



Department of Mineral Fuels  
**MINISTRY OF ENERGY**

# Thailand's CCUS Policy and Development

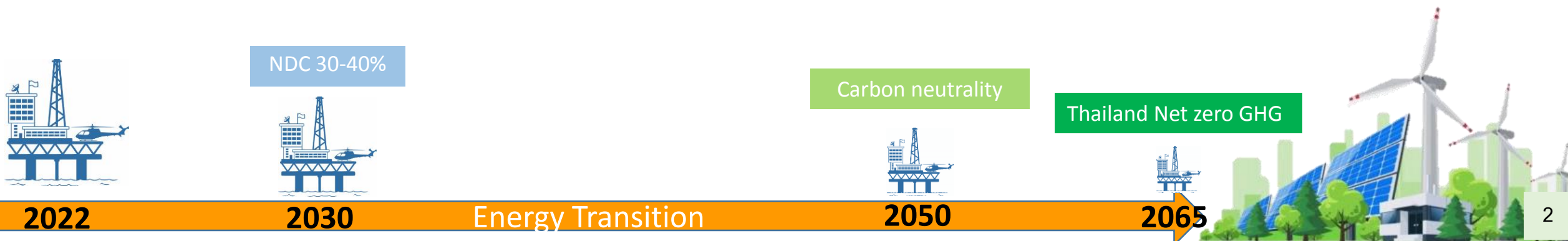
**Dr. Apiradee Suwannathong**

24 March 2023



# AGENDA

1. Energy Transition Direction
2. Thailand's Strategy and Action Plan on CCUS
3. Thailand Commitment to the Paris Agreement
4. DMF's Role on CCUS Development
5. Key Takeaways



## Key message:

Uniting the world to accelerate action toward the goals of the Paris Agreement and the UN Framework Convention on Climate Change - limiting global temperature rise by 2°C by the end of the century



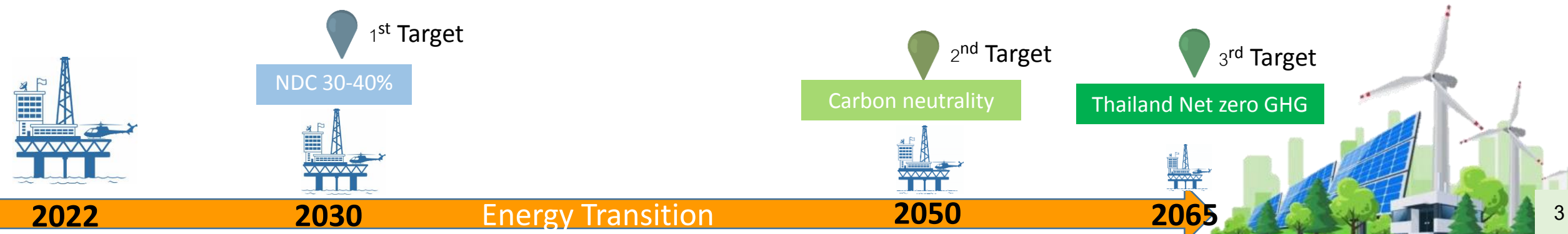
## Thailand announced to the United Nations Framework Convention on Climate Change (COP26)



### Thailand announces 3 goals to mitigate climate Change

- 1. Nationally Determined Contributions (NDCs) target 30-40 %
- 2. Reaching to Carbon neutrality in 2050
- 3. Achieving to Net Zero GHG Emissions by 2065

Source:  
[https://unfccc.int/sites/default/files/resource/THAILAND\\_cop26cmp16cma3\\_HLS\\_EN.pdf](https://unfccc.int/sites/default/files/resource/THAILAND_cop26cmp16cma3_HLS_EN.pdf)



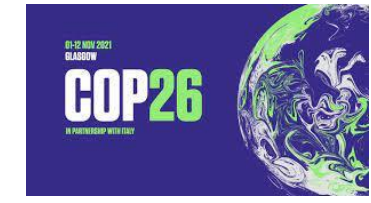
## Thailand Joining to World Agenda Regarding to Climate Change

“The science is clear, to limit global temperature rise to 1.5 °C, we must cut global emissions by 45% by 2030 from 2010 levels.”

UN Secretary-General António Guterres

### Thailand

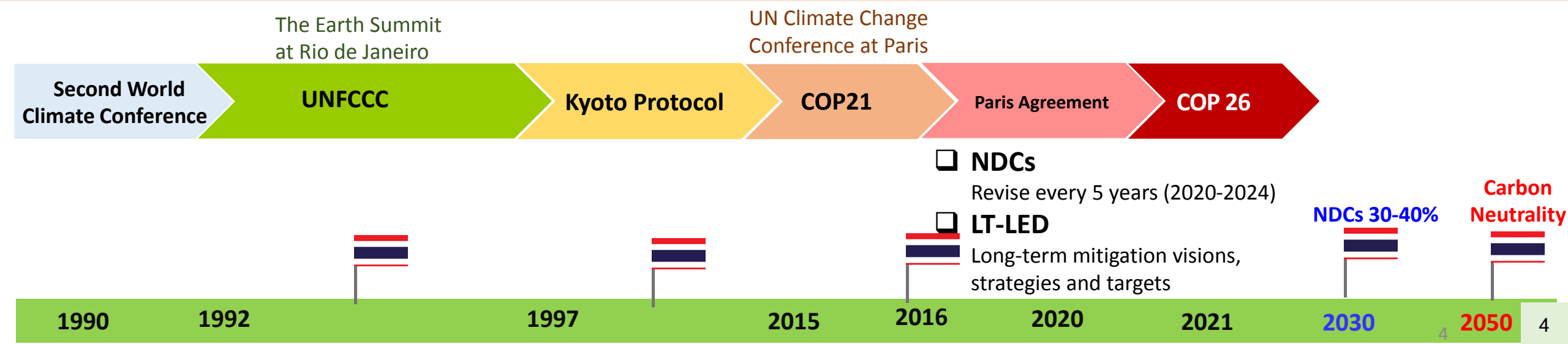
- Become a party to UNFCCC in 1994
- Ratified the Kyoto Protocol in 2002
- Ratified the Paris Agreement in 2016 (long-term mitigation vision, strategies and targets on temperature goal)



