gas)	40%		
	High energy efficiency absorption chiller(oil)	COP	1.35	9 E	Diffusion ratio (cooling: oil)	70%	3.2	4
	High energy efficiency boiler (oil)	COP	0.88	1 E	Diffusion ratio (heating: oil)	70%	25.1	4
	High energy efficiency boiler (gas)	COP	0.88	1 E	Diffusion ratio (heating: gas)	70%	75.4	4
	Air conditioner (heating only)						67.0	4
	Super high energy efficiency air conditioner (heating only)	COP	7.40	2 E	Diffusion ratio (heating: electricity)	90%		
	Highest energy efficiency air conditioner (heating only)	COP	6.44	1 E	Diffusion ratio (heating: electricity)	10%		
	High energy efficiency oil water heater	COP	0.87	1 E	Diffusion ratio (hot water: oil)	70%	16.0	4
	Gas water heater						64.2	4
	High energy efficiency gas waterheater	COP	0.87	1 E	Diffusion ratio (hot water: gas)	50%		
	Latent heat recovery- type water heater	COP	0.85	1 E	Diffusion ratio (hot water: gas)	50%		
	CO_2 cooling medium water heater	COP	3.00	1 E	Diffusion ratio (hot water: electricity)	100%	64.2	4
	High energy efficiency gas cooker	Thermal efficiency (base year- 1)	0.55	1 E	Diffusion ratio (cooking: gas)	70%	27.0	4
	IH cooking heater	Thermal efficiency (base year- 1)	0.86	1 E	Diffusion ratio (cooking: electricity)	70%	11.6	4
	Fluorescent light						113.6	4
	Timer controlled LED (substitute fluorescent light)	Electricity consumption (conventional type- 1)	3.95	1 E	Diffusion ratio	50%		
	Illumination controlled LED (substitute fluorescent light)	Electricity consumption (conventional type- 1)	3.36	1 E	Diffusion ratio	50%		
	Incandescent light						20.6	4
	LED (substitute incandescent light)	Electricity consumption (conventional type- 1)	4.55	1 E	Diffusion ratio	50%		
	Balls- type fluorescent light	Electricity consumption (conventional type- 1)	4.55	1 E	Diffusion ratio	50%		
	High- intensity evacuation light	Electricity consumption (conventional type- 1)	4.18	1 E	Diffusion ratio	70%	0.5	4
	Large scale computer (energy- saving type)	Electricity consumption (conventional type- 1)	1.18	1 E	Diffusion ratio	70%	3.1	4
	Personal computer (energy- saving type)	Electricity consumption (conventional type- 1)	2.47	1 E	Diffusion ratio	70%	3.3	4
	Copier (energy- saving type)	Electricity consumption (conventional type- 1)	1.45	1 E	Diffusion ratio	70%	0.0	4
	Fax machine (energy- saving type)	Electricity consumption (conventional type- 1)	1.45	1 E	Diffusion ratio	70%	0.6	4
	Printer (energy- saving type)	Electricity consumption (conventional type- 1)	1.45	1 E	Diffusion ratio	70%	1.2	4
	Elevator (energy- saving type)	Electricity consumption (conventional type- 1)	4.01	1 E	Diffusion ratio	70%	5.4	4
	Ventilation						50.1	4
	with energy- saving fan	Electricity consumption (conventional type- 1)	2.00	1 E	Diffusion ratio	50%		
	with low- pressure duct	Electricity consumption (conventional type- 1)	1.82	1 E	Diffusion ratio	50%		
	Vending machine (energy- saving type)	Electricity consumption (conventional type- 1)	2.17	1 E	Diffusion ratio	70%	11.5	4
	Traffic light (LED type)	Electricity consumption (conventional type- 1)	5.75	1 E	Diffusion ratio	70%	1.4	4
	High-energy efficiency transformer	Electricity consumption (conventional type- 1)	2.53	1 E	Diffusion ratio	70%	13.3	4
	Other electric appliances						61.2	4
	30%-energy- saving type	Electricity consumption (conventional type- 1)	1.43	1 E	Diffusion ratio	50%		
	10%-energy- saving type	Electricity consumption (conventional type- 1)	1.11	1 E	Diffusion ratio	50%		
	Building insulation	Thermal loss (base year- 1)	0.50	1 E	Diffusion ratio	100%	231.1	2
	BEMS	Energy demand reduction ratio	10%	10 E	Diffusion ratio	25%	24.4	4
	Energy- saving behavior	Energy service demand reduction ratio	10%	5 B	Diffusion ratio	25%	40.3	4
	Photovoltaic power generation	Potential(ktoe)	295	6 S	Diffusion ratio	10%	26.9	5
	Solar water heating	Potential(ktoe)	1037	6 S	Diffusion ratio (hot water: all)	5%	49.6	5
	Other fuel shifting			S			70.8	4
	Total						1161.8	
Industrial sector	Energy efficient equipments			E			184.7	4
	High energy efficiency boiler	Thermal efficiency(base year- 1)	1.09	11	Diffusion ratio	80%		
	High energy efficiency furnace	Thermal efficiency(base year- 1)	1.67	12	Diffusion ratio	80%		
	High energy efficiency merter	Electricity consumption(base year- 1)	1.25	11	Diffusion ratio	80%		
	Inverter control	Electricity consumption(base year- 1)	1.05	13	Diffusion ratio	80%		
	Fuel shifting	From oil to gas		S	Shifting ratio	60%	63.9	4
	Increase in the ratio of seasonal vegetable production	Ratio of CO2 emissions against non- seasonal vegitable produc	0.7	17 E	Ratio of selling seasonal vegitables	36.2%	6.3	4
	Increase in the ratio of wooden buildings	Ratio of CO2 emissions against non- wooden buildings	0.6	17 E	Diffusion ratio	30%	9.0	4
	Total						257.9	
Passenger transport sector	Vehicle						270.7	1
	Hybrid vehicle	Fuel cost (conventional type- 1)	0.6	1 E	Diffusion ratio	50%		
	High energy efficiency vehicle	Fuel cost (conventional type- 1)	0.8	1 E	Diffusion ratio	50%		
	Modal shift	From vehicle to:		B			236.7	1
	Intra area trip	walking and bicycle			Shifting ratio	15%		
		train and bus			Shifting ratio	10%		
	Inter area trip	bicycle			Shifting ratio	10%		
		train and bus			Shifting ratio	10%		
	Trip to outside of the city	train			Shifting ratio	10%		
	Bio Fuel	From oil to bio fuel		S	Diffusion ratio	20%	231.7	5
	Eco- driving	Fuel efficiency improvement ratio	24%	13 B	Diffusion ratio	20%	37.8	1
	Total						776.9	
Freight transport sector	Vehicle						176.9	1
	Hybrid vehicle	Fuel cost (conventional type- 1)	0.6	1 E	Diffusion ratio	50%		
	High energy efficiency vehicle	Fuel cost (conventional type- 1)	0.8	1 E	Diffusion ratio	50%		
	Bio Fuel	From oil to bio fuel		S	Diffusion ratio	20%	156.2	5
	Total						333.1	
Energy conversion & supply sector	Bio- methanol power generation			17	production of electricity (ktoe)	18.8	53.8	5
	Reducing the amount of waste incineration			17	Rate of CO_2 emissions reduction	40%	228.1	1, 4
	Improvement of CO2 intensity of power generation				CO_2 emission per generation (tC/toe)	0.78	873.9	4(***)
	Fuel shifting			14				
	Generation efficiency improvement							
	Coal	Generation efficiency	48%	15				
	Gas	Generation efficiency	55%	16				
Total							4310.2	

Kyoto city

LOW-CARBON MEASURES



Thailand

Low-Carbon Society Vision 2030

- Sirindhorn International Institute of Technology, Thammasat University
- Asian Institute of Technology
- National Institute for Environmental Studies
- Kyoto University
- Mizuho Information & Research Institute
- Asia-Pacific Integrated Model

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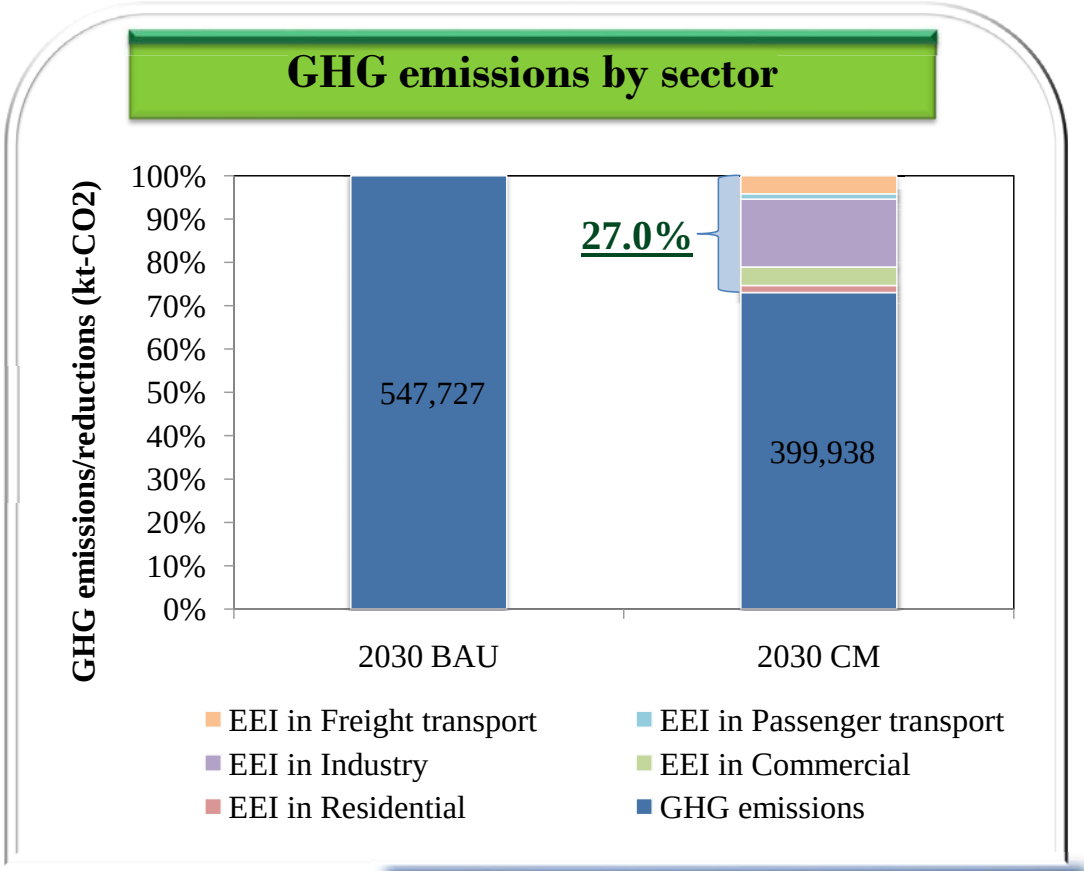


Selected Projects for FY2010

FY 2010

[Cameroon]
☆ Sustainable Livelihood and Natural Resources Management in Tropical Rain Forest and its Surrounding Areas of Cameroon: Integrating the Global Environmental Concerns with Local Livelihood Needs
☆Magmatic Fluid Supply into Lakes Nyos and Monoun, and Mitigation of National Disaster in Cameroon

[Afghanistan]
☆Project for the Development of Wheat Breeding System for Sustainable Food Production

[India]
☆UASB-DHS Integrated System-A Sustainable Sewage Treatment Technology

[Bangladesh]
☆Improved Diagnosis of Tuberculosis in Bangladesh

[Thailand]
☆New Biodiesel Production and Utilization from Vegetable Oil

[Viet Nam]
☆Establishment of Carbon-Cycle-System with Nature Rubber
☆Project for the Promotion of Improved Crop Production in the Mountainous Areas of North Vietnam

[Philippines]
☆Comprehensive Etiological and Epidemiological Study on Acute Respiratory Infections in Children

[Sri Lanka]
☆Pollution Control and Site-Specific Remediation Technique at waste Dumping Site in Sri Lanka

[Algeria]
☆Sahara Solar Energy Research Center (SSERC)

[Mozambique]
☆Sustainable Production of Biodiesel from Jatropha in Mozambique

[Malaysia]
☆Development of Low Carbon Society Scenarios for Asian Regions
☆Geo-Hazard Remote Analysis and Monitoring Stations (GRAMS)

[Indonesia]
☆Development of Internationally Standardized Microbial Resources Centers as a Core of Biological Resources Center to Promote Life Science Research and Biotechnology

[Panama]
☆Comparative Studies of the Early Life History for Purposes of Pacific Bluefin Tuna and Yellowfin Tuna Resource Management and Yellowfin Tuna Aquaculture Development

[Mexico]
☆Study of O3, VOC and PM2.5 Air Pollution between Japan and Mexico

Low-Carbon Society Modeling and Scenario Making Process

by

Prof. Yuzuru Matsuoka (Kyoto Univ.)

Low-Carbon Society Modeling and Scenario Making Process

19, November, 2010

Yuzuru Matsuoka

Table of Contents

1. A brief introduction of AIM

- AIM(Asian Pacific Integrated Model) is a group of computer models developed by a team composed of NIES(National Institute for Environmental Studies), Kyoto University, and several research institutes in the Asian-Pacific region.
- The objective of AIM is to design and assess policy options for stabilizing the global climate, particularly in the Asian-Pacific region.
- Internationally, AIM has been used as a core tool for developing IPCC, GEO and Millennium Ecosystem Assessment scenarios conducted by UN. Many members of AIM team have been deeply involved to IPCC process, as CLA or LAs.
- Also, the assessments conducted by AIM gave influential impacts on the real actual processes;

  1) to determine national GHG reduction targets and in the implementation process, in Japan,

  2) to assess national and regional feasible reduction potential of GHG emissions in China, India, and several local regions in Asian countries

Seniors and Youngs in AIM

2. What we are now doing, ...

In order to realize Asian Low Carbon Societies,

1. We are focusing on domestic and international factors which control the realization of LCS,
2. Describing the development, accumulation, and deepening of factors which control LCS with multi-layered, spatial, and integrated quantification models/tools,
3. Applying quantification models/tools to various Asian regions,
4. Taking account of regional distinctive diversified characteristics,
5. And designing positive Asian low carbon societies and roadmaps towards the LC societies, in each region with a back-casting methodology.

3. What are the Asian Low Carbon Societies, we target ?

By the middle of this century (2050), the target societies will satisfy the followings;

1. Harmonized with drastically changing future Asian society and economy,
2. Complying with each region's national reduction target that consists with the global low carbon target, under the global, national and regional constraints on fossil and renewal energy resources, and land resource,
3. Promoting LCS policies based on each region’s characteristics ,
4. Also utilizing effectively co-benefits of LCS policies and neighboring policies.

Also, in order to taking account of multilayered characteristics of Asian LCS issue and not to loose perspective and reality of LCS, we are adopting

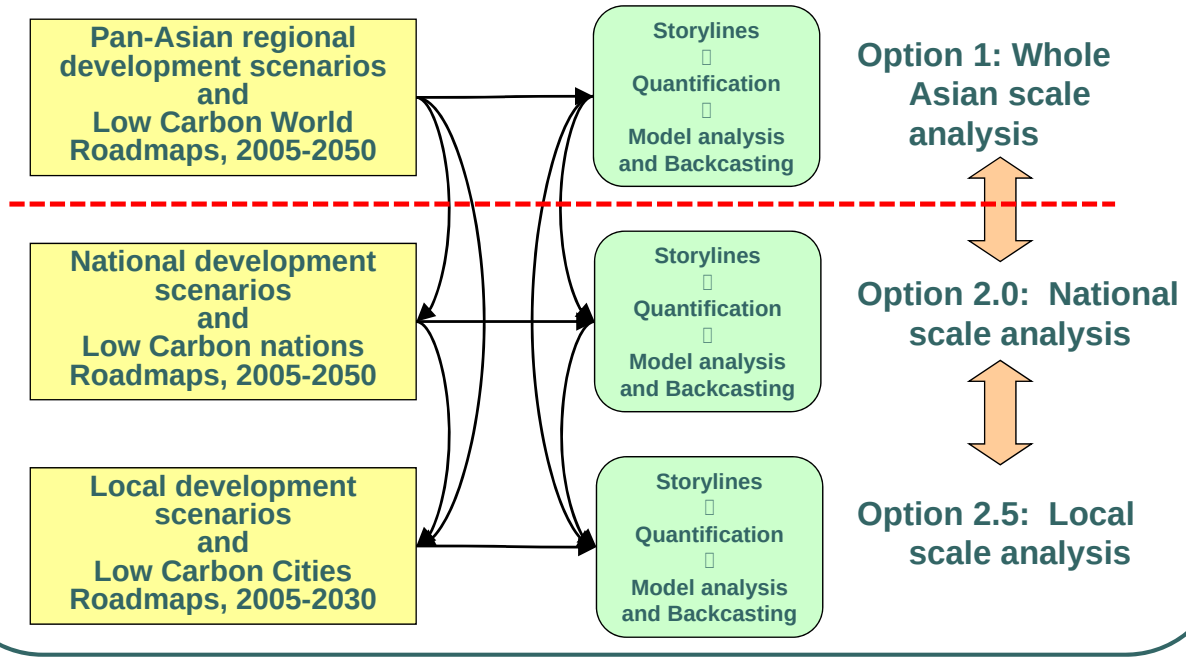
Two approaches in regional and time scales

1. Pan Asian-Pacific approach : Put more emphasis on comprehensiveness and compatibility among global and pan Asian-Pacific regions

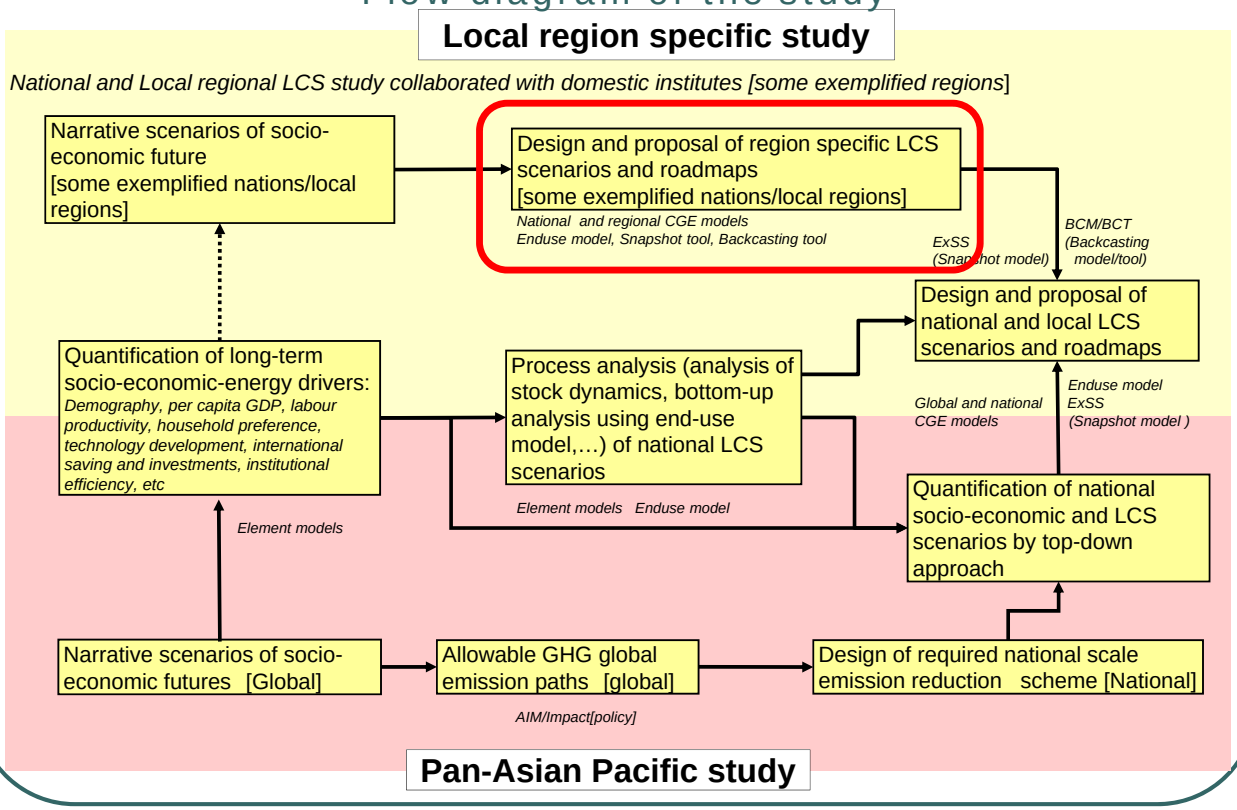
2. National or Local region specific study : Country/local region specific approach collaborating with domestic research institutions, and putting more focus on regional initiative and acceptability

Two and half regional/time scales of concern

To all scales, our methodology has been applied, and they are inter-connected each other.



How do we implement these approaches?
Flow diagram of the study



4. Modeling

Development, maintenance and application of multi-layered modeling system

Two groups of models and tools have been developed.

(1) Quantification tools encompassing various spatial scales and disciplines, operated complementary *e.g.* global, country, and regional (city) scales, economical, demographical, industrial, building, transportation systems, etc.

(2) Integration models/tools which link the above models towards low carbon society visions and roadmaps.

Manual of these models is available from http://www-cger.nies.go.jp/publication/I072/I072.html

Up to now, we developed nine national/local scale models for projecting energy services, energy consumption, their management etc. (*Element models*)

1. ***AIM/enduse:*** National and local level bottom-up engineering type model for energy supply/consumption
2. ***Macro-economy model (EME):*** Supply-side type mid-term econometric model
3. ***Population/Household dynamics model (PHM):*** to describe each country's demographic dynamics
4. ***House and building dynamics model (BDM):*** to describe transition and renovation dynamics towards modern and highly insulated buildings.
5. ***Traffic demand model (TDM):*** to describe passenger and freight transports coupled with economic activity and urban structure
6. ***Material stocks and flow model (MSFM):*** to describe material metabolism towards low material societies
7. ***Energy supply model (ESM):*** to describe scenarios of biomass production, power infrastructure development
8. ***Household production and lifestyle model (HPLM):*** to describe the transition of household consumption, lifestyle etc.
9. ***AIM/enduse[air]:*** an atmospheric environment model to estimate co-benefits caused by low carbon policies.

Three integrated models/tools for developing LCS scenarios

- ***AIM/cge:*** One/multi-regional multi-sectoral static CGE model. Integration platform with which element models are soft-linked according to analytical objects.
- ***Extended snapshot tool (ExSS):*** A tool to designing social accounting matrices, energy balance tables, GHG emission and reduction tables of the target societies. Multi-regional static model.
- ***Back-casting model /Tool (BCM/BCT):*** A model for designing roadmaps towards low carbon societies. Dynamic optimization model.

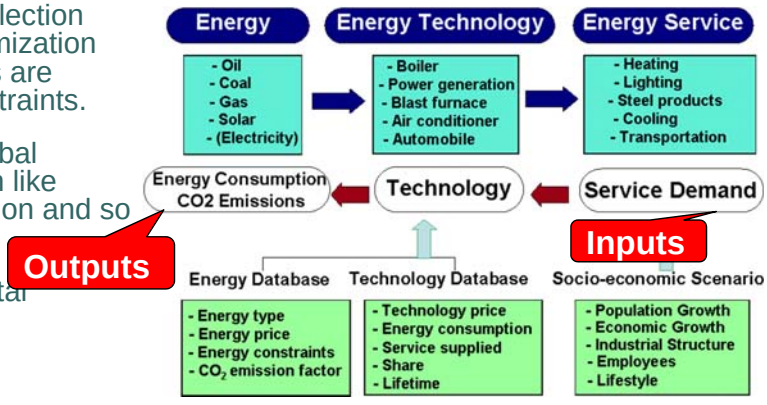
Model Implementation

- All models are on MS-Windows XP or later,
- Most models are implemented with,
  1) GAMS (Mathematical programming Language),
  2) MS Office,
  3) Gnu tools in GnuWin
- And some models use,
  4) Fortran/C
  5) ArcGIS

An example of Element models: AIM/enduse Model

A model for describing the engineering mechanism of GHG emissions and their reduction

- Bottom-up type technology selection model, based on a linear optimization framework in which total costs are minimized under several constraints.
- Analyze policies related to global warming and local air pollution like emission tax, subsidy, regulation and so on
- Considering local environmental constraints
- Simplified Structure
- Flexible model structure to cope with various practical situation in different regions



Structure of the AIM/End-Use Model

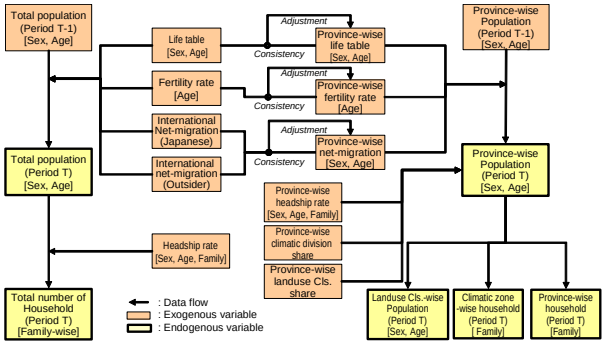
- *"Energy technology" refers to a device that provides a useful service by consuming energy*
- *"Energy service" refers to a measurable need that must be satisfied.*

An example of Element models: Population and Household Model

- A cohort component model for population, a household headship rate model for household types, with spatial resolution of provinces, land-use types and climate zones and five family types was developed, and is used to analyze effects of depopulation and changes in family composition on the realization of LCS.

- In case of Japan, drastic change is foreseen in the population structure by 2050. Downturn in birthrate, depopulation and aging will continue until 2050, and they affect greatly the future vision.

- Outputs: Future population and household structure



Flowchart of PHM

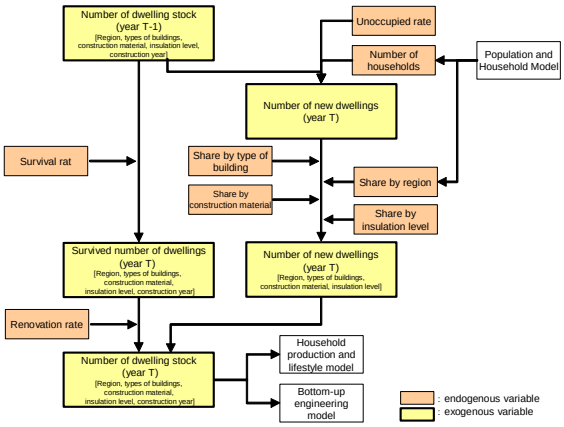
An example of Element models: House and Building Dynamics Model (BDM)

- Enhancement of building insulation is an effective countermeasures. For example, in Japan, 60% of the heating demand from the residential sector can be cut down, if appropriate insulation systems are installed. Future dynamics of building construction and rebuilding, besides configuration of buildings in urban and rural area affects total energy efficiency greatly.

- In order to take account these factors, a model of building dynamics (BDM) was developed.

- It is a cohort model with a spatial resolution of climate zones, four heat insulation levels, four residential building types, and six commercial building types.

- Outputs: Future type/age/insulation of buildings



Flowchart of BDM (residential)

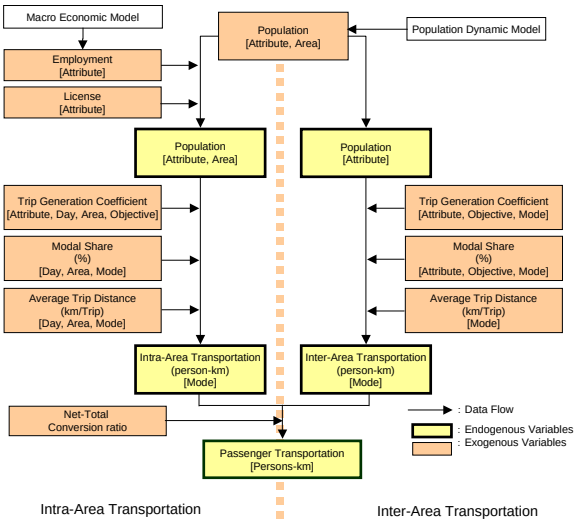
An example of Element models: Passenger Transportation Demand Model (PTDM, a part of TDM)

- Many effective countermeasures exist related with transportation. Modal shift from private motor vehicles to mass transit systems, urban planning towards compact cities, transportation substitution with diffusions of tele-working and virtual communication systems and so on.

- Passenger Transportation Demand Model (PTDM) can simulate transportation demand associated with changes in population distribution, people's activity patterns, modal shares and average trip distances.
- The trafic demands in this model are divided into two types,

  1) Intra-regional transportation within the daily living area,
  2) Inter-region transportation between the daily living areas,

  and they are calculated with keeping mutual dependency
- Outputs: Future transport volume/modal structure of passenger travel



4. Modeling

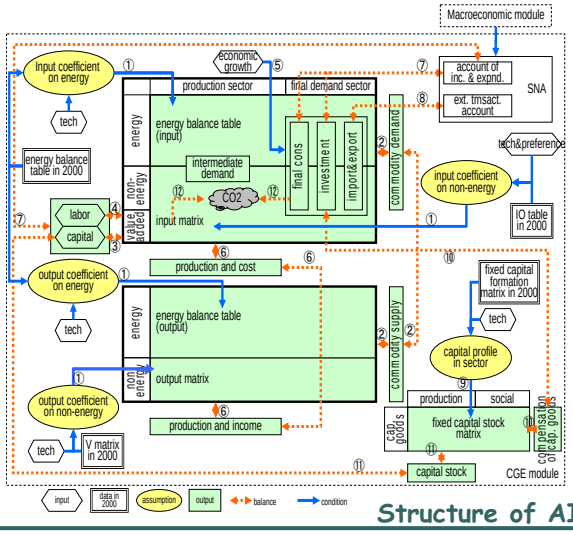
Three integrated models/tools for developing LCS scenarios

- ***AIM/cge:*** One or multi-regional multi-sectoral static CGE model. Integration platform with which element models are soft-linked according to analytical objects.
- ***Extended snapshot tool (ExSS):*** A tool to design future social accounting matrices, energy balance tables, GHG emission and reduction tables of the target societies. One or multi-regional static model.
- ***Back-casting model /Tool (BCM/BCT):*** A model for designing roadmaps towards low carbon societies. Dynamic optimization model.

An example of Integrated models: Computable General Equilibrium model (AIM/CGE)

- AIM/CGE consists of a GE (general equilibrium) module, detailed energy balancing module and several satellite modules. This model is used to project macro economic activity, sector production, based on descriptive future economic scenarios.

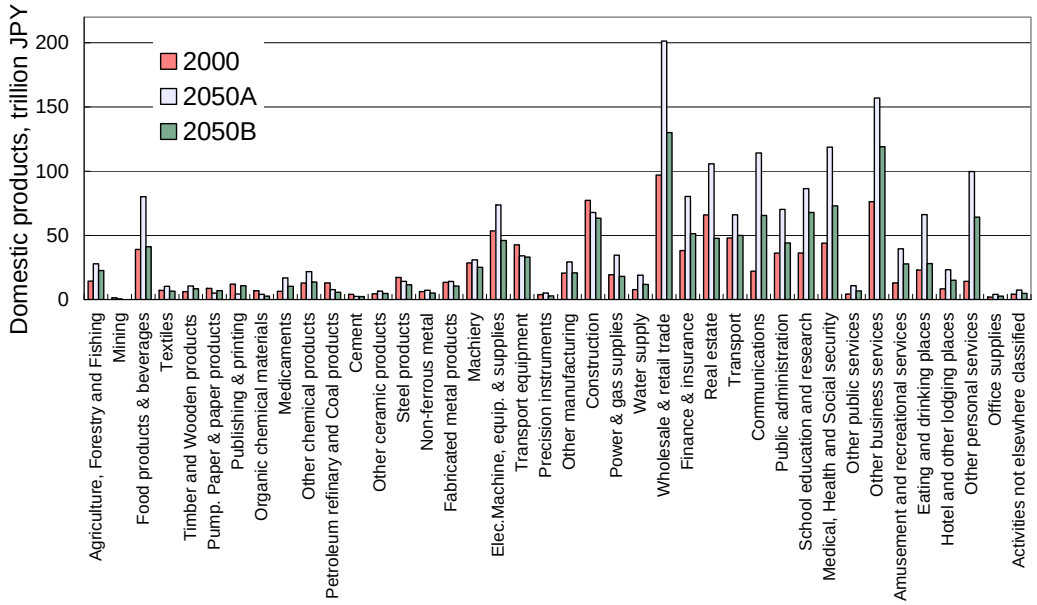
- Also the model can be used to estimate the economic effect of diffusion of energy efficient technologies and dematerialization technologies in industrial sectors, development of ICT, increase of service sectors, change of people's good's and service preference.



① production function
② commodity market
③ capital market
④ labor market
⑤ calculation of GDE
⑥ expenditure and income in production sector
⑦ expenditure and income in household and government
⑧ assumption of import and export
⑨ fixed capital stock matrix
⑩ investment goods market
⑪ capital stock
⑫ CO_2 emissions

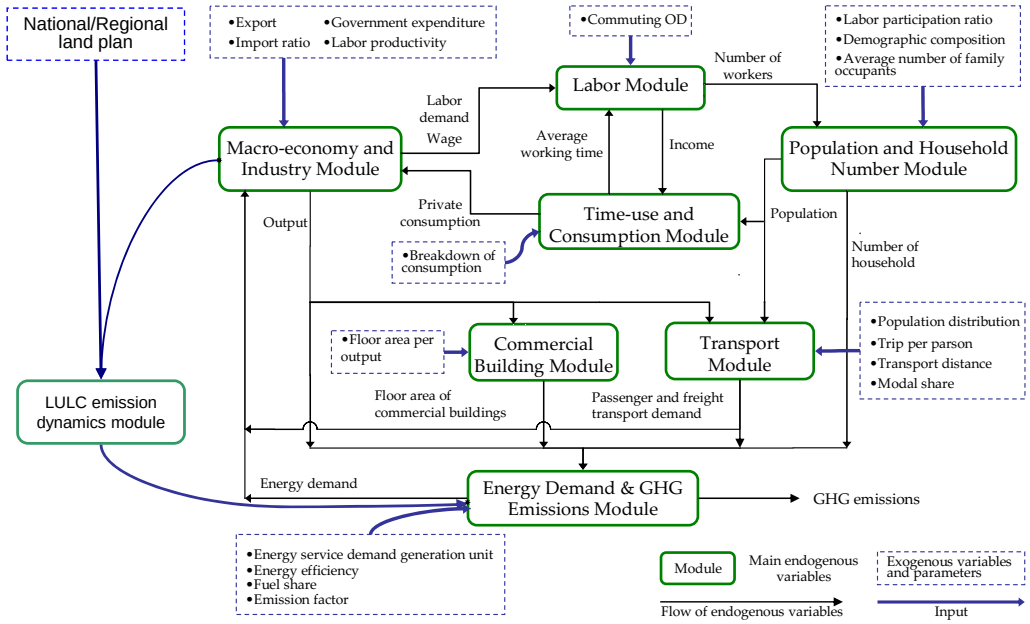
Structure of AIM/CGE

An example of AIM/CGE outputs in the Japan 2050 LCS study

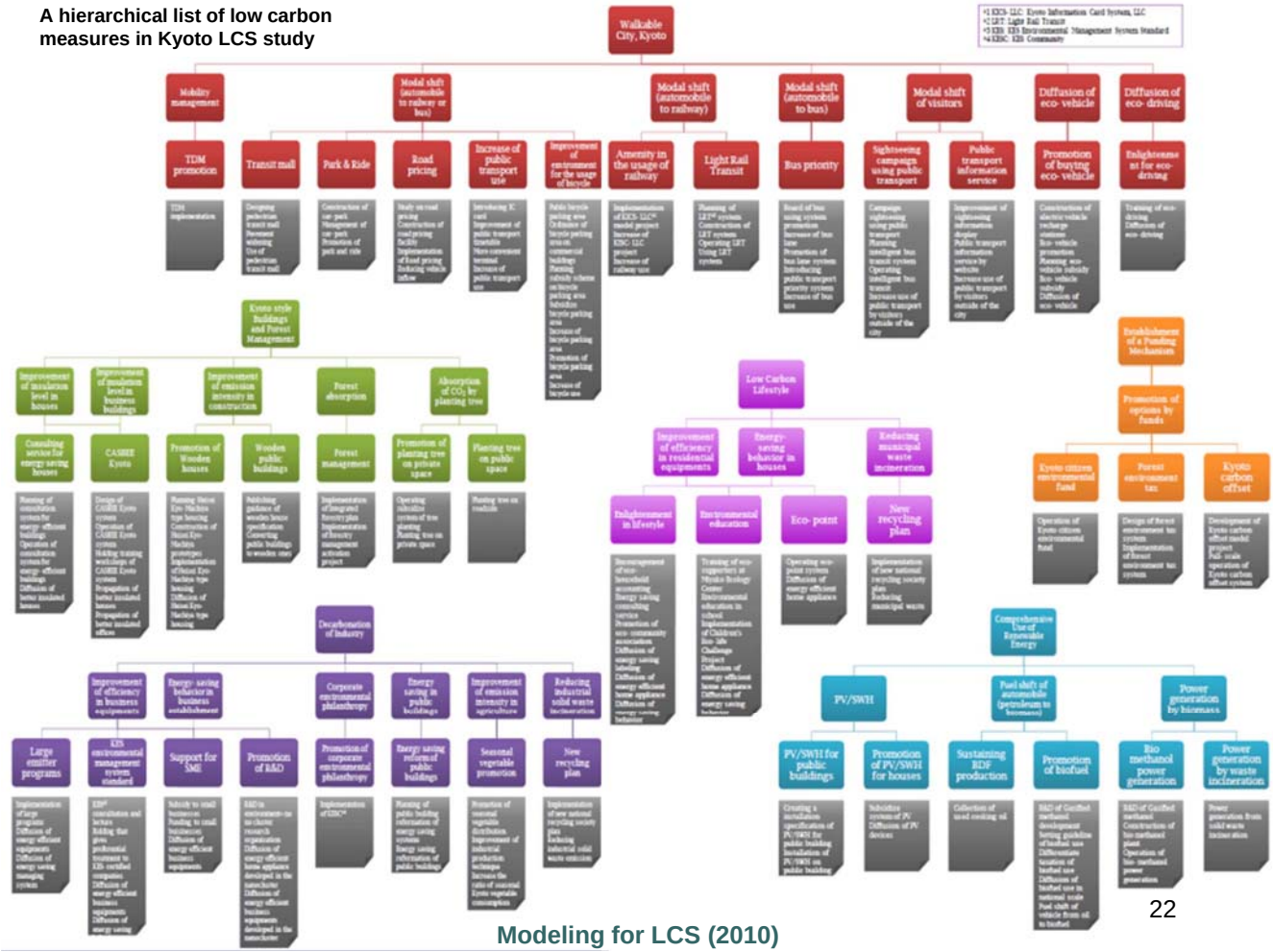


Extended Snapshot Tool (ExSS)

- A tool to designing social accounting matrices, energy balance tables, GHG emission and reduction tables of the target societies -



A hierarchical list of low carbon measures in Kyoto LCS study



A hierarchical list of low carbon measures in Kyoto LCS study

Output from ExSS

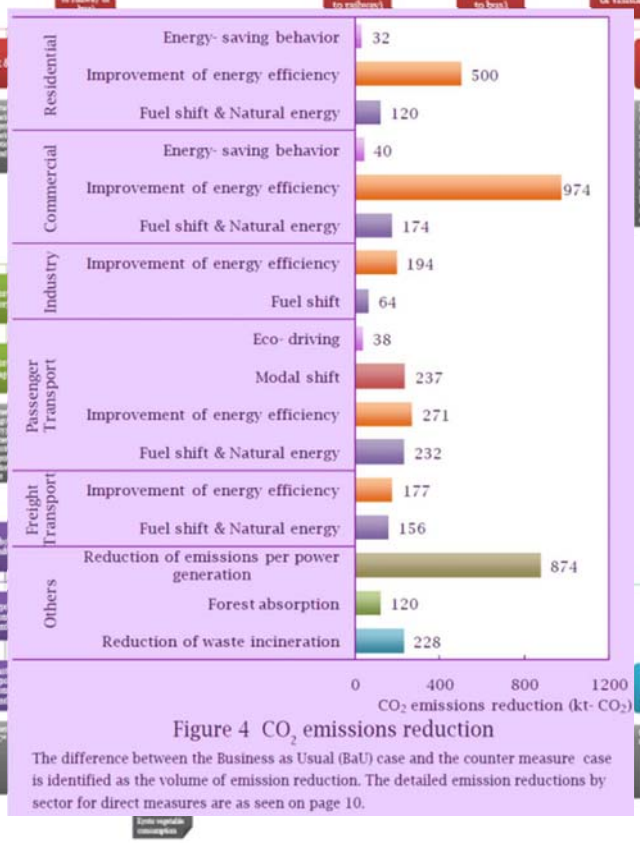


Figure 4 CO_2 emissions reduction

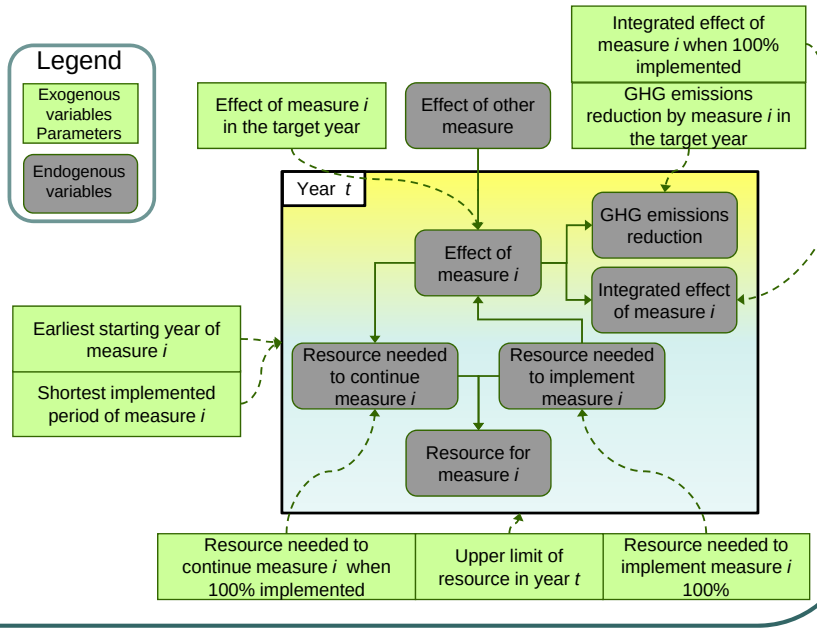
The difference between the Business as Usual (BaU) case and the counter measure case is identified as the volume of emission reduction. The detailed emission reductions by sector for direct measures are as seen on page 10.

