

Progress in Strategic Database and CGE Activities at AIT

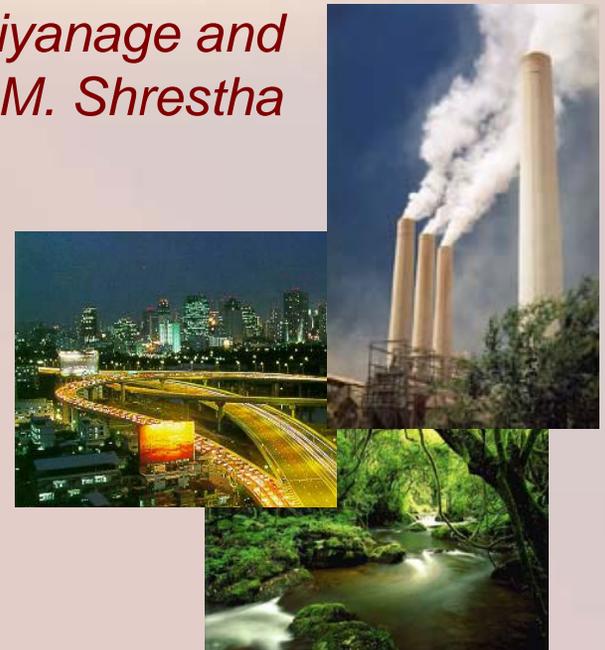
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10th AIM International Workshop
10-12 March 2005
NIES, Tsukuba, Japan



SDB Project Activities at AIT

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SDB Project Activities

- Past and ongoing activities on APEIS-SDB project:
 - Collection of qualitative data for 70 innovative technologies/programs
 - Collection of quantitative data for 20 innovative technologies/programs
 - Developing illustrative diagrams to represent activities in the transport sector and renewable energy sector
 - Representing the impact of bio-fuel program in Thailand using AIM/Enduse model.



Collection of qualitative information on innovative environmental options

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Renewable Energy Promotion

Solar PV (water pumping, SHS),
Solar Water Heater and Dryer,
Biomass (thermal & electricity),
Biogas (thermal & electricity),
Capacity buildings, etc.

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Residential Sector

Thin tube project,
Brown Rice Label 5 Project,
Hi-eff Air condition & refrigeration,
Energy efficient house,
Human awareness, etc.

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Transport Sector

Biodiesel and Gasohol,
Electricity vehicles, NGV,
Walking Street,
Fixed route Van bus,
Vehicle Emission Clinic, etc.

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Solid Waste Management

Hi-eff. waste incinerator,
Fly ash application in concrete works,
Recycled PET bottle to be carpet,
Aluminum Recycling for Prosthesis,
Waste Bank in school, etc.



Collection of quantitative data on innovative environmental options (1)

- **Renewable Energy Promotion (11 Selected options)**
 1. Residential Grid Connected PV Systems in Thailand
 2. Solar Home System Project
 3. Solar PV Power System for Rural Schools
 4. Solar Power plant
 5. Hybrid Power System for National Parks
 6. Biogas for Power Generation in Livestock Farms
 7. Biogas Used in Tapioca Starch Plant
 8. Biogas Used in Municipal Slaughter Houses
 9. Biogas Used in Palm Oil Extraction Plant
 10. Rice Husk Power Plant
 11. Absorption Chiller from Rice Husk for Mushroom Drying



Collection of quantitative data on innovative environmental options (2)

