Symposium on Low Carbon Asia Research

Thailand's LCS Scenarios and Actions: The ExSS Modeling Experience

Johor Bahru, Malaysia

July 5, 2011

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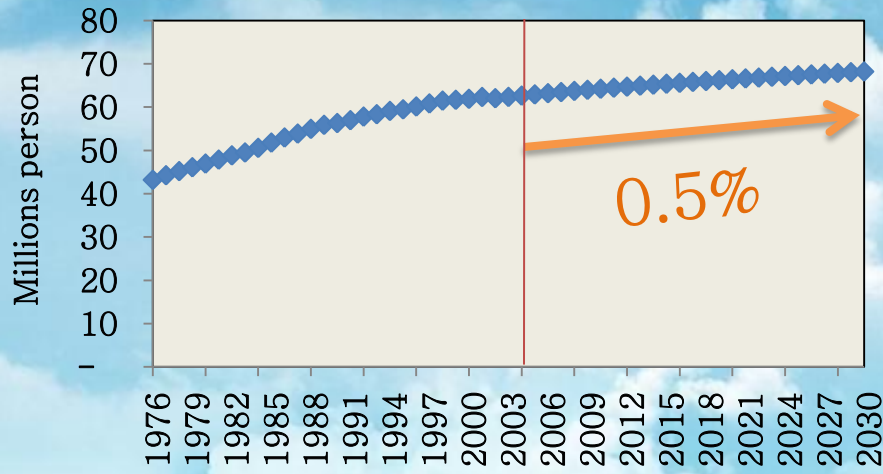
Thailand "LCS" Study Objectives

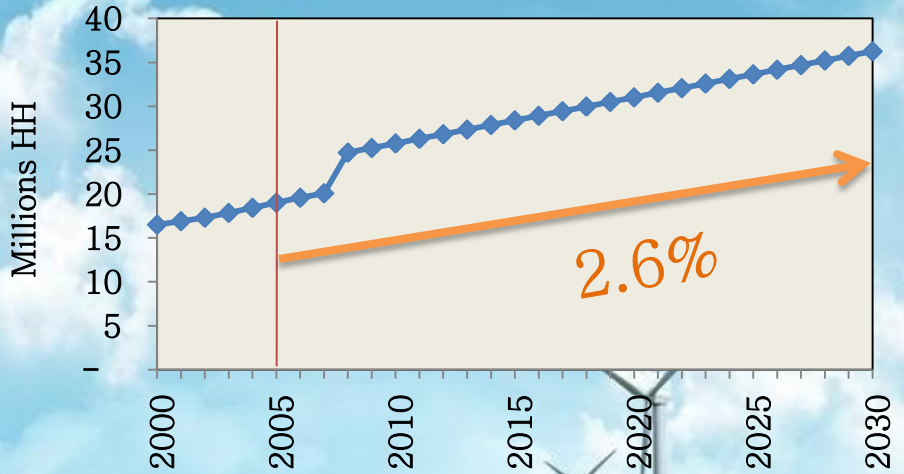
- To propose measures for avoiding climate change, and precursors to zero carbon society and renewable-energy economy.
- To discuss the possibility of developing a low-carbon society in Thailand.
- To create awareness among Thailand's authorities, government, stakeholders, and communities for low-carbon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

Quantitative assumptions

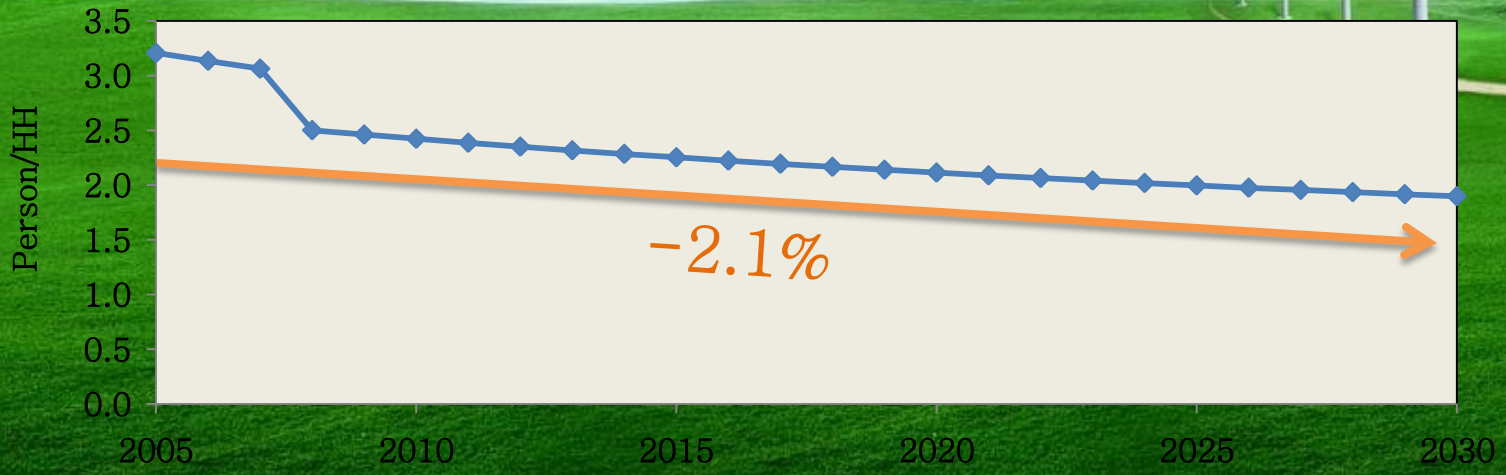
Population



No. of Households



Household size



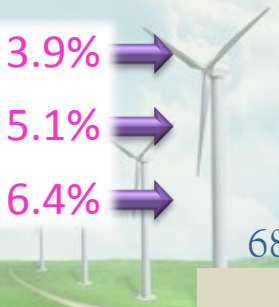
Estimated socio-economic indicators

	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		
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 m^2)	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



68,456,651

Remarks: Primary industry → Agriculture, Mining, and Construction

Secondary industry → Textiles, Food & beverage, Chemical, Metallic, Non-metallic, and Others

Tertiary industry → Service sector

Scenarios & CO_2 Countermeasures

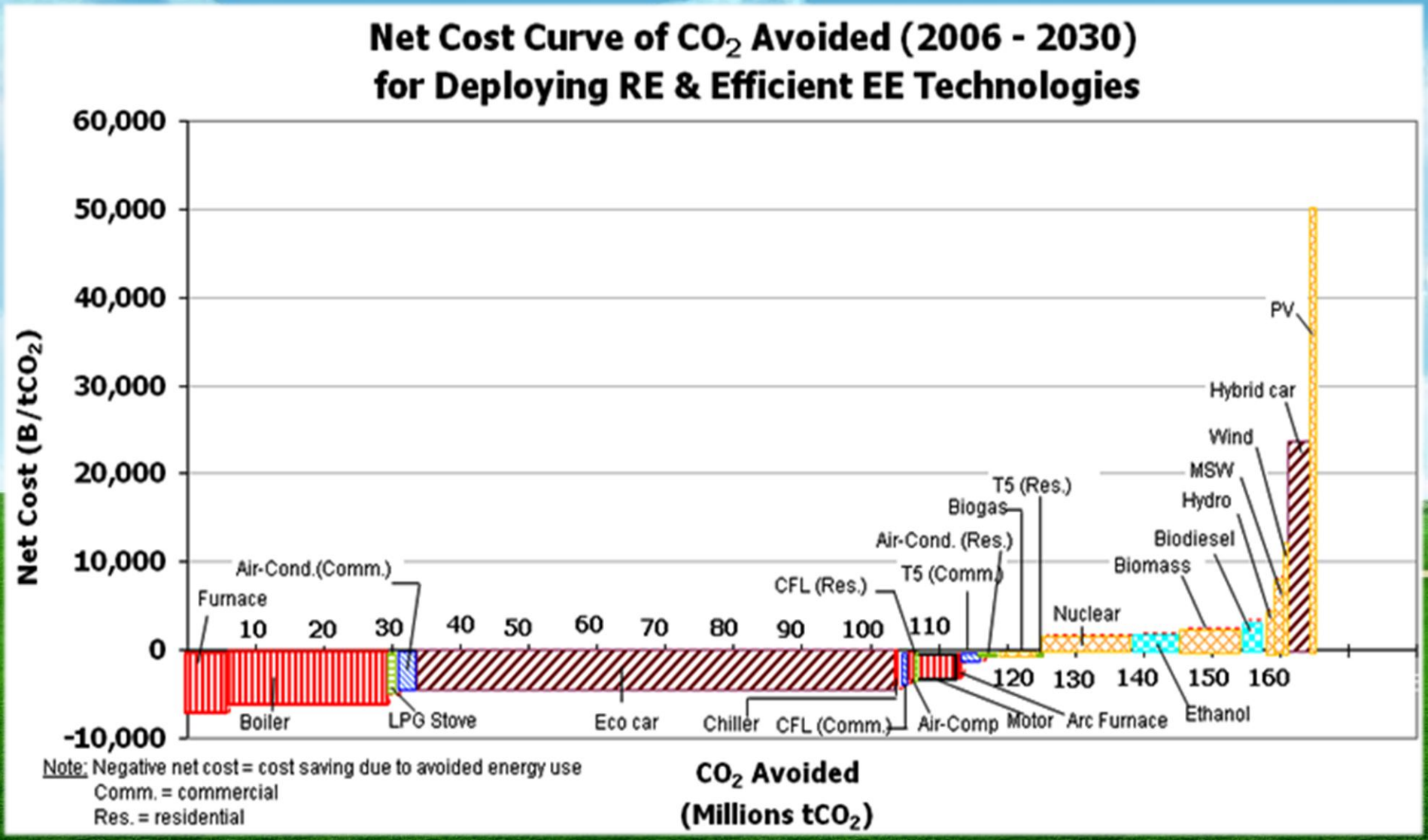
- Energy demand in 2030 BAU scenario
- Energy demand in 2030 CM scenario

