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OFFICE OF NATIONAL HIGHER EDUCATION
SCIENCE RESEARCH
AND INNOVATION POLICY COUNCIL

Role of Energy Sector in Thailand
Net zero 2050 Pathways

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