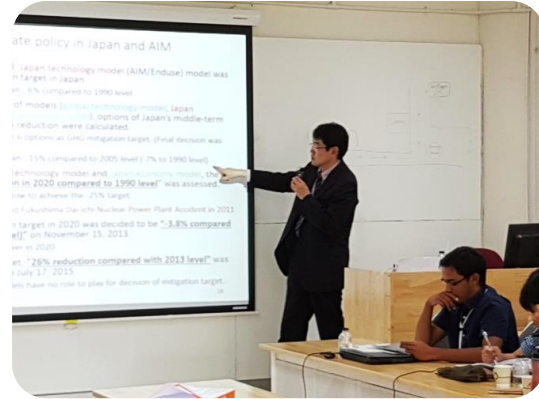


# LCS-RNet 14<sup>th</sup> Annual Meeting – Further steps towards Net Zero: Ways to accelerate stakeholder collaboration between citizens, policymakers and researchers

**Getting models and modellers to inform national low carbon strategies:  
institutional and methodological challenges:  
The Case of AIM in Thailand's NDC and LT-LEDS**

Bundit Limmeechokchai  
Thammasat Design School  
Thammasat University, Thailand

# AIMs Training Workshop at Thammasat, Jan 30 – Feb 1, 2017



# AIM/CGE Training Workshop at Thammasat, Thailand June 2018 (Beginning level for Policy maker)



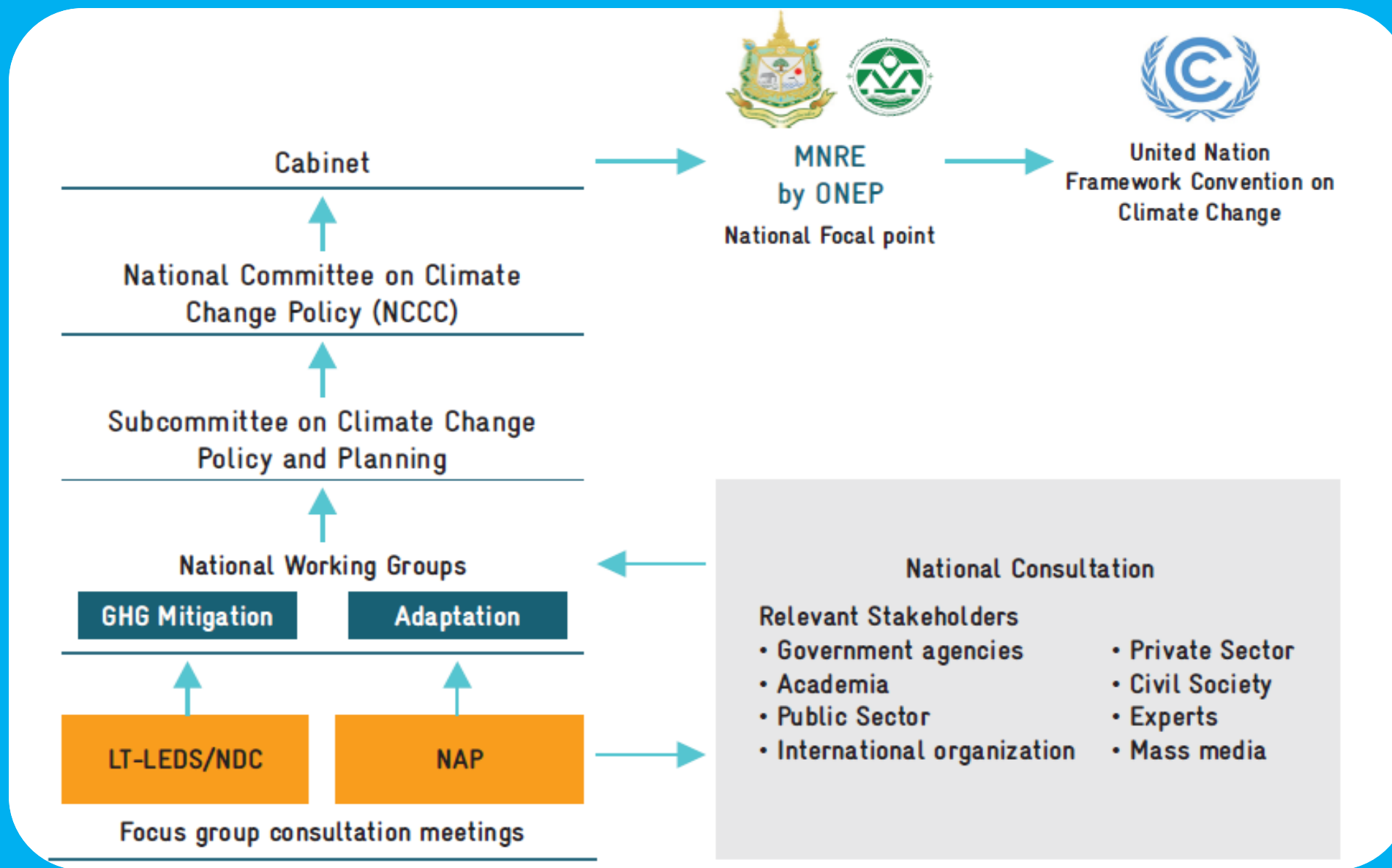
Participant: Bhutan, Thailand: ONEP & CITC, TU, JICA-Thailand