### As Party of the Paris Agreement, Thailand should submit

- Nationally determined contributions (NDCs) to UNFCCC
- Long-Term Low Greenhouse Gas Emission Development Strategy (LT-LEDS) (Energy Sector) modeled by Office of Natural Resources and Environmental Policy and Planning with detailed- technology information to UNFCCC

## United Nations Framework Convention on Climate Change (UNFCCC)





## Thailand's plans on CCUS technology in different level

Thailand's plan (strategy, priorities and actions) on CCUS technology and policy opportunities to reduce GHG emission

**The 1<sup>st</sup> level of plan**  
(20-year National Strategies)

The Thailand's 20-year National Strategy (2018-2037)

**Top Management**  
Long- term plan

**The 2<sup>nd</sup> level of plan**  
(Five-year development plan)

The National Economic and Social Development Plan

**Middle Management**  
Standing short- term plan

- ❑ The 13<sup>th</sup> National Economic and Social Development Plan (2022- 2027) issued by Office of the National Economic and Social Development council)

**The 3<sup>rd</sup> level of plan**  
(Five-year action Plan)

Action plan of each organization

**Middle and First level Management**  
Policies, procedures, Rules

- ❑ National Energy Plan 2022
- ❑ DMF action plan (2023-2027)

(แผนปฏิบัติการราชการ 2566-2570)



# The 13<sup>th</sup> National Economic and Social Development Plan 2023-2027

Delivered by Office of the National Economic and Social Development council)

## The 13<sup>th</sup> National Economic and Social Development Plan (NESDP)

The 2<sup>nd</sup> level of plan (Five-year development plan)

Consisting of 4 priorities and 13 milestones

*CCUS technology is aligned to the NESDP strategic priorities No. 3 Eco-Friendly living and milestone No.10*

- 10** Circular economy and low-carbon Society
  - ❖ Promote CCUS technology



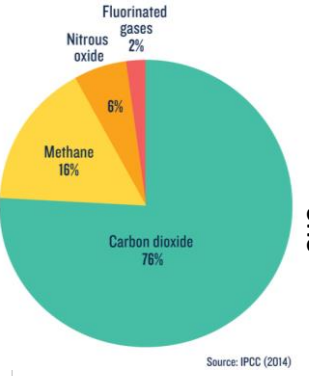
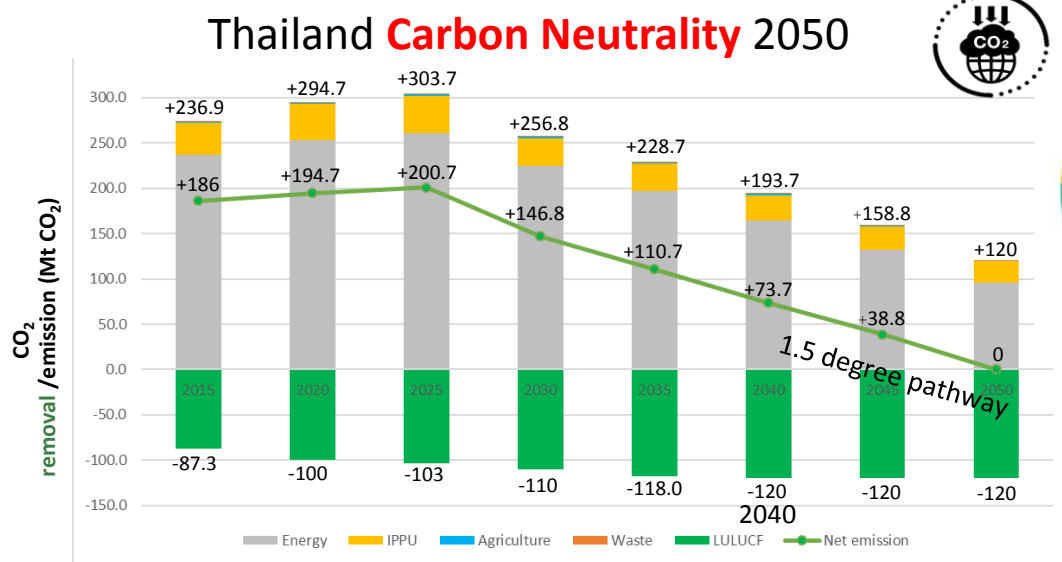
# 2. Thailand's Strategy and Action Plan on CCUS

## National Energy Plan 2022 (The 3<sup>rd</sup> level of plan)

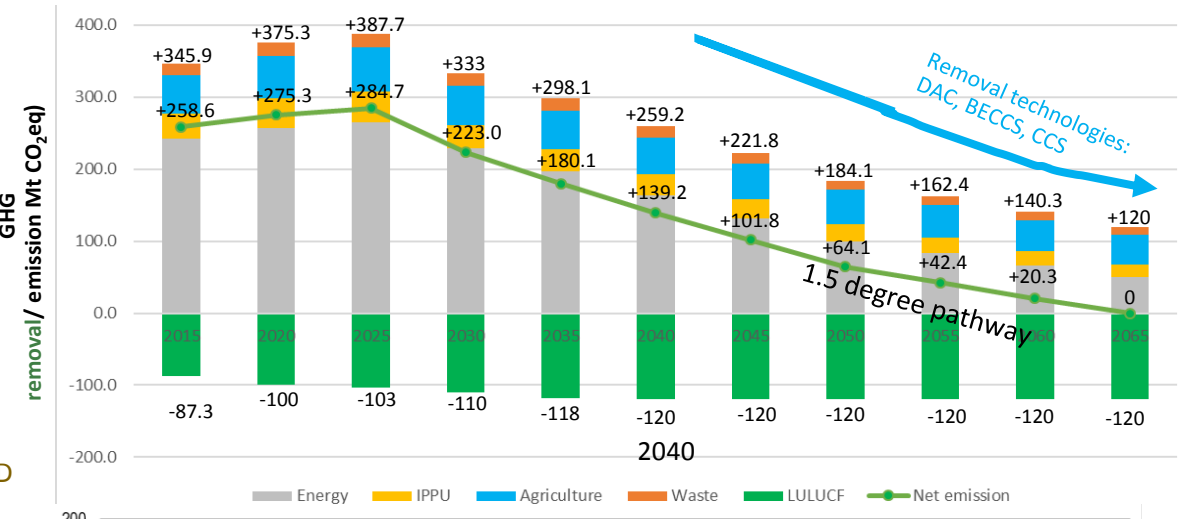
Delivered by Energy Policy and Planning Office, Ministry of Energy



