

# **Analytical Tools for Assessing Low Carbon Society Measures: Country-level Examples**

## **THAILAND**

**6 February 2017**

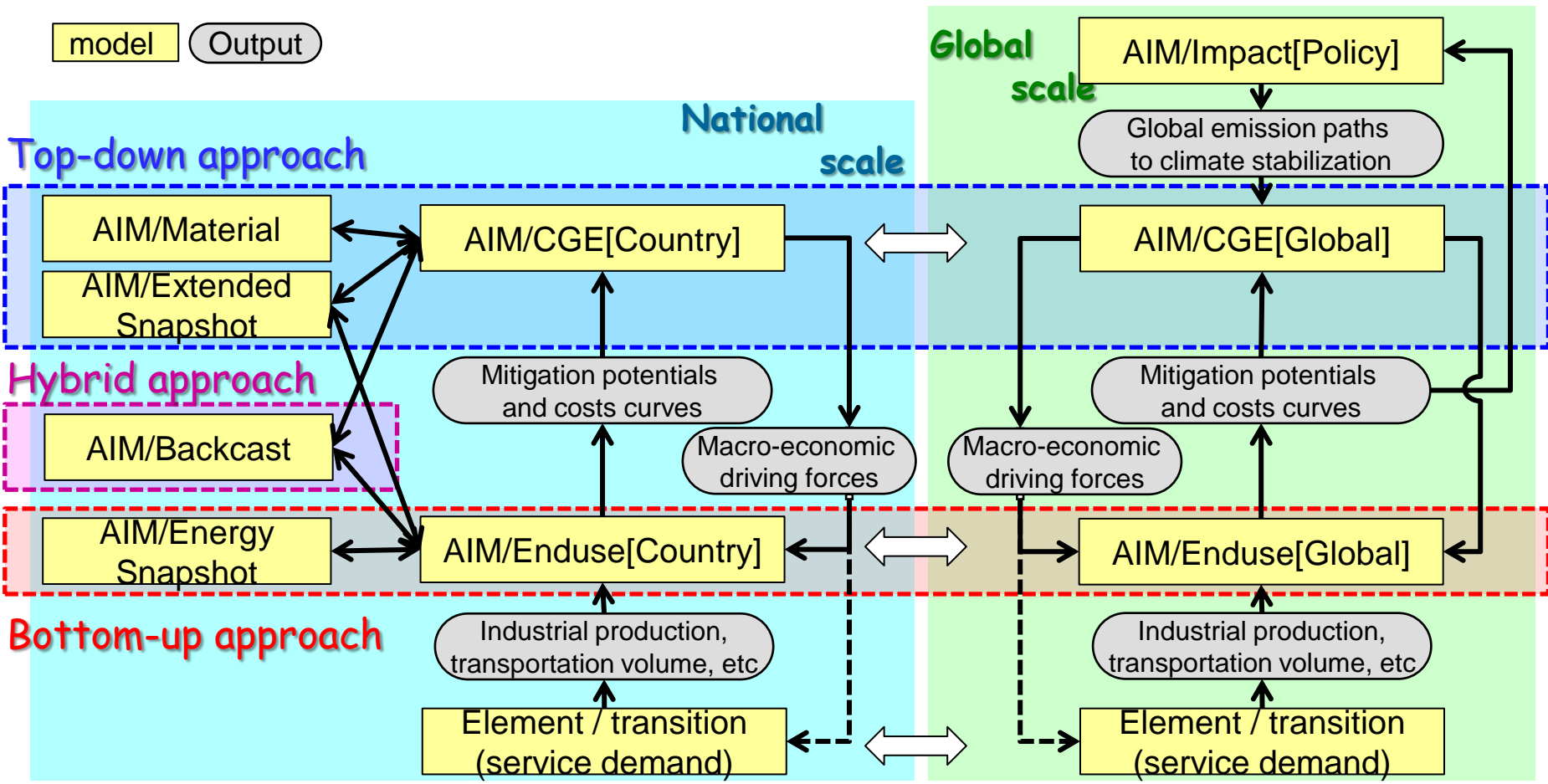
**AIT**

**Bundit Limmeechokchai**

**SIIT-TU**

# Asia-Pacific Integrated Model (AIM)

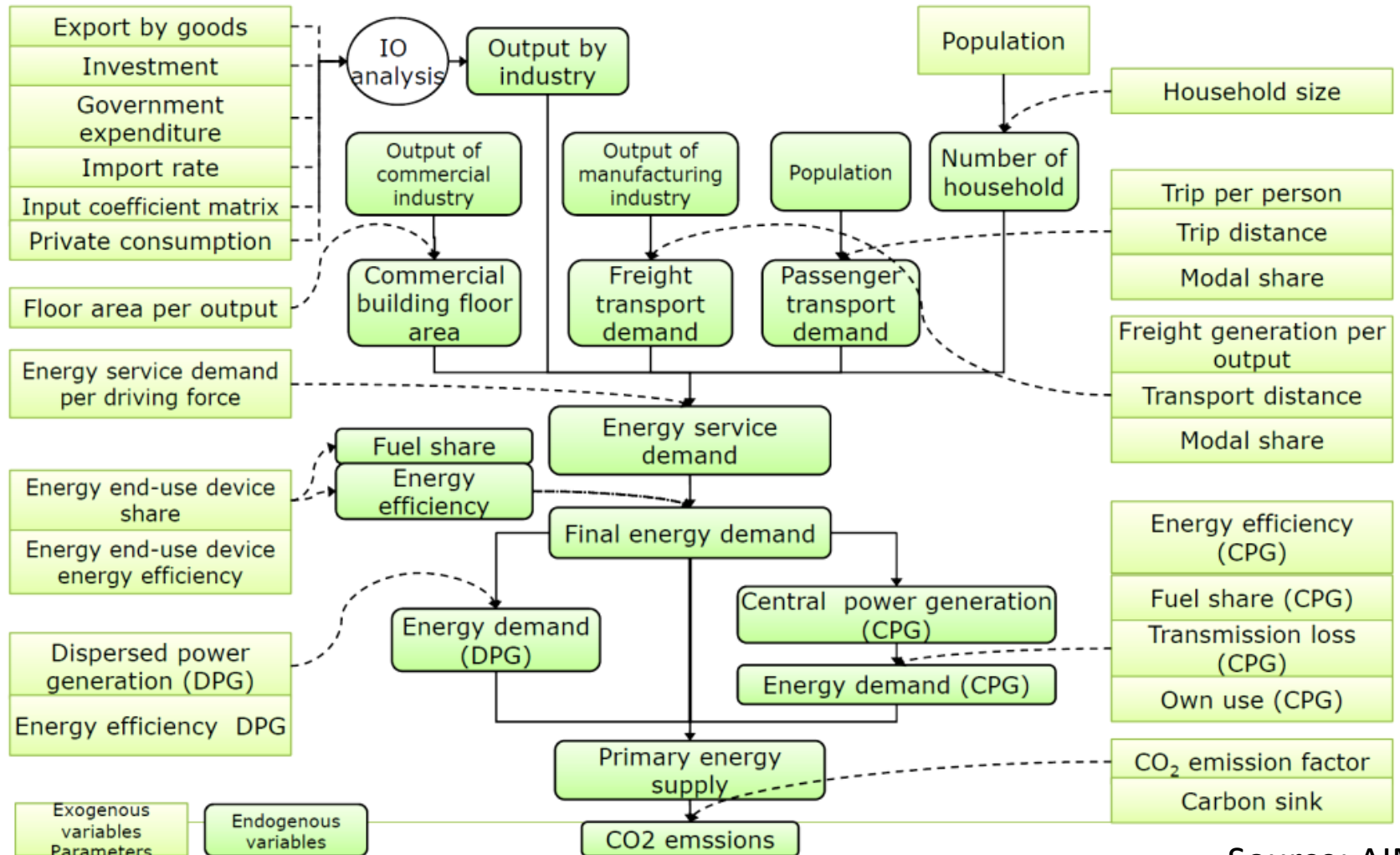
## AIM family for mitigation analysis



Source: NIES Japan

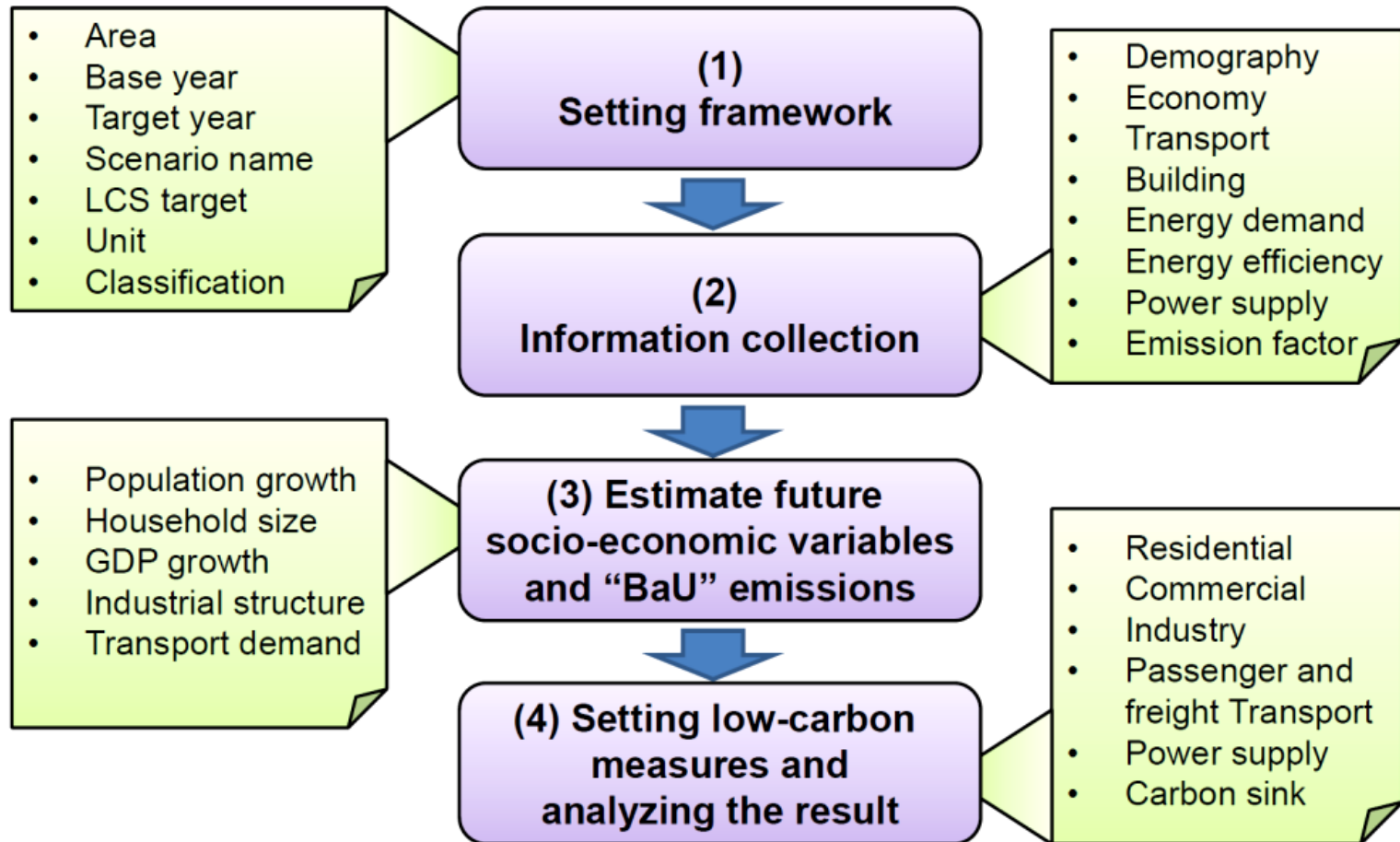
# AIM/ExSS

## Model structure

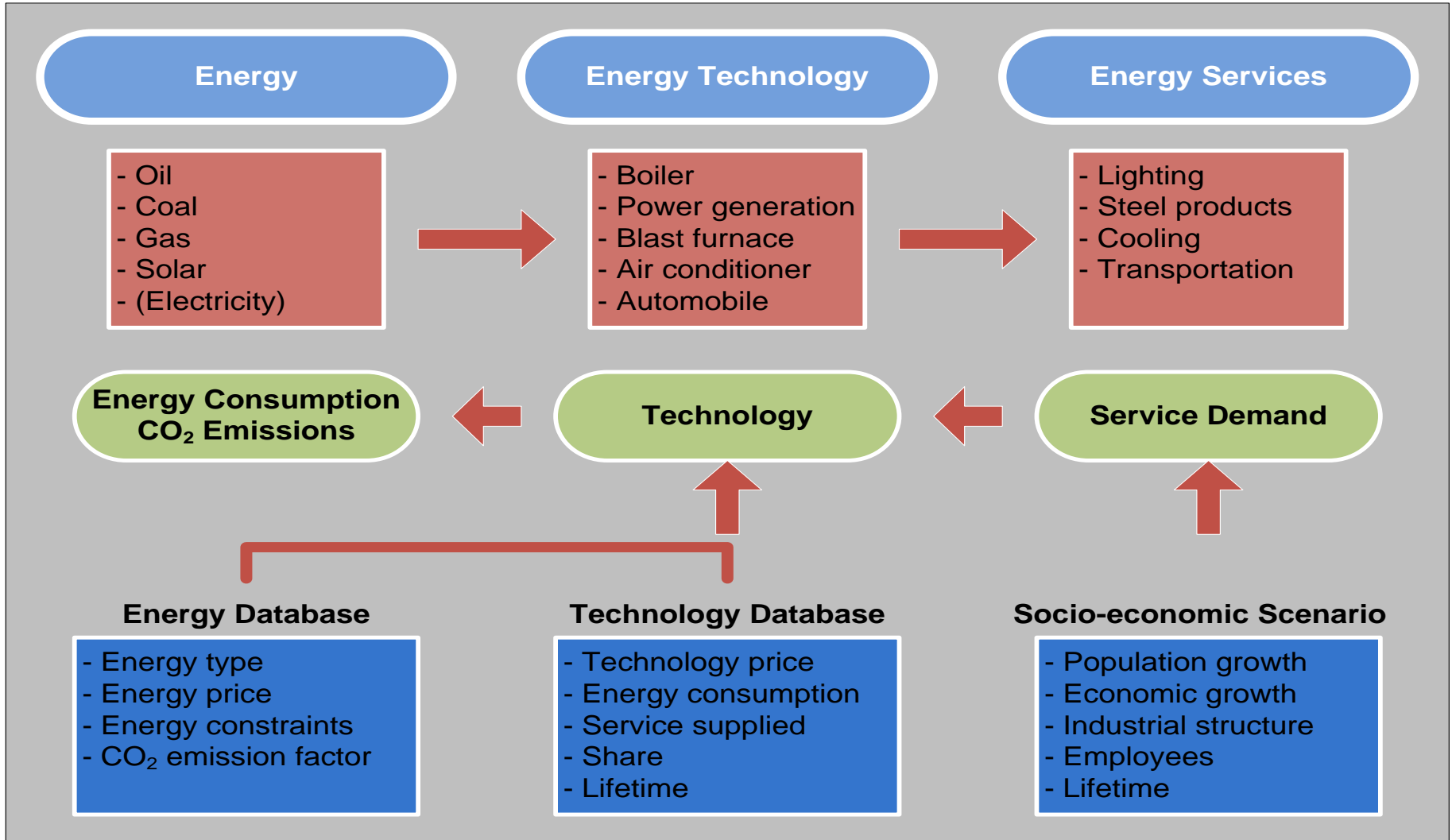


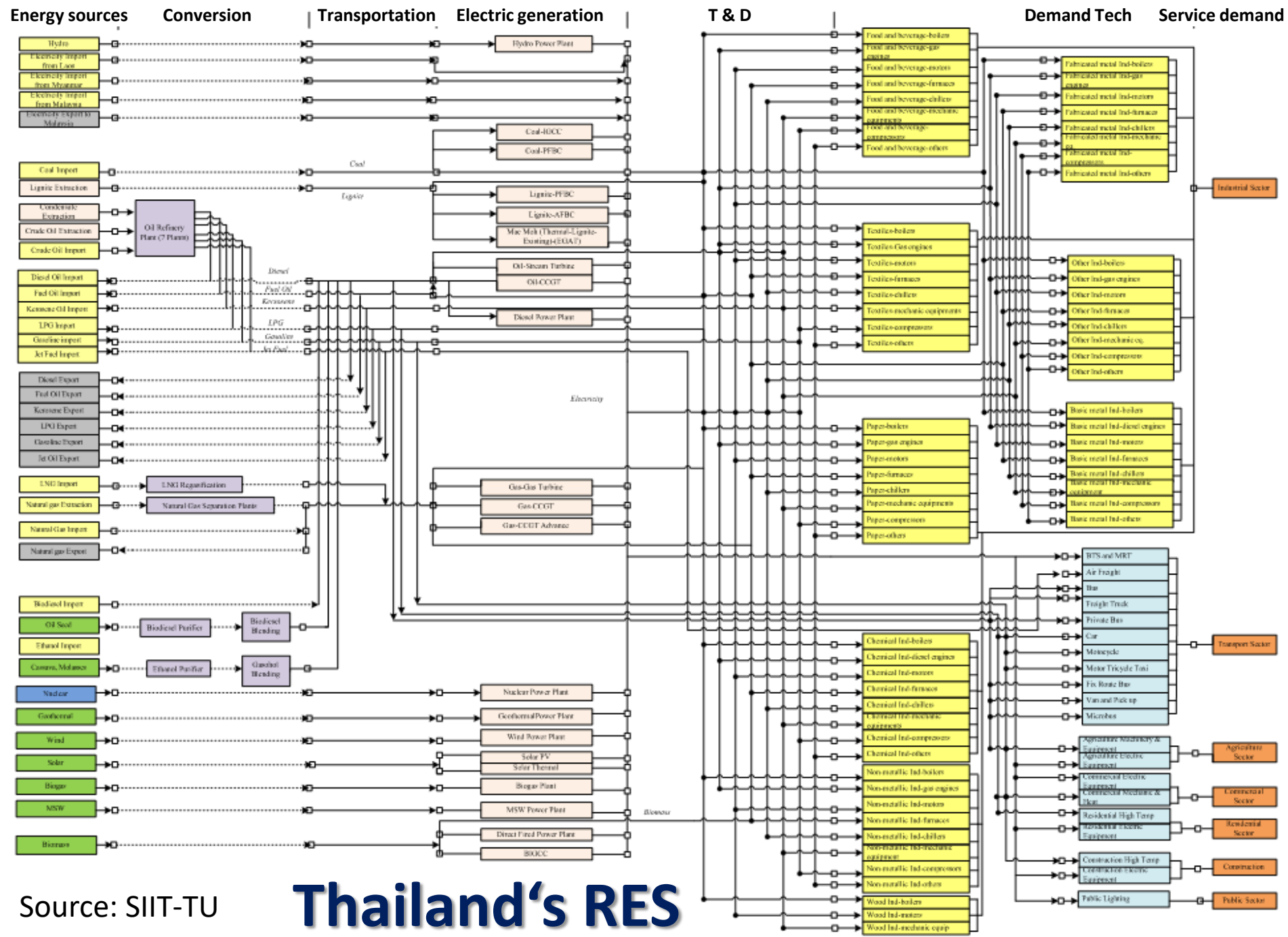
# AIM/ExSS

## Four Steps



# Methodology (AIM/Enduse), NIES





Source: SIIT-TU

# Thailand's RES

# AIM/CGE

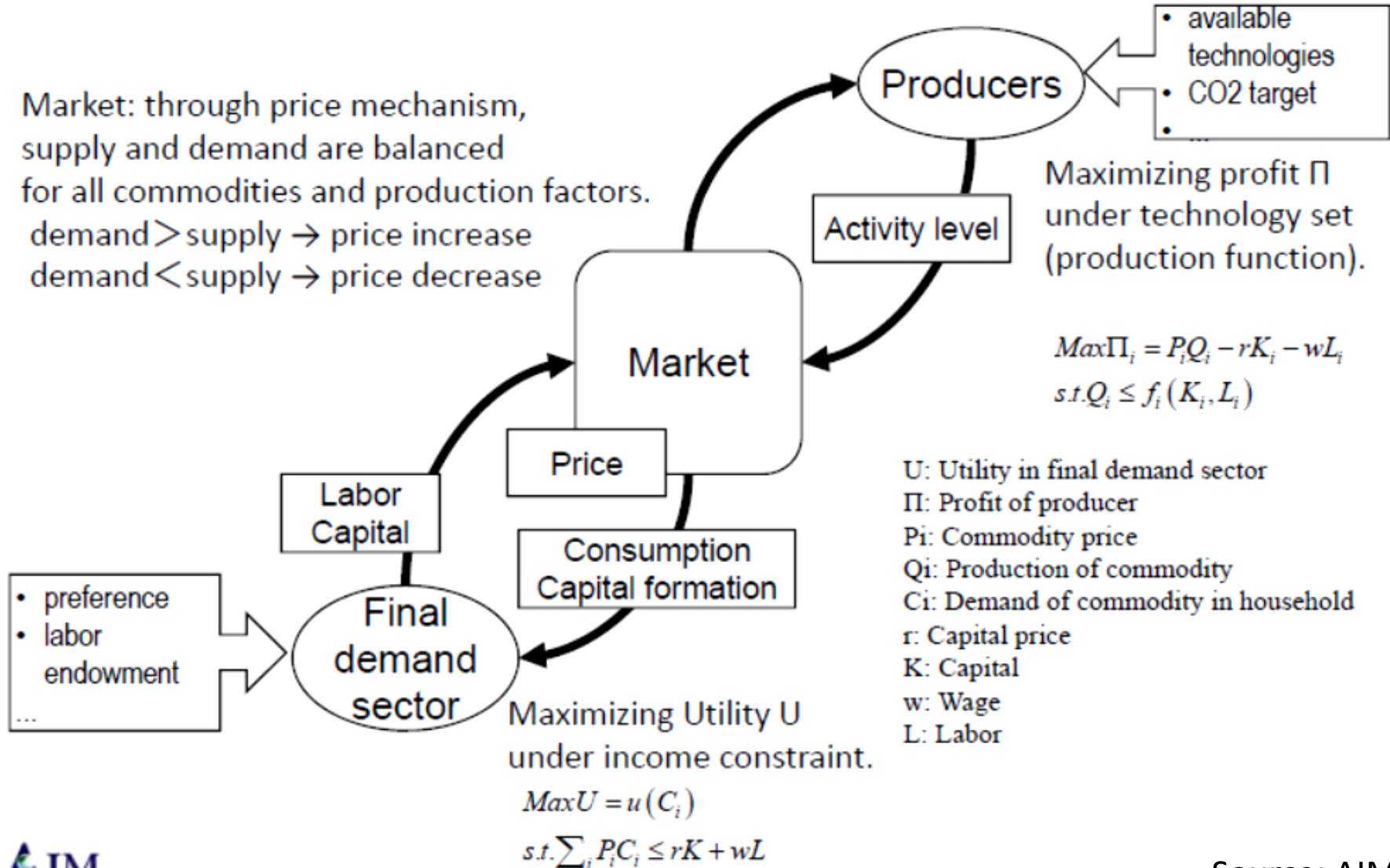
What's CGE?