- **Transport Sector (6 Selected options)**

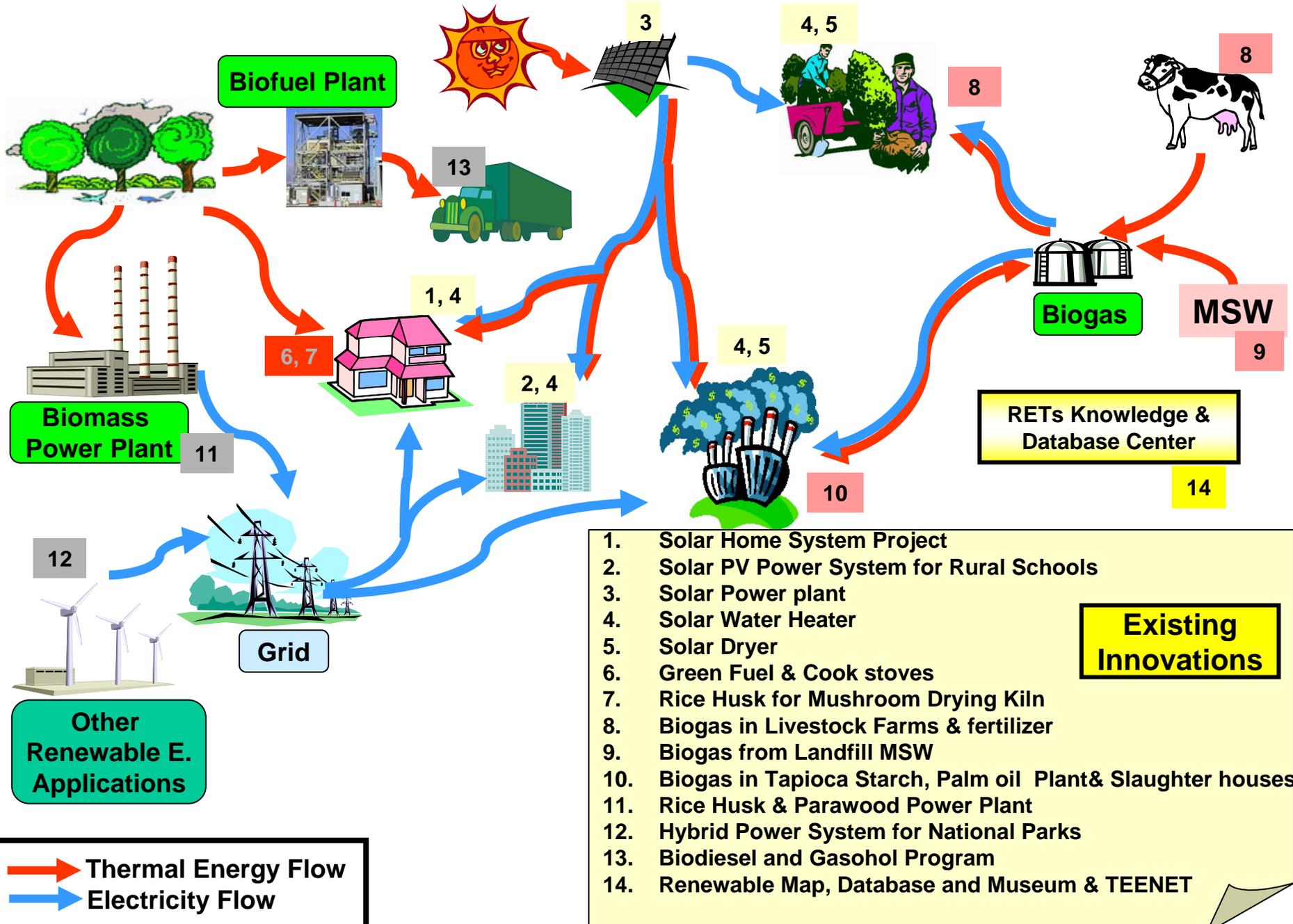
1. **Gasohol Promotion Program**
2. **Biodiesel Promotion Program**
3. **Natural Gas Vehicles Program (NGV)**
4. **Phase out Lead from Gasoline**
5. **4-Stroke to 2-Stroke Motorcycle Engine**
6. **Street Lighting Program**