CO_2 Mitigation:

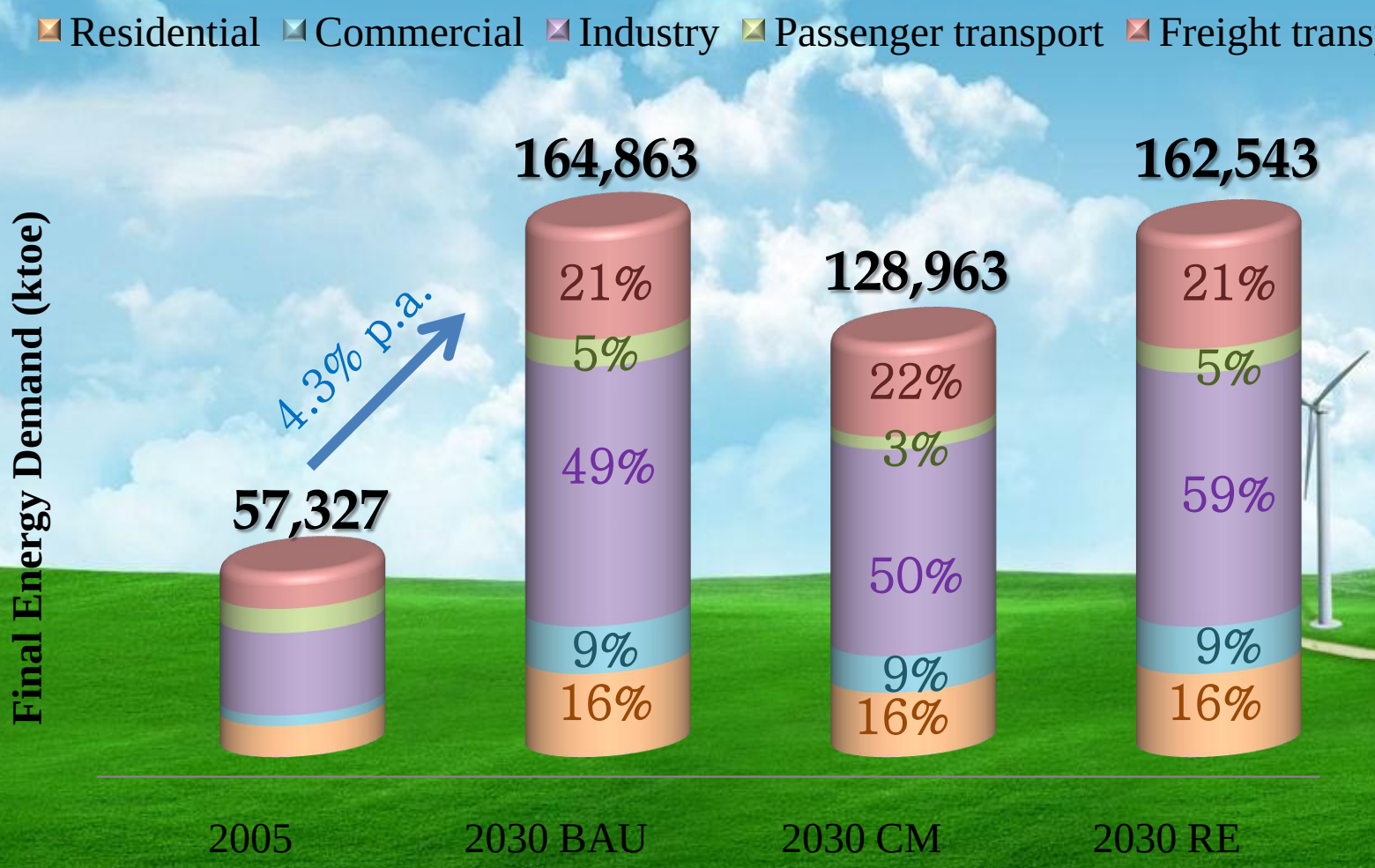
❖ Only cost-effective energy savings of CO_2 mitigation options are considered.

❖ CO_2 mitigation measures in 2030CM must be complied with national constraints.