### Thailand's Carbon Neutrality and Net Zero Greenhouse Gas Emission Pathway Thailand Net Zero GHG Emissions 2065



Focused to study LT-LED



	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065
Waste	16.0	17.6	18.0	17.4	17.2	15.4	14.2	13.1	12.3	11.6	10.8
Agriculture	52.3	59.7	62.5	55.1	53.1	51.1	49.1	47.2	45.2	43.2	41.2
IPPU	35.7	40.7	42.5	31.9	31.0	28.9	26.6	24.4	22.1	19.7	17.3
Energy	241.9	257.3	264.6	228.6	196.8	163.8	131.8	99.5	82.8	65.8	50.7
LULUCF	-87.3	-100.0	-103.0	-110.0	-118.0	-120.0	-120.0	-120.0	-120.0	-120.0	-120.0
Net emission	258.6	275.3	284.7	223.0	180.1	139.2	101.8	64.1	42.4	20.3	0.0

#### To achieve Net Zero GHG Emissions 2065

LULUCF sector	2037 through the end of this century	To be expected to stabilize 120 Mt CO <sub>2</sub>
Energy Sector	2040	<ul style="list-style-type: none"> <li>Balance GHG emission by source and removals</li> <li>Coal-phase-out</li> <li>Negative emission technology: Bioenergy with CCS (BECCS), Direct air capture (DAC) and Storage</li> </ul>

	2015	2020	2025	2030	2035	2040	2045	2050
Waste	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2
Agriculture	1.4	1.5	1.6	1.4	1.3	1.0	0.8	0.5
IPPU	34.8	40.0	41.5	31.2	30.3	28.2	26.0	23.8
Energy	236.9	253.0	260.4	224.0	196.9	164.3	131.8	95.5
LULUCF	-87.3	-100.0	-103.0	-110.0	-118.0	-120.0	-120.0	-120.0
Net emission	186.0	194.7	200.7	146.8	110.7	73.7	38.8	0.0

#### To achieve Carbon Neutrality 2050

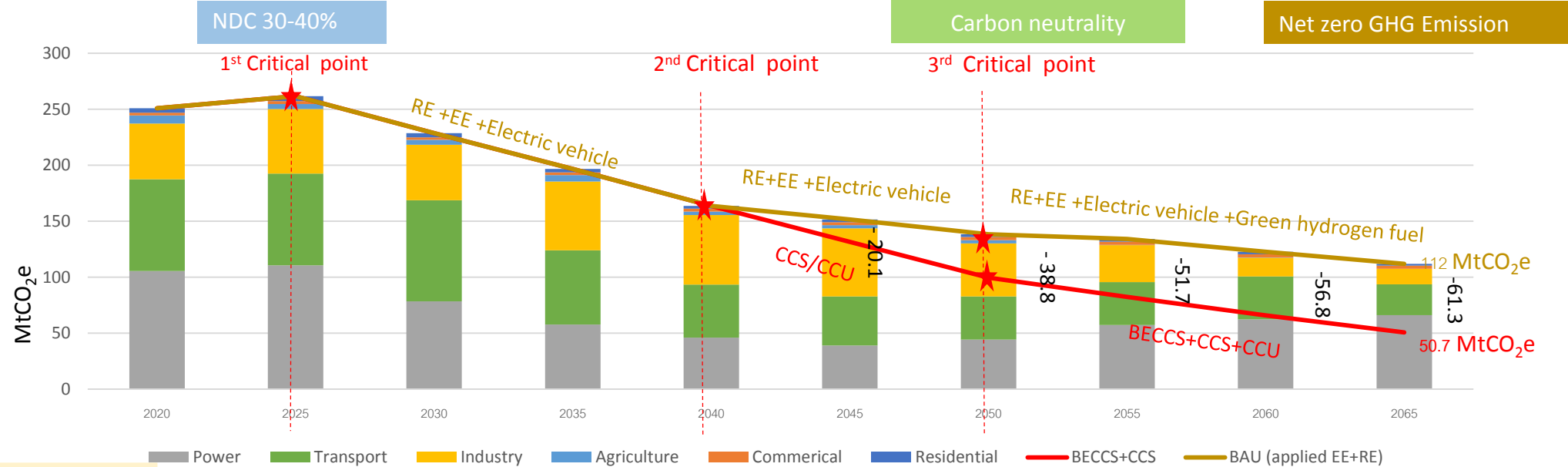
LULUCF sector	2037	Carbon removal is expected to increase to 120 Mt CO <sub>2</sub> (Increase forest and green area from 31.96 % (2018) upto 55% (2037) of Thailand's total land area)
Energy Sector	2035	Share of renewable energy for Electric vehicle with the share of 69%
	2050	Share of renewable energy for new power generation capacity at least 50%

Remark IPPU: Industrial Process and Product use LULUCF: Land use, Land-use change and forestry