- **Residential Sector (6 Selected options)**

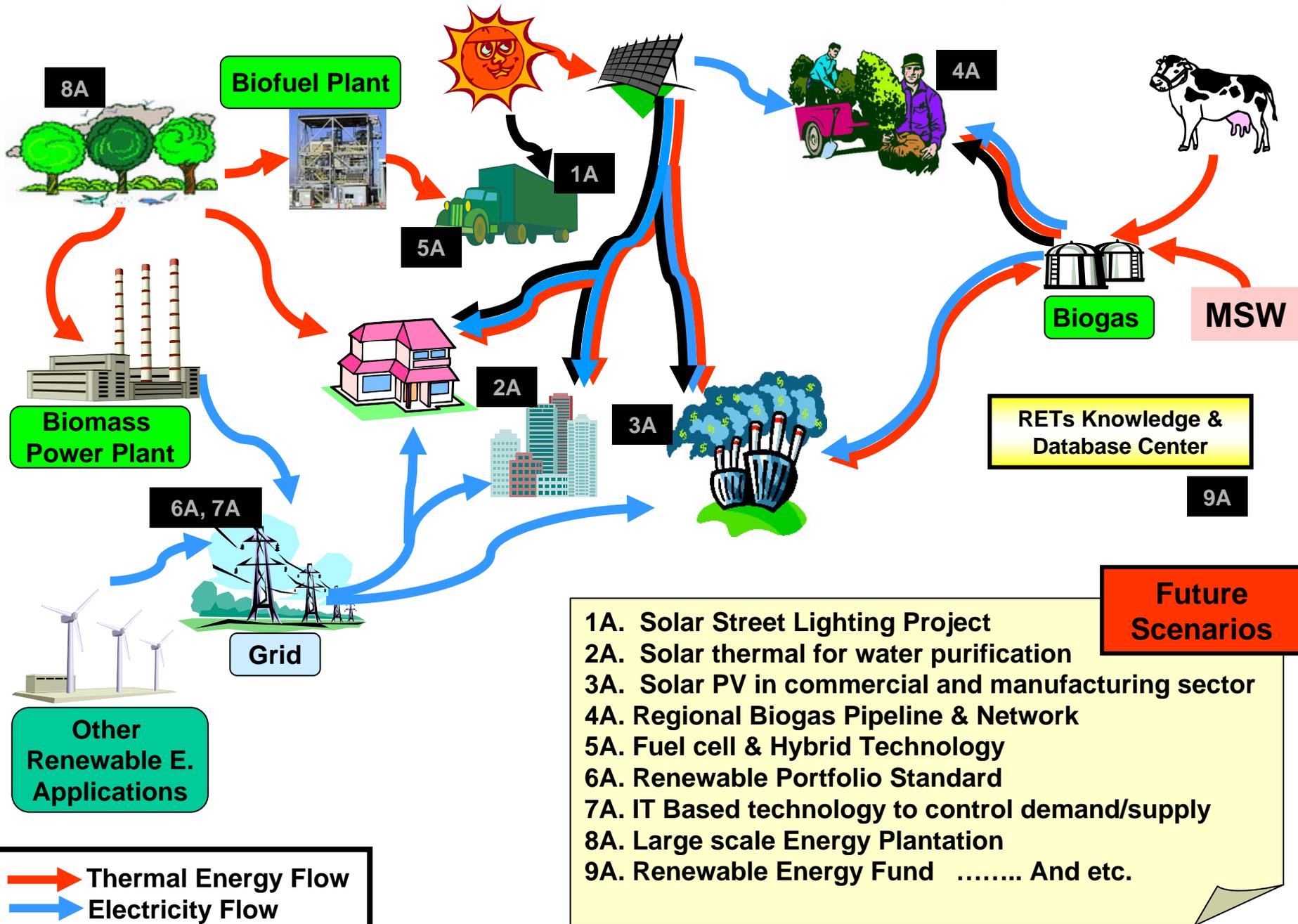
1. **Thin Tube Program**
2. **CFL Program**
3. **High Efficiency Air Conditioner Labeling Program**
4. **High Efficiency Refrigerator Labeling Program**
5. **Brown Rice No.5 Program**
6. **Low emission Crematorium**