Thailand's EE & RET: Abatement Cost Curves

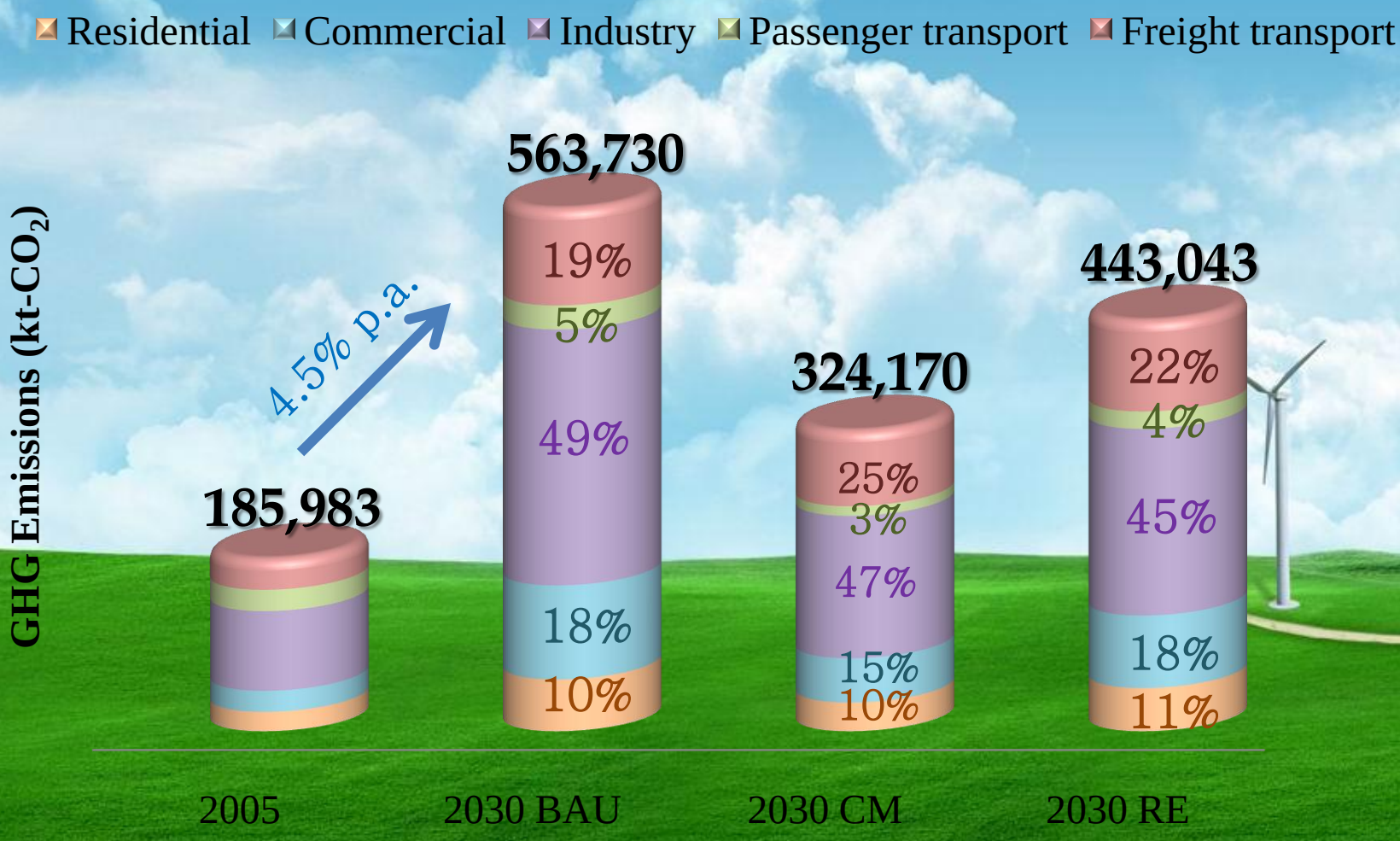


Energy demand



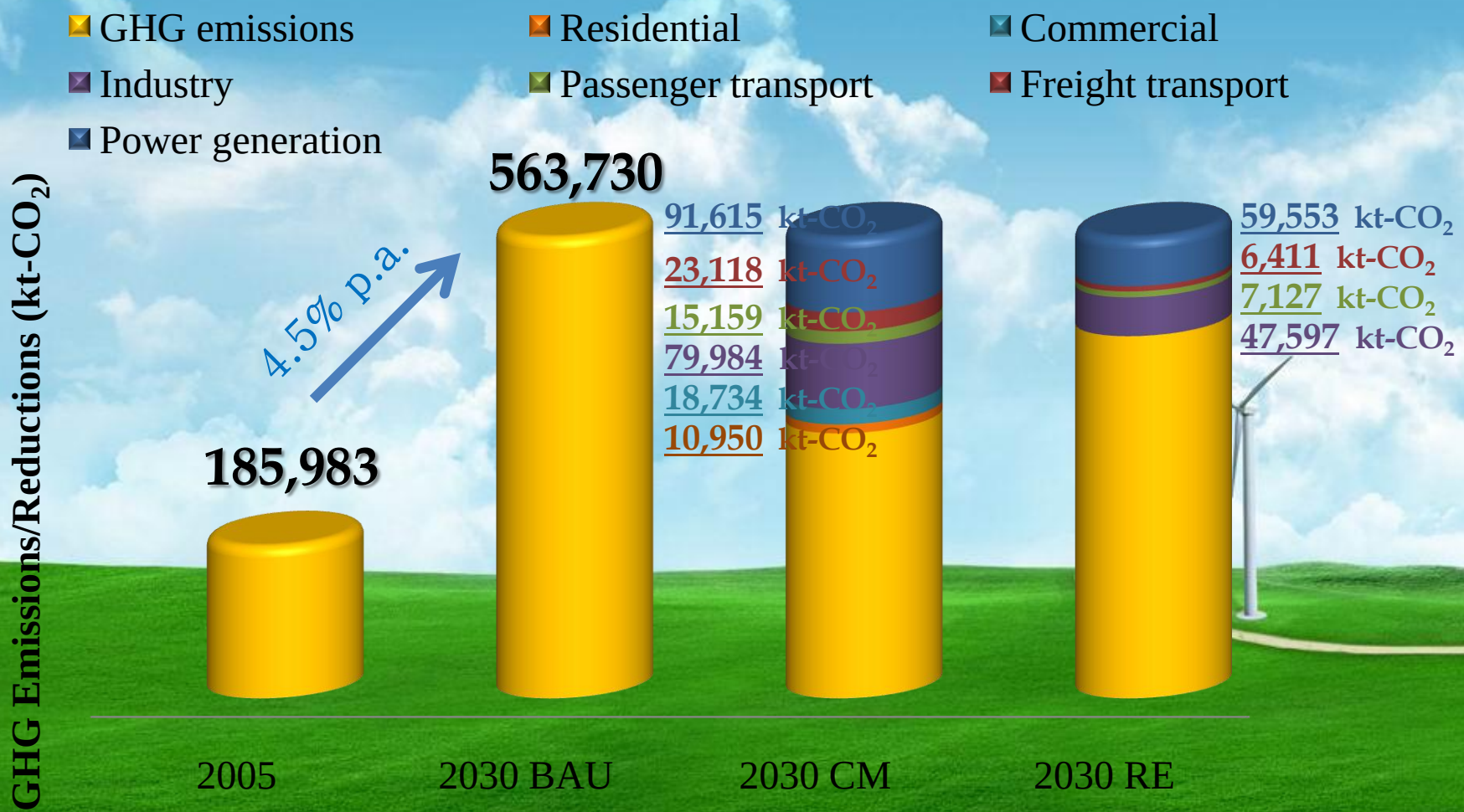
Remarks: BAU is Business as Usual
CM is Countermeasures
RE is Renewable energy scenario

GHG emissions



Remarks: BAU is Business as Usual
CM is Countermeasures
RE is Renewable energy scenario

GHG Emissions/Reductions



Remarks: BAU is Business as Usual
CM is Countermeasure
RE is Renewable energy scenario

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

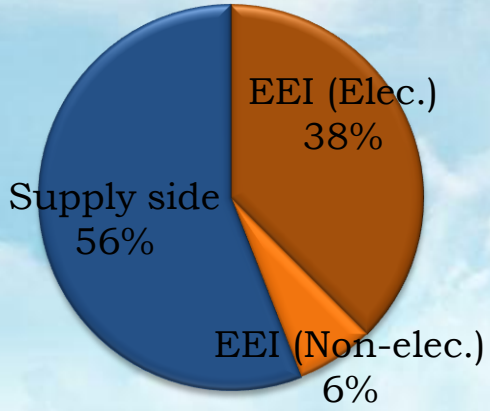
RESIDENTIAL

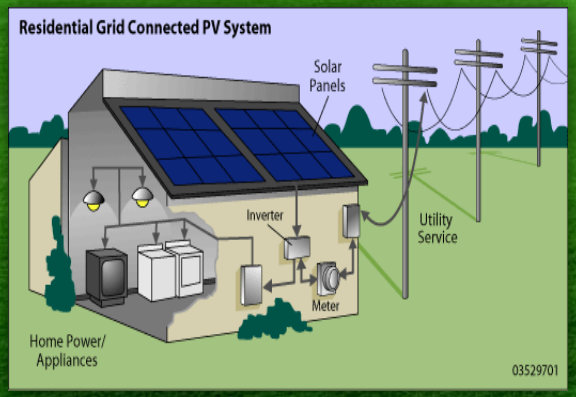
- Energy efficiency improvement in ***Households (Electric)***
  - *Efficiency improvement by 30%*
  - *Penetration rates up to 100% in 2030*
- Energy efficiency improvement in ***Households (Non-electric)***
  - *Efficiency improvement*
    - *by 30% in wood stove*
    - *by 5% in LPG stove*
  - *Penetration rates up to 100% in 2030*