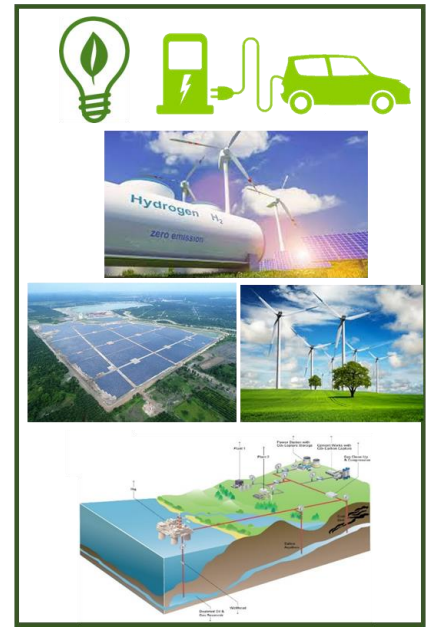
# 3. Thailand Commitment to the Paris Agreement

## Long-Term Low Greenhouse Gas Emission Development Strategy (LT-LED) (Energy Sector) Modeled by Office of Natural Resources and Environmental Policy and Planning with detailed- technology information

Planned CO<sub>2</sub> /GHG Emission from Energy Consumption in Thailand by sector 2020- 2065



Long-term mitigation actions



Key sectors	2025	2030	2040	2045	2050
<b>Transportation</b>	<ul style="list-style-type: none"> <li>Efficient engine vehicles</li> <li>RE (E10, E20, E85, B10, B20)</li> <li>Electric train</li> </ul>	<ul style="list-style-type: none"> <li>Phase down of IC engines</li> <li>Most efficient IC engine vehicles</li> <li>Electric vehicle 30@30</li> <li>RE (E10, E20, E85, B10, B20, B100)</li> </ul>		<ul style="list-style-type: none"> <li>Most efficient IC engine vehicle with biofuels</li> <li>High share of electric vehicle</li> <li>Fuel cell vehicle</li> </ul>	
<b>Industry</b>	<ul style="list-style-type: none"> <li>Efficient lighting /cooling/motor technologies</li> <li>Efficient boiler</li> <li>RE</li> <li>Industrial heat pumps</li> </ul>	<ul style="list-style-type: none"> <li>Most efficient lighting /cooling/motor technologies</li> <li>Efficient boiler</li> <li>RE</li> </ul>		<ul style="list-style-type: none"> <li>Green hydrogen fuel</li> </ul>	<ul style="list-style-type: none"> <li>Most efficient electrical devices/boiler</li> <li>RE</li> </ul>
<b>Power</b>	<ul style="list-style-type: none"> <li>EE</li> <li>RE energy-based technologies</li> <li>Phase out of oil power plant</li> </ul>	<ul style="list-style-type: none"> <li>Solar wind with battery storage</li> </ul>	<ul style="list-style-type: none"> <li>CCS CCU</li> <li>68 % share of RE electricity</li> <li>Phase down of coal power plants</li> </ul>		<ul style="list-style-type: none"> <li>74 % share of RE electricity</li> <li>Combined cycle natural gas</li> <li>Phase out of coal power plants</li> <li>Net zero emission electricity</li> <li>Biomass-based generation with CCS</li> </ul>



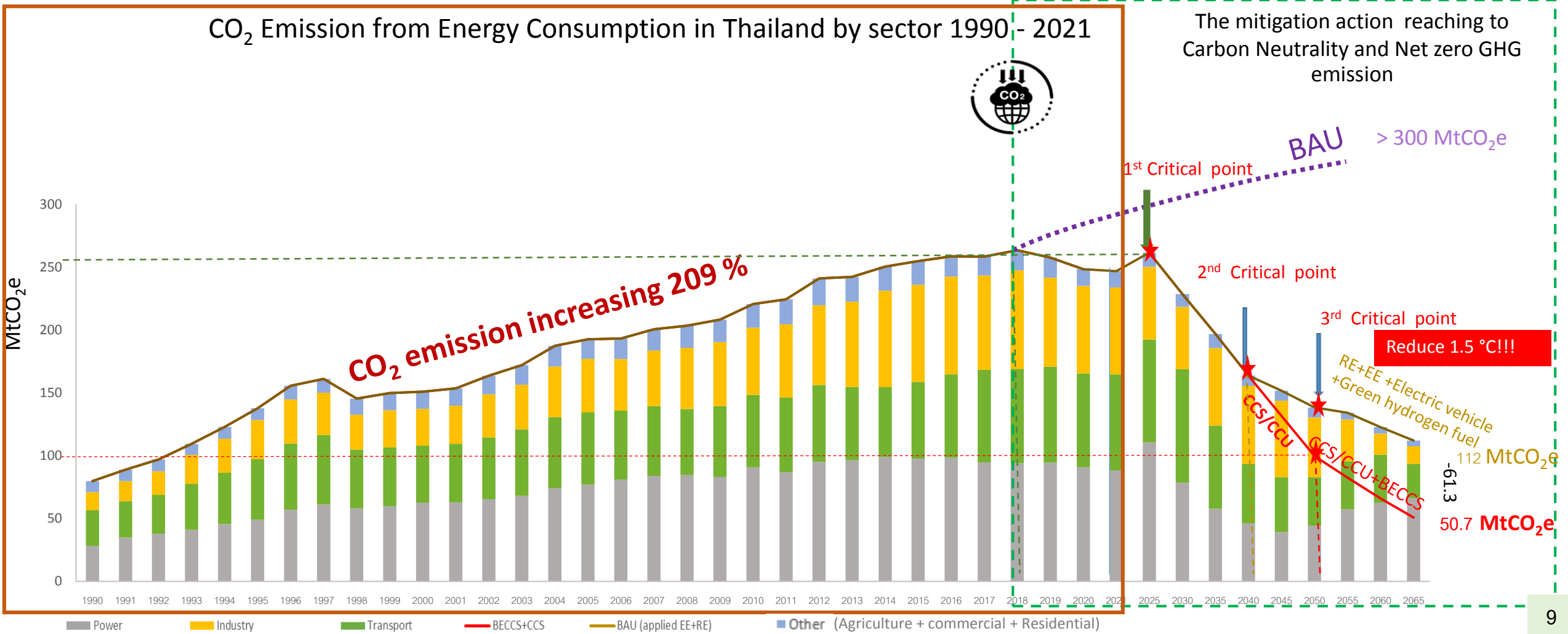
## Thailand's Effort to Reduce GHG Emission and Expected Outcomes