An example of Integrated models:
Back-Casting Tool (BCT)

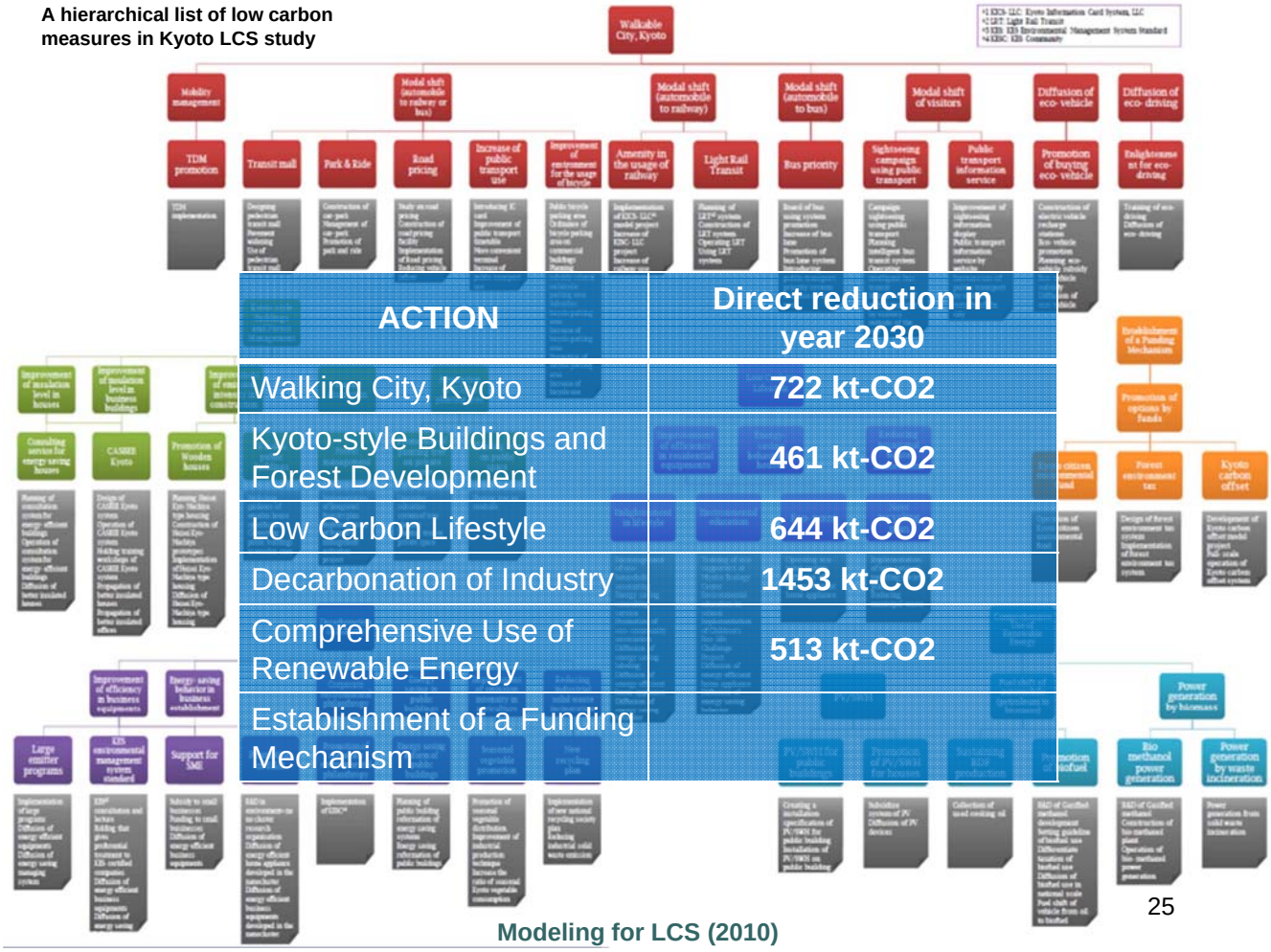
Designing tool of implementation schedule of policy measures

Design time schedule and combinations of measures towards the target LCS, which maximizes integrated benefits including co-benefits during planning period , under the following six types of resource constraints.

Constraints considered are financial, human and administrative resource (capacity) constraints in private and public sectors.



A hierarchical list of low carbon measures in Kyoto LCS study

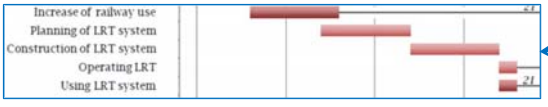


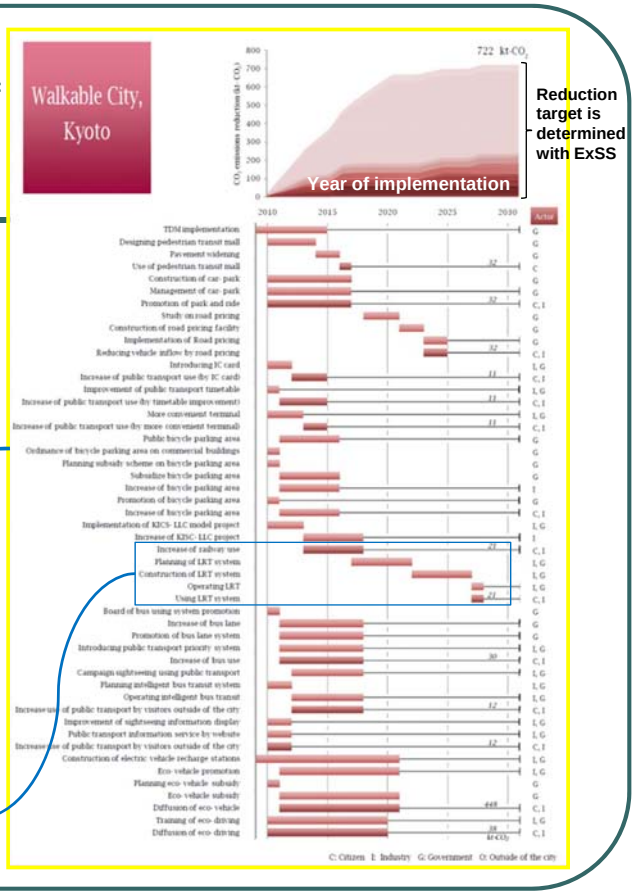
ACTION	Direct reduction in year 2030
Walking City, Kyoto	722 kt-CO2
Kyoto-style Buildings and Forest Development	461 kt-CO2
Low Carbon Lifestyle	644 kt-CO2
Decarbonation of Industry	1453 kt-CO2
Comprehensive Use of Renewable Energy	513 kt-CO2
Establishment of a Funding Mechanism	

An example of the output of the Back-casting tool

- From Low Carbon Kyoto study -

Narrative description of an Measure Roadmap in the action "Walkable City, Kyoto"





5. Two stages of LCS scenario development

Stage 1: Design of a Low Carbon Society

1. Creation of narrative storylines of future Low Carbon Societies
2. Description of sector-wise details of the future LCSs.
3. Quantification of the Macro-economic and social aspects of the LCSs.
4. Identification of effective policy measures and packaging them

Stage 2: Putting them together and design roadmaps towards LCS

1. Design of policy roadmaps toward the Low Carbon Society
2. Feasibility analysis of the roadmaps considering uncertainties involved in each policy option
3. Analysis of robustness of the roadmap caused by social, economical and institutional acceptability and uncertainties

Group 1: Element models;

1) Snapshot models;
- *CGE[country]:* Quasi steady computable general equilibrium (CGE) model
- *enduse[country]:* Energy technology bottom-up models
- *ESM:* Energy supply model
- *HPLM*: Household production/lifestyle model
- *TDM:* Transportation demand model

2) Transition models;
- *PHM:* Population and household model
- *BDM:* Building dynamics model
- *MSFM:* Material stocks and flow model
- *EME:* Econometric type macro-economy model

Group 2: Extended Snapshot Tool (ExSS) and CGE

Group 3: Backcasting Model for roadmap design and transient control (BCM/BCT)

Stage 1: Creation of narrative storylines of future Low Carbon Societies

- Examples of Japan 2050 LCS study -

For Japan, we prepared two different but likely future societies

	Vision A	Vision B
Goal of life	Pursue economical "success" in the competitive society and spend much time on their own skill development.	Contribute to society as possible in the various fi their capabilities
Work	Pursue high productivity and efficiency. "Success in the economic society has the highest priority over any other factors.	Although working is one worthwhile activities, mo placed on balance betwe and life
Residence	Prefer sophisticated and convenient urban life.	Prefer slower and health
Acceptance of advanced technologies	Positively accept new and advanced technologies. People tend to expect advent of new technologies to overcome various social issues.	Take a cautious attitude some advanced technol Genetic technologies, at power). Accept inconven lifestyle to some extent.
Presence of Japan	Japan should continue to be a great economic nation and lead the world. In order to achieve the goals, more stress should be placed on economic development policies	Japan should show our p by our own culture or international cooperation, although economy is also important

Vision A	Vision B
Vivid, Technology-driven	Slow, Natural-oriented
Urban/Personal	Decentralized/Community
Technology breakthrough Centralized production /recycle	Self-sufficient Produce locally, consume locally
Comfortable and Convenient	Social and Cultural Values
2%/yr GDP per capita growth	1%/yr GDP per capita growth

An example of Quantification of Scenario A and B in Japan 2050 national LCS study

year	unit	2000	2050 A	2050 B	model
Population	Mil.	127	94 (74%)	100 (79%)	
Household	Mil.	47	43 (92%)	42 (90%)	Population and Household model (PHM)
Average number of person per household		2.7	2.2	2.4	
GDP	Tril.JPY	519	1,080 (208%)	701 (135%)	Macro-economy model(EME), Household production model & AIM/cge
Share of production					
primary	%	2%	1%	2%	
secondary	%	28%	18%	20%	
tertiary	%	71%	80%	79%	
Office floor space	Mil.m^2	1654	1,934 (117%)	1,718 (104%)	Building dynamics Model & AIM/cge
Travel Passenger volume	bill. p·km	1,297	1045 (81%)	963 (74%)	
Private car	%	53%	32%	51%	Traffic demand model (TDM) & AIM/cge
Public transport	%	34%	52%	38%	
Walk/bycycle	%	7%	7%	8%	
Freight transport volume	bill. t·km	570	608 (107%)	490 (86%)	
Industrial production index		100	126 (126%)	90 (90%)	Macro-economy model (EME), Material stocks and flow model (MSFM) and AIM/cge
Steel production	Mil.t	107	67 (63%)	58 (54%)	
Etylen production	Mil.t	8	5 (60%)	3 (40%)	
Cement production	Mil.t	82	51 (62%)	47 (57%)	
Paper production	Mil.t	32	18 (57%)	26 (81%)	

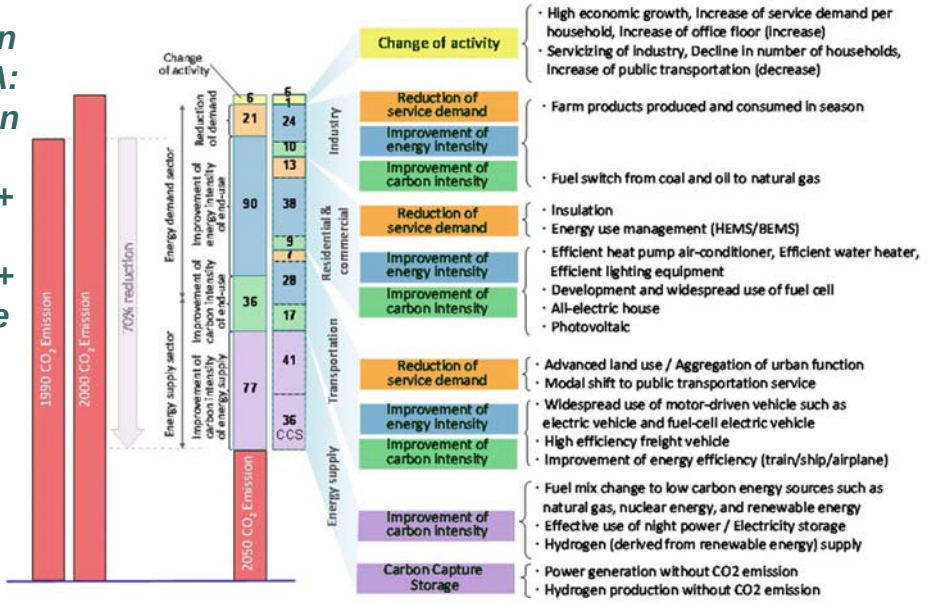
(%) is a percentage compared with year 2000

5. Two stages of LCS scenario development

Stage 1-3 : Evaluation of LCS policies and counter-measures

- An example from Japan 2050 study -

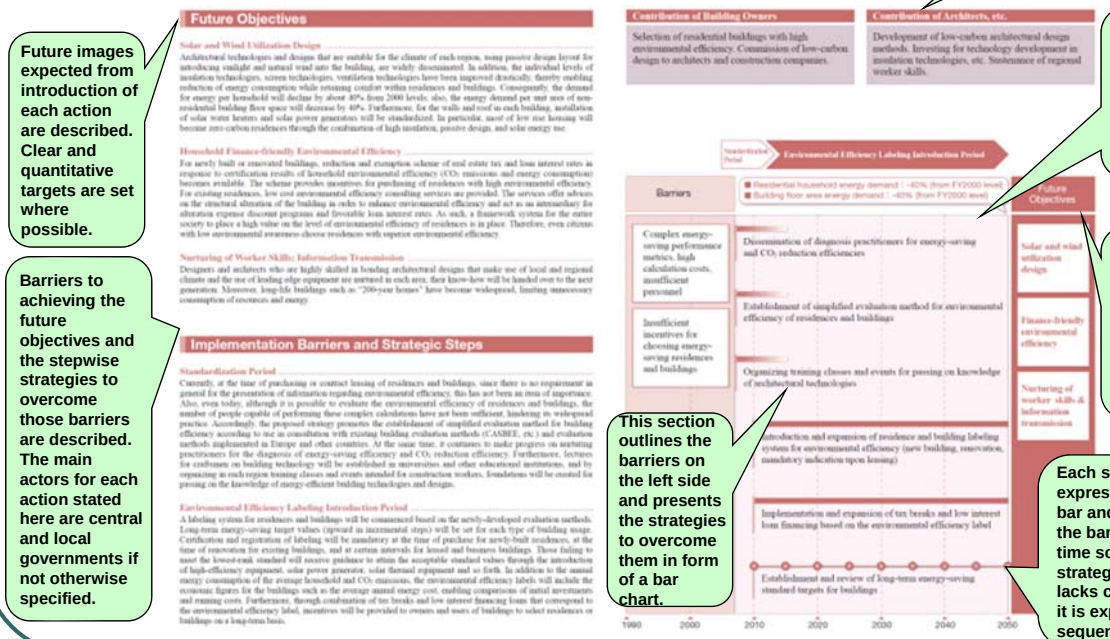
GHG 70% reduction in 2050 Scenario A: Vivid Techno-driven Society, demand side energy -40% + Low carbonization of primary energy + CCS with moderate cost of technological options as 0.3% of GDP in the year of 2050



5. Two stages of LCS scenario development

Roadmaps of Actions

- An example of "Comfortable and Green Built Environment" in Japan's 2050 LCS study -



Future images expected from introduction of each action are described. Clear and quantitative targets are set where possible.

Barriers to achieving the future objectives and the stepwise strategies to overcome those barriers are described. The main actors for each action stated here are central and local governments if not otherwise specified.

When the actions of other stakeholders can be crucial to achieve the future objectives, their expected contributions are mentioned here.

Indicators to measure the achievement of each action are presented here. Quantitative target are set where possible.

Keywords that describe future objectives Details of each keyword are described in "Future Objectives" in the left page

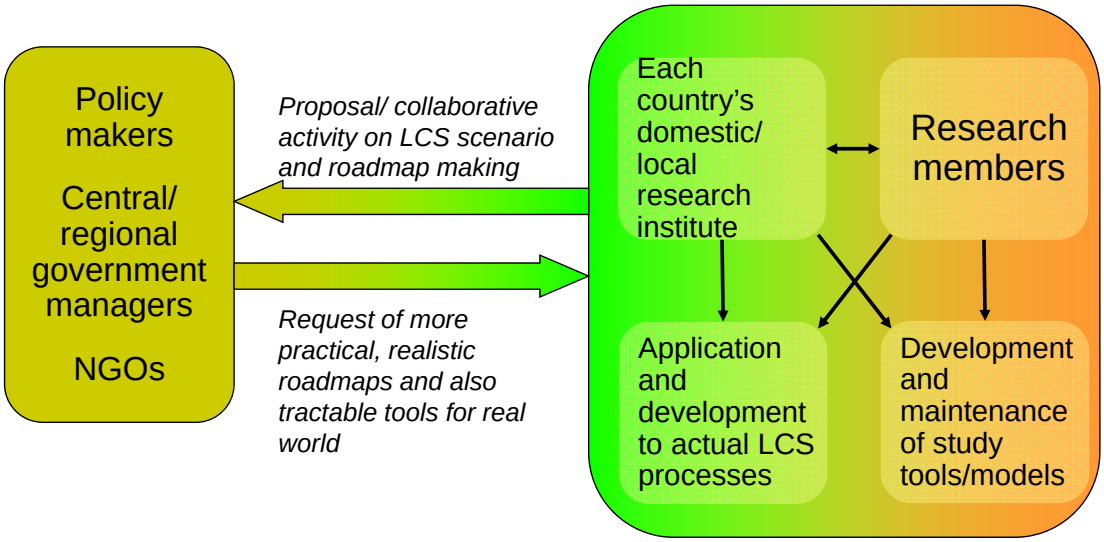
This section outlines the barriers on the left side and presents the strategies to overcome them in form of a bar chart.

Each strategy is expressed in a solid bar and the length of the bar indicates the time schedule of the strategy. If a strategy lacks continuity then it is expressed as a sequence of circles.

Several different focusing points exist depending on audiences and degree of the study progress

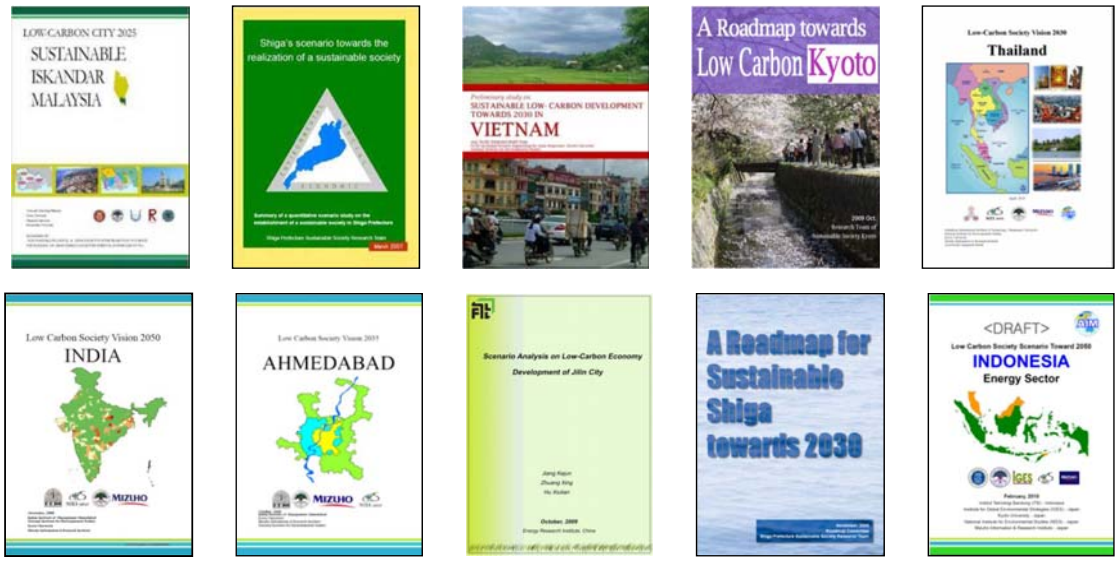
Focusing points	Type
Analysis of GHG reduction targets and reduction potential	Design of Target Society and Reduction Potential analysis
Economic analysis of LCS policies	Economic analysis
Design of policy packages and roadmaps	Roadmap design
Analysis of co-benefits of LCS policies	Co-benefit analysis

6. Collaborating with Asian colleagues



Region specific studies now we are going on

Communication and feedbacks of LCS study to real world



Asia Modeling Network

Asian Modeling Meeting at Tsukuba on 17-18 September 2009

14th AIM International Workshop on 14-15 February 2009

AIM Training Workshop on 2-4 August 2010

7. Final remarks

1. **"Low Carbon Society (LCS)" issue is not only related with energy supply and consumption systems but also essentially connected with socio-economic-industrial planning. Real and quantitative integration is necessary in order to design Low Carbon Society.**

2. **Myopic tactics can not drive us to LCS. In order to realize LCS, policy measures with well calculated strategies and time horizon of more then several decades are necessary.**

3. **From that point of view, we have developed tools in order to design quantitatively the visions of LCS and roadmaps towards LCS. We applied them to the real fields mainly in Japan.**

4. **Collaborating with Asian colleagues, we want to extend our approach to Asia region, acquiring experience, improving and intensifying the applicability to real world.**

Thailand's LCS Development and Co-benefits of CO_2 Mitigation Strategies

by

Prof. Ram Shrestha (AIT) and Prof. Bundit Lim (SIIT-TU)

Thailand LCS Development and Co-benefits of Carbon Mitigation Strategies

Bangkok, November 19, 2010

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Low-Carbon Society Thailand

1 Sirindhorn International Institute of Technology, TU

2 Asian Institute of Technology

3 National Institute for Environmental Studies

4 Kyoto University

5 Mizuho Information & Research Institute

6 Asia-Pacific Integrated Model

Contents

1. Thailand Low Carbon Scenario Development

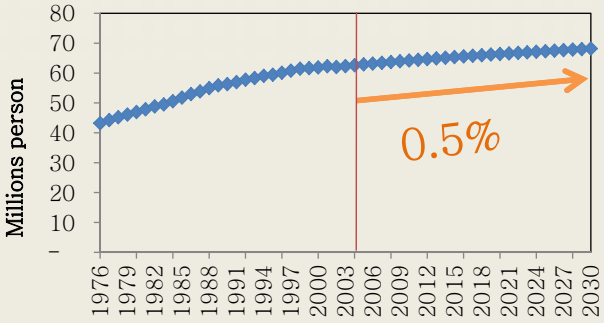
THAILAND "LCS" STUDY OBJECTIVES

- To propose measures for avoiding climate change, and precursors to zero carbon society and renewable-energy economy.
- To discuss the possibility of developing a low-carbon society in Thailand.
- To create awareness among Thailand's authorities, government, stakeholders, and communities for low-carbon Thailand.

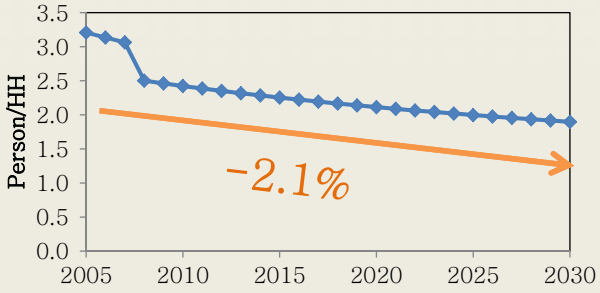


QUANTITATIVE ASSUMPTIONS

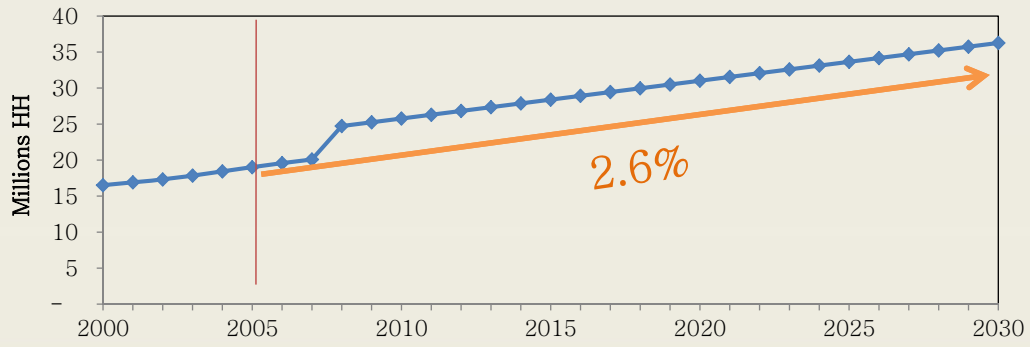
Population



HH size



No. of HH



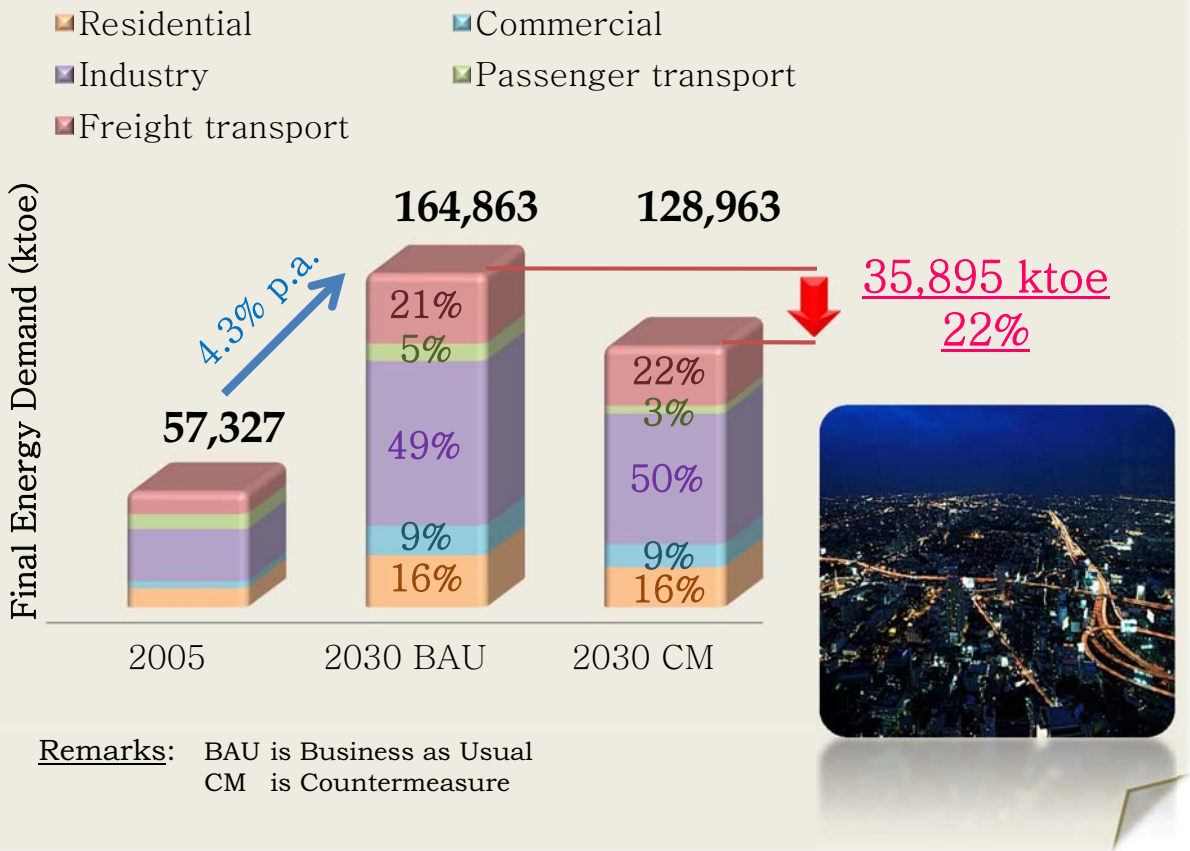
ESTIMATED SOCIO-ECONOMIC INDICATORS

	2005		2030
Population	60,991,000	0.49% →	68,815,004
No. of HH	19,016,784	2.6 % →	36,265,390
GDP (mil Baht)	8,016,595	5.5- 5.0% →	30,802,306
Gross output (mil Baht)	18,755,884		68,456,651
Primary industry (mil Baht)	*1,116,621*	3.9% →	*2,801,864*
Secondary industry (mil Baht)	*11,453,496*	5.1% →	*38,008,931*
Tertiary industry (mil Baht)	*6,185,767*	6.4% →	*27,645,856*
Floor space for commercial (mil m²)	88		394
Passenger transport demand (mil p-km)	191,520		216,088
Freight transport demand (mil t-km)	188,524		589,859

- NESDB
- DOPA
- NESDB
- TTP
- DCA
- DLT

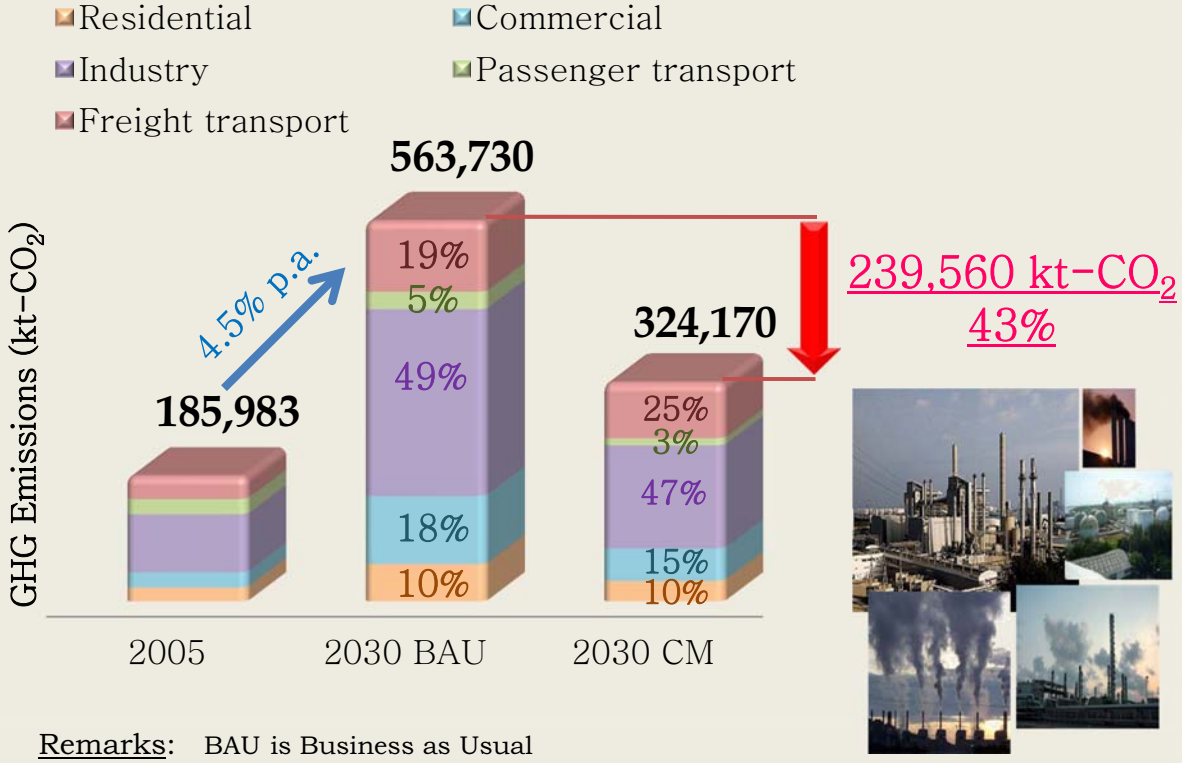
Remarks: Primary industry → Agriculture, Mining, and Construction
Secondary industry → Textiles, Food & beverage, Chemical, Metallic, Non-metallic, and Others
Tertiary industry → Service sector

ENERGY DEMAND



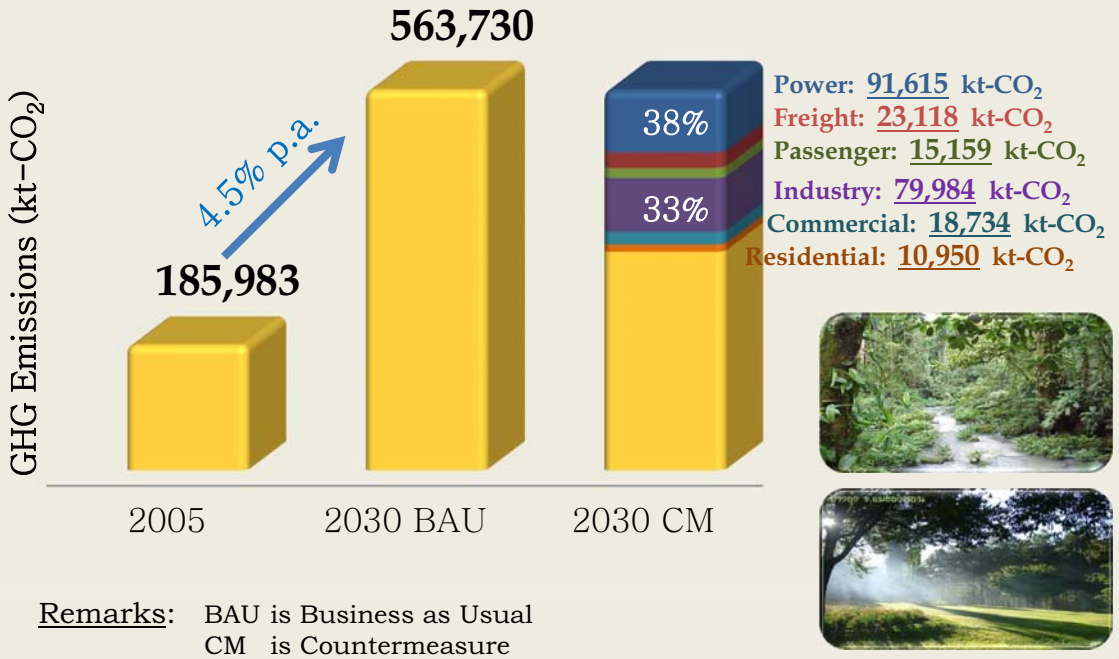
Remarks: BAU is Business as Usual
CM is Countermeasure

GHG EMISSIONS



Remarks: BAU is Business as Usual
CM is Countermeasure

GHG EMISSIONS/REDUCTIONS



Power: 91,615 kt-CO_2
Freight: 23,118 kt-CO_2
Passenger: 15,159 kt-CO_2
Industry: 79,984 kt-CO_2
Commercial: 18,734 kt-CO_2
Residential: 10,950 kt-CO_2

Remarks: BAU is Business as Usual
CM is Countermeasure

MEASURES

POWER GENERATION

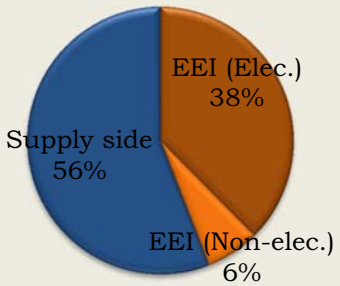
- Efficiency improvement in the *Power generation sector*
  - *T&D loss will improve to be 5%.*
  - *Technology transfer: New power plant technology will be added such as IGCC and CCGT → Eff. Improve to be 48% and 56%.*
  - *Fuel switching: Increasing share of RE and NE in PDP 2010.*

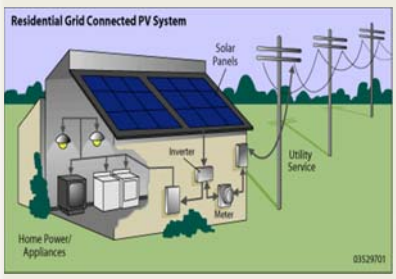
Fuel type	Share in 2030 BAU	Share in 2030 CM
Natural gas	71.4	39.0
Oil	6.6	-
Coal	15.1	23.6
Hydro	4.4	20.5
Nuclear	-	11.2
Renewable energy	2.5	5.7

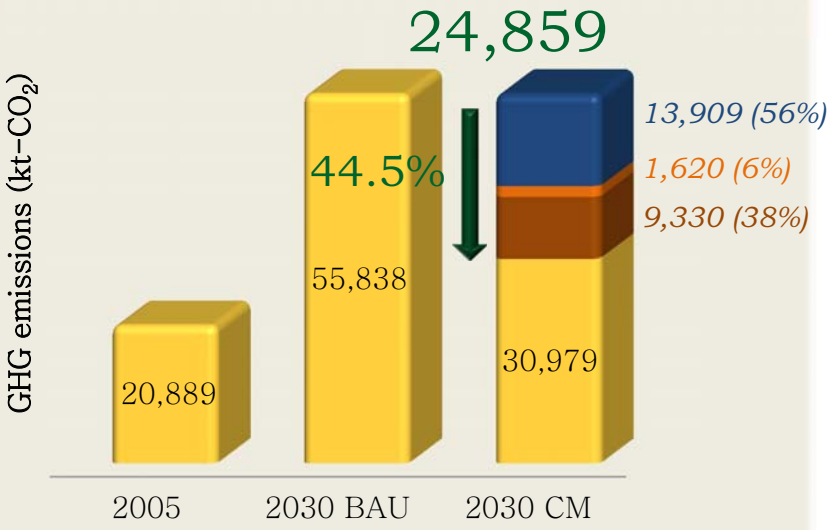
Ref: Thailand's Power Development Plan, PDP 2010.

MEASURES

RESIDENTIAL

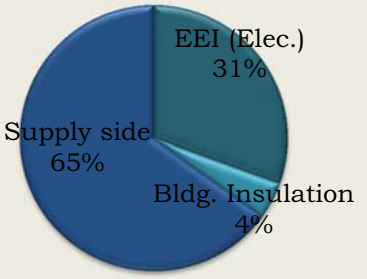


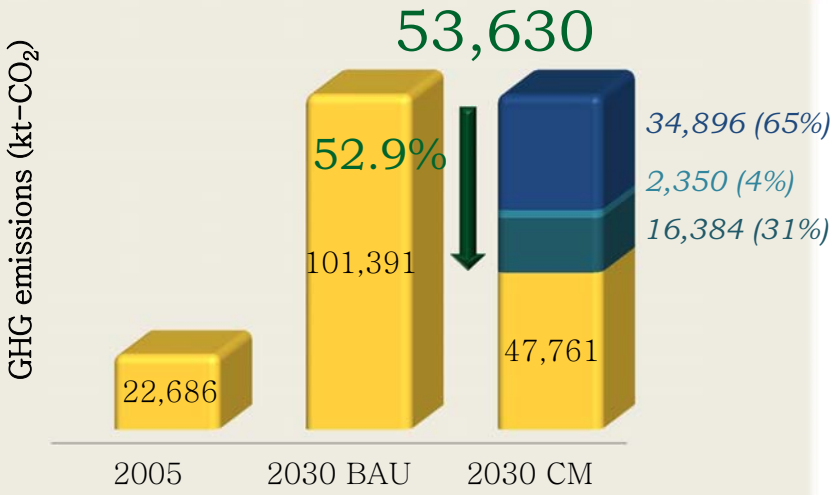




MEASURES

COMMERCIAL

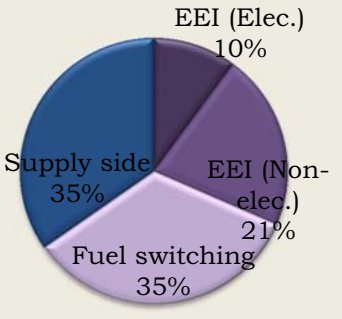


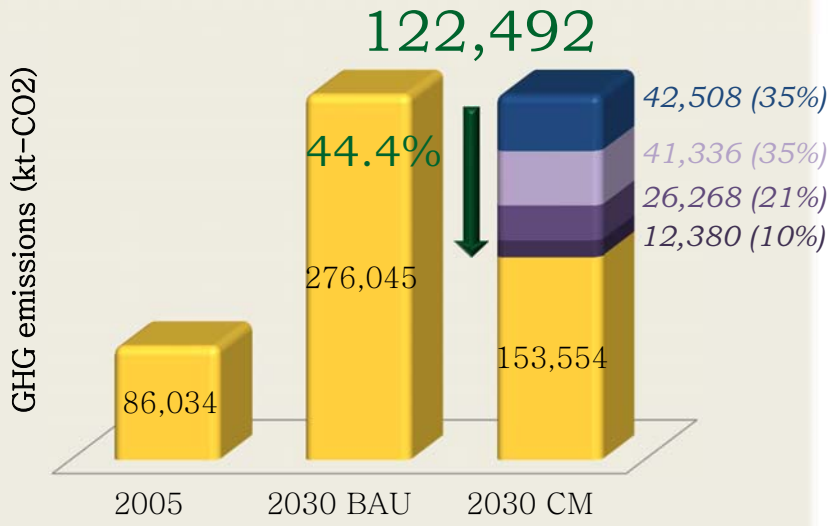


GHG emissions
EEI (electrical app.)
Building insulation
EEI (power sector)

MEASURES

INDUSTRY

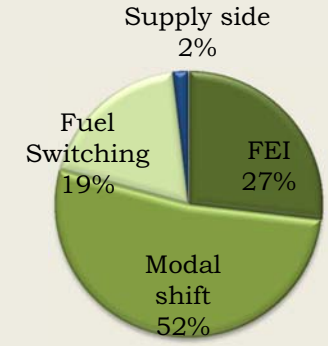


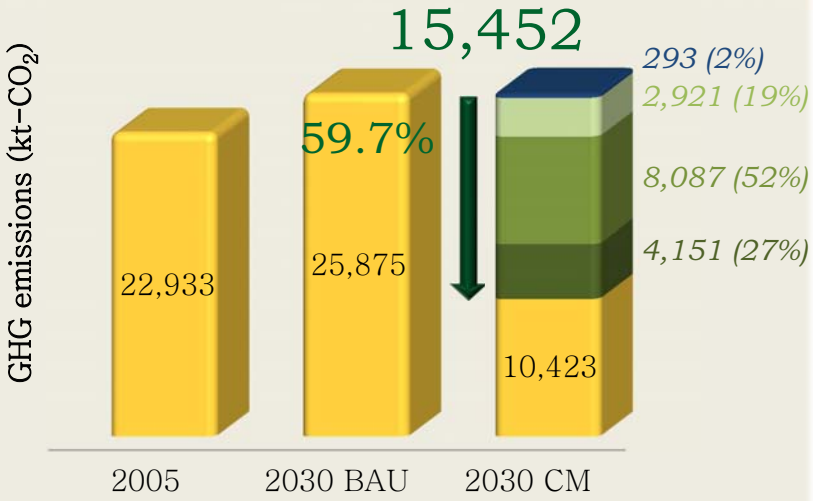


EEI (power sector)
Fuel switching
EEI (non electrical app.)
EEI (electrical app.)
GHG emissions

MEASURES

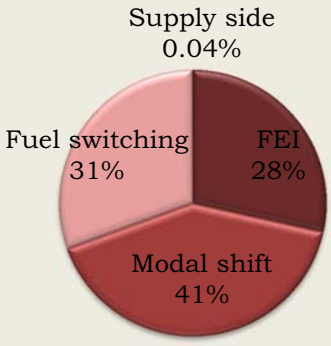
PASSENGER TRANSPORT

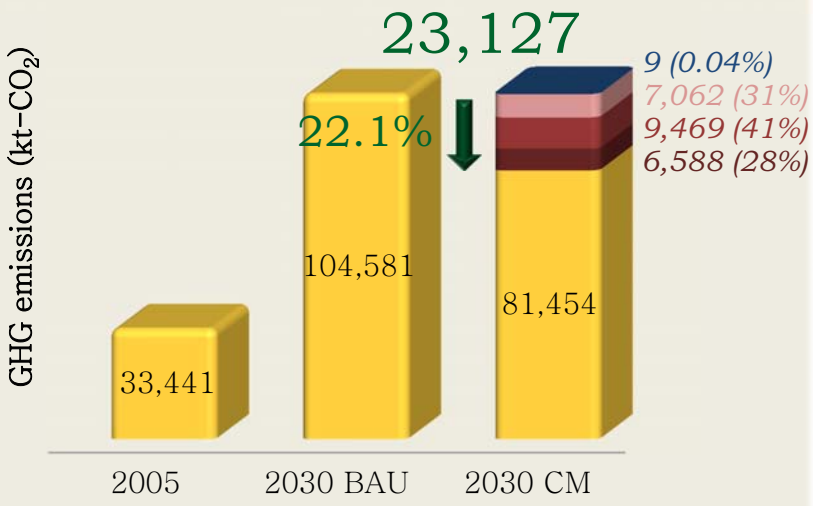




MEASURES

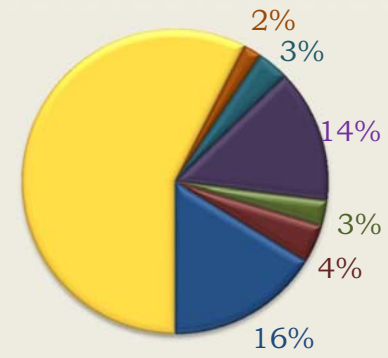
FREIGHT TRANSPORT



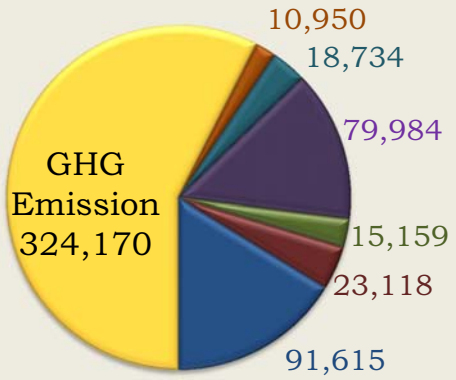


GHG EMISSIONS/REDUCTION

TOTAL



GHG REDUCTION: 239,560 KT–CO_2



Unit: kt-CO_2

SUMMARY OF GHG MITIGATION MEASURES

Action	GHG Reduction (kt-CO_2)	(%)
1. Energy efficiency improvement (EEI) in households	10,950	4.6%
- EEI in electric devices	9,330	3.9%
- EEI in non-electric devices	1,620	0.7%
2. Energy efficiency improvement in buildings	16,384	6.8%
3. Building codes	2,350	1.0%
4. Energy efficiency improvement in industries	38,648	16.1%
- EEI in electric devices	12,380	5.1%
- EEI in non-electric devices	26,268	11.0%
5. Fuel switching in industry	41,336	17.3%
6. Fuel economy improvement in transportation	10,739	4.5%
- Passenger transport	4,151	1.7%
- Freight transport	6,588	2.8%
7. Fuel switching in transportation	9,983	4.2%
- Passenger transport	2,921	1.2%
- Freight transport	7,062	3.0%
8. Modal shift in transportation	17,556	7.3%
- Passenger transport	8,087	3.3%
- Freight transport	9,469	4.0%
9. Efficiency improvement and fuel switching in the power sector	91,614	38.2%
Total GHG mitigation in 2030	239,560	100.0%
Total GHG emissions in the 2030 BAU scenario	563,730 kt-CO_2	
Total GHG emissions in the 2030 CM scenario	324,170 kt-CO_2	

CONCLUSIONS

- Energy saving can be decreased by 35,895 ktoe or 21.8% in 2030CM.
- The GHG emissions under the scenario without mitigation measures will increase to 563,730 kt-CO_2.
- By adopting measures, GHG emissions can be decreased to 324,170 kt-CO_2 or by 42.5%.
- If those policies are planned for early stage, Thailand will be able to develop not only as a premier growth center but also serve as a model for LCS.