# Sharing of View on Climate Change Policies and Mitigation Actions , BANGKOK, 30 October 2019



# Preparation and Approval Process of Thailand LT-LEDS



# Framework of Thailand Updated NDC and Updated LT-LEDS

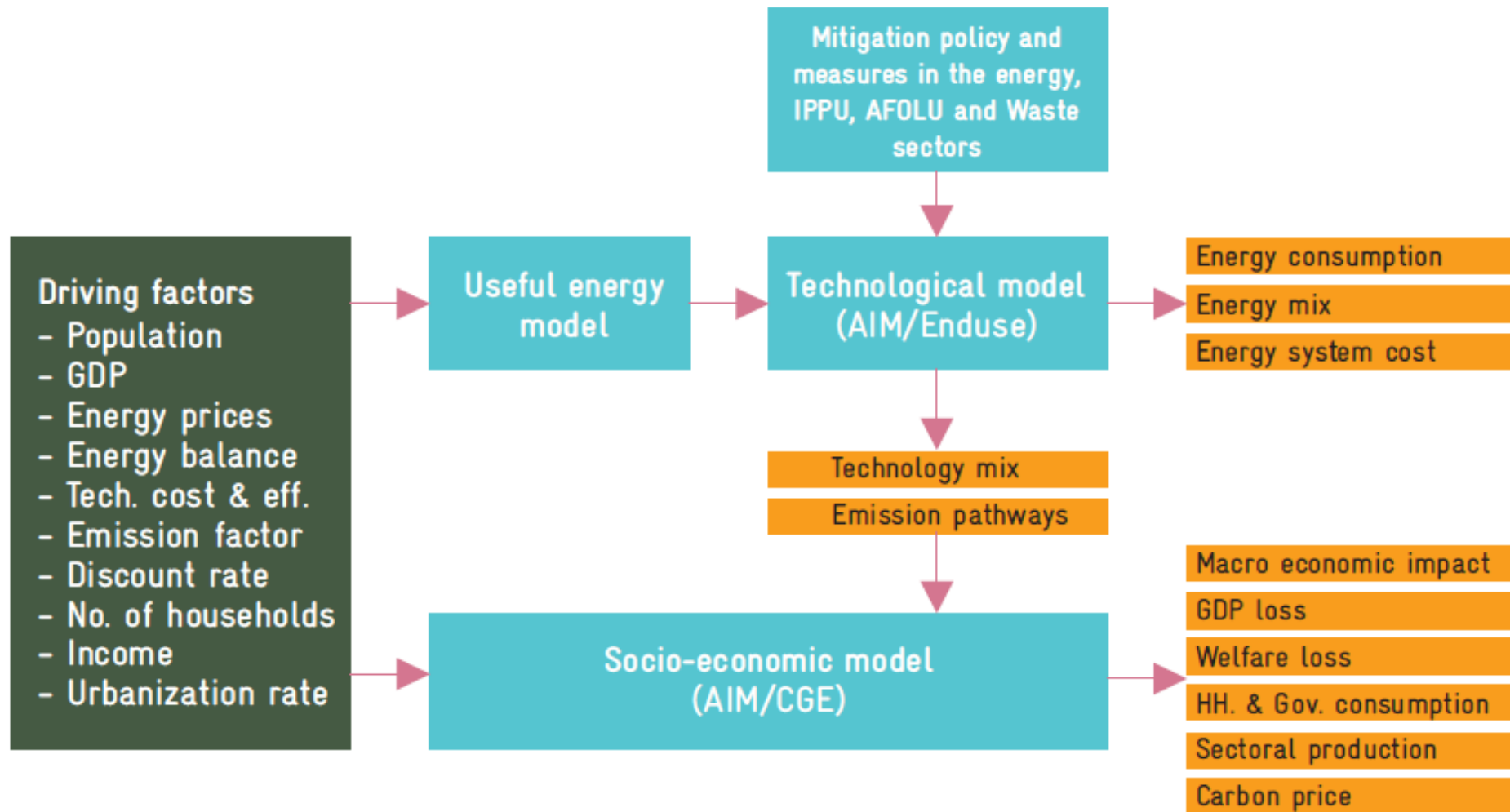
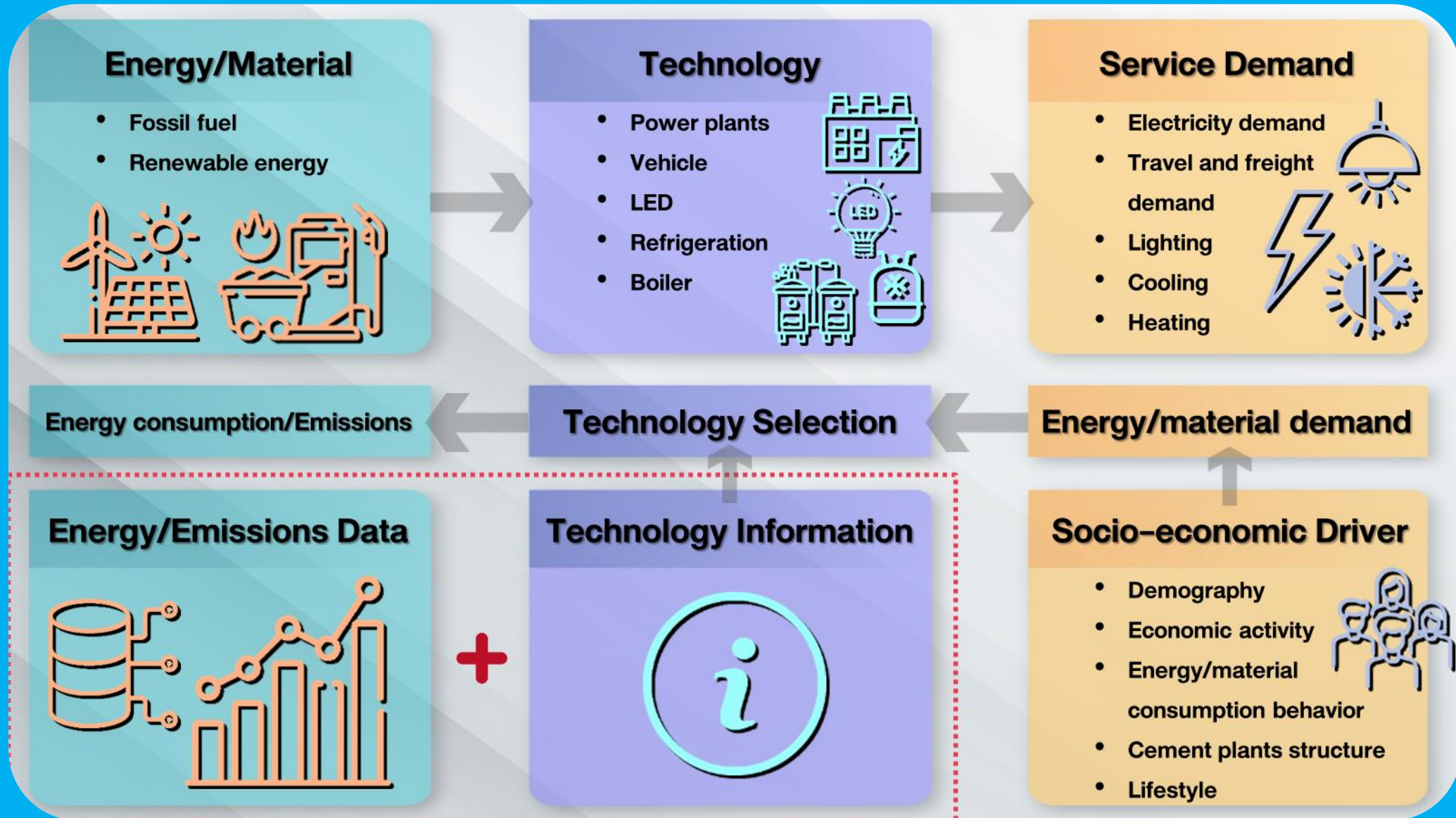