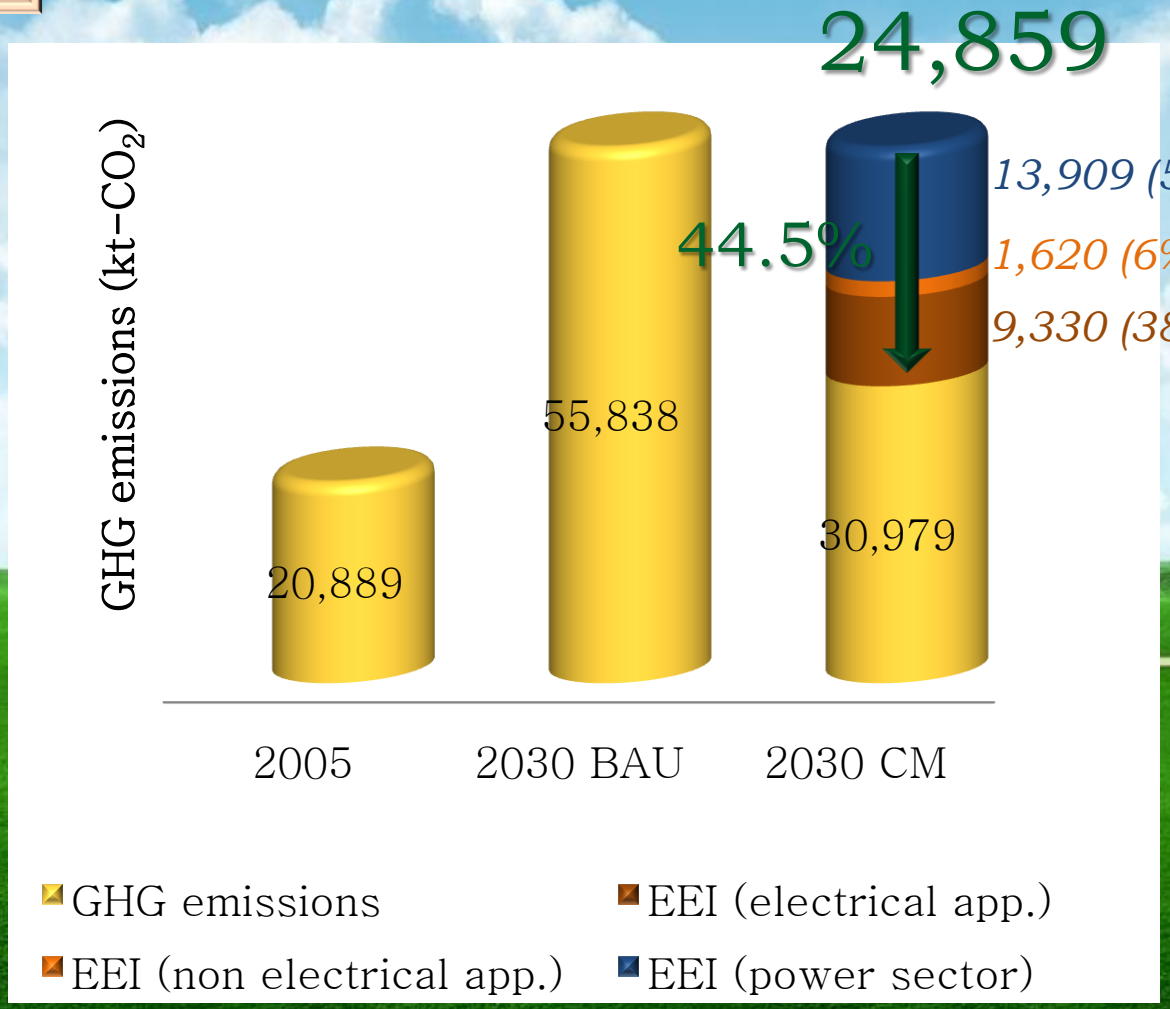
Ref: Ministry of Energy, Thailand.

Measures

RESIDENTIAL







Measures

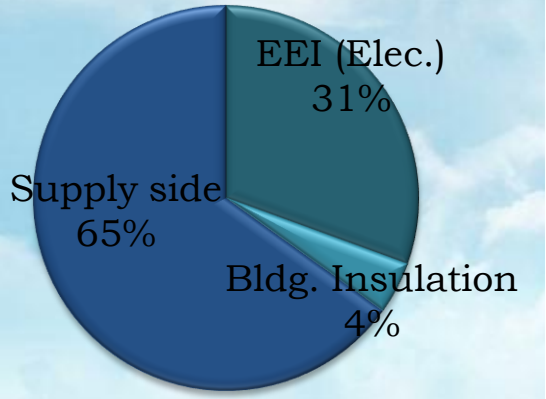
COMMERCIAL

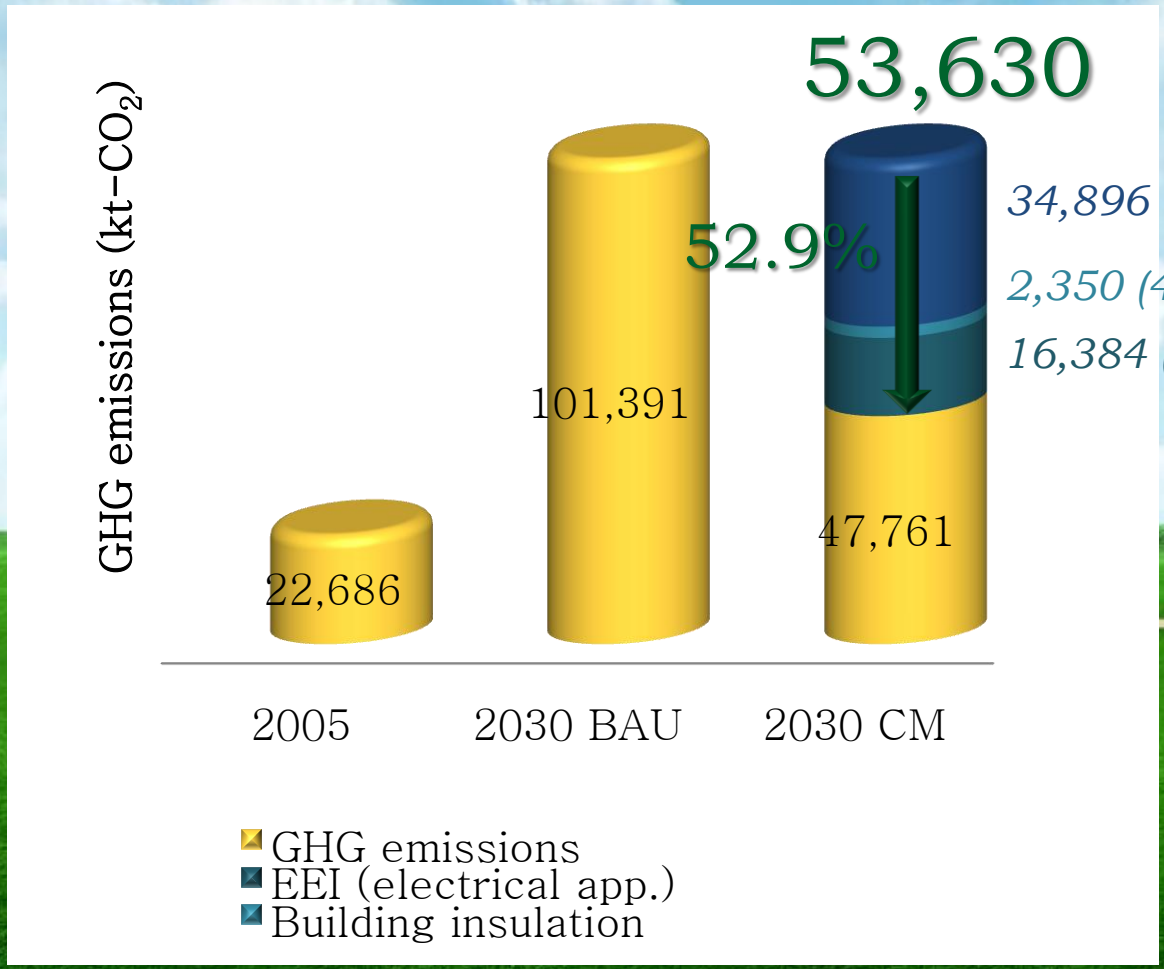
- Energy efficiency improvement in ***Buildings***
  - *Efficiency improvement by 30%*
  - *Penetration rates up to 100% in 2030*
- Energy efficiency improvement in ***Buildings (Building Codes)***
  - *Building insulation*
  - *Building envelope*
  - *Penetration rates up to 100% in 2030*

Ref: Ministry of Energy, Thailand.

Measures

COMMERCIAL





Measures

INDUSTRY

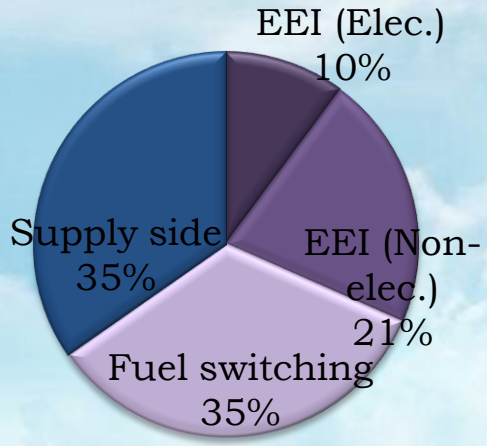
- Energy efficiency improvement in ***Industry (Electric)***
  - *Efficiency improvement*

