

Activities on Assessment of Environmental Policies and Dissemination at AIT

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Presentation Outline

- ❑ **Multigas Emission Inventory in Thailand**
- ❑ **Promotion of Biofuels Program in Thailand: Application of AIM/Enduse**
- ❑ **Assessment of Energy, Economy and Environment in Thailand: Application of AIM/CGE**
- ❑ **Dissemination: Workshop on Energy System Development and GHG: Analyses of Selected Options in Thailand**



Multigas Emission Inventory in Thailand



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Multigas Emission Inventory in Thailand

- ❑ Thailand submitted initial national communication on 13th November 2000
- ❑ Study conducted according to guidelines based on revised IPCC Guidelines (1996).
- ❑ Planning horizon: 2000-2035
- ❑ Non-CO₂ GHGs considered: CH₄, N₂O, NO_x and CO
- ❑ GHG emissions source and sink categories:
 - Energy use
 - Fugitive emissions
 - Industrial processes
 - Agriculture
 - Waste



Global Warming Potential of GHGs

Pollutant	2000		2015		2025		2035	
	kilo ton	%	kilo ton	%	kilo ton	%	kilo ton	%
CO ₂	183,583	58	354,529	68	593,470	76	959,821	82
CH ₄	5,487	36	7,094	28	7,990	21	9,168	16
N ₂ O	55	5	63	4	69	3	75	2
CO₂ equivalent GHG	315,858		523,054		782,613		1,175,656	

❑ Changes in shares of GHG emissions (between 2000 and 2035):

- CO₂: 58% to 82% ↑
- CH₄: 36% to 16% ↓
- N₂O: 5% to 2% ↓

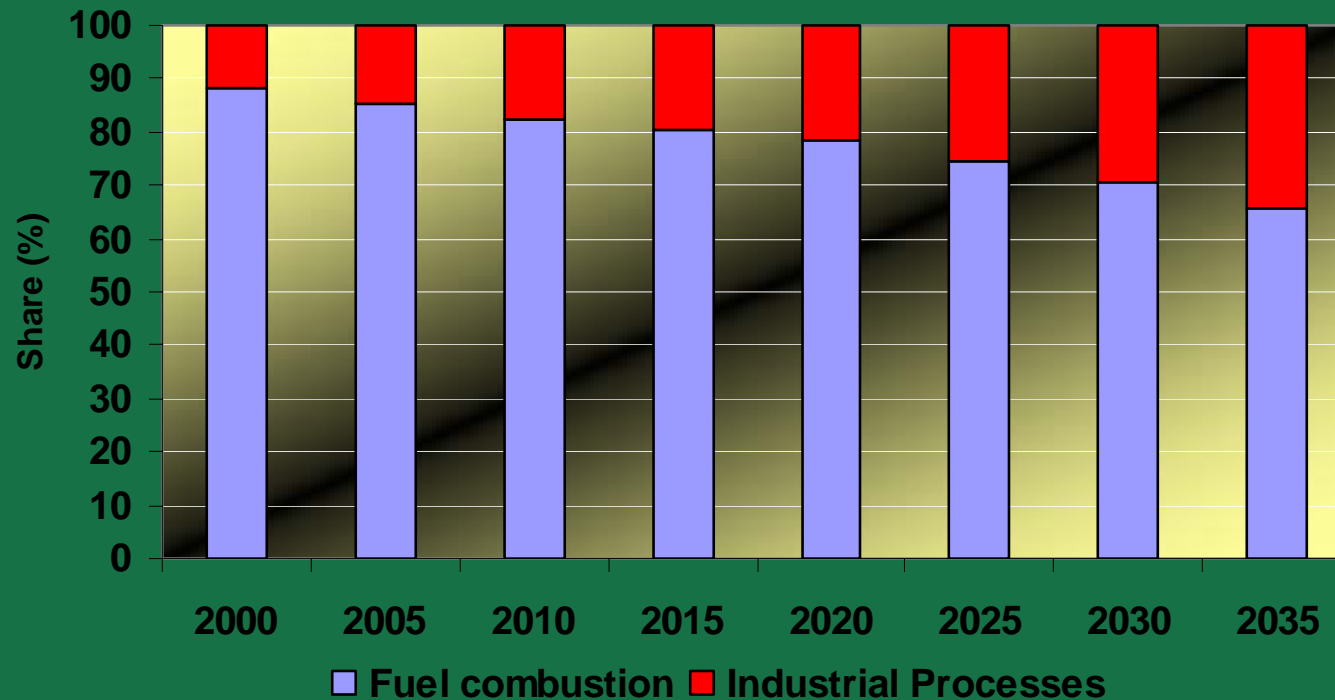
❑ CO₂ equivalent GHG:

- 316 million ton (2000) to 1,176 million (2035) ~ 3.7 times increase
- AAGR 3.8%

❑ Among the Sources of GHG emissions, energy use is estimated to account for 57% of total GHG emissions in 2035 as compared to 54% in 2000.



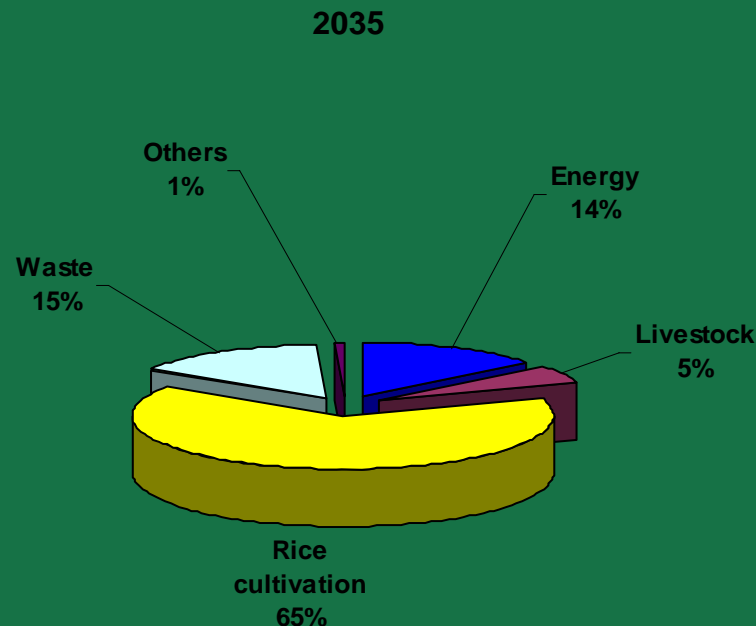
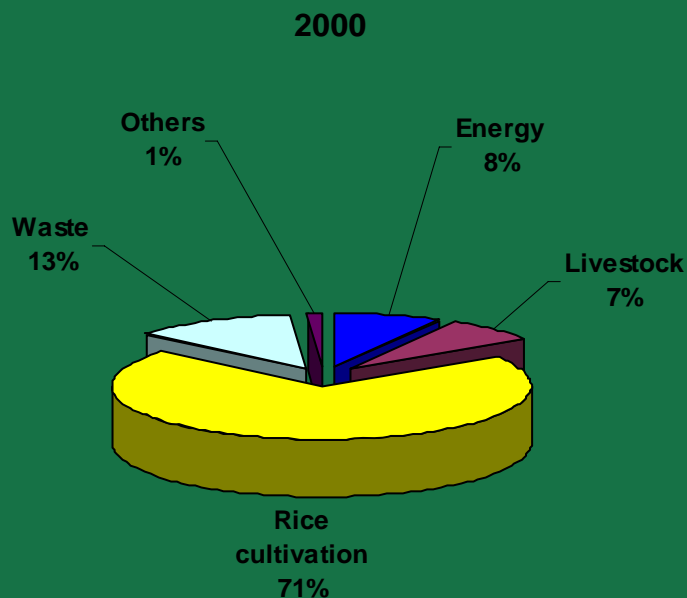
CO₂ Emission from Fuel Combustion and Industrial Processes



□ Changes in shares of CO₂ emissions from 2000 to 2035:

- Fuel combustion: 88% to 66% ↓
- Industrial processes: 12% to 34% ↑

Methane Emission during 2000-2035

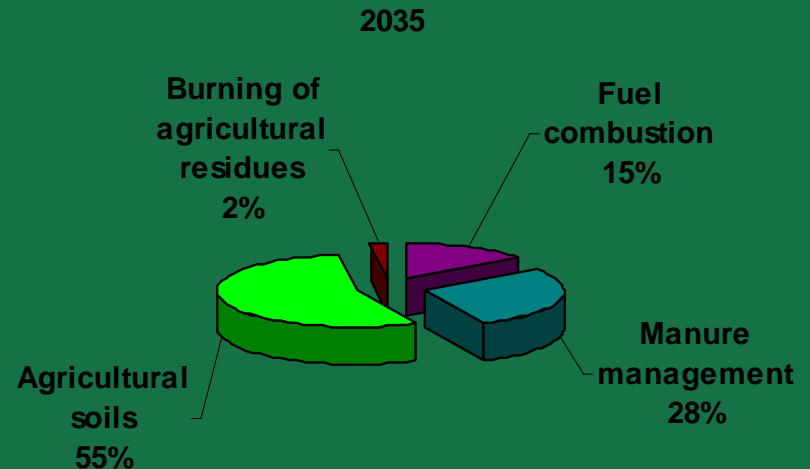
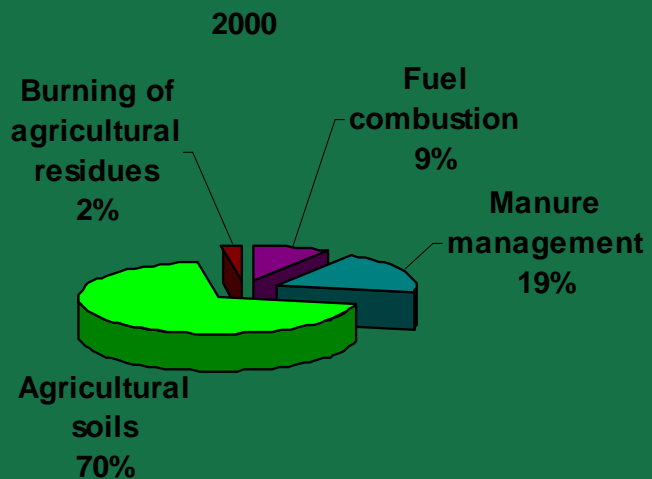


- ❑ AAGR during 2000-2035: 1.5%
- ❑ Changes in shares of methane emission by source during 2000 to 2035 (%):

▪ Rice cultivation	71 to 65	↓	Energy	8 to 14	↑
▪ Waste	13 to 15	↑	Livestock	7 to 5	↓
- ❑ Rice cultivation to account for more than two-thirds of methane emissions.
- ❑ Increasing share of energy use and waste in Methane emissions.



Nitrous Oxide Emission during 2000-2035



- ❑ AAGR during 2000-2035: 0.9%
- ❑ Changes in shares of N₂O emission by source from 2000 to 2035 (%):
 - Agricultural soil 70 to 55 ↓
 - Fuel combustion 9 to 15 ↑
 - Manure management 19 to 28 ↑
- ❑ Agricultural soil is the largest contributor to N₂O emission (55 to 70%).
- ❑ The shares of fuel combustion and manure management are to increase in the future.

Promotion of Biofuels Program in Thailand: Application of AIM/Enduse



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Promotion of Bio-fuels in Transport sector and Their Impacts on Energy Systems and the Environment

- ❑ Based on AIM/Enduse [Thailand]
- ❑ Time period: 30 years (2000 to 2030)
- ❑ 2 Types of biofuel considered: Gasohol and Biodiesel
- ❑ Biofuels are considered only in transport sector
- ❑ Thai Government's roadmap of gasohol and biodiesel development and promotion:
 - Gasohol roadmap:
 - Phase I: Replacement of MTBE (Methyl Tertiary Butyl Ether) by ethanol from 2006
 - Phase II: 10% gasohol in all types of gasoline by 2007
 - Biodiesel roadmap:
 - Phase I: Introduction of biodiesel in targeted areas during 2006-2010
 - Phase II: Introduction of biodiesel nationwide from 2010