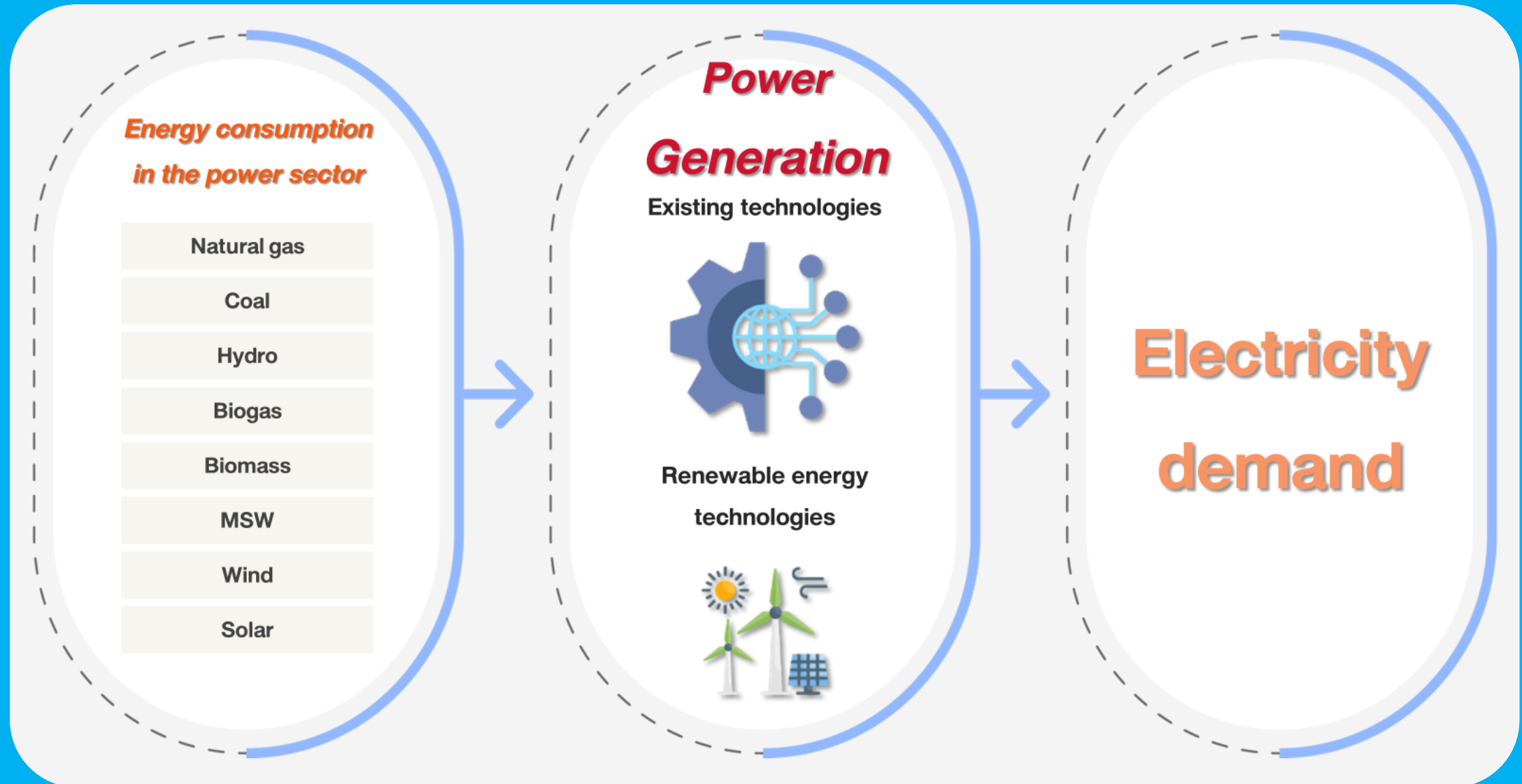
Figure 3-1 Framework of Thailand's LT-LEDS



# Thailand's AIM/Enduse Model



# Thailand's AIM/Enduse Model





# Thailand's AIM/Enduse Model



อุตสาหกรรมผลิตภัณฑ์โลหะ:  
(Fabricated metal)



อุตสาหกรรมอโลหะ:  
(Non-metallic)



อุตสาหกรรมสิ่งทอ  
(Textile)



อุตสาหกรรมกระดาษ  
(Paper and pulp)



อุตสาหกรรมโลหะขั้นมูลฐาน  
(Basic metal)



อุตสาหกรรมไม้และเครื่องเรือน  
(Wood)



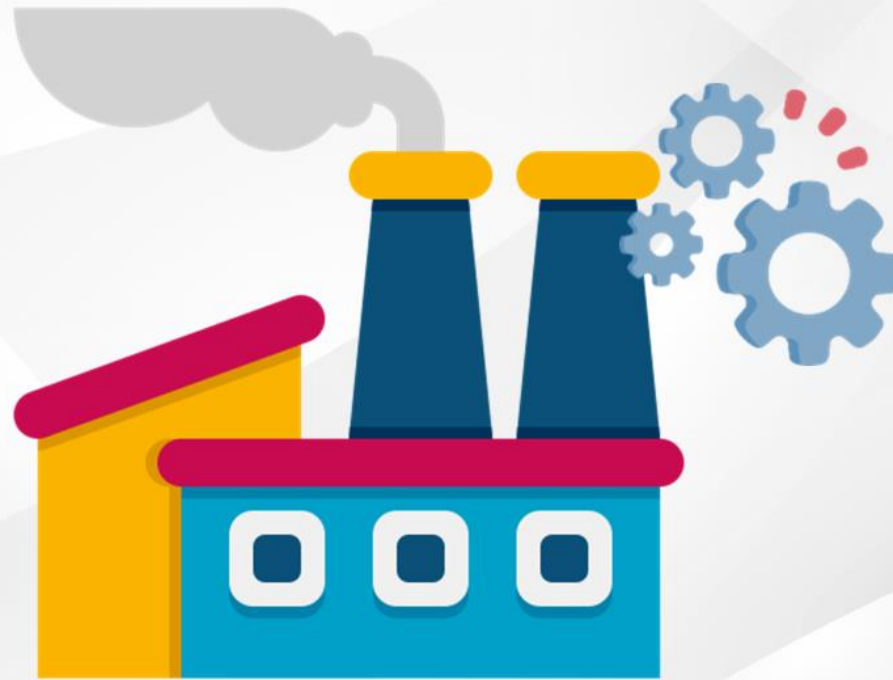
อุตสาหกรรมเคมี  
(Chemical)