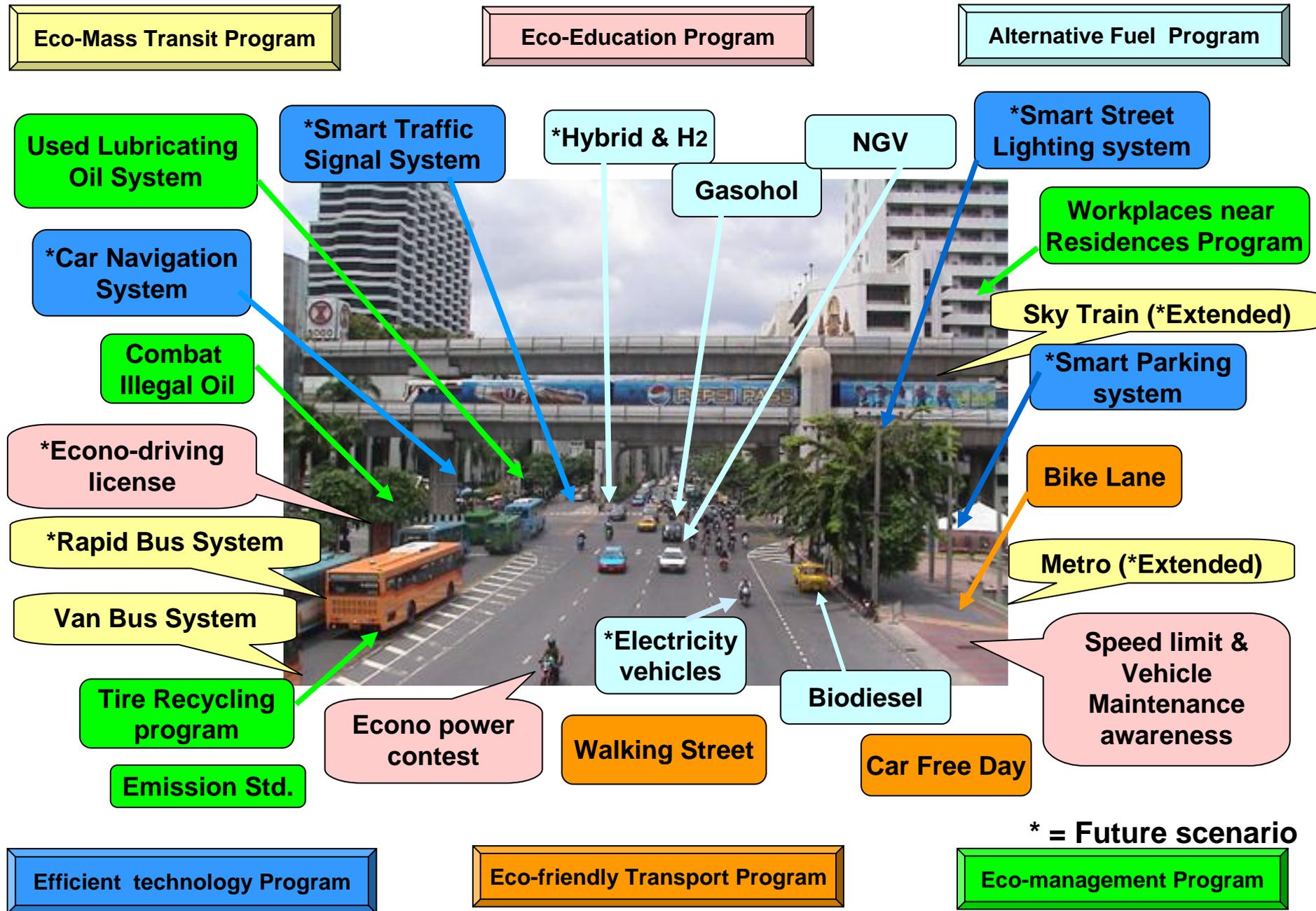
Illustrations of Strategies: Renewable Energy Promotion