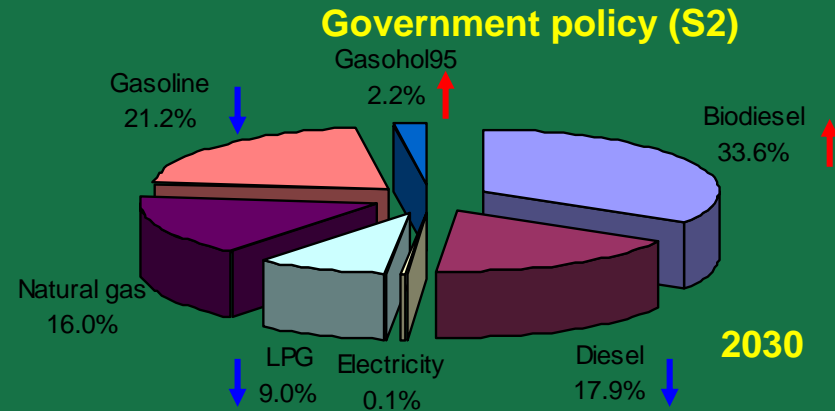
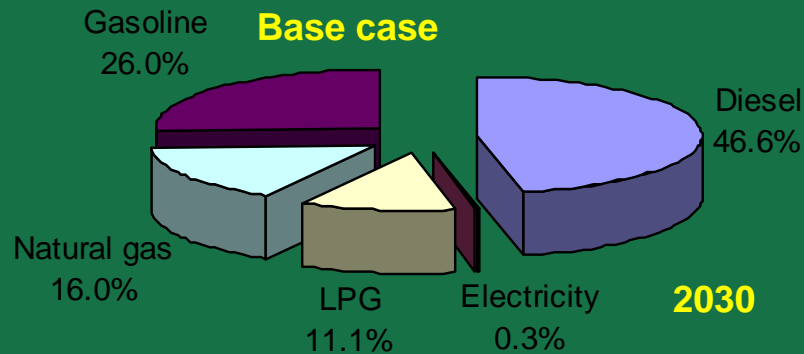
Promotion of Bio-fuels (Scenarios considered)

- ❑ Scenario 1: (S1) The Base Case -- No biofuels
- ❑ Scenario 2: (S2) Government Plan
 - Based on the government biofuel plan and resources availability
 - Land limit for biodiesel production is 0.8 Million ha (5 Million Rais)
- ❑ Scenario 3: (S3) High biofuel availability
- ❑ Scenario 5: (S5) Subsidy for gasohol 95



Promotion of Bio-fuels

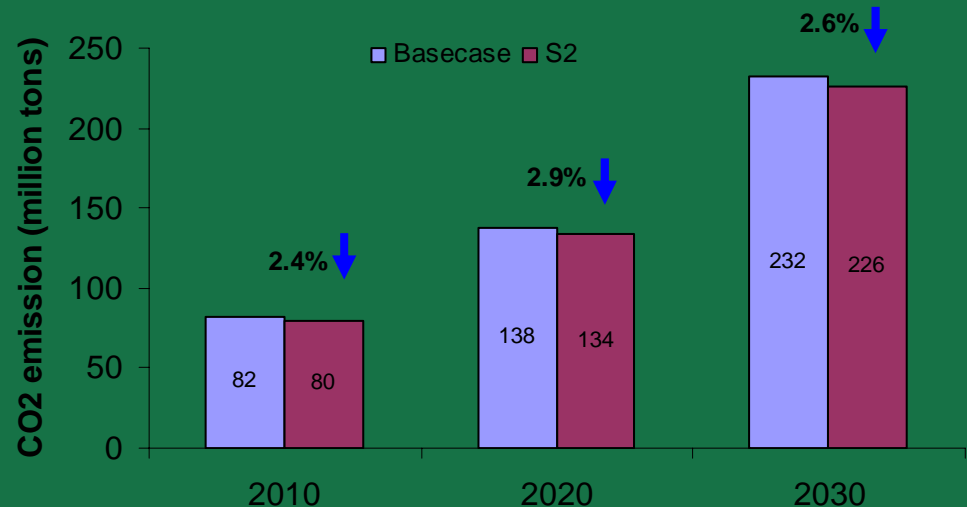
Changes in fuel mix in transport sector



- ❑ Shares of diesel, gasoline and LPG in total energy use is estimated to decline.
- ❑ Shares of gasohol95 and biodiesel are estimated to reach about 2% and 34 % in 2030.