Applying the Long-term mitigation action, strategies and targets

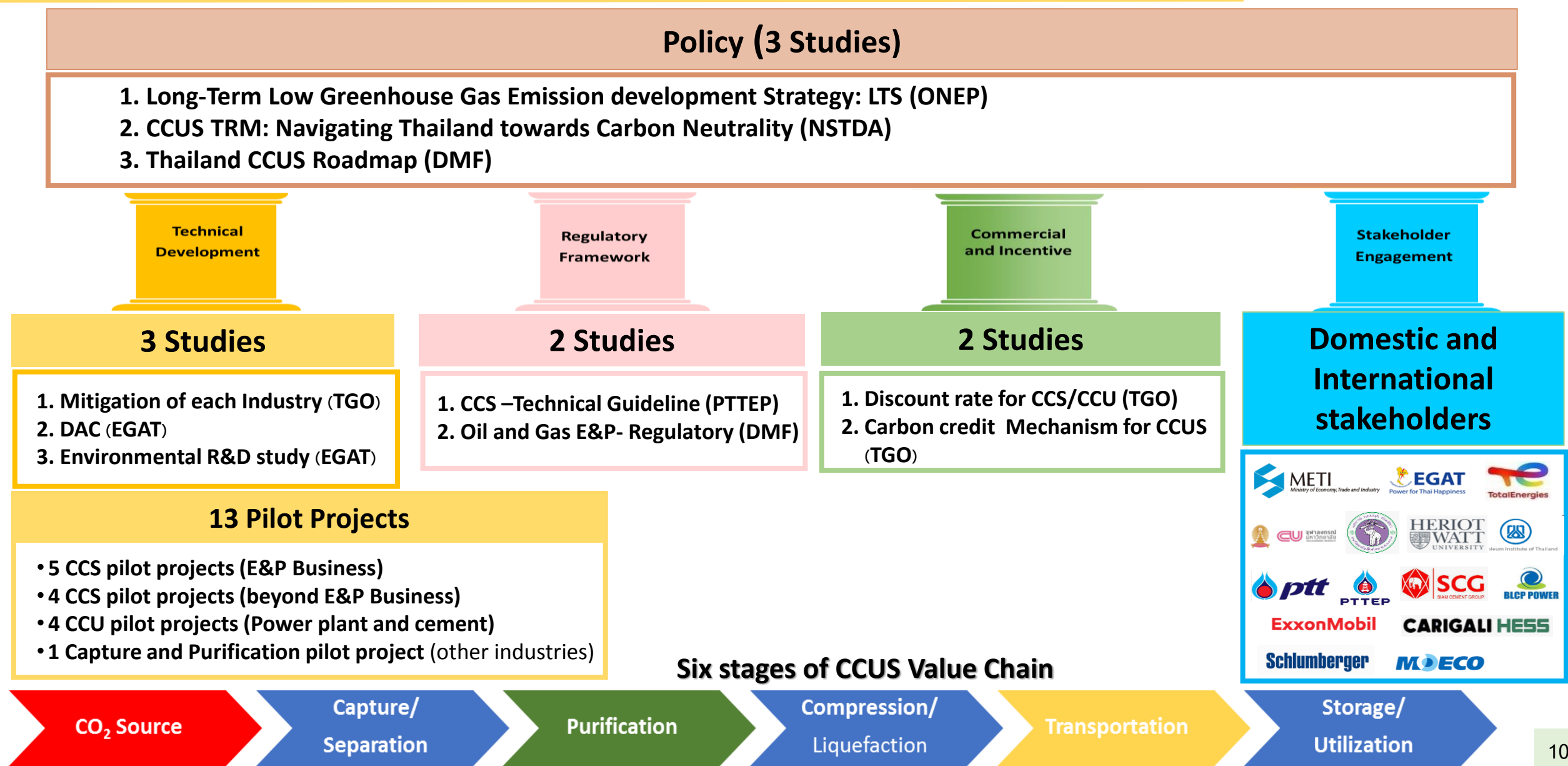
### GHG/CO<sub>2</sub> emission Projection