- "**Computable**": quantitative
- "**General**": treatment of all commodities, sectors and production factors in the treated society
- "**Equilibrium**": demand and supply of each commodity and factor are balanced through the price mechanism

# AIM/CGE

## AIM/CGE -Top-down approach-

Market: through price mechanism, supply and demand are balanced for all commodities and production factors.  
 demand > supply → price increase  
 demand < supply → price decrease





# LCS Modelling for Thailand

1. LCS Scenario 2030 by AIM/ExSS
2. Appropriate CO<sub>2</sub> mitigation target in 2020 by AIM/Enduse
3. Roadmap to Low Carbon Thailand 2050 by AIM/Enduse
4. Economic impacts of CO<sub>2</sub> mitigation targets by AIM/CGE
5. Peak CO<sub>2</sub> Scenario for Thailand
6. 1.5 Degree Scenario for Thailand

Low-Carbon Society Vision 2030

# Thailand



November, 2010



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

1<sup>st</sup> LCS Scenario by AIM/ExSS

## Roadmap to Low Carbon

# Thailand

## towards 2050



A Roadmap to Low Carbon Growth



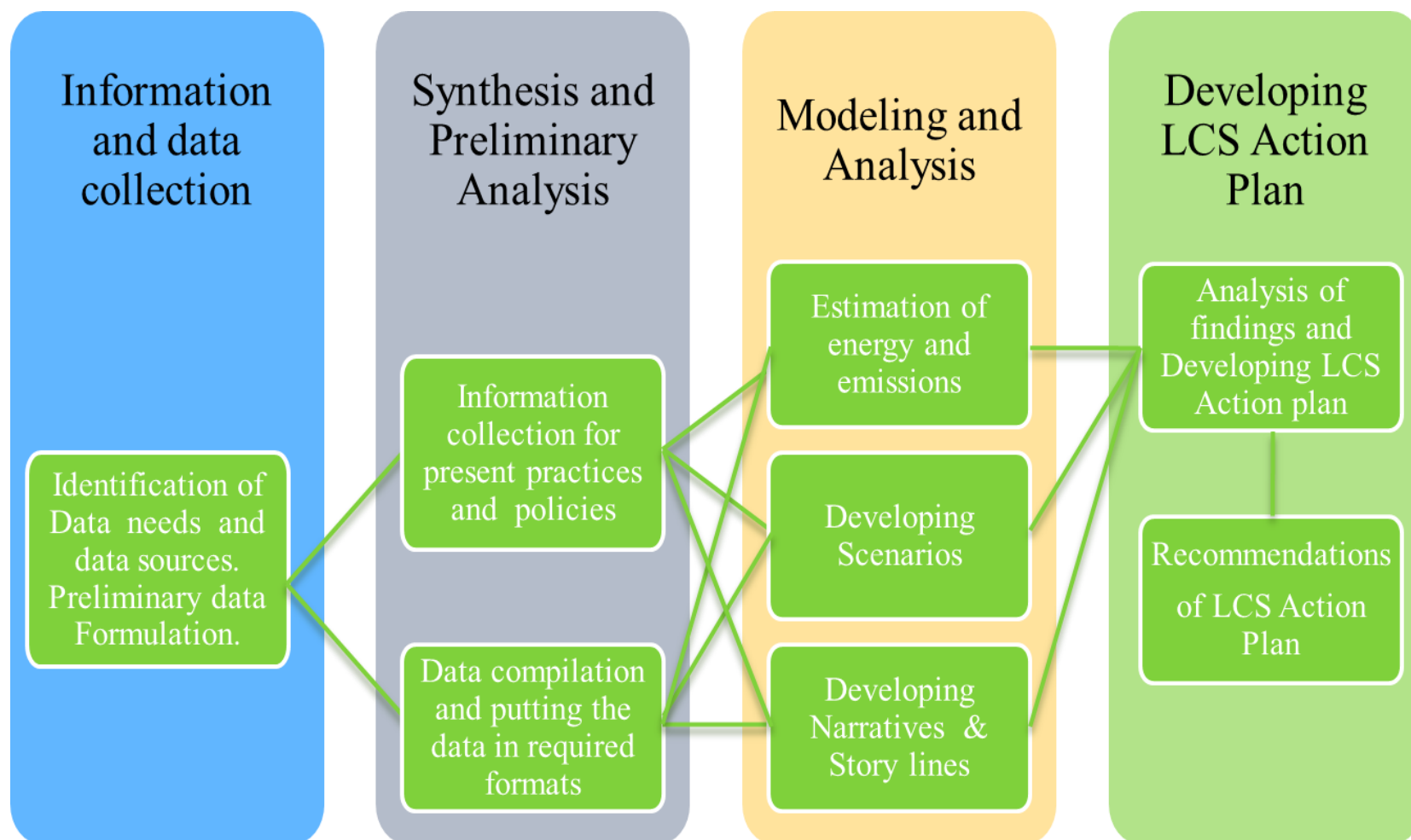
Sirindhorn International Institute of Technology, Thammasat University  
Asian Institute of Technology  
Asia Pacific Integrated Model (AIM)  
National Institute for Environmental Studies (NIES)  
Kyoto University  
Mizuho Information & Research Institute