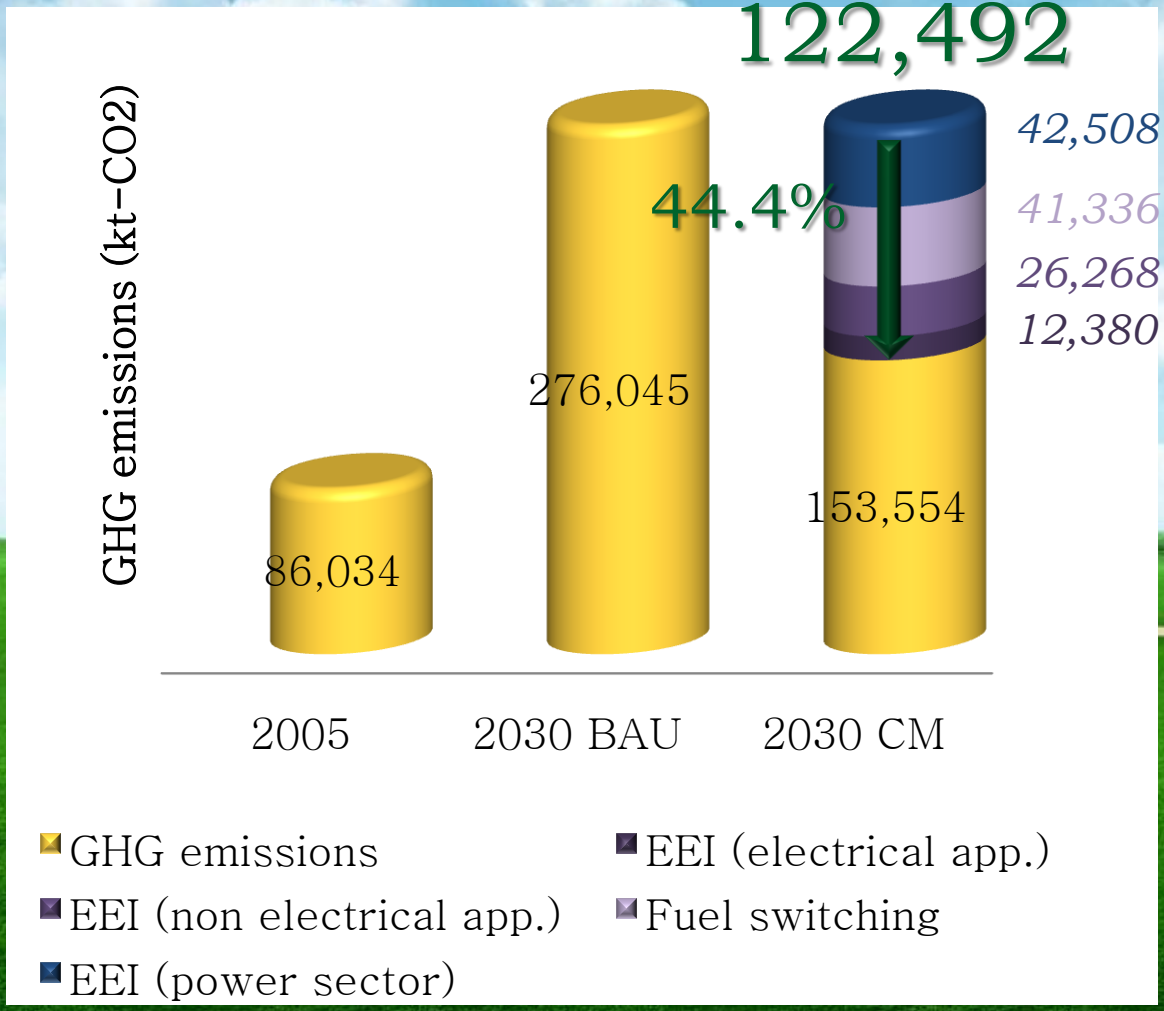
System	Motor	Others	Lighting
EEI	10%	20%	30%

  - *Penetration rates up to 100% in 2030*
- Energy efficiency improvement in ***Industry (Non-electric)***
  - *Efficiency improvement by 30%*
- Fuel switching in ***Industry***
  - *Reduce the penetration level in coal and oil by 50%*
  - *Replace the penetration level remaining in biomass and LPG.*

Measures

INDUSTRY





Measures

TRANSPORTATION

- Fuel economy improvement (FEI) in ***Transport sector***
  - *Efficiency improvement by 30% in*
  - *Penetration rates up to 100% in 2030*
- Travel demand management (TDM) in ***Transport sector***
  - *Efficiency improvement by 7.38%*
  - *Using (eco-driving, bus priority, and non-motorized transport)*

Ref: Pongthanaisawan, J. 2007. Road transport energy demand analysis and energy saving potentials in Thailand. Asian Journal of Energy and Environment

Kuwattanachai, N. 2009. Hybrid and Electric cars. TRF Newsletter.

Measures

TRANSPORTATION

- Fuel switching in ***Transport sector***
  - *CNG engines will increase by 20% in 2030*
  - *Hybrid engines can save energy consumption by 30%*

- Modal shift in ***Transport sector***

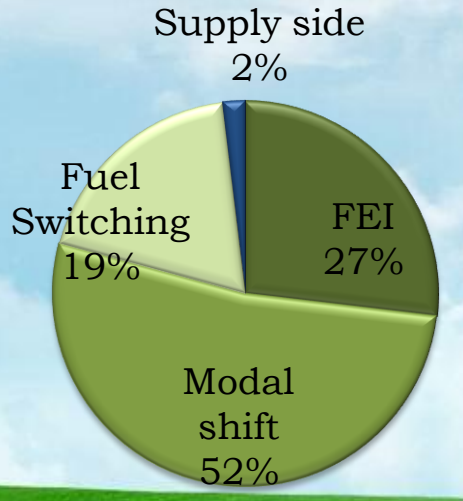
		SV	LV	Bus	Motor bike	Bike	Walk	Train	Plane	Ship
Passenger	2005	24.3	6.7	42.3	14.6	0.8	10.7	0.2	0.4	-
	2030	15.0	5.0	20.0	10.0	12.8	25.0	12.0	0.2	-
Freight	2005	2.2	80.8					2.3	0.02	14.8
	2030	2.2	58.2	-	-	-	-	24.9	0.02	14.8

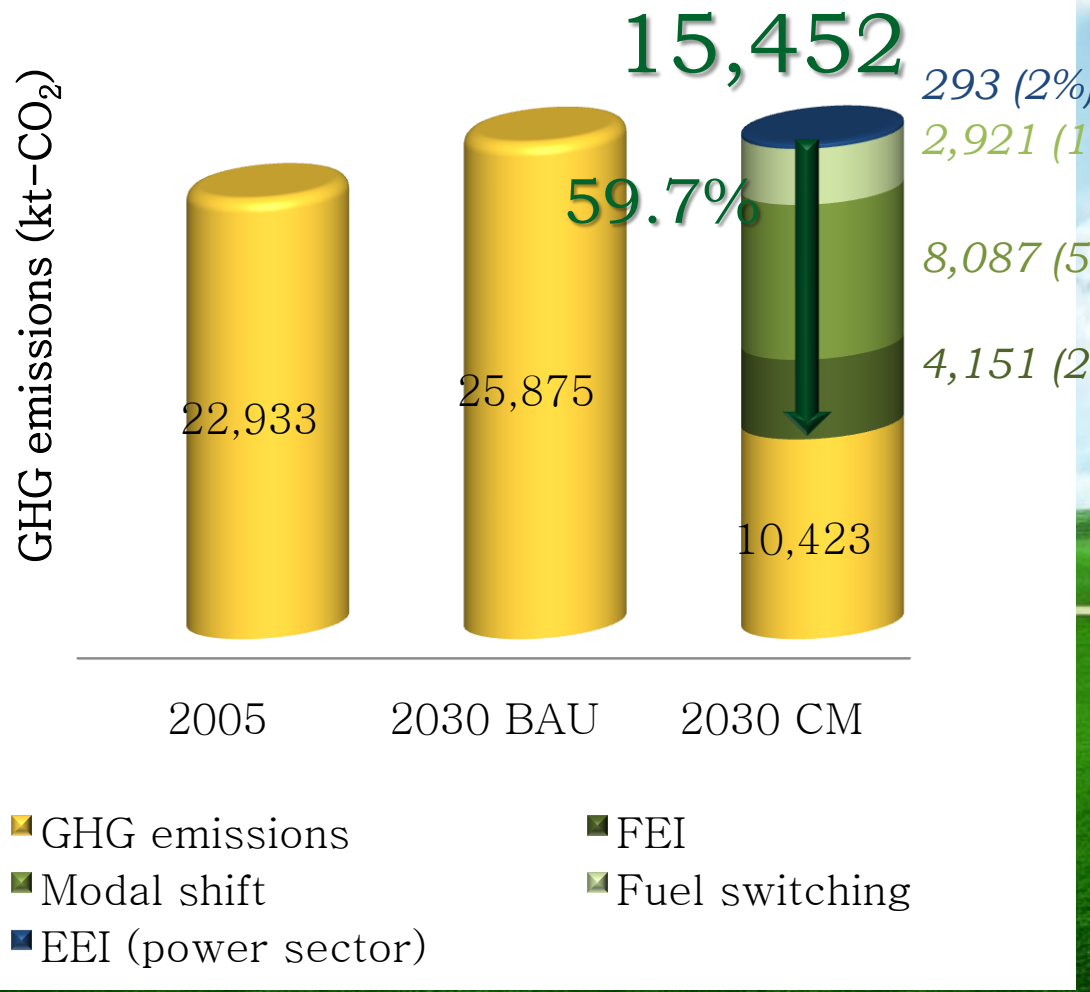
Ref: Pongthanaisawan, J. 2007. Road transport energy demand analysis and energy saving potentials in Thailand. Asian Journal of Energy and Environment

Kuwattanachai, N. 2009. Hybrid and Electric cars. TRF Newsletter.