Part 1: Co-benefits of carbon mitigation

Outline

- Description of scenarios
- CO2 emission in the base case
- Environmental co-benefits: Reduction of SO_2 and NOx emission
- Energy security – co-benefits
- Cost implications

Scenario Description

Base case and three emission reduction target scenarios as follows:

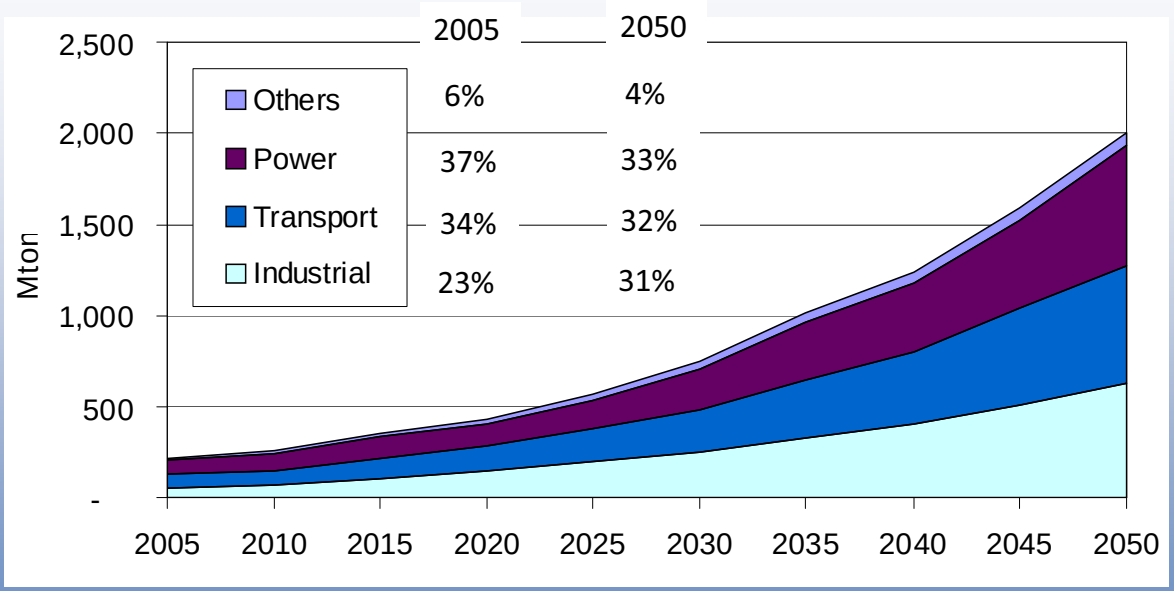
1) Base case
2) 10% Emission reduction target (ERT10)
3) 20% Emission reduction target (ERT20)
4) 30% Emission reduction target (ERT30)

- MARKAL modeling framework – the least cost optimization model is used for the analysis.
- All prices are given in US$ 2000 price.

Base Case Assumptions

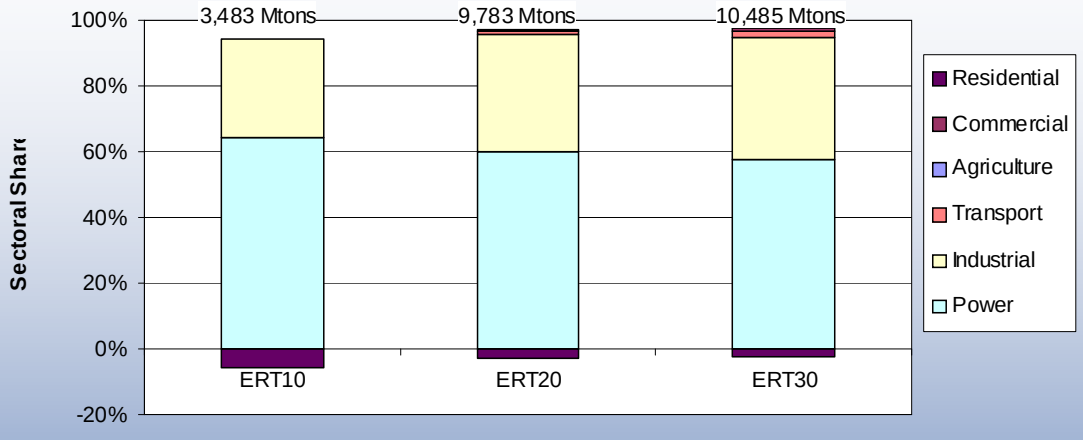
- CAGR (2000-2050): Population: 0.4%; GDP: 5.6%
- No greenhouse gas (GHG) mitigation policy intervention.
- Nuclear power generation would be introduced from 2020 onwards (2000 MW is proposed to be installed in 2020 and similarly in 2021 (EGAT, 2007)).
- Minimum of 3 million liters of ethanol per day and 4 million liters of biodiesel per day would be used by 2015 in the transport sector.
- 64,000 thousands tons of feedstock (e.g., cassava, molasses, sugarcane and others) for ethanol production and 2,550 thousands tons of oil seed (palm oil and coconuts) for biodiesel production would be available from 2015 onward during the planning horizon.
- Emerging technologies like hybrid vehicles are considered to be available from 2015 onward; fuel cell vehicles and power generation with carbon capture and storage technology are considered to be available from 2020 onward.
- Modal substitution between road transport and railways/MRT not considered.

CO_2 emission in the base case during 2005-2050



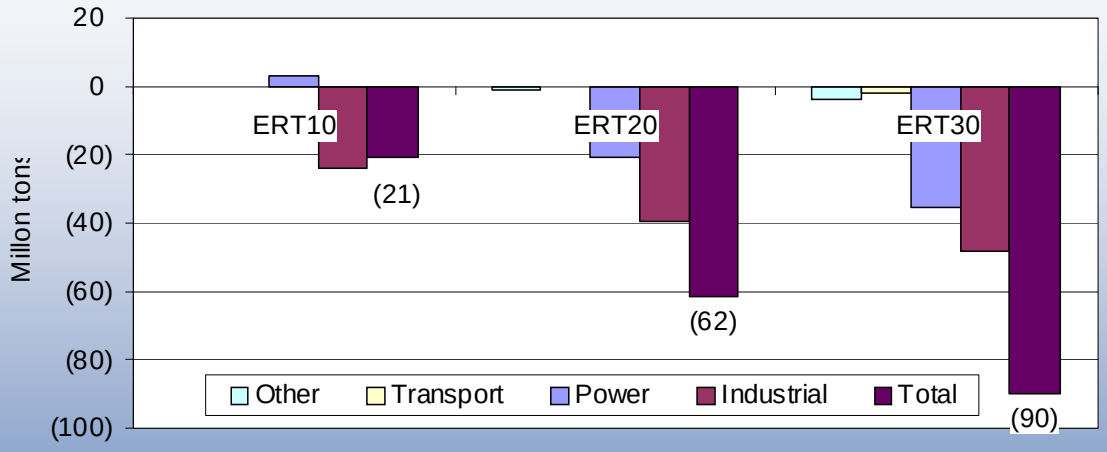
Total CO_2 emission would increase by more than 7 folds during 2005-2050 (AAGR 4%), i.e., 223 million tCO_2 in 2005 to 2,006 million tCO_2 in 2050.

Sectoral contributions to achieve the CO_2 emission reduction targets?



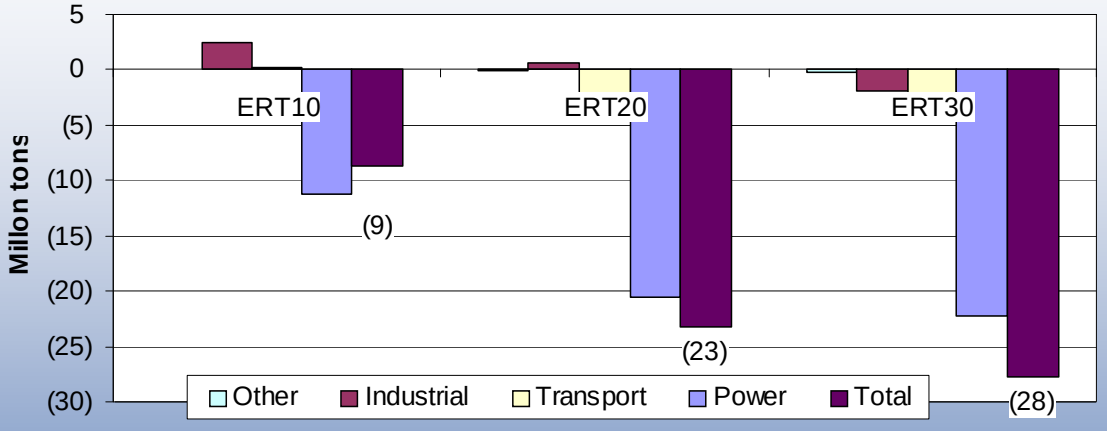
- Highest CO_2 emission reduction from the power sector, followed by the industrial and transport sectors.
- Over 73%, 64% and 61% of the total CO_2 emission reduction from the power sector in ERT10, ERT20 and ERT30 cases respectively.
- Major role of natural gas based advanced combined cycle power generation, carbon capture and storage (CCS) and nuclear based power generation in the power sector CO_2 emission reduction.
- Up to a maximum of 36% reduction from the base case emission could be feasible under the present framework.

Environmental co-benefits (1): Reduction in SO_2 emission



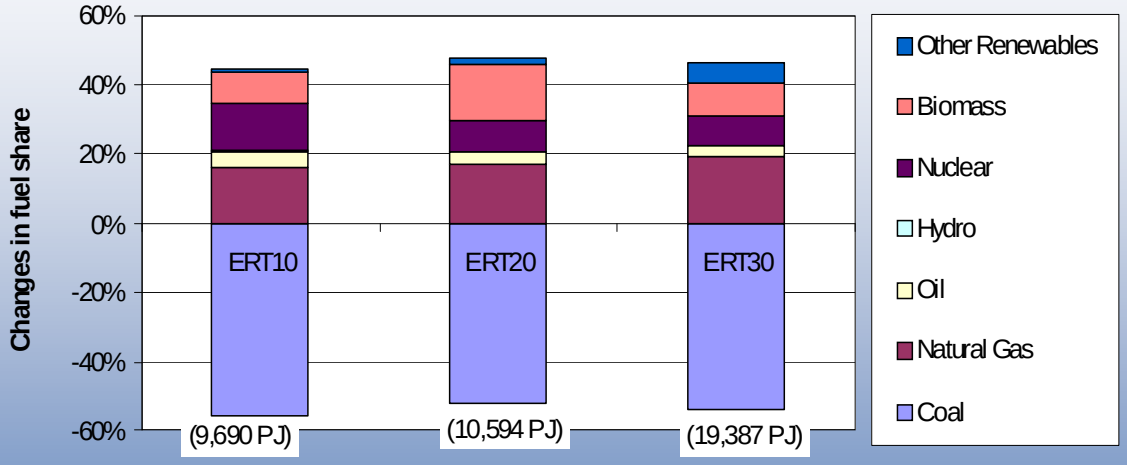
- SO2 reductions of 10%, 28% and 41% from the base case value under ERT10, ERT20 and ERT30.
- The highest SO2 reduction (over 54%) from the industrial sector followed by the power sector.

Environmental co-benefits (2): Reduction in NOx emission



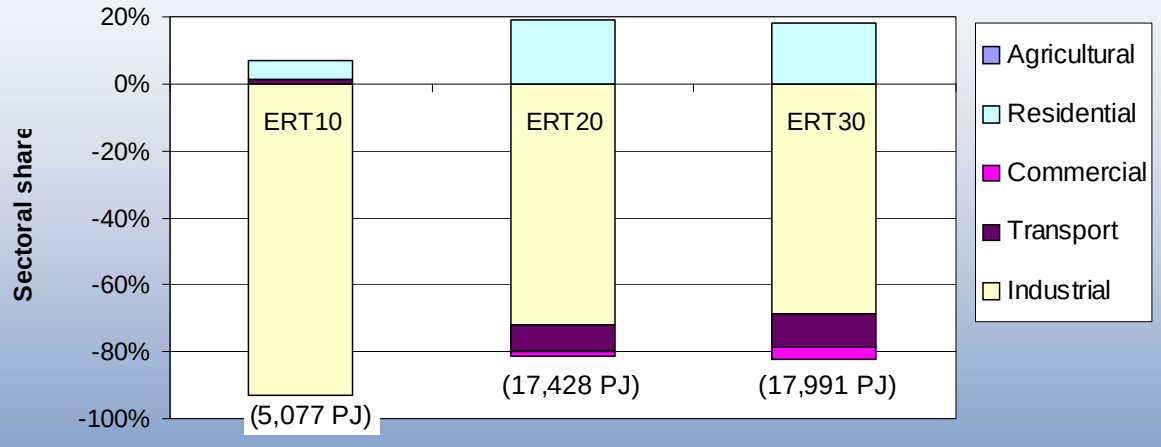
- % reduction of NOx relatively lower than that of SO_2 emission.
- NOx reduction of 2%, 6% and 7% of from the base case value under ERT10, ERT20 and ERT30 respectively.
- The highest NOx reduction (over 80%) would take place in the power sector followed by the transport sector.

Energy Co-benefit (1): Reduction in total primary energy requirement



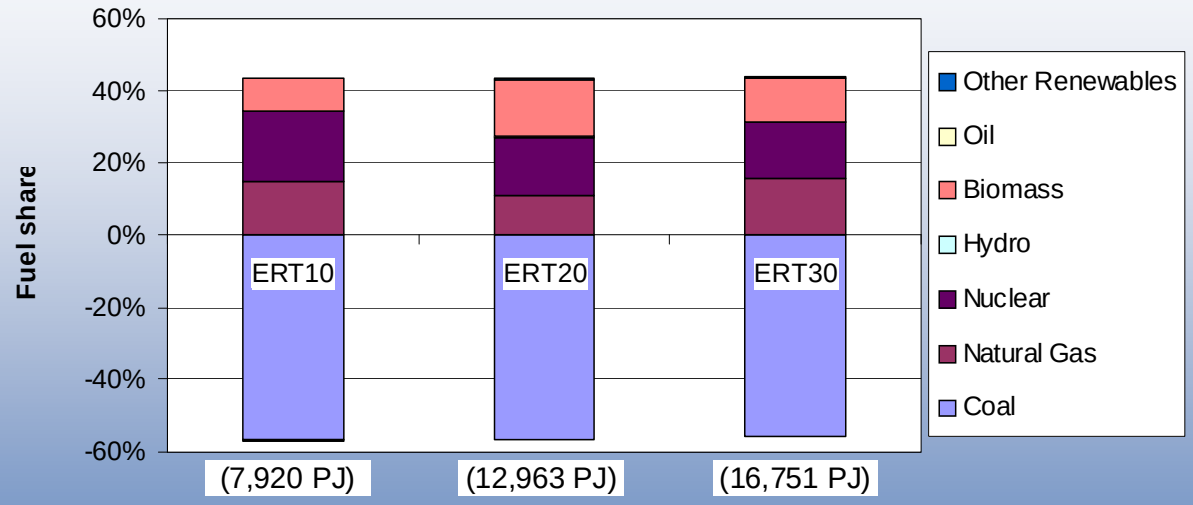
- Total primary energy requirement would decrease by 1.9%, 2.0% and 3.7% under ERT10, ERT20 and ERT30 respectively.
- Coal requirement would significantly decrease in all the cases.

Energy Co-benefit: Reduction in final energy consumption



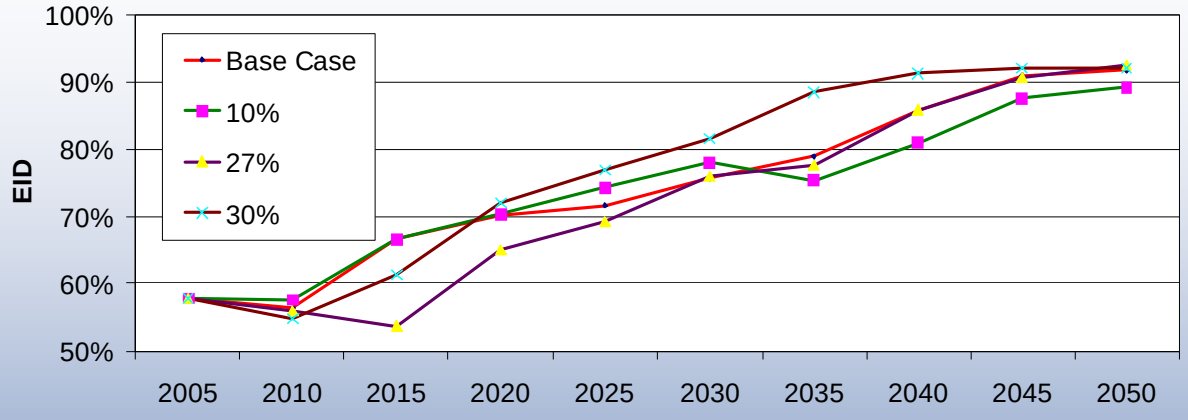
- Final energy demand would decrease by 1.2%, 4.2% and 4.3% under ERT10, ERT20 and ERT30 respectively.
- The industrial sector would gain most in terms of energy efficiency.

Energy Co-benefit:
Reduction in energy requirement for power generation



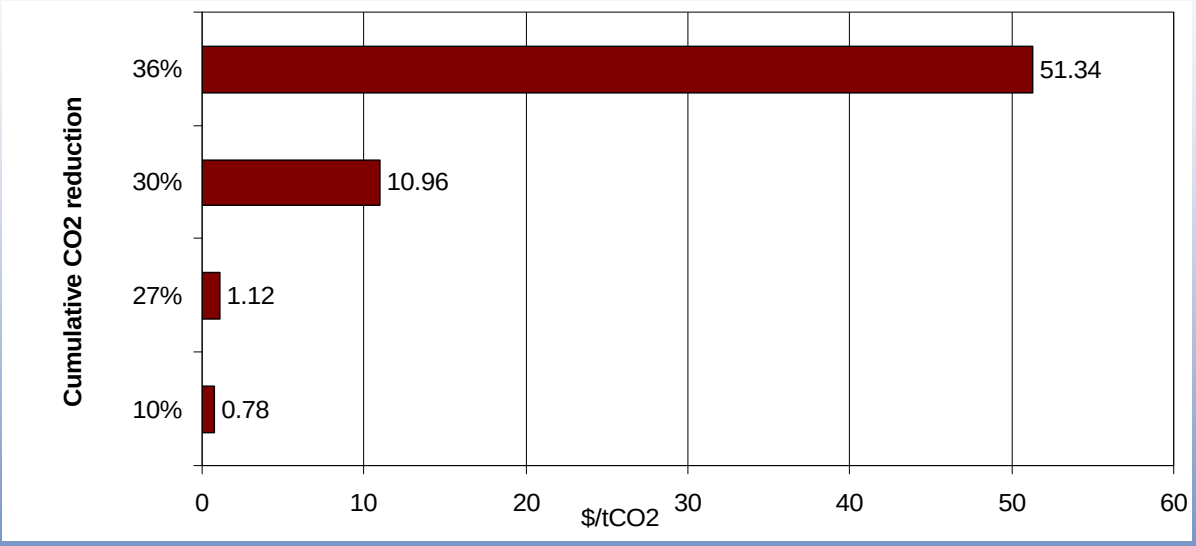
- Energy requirement in power generation would be reduced by 5.0%, 8.2% and 10.6% under ERT10, ERT20 and ERT30 respectively.

Energy security co-benefit



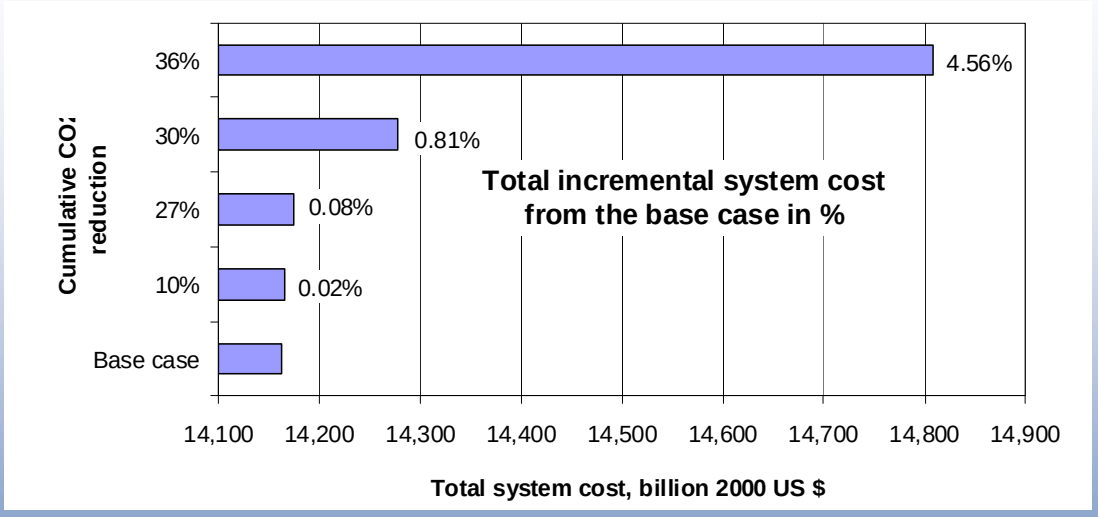
- TPES would be reduced by 1.9%, 2.0% and 3.7% under ERT10, ERT20 and ERT30 respectively.
- Cumulative energy import dependency (EID) in base case would be 80.6%. EID would decrease from the base case by 1.9% and 1.7% in ERT10 and ERT20. On the contrary, EID would increase by 2.9% in ERT30.
- The level of energy import dependency in year 2050 in ERT20 and ERT30 would be similar to that in the base case (i.e., 92%). In ERT10, EID would slightly decrease (to 89%) in 2050.

What would be the CO_2 abatement cost ($/t$CO_2$) under different ERTs?



- Up to 27% of the total CO_2 emission could be cost effectively mitigated at $ 1.12 per ton of CO_2.
- The cost for CO_2 abatement higher than 27% would be much higher and would increase from $ 10.96 to $ 51.34 for 30% to 36% emission reduction from the base case respectively.

How would the total cost increase with emission reduction?



- A maximum of 36% of CO_2 emission reduction would be possible from that in the base case as has been considered in the study (e.g., assuming there would be no modal shift to MRTs and electric railways, no reduction in service demand etc.).
- Total cost increases drastically for targets above 27% of emission reduction.



ASIAN INSTITUTE OF TECHNOLOGY
1959

NIES JAPAN

KYOTO UNIVERSITY
KYOTO JAPAN
FOUNDED 1897

MIZUHO

AIM
ASIA-PACIFIC INTEGRATED MODEL

THANK YOU

Development of Low Carbon Society Scenarios for Iskandar Malaysia

by

Prof. Ho Chin Siong

(Universiti Technologi Malaysia (UTM))

Development of Low Carbon Society Scenarios for Iskandar Malaysia

AIM workshop

Pullman Hotel Bangkok Nov 19, 2010

JST-JICA 2010 Japan International Cooperation Agency

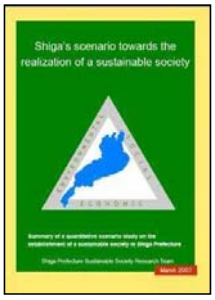
Technical Cooperation Project

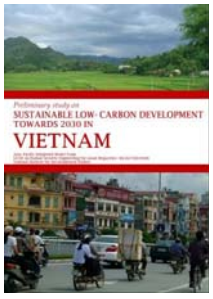
UTM, IRDA, PTHM and JPBD Malaysia

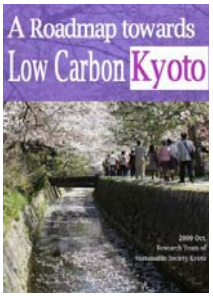
Kyoto U, Okayama U and NiES Japan

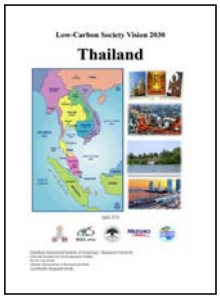
On going Region specific studies

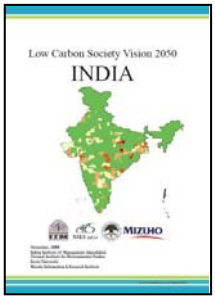
Communication and feedbacks of LCS study to real world

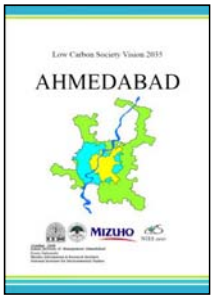


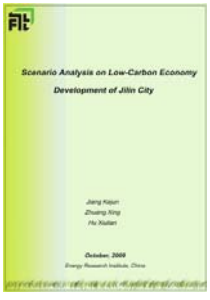


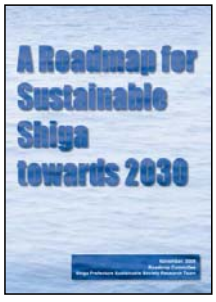












POINTS OF DISCUSSION

- Development LCS sustainable future
  - Political will and Institutional commitment
  - Modeling experts – External and internal
- Research sponsorship and expertise SATREPS project
- How to communicate research project with stakeholders/ Policy makers
- What are the current sustainable issues ?

  - to obtain view points from policy makers and implementing agency of the research project.

LCS Scenario development

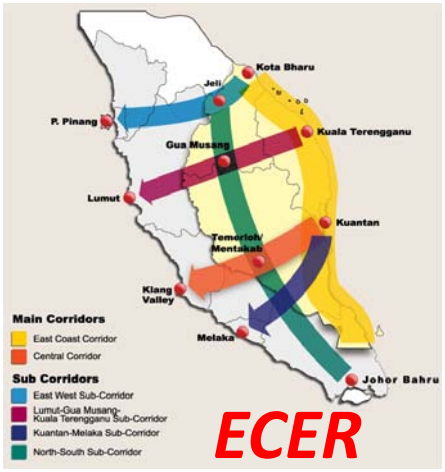
- Development LCS sustainable future
  - Quantification of variables
  - Modeling experts – External and internal
  - Vision - Political will and Institutional commitment

Why IM?

MALAYSIA: KEY ECONOMIC DEVELOPMENT CORRIDORS

IM

NCER



ECER

SCORE

SDC

NATIONAL VISION

1 MALAYSIA CHARTING DEVELOPMENT TOWARDS A HIGH INCOME NATION

- The 2011 Budget, with the aim to position Malaysia as a **developed and high-income economy** with inclusive and sustainable development, will continue to ensure that the **most conducive socio-economic environment** is created through the **Government Transformation Programme (GTP)** to underpin growth.

The 10th Malaysia Plan

- Building an environment that **enhances Quality of Life**
- New urbanism and **compact city**
- Growth concentrated in **urban conurbation**
- **Safe city** initiatives
- **Developing climate resilient growth** policy
- Adaptation measures
- Mitigation measures
- Incentives for **RE and EE**
- Improving **Solid waste management**
- Conserving forest
- Reducing **emission to improve air quality**

COP 15 – Malaysia's target

- Prime Minster of Malaysia, Y.A.B Dato' Sri Mohd Najib bin Tun Abdul Razak, in COP15 last year at Copenhagen, Denmark, proposed to reduce CO_2 emission intensity in Malaysia to 40 per cent by the year 2020 compared with its 2005 levels, subject to assistance from developed countries.
-

COP15 on Dec 17, 2009 at Copenhagen, Denmark

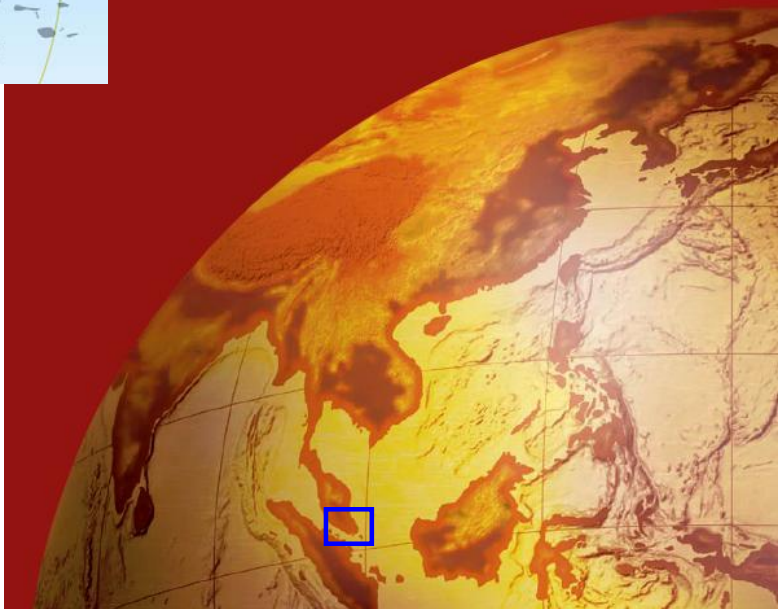
CASE STUDY –ISKANDAR MALAYSIA

Case study

Iskandar Development Region

2,216 km^2

Population 1,353,200



The Iskandar Malaysia Vision

Economic Growth

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

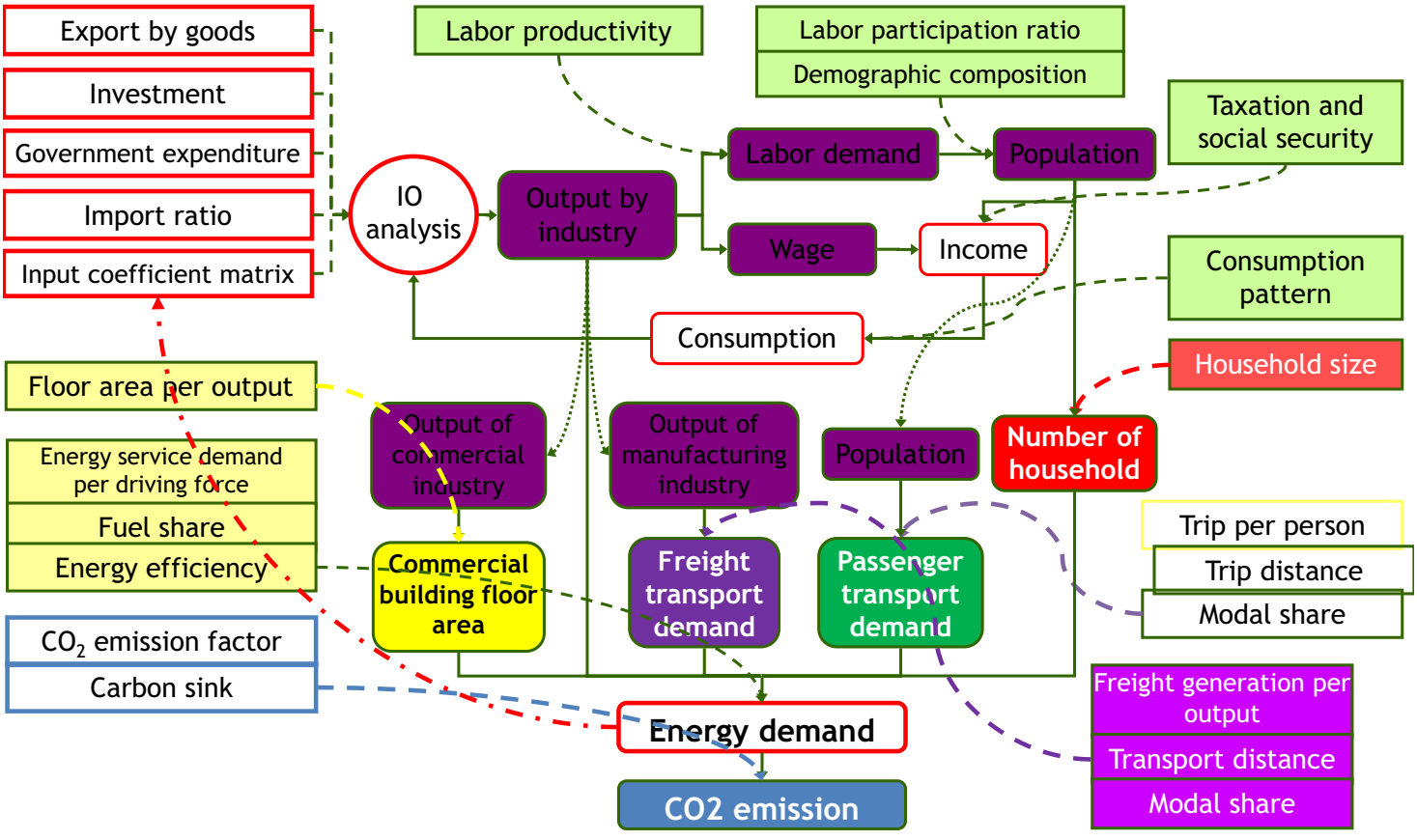
"To develop Iskandar Malaysia into a strong and sustainable metropolis of international standing"

	Year 2005	Projected (2025)
GDP (RM)	70 billion	325.5 billion
Per capita GDP (RM)	51,765	108,850
Employment	0.610 million	1.428 million
Population	1.4 million	3.1 million

Socio Economic Scenario of IM

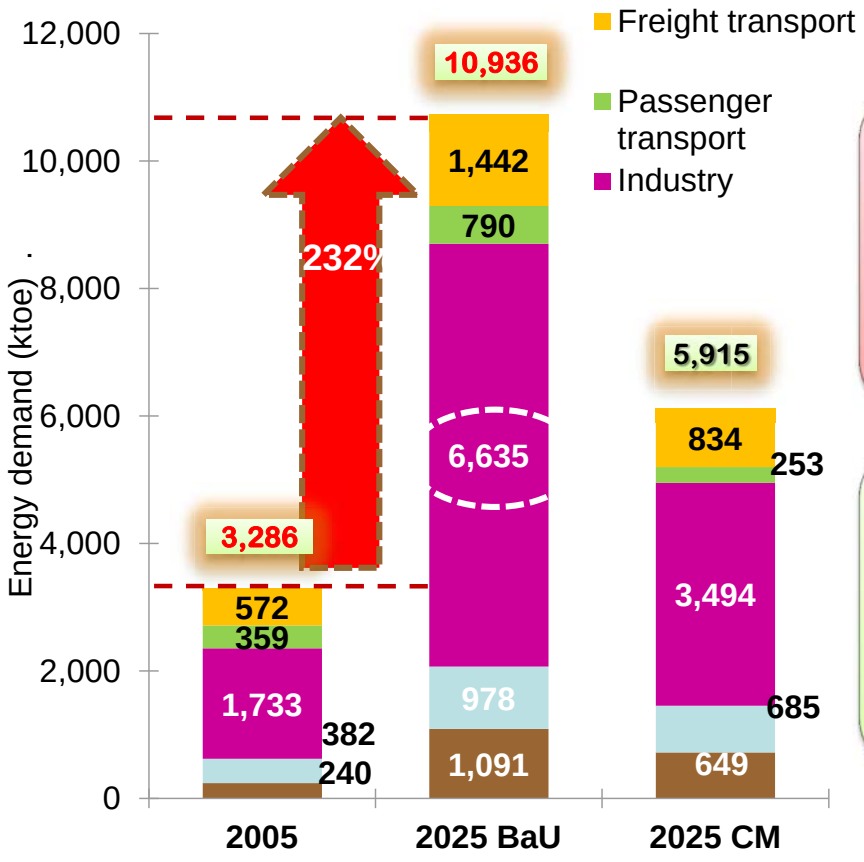
	222005	2025	2025/2005
Population	1,353,200	3,005,815	2.2
No. of households	317,762	751,454	2.4
GDP (mil RM)	37,641	176,224	4.7
GDP per capita (RM/capita)	27,817	58,628	2.1
Gross output (mil RM)	121,431	474,129	3.9
Primary industry (mil RM)	1,860	5,375	2.9
Secondary industry (mil RM)	83,502	263,444	3.2
Tertiary industry (mil RM)	36,069	205,309	5.7
Floor space for commercial (mil m^2)	6.8	19.3	2.8
Offices	1.3	1.7	2.9
Shops	5.7	16.3	2.9
Hospitals & Schools	0.6	1.2	2.1
Passenger transport demand (mil p-km)	3,816	8,677	2.3
Freight transport demand (mil t-km)	1,652	5,303	3.1

LCS scenario study using ExSS



Methodology developed by Shimada et.al (2006), Gomi et. Al (2007)

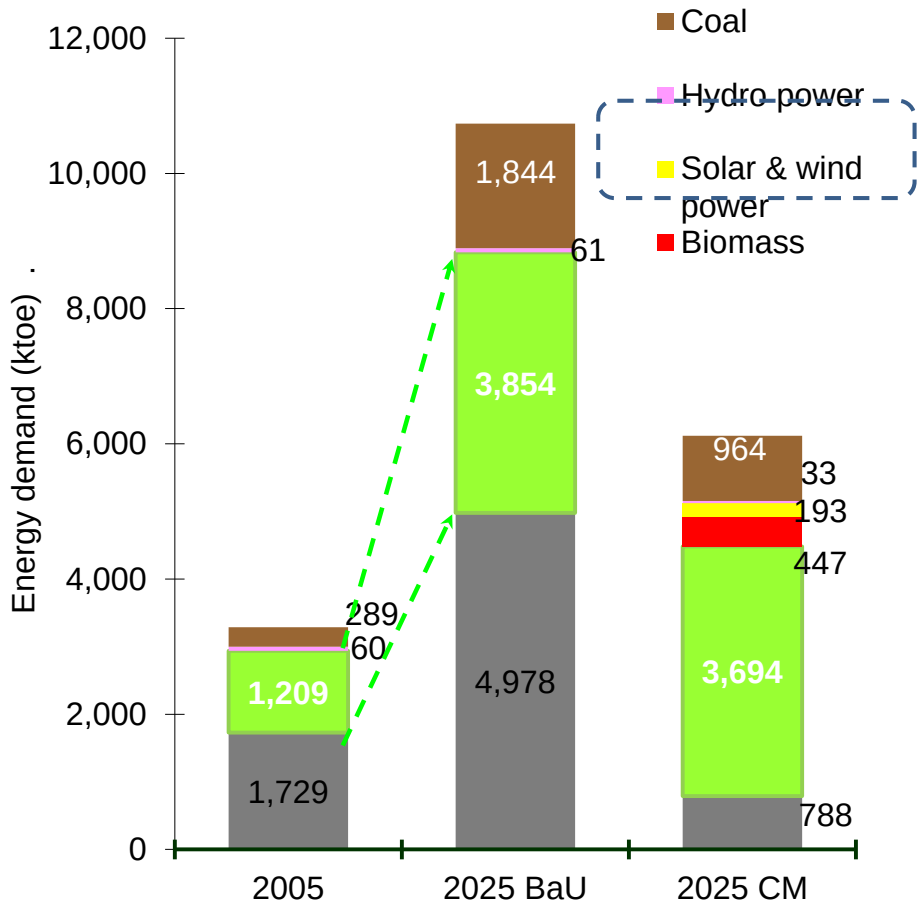
Energy Demand By Sector



Energy demand in IM is projected to increase from **3,286 ktoe** (toe: tonne oil equivalent) in 2005 to **10,936 ktoe** in 2025 for the BaU case (BaU: business as usual)

Industry is expected to be 6,635 ktoe and will maintain the largest share of 61%.