#### Historical CO<sub>2</sub> emission

#### Long-Term Low Greenhouse Gas Emission Development Strategy



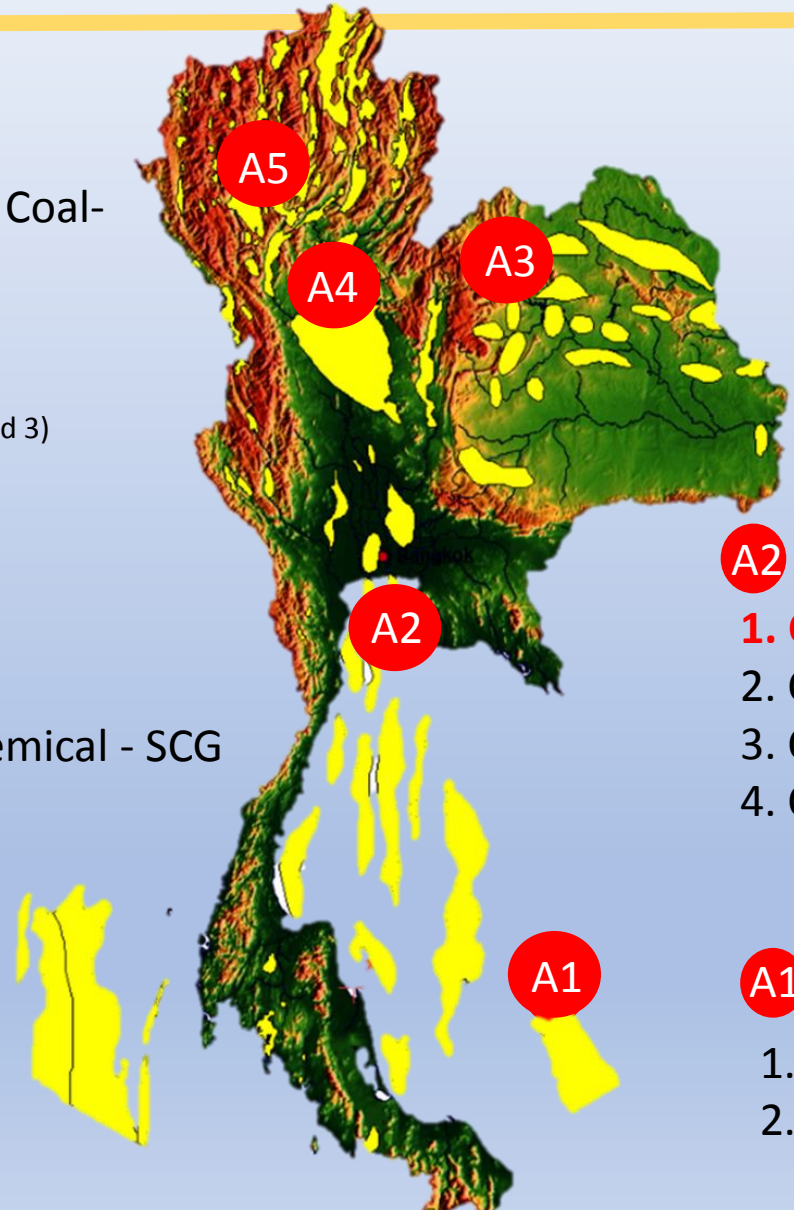
## CCUS projects in Thailand Covering 6 stages of CCUS value chain (23 Projects: 10 Studies + 13 Pilot projects)



# 4. DMF's Role on CCUS Development

## CCUS Projects in Thailand 13 Projects in 5 Areas

Cover E&P business, Power plants (Gas and Coal fuels), Cement industry



### A5

- 1. CCU: Artificial Carbonate : Mae Moh Coal-fired Power Plant - EGAT
  - 2. CCS: Mae Moh Project
  - 3. CCS: Lampang Project
- (DMF, EGAT, PTTEP and DED take in charge project No. 2 and 3)

### A3

- 1. CCS: Phu Horm Pilot Project - PTTEP
- 2. CCS: Nam Phong Power Plant - EGAT

### A4

- 1. CCS: S1 Pilot Project - PTTEP
- 2. CCU: Syngas and Hydrocarbon Chemical - SCG

### A2

- 1. CCS: North GOT CCS - DMF
- 2. CCU: Methanol Production - BLCP
- 3. CCU: Ammonia Co-firing - BLCP
- 4. Carbon Capture and Purification - PTT Group Industry

### A1

### A1

- 1. CCS: Arthit Project - PTTEP
- 2. CCS: A18 - MTJA

## Theoretical CO<sub>2</sub> Storage Capacity

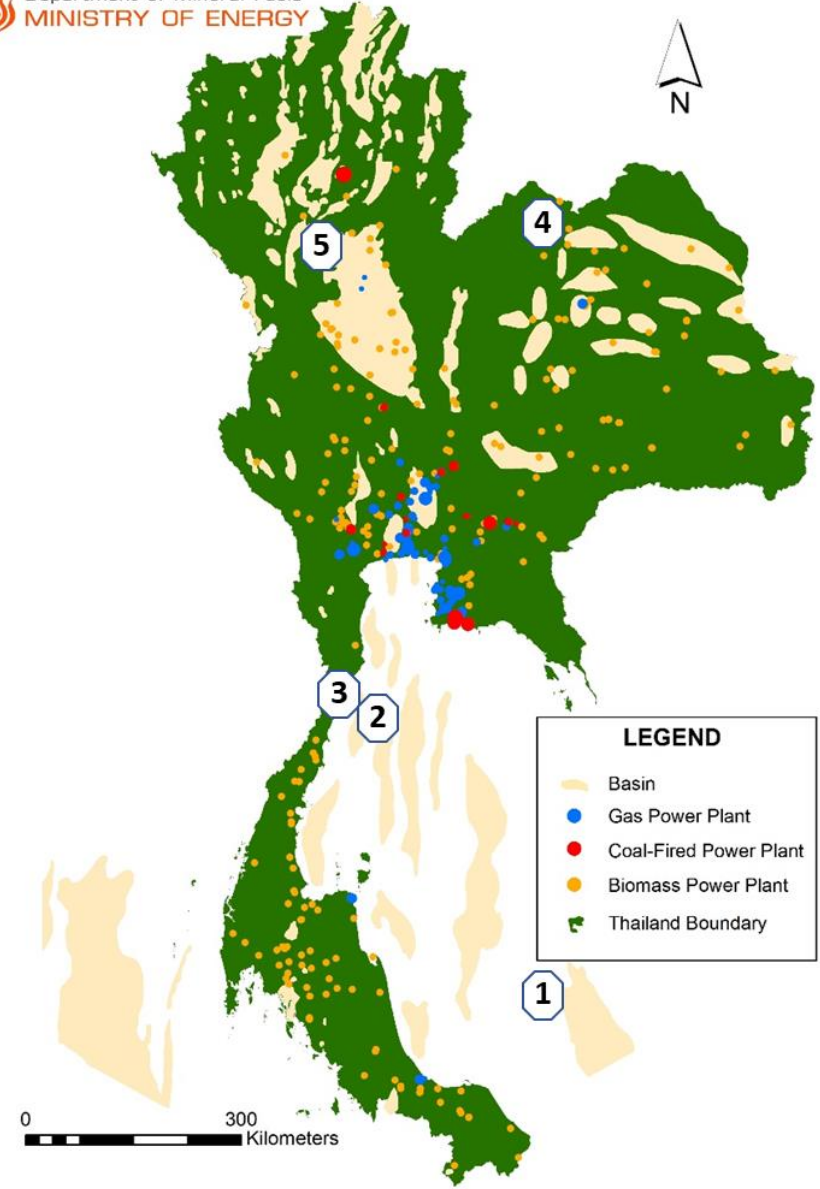
Total Theoretical CO<sub>2</sub> storage capacity = 2.69 GtCO<sub>2</sub>