Measures

PASSENGER_TRANSPORT





E20 20% Ethanol

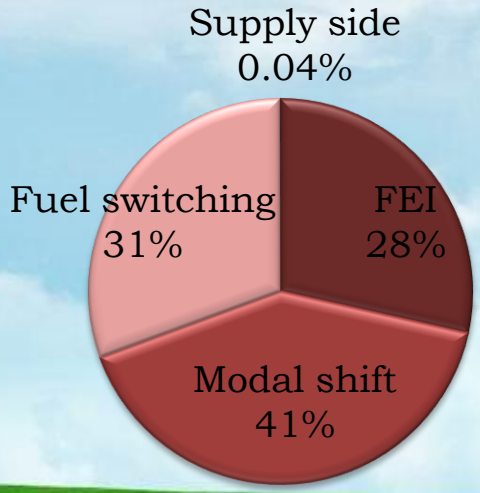
E85 ethanol FLEX-FUEL

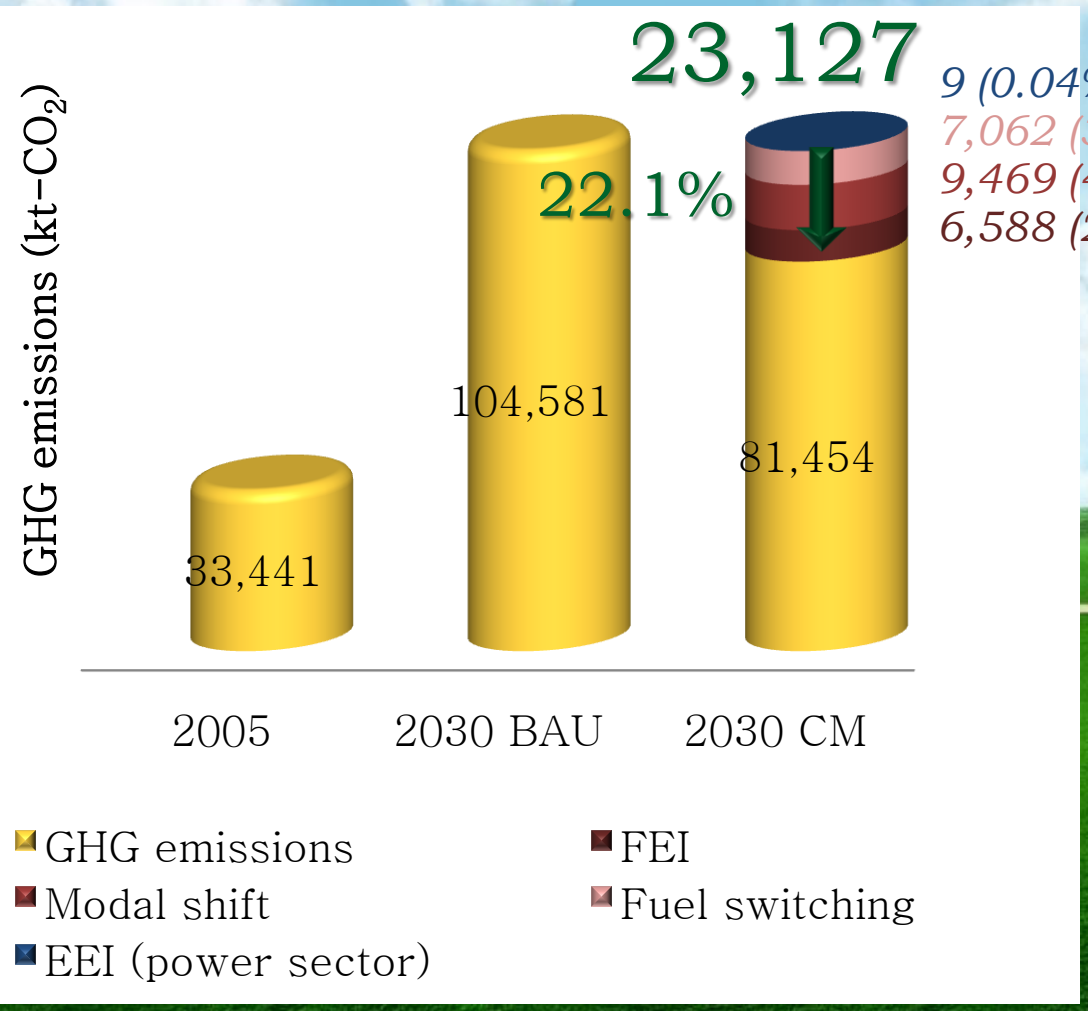
เพาเวอร์ B5

CNG

Measures

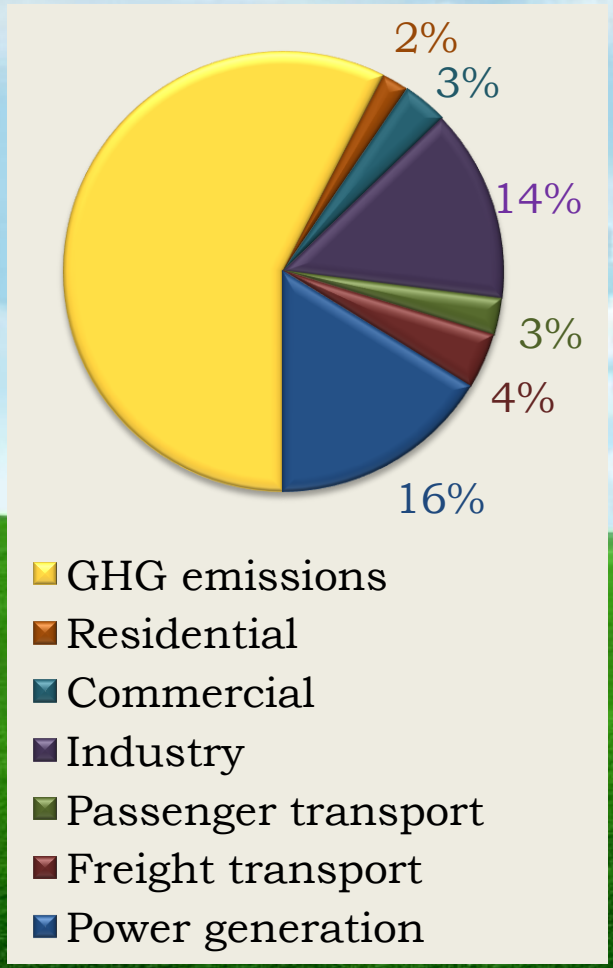
FREIGHT TRANSPORT



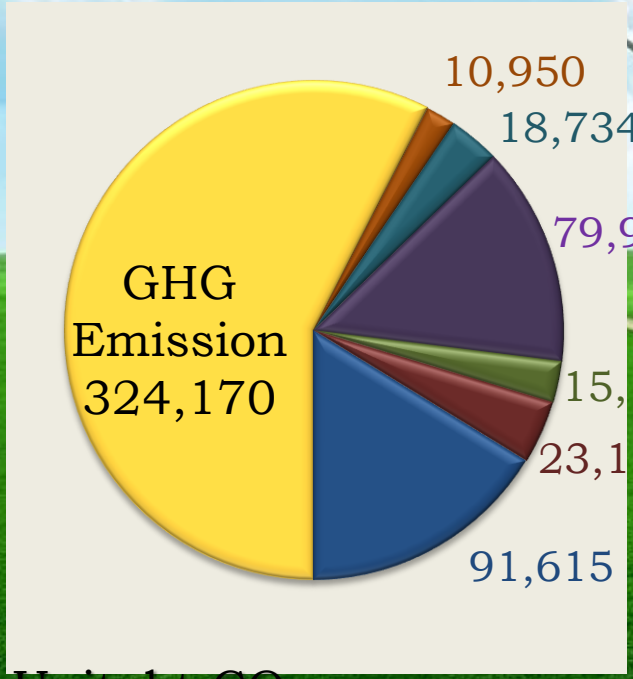


GHG emissions/reduction

TOTAL



GHG REDUCTION: 239,560 kt-CO_2



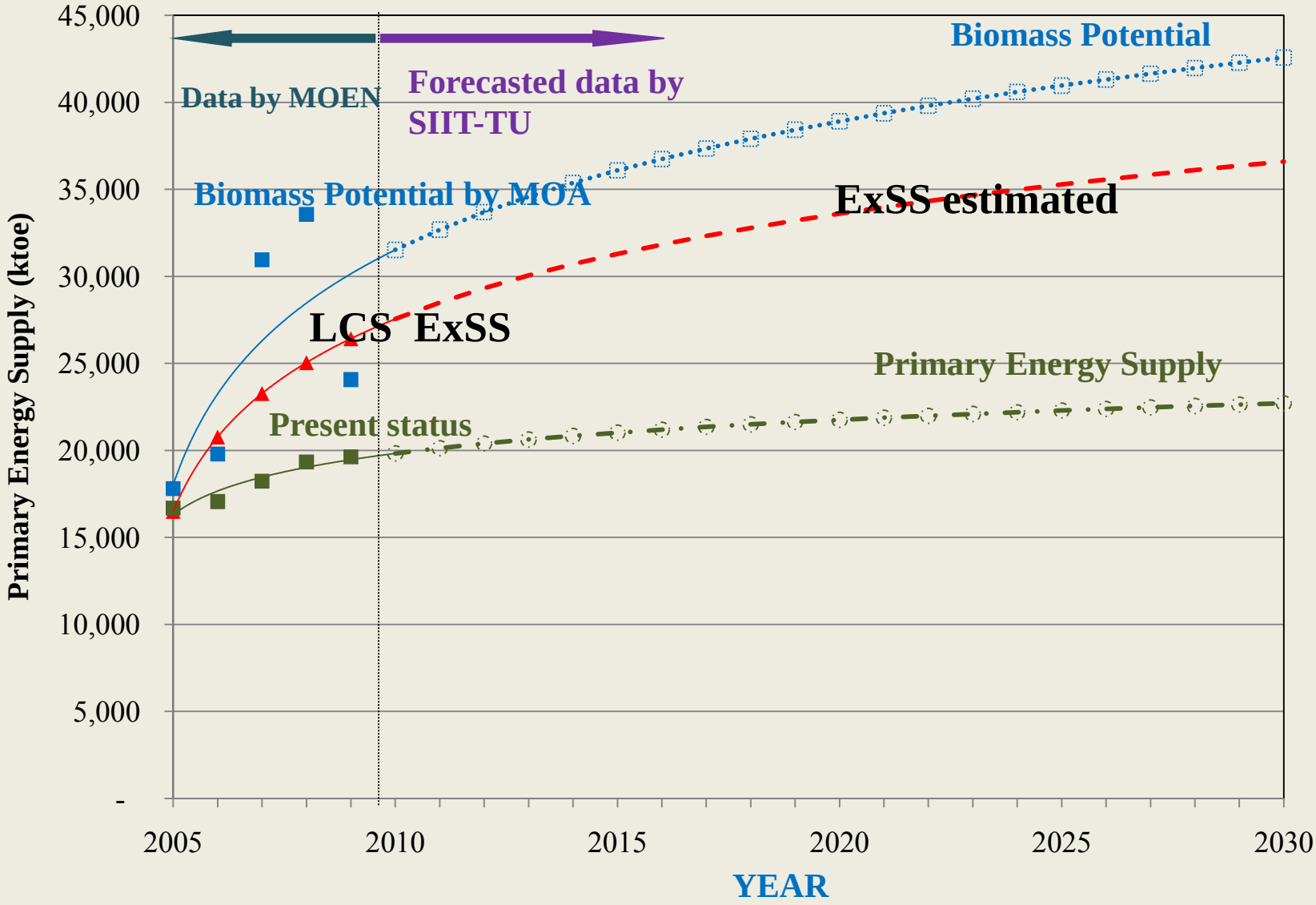
Unit: kt-CO_2

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

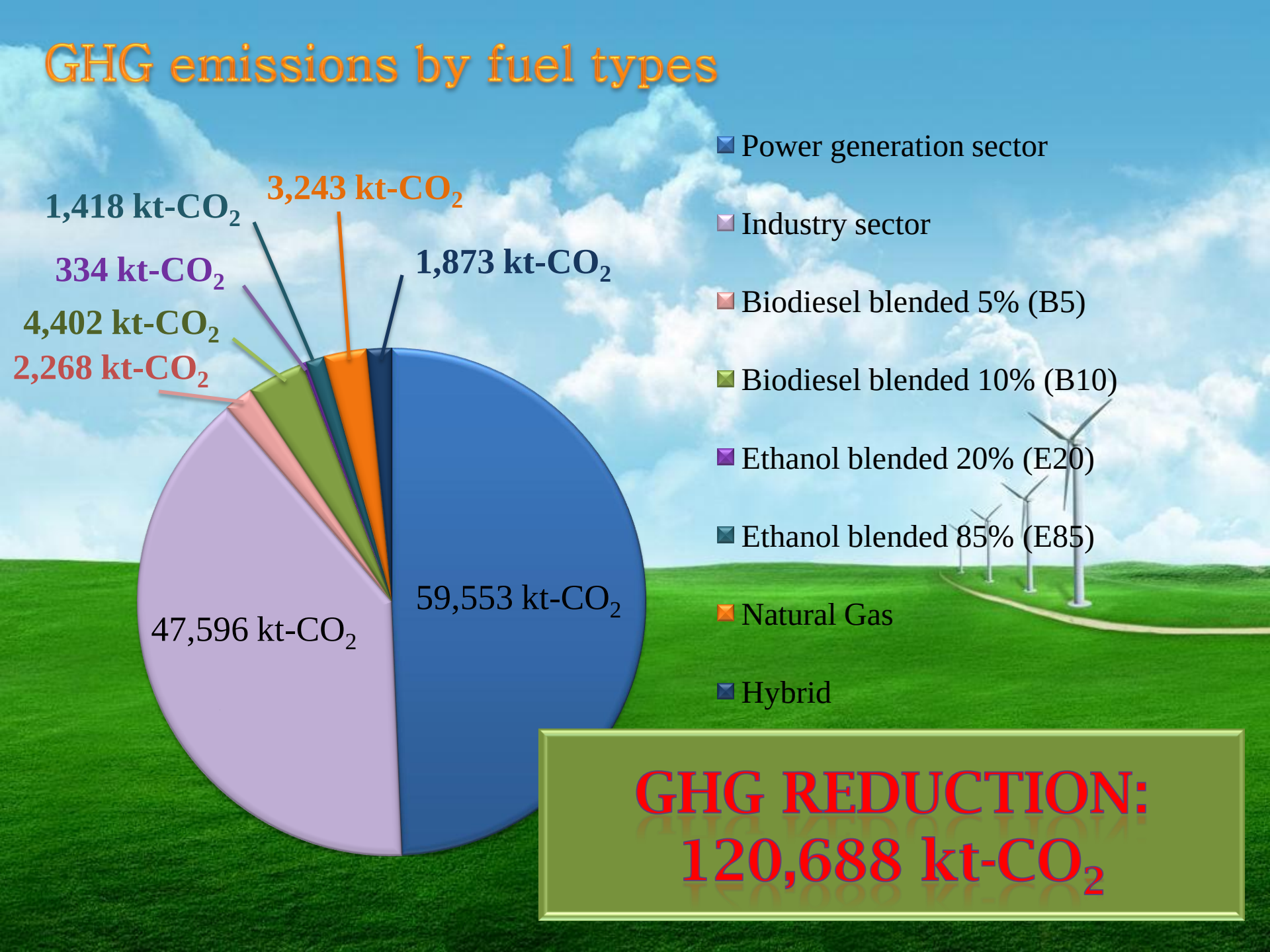
Biomass potential & consistency



Renewable Promotion (MOEN): Feed-in-Tariffs

Sources	Target Installed Capacity (MW)		
	2008-2011	2012-2016	2017-2022
Solar	55	95	500
Wind	115	375	800
Municipal Solid Waste (MSW)	78	130	160
Biomass	2,600	3,220	3,700
Hydro	165	281	324
Biogas	60	90	120
Financial Support (MBaht)	3,273	4,191	5,504

GHG emissions by fuel types



GHG REDUCTION: 120,688 kt-CO_2

Conclusions on Thailand's LCS Scenarios & Actions

- The GHG emissions in 2030 BAU scenario w/o mitigation measures will increase to 563,730 kt-CO_2.
- By adopting CMs in all sectors, GHG emissions can be decreased to 324,170 kt-CO_2 or by 42.5%.
- By adopting RET, GHG emissions can be decrease to 443,043 kt-CO_2 or by 21.4%
- If those policies are planned in early stage, Thailand will be able to serve as a model for LCS.