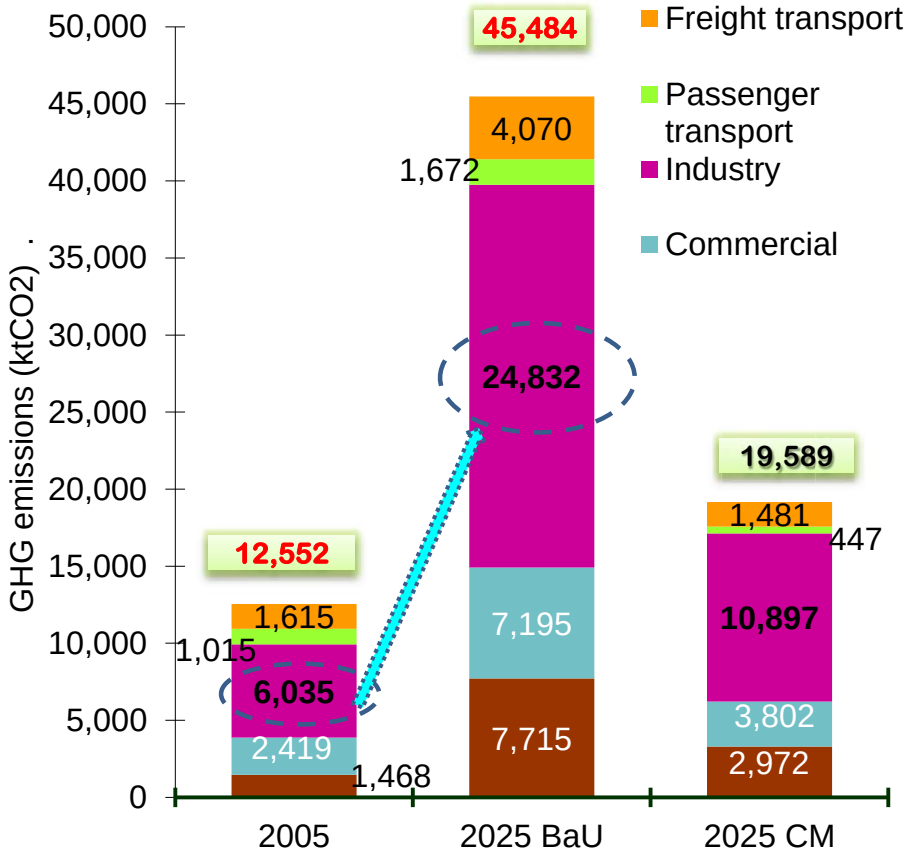
Energy Demand by Energy Sources



Increase in demand for **natural gas (3.2 times)** the consumption in 2005.

Energy sources such as **biomass, solar** and **wind power** will be newly introduced for primary energy in 2025 **CM case.**

GHG Emission By Sector

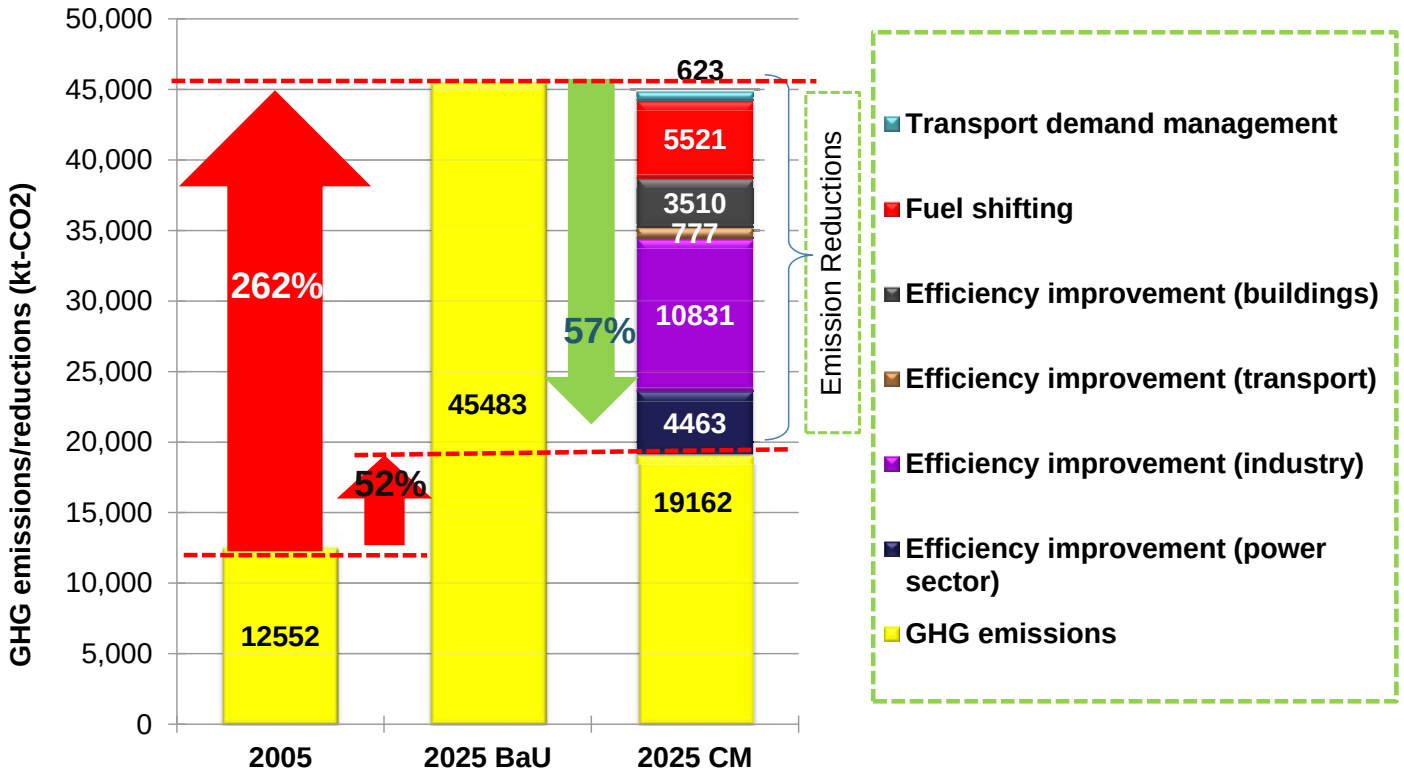


GHG Emissions in IM are projected to increase from 12,552 ktoe CO2 (2005) to 45,484 ktoe CO2 (2025 BaU)

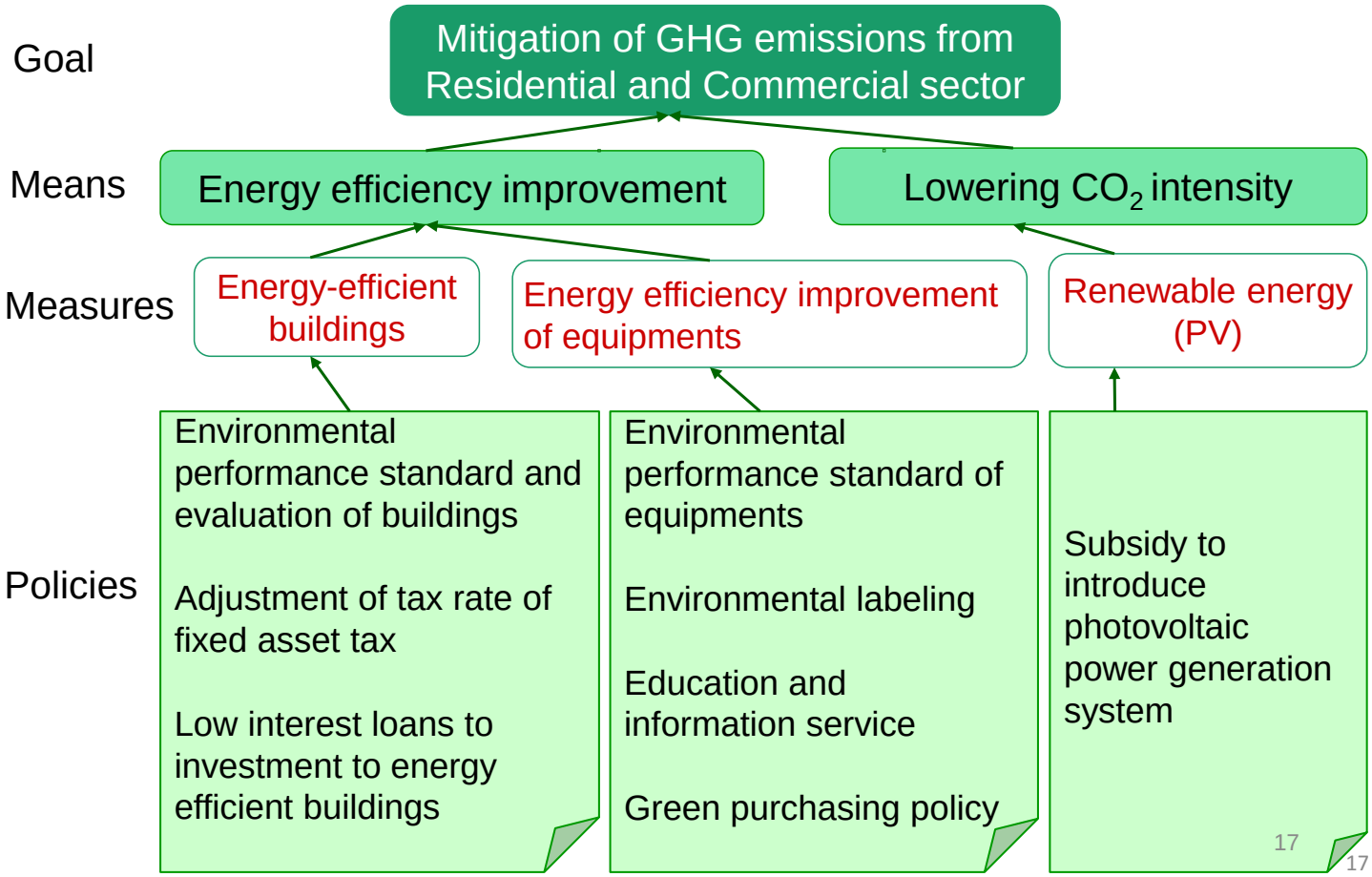
Industry Sector will increase 4.1 times in total as compared to 2004 in GHG emission . (54%of total GHG emission in 2025 BaU)

GHG emissions per capital : 9.3 tonnes of CO_2 /capita (2005) to 15.1 tonnes /capita (2025 BaU), with CM will be reduced to 6.5 tonnes of CO_2/capita.

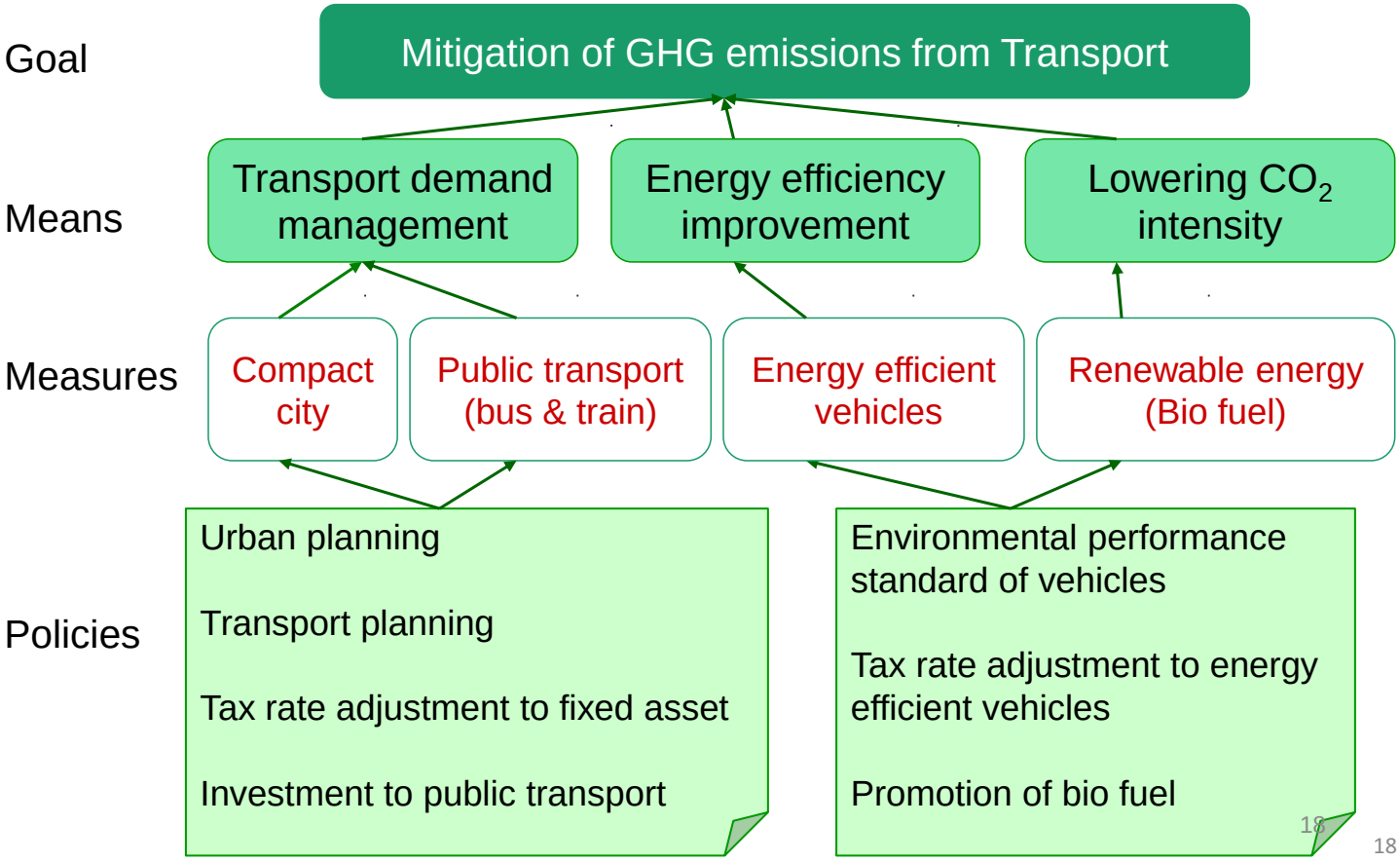
Potential Mitigation in IM



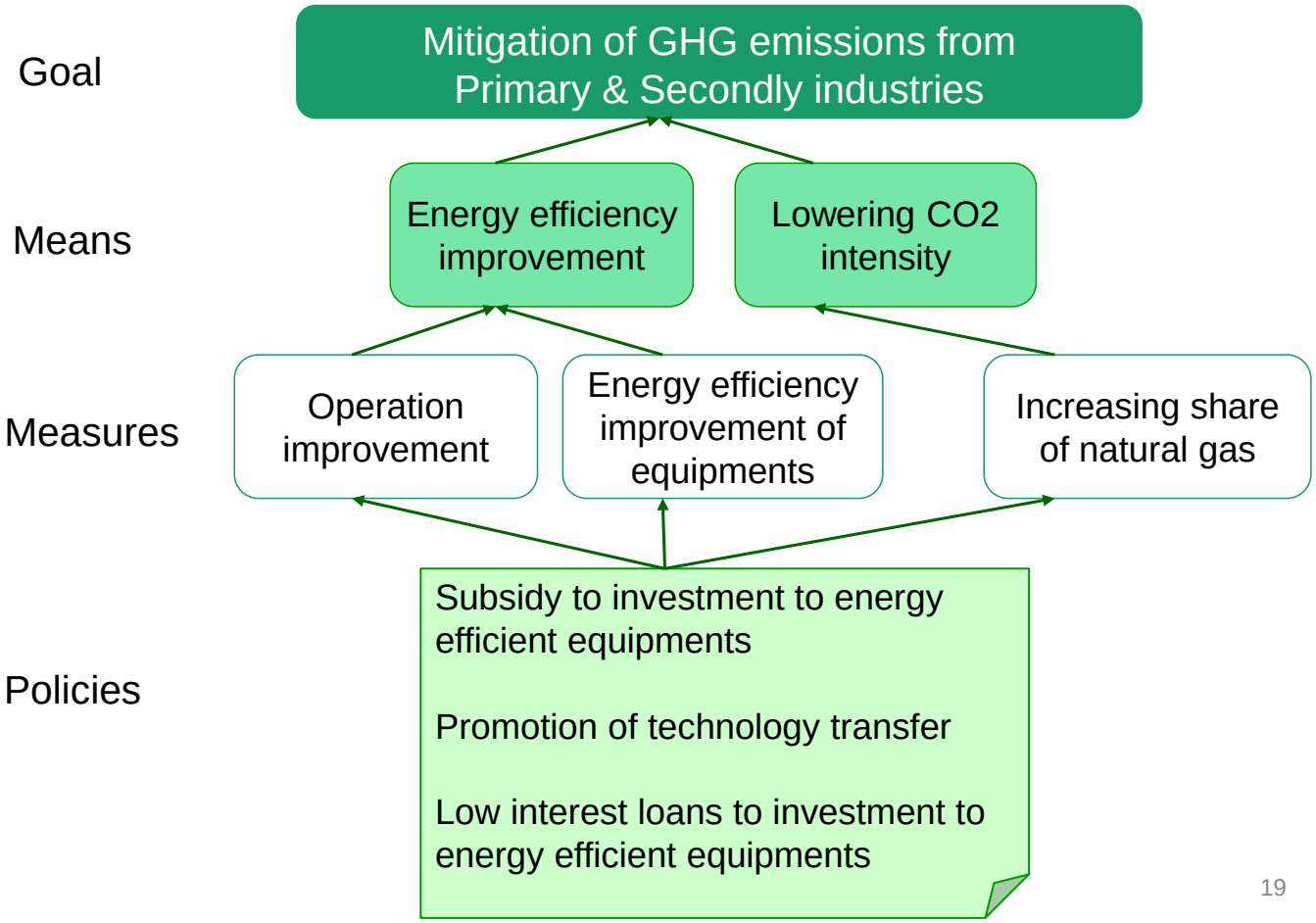
Mitigation measures and policies for buildings (residential and commercial)



Mitigation measures & policies for transport & land use



Mitigation measures & policies for industry



19

Low Carbon Cities Policy Package

Buildings

- •Environmental performance standard and evaluation of buildings
- •Adjustment of tax rate of fixed asset tax
- •Low interest loans to investment to energy efficient buildings

- •Environmental performance standard of equipments
- •Environmental labeling
- •Education and information service
- •Green purchasing policy

- •Subsidy to introduce photovoltaic power generation system

Transport & Land use

- •Urban planning
- •Transport planning
- •Tax rate adjustment to fixed asset
- •Investment to public transport

- •Environmental performance standard of vehicles
- •Tax rate adjustment to energy efficient vehicles
- •Promotion of bio fuel

Industry

- •Subsidy to investment to energy efficient equipments
- •Promotion of technology transfer

- •Incentive to introduce energy efficient equipments & buildings
- •Incentive to introduce renewable energy

- •Controlling urban growth & choice of transport mode

Energy efficiency improvement

Lowering CO_2 intensity

Transport demand control

Mitigation of GHG emissions from Iskandar Malaysia

Mitigation Measures

RESIDENTIAL & COMMERCIAL SECTOR

- Energy Efficiency (EE) Improvement (Buildings & equipments)
- Lowering CO_2 Intensity (Renewable Energy – Photovoltaic power generation system)

TRANSPORTATION (FREIGHT & PASSENGER)

- Transport Demand Management (Improvement of Public Transportation Sector)
- EE Improvement (Hybrid Vehicles)
- Lowering CO_2 Intensity (Renewable Energy- Bio fuel)

INDUSTRY & POWER SECTOR

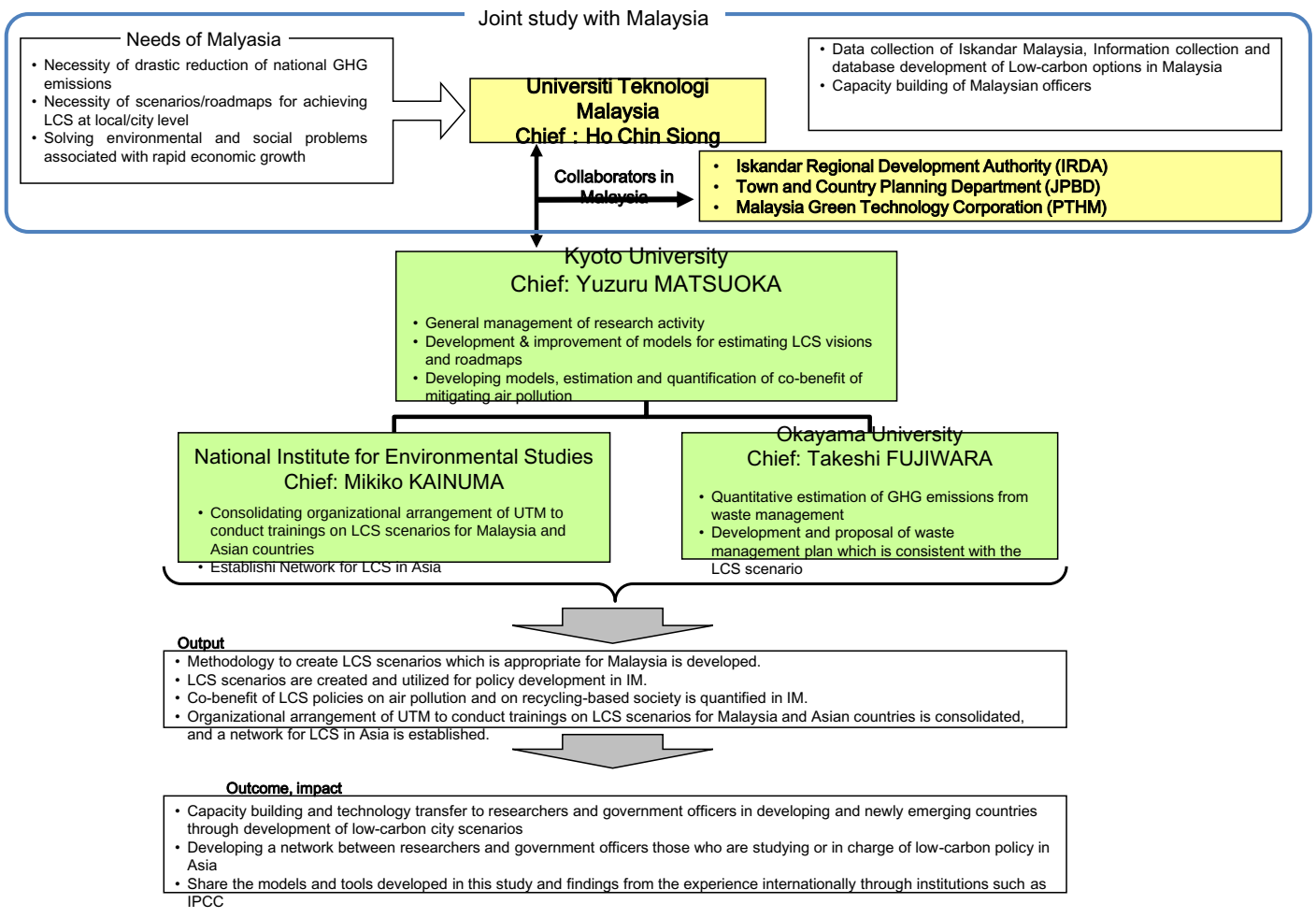
- EE Improvement – (Improvement in Operations & Equipment, Promotion of Technology Transfer)
- Lowering CO_2 Intensity (Increase share of Natural Gas Usage)

RESEARCH PROJECT SPONSOR

- SATREPS PROJECT
- STAKEHOLDERS
  - IRDA
  - TOWN AND COUNTRY PLANNING DEPARTMENT
  - MALAYSIAN GREEN TECHNOLOGY CORPORATION
  - UTM

What is the SATREPS (Science and Technology Research Partnership for Sustainable Development)

- **SATREPS is a research program intending to promote international joint research through collaborating Japan's advanced S&T and Official Development Assistance (ODA), as a symbol of promoting Science and Technology Diplomacy. It is conducted in collaboration between JST and JICA supported by Ministry of Education, Culture, Sports, Science and Technology (MEXT) and Ministry of Foreign Affairs (MOFA), Japan.**
- **This program is to entails promotion of international joint research targeting global issues and envisaging future utilization of research outcomes.**
- **Implemented through collaboration with Official Development Assistance (ODA), the aim of the program is to acquire new knowledge leading to resolution of global issues.**
- **Such international joint research under the program will also address the research and development of capacity and contribute to the sustained research activities in developing countries.**



GANTT CHART

Sub theme and Research Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1. Development of Low Carbon Society Scenario in Asian Cities					
1-1 Description of national level long-term low carbon society scenario		Completion of a long-term scenario			
1-2 Evaluation of energy systems as counter measures			Completion of an option database		
1-3 Development of low carbon society vision of regional / city level for 2030 , Iskandar (Malaysia)				Completion of a middle-term scenario	
1-4 Development of the policy road map toward low carbon society by back casting model (BCM)				Completion of a policy road map	
2. Quantitative estimation of the ancillary benefit of a low carbon society policies					
2-1 Quantitative estimation of the mitigation effect to the urban air pollution impact by a low carbon society policies				Quantitative estimation of the ancillary benefit to air pollution	
2-2 Optimization of solid waste management and quantitative estimation of co-benefit which suit with a low carbon society scenarios				The proposal of waste management system	
2-3 Model development and quantitative estimation on conquest of poverty and other social problem relevant to low carbon society policies				Quantitative estimation of the ancillary benefit to a social problem	
3. Detail analysis for policy implementation, and capacity building					
3-1 Compilation of the manual for development of low carbon city scenarios			Completion of a manual		
3-2 Implementation of the low carbon policies by collaboration with a local authorities.				Completion of concrete policies	
3-3 Organization of Asian Low Carbon City Network				The organization of the Network	

Project Purpose

- To develop Methodology for creating Low-Carbon Society scenarios
- To apply research findings and use the methodology and in Malaysia, and also to disseminate the ideas to other Asian countries.

2.0 Outputs

- To develop Methodology to create LCS scenarios which is appropriate for Malaysia
- To create LCS scenarios and incorporate LCS in the development plan for policy implementation in IM.
- To quantify the Co-benefit of LCS policies on air pollution and recycling-based society in IM.
- to conduct trainings on LCS scenarios in UTM for urban managers/researchers from Malaysia and other Asian countries
- To establish a network for LCS in Asia

Conclusion

1. LCS Scenario development needs national vision and political/ society commitment and input.
2. The use of model to quantify this vision into quantifiable variables – AIM model from NIES and Kyoto University
3. Data collection and Support of experts in modelling exercise – Capacity building
4. To realize a LCS, IM has to have new and bold policies to encourage and promote businesses and citizens have to take countermeasures to lower the emissions levels.

THANK YOU FOR THE ATTENTION.

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A GREEN-FOCUSED AGENDA FOR ISKANDAR MALAYSIA: Towards a Low Carbon Society

by

Mr. Boyd Dionysius Joeman

(Iskandar Regional Development Authority (IRDA))

A GREEN-FOCUSED AGENDA FOR ISKANDAR MALAYSIA:
Towards a Low Carbon Society

LCS Bangkok
19 Nov 2010

Boyd Dionysius Joeman
VP Environment Planning
Integrated Planning Division
19 November 2010

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

Presentation Outline

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

Malaysia
Johor State
Iskandar Malaysia

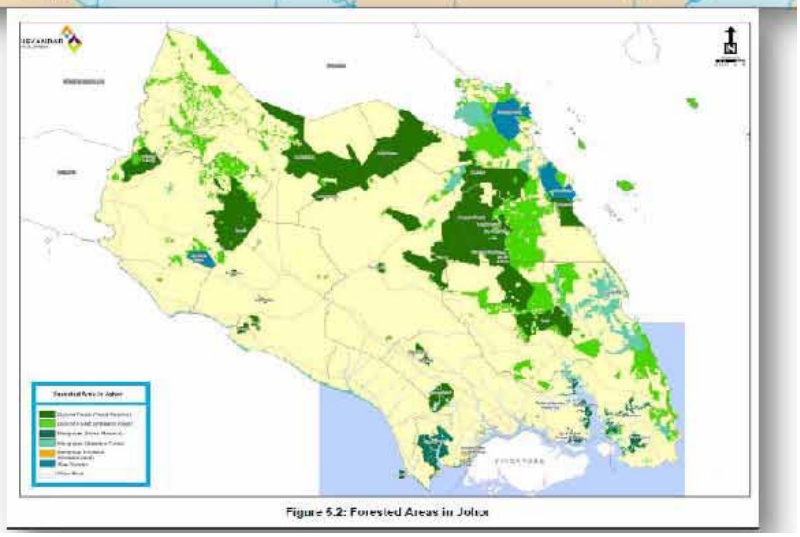


Figure 5.2: Forested Areas in Johor

Introduction: Malaysia's Economic Corridors

Established: 2006
Focus areas: 9 Pillars
5 existing economic clusters;
4 new service sectors

ISKANDAR MALAYSIA

Established: 2007
Focus areas:
Agriculture, Manufacturing & Tourism

KORIDOR UTARA

Established: 2007
Focus areas:
Agriculture, Biotech, Tourism & Logistics

SABAH DEVELOPMENT CORRIDOR

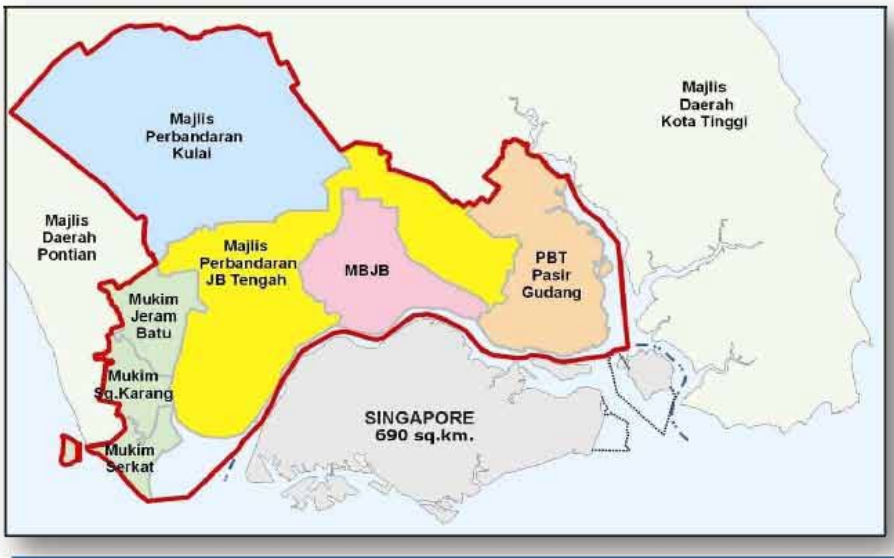
SARAWAK CORE
CORRIDOR OF RENEWABLE ENERGY

Established: 2008
Focus areas:
Oil-based, Aluminum, Steel, Glass, Tourism, Palm Oil, Timber, Livestock, Aquaculture, Marine Engineering

EAST COAST ECONOMIC REGION

Established: 2008
Focus areas:
Oil & Gas, Tourism, Petrochemical, Manufacturing, Education, Agriculture

Geographical Coverage of Iskandar Malaysia



Area:

- 2,217 km² / 550,000 ac.
- 3 times the size of Singapore
- **Pop: 1.4 million (2009) to 3m by 2025**
- 5 Local Authorities within IM

Region	Area (km²)	Population (million)
Iskandar Malaysia	**2,217**	**1.4 (Projected 2025: 3.0 million)**
Singapore	690	4.1
Dubai	3,885	1.2
Hong Kong	1,095	6.9

Presentation Outline

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

1. Brief Introduction to Iskandar Malaysia
2. The IM environment
3. IRDA's Roles and Responsibilities
4. IM: Issues and Challenges
5. IRDA's Proposed Actions for LCS
6. IRDA's Blueprints on LCS
7. Essential Mechanisms to achieve LCS
8. Summary & Conclusion

Iskandar Malaysia – Wealth of Environmental Features and Scenic Beauty

ISKANDAR
REGIONAL
DEVELOPMENT
AUTHORITY

Iskandar Malaysia – Characteristics

- Picturesque landscapes, architectural and historic features, visual expanse of green, fishing villages and coastal settlements.
- 3 Ramsar sites (of 6 in Malaysia); Forest reserves; other forests & mangroves: Carbon Sinks; REDD+

Pressures and threats for change emanating from development demands – economic development; tourism and countryside recreation; transport corridors; industry

Crucial: Continuing protection, conservation and enhancement

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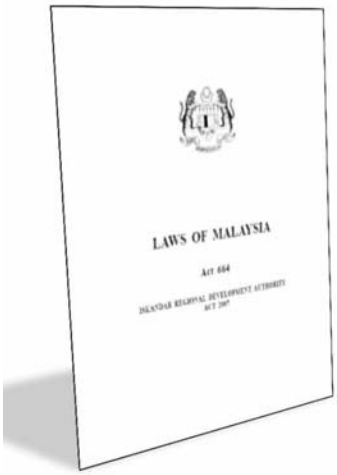
IRDA's Roles and Responsibilities

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

- As a regulatory authority, IRDA's roles and responsibilities are to Plan, Promote and Facilitate development in Iskandar Malaysia. IRDA was formed on 23rd February 2007.



IRDA ACT 664

PLAN
- Master Planning (inclusive of Social Planning)
- Economic Planning Clusters
- Recommend policies, laws, actions and incentives

PROMOTE
- Brand guardian of Iskandar Malaysia as an investment destination
- Promote private & public investments in IM
- Disseminate information to investors and public

FACILITATE
- Monitor and align sector developments
- Coordinate and monitor enabler developments
- Principal coordinating agent for approval

Iskandar Malaysia Development Strategy

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

Vision

A Strong Sustainable Metropolis of International Standing

Five Strategic Pillars

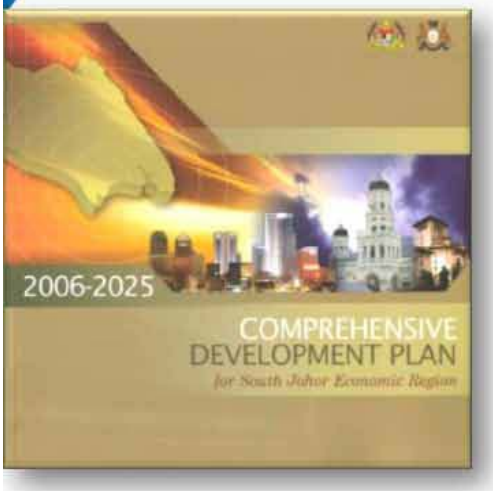
1. International Rim Positioning
2. Economic Drivers & Catalyst Projects
3. Socio Economic Equity
4. Institutional Framework & Regulatory Authority
5. Infra-structure Enablers

Three Foundations

- Equitable & Fair Distribution Among Stakeholders
- Growth and Value Creation
- Nation Building

Comprehensive Development Plan 2006-2025

The CDP is the principal document to guide IM's economic, social, physical development and environmental planning and management toward the establishment of a "strong, sustainable metropolis of international standards".

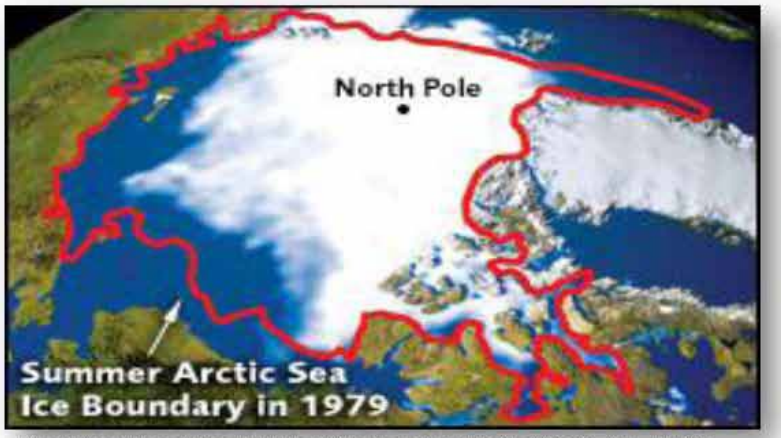


Downloadable at
www.iskandarmalaysia.com.my

DEVELOPMENT STRATEGIES:

- ❑ Balanced Development
- ❑ Protect and Conserve Nature, Historic and Open Spaces
- ❑ Focused Development at Areas with Existing & Adequate Infrastructure
- ❑ Promote Infill & Redevelopment
- ❑ Enhance Accessibility
- ❑ Promote Key Economic Areas as Focal Point For Growth
- ❑ Manage Regional Growth
- ❑ Plan for Innovative & Sustainable Infrastructure & Utilities
- ❑ Promote Planned Communities which produce Quality and Sustainable Neighbourhoods

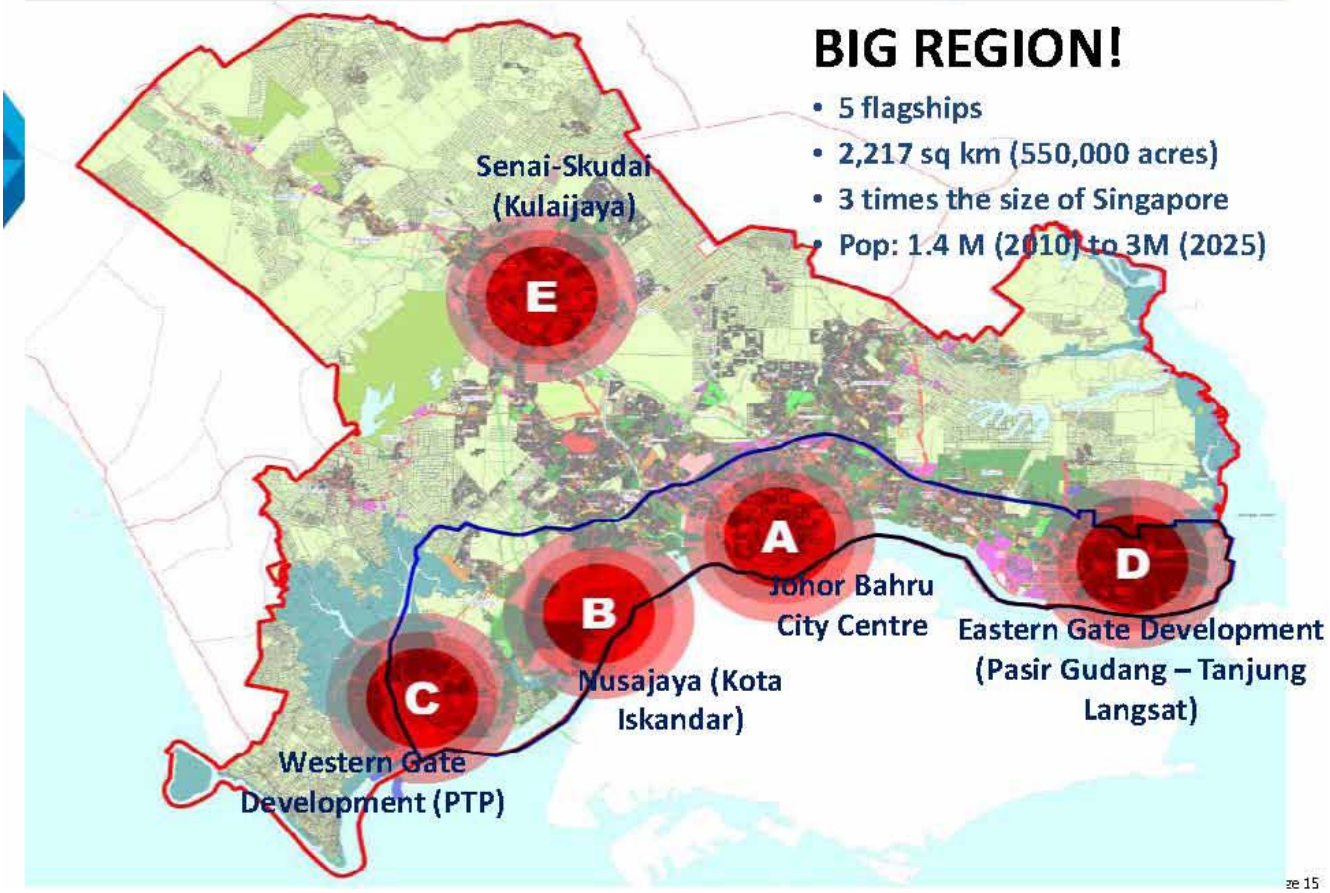
Global Issues/regional/local impacts



Red line was the summer ice boundary in 1979; the white area in 2009

Indonesia – Land clearing; Haze in Malaysia and Singapore

Environmental Issues in IM today



GHG emission reduction for Malaysia

"Malaysia is adopting a voluntary national reduction of up to 40% in terms of GDP emission intensity by 2020 compared with 2005 levels."

YAB Dato' Seri Mohd Najib Tun Abdul Razak,

COP 15 Copenhagen December, 18 2009

Issues and Challenges for IM

1. Rapid sprawling developments; car-centred cities and towns
2. Threats to designated sites; degradation of natural areas and pocket open spaces in towns
3. High private car ownership & high dependence on fossil fuels e.g. vehicles, goods movements
4. Limited recycling culture; apathy; high dependence culture
5. Low efficiency appliances

Presentation Outline

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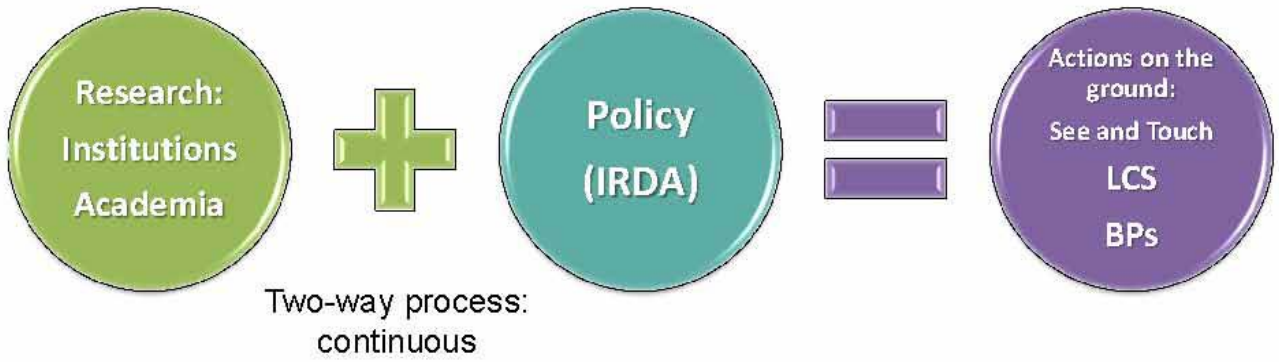
IM's aspirations from the LCS Study

- How will the LCS Scenarios (AIMs) help to reduce IM's CO_2 emissions between 30-50% by 2025?
- How do we translate the results obtained from the scenarios into policies and proposals for actual action?
- How will the results enhance IRDA's blueprints?
- What do IRDA and stakeholders need to do in order to achieve the target?
- How do we implement the results – when, where, who?

Effective & Efficient combination for Iskandar Malaysia and for the LCS Study



Establishing a framework of LCS scenario for IM

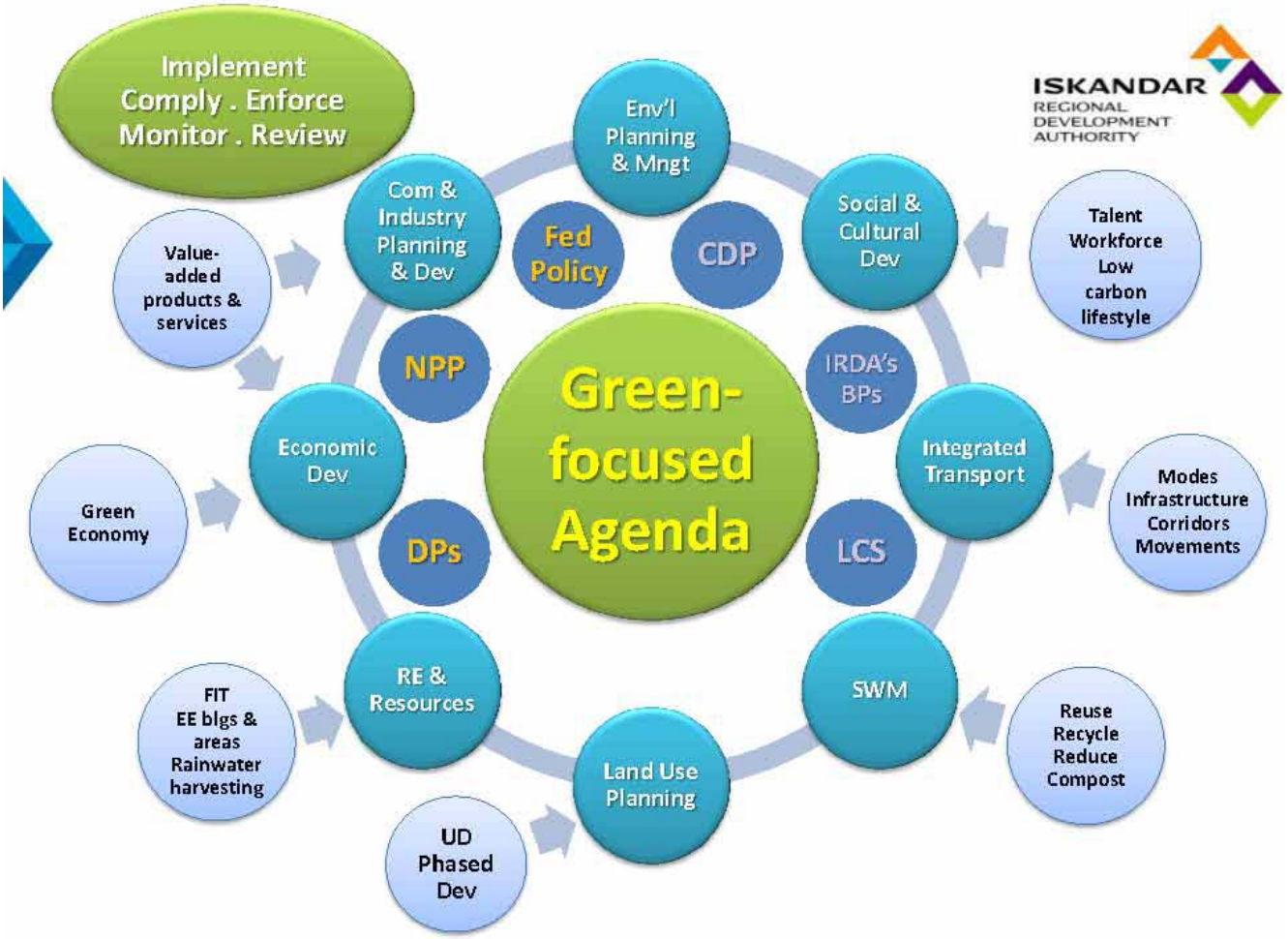
Item	Description
Region	Iskandar Malaysia 2,217 sq. km (550,000 acres)
Base yr/Target yr	2005 and 2025
Sectors/elements to be considered	Commercial, Industry, Transport, Residential, Power Supply City, Town, Natural Environment, Buildings
Emissions	CO_2 from fuel combustion Emissions from power sector to final energy demand sector Output from buildings e.g. aircon, electricity
Proposed targets	Between 30-50% reduction of CO_2 emission intensity of GDP by 2025, compared to 2005 levels.

Malaysia: Driving Forces of our Federal Policy

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

1MALAYSIA
PEOPLE FIRST
PERFORMANCE NOW

- Government Transformation Policy
- Tenth Malaysia Plan 2011-2015 (10MP)
- National Key Results Areas (NKRAs).
- New Economic Model (NEM) – towards a High Income Economy
- Climate Change and Innovation Policies – setting up of the Ministry of Energy, Green Technology and Water (KeTTHA) & Ministry of Science, Technology and Innovation



ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

To achieve Low Carbon Society status by 2025, what do we need to do?
IRDA's Proposed Actions:

- Action 1: Walkable/Liveable/Green City
- Action 2: A Green Environment/nature conservation
- Action 3: Low Carbon Lifestyle
- Action 4: A Green Economy
- Action 5: Integrated Transportation
- Action 6: Energy-efficient buildings
- Action 7: Land Use Planning
- Action 8: Securing Funding

Presentation Outline

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IRDA Blueprints that promote Low Carbon Society

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

IM Vision: "A Strong, Sustainable Metropolis of International Standing"

Environmental Planning Blueprint: *5 Principles, 7 Strategies & 66 Initiatives*

ISKANDAR MALAYSIA

Environmental Principles

EPB Principle 1 :
Integration of Environment and Development

EPB Principle 2:
Common but Differentiated Responsibility

EPB Principle 3:
Precautionary Principle

EPB Principle 4:
Pollution Prevention

EPB Principle 5 :
Polluters Pay Principle

Environmental Thematic Areas

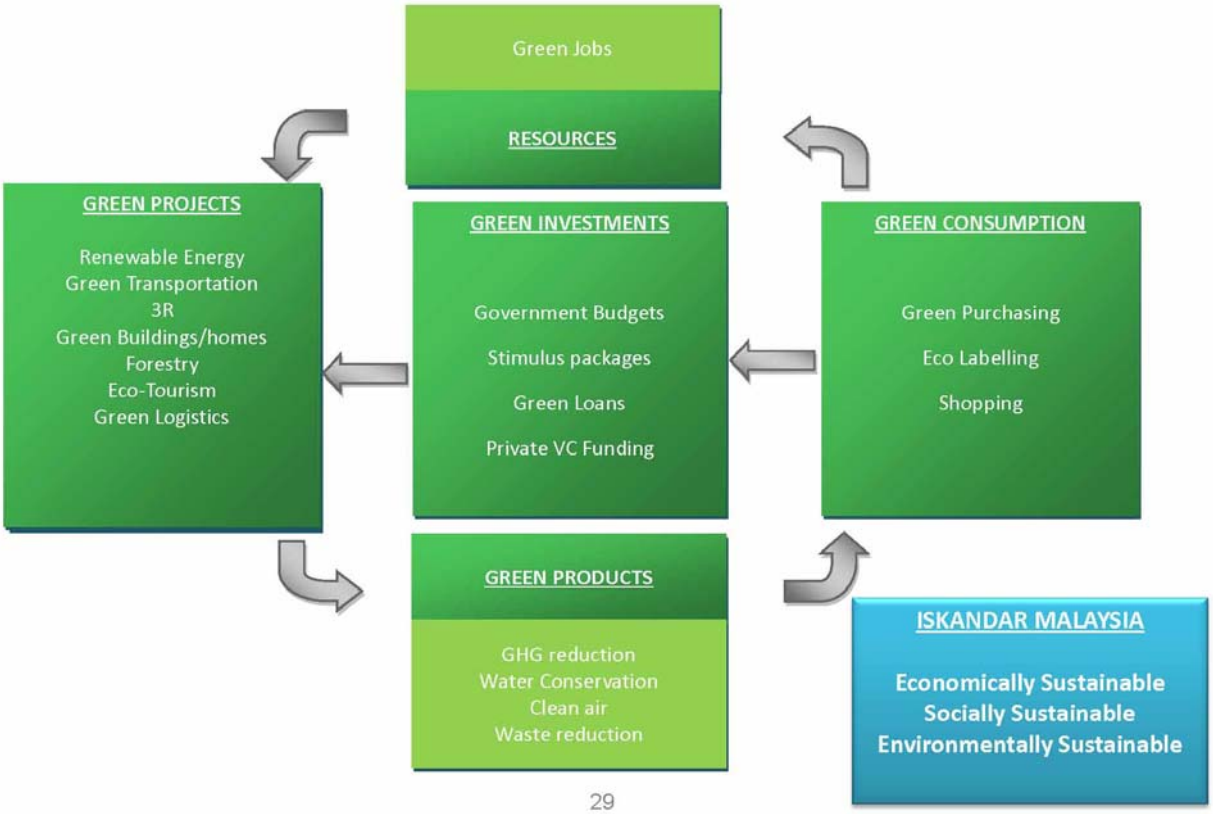
1. Biodiversity and Habitat Management
2. Climate Change Management
3. Air Quality Management
4. River Water Quality Management
5. Geo-Terrain, Soil & Groundwater Management
6. Green Economy
7. Environmental Governance

Environmental Planning Blueprint: *66 Initiatives*

ISKANDAR MALAYSIA

No	Environmental Planning Blueprint Thematic Area	Code	Initiatives	Priority
2	**CLIMATE CHANGE MANAGEMENT**			
	Policy: Integrate and enhance climate change responses within developments in IM Strategy: Climate change management within IM shall adopt a Proactive Approach Objective: To achieve lower emissions of greenhouse gases Targets: • The energy from renewable sources must be at least 15% by 2020 • All public transport buses must be converted to cleaner CNG buses • All diesel transportation vehicles (other than buses) used by IRDA, local councils and the Johor State Government must use biodiesel • The carbon intensity target in IM must be a minimum of 40% • The recycling rate within IM to be increased from the current 3-5% to 40% by 2013	EPB2-1	Prepare an Integrated Climate Change Action Plan.	Moderate
		EPB2-2	Promote Renewable Energy By Installing A Pilot Solar Powered Air Conditioning System.	High
		EPB2-3	Phase Out The Use Of Diesel Public Buses By Either Replacing Or Retrofitting To A CNG Buses.	High
		EPB2-4	Establish A Pilot Composting Plant At Tanjung Langsat Landfill.	High
		EPB2-5	Establish a Model Green Building in IM.	Moderate
		EPB2-6	Formulate Green Shipping Policies For Ships Coming Into PTP, Johor And Tanjung Langsat Ports.	Low
		EPB2-7	Implement A Carbon Offsetting Programme For The Incoming And Outgoing Flights At The Senai Airport.	Low
		EPB2-8	Improve The Energy Efficiency In Local Authority Buildings By Conducting Energy Audits.	Low
		EPB2-9	Establish a GHG Inventory Database in IM.	Moderate
		EPB2-10	Integrate Climate Change Management in Development Planning.	Moderate

Green-focused Agenda: Green Economy Framework

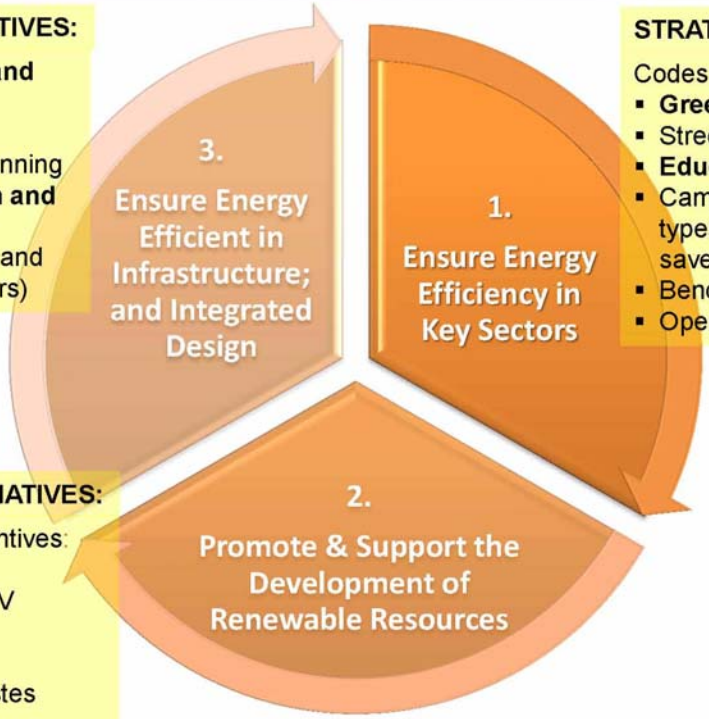


Renewable Energy & Energy Efficiency Blueprint: Proposed initiatives and action plan: *3 main strategies and 16 initiatives*

ISKANDAR MALAYSIA

STRATEGIC INITIATIVES:

- **District cooling and ice-storage**
- Co-generation
- GIS for spatial planning
- **Transport design and policy**
- Integrated design and renovation (clusters)



STRATEGIC INITIATIVES:

Codes and standards:

- **Green building index**
- Street lighting
- **Education programmes**
- Campaigns (labeling, types of appliances that save energy, good habits)
- Benchmarking
- Operation & maintenance

STRATEGIC INITIATIVES:

IM's own FIT incentives:

- **Solar farms**
- Rooftop solar PV
- **Mini-hydro**
- MSW
- Agricultural wastes
- Liquid wastes

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Essential Mechanisms

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

"Do you Iskandar Malaysia?"
Old habits die hard! Changed Mindset!
How much do we care for our planet?

ISKANDAR REGIONAL DEVELOPMENT AUTHORITY

IRDA: Promote, lead and work closely with our Malaysian and Japanese teams in order to realise the aims and objectives of the Low Carbon Society project.

IRDA: Duty to protect our natural assets and resources, promote a green economy, integrate transportation, promote renewable energy, practise being green, reduce pollution, work towards zero waste, ensure that buildings are energy-efficient.

IRDA: Will transform how we shop, work, drive, rest and play. we will address and tackle GHGs and climate change.

Everyone must play a part; work together towards a common goal, i.e. achieving low carbon for all our societies.

Summary & Conclusion

1. The LCS Project for Iskandar Malaysia – timely, anticipated & needed.
2. We know what we want: "strong, sustainable metropolis of international standing". We have a robust development plan.
3. IM will help Malaysia achieve our PM's target of up to 40% reduction in CO_2 emission by 2020. IM proposes a target reduction of between 30-50% by 2025.
4. IRDA's Blueprints esp. EPB, RE, GBI, SWM and ACS, assist in achieving low carbon status. The LCS Project will enhance the BPs.
5. The LCS will support and enhance IRDA's Green-focused Agenda where the environment is at the centre of our development and conservation policy.
6. We will develop IM with our aspirations of a place to invest, work, live and play; as reflected in our proposed Action Plans for a Low Carbon Society.

ISKANDAR
REGIONAL
DEVELOPMENT
AUTHORITY

Thank You

invest, work, live and play

Extended Snapshot Tool& AIM/ExSS Exercise by participants

by

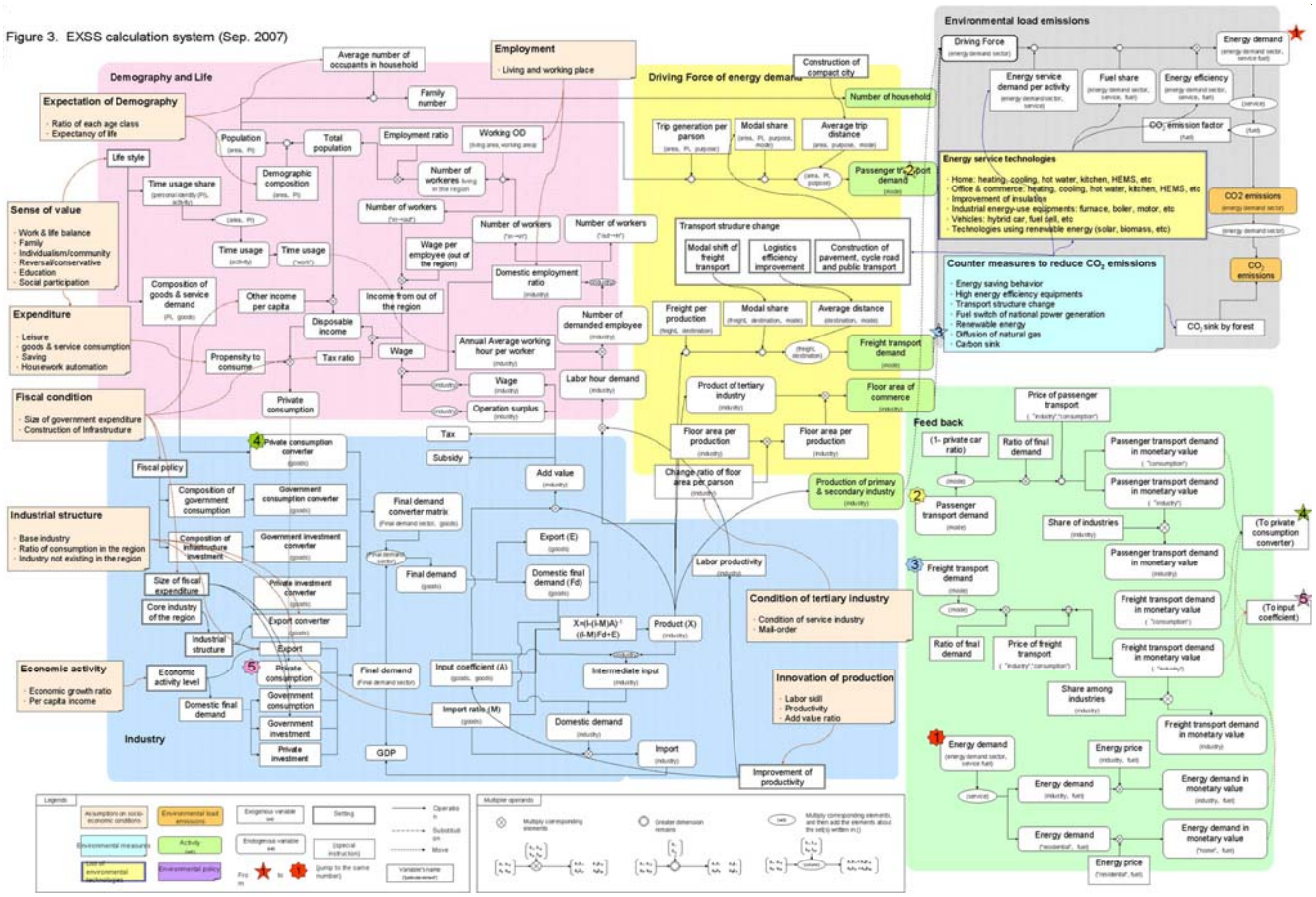
Dr. Kei Gomi (Kyoto Univ.)

Extended Snapshot Tool

19th Nov. 2010 Bangkok, Thailand
Kei GOMI
Kyoto University

What is ExSS?

- Extended Snapshot Tool
- A static model consists of simultaneous equations with about 6000 variables
- GAMS program
- Describe Socio-economic activity, energy consumption and CO2 emissions quantitatively and consistently
- Determine introduction of Low-carbon measures required to achieve certain level of emission target
- Extendable to Agriculture, Forestry, Land-use change, Waste disposal, Air/Water Pollution, etc.



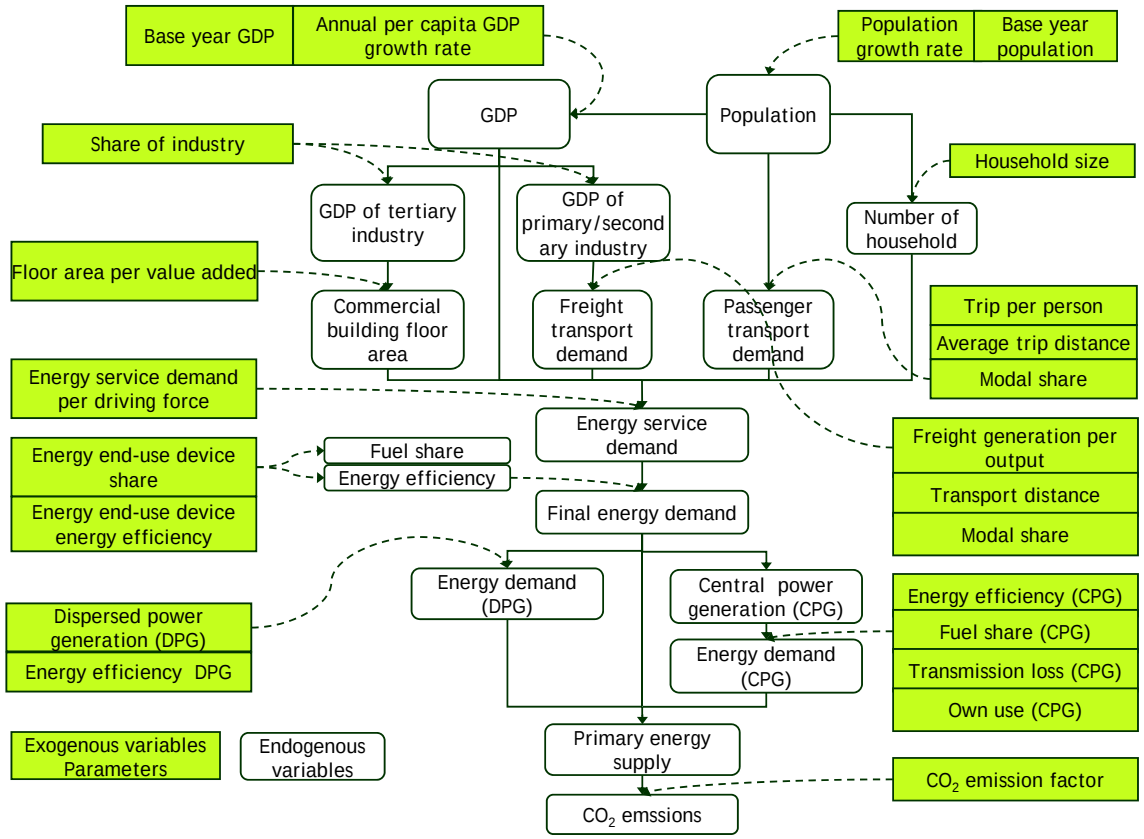
Necessary information

- Base year data
  - Population and Household
  - Input Output table (or, regional economic accounting)
  - Transport demand (Passenger & Freight)
  - Building
  - Energy demand
  - Energy supply
  - etc
- Reference for future scenario
  - Population projection
  - Economic projection / planning
  - Transport planning
  - Energy strategy
  - Potential of renewable energy
  - etc

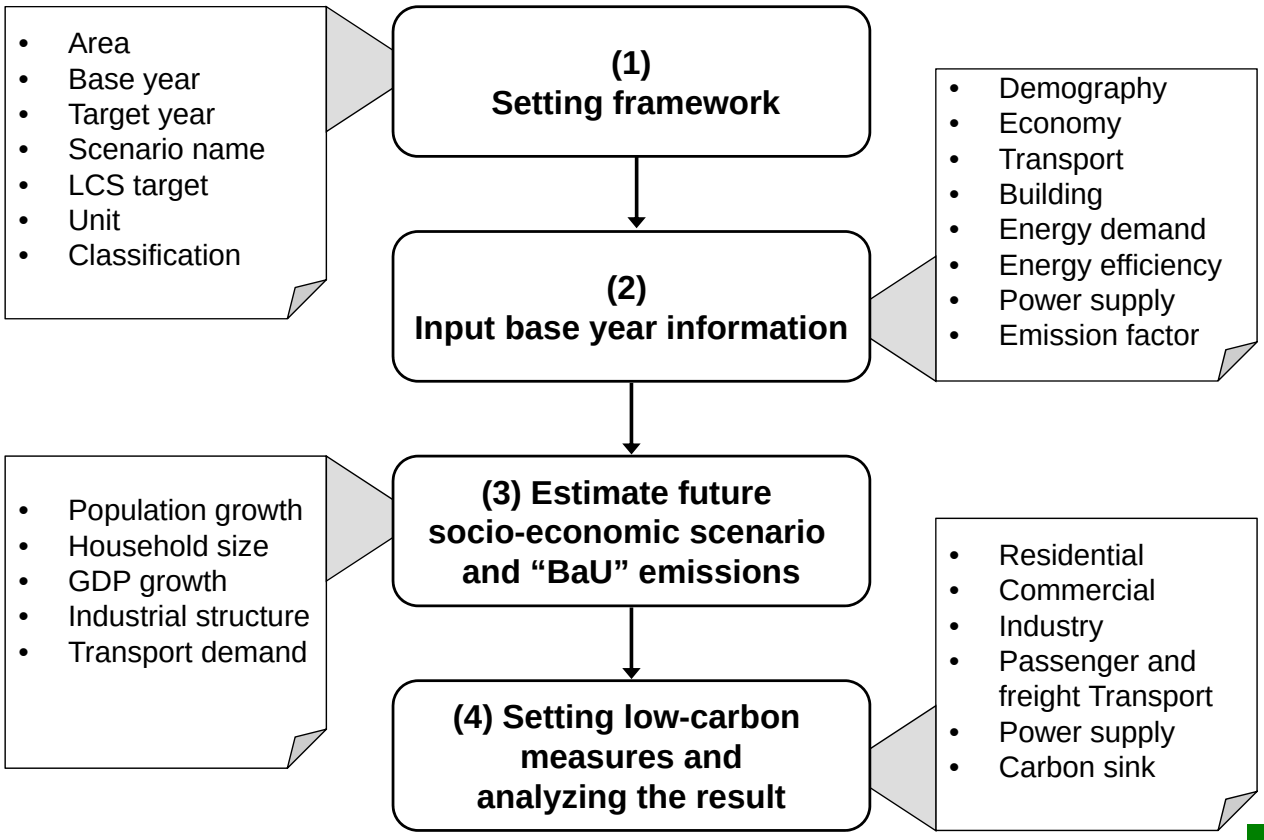
ExSS Demo Version

- Simplified version of ExSS
- Similar structure with full version
- An Excel file
- For demonstration and training

Structure of ExSS Demo Version



Four Steps



Today,

- Using ExSS Demo Version
- With Thailand data
- Input parameters based on socio-economic assumptions
- Estimate BaU (business as usual) emissions
- Try to achieve an emission target
- Q&A

Application of ExSS to Ratchaburi LCS scenarios development

by

Dr. Savitri Garivait and Dr. Penwadee Cheewapongphan (JGSEE-KMUTT)

Application of ExSS to Ratchaburi LCS scenarios development

Low-carbon society model capacity building workshop

- Bridge simulation scenarios and sustainable LCS policy implementation using AIM (Asia-Pacific Integrated Model) -

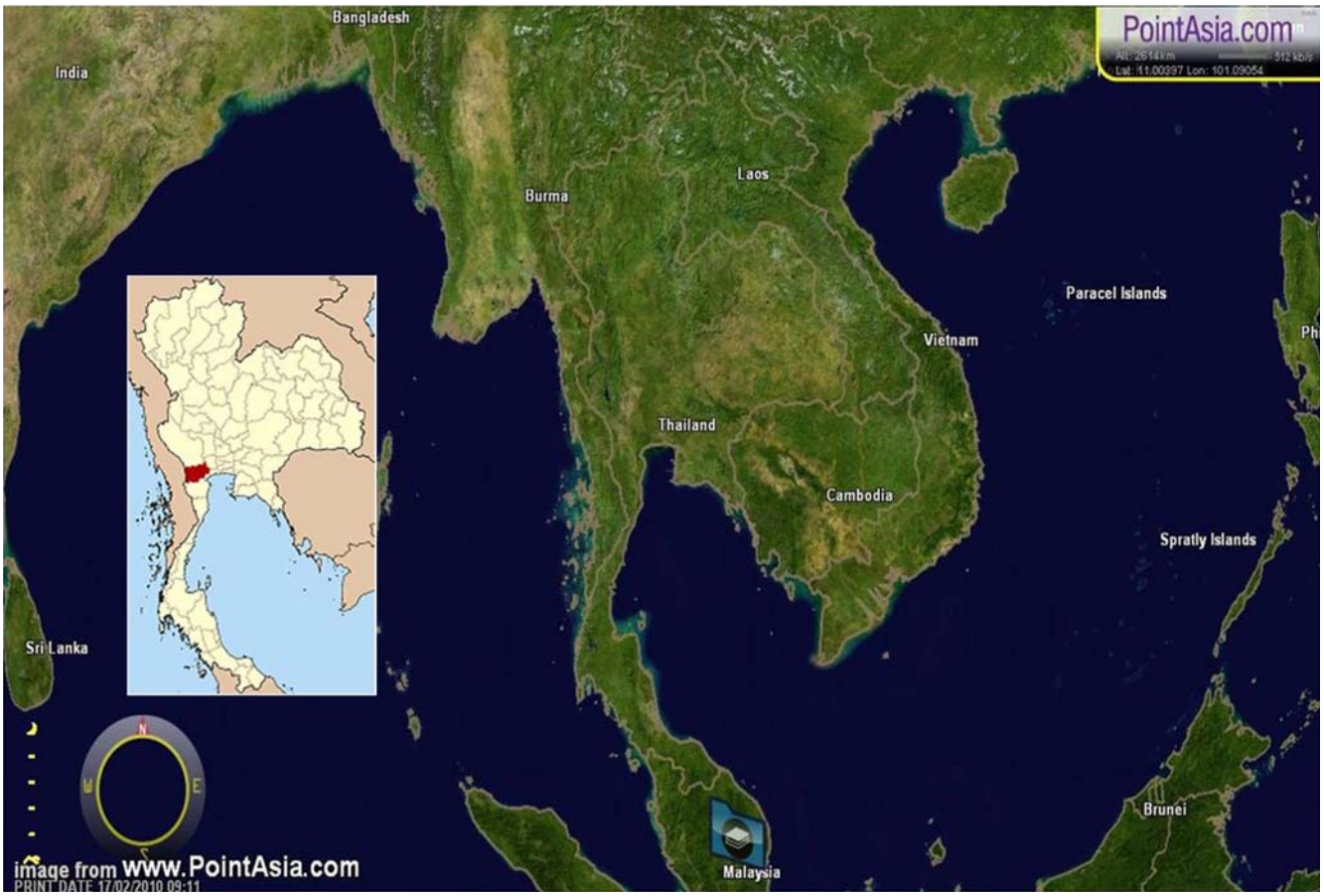
Savitri Garivait and Penwadee Cheewaphongphan

19 November 2010
Hotel Pullman
Bangkok, Thailand

JGSEE
The Joint Graduate School of Energy and Environment

KMUTT

Thailand



Ratchaburi

Location

latitudes 13º32’15” N
longitudes 90º49’09” E

Climate SW monsoon with very dry zones

Mean Annual Temperature 21-38ºC

Average Annual Precipitation

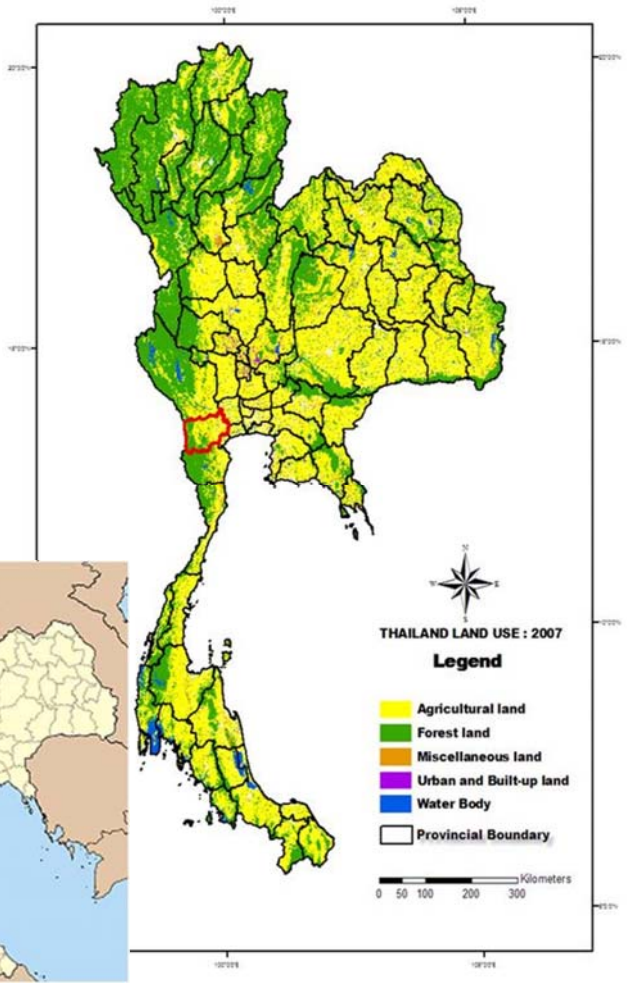
1,303 mm (131 days)

Population 2000 (2009)

791,217 (837,383) = 1.2% nat.

Total Land 5,196.5 km^2

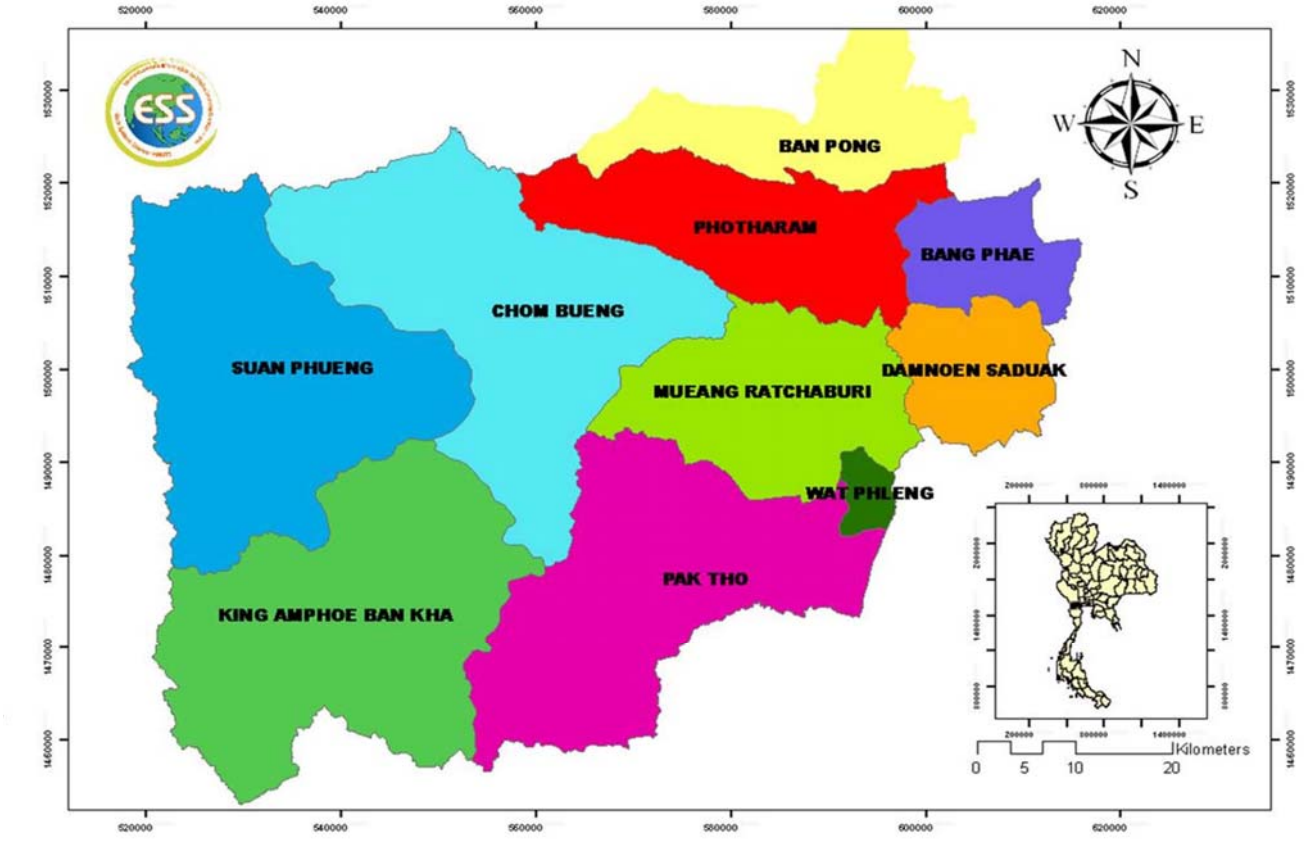
(about 1% of the country)



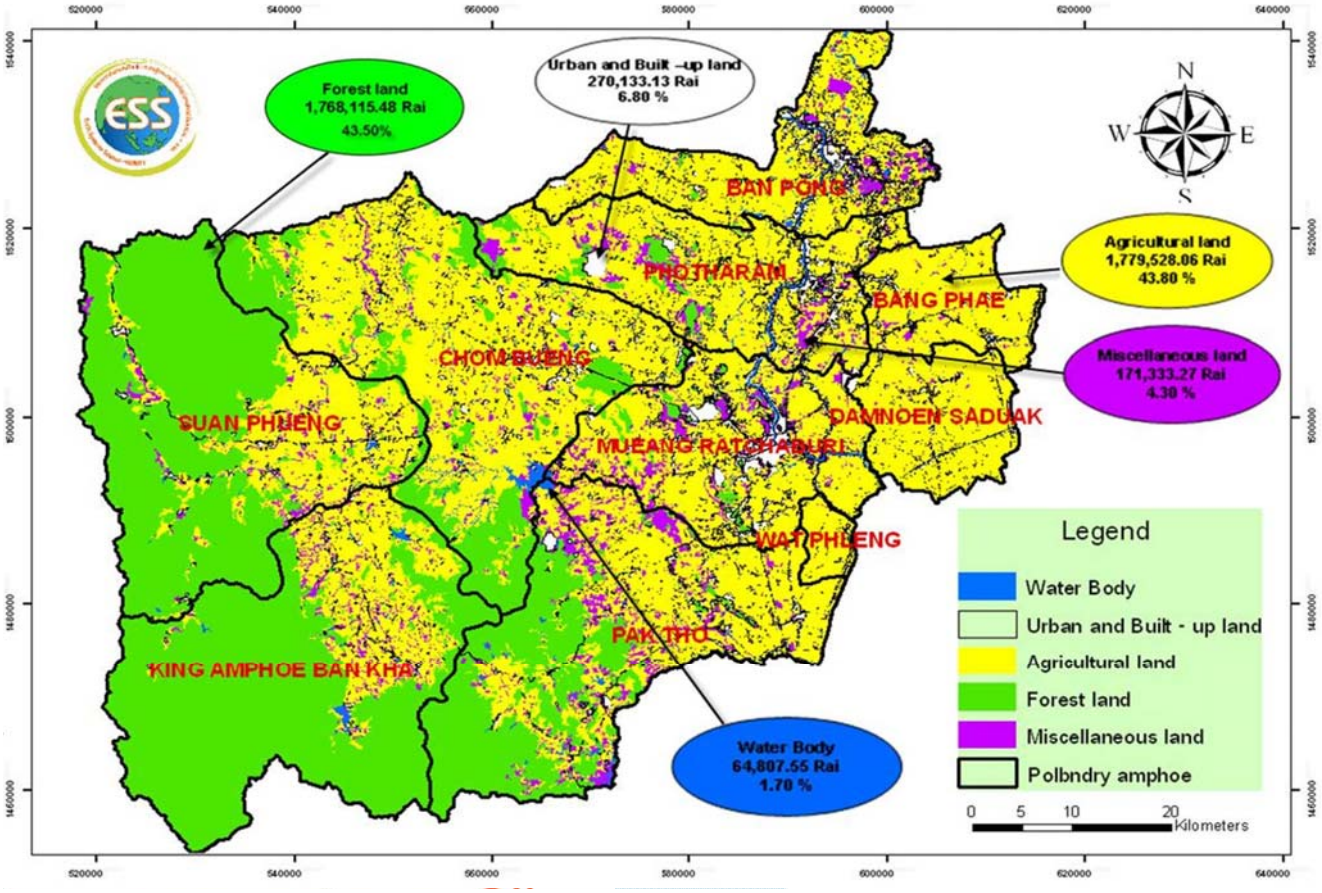
JGSEE
The Joint Graduate School of Energy and Environment

KMUTT

Ratchaburi - Administration

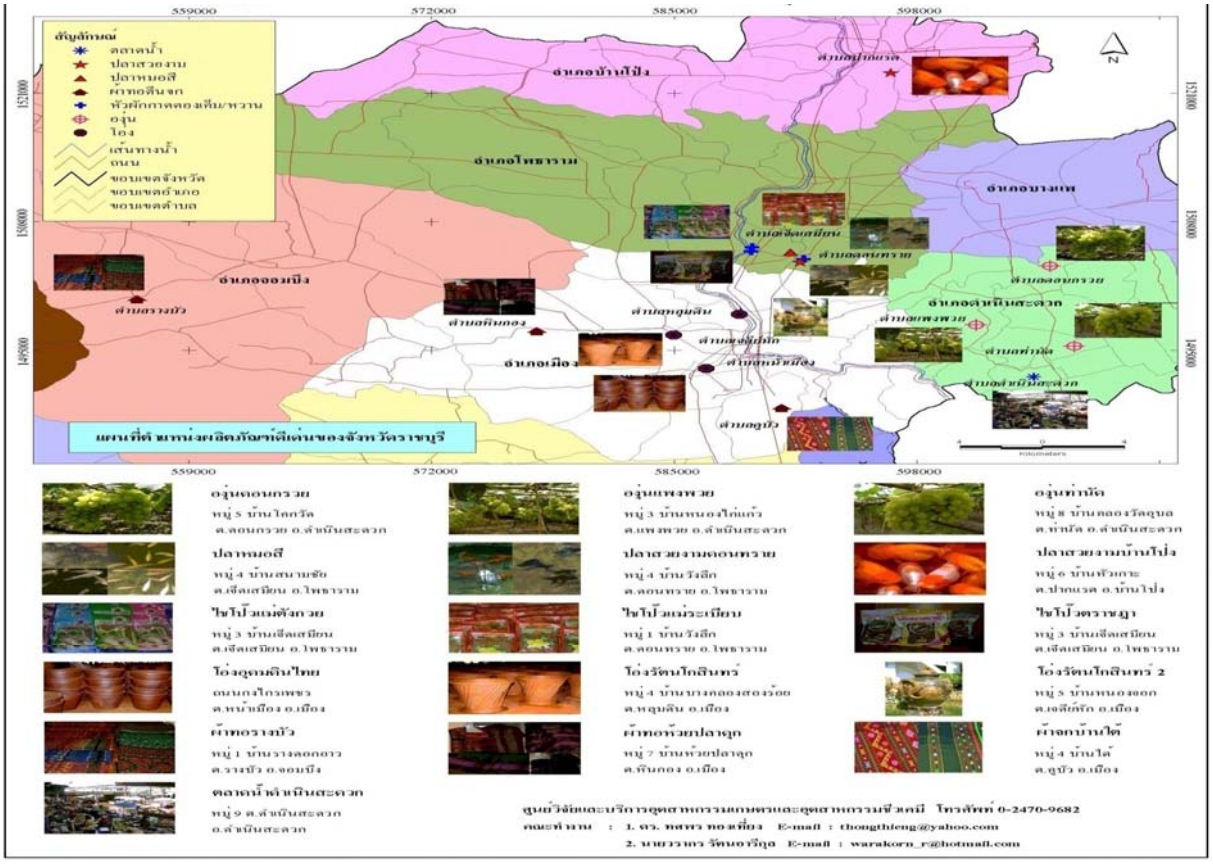


Ratchaburi - Landuse



Ratchaburi – Attractions

Ratchaburi – Economic Activities



Ratchaburi LCSS Development Using ExSS

Background

Initiating during AIM Training Workshop in Aug-Sept 09

➔ Base Year: Y2000 and Target Year: Y2025

Data Required as Inputs

- **Population (Y 2000, National Statistics)**
- **Socio-economic Accounting Matrix (Y 2000, nested down from the national I/O Table)**
- **GPP (Y 2000, National Statistics)**
- **Energy Balance Table (Y 2000, Ministry of Energy)**
- **Transport of Passengers and Freight (AIM Team Database)**
- **Technology in use (AIM Team Database)**

Assumptions for BaU

- GPP growth = GDP growth ➔ 3% annually with
  - +3% for other industries
  - +1% for iron and steel
  - +1% for cement
  - +2.5% for services
  - -1% for agriculture
  - -1% for food and beverage
- Population growth = 1.5% annually (all age)
- No change in size of household

Ratchaburi LCSS Development Using ExSS

Proposed Countermeasures

- CM 1

  Improvement of energy efficiency in industry

- CM2

  Improvement of electricity generation process (as national plan)

- CM3

  Improvement of public transportation based on promotion of small vans and bicycles use in city areas

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Results from ExSS

	Base	BAU	CM
Population (pers)	791,217	1,148,013	1,148,013
Household (house)	201,665	292,605	292,605
GPP (Thousand Baht)	92,981,300	190,610,307	190,610,307
GPP/Capita (Thousand Baht/pers)	117,517	166,035	166,035
Primary (Thousand Baht)	6,725,043	9,885,958	9,885,958
Secondary (Thousand Baht)	118,176,674	244,201,978	244,201,978
Tertiary (Thousand Baht)	83,337,862	175,360,925	175,360,925
Floor_area	1	2	2
Passenger_trs	6,652	9,652	9,041
Freight_trs	1,118	2,274	2,274
Energy_demand (ktoe)	951	1,726	1,655
CO2_emissions (kt CO2)	863	1,592	1,261

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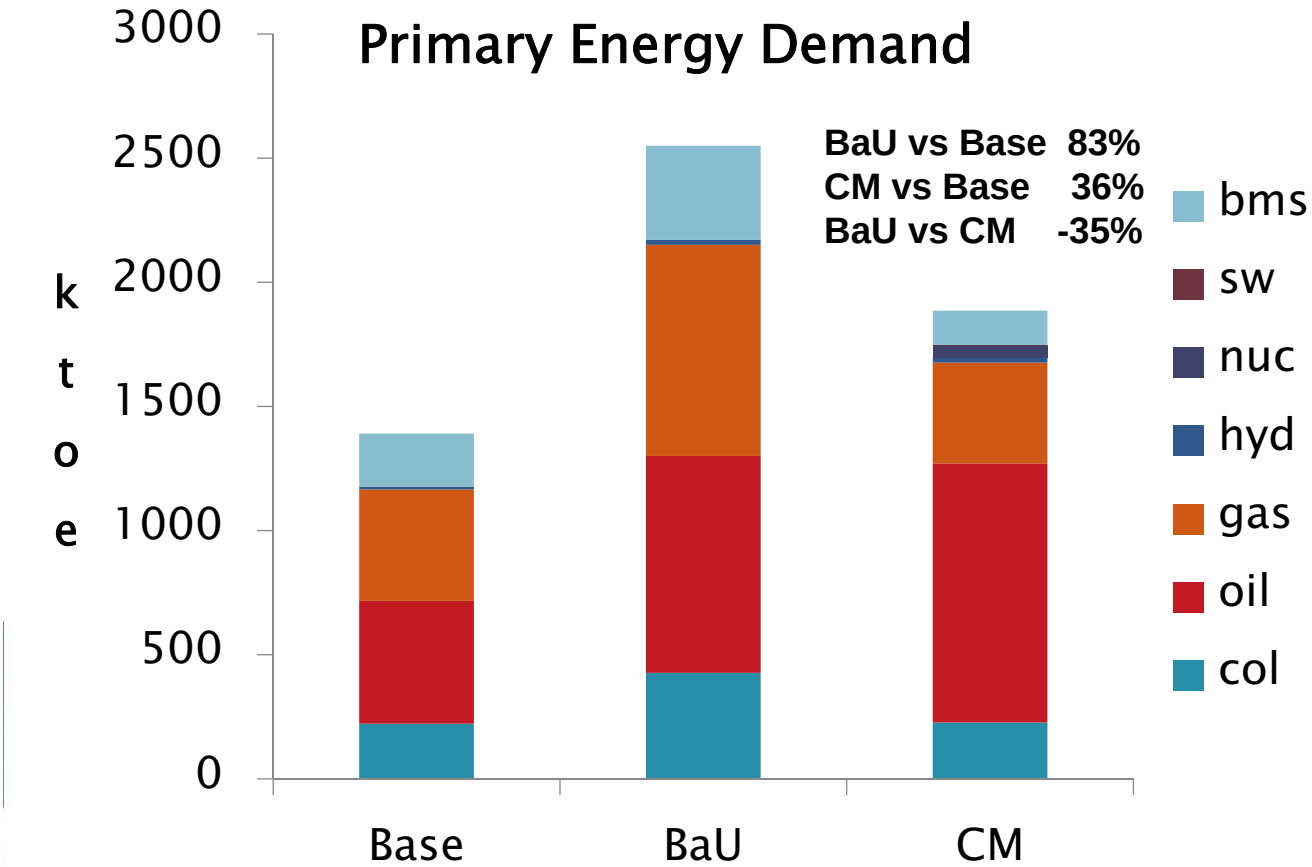
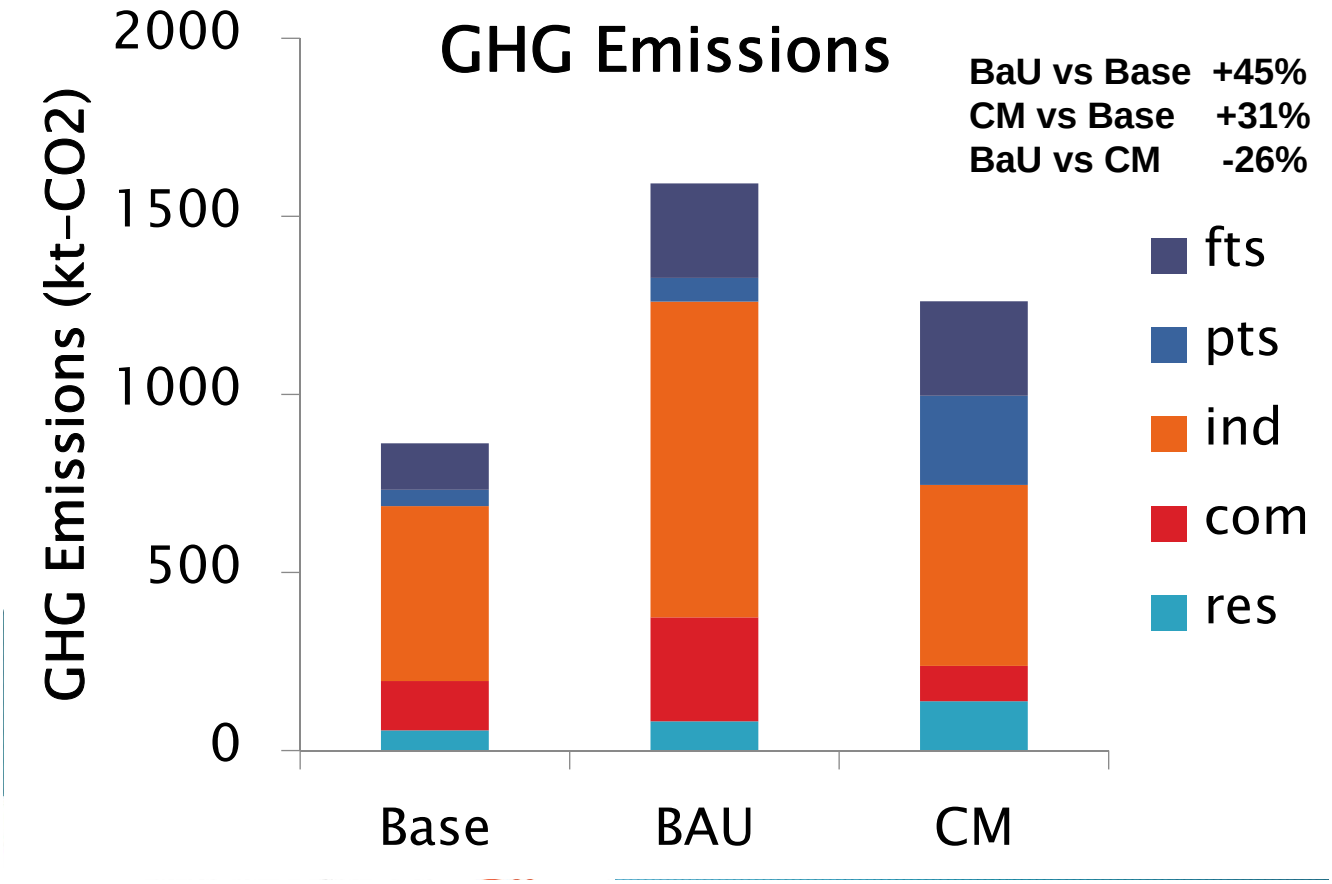
Results from ExSS



Results from ExSS



Findings

- ExSS enables to pinpoint priority issues in energy sectors to focus on for improvements
- Data collection is the limiting step in the application of ExSS
- Preliminary dissemination of results with local government
  - ExSS = Promising tool
  - BUT! : Energy is not the only sector to emit GHG
  - Agriculture and LU are of concern for future development of Ratchaburi (Development Plan 2010-2013)
- Further step forward: Development of LCSS by GHG EI

Further Steps

- **Development of LCSS by GHG EI for key categories (done for Tier 1)**
- **Development of GHG Emission Projections (on-going)**
- **Development of countermeasures from Development Plan (done for Energy Efficiency in industry, but need more data for Transportation)**
- **Development of modules of ExSS dedicated to Agriculture and LU (To be cont'd)**

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Finally…
Live Coolly with Strategy
(LCS)

KMUTT

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ขอบคุณค่ะ
Khob Khun Kha
สวัสดีค่ะ
Sawasdee Kha

Low Carbon Society: A Green Roadmap for India

by

Prof. Aashish Deshpande

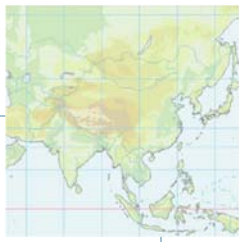
(Maulana Azad National Institute of Technology, Bhopal)

Low Carbon Society: *A Green Roadmap for India*

Aashish Deshpande
National Institute of Environmental Studies, Tsukuba, Japan
Maulana Azad National Institute of Technology, Bhopal, India

P.R. Shukla
Indian Institute of Management, Ahmedabad, India

Low Carbon Society Model Capacity Building Workshop
AIM (Asia-Pacific Integrated Model)
November 19, 2010, Bangkok



Outline

- India's Commitments, Actions and Drivers
- Developing National LCS Roadmap
- Developing Regional LCS Roadmaps
  - Case Study: Ahmedabad, India
  - Case Study: Bhopal, India
- Building Sector Studies
- Actions and Barriers for LCS Pathways

India: Commitments, Actions and Drivers

Commitments and Actions

Copenhagen Commitments

- 20 to 25% Emissions Intensity Reduction from 2005 to 2020
- Per Capita Emissions Below OECD Average (through 2100)

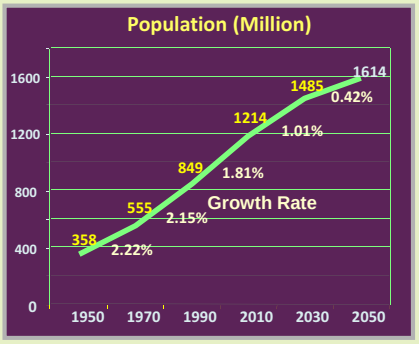
National Climate Change Action Plan - 8 National Missions

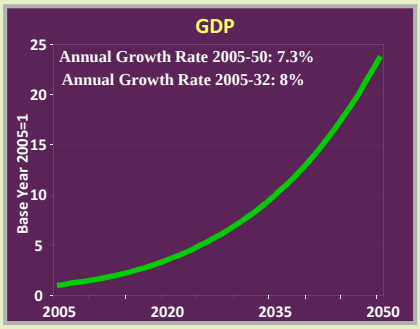
1. Solar Energy (20 GW by 2022; 2 GW off-grid; 20 m sq. m collectors)
2. Enhanced energy efficiency (Avoided capacity of 19000 MW by 2014-15)
3. Sustainable habitat
4. Water Sector (20% water use efficiency improvement)
5. Sustaining the Himalayan eco-system
6. A "Green India" (20 Mil. Hectare afforestation by 2020; Forest cover from 23 to 33%)
7. Sustainable agriculture (micro irrigation promotion in 40 m ha)
8. Strategic knowledge for climate change

Domestic Actions

- Carbon tax on coal to fund clean energy
  - US $1/ton on domestic & imported coal; funds to be use for Clean Energy
- Enhanced Energy Efficiency measures
  - National Solar mission (20 GW by 2022; 2 GW off-grid; 20 m sq. m collectors)
- Mass Distribution of CFLs
  - Potential reduction of 6 GW of electricity demand

Drivers of Economy



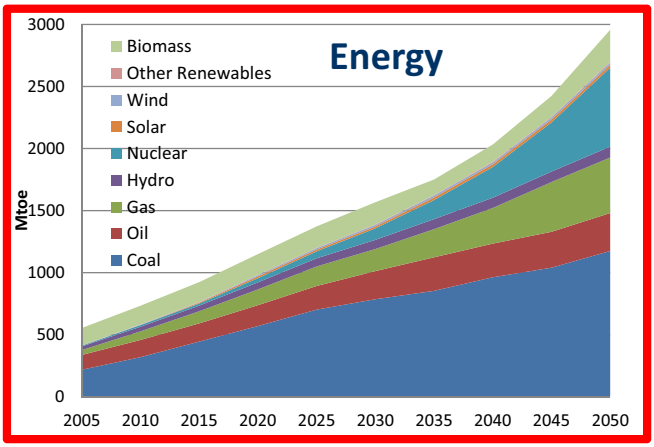


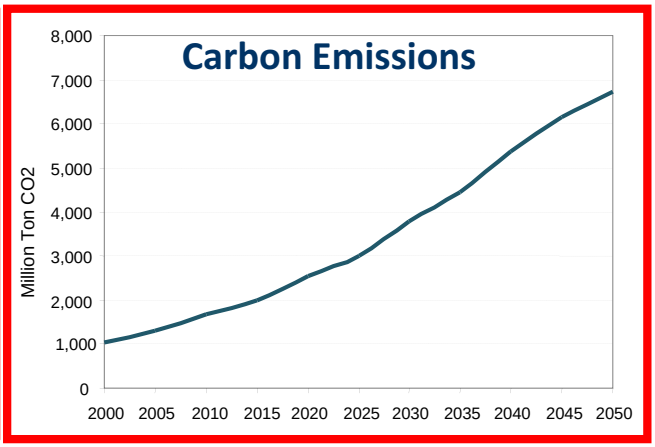
BAU Projections: Analysis with ANSWER-MARKAL Model

Assumptions

From 2005-2050:
Annual Economic Growth: 7.34 %
Annual Population Growth: 0.8 %

Absolute Growth in 2050 over 2005
Economy 24 times
Population 1.43 times



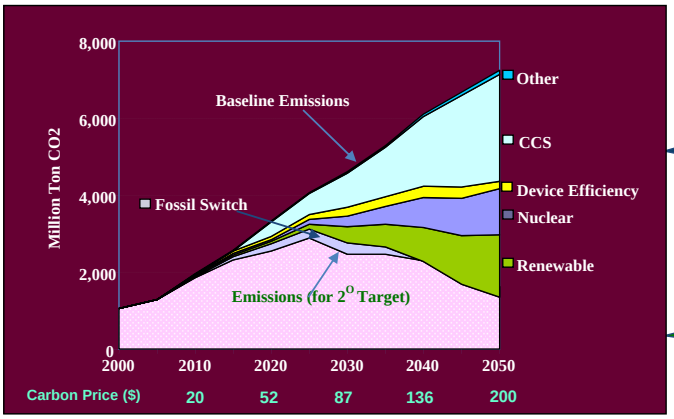


Results: Energy and Carbon Intensity

Annual Improvement From 2005-2050:
Energy Intensity: 3.0 (%)
Carbon Intensity: 3.6 (%)
Decarbonization of Energy: -0.6 (%)

Ratios: 2050 over 2005
Final Energy Demand: 6.27
Energy Intensity: 0.26
Carbon Intensity: 0.19

Mitigation Options: Perspectives



Conventional Approach: transition with conventional path and carbon price

- High Carbon Price
- Climate Focused Technology Push
- Top-down/Supply-side actions

Technology Co-operation Areas

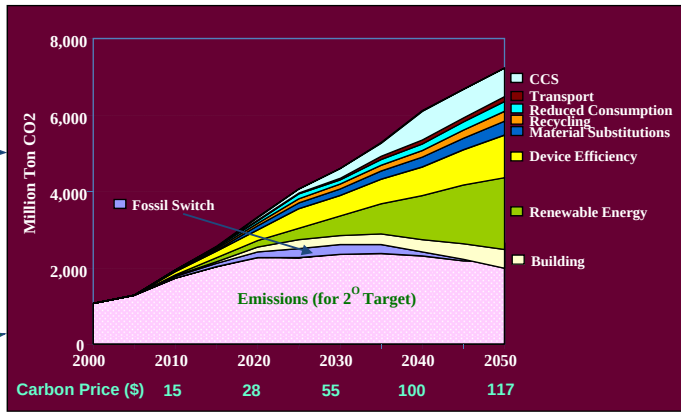
- Energy Efficiency
- Wind/Solar/Biomass/Small Hydro
- Nuclear/CCS

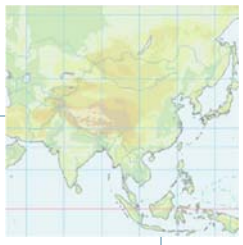
Sustainability Approach: aligning climate and sustainable development actions

- Low Carbon Price
- Bottom-up/Demand-side actions
- Behavioural change
- Diverse Technology portfolio

Technology Co-operation Areas

- Transport Infrastructure Technologies
- 3R, Material Substitutes, Renewable Energy
- Process Technologies
- Urban Planning, Behavioral Changes

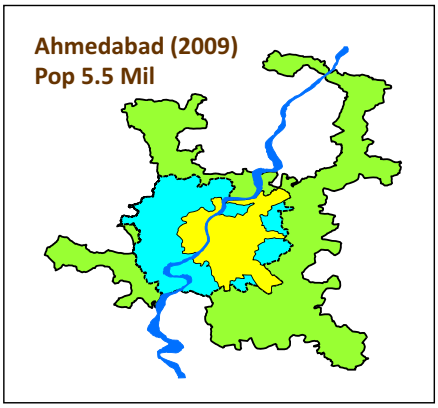


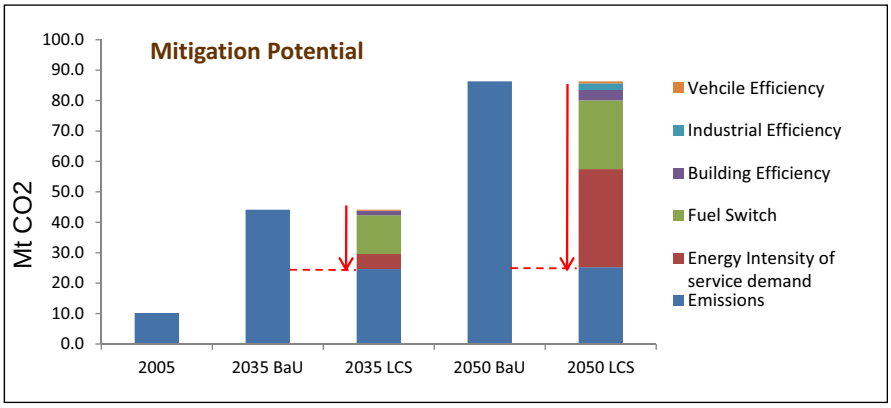


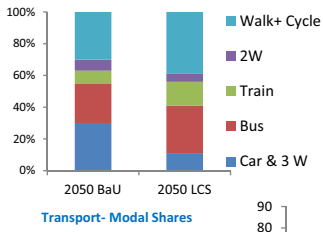
Low Carbon Society

Case Study: Ahmedabad, India

Co-benefits in City Planning: Ahmedabad

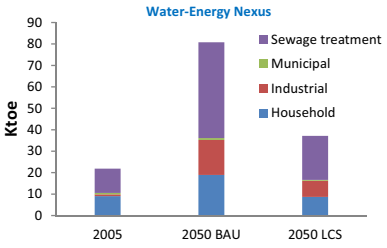


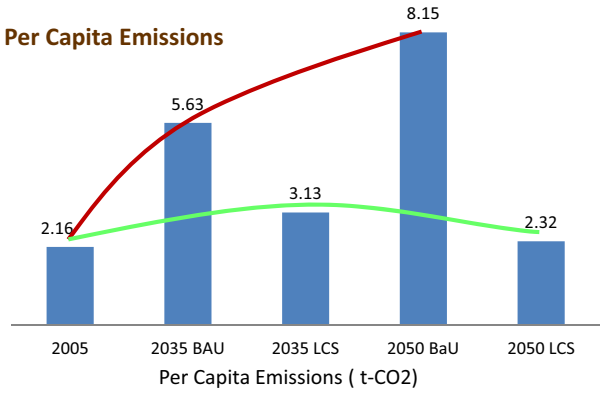




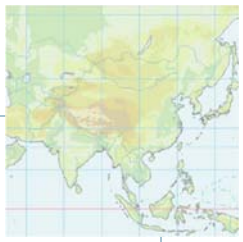
Transport- Modal Shares

Sustainable Low Carbon Infrastructures





Analysis with AIM/EXSS Model

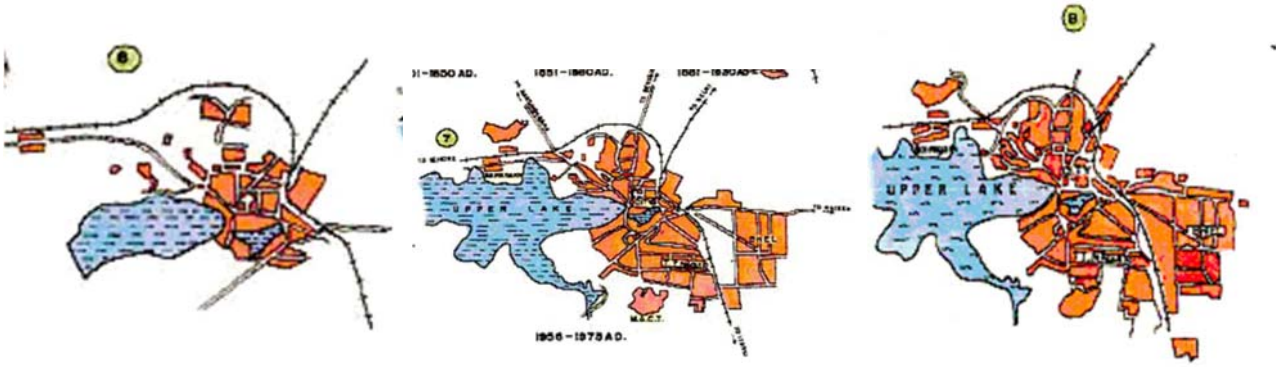


Low Carbon Society

Case Study: Bhopal, India

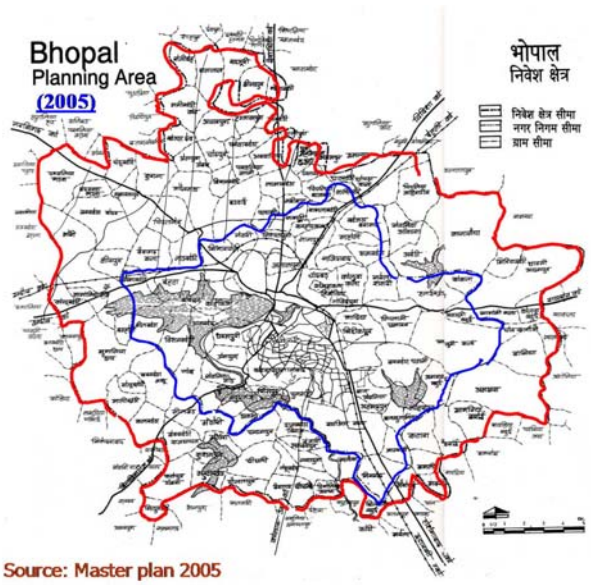
Bhopal: Chronological Development

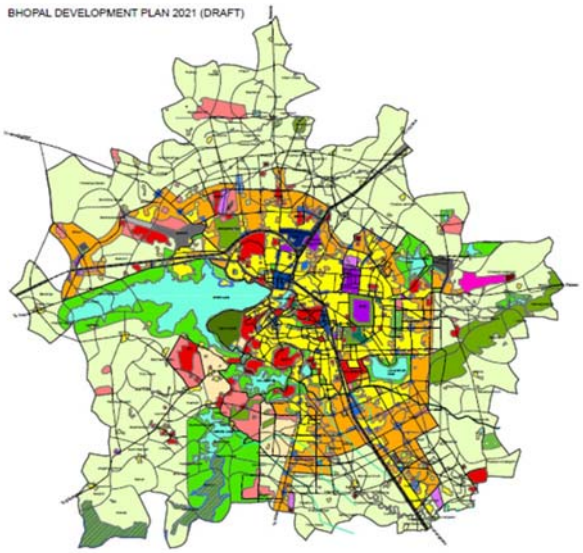
1010 - 1200 AD | 1201 - 1800 AD | 1801 - 1850 AD | 1851 - 1880 AD | 1881 - 1930 AD



1931 - 1955 AD | 1956 - 1973 AD | 1974- 2000 AD

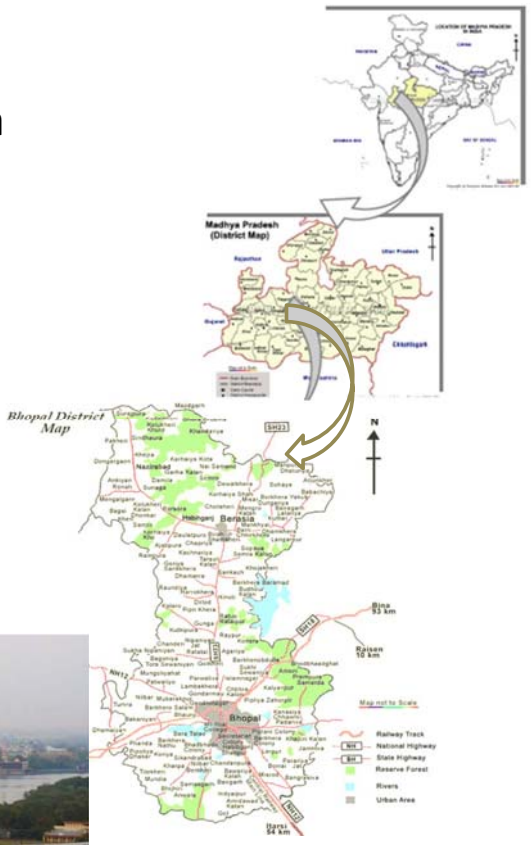
Landuse 2021





Bhopal, India

- The city is centrally located.
- The climate is composite climate representing a large part of the country.
- The city has physical features like large water body, Hills and forests for analysis of local variations.
- A million plus city, it can represent the majority of Indian cities.
- Amongst the 21 fastest growing cities in India.

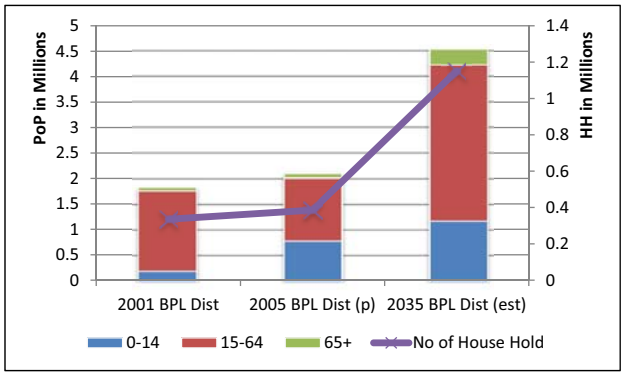


Developing Bhopal LCS Scenario 2035

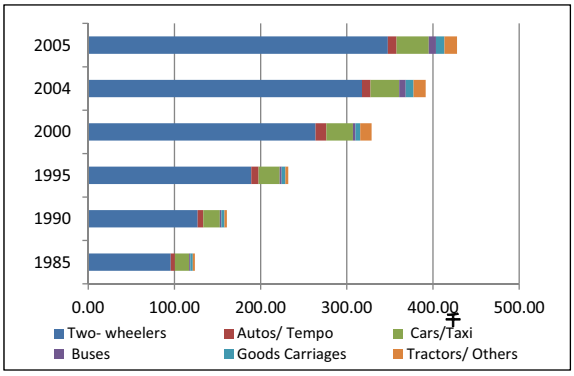
The Methodology:

- Phase - I
  - Quantification of scenario estimates for Bhopal district
  - Creation of narrative storylines of likely future
  - Description of sector-wise details of likely future
  - Quantification of the macro-economic considerations and social aspects
  - Identification of possible effective policy measures
  - Develop action plan for policy measures
- Phase – II
  - Design of policy roadmaps toward the Low Carbon Society
  - To carry feasibility study of the roadmaps considering uncertainties involved in each policy option
  - To analyze robustness of the roadmap with social, economic and institutional acceptability and uncertainties

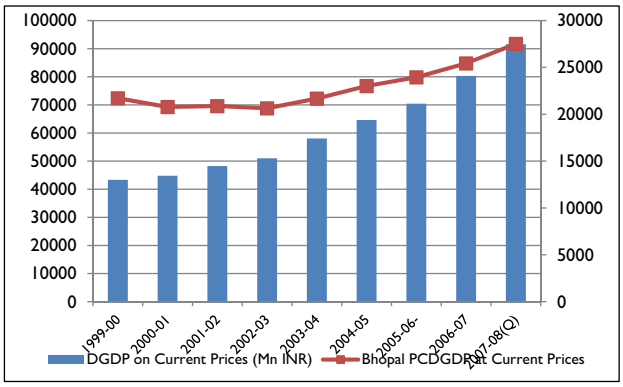
Drivers of Change-Bhopal (Distt.)

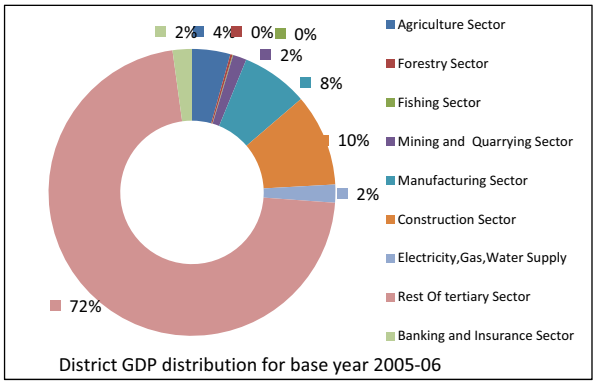


Population trends



Transport (New Registration) trends





Economic trends and sectoral distribution of District GDP

Bhopal (Distt.) Socio- Economic Indicators

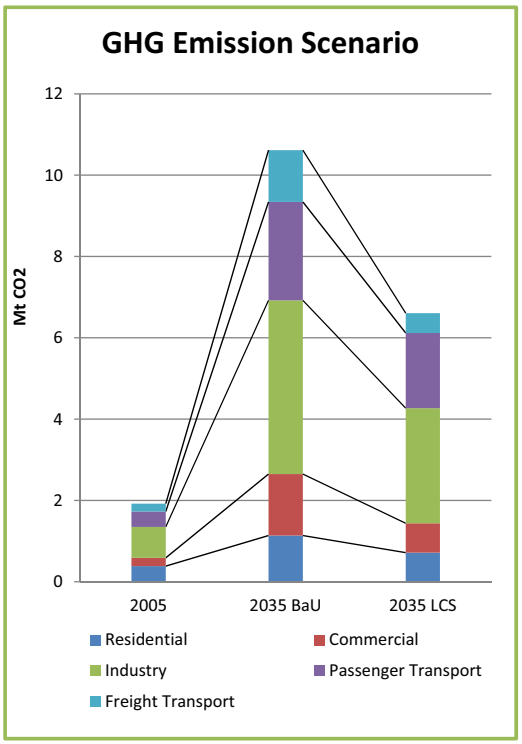
Average Number of people/household	5.4 on population of 21 Million (2005)
Demographic composition	0-14 [35%], 15-64 [61%], 65+ [4%]
Economic Characteristics DGDP (INR 70.04 billion)	Primary Sector (6.19%)
	Secondary Sector (19.98%)
	Tertiary Sector (73.84%)
Growth Rate of District Domestic Product	% increase (2.59%)
Decadal Growth Rate (1991-2001)	% increase (14%)

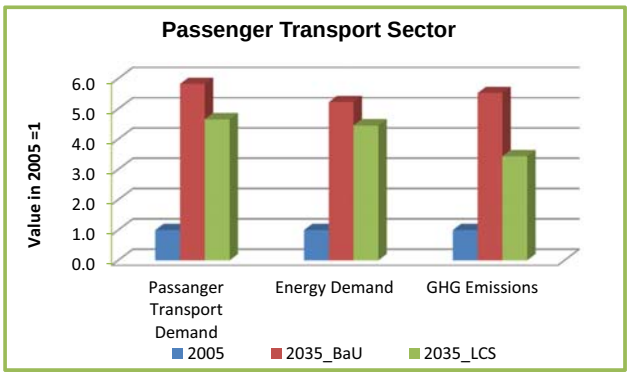
The Scenarios

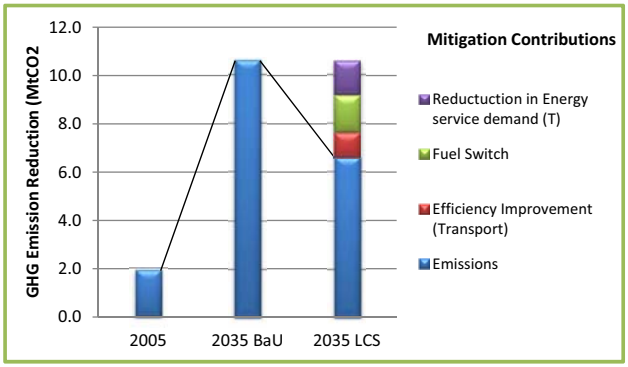
- Business As Usual (BAU) scenario
  - The present trend in Bhopal has been considered with existing technology and prevailing economic and demographic trends. The BAU scenario for future energy consumption and emissions projection in Bhopal envisages the continuum of present government policies, and capture forecast for various economic, demographic, land use and energy use indicators.
- Low Carbon Society (LCS) scenario
  - For analysing the possibilities of reducing the GHG emissions in future a sustainable development future scenario is drawn here for Bhopal that is expected to take it towards ***Low Carbon Society***. The energy consumption trajectory / emissions trajectory in all the sectors of Bhopal that would result from aggressive policies to promote demand side management, energy efficiency, development of renewable energy, and other policies to promote sustainable development .

Bhopal (Distt.) LCS Scenario Development

Preliminary Results with Transport and Energy Sector Intervention







Analysis with AIM/EXSS Model

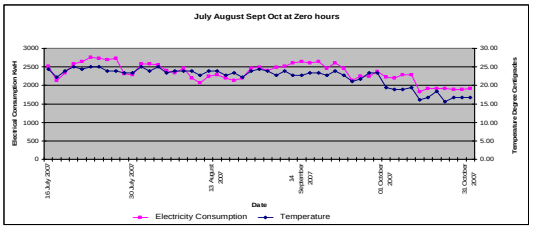
Building Sector Studies

Building Sector Studies

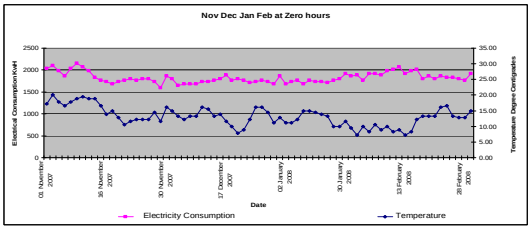
- Assumptions
  - The energy consumption in built environment is primarily a function of “Cooling” and “Heating” needs
  - Case Study Approach provides opportunity to study local variations and developing suitable actions
  - Building Design: Form (shape), Orientation, Materials and Technology play an important role
- Temperature change and electricity demand
  - Temperature data of the city analyzed for one year period
  - Seasonal variations in electricity consumption identified
  - Hourly temperature data and electricity consumption compared and analyzed
- Simulation
  - Double storey building considered with select parameters
  - Six alternate configurations analyzed.
  - Software used for simulating the building.

Emerging Findings: Temperature Effect

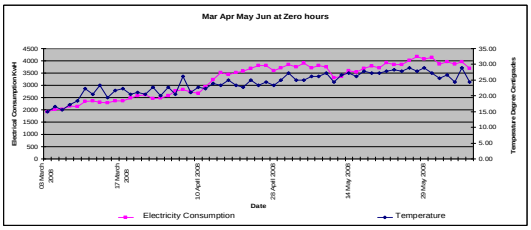
- Electricity consumption in buildings is dependent on many factors.
- It is necessary to eliminate the effects of other influences to bring out the effect of temperature.
- Marked seasonality and periodicity in electricity demand
- Electricity consumption is well correlated with temperature change
- The correlation is more prominent during night hours
- CDD and HDD analysis are more useful



July-Aug-Sept-Oct



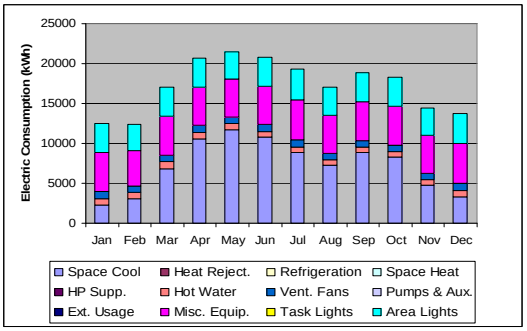
Nov-Dec-Jan-Feb



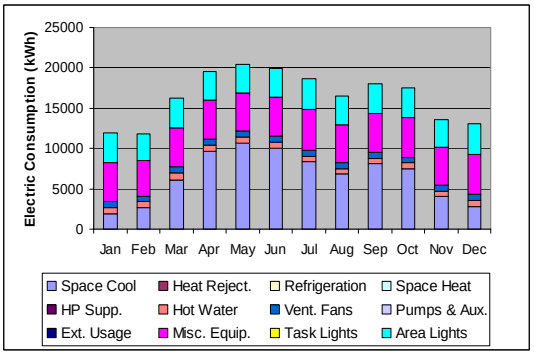
March-Apr-May-June

Emerging Findings: Simulation

- Building with longer axis north-south consumes the highest energy
- The most efficient orientation is obtained when longer axis is north-east to south-west
- Energy consumption well correlated with temperature change
- Highest energy consumption in summer months
- Space cooling requires maximum amount of energy
- Suitable construction material or provision of adequate insulating material may further reduce energy consumption



Longer axis north-south



Longer axis north-east to south-west

Low Carbon Society

Actions & Barriers

Bhopal LCS Scenario
Seven Actions

- Action 1: Walkable/Liveable/Green City
- Action 2: Integrated Transportation System
- Action 3: Land Use Planning
- Action 4: Energy-efficient buildings
- Action 5: A Green Environment/nature conservation
- Action 6: Low Carbon Lifestyle
- Action 7: A Green Economy

Actions: Residential Sector

- ***Energy audit programmes***
  - Conducting energy audits to evaluate the most cost effective improvements.
- ***Fiscal Incentives***
  - Loan, grants and incentives programmes for energy conservation measures
- ***Energy code for New buildings***
  - Encourage or require increased installation of efficient lighting systems
  - Requirement of more efficient cooling systems
  - Increase window insulating values and requirement of shading devices
- ***Harnessing renewable energy***
  - Use of renewable energy sources to meet rapid growth of energy demand, supporting economic development without increasing atmospheric greenhouse gas concentrations.

Actions: Transport Sector

- ***The cost-effectiveness of technology-specific policies:*** to be carefully considered like banning certain vehicles or prohibiting traffic in certain areas.
- ***Use of alternative fuels*****:** vehicles using LPG/CNG emit considerably less particulate matter than conventional diesel.
- ***Traffic management measures:*** such as coordination of traffic lights, zebra crossings, side paths, left turns which yields significant economic benefits because it decreases congestion and improves mobility.
- ***Demand management:*** through provision of public transport, fiscal measures, area wide licensing, pricing instruments such as differential pricing for access and preferential treatment of high-occupancy vehicles. Public transport dedicated bus.
- ***Use of non-motorized transport (NMT) mechanism*****:** to be promoted by curtailing motorization and elimination of impediments to NMT. Government intervention, like introducing stringent parking restrictions and constructing safe bicycle routes.
- ***Inspection and maintenance*** *of vehicles and retirement and scrapping;* retirement and scrapping of old vehicles and improved maintenance.

Actions: Transport Sector

- ***Fiscal measures:*** Higher taxation on purchase of new vehicles and for polluting fuels providing indirect incentive for penetration of cleaner fuels and technologies.
- ***Equitable allocation of road space:*** Reserving lanes and corridors exclusively for public transport and non-motorized modes of travel
- ***Parking in city centres and commercial areas:*** Provision of planned parking spaces away from busy commercial areas with park and ride facilities
- ***Freight traffic management:*** *Staggered f*reight and passenger traffic
  - By enforcing the use off-peak passenger travel times to move freight.
  - By using and developing by-passes for the through traffic.
- ***Private sector participation:*** for activities like the operation and maintenance of parking facilities, certification facilities, repair facilities, construction and management of terminal facilities, etc.
- ***Public awareness and cooperation:*** To organise awareness campaigns on the ill effects of the growing transport problems in urban areas with aim at encouraging individuals, families and communities to adopt "Green Travel Habits".

Barriers to LCS Pathways

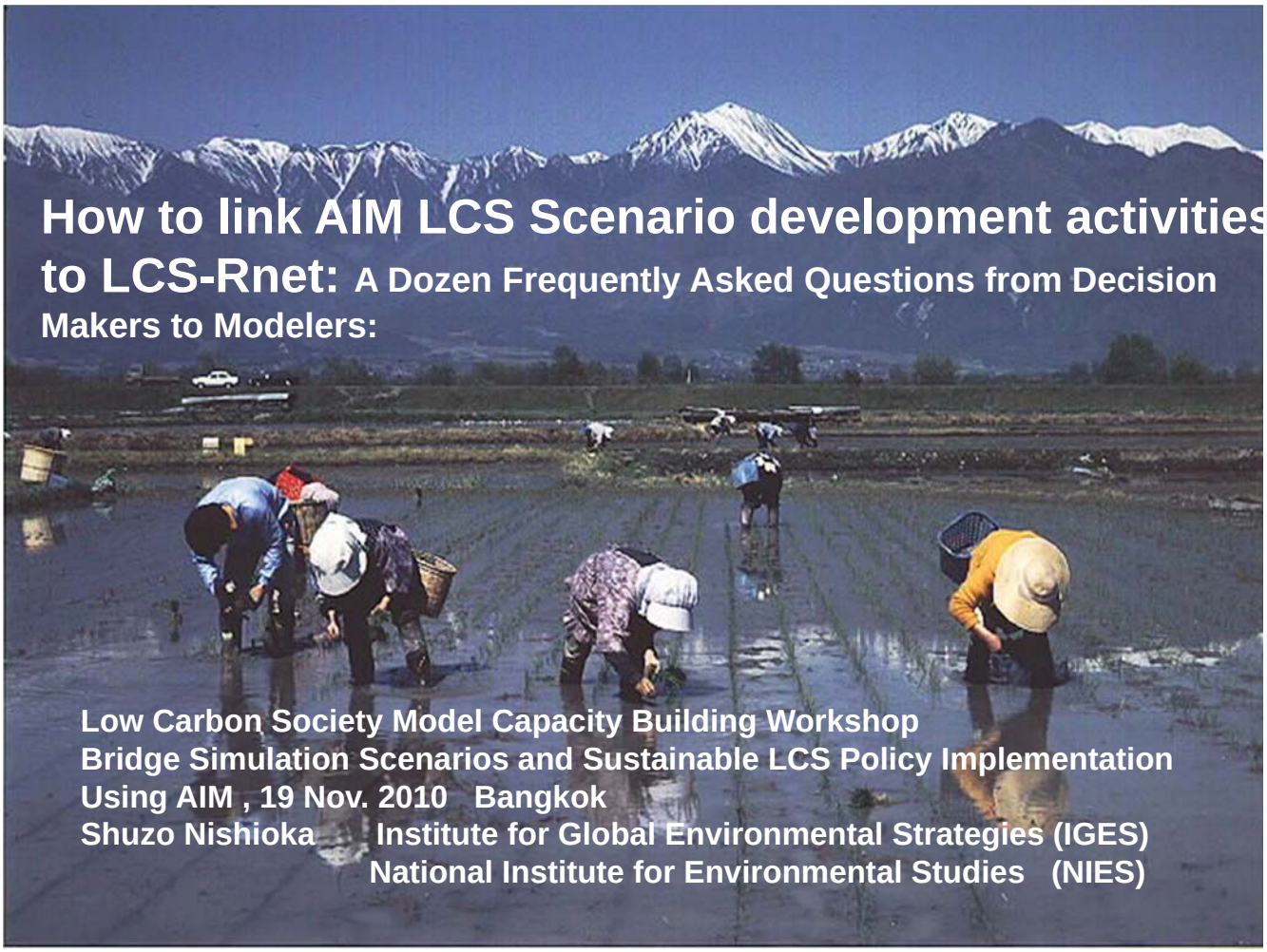
- No common generalized policies can be developed, Individual solutions are needed each of the city
- Success depends on the participation of local government / people
- Almost no awareness in smaller cities
- Capacity building is slow and time taking
- Good quality infrastructure and services are almost always necessary that are already stressed
- Development priorities may not be in line with LCS objectives
- Economic implications are not easy to anticipate

Thanks for your attention!

How to link AIM LCS scenario development activities to LCS-RNet

by

Dr. Shuzo Nishioka (IGES)



How to link AIM LCS Scenario development activities to LCS-Rnet: A Dozen Frequently Asked Questions from Decision Makers to Modelers:

Low Carbon Society Model Capacity Building Workshop
Bridge Simulation Scenarios and Sustainable LCS Policy Implementation Using AIM , 19 Nov. 2010 Bangkok

Shuzo Nishioka Institute for Global Environmental Strategies (IGES)
National Institute for Environmental Studies (NIES)

How to reach a Low Carbon Society ?

Low Carbon Society Research Network: LCS-RNet:

International researcher's community responds to G8 and world leaders' requirements

Shuzo Nishioka
Secretary General of LCS-RNet
Institute for Global Environmental Strategies (IGES)

Transition towards Low Carbon Soceities in Thailand and Asia
17-18 Nov. 2010 Bangkok

Antonio NAVVARA

Stefan LECHTENBÖHMER

Jim SKEA

David MCLAUGHLIN

Mikiko KAINUMA

P.R. Shukla

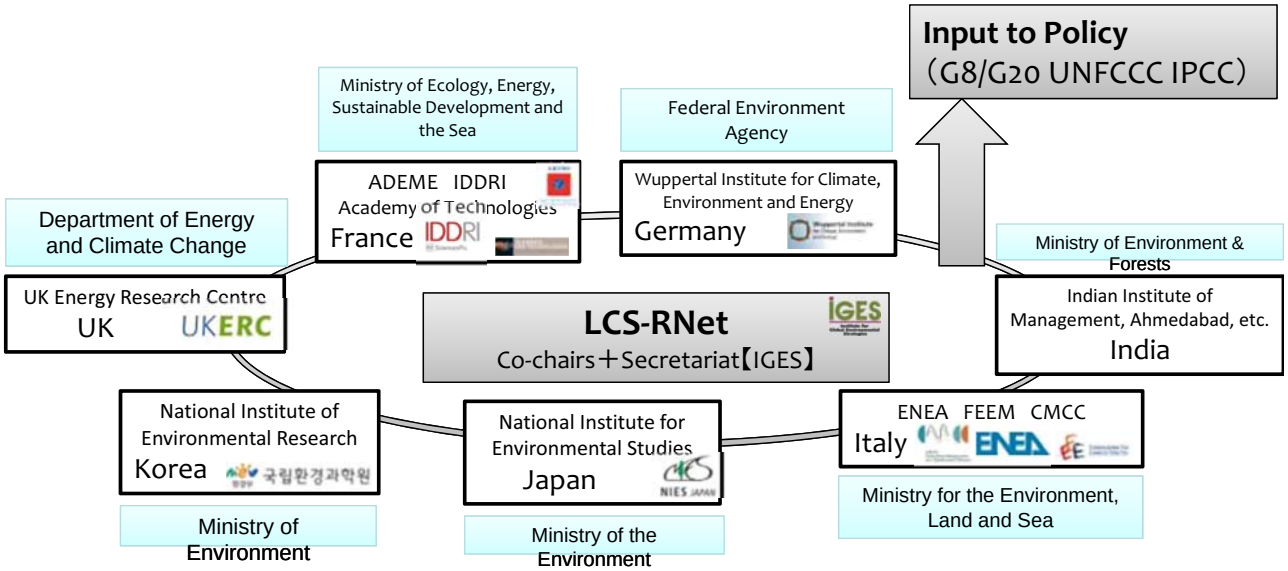
CMCC Wuppertal Institute UKERC NRTEE NIES JAPAN

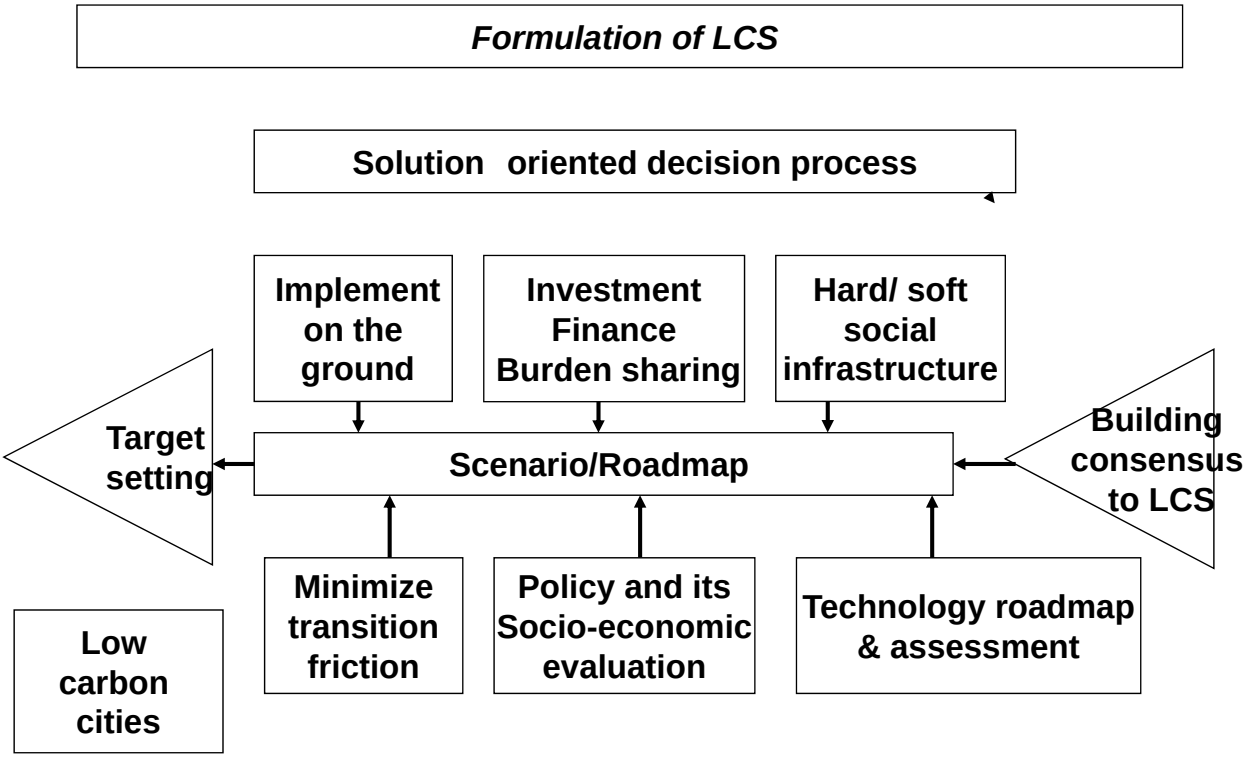
International Low Carbon Society Research Network (LCS-RNet)

- Established in 2009 on the initiative of the **G8 Environment Ministers** Meeting
- LCS-RNet promotes:
  - 1) **information exchange amongst researchers** to share updated scientific knowledge and information on the various policy tools required to realize low carbon societies and green growth (hereafter "LCS research");
  - 2) **research cooperation** amongst researchers;
  - 3) international **dialogue between researchers, policy-makers and other stakeholders** from different countries in order to learn from knowledge and experience and to reflect them in LCS research ("LCS dialogue");
  - 4) the diffusion of scientific inputs and recommendations to international climate change **policy-making fora including G8, G20 and the UNFCCC COP's**
- Network of research institutions:15 institutions from 7 countries in 2010
- Secretariat: Institute for Global Environmental Strategies (IGES), Japan
- Annual Meeting: 2009 in Bologna, October 2009 hosted by Italy
- 2010 in Berlin, September 2010 hosted by Germany
- Other information is provided in http://lcs-rnet.org/

LCS-RNet(International Research Network for Low Carbon Societies)

- Supported its foundation by G8 Environment Ministers Meeting.
- Research network to foster researches to realize low-carbon societies.
- 7 countries and 15 research institutes (currently)





Collaborative works between policy makers and research society to achieve Low Carbon Society

A Dozen Frequently Asked Questions from decision makers to modelers

* What happens without climate policy ?
* How much reduction needed ultimately ?
* How to set world reduction target ?

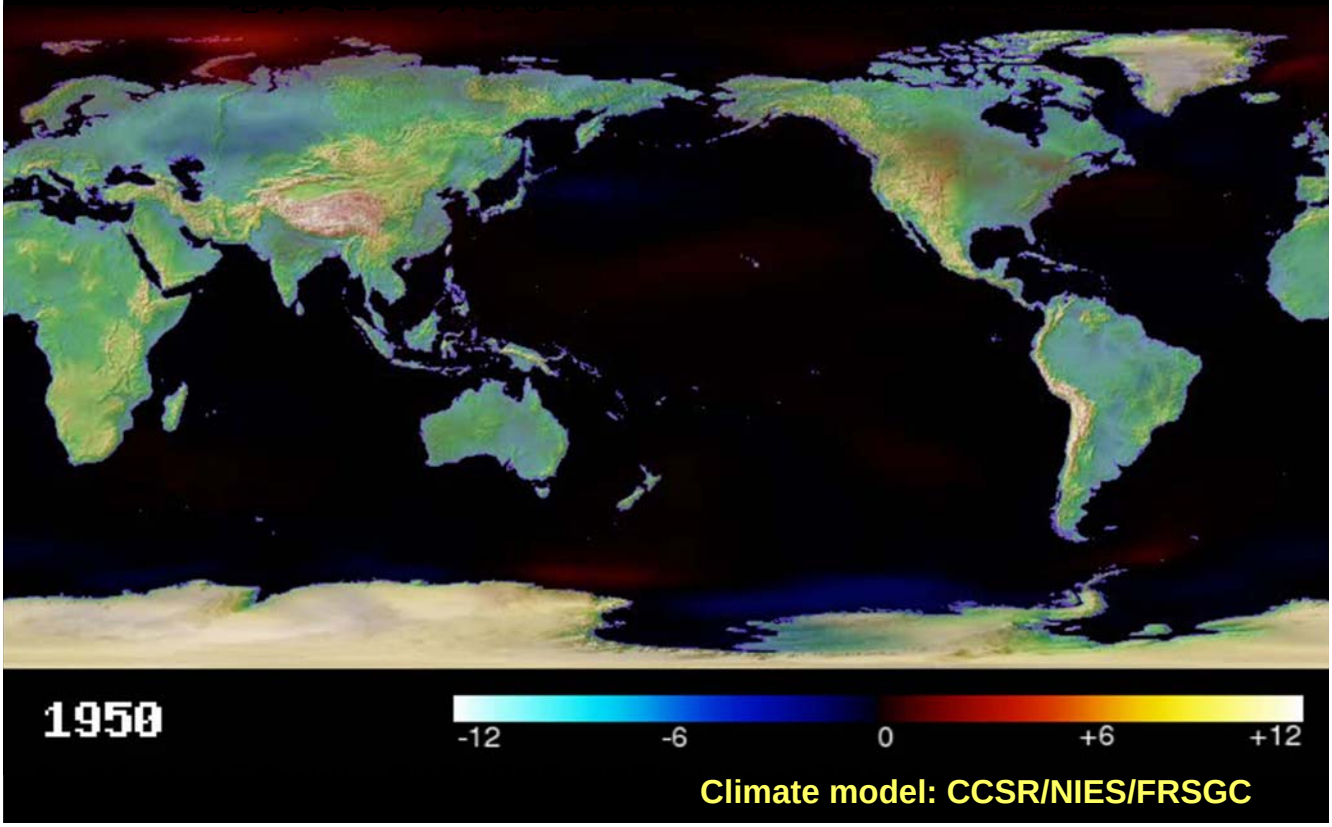
* Options of country's reduction target: long/mid- term
  * Should industrial structure change ?
  * How much reduction potential each sector has ?
  * How to change land use ?
  * How much is the cost of reduction ?
  * What policy options exist to attain the goal ?
  * How much is the impact to country's economy ?
  * Can we win in international technology competition ?

* How Japan can contribute internationally?

Q1: What happens without climate policy ?

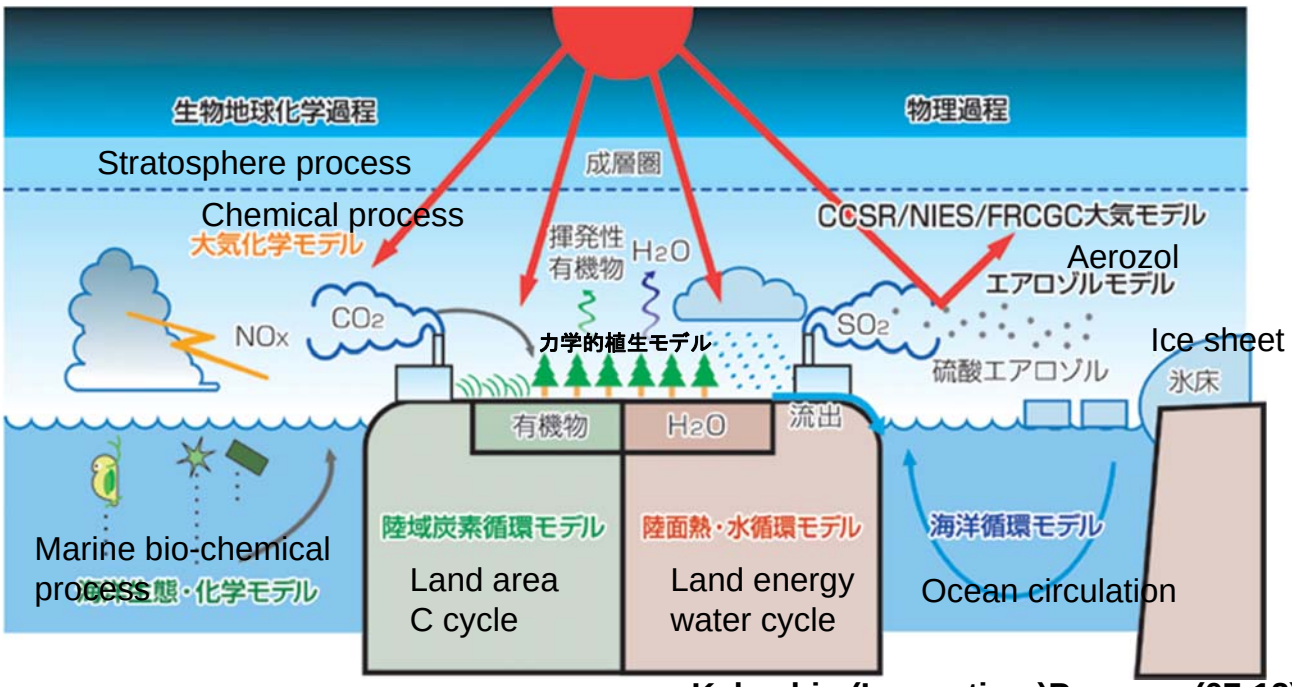
Building consensus for action

Projection of surface temperature from 1900



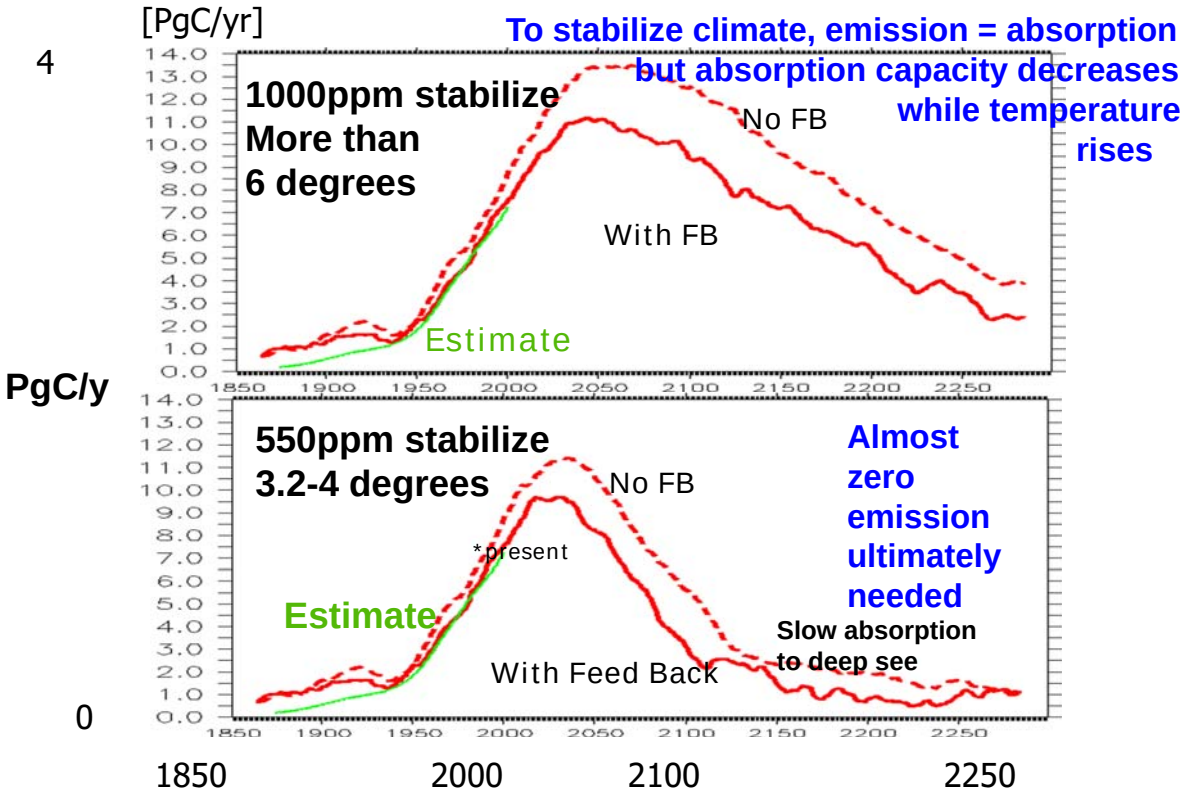
Q2: How much reduction needed ultimately ?

Earth System Integrated Model:
climate +carbon cycle model

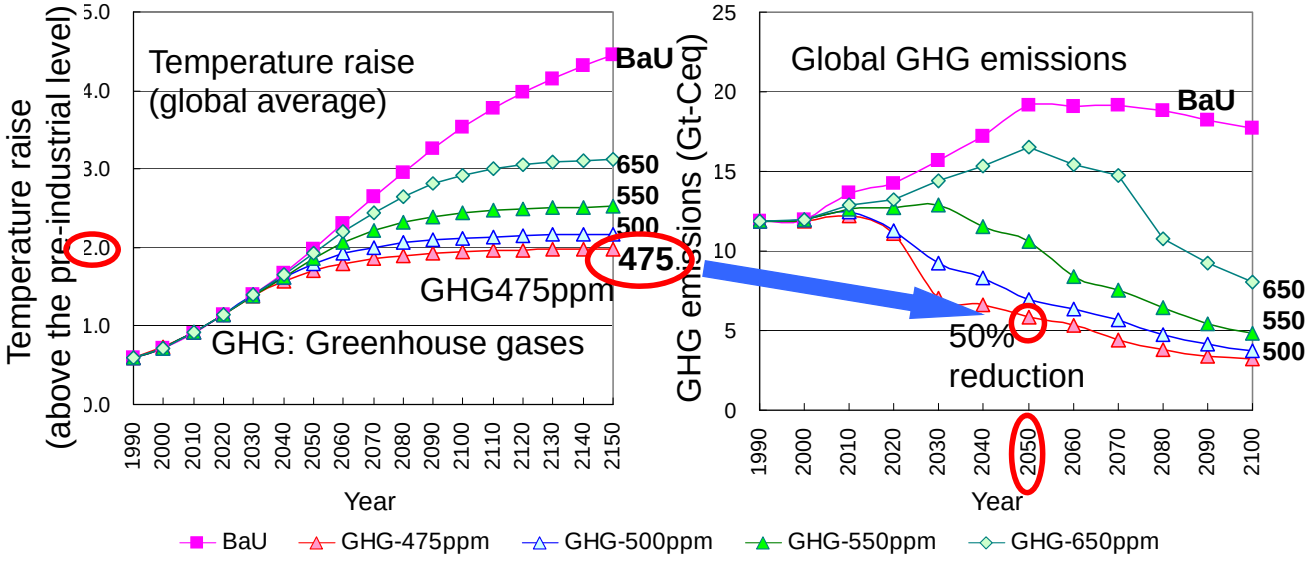


Kakushin (Innovation)Program (07-12)

Q2：How much reduction needed ultimately ?



Interim research findings of "Innovative" Earth System Model
JAMSTEC(2007)



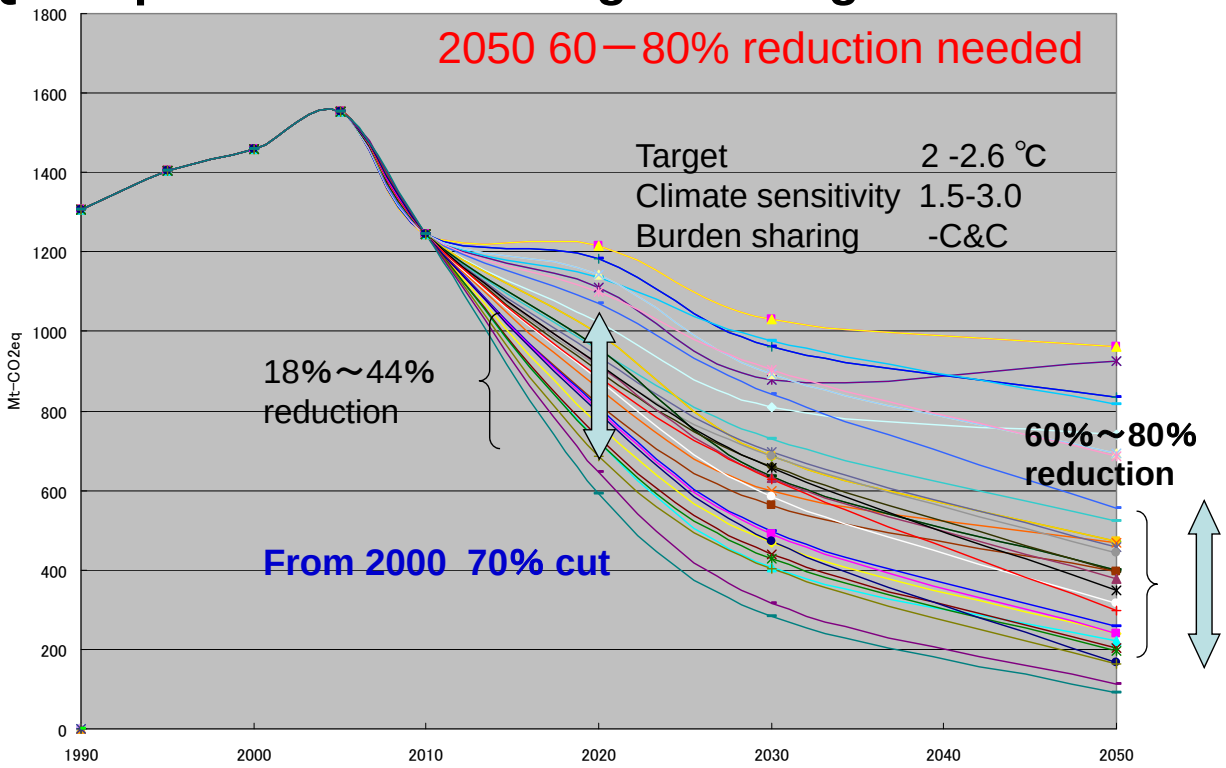
Q3:How to set world reduction target ?

•to avoid temperature rise of 2℃ from pre-industrial era, 50% GHG reductions in 2050 is required

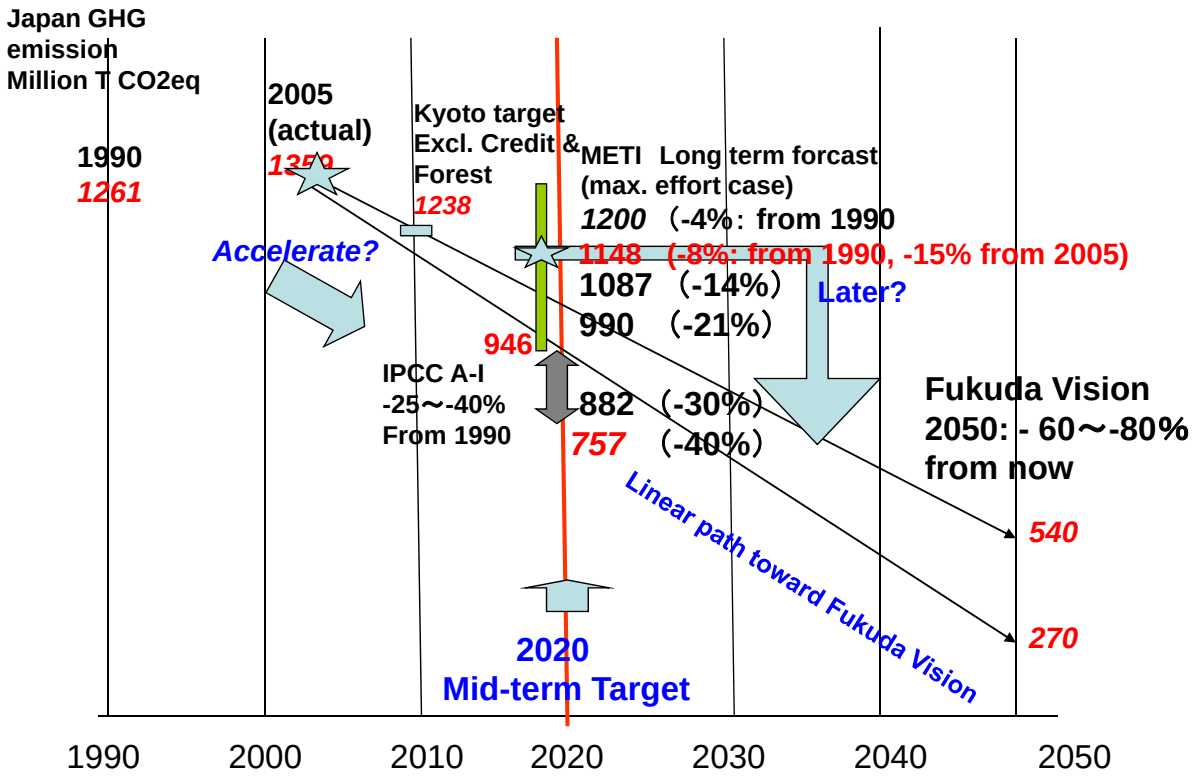
Calculated by AIM/Impact [policy] Model: NIES

http://2050.nies.go.jp

Q4：Japan's reduction target ?: long- term

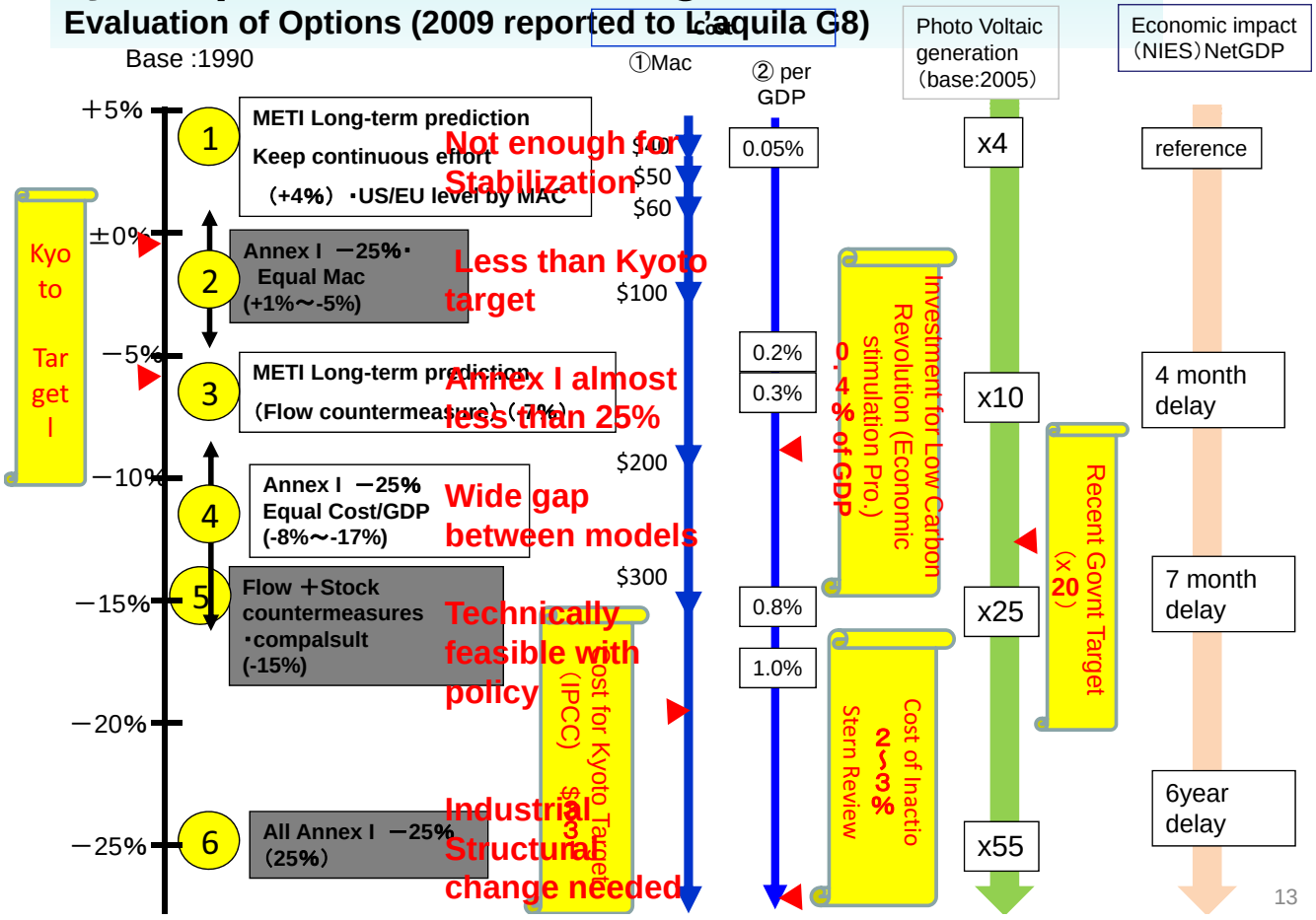


Q4：Japan's reduction target ?: mid- term

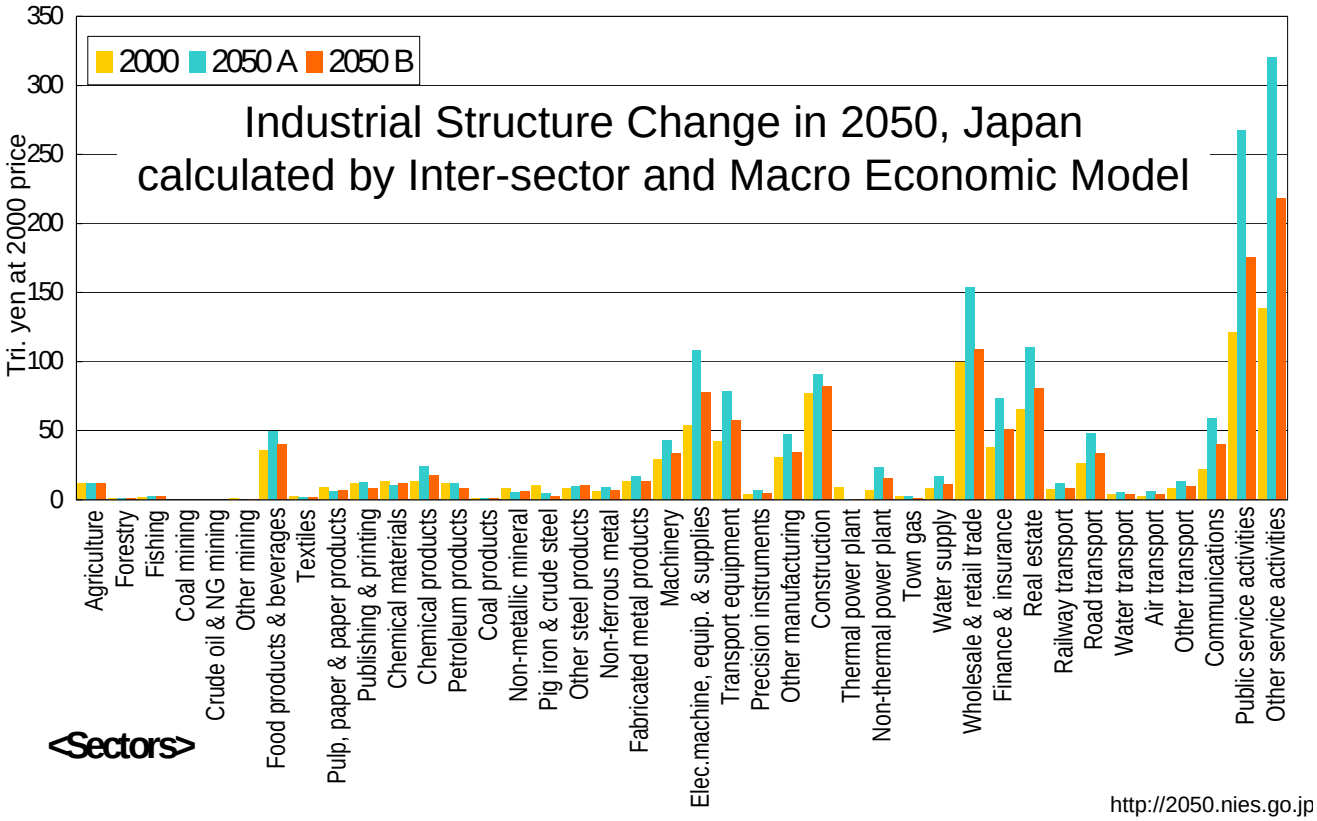


Q4：Japan's reduction target ?: mid- term

Evaluation of Options (2009 reported to L'aquila G8)



Q5: Should industrial structure change ?



http://2050.nies.go.jp

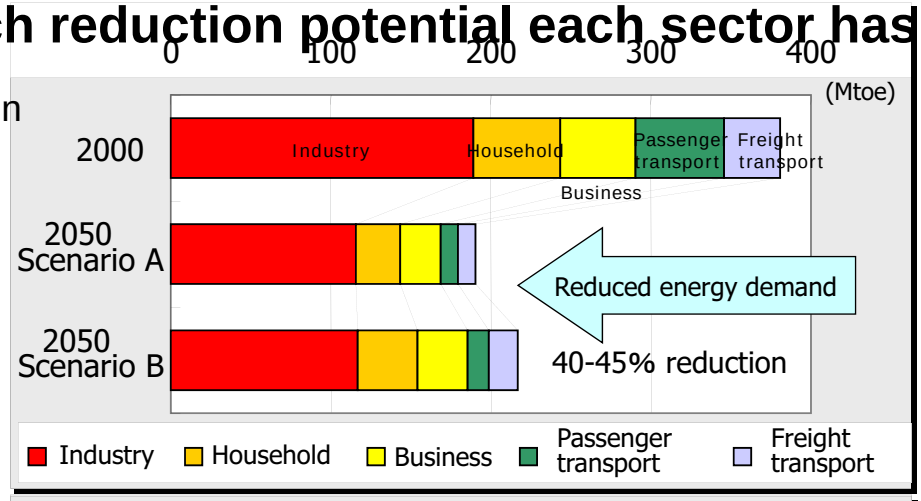
Q6: How much reduction potential each sector has ?

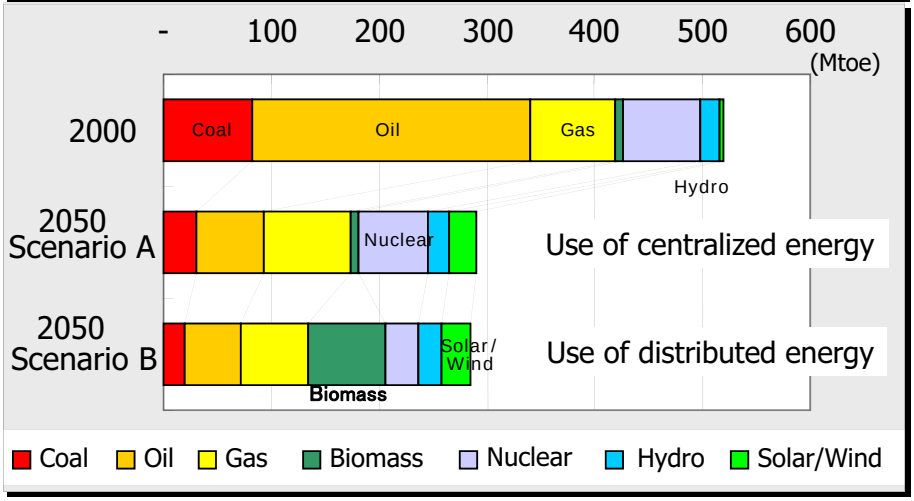
70% CO_2 reduction feasible

Smart consumer choices can reduce energy consumption by as much as 40-45%!

Equal effort by demand & supply side

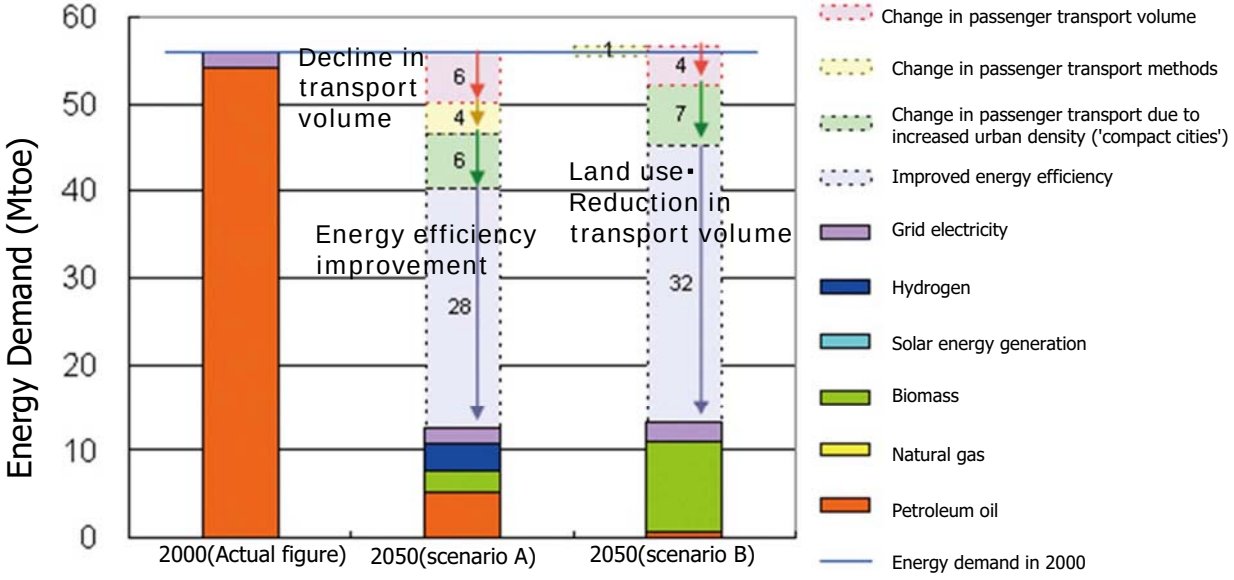
Low carbon shift in primary energy sources via introduction of renewable energies





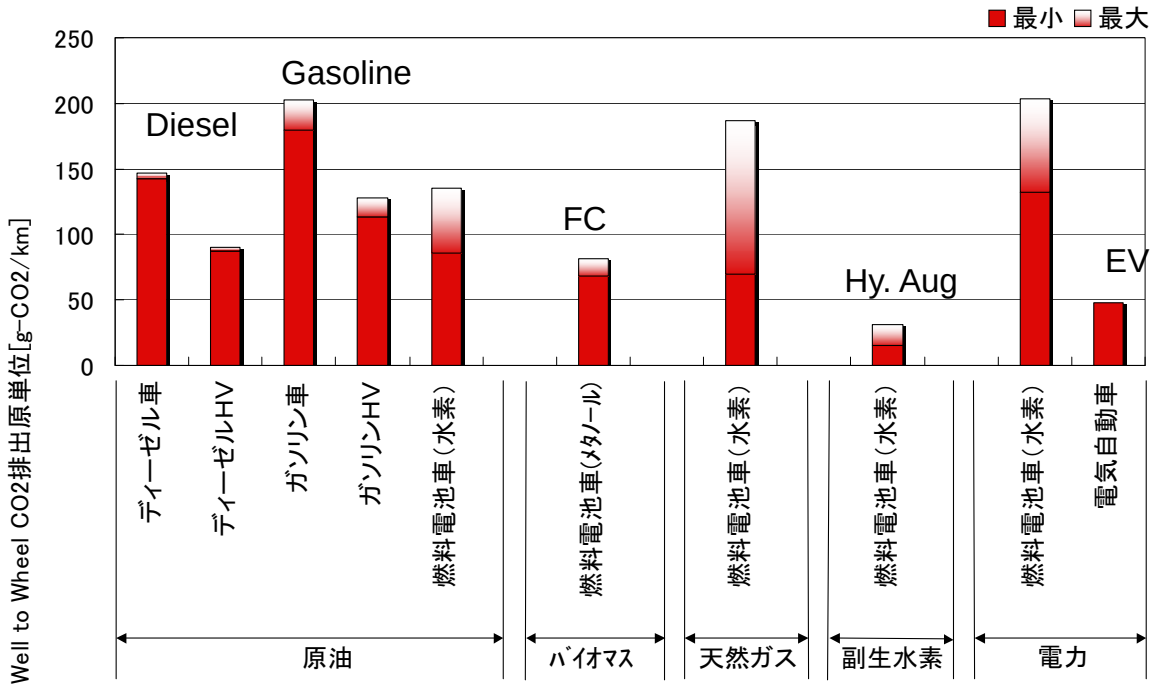
Q7: How to change land use ?

Passenger transport sector can achieve 80% reduction in energy demand via improved energy efficiency & suitable land use



Change in passenger transport volume: reduction in total movements due to population decline
Change in passenger transport methods: modal shift using public transport system (LRT etc.)
Change in passenger transport due to increased urban density ('compact cities'): reduced travel distance due to proximity of destination
Improved energy efficiency: improvements in automobiles & other passenger transport devices (hybrids, lightweight designs etc.)

Technical solution
Car CO_2 Emission/km:　EV: Gasoline= 1:4

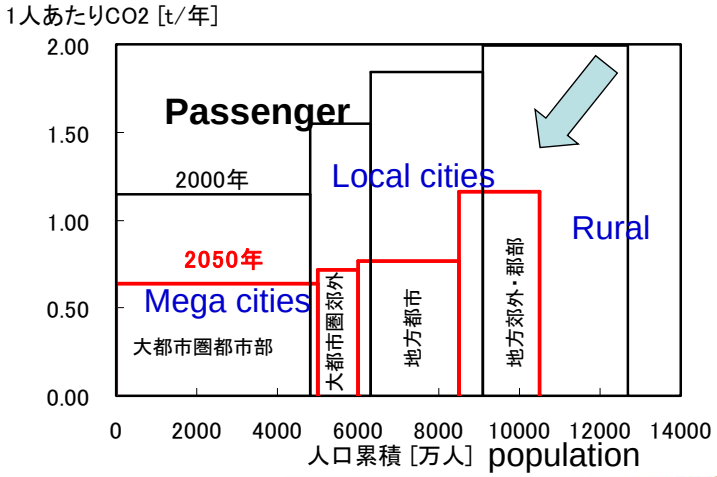


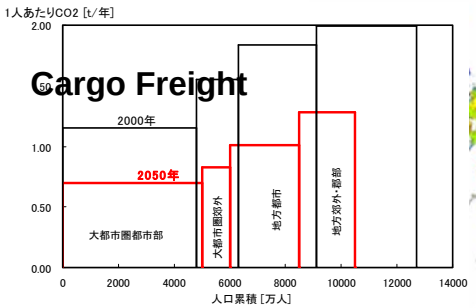
※HV：ハイブリッド車の省略形　　※電力：日本の平均電源構成
※燃料電池車：回生エネルギーを二次電池で回収　　※水素：圧縮水素を仮定

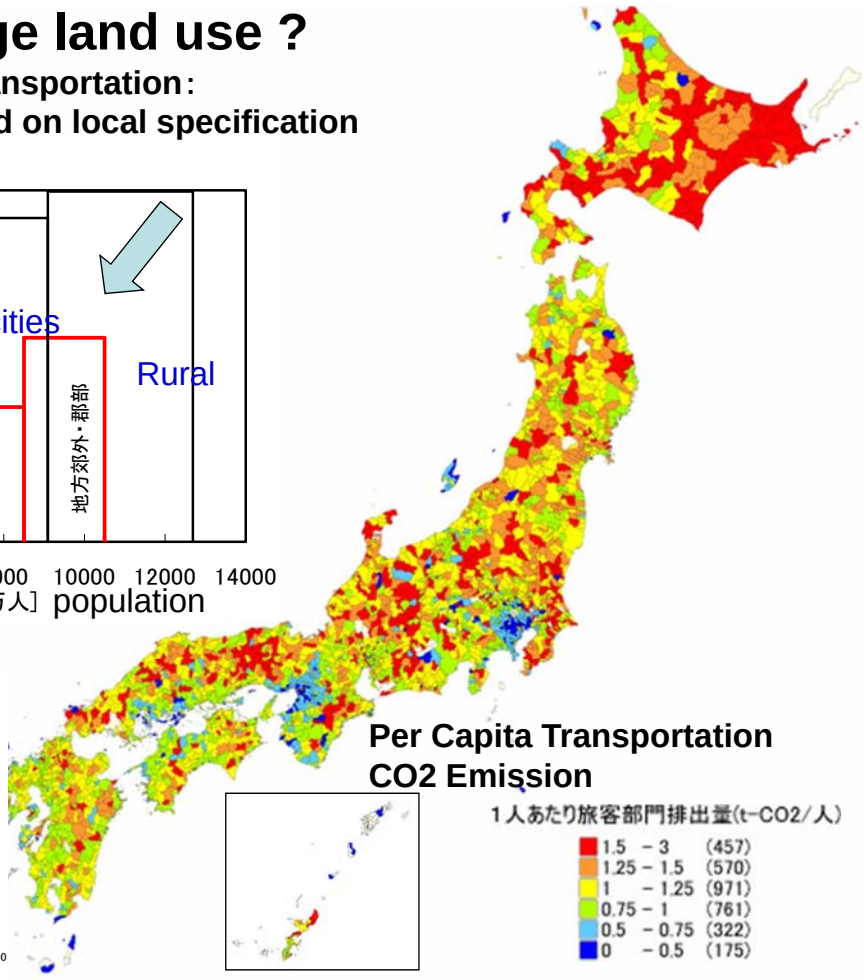
脱温暖化2050研究
交通チーム　工藤

Q7:How to change land use ?

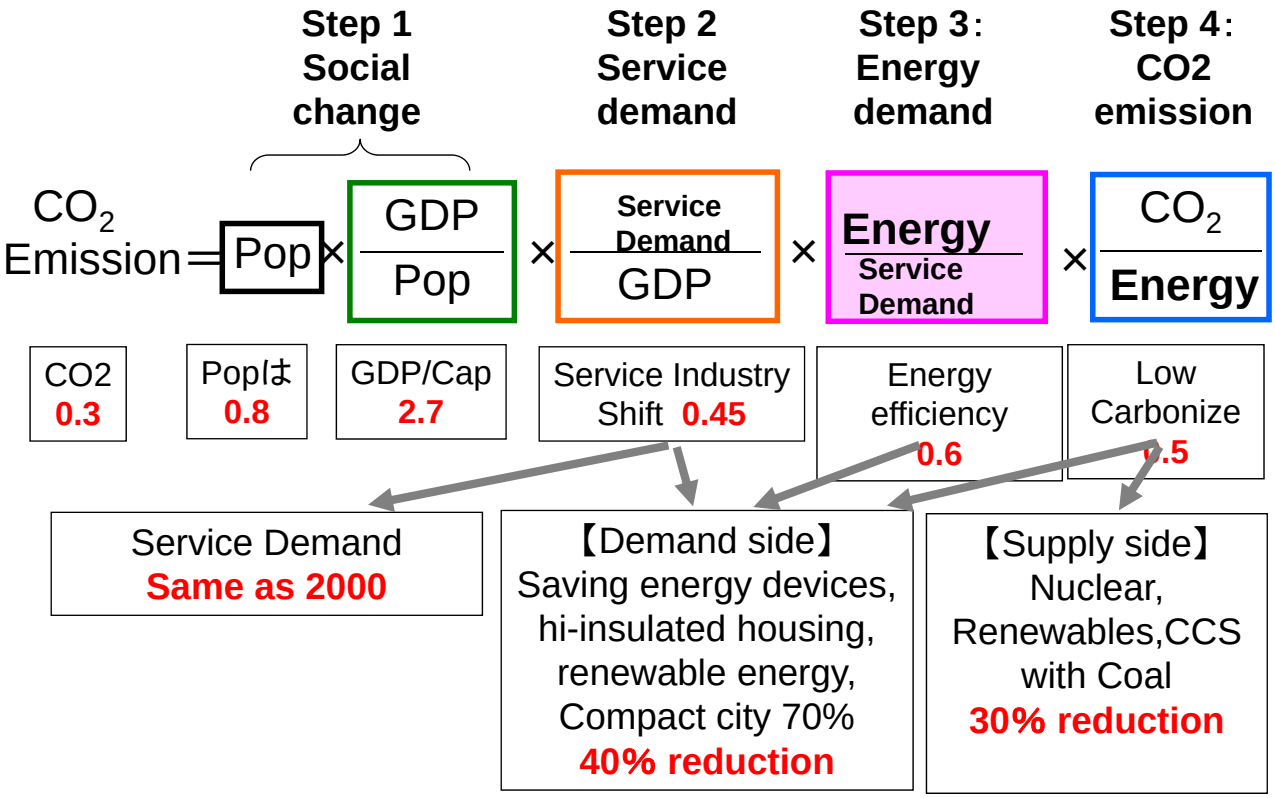
Land-use planning and transportation：
Reduction strategy depend on local specification







Energy Efficiency is the key, but not enough

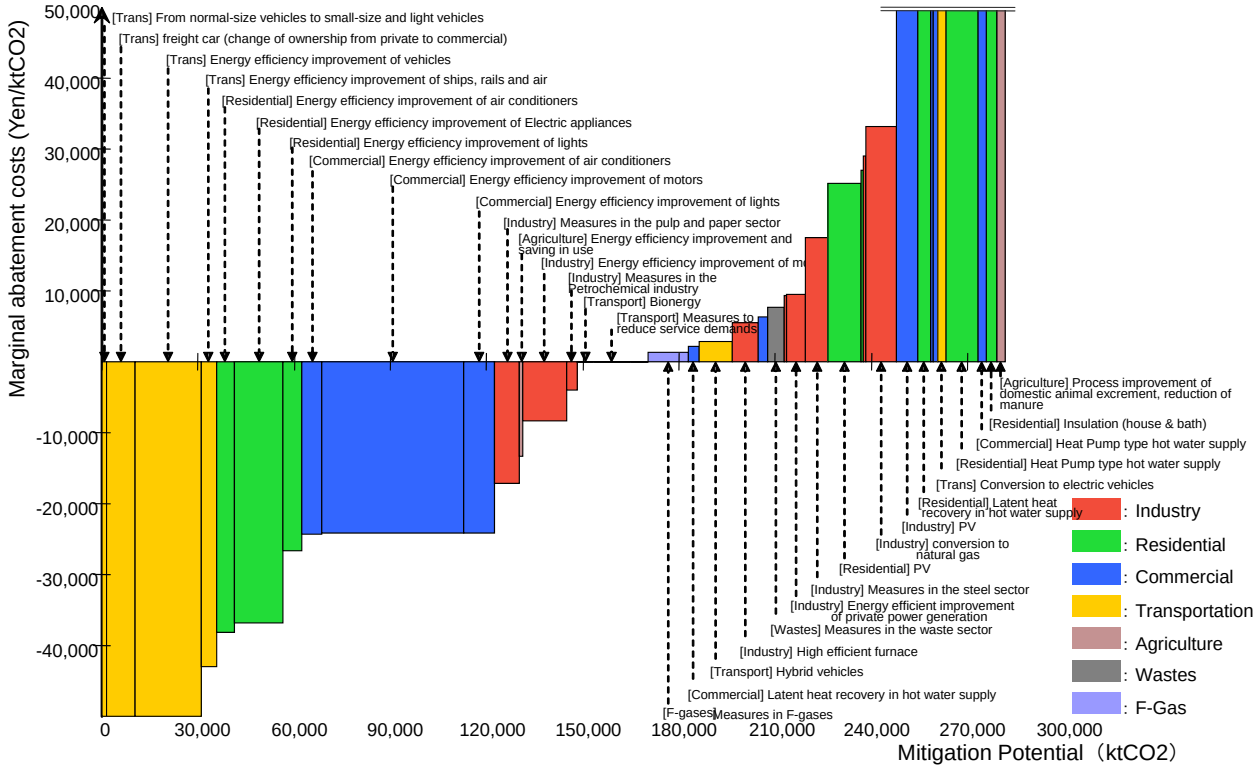


2050 Japan LCS Scenario

AIM/Enduse[Japan]

Q8: How much is the cost of reduction ?

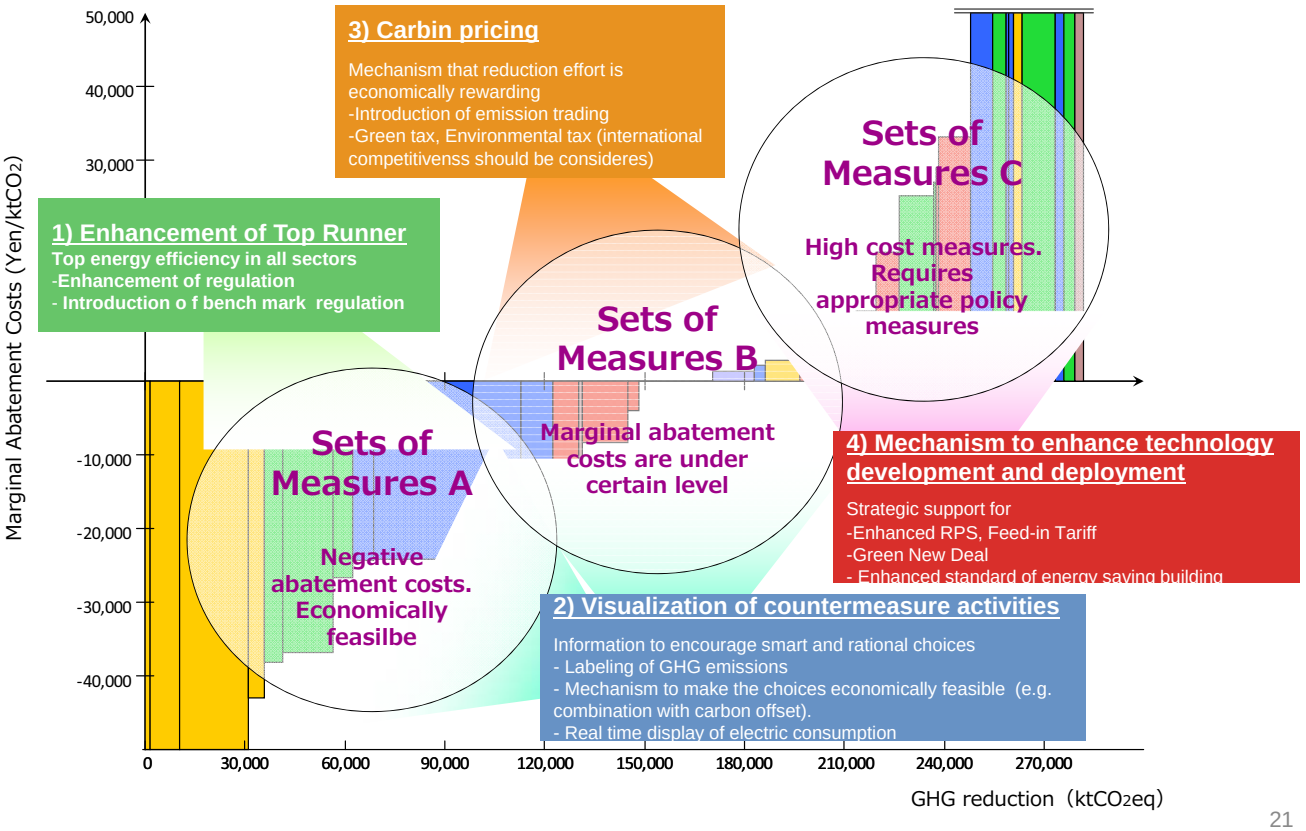
Marginal Abatement Cost to Reduce GHG emissions in 2020



Note: MCII, Payback time is 3 years except 10 years in Insulation and PV. Mitigation potential is compared to the emissions in Frozen Case

Q9: How much is the cost of reduction ?

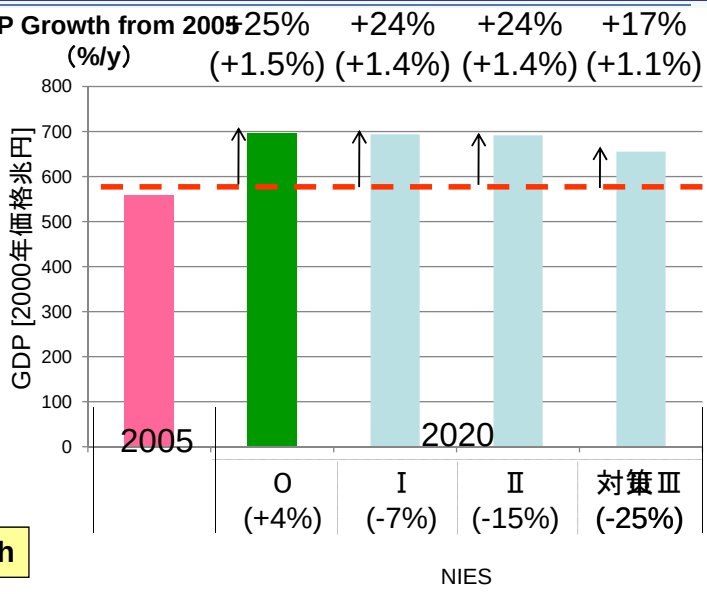
Feasible with Four sets of countermeasures to achieve the target of 2020

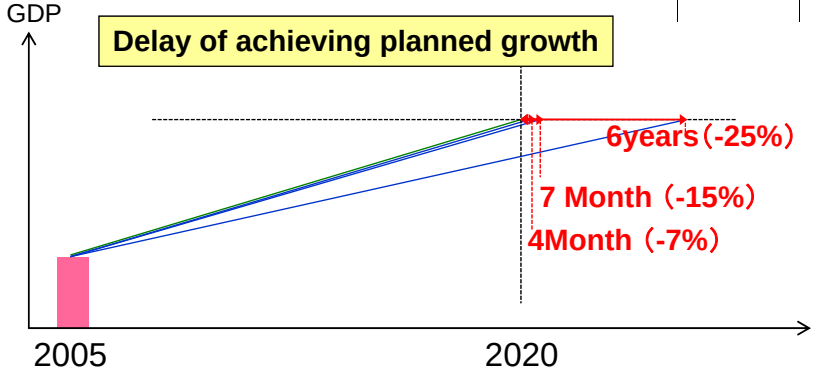


Q10: How much is the impact to country's economy ?

Endurable loss in GDP growth:?

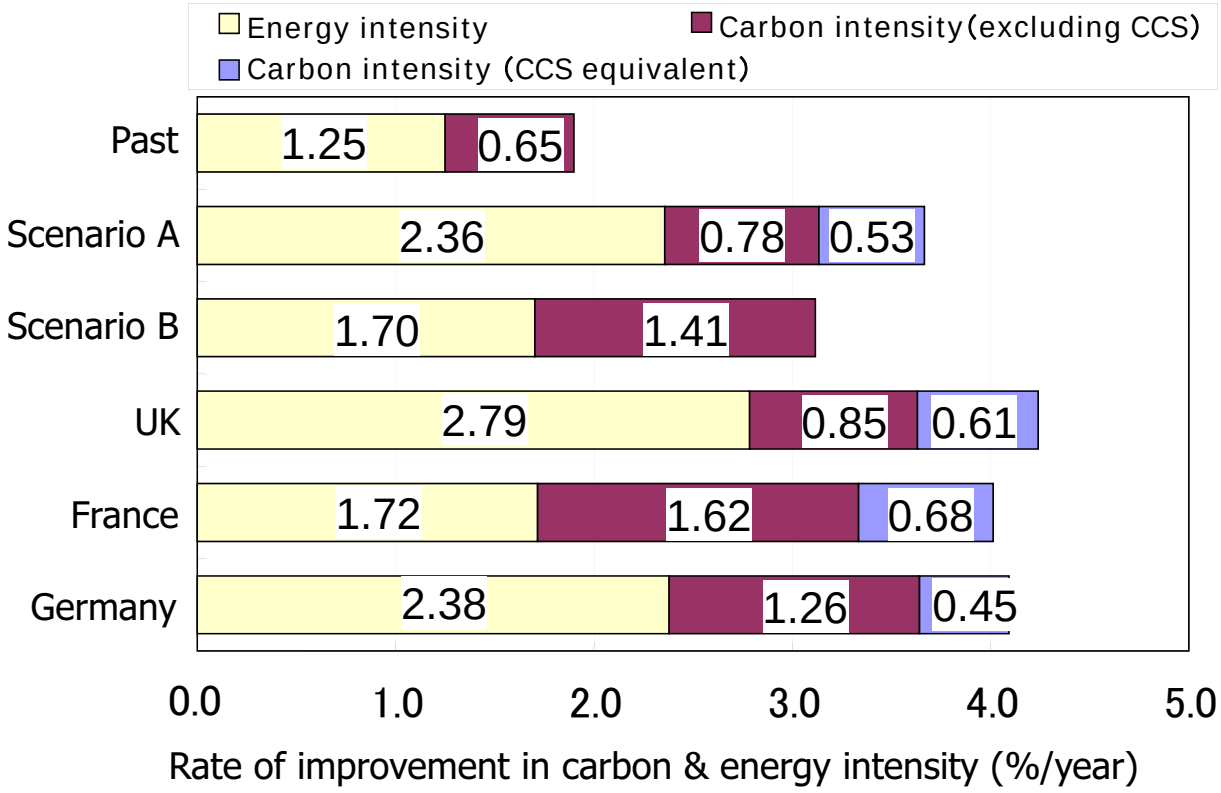
- 7%～15% reduction from 1990 effect little to GDP
- 25% reduction from 1990 can secure 1.1%/y growth



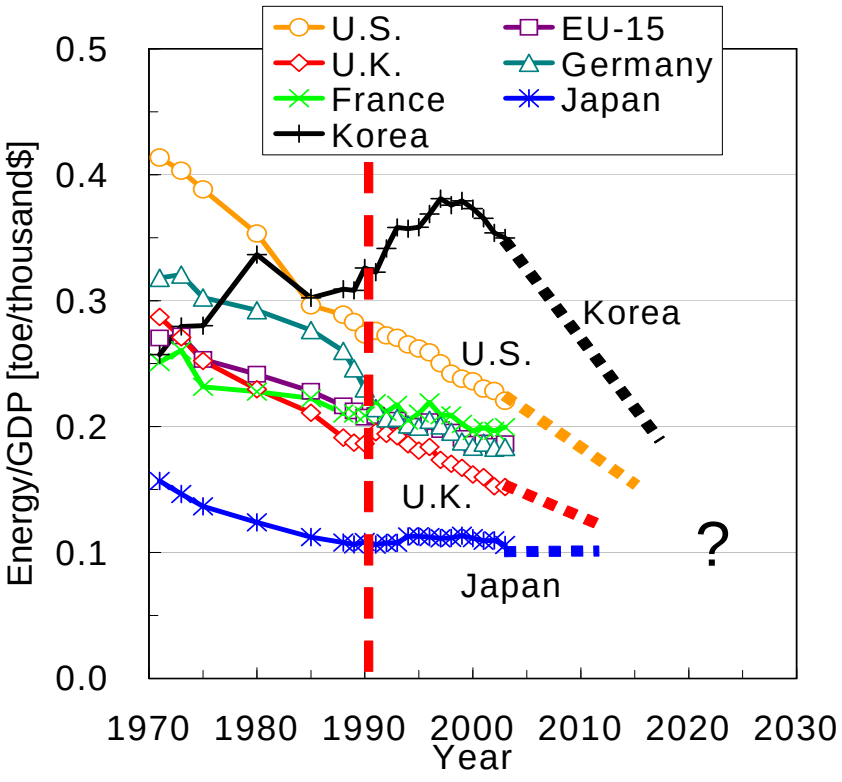


Q11: Can we survive in international technology competition ?

Acceleration of Technology Essential to Realize a Low Carbon Society



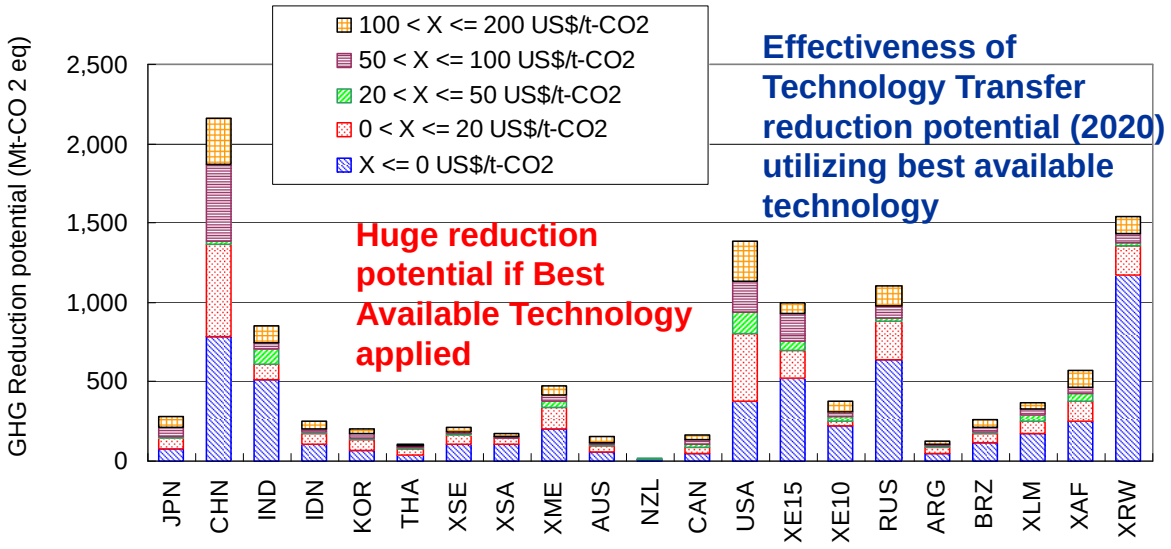
International Energy Intensity Competition



Japan almost caught up by European countries

IEA Energy statistics

Q12: How Japan can contribute internationally?



- **China, US, India, Western Europe and Russia are major 5 regions where there are large reduction potentials, and it accounts for 63 % of total reduction potentials in the world. Top 10 regions account for about 80 % of total reduction potentials.**

Open discussion on modeling, scenarios, and its policy implementation

by

"How to bridge simulation scenarios and sustainable LCS policy implementation"

Coordinated by Associate Prof. Dr. Bundit Limmeechockchai (SIIT-TU)

Closing Remarks

by

Dr. Mikiko Kainuma (NIES)

National Institute for Environmental Studies

Q&A and Comments

Questions & Answers

Q: Dr. Kitti (CU)

In the IO for 2030, the coefficients are already changed from 2005 how to estimate the future. The structural industrial relationship is different from 2005.

A: Dr. Bundit (SIIT-TU)

Now Thailand is moving to more primary industry. However, from the studies in many countries, especially in Japan and with the suggestion from Prof. Matsuoka, we decided that in the case of Thailand we should focus on tertiary industry or service sector in 2030.

Q: Dr. Kitti

Question on the load forecast.

A: Dr. Bundit

We have followed the Power Development Plan (PDP 2010) up to 2022 and forecast to 2030.

Q: Dr. Kitti

For the MARKAL, Could you explain the electricity substitution or the energy use on the demand side?

A: Prof. Ram (AIT)

For the demand side, the service demand is the driver of the model to estimate Financial costs of technologies and the fuels.

Q: Dr. Kitti

In your study, how many percent is the optimum CO_2 reduction according to the cost?

A: Prof. Ram

About less than 10%.

Q: Dr. Kitti

Thailand is going to have nuclear power plants. Are there any co-benefits?

A: Prof. Ram:

Nuclear power will substitute conventional power generation. However, you have to consider both environmental and technological costs.

Q: Mr. Martin Brechter, GTZ Advisor at TGO

I am from TGO.
Are there modeling especially for local government and the city?
Because I understand that the modeling is to show all in the futures.
For a local government and analysis tool for specific parts, how to formulate specific parts and to transfer concept of emissions inventory for CO_2 reduction.
It is a very hard part to get the city data. Before the exercise I thought may be very difficult to get all the data. In the national level it has already a lot of statistics.

So that my question is how can I use or verify the data on the local level or local reduction plan, and to reduce my emissions. How can I combine this model?

A: Prof. Matsuoka (KU)

There are differences in the base year of the model. The base year is to identify the change from now into the future. We do not know about the future mechanism; but the most important to the model is the future projection to support policy making. The objective of the model is to identify the change in future. Of course we want to know the precise and details of mechanisms, but not easy. In case of local authorities, we do not know. W must guess. We have to find information from another way. In modeling, we integrate such information, and they sound very consistently.

In Japan, for example, we have no exact local statistic table, in such a case, we estimated and surveyed in buildings, industries. If we have energy balance tables, we can use directly, but we do not know. From energy balance table, we can estimate future energy structure, and estimate the changes. Such process is very crucial and very useful.

Comments: Dr. Sirinthornthep (JGSEE-KMUTT)

According the LCS to the policy makers, I understand that what your reason to make sure the data as Prof. Matsuoka already mentioned of the model as a tool to do emissions and project the emissions in the future as a tool for policy makers and to see the objective plan for the actions currently or at this moment or at short time and to see the effect of the mitigation in the long term. In mitigation, I think the model is one of the tool the can link between the policy makers and the researchers. However, the model is the model. So, you have to make sure and you have to put data enough to put in there.

For me I think that the model like a JIGSAW. It's a bottom-up approach or the national inventory that consists of the top-down approach. Top-down approach also gives information to the policy to expect a level. If you would like to see in the future with top-down approach then we need the forecasting, and you see this picture in the future and to see whatever appropriate mitigation and actions will be suitable.

At the end of this, the policymakers would like to guess would like to see the top-down approach and the bottom-up approach to compare with the region. If the region is the same, then this might help them. That's OK. What direction is the right one to go forward? I think that the model is the top-down approach, and forecasting the mitigation in other macro or national scale to be comparative for the decision makers.

Q: Dr. Bundit Lim

How can NIES link this model to the policy level from NIES experiences?

A: Dr. Kainuma (NIES)

We have developed the AIM model for more 10 years.
Model is a model. Data analysis is also very important. We have to develop scenarios for policy makers as well as action plans.

Q: Dr. Bundit Lim

Many people see Thailand'LCS brochure using ExSS tool at National level. Can we use ExSS tools for developing LCS scenarios for sub-national level or a city?

A: Dr. Kainuma

Yes, really we can use such as Malaysia case.

Comments: Mr. Boyd Dionysius Joeman (IRDA)

Let me share some on the Malaysia context. What I found was very useful to understand the module itself when I went to NIES and KYOTO and to develop and training AIM. It's very useful to policy makers to understand and how the model works and thank to Gomi-san. It is very useful for me to understand how it does, what we need for inputs, and what kind of data is used for the input. How correct the data is. For me to understand that and to translate that into policy for action is very useful. Then, I want to share policies with the top level and the bottom levels. This is not LCS but it proportion of strategic plan. Let me do it to get people to take part and understand the issue of the point of view of the scenarios you did, and strategic plan. The program shows all the information in each section and by showing those they can decide what they what to see. The answer to the question is what they want to see. We give some idea for them and let them choose what they want, such as street lighting. If they take each strategic action, and tell them what will happen if they don't do anything. And if they do something, this is the energy savings and CO_2 reduction. In such a way, they will learn how to adapt, for example, they may need to learn how to ride a bicycle to achieve some emissions reduction. We have to show them exactly 'what they need to do', and that is for the bottom level.

For the top level, the program can tell the top level people (e.g. state government administrator or the prime minister) what you can and cannot do. We tell them what will happen if this plan is taken, like the way it demonstrates to the local people.

Comments: Prof.Ram M Shrestha

It is depended on priority of government since government has lots of things to do. Priority of the country has been changed. I remember that in 2005 CDM topic is very difficult to convince Thai government and policy makers on the opportunities of CDM. At that time, I cannot find anybody can use CDM opportunity. It likes a dream. Though in my projects at AIT, in 2005 ONEP had been included in the workshop, they knew about the benefits and opportunities of CDM. But very soon there is a change. Now there are several organizations have been formed in Thailand for CDM including consulting firms.

I also wonder on the case of Vietnam. Now many privates form CDM consulting firms in Vietnam.

I think that it takes sometimes. Because academic researches, in general, think ahead of actual policy makers. Researchers are supposed to think first. Researches on CDM started immediately just after the Kyoto Protocol in 1997. At that time, it is quite difficult to people to comprehend; but few years later, more and more know about the CDM benefits and so on, such as this kind of workshop and policy dialogues.

I think that it is communication problem between researchers and policy makers. More interaction programs and needed.

Comments: Representative from Khon Kheng City, Thailand

Climate change organization is very important. Today climate change focal point is the Office of National Environment Policy (ONEP). I think that the climate change focal point should be neutral and independent under Office of Prim-minister. I suppose that NESDB should have more important role in climate change since NESDB provide national plans to government. If the climate change action plan is nationally proposed, the local cities will follow that plan especially the local authorities or provincial authorities who authorize the action plans with their own budgets. Especially, at this moment NESDB is formulating 11^{th} NESDB plan to government. If those plans are included, they will be implemented successfully under appropriate mechanisms.

The second issue is the Key Performance Index (KPI) of the city. If climate change action plans are linked to the KPI, the local staffs will follow the action plans. We may select the big city who have high potentials and can do it successfully as show cases.

Finally, we have to present the co-benefits of CO_2 mitigation from academic studies. I would like to propose the selection of cities for the show cases and can be presenting the northern, southern, central, and northeastern regions. These selected cities can be representatives such as the case of Khon Kheng City. We have implemented climate change activities for 2 years. What we did is the social network and increase awareness of local people. What we need and lack of is the mechanisms. Now we are supported by UNDP to develop LCS city. We started with training on GHG inventory for policy analysis of future action plans. Next, we need strategic plans for local city. The corresponding ministries should be the hosts of these activities with supporting budgets. I emphasize that Thailand need strong climate change focal point to push these policies.

---------- THE END ----------

SUMMARY OF INTERNATIONAL PARTICIPANTS' EVALUATION FORM

SUMMARY OF INTERNATIONAL PARTICIPANTS' EVALUATION FORM

Low-carbon society model capacity building workshop

Bridge simulation scenarios and sustainable LCS policy implementation using AIM (Asia-Pacific Integrated Model)

Friday, 19 November 2010

Pullman Bangkok King Power

Number of participants: 71 persons

	Level of satisfaction			
① Registration and information	Excellent	Good	Fair	Comments
② Introduction of Asian LCS research study	10%	90%		
③ Example of bridging LCS scenarios and policy-making process	99%	1%		
④ Capacity building for LCS model simulation	99%		10%	
⑤ National and sub-national LCS scenario development in Asia	1%	99%		
⑥ Overall	90%	10%		

Suggested Improvements

1. Kindly describe the relationship between LCS scenarios and your work / area of interest.

- I'm working in the area of environment & the responsibility is to enhance& promote environmental awareness people in responsible areas (4 provinces in the south). So LCS is relevant to my job.
- Although LCS is mainstreamed into the national economic & social development plan of Thailand,
- We are implementing a project on Low carbon for Asia Pacific. We are looking into the impact of EDP growth
- Control/ Reduce smoke in north-Thailand vs. Solid Waste; Lampang province
- Teaching student in the University Encourage villagers to live in a garden- eco life style
- LCS scenario is related will my work. I'm working on renewable energy promotion and it impacts on emission reduction therefore LCS and my work more in the direction.
- My responsibility is to coordinate LCS project in Mueng Klaug Municipal.
- Project approach.

Suggested Improvements

2. ***Do you think this workshop helps to bridge simulation scenarios and sustainable LCS policy implementation? Do you find any other issues to be discussed more and further?***

- Not so sure, I'm still thinking how to disseminate the information & interpreter to be use a local level.
- Absolutely it would be very worthwhile i.e. AIM can include the cost and the impact on economy (GDP) as a whole. In short, if the CGE type modal can be made easier to access, policy makers will likely to use the result.
- Yes. Not only energy relcted reduction but also carbon should be included ad one of the measures to reduce effect emission.
- Yes instead of working on emission reduction targets RE should be promoted to reduce emission.
- It is useful to assist decision on planning either.

3. ***Which points did you understand well in AIM / ExSS Modeling exercise?***

- The step to use Exss Demo Version by Dr.Kei Gomi.
- AIM/Exss is very useful tool for scenario of LCS which will be helpful for discussion among stake holders and lead to consensus building on LCS policies that are transparent and scientifically reliable.
- Exss modeling it static not dynamic and also depending on technology development hypothesis.
- Target the future.
- The model can predict the outcome in the future
- The GDP is the factor for controlling GHG emission and also the population.
- Finally worksheet sample but need instruction for beginners.

4. ***What components, do you think, are important to implement the LCS scenarios?***

- Data Good & correct.
- Data both primary and secondary ones. The reliability& precision would be the key to the reliable credible output from the models.
- When designing model it would be important to property incorporate the version of countries and policy objective such as GDP growth industrial competitiveness employment increase other than GHG emission reduction.
- Basic/ base data.
- Vision and strong will be of the policy makers.

Suggested Improvements

5. ***In addition to today's AIM/ExSS modeling workshop what additional training would be useful for you in future?***

- There will be needed for work details of the program.
- CGE finding input of countermeasures or their policies would need CGE.
- To use in real situation. Should we have data preparation from each area. Then it would be more useful.
- Development of national using both modeling exercise and compilation of policy options e.g. bottom up approach.

6. ***Would you be interested in developing the LCS scenarios in your area with the simulation models? How will you use LCS scenarios for your area?***

- Yes, I am interested but I have no knowledge in technical detail i.e. GAM and computer programming. It would be helpful if LCS scenarios can incorporate the countermeasures like green tax & budget reform. The simulation model that can show the economic from the use of environmental fiscal reform. would be useful for policy makers.
- By using Markal Model.
- GHG mitigation target, Renewable Portfolio Standard.
- Yes, as we are implementing institute to solve environmental problem which also directly related to LCS. This should be a good tool to monitor or measure the implementation result.

Any comments and suggestions are welcome.

- To get the data in the area is difficult to implement the vision to be practical is more difficult.
- This is a very good opportunity for us to learn about modeling exercise which very complex and hard to understand.

Annex

Pullman Bangkok King Power