อุตสาหกรรมอาหารและเครื่องดื่ม  
(Food and beverage)



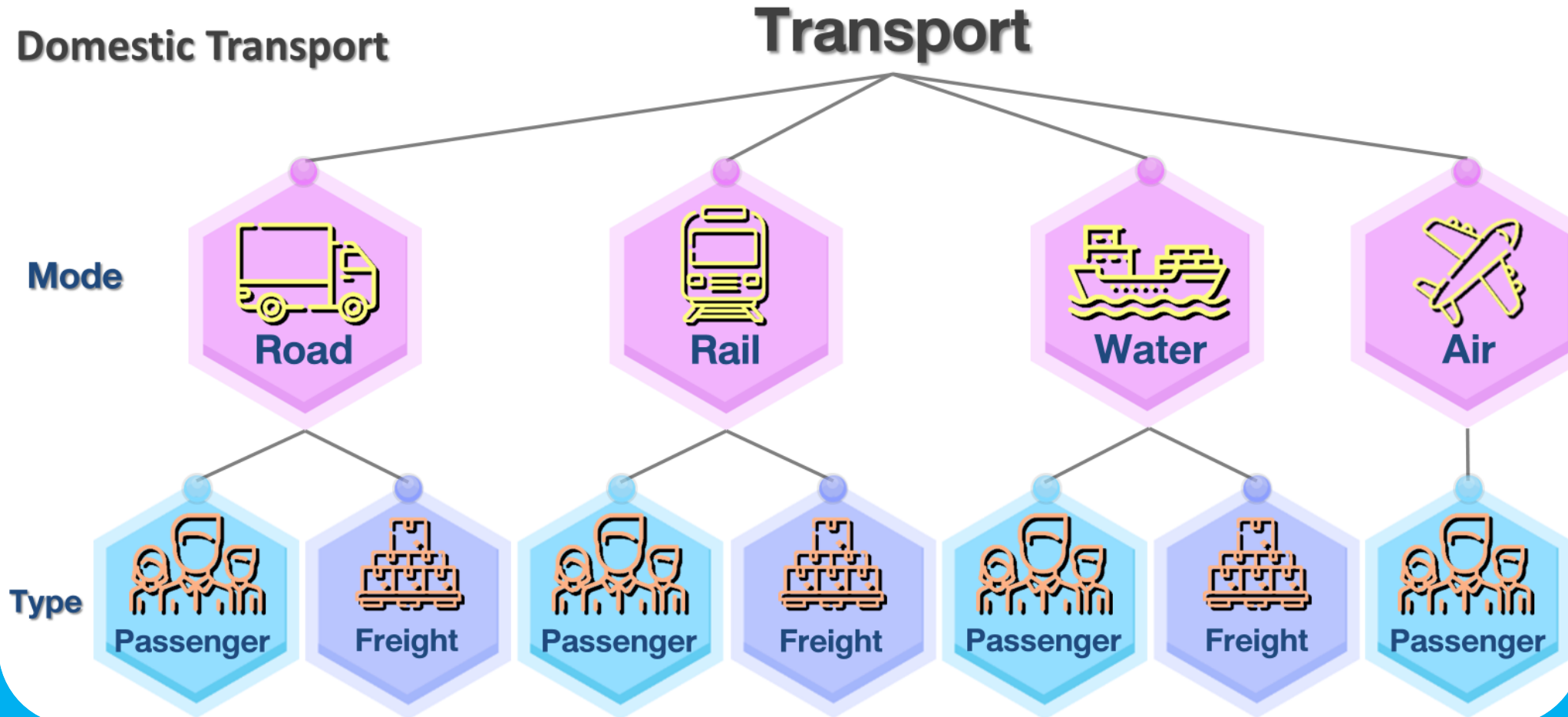
อุตสาหกรรมอื่นๆ  
(Others)