November, 2012

2<sup>nd</sup> LCS Roadmap by AIM/Enduse

# Methodology (LCS Action Plan)



# Role of Integrated Assessment Model (IAM) in Thailand domestic discussion

## I. Review, Analyze mitigation potentials Thailand's contributions

- Review of UNFCCC and Thailand CDM and Pre2020 Mitigation
- Status/Readiness of Thailand for contributions
- Countermeasures/Priority areas of Contributions

## II. AIM/Enduse and Multi-benefit analyses

- AIM Modeling Energy  
→ Result From Model  
(Energy Consumption, CO<sub>2</sub> Emission, Abatement Costs)  
→ GHG Mitigation Potential
- Pre2020 Assessment  
(Cost Effectiveness, Co-benefit, Energy Security)  
→ Policy measures for agreement

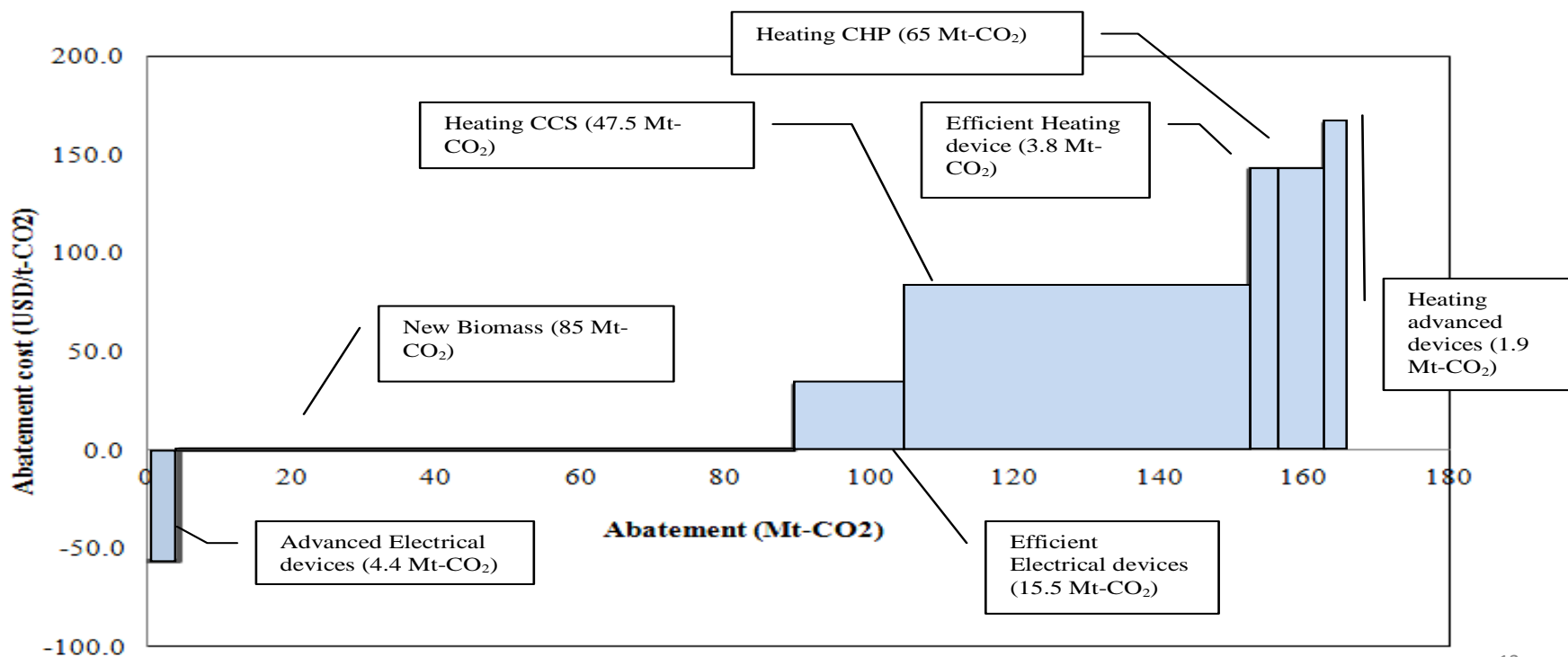
## III. Consultation and Pledge preparation

- Stakeholders Involvement
- Thailand's Readiness and Contributions

**NCCC & Gov't Decision**

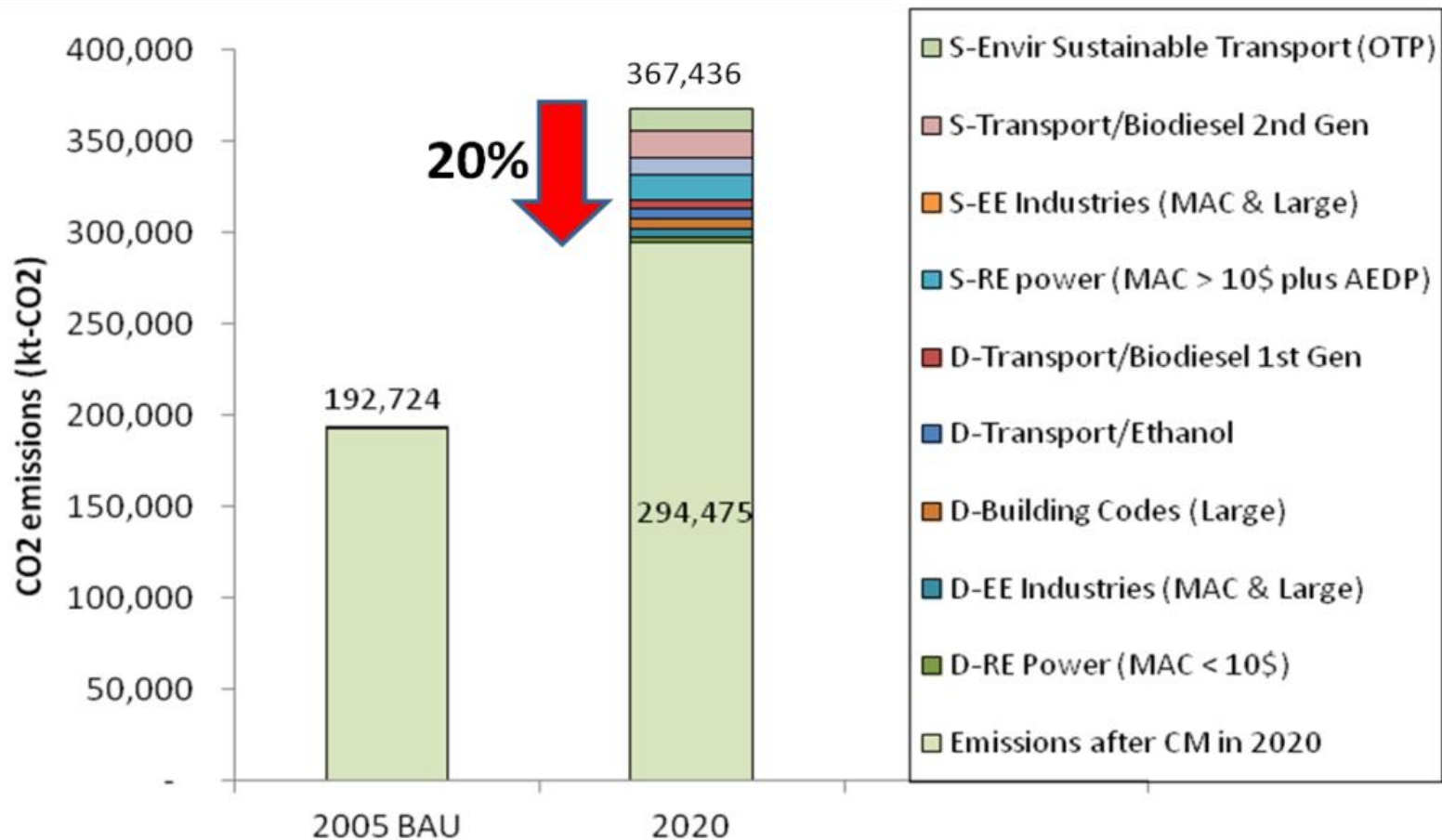
# Successful Application of IAM to Thailand LCS

- **Co-benefits** are also assessed, and they reveal positive aspects of GHG mitigation under NAMA/NDC frameworks
- **Abatement costs** of actions are identified across the sectors.
- The **MRV** process of NAMA/NDC needs cooperation among related ministries.