### Fundamental Concept of Assessment

- Theoretical CO<sub>2</sub> storage capacity estimated from field study of depleted reservoir in 5 areas (Excluding Pattani Basin)

North Malay Basin	①
Kra Basin	②
West Kra Basin	③
Sinphuhorm and Namphong fields	④
Phitsanulok Basin (S1)	⑤

- Based on practical storage capacity method
- Saline Aquifer not included in assessment





## CCUS Development in Thailand

### THAILAND:

**A5**

1. CCU: Artificial Carbonate : Mae Moh Coal-fired Power Plant - EGAT

**A3**

1. CCS: Phu Horm Pilot Project - PTTEP
2. CCS: Nam Phong Power Plant - EGAT

**A4**

2. CCS: Mae Moh Project
3. CCS: Lampang Project (2 and 3 in charge of DMF, EGAT, PTTEP and DED)

**A2**

1. CCS: North GOT CCS - DMF
2. CCU: Methanol Production - BLCP
3. CCU: Ammonia Co-firing - BLCP
4. Carbon Capture and Purification - PTT Group Industry

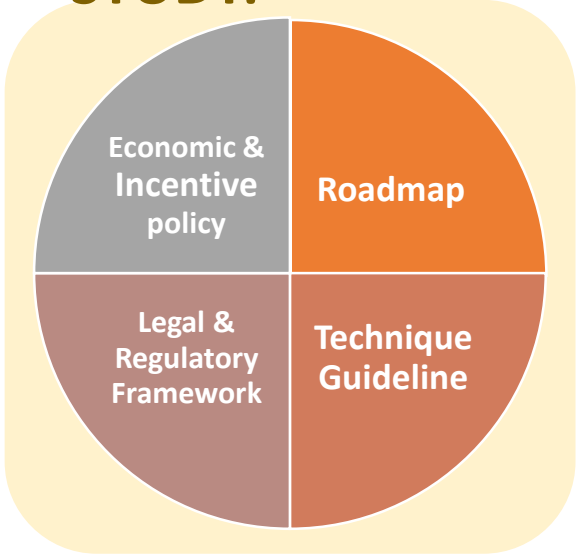
**A1**

1. CCS: Arthit Project - PTTEP
2. CCS: A18 - MTJA

### ASEAN:

- 1) THE 20<sup>th</sup> AFOC Council Meeting and its associated meetings AFOC Workshop on Carbon Capture Utilisation and Storage (CCUS): Policy and Regulatory Framework
- 2) THE 20<sup>th</sup> AFOC Council Meeting-Initiative to Conduct the Study on CCS/CCUS Development and the Collaborative Network in ASEAN
- 3) The 21<sup>st</sup> Regional Energy Policy and Planning Sub-Sector Network (REPP-SSN) Annual Meeting
- 4) The 40<sup>th</sup> AFOC Senior Officials Meeting on Energy

### STUDY:



### STAKEHOLDERS:

### WORLD:



**Thailand seeks the collaborative support from international government / organization in many aspects**

Capacity building, Technique and technology, legal and regulatory framework, and economic and incentive and policies financial support

## Work Progress

### Legal and Regulatory Framework

- ❖ Phase I: On-going drafting the regulations to act related to petroleum activities

### CCUS Standards

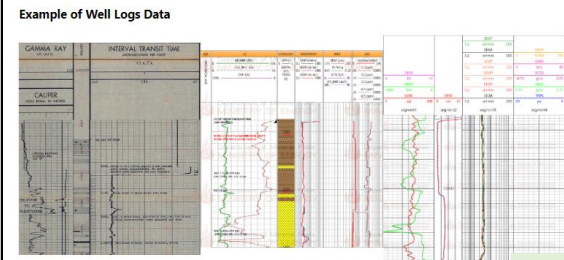
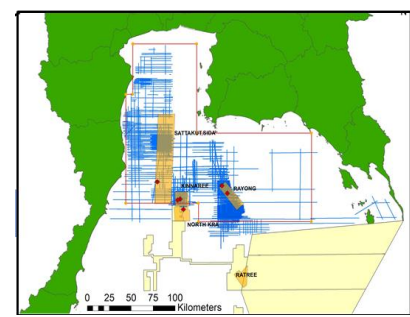
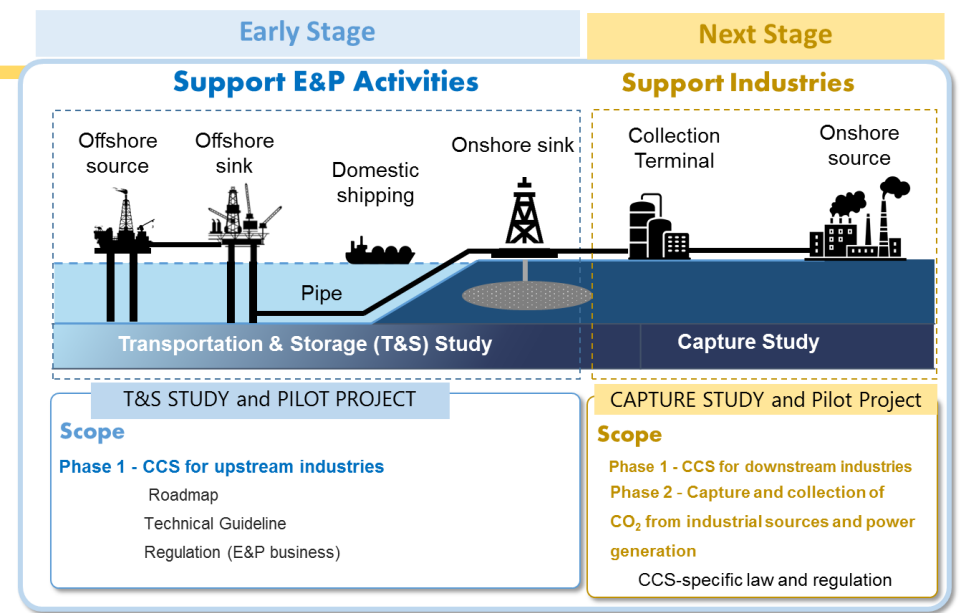
- ❖ ISO/TC265 Standards