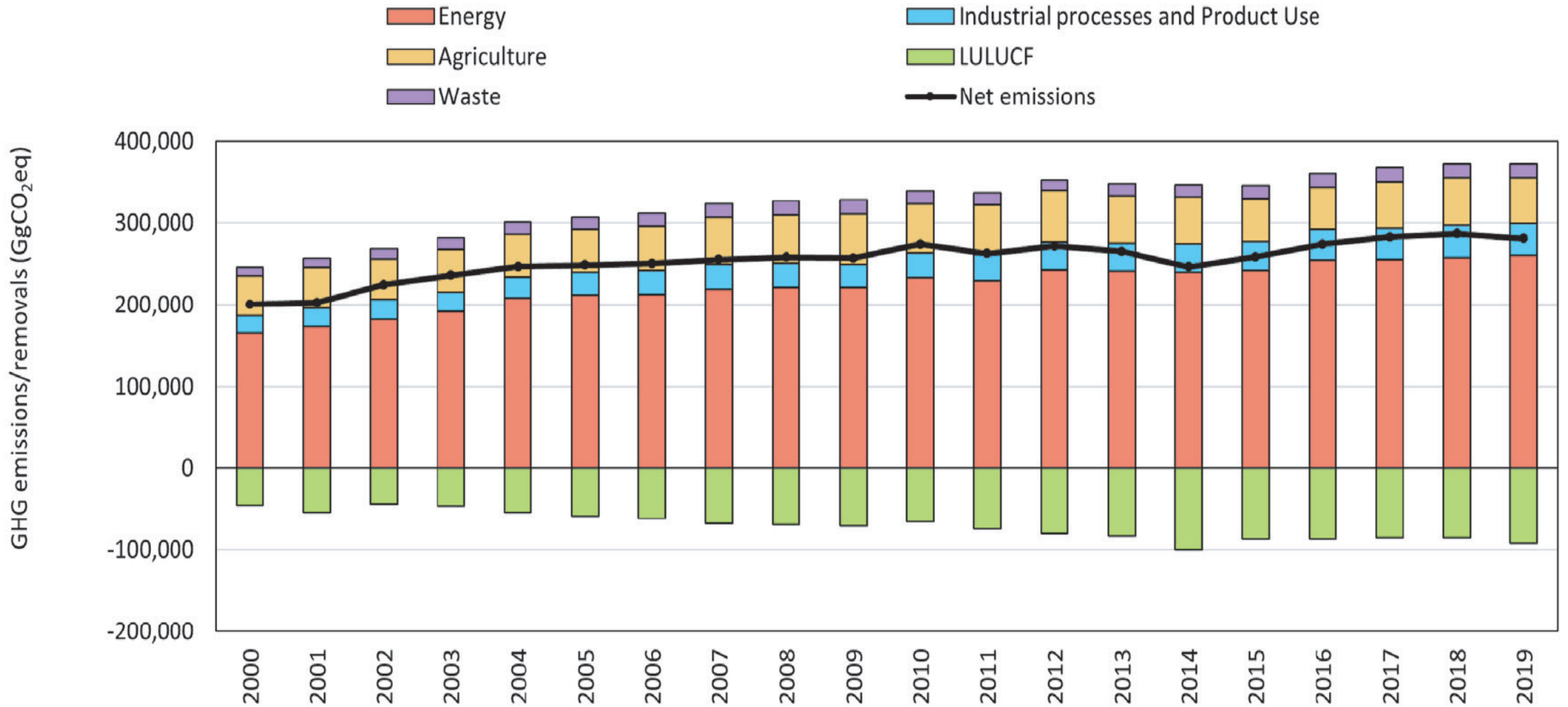
## Manufacturing Industries

# Thailand's AIM/Enduse Model

## Transport Sector

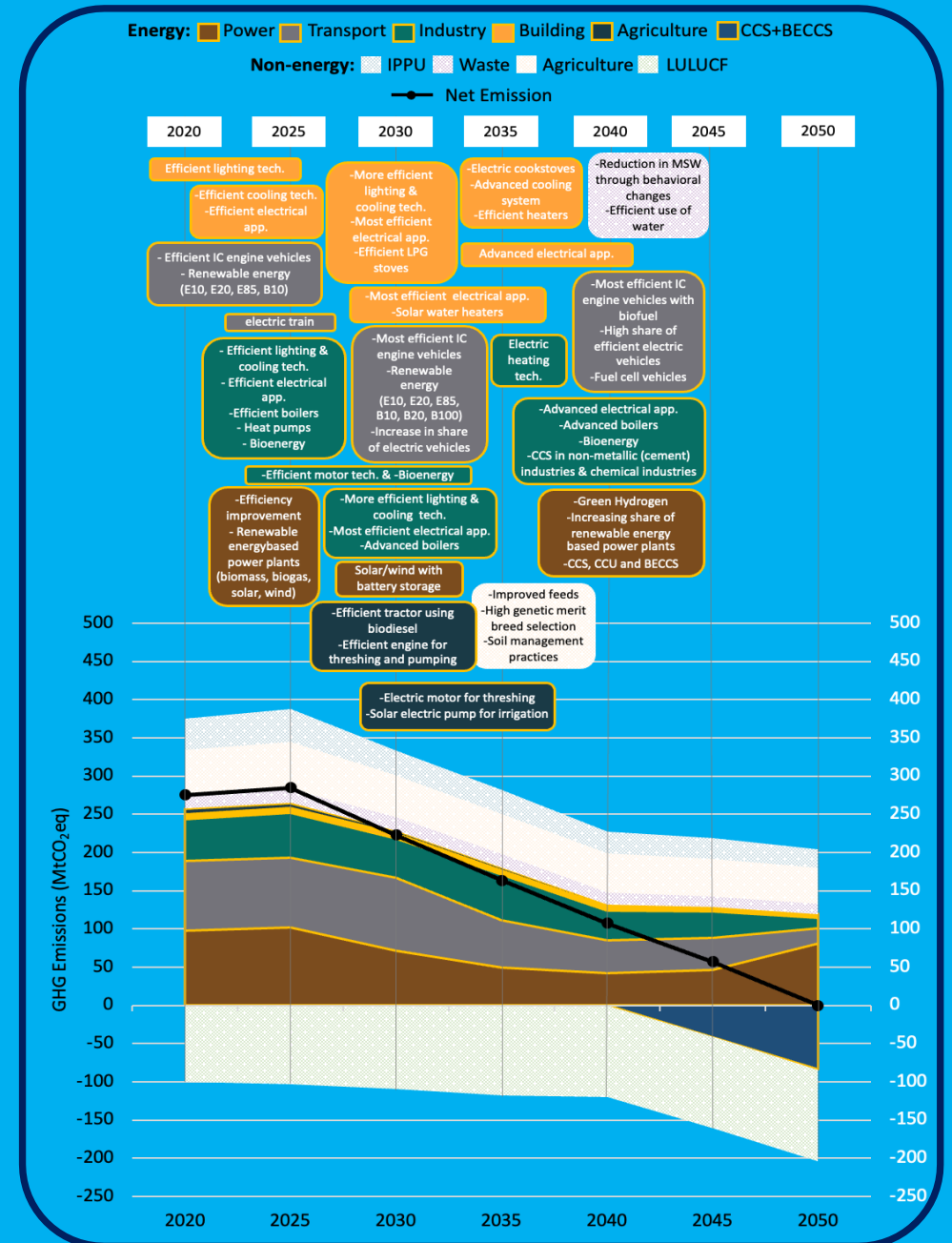


# Thailand's Greenhouse Gas Emission Situation in BUR4

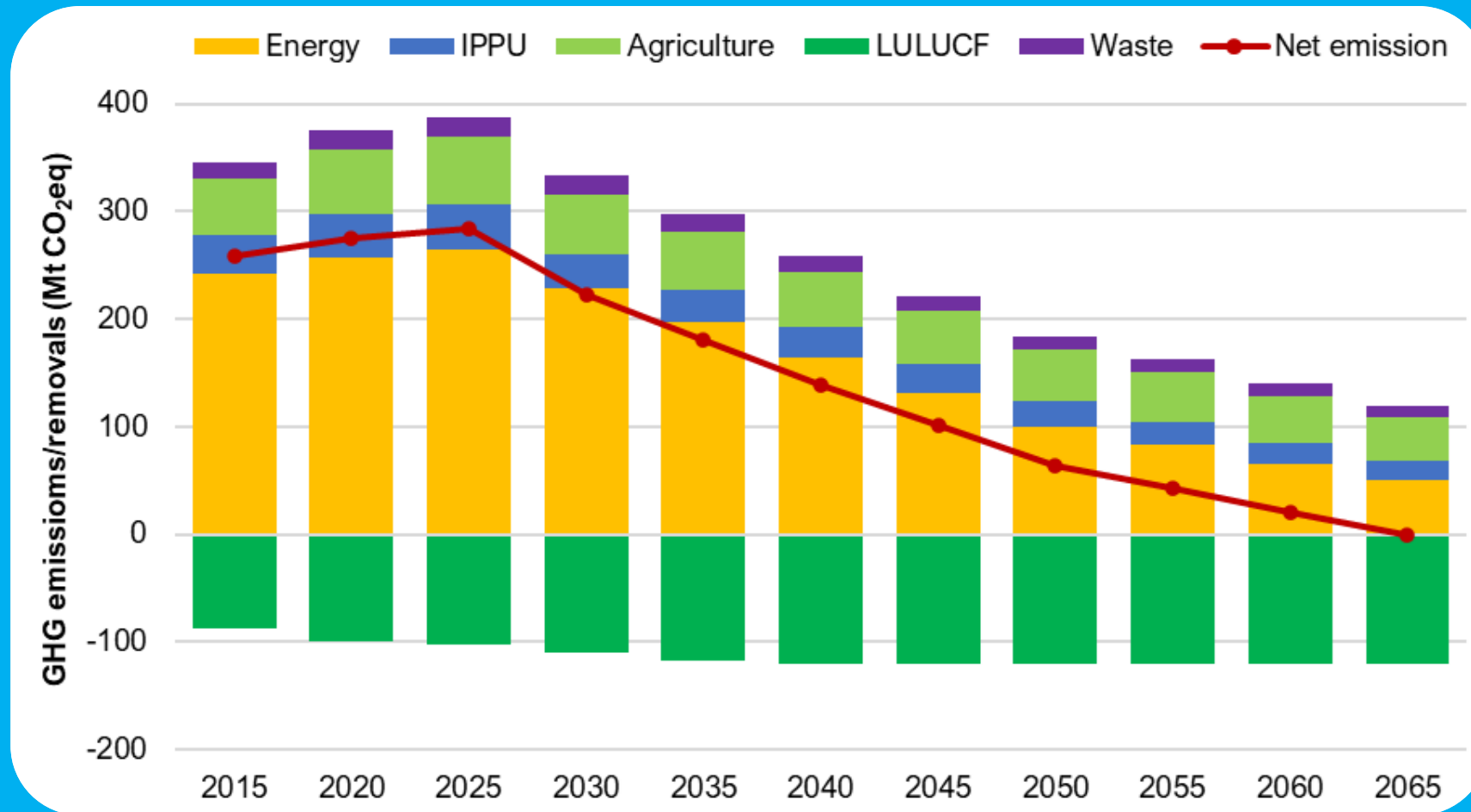