# High Potential Scenario : Potentials of CO<sub>2</sub> Countermeasures in 2020 at 20%



# Policy Package for Roadmap to “LOW CARBON THAILAND”

## POWER GENERATION

- Implementation of energy efficiency improvement
- Promotion of technology transfer
- Reduce own usage and transmission loss
- Promotion of alternative energy
- Promotion of renewable energy

## INDUSTRY

- Implementation of energy efficiency improvement
- Promotion of technology transfer
- Promotion of alternative and renewable energy

## PASSENGER TRANSPORT

- Implementation of energy efficiency improvement
- Promotion of technology transfer
- Promotion of alternative and renewable energy
- Promotion of mass transit system
- Promotion of new technology

## FREIGHT TRANSPORT

- Implementation of energy efficiency improvement
- Promotion of new technology
- Promotion of alternative and renewable energy
- Promotion of mass transit system

## RESIDENTIAL

- Building insulation
- Energy efficiency labeling
- Energy performance standard of equipment
- Promotion of new technology

## COMMERCIAL

- Building codes
- Building insulation
- Energy efficiency labeling
- Energy performance standard of equipment
- Promotion of new technology

Incentive to introduce energy efficiency improvement and advanced technology

Mitigation of GHG emissions

# Clean Power

Energy efficiency improvement

Diffusion of new technology

Promotion of new & renewable energy

Large emitter programs

Clean technology

Promotion of Research & Development

Power generation by renewable energy

Power generation by alternative energy

- Implementation of IGCC
- Treatment of
- Reduction of distribution loss
- Implementation of large programs
- Diffusion of energy saving managing systems

- Implementation carbon capture storage (CCS) technology
- Implementation nuclear technology

- R&D of gasified biofuel development
- R&D of new technology
- R&D of new technology
- R&D of new technology
- R&D of new technology

- Power generation from solid waste incineration
- Generation of bio-methanol
- Construction of bio-methanol plant

- Ready to be alternative energy
- Planning of alternative energy

# LCP-ABS Action 1: Clean Power

DEDE, EGAT

MOST



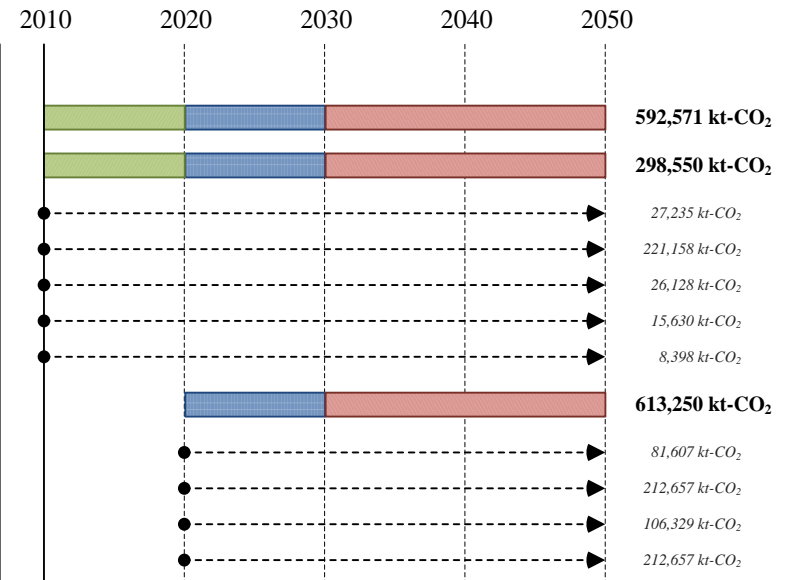
Energy efficiency improvement

Renewable energy

- Biogas
- Biomass steam power plant
- Solar
- Wind
- Municipal Solid Waste (MSW)

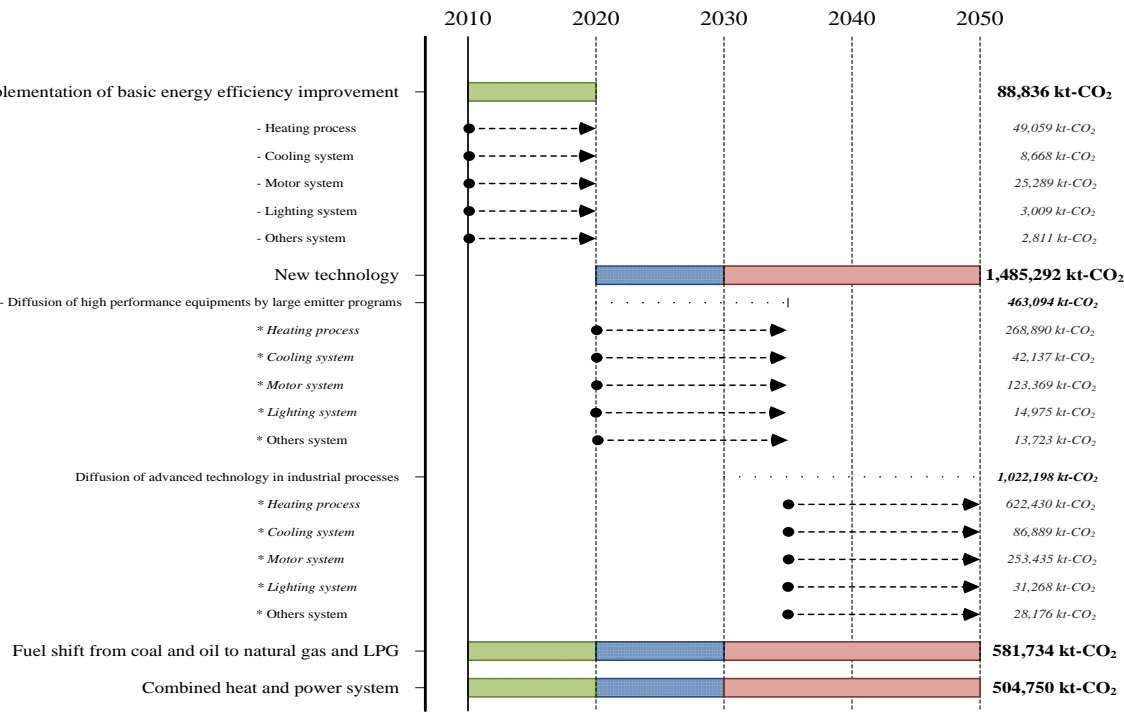
New technology

- Nuclear
- Steam power plant with CCS
- IGCC with CCS
- Supercritical power plant with CCS





# LCP-ABS ACTION 2: GREEN INDUSTRY



Green Industry

Energy efficiency improvement

Energy saving behavior

Diffusion of new technology

Environmental management system standard

Diffusion of energy saving management systems

Support for SMEs

Diffusion of high performance equipment

- Diffusion of environmental equipment standard

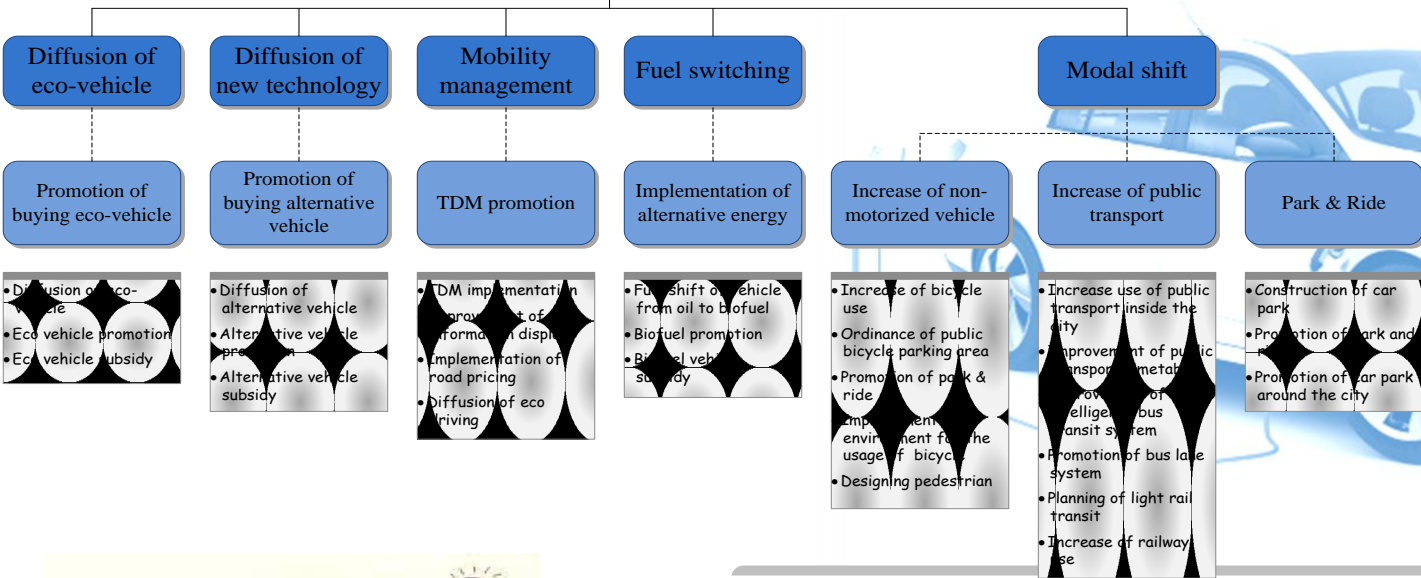
- Implementation of large emitter programs
- Diffusion of energy efficiency improvement equipment
- Improvement of industrial production technique
- Diffusion of energy saving behavior