Illustrations of Strategies: Renewable Energy Promotion



Illustrations of Strategies: Transport Sector (Urban)



Illustrations of Strategies: Transport Sector (Rural)

Eco-Mass Transit Program

Eco-Education Program

Alternative Fuel Program

*Gasohol

Biodiesel

*Smart Street Lighting system

Combat Illegal Oil

Used Lubricating Oil System

*Econo-driving license

Recycle Tire system

*Less Maintenance Highway

*Vehicle Maintenance awareness

*Bike Lane

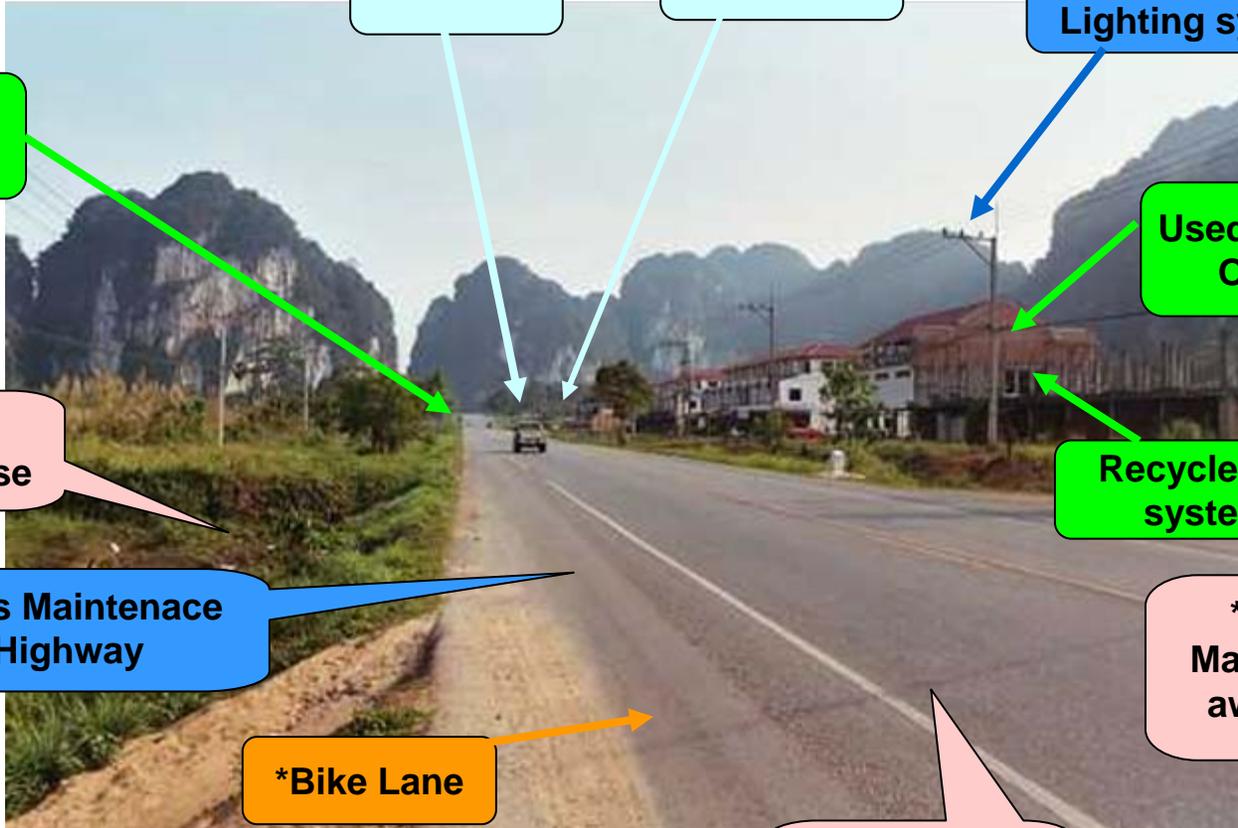
Speed limit awareness

* = Future scenario

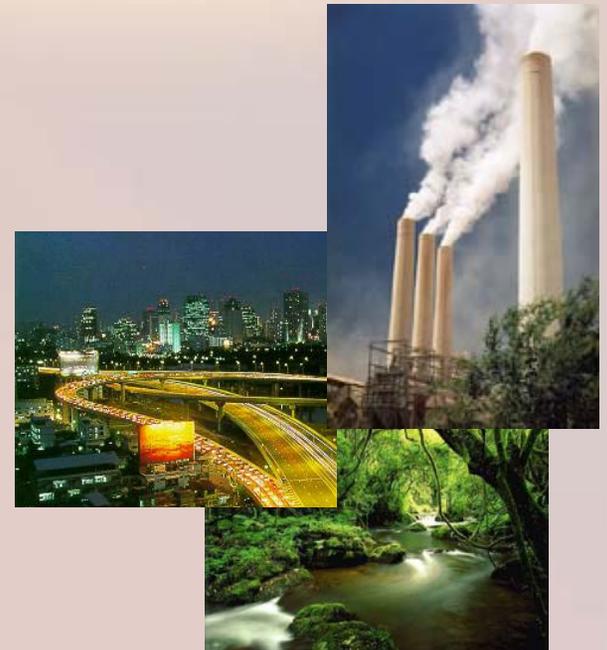
Efficient technology Program

Eco-friendly Transport Program

Eco-management Program



Analysis of the Biofuel Program in Thailand using AIM/Enduse Model



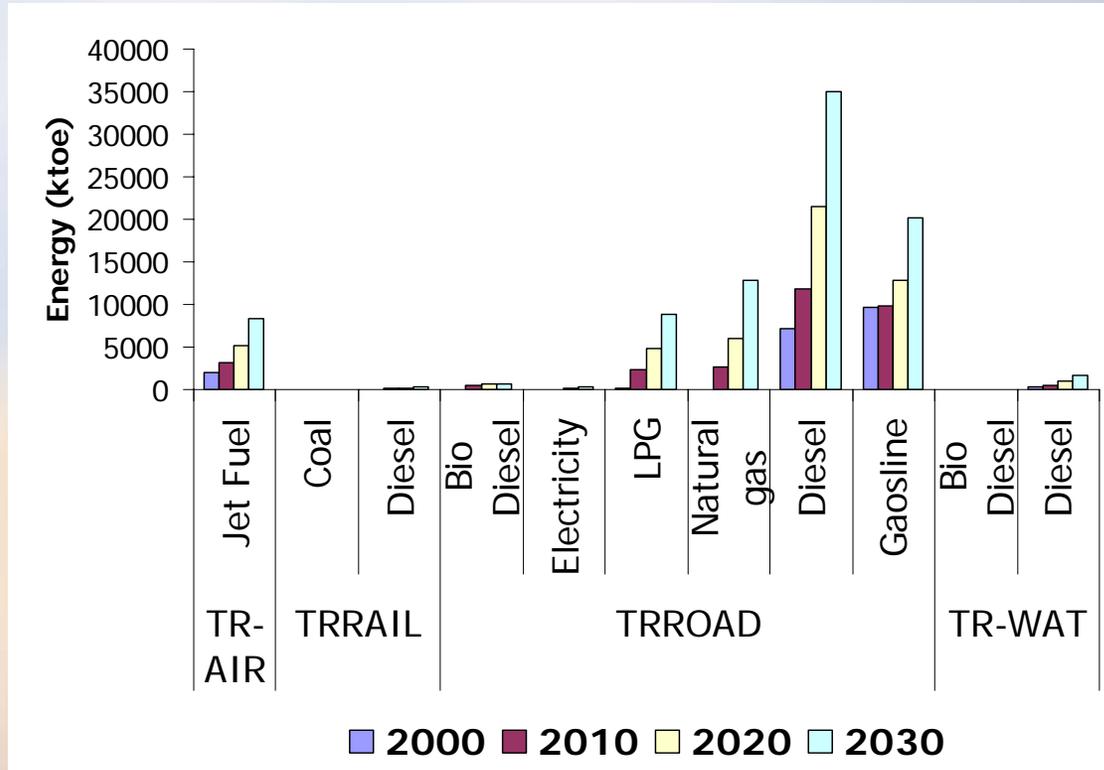
Analysis of Biofuel Program in Thailand (1)

- Issues considered in the analysis:
 - Cost effectiveness of bio-fuel options in transport sector
 - Environmental impacts
- Bio-fuel Options considered:
 - Bio-diesel (without any mixing)
 - Maximum availability of Bio-diesel for transport sector limited up to 875 million liters (3% of the diesel requirement) in 2011
 - Considered only for Road and Water transport
 - Gasohol (10% Ethanol)



Analysis of Biofuel Program in Thailand (2)

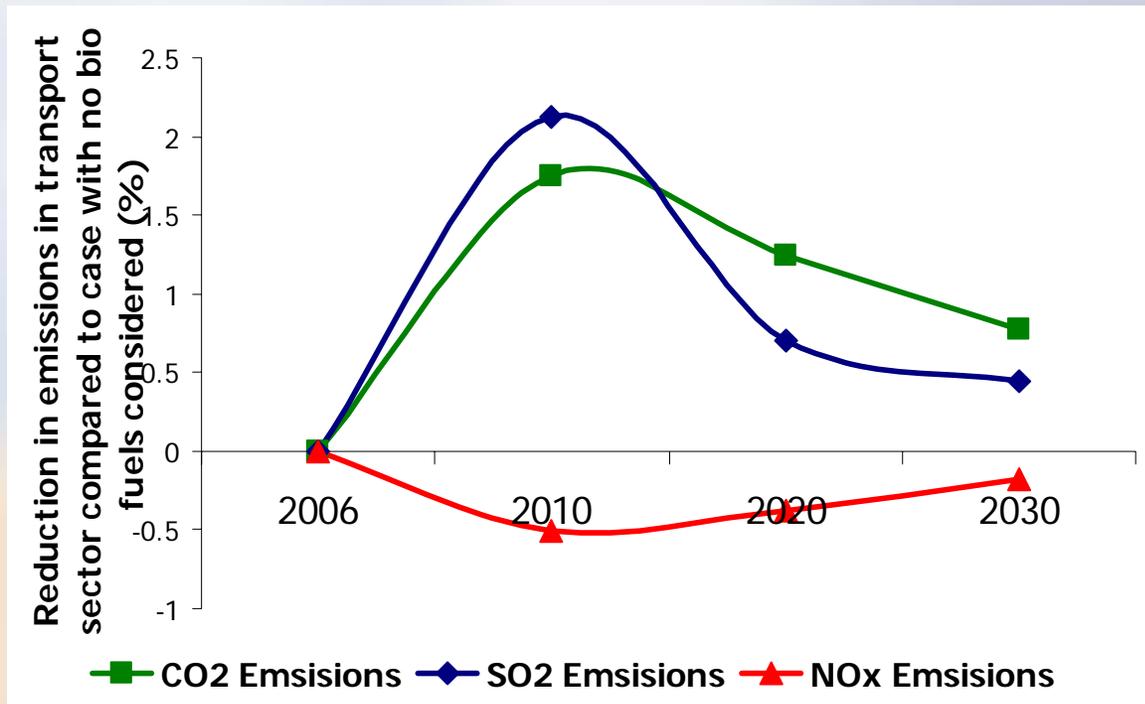
- Energy consumption in the Transport sector



- Biodiesel is cost effective in Road transport (but not cost effective for water transport)
- Gasohol was not cost effective at current cost of production



Effect of Biofuel Program in Reducing Emissions



- Reduction in transport sector emissions from biofuel program during 2006-2030 :
 - CO₂, by up to 1.6 Mton (1.8%) in 2011 In 2011,
 - SO₂ reduction by 1.9 kton (2.2%) in 2011
 - NO_x increases by 1.4 kton (0.4%) in 2011



Implications of Carbon Tax in Thai Economy: Preliminary AIM/CGE Model Results

Sunil Malla



Sectors/commodities in AIM/CGE Thailand

27 Sectors/commodities with 8 energy sectors

1	Agriculture, livestock, forestry, fishery	23	Construction
4	Other non-energy mining	24	Trade
5	Food, beverage and tobacco	25	Hotels & Restaurants
6	Textile, leather, and the products	26	Transport & Communications
7	Timber and wooden products	27	Services
8	Pulp, paper and printing	8 Energy sectors	
9	Chemical products	2	Coal and lignite
14	Plastic and rubber products	3	Crude oil
15	Non-metallic mineral products	10	Gasoline
16	Metal products	11	Diesel
17	Machinery	12	Aviation fuel
18	Transport equipment	13	Fuel oil
19	Other manufacturing products	20	Electricity
22	Water	21	Gas distribution

- Original 1998 SAM has 61X61 sectors [obtained from International Food Policy Research Institute (IFPRI)]
- Based on modified SAM (i.e., 27x27 sectors), U-, V- and capital formation- matrices are prepared .



Policy scenarios

- **Base case (Reference case)**
 - No energy efficiency improvement and no carbon taxes
 - Differentiated labor productivity improvement is assumed
 - Replicates the benchmark economy
- **Efficiency scenario**
 - Energy efficiency improvement of 1%/year for entire study period (i.e., 1998-2030)
- **Carbon tax scenarios**
 - Implementation of tax: **from 2008 onwards**
 - 4 different tax scheme
 - CT50 (US\$ 50 per ton of carbon)
 - CT100 (US\$ 100 per ton of carbon)
 - CT150 (US\$ 150 per ton of carbon)
 - CT200 (US\$ 200 per ton of carbon)



Preliminary results (1)

Base case economic indicators and CO₂ emissions profile

Year	Consumption	Investment	Net export	GDP	Labor income	Capital income	Capital stock	Wage rate	CO ₂ emissions
	(trillion Baht)							(1998=1)	(million ton)
1998	3.0	1.0	0.7	4.7	1.4	2.6	21.2	1.00	148
2005	3.6	3.5	-0.1	7.0	1.5	4.4	28.5	1.41	177
2010	4.5	5.3	-0.1	9.6	1.6	6.3	40.9	1.68	218
2015	5.9	7.4	<0.0	13.4	1.7	9.1	59.1	2.09	288
2020	9.4	7.7	1.1	18.2	1.7	12.5	81.3	2.55	386
2025	10.8	8.8	2.0	21.6	1.8	15.2	98.9	2.69	472
2030	12.9	10.8	3.0	26.7	1.9	18.4	119.9	2.84	577

- ❖ 1998 is the benchmark year (actual data)
- ❖ GDP is sum of consumption, investment and net export (No government in the model)
- ❖ By 2030: GDP increases by 5.7 times compared to 1998 value
CO₂ emissions increases by 3.9 times compared to 1998 value
- ❖ Share of consumption and investment combined together in total GDP is about 85% in 1998 and increased to about 90% in 2030.



Summary

- **Efficiency scenario**
 - **GDP loss** : 0.51% in 2010 to 2.77% in 2030
 - **Avoided CO₂ emissions** : 4.8% in 2010 to 20.0% in 2030
- **Carbon tax scenario**
 - **primary economic indicators** (under CT200)
 - **GDP loss** : 0.50% in 2010 to 2.81% in 2030
 - **Loss in consumption**: 0.13% in 2010 to 2.58% in 2030
 - **Loss in net export** : 0.9% in 2010 to 3.0% in 2030
 - **CO₂ emissions improvement** (under CT200)
 - 5.7% in 2010 to 20.8% in 2030



Thank you