# Key Actions to Achieve Net Zero Emissions in 2050 Thailand

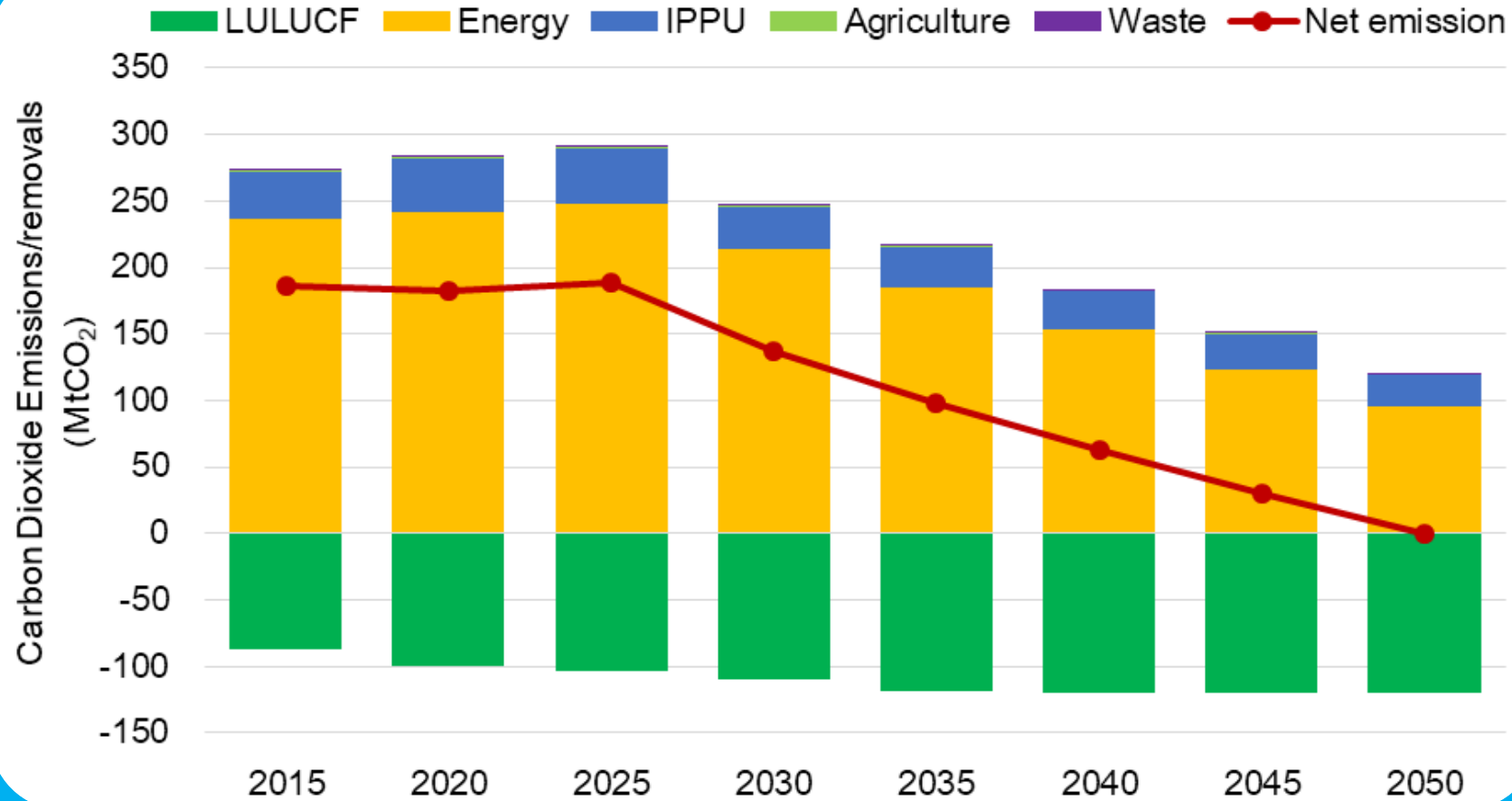
- High energy efficiency
- New RE development
- Green hydrogen
- High electrification
- Carbon capture & utilization (CCU)
- Bioenergy plus CCS
- Behavioral changes