- Subsidy to small businesses of energy saving management
- Planning of consult for energy efficient industries

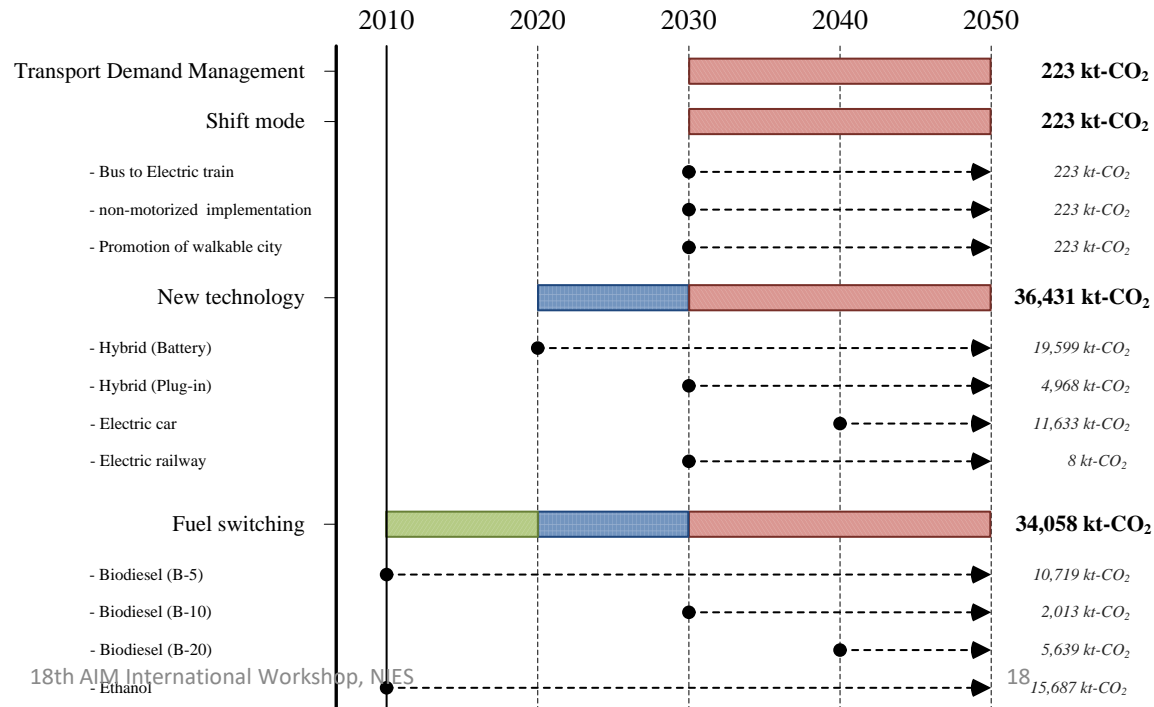
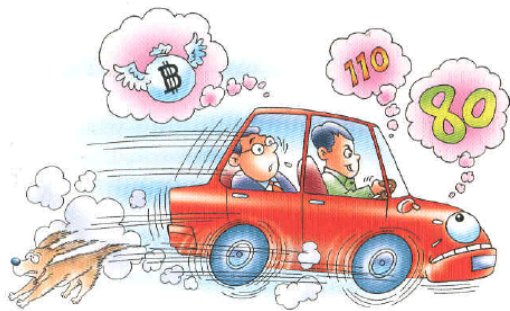
- Implementation of advanced energy saving equipment
- Implementation of research and development in the nano cluster
- Improvement of research organization