### CCUS Workshop

- ❖ DMF collaborated with CLDP
- ❖ CCUS Workshop regarding to 3 areas of industry roundtable on barriers to private investment in CCUS, CCUS standards development and global CCS/CCUS Legal and Regulatory Framework, hold on Thursday, March 2, 2023 cooperated with CLDP
- ❖ 64 attendees from 16 organizations from many sectors of power plant, US Embassy, oil and gas companies, Cement factors, educational institute

### Available Data To purchase

- ❖ North Gulf of Thailand (GOT) (Seismic data, well logs and reports)
- ❖ Detailed At <https://dmf.go.th/public/list/data/index/menu/1448/mainmenu/1436>





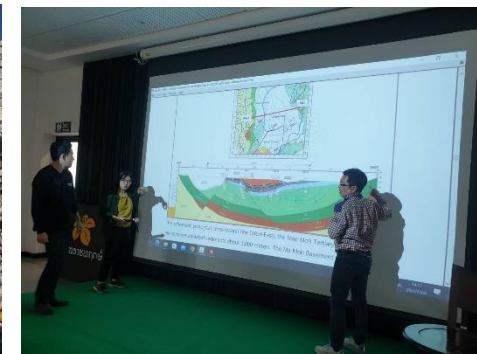
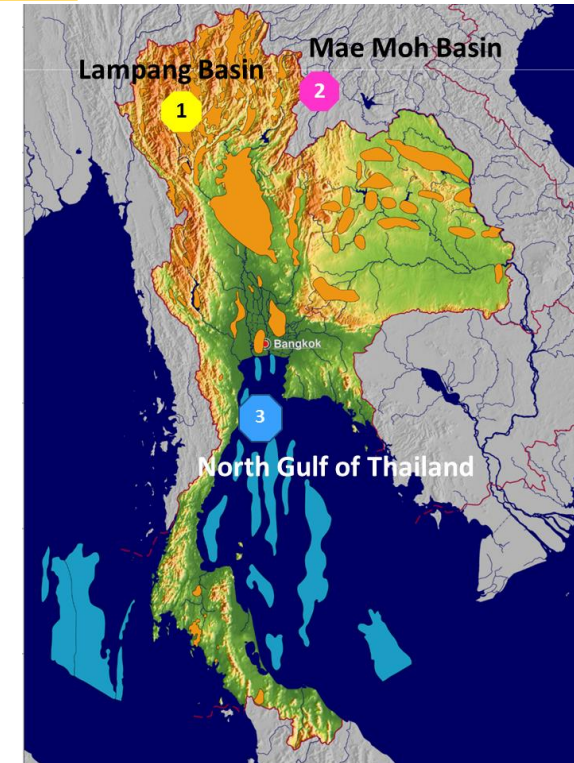
## Highlights: Thailand and Japan Cooperation

### Thailand and Japan Cooperation (G to G)

- ❖ Propose to get financial and specialist support from METI on 12-13 January 2023
- ❖ Memorandums of Cooperation on CCS/CCUS between the Ministry of Energy of The Kingdom of Thailand and the Ministry of Economy, Trade and Industry of Japan on 4 March 2023 at Tokyo Japan

### Collaborated with Japanese companies

- ❖ CCS Project
- ❖ Assessment of geological formation to store CO<sub>2</sub> in 3 areas of Mae Moh Basin, Lampang Basin and North Gulf of Thailand collaborating with INPEX cooperation
- ❖ Site visit at Mae Moh and Lampang Basin on 27-28 February 2023



Phase 1  
Site Screening

Phase 2  
Appraisal phase

Phase 3  
Development

# Way Forward

- ❖ DMF try to assess the geological formation, saline aquifer to store CO<sub>2</sub>
- ❖ DMF will be host the 1<sup>st</sup> Southeast Asia CCS Accelerator (SEACA) Workshop on 15-16 May 2023
- ❖ DMF and INPEX will visit site and survey North Gulf of Thailand, Rayong and Chonburi province on 3 April 2023
- ❖ DMF plan to develop the CCS-specific laws and regulation end of this year
- ❖ DMF will be member of ISO/TC 265
- ❖ DMF will establish new activities of CCUS proposing to The Board of Investment of Thailand (BOI) to get support
- ❖ DMF has been engaging many parties from various government organizations/ industries/local people to develop CCUS hub in North GOT and other areas.



- ❑ Strong strategy, policy and plan to achieve
  - ❖ Carbon Neutrality in 2050 and Net Zero GHG Emissions by 2065
- ❑ Well-design strategy, policy and action plan on CCUS:
  - ❖ low-carbon Society
  - ❖ The 13th National Economic and Social Development Plan 2023-2027
  - ❖ National Energy plan 2022
  - ❖ LT-LED
- ❑ Theoretical CO<sub>2</sub> Storage Capacity: 2.69 GtCO<sub>2</sub>
- ❑ Activities on CCUS development: **CCUS pilot projects and studies**
- ❑ Support the opportunity of CCUS Hub development
- ❑ Integration all stakeholders from many sectors: Government organizations, private sectors (Power plant, Cement Industry, E&P and other industries)



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