Conclusions on Thailand's LCS Scenarios & Actions

- However, to increase more CO_2 mitigation, more CMs & advanced technologies are needed under National Appropriate Mitigation Actions (NAMAs).

- In 2011, specific CMs have been developed under Thailand's NAMAs by using AIM/EndUse.

1st Thailand's LCS Scenario 2030 Brochure

1st Draft, Apr 2010

2nd Draft, July 2010

FINAL Thailand LCS Brochure November 2010

1st Thailand's LCS Scenario 2030 Brochure

The 3 versions of Thailand's LCS brochures had been distributed and disseminated in Thailand.

1. **Thailand Greenhouse gas management Organization (TGO), MONRE.**
2. **Climate Change Focal Point: ONEP, MONRE.**
3. **Bangkok Metropolitan Administration (BMA).**
4. **Energy Planning and Policy Office (EPPO), MOEN.**
5. **Department of Alternative Energy Development and Efficiency (DEDE), MOEN.**
6. **Research Institutes & Universities.**
7. **NGOs.**
8. **Privates/Business.**

1st Thailand's LCS Scenario 2030 Brochure

The 2nd version of Thailand's LCS brochures had been distributed and disseminated during CTC2010 conference, organized by TGO during 19-21 August 2010.

Thailand's LCS scenario development was presented in CTC2010. In addition, 2 papers on Thailand LCS were also presented.

Asia LCS scenarios and actions:
How to achieve sustainable low-carbon society

Dissemination & ExSS Workshop in Thailand

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, 2010. Pullman King Power Hotel, Bangkok

Low-Carbon Society Model Capacity Building Workshop

Objective:

1. To introduce LCS scenario.
2. To operate LCS model. (ExSS tool)
3. To communicate among policy makers, researchers, and business on feasible LCS development.

Prof. Matsuoka

Prof. Ram Shrestha

TGO NIES Kyoto NIES

TGO TGO SIIT-TU

NIES TGO SIIT-TU

TGO Board, Dr Kitti

TGO Local Authority

AIT iGES

Low-Carbon Society Model Capacity Building Workshop

LCS methodology

LCS Thailand, SIIT & AIT

Prof. Ho (MTU)

Mr. Boyd (IRDA)

Dr Savitri (KMUTT)

LCS India, Prof. Aashish

Chair, TGO Board

Dr Kainuma Dr Komi

ExSS Training

ExSS Training

ExSS Training

ExSS Training

Low-Carbon Society Model Capacity Building Workshop

ExSS Training

ExSS Training

Prof Nishioka (iGES & NIES)
Bridge simulation & LCS Policy

Bridge simulation & LCS Policy
Closing Remarks

Thailand's Low-Carbon Society Model Capacity Building Workshop

http://2050.nies.go.jp/sympo/101119/

Proceeding of LCS Workshop

Low-Carbon Society Scenarios towards 2050

HOME | Project | News | Report | Symposium | Member | Link | 日本語

Low-Carbon Society Model Capacity Building Workshop – Bridge Simulation Scenarios and Sustainable LCS Policy Implementation using AIM (Asia-Pacific Integrated Model) –

Time	9:00-16:30, November 19 (Fri.), 2010
Venue	Pullman King Power Hotel, Bangkok, Thailand.
Language	English-Thai Simultaneous translation is available.
Organizer	TGO, SIIT-TU, JGSEE and NIES

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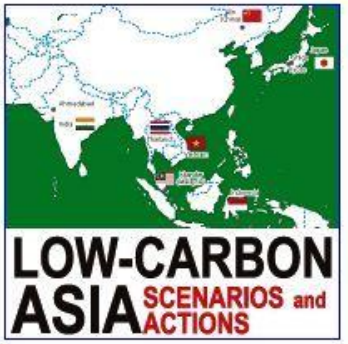


AIM
ASIA-PACIFIC INTEGRATED MODEL

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 CO2 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

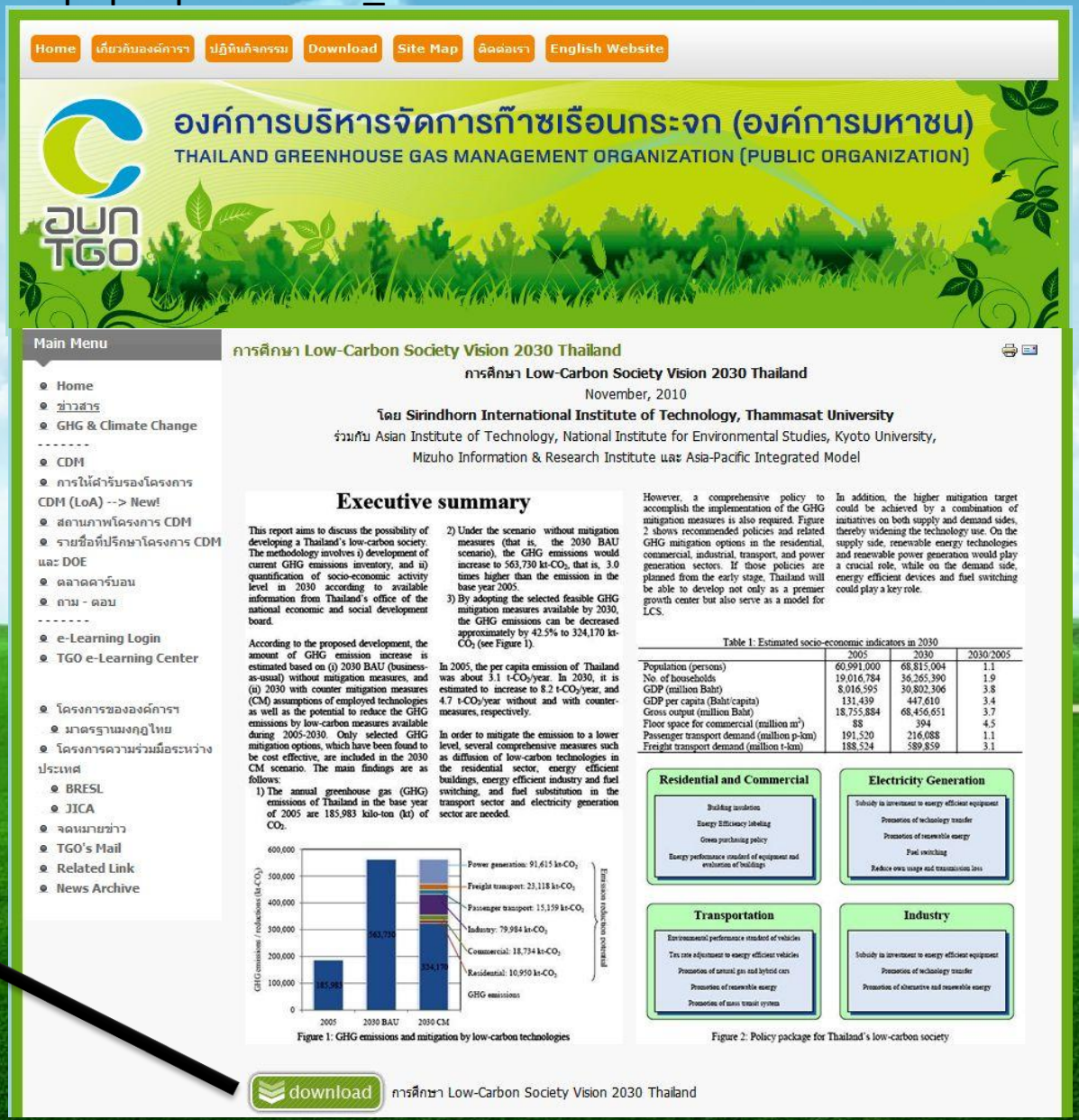
Workshop Proceedings

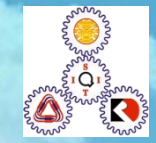
All presentations and discussions are summarized in a proceedings.

Download the Proceedings (PDF:17MB)

Thailand's LCS Brochure in the TGO Homepage is available at

http://www.tgo.or.th/index.php?option=com_content&task=view&id=441&Itemid=2






Terima kasih

THANK YOU

ขอบคุณครับ

S-6, MOEJ