# Thailand's Net Zero GHG Emission Pathway 2065 by AIMs



# Thailand's Carbon Neutrality Pathway 2050 by AIMs



# Stakeholder Engagements in Thailand

## Relevant Stakeholders before and after modelling

- Government agencies
- Academia
- Public Sector
- International organization
- Private Sector
- Civil Society
- Experts
- Mass media



# Thailand's LT-LEDS

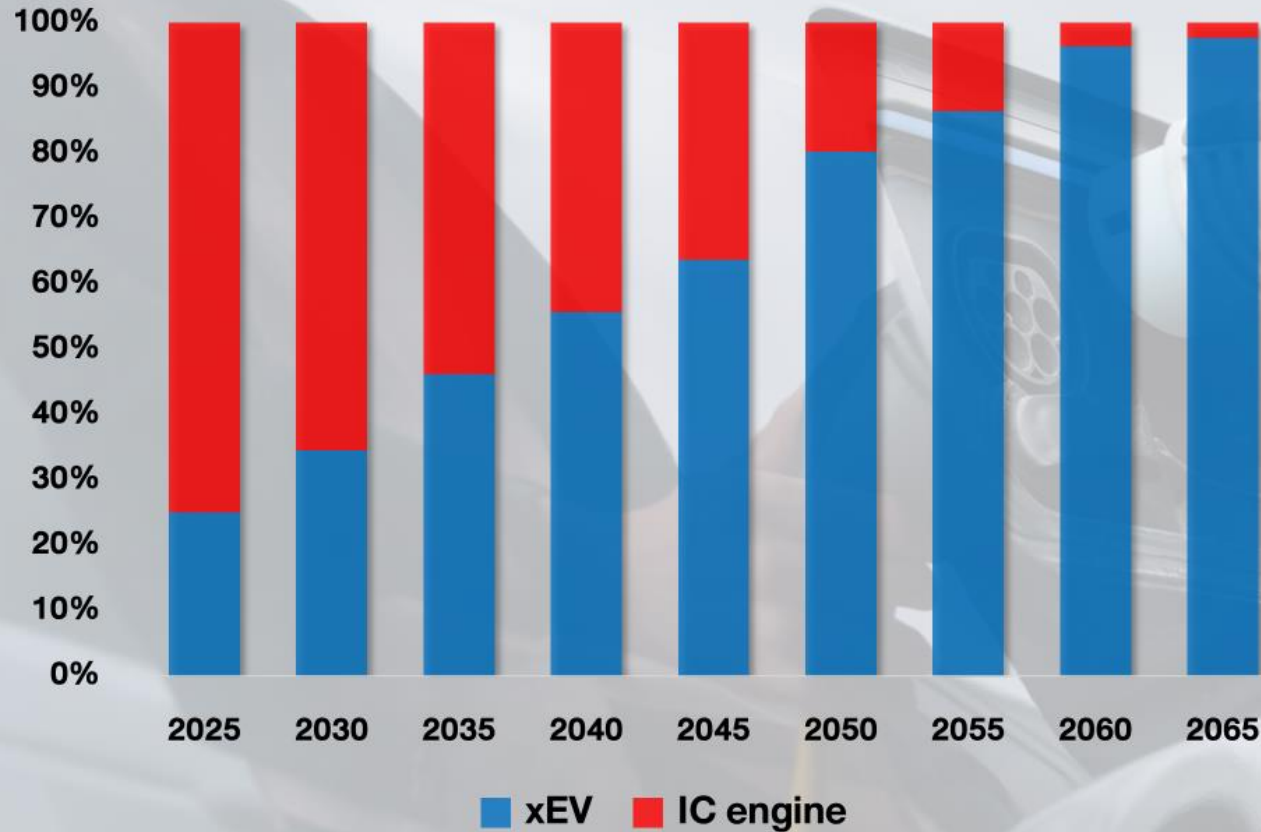
## Solar PV land requirement

	2050	2065
Solar electricity generation (GWh)	217,804	312,202
PV installed capacity (GW)	62	71
PV land requirement (km <sup>2</sup> )	235 (147,000 ไร่)	269 (168,000 ไร่)
PV area required (%)	0.05	0.05



# Thailand's LT-LEDS

Vehicle addition composition



*xEV in Transport*

Vehicle Addition Composition

Year	xEV (%)	ICE (%)
2025	25	75
2030	35	65
2035	45	55
2040	55	45
2045	65	35
2050	75	25
2055	85	15
2060	95	5
2065	98	2

# Thailand's LT-LEDS

## Power Generation

- Efficiency improvement in power plants
- Use of renewable energy (biomass, biogas, solar, wind)
- Phase out of oil power plants

- Phase down of coal power plants
- 68% share of RE electricity

Thailand net zero CO<sub>2</sub>

Thailand net zero GHG

2025

2030

2035

2040

2045

2050

2055

2060

2065

- Solar/wind with battery storage

- CCS, CCU & BECCS

- Combined cycle natural gas used best in class
- 74% share of RE electricity
- Phase out coal power plants
- Net zero emission electricity
- Biomass-based generation fully equipped with CCS technologies

# Thailand's LT-LEDS

*Early entry of advanced technologies reduces macroeconomic impacts*

	2050	
	CCS - 2050	CCS - 2040
1. Change in GDP (%)	-3.3	-1.3
2. Change in Government consumption expenditure (%)	28	16
3. Change in Welfare (%)	-6.9	-3.7
4. Carbon price (USD/t-CO <sub>2</sub> e)	640	440