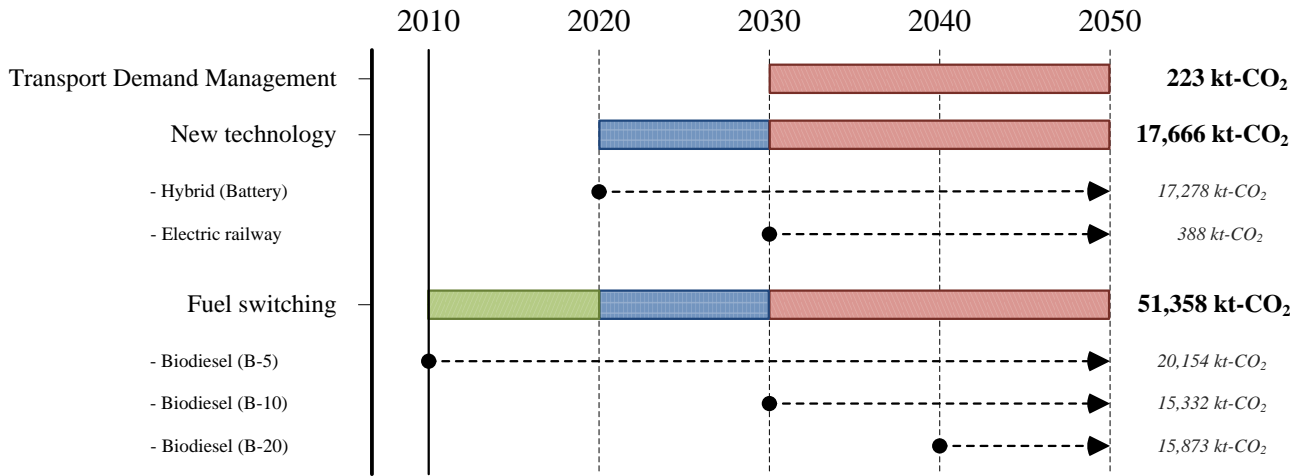


# Smart Passenger Transport

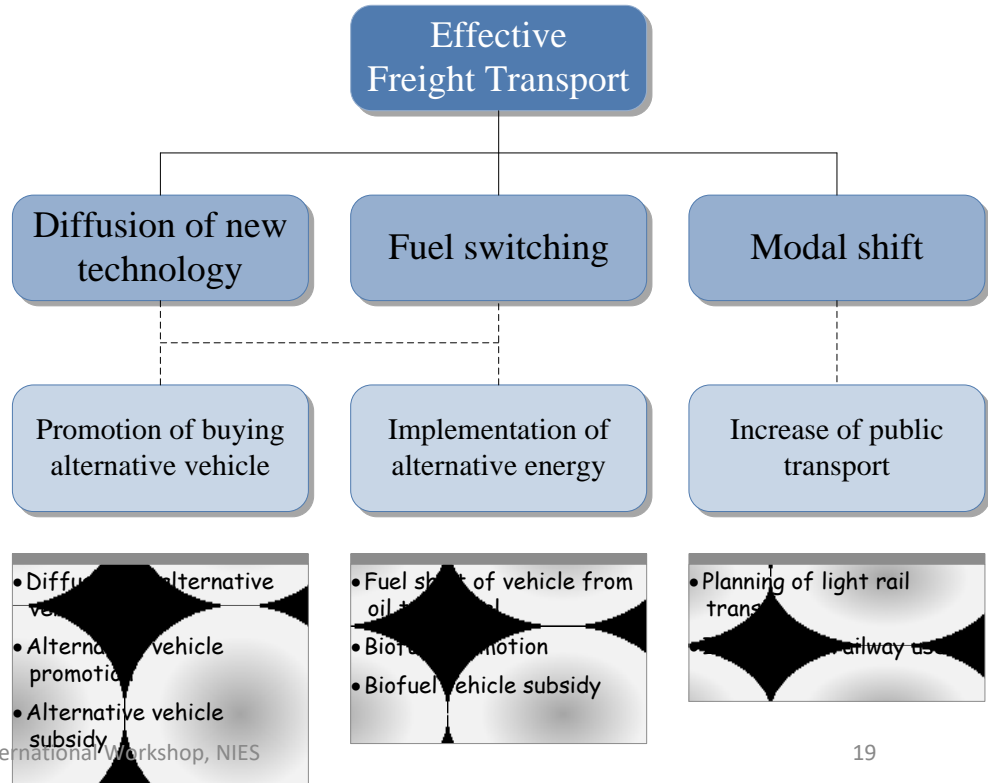


# LCP-ABS Action 3: Smart Passenger Transport





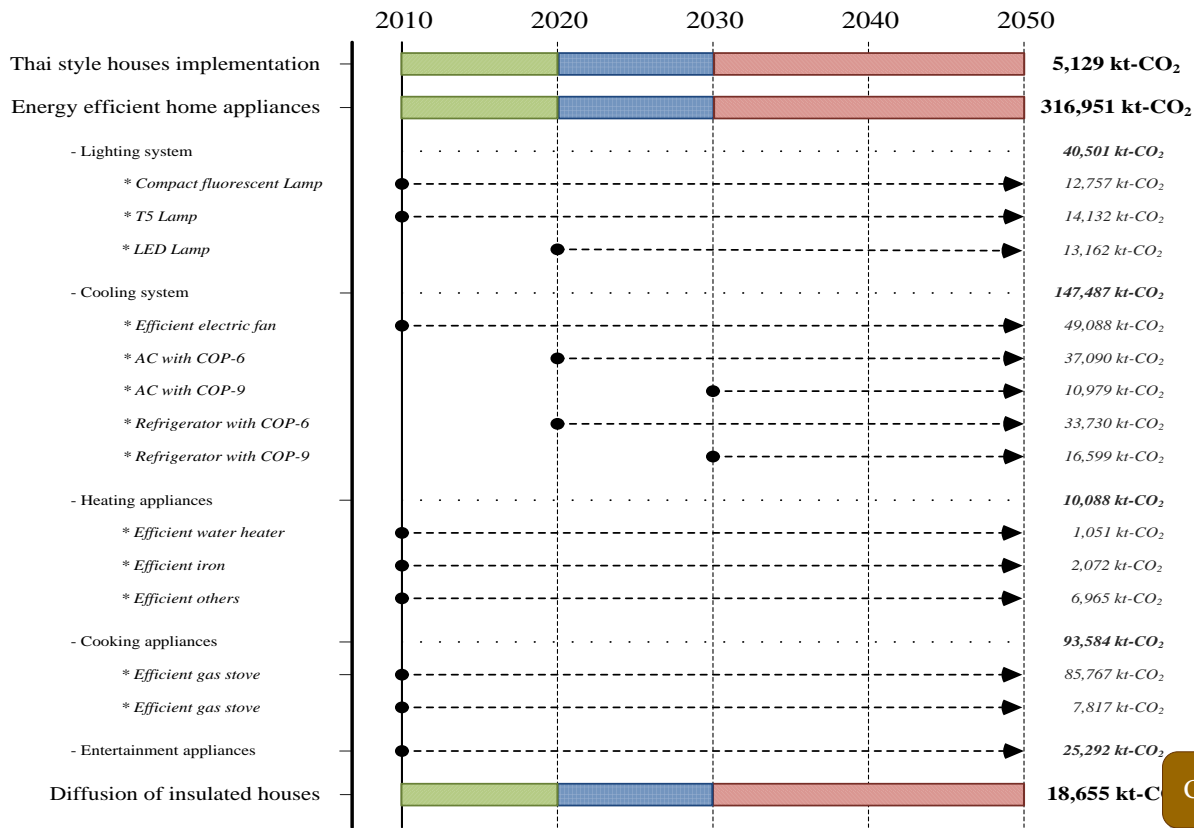
# LCP-ABS Action 4: Effective Freight Transport