- ❑ CO₂ emission reduction under S2 (government policy), during (2010-2030) compared to base case:

2010: **2.4%**
2020: **2.9%**
2030: **2.6%**



AIM/CGE Activities



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AIM/CGE Model

- ❑ Based on APEIS training attended by AIT team (Sunil Malla and Aunkung Lim in November 2005 at NIES)
- ❑ 2000 IO table of Thailand with 23 economic sectors
- ❑ Time horizon: 30 years (2000 – 2030)
- ❑ Four scenarios are analyzed:
 - Global market (TA1)
 - Dual track (TA2) : **Reference scenario**
 - Sufficiency economy (TB1)
 - Local stewardship (TB2)



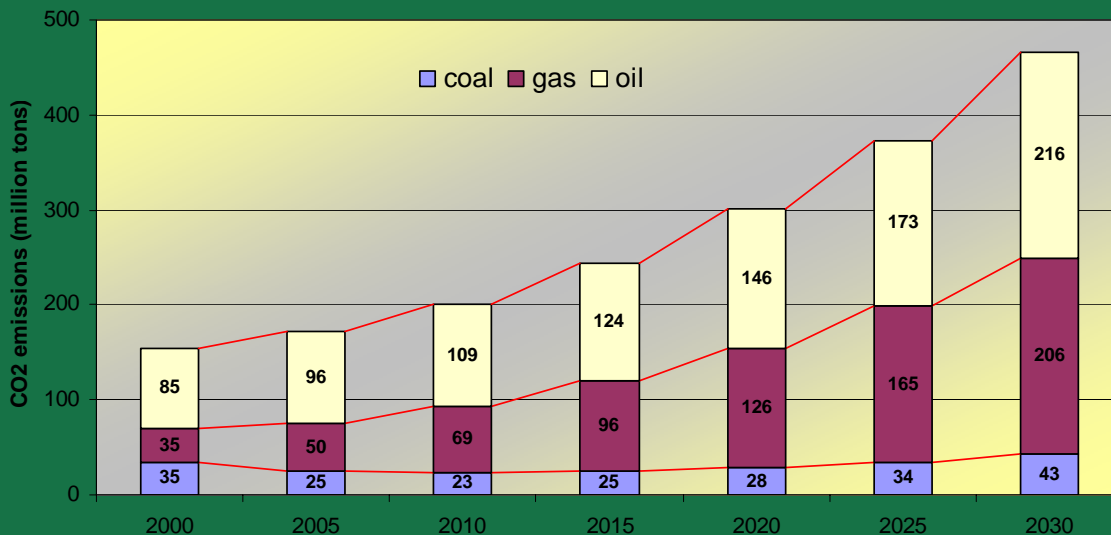
AIM/CGE Model

Simulation results: Reference case (Dual track):

	Consumption	Investment	Net export	GDP	Capital income	Labor income	Wage rate	CO2 emission
	(trillion Baht)						(2000=1)	(million tons)
2000	3.8	1.3	0.2	5.2	6.5	2.0	1.0	155
2010	6.4	2.3	0.2	8.9	13.8	2.2	1.6	214
2015	8.2	3.3	0.1	11.6	19.1	2.3	1.9	251
2020	10.7	4.6	-0.1	15.2	27.0	2.4	2.4	305
2025	14.0	6.6	-0.7	19.9	38.2	2.5	3.0	375
2030	18.5	9.3	-1.6	26.2	54.1	2.6	3.8	467

- ❑ GDP is expected to increase by more than 5 times
(5.2 trillion Baht in 2000 to 26.3 trillion Baht in 2030)
- ❑ CO₂ emissions is expected to increase by more than 3 times
(155 million tons in 2000 to 467 million tons in 2030)

Reference Scenario



Fuel share in CO₂ emission:

In 2000:

Coal: 23%, Natural gas: 23%

Oil: 54%

By 2030:

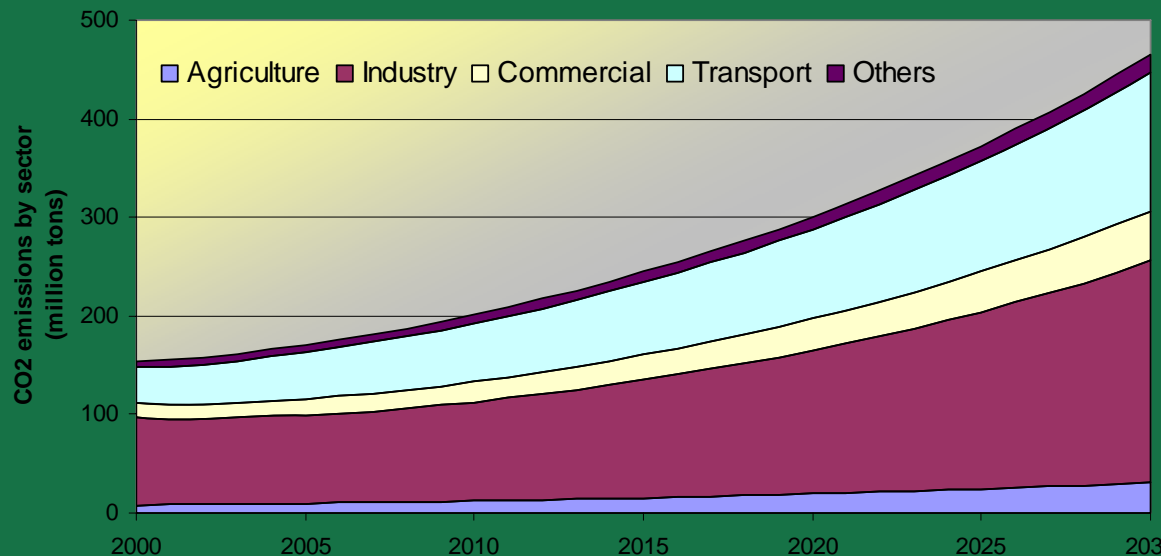
↓ Coal: 10%, Natural gas: 44% ↑

Oil: 46% ↓

CO₂ emission by sectors:

□ By 2030, industry and transport sectors combined contribute more than two-thirds of total CO₂ emissions.

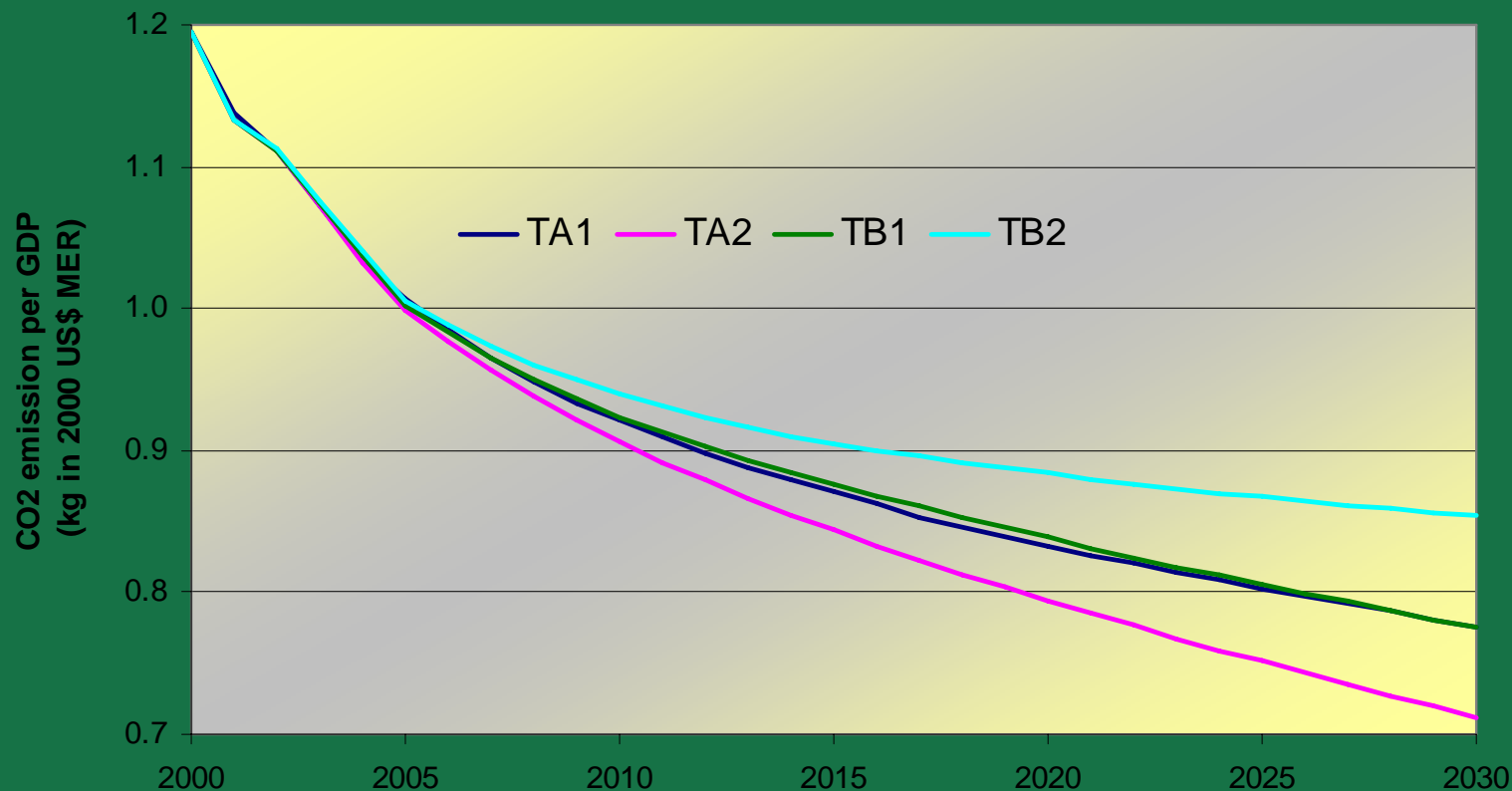
□ Over time, share of transport increases (from 25% in 2000 to 28% in 2030) and share of industry sector falls (from 58% in 2000 to 45% in 2030).



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AIM/CGE Model



□ CO₂ emissions intensity is expected to fall over time in the country.

- Highest: 0.71 (kg in 2000 US\$ MER) under TA2 in 2030;
- Lowest: 0.86 (kg in 2000 US\$ MER) under TB2 in 2030.



Dissemination Activities



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Dissemination/Capacity Building

- ❑ **Workshop on Energy System Development and GHG Emissions: Analyses of Selected Options in Thailand**
 - Held in June 23, 2005 at AIT
 - 29 participants representing universities, government organizations and private institutes
 - Department of Alternative Energy Development and Efficiency (DEDE)
 - Pollution Control Department (PCD)
 - Office of the natural Resources and Environmental Policy (ONEP)
 - Thailand Institute of Scientific and Technological Research (TISTR)
 - Thailand Development Research Institute (TDRI)
 - Appropriate Technology Association (ATA)
 - Universities (SIIT, Chulalongkorn, Kasetsart, AIT)
 - Objective of the workshop was to make policy makers and researchers in Thailand make aware of activities on environmental policy assessment based on AIM/Enduse & CGE models.
- ❑ **Poster exhibition and distribution of dissemination materials during Royal Thai Government (RTG) Joint Research Program Seminar, August 2005 at AIT**



Dissemination/Capacity Building

Presentations during the workshop included:

- ☐ **Implications of carbon tax and energy efficiency improvement on Thai Economy**
- ☐ **National level energy and emission scenarios development for Thailand**
- ☐ **Energy and environmental implications of CO₂ emissions reduction targets in Thailand**
- ☐ **Promotion of bio-fuels and their impacts on energy systems and the environment in Thailand**



Dissemination/Capacity Building



Information of the workshop is available at:
<http://www.serd.ait.ac.th/ep/esdgge>



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