# Conclusions

Strategy

1

**CCUS & BECCS  
Hydrogen**

- Energy
- Industry



Strategy

2

**High Electrified  
Green Electric**

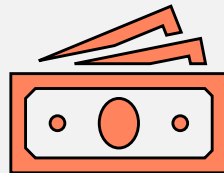
- Power
- Transport



Strategy

3

**Taxonomy/  
Emission  
Trading**



Strategy

4

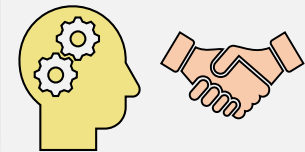
**Climate  
Change  
Awareness/  
Behavior  
Changes**



Strategy

5

**Capacity  
Building/  
Knowledge  
Platform**



# Delaying Emissions Peak using AIM/CGE

## Thailand's Economy-wide Implications of Delaying Peak Carbon Emissions by 2030

**Salony Rajbhandari<sup>1,2</sup>, Bundit Limmeechokchai<sup>2</sup>, Toshihiko Masui<sup>1</sup>**

<sup>1</sup>National Institute for Environmental Studies (NIES), 16-2 Onogawa, Tsukuba, Ibaraki, 305-8506 Japan

<sup>2</sup>Thammasat University Research Unit in Sustainable Energy and Built Environment, Thammasat Design School, Thammasat University, 99 Moo 18, Km. 41 on Paholyothin Highway, Khlong Luang, Pathum Thani 12120, Thailand

- Delaying emissions peak from 2025 to 2030 results in a higher economic loss in the range of 1.0% to 8.8% basically during 2040 to 2050.
- Lower carbon price in the near term, but higher prices in the longer term.
- Early introduction of CCS helps in decreasing economic losses & carbon price.

# Co-benefits of net zero emissions 2050 by AIM/Hub-Thailand

## Macroeconomic impacts and co-benefits of net zero greenhouse gas emission 2050 in Thailand

Achiraya Chaichaloempreecha<sup>1,2</sup>, Bijay B. Pradhan<sup>2</sup>, Salony Rajbhandari<sup>1,2</sup>,  
Puttipong Chunark<sup>3</sup>, Shinichiro Fujimori<sup>4,5</sup>, Ken Oishiro<sup>4,5</sup>, Tatsuya Hanaoka<sup>1</sup>, Bundit Limmeechokchai<sup>2,\*</sup>

<sup>1</sup>National Institute for Environmental Studies (NIES), Tsukuba, Japan

<sup>2</sup>Thammasat University Research Unit Sustainable Energy and Built Environment, Thammasat Design School  
Faculty of Architecture and Planning, Thammasat University, Pathumthani, Thailand

<sup>3</sup>Electricity Generating Authority of Thailand (EGAT), Nonthaburi, Thailand

<sup>4</sup>Department of Environmental Engineering, Kyoto University, Kyoto, Japan

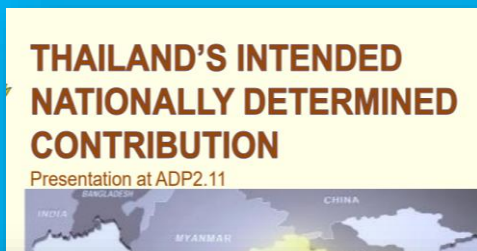
<sup>5</sup>International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria

\*Corresponding author. [bunditl@tu.ac.th](mailto:bunditl@tu.ac.th), [bundit.lim@gmail.com](mailto:bundit.lim@gmail.com)

- Full deployment of CCS, BECCS and RE would play a vital role in reducing the GHG emissions in NZE2050 with GDP loss of 7.7%.
- Major air pollutants would be lowered by 17-41% in NZE2050.
- Trade-off between land use for non-energy crops, energy crops and forests results in better land use for biomass production and higher agricultural production.

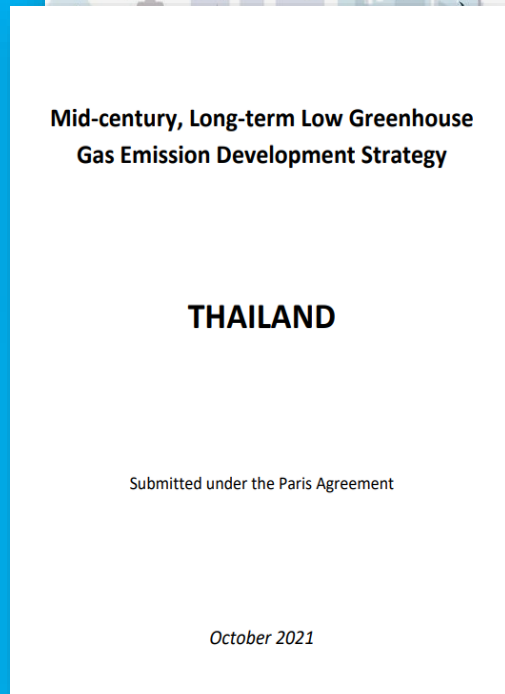
# AIM models Contribution to Thailand NC, BUR, NDC & LT-LEDS

Thailand INDC 2015



Thailand BUR4 2022

Thailand BUR2 2017



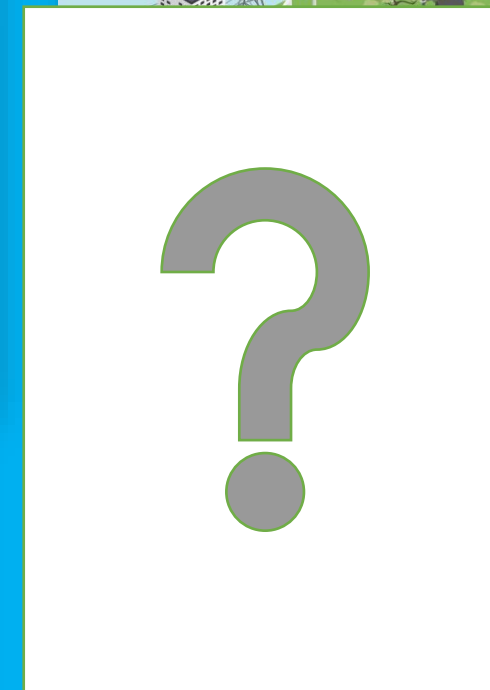
Thailand LT-LEDS 2021

Thailand NC3 2018



Thailand LT-LEDS 2022

Thailand NC4 2021



BTR1 NDC2 & LT-LEDS

**THANK YOU**