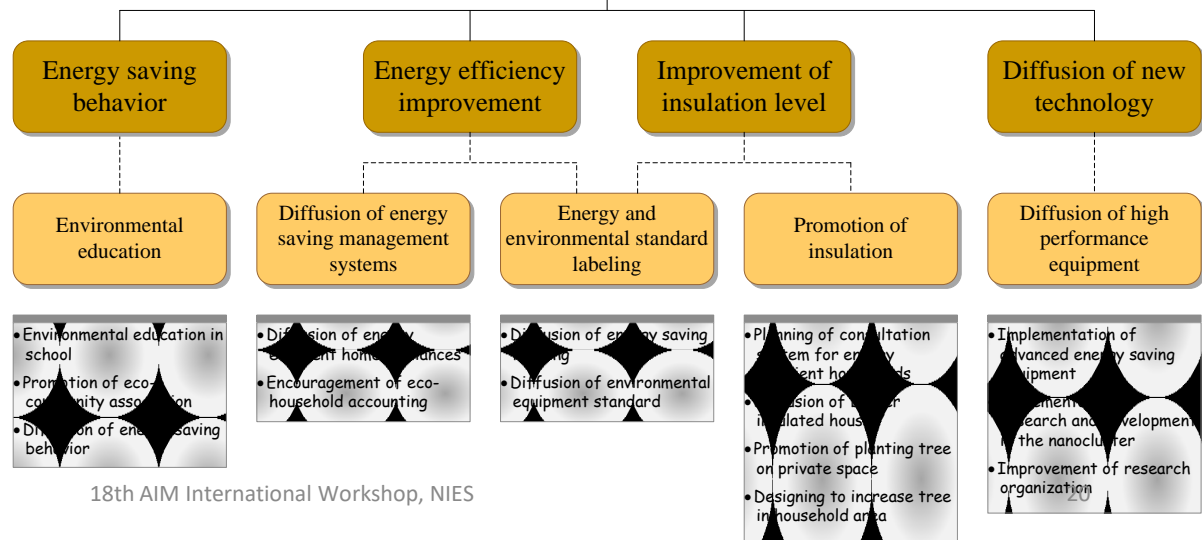




# LCP-ABS Action 5: Thai Style Comfortable Houses

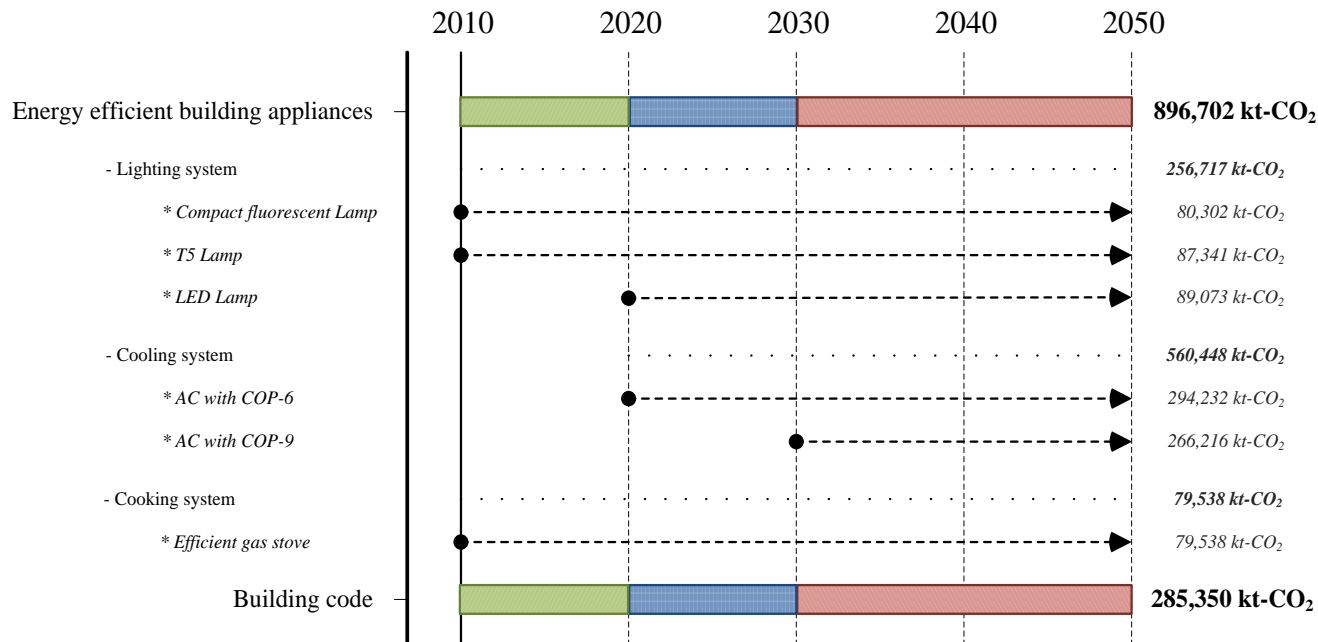


Comfort houses

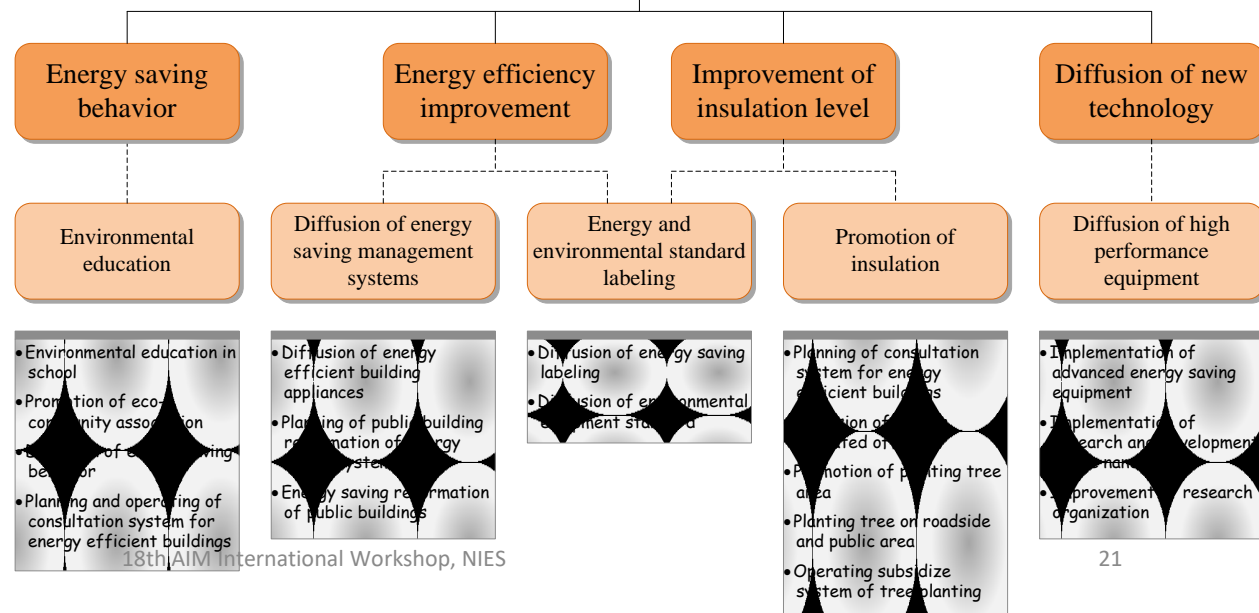


# LCP-ABS

## Action 6: Modern Buildings

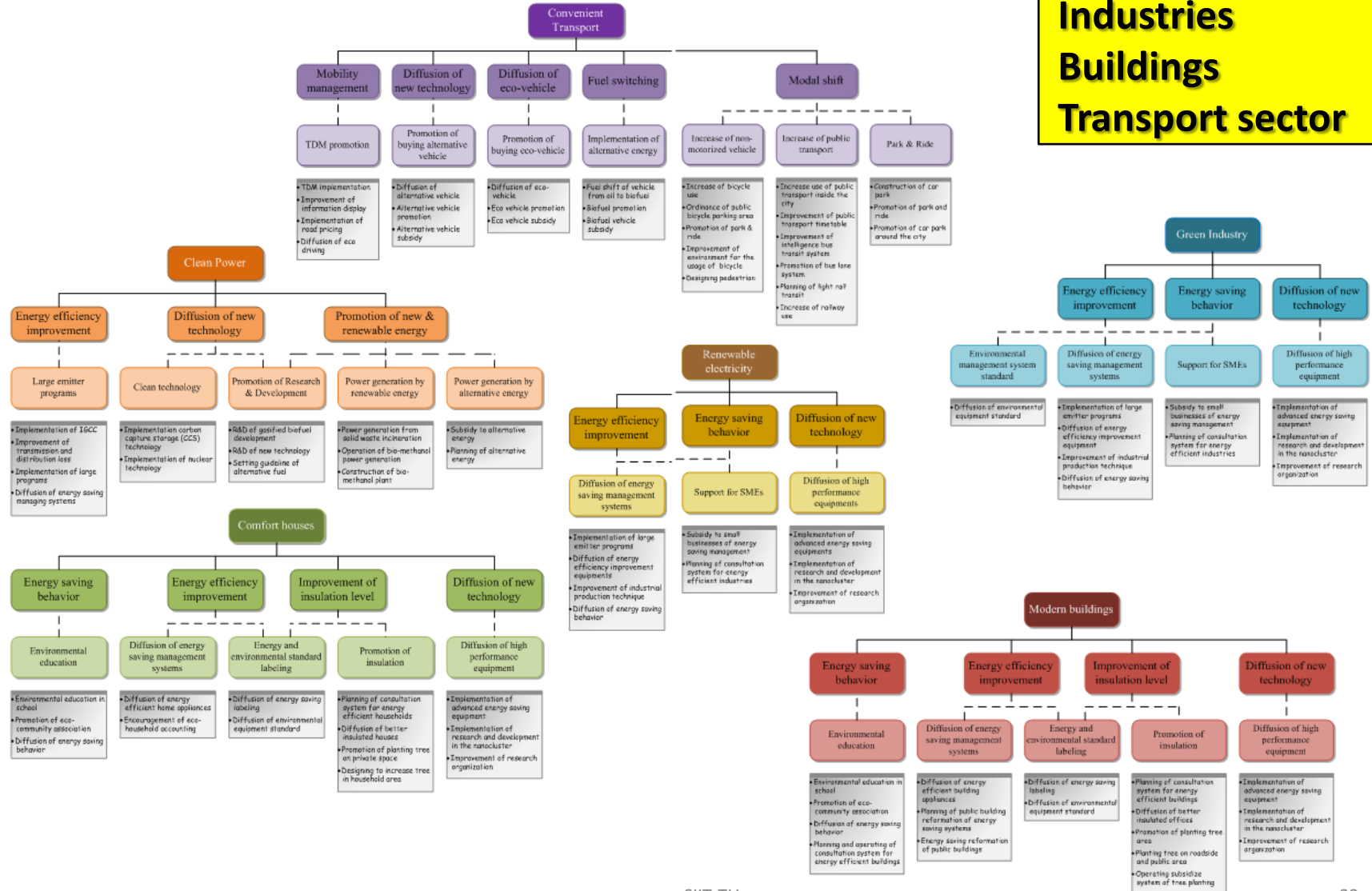


Modern buildings

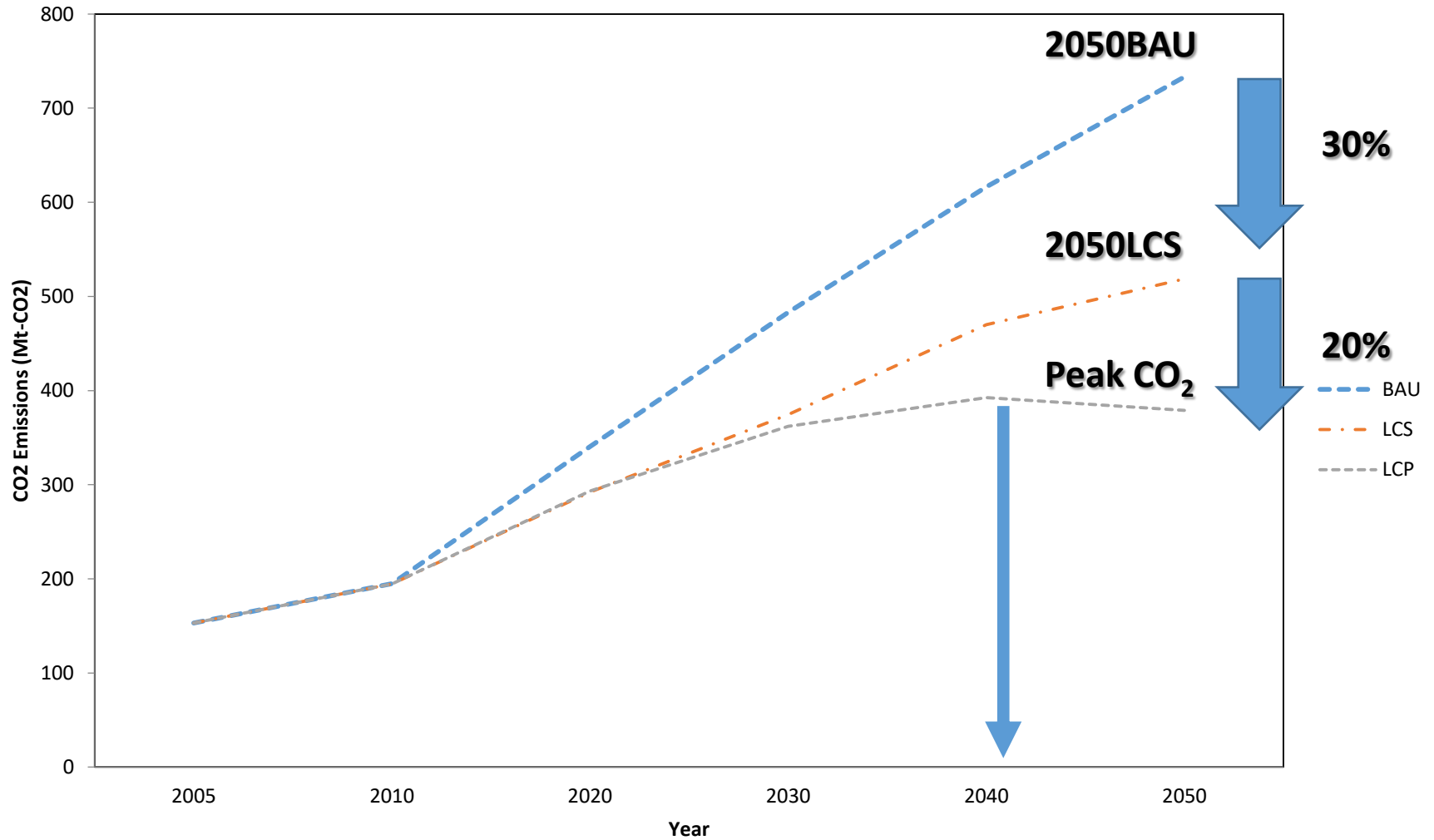


# Robust Roadmap to Thailand's LCS Scenario

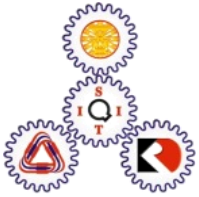
**Power sector**  
**Industries**  
**Buildings**  
**Transport sector**



# Total GHG Emissions 2005-2050 (Peak CO<sub>2</sub>)



# Acknowledgement



どうもありがとうございます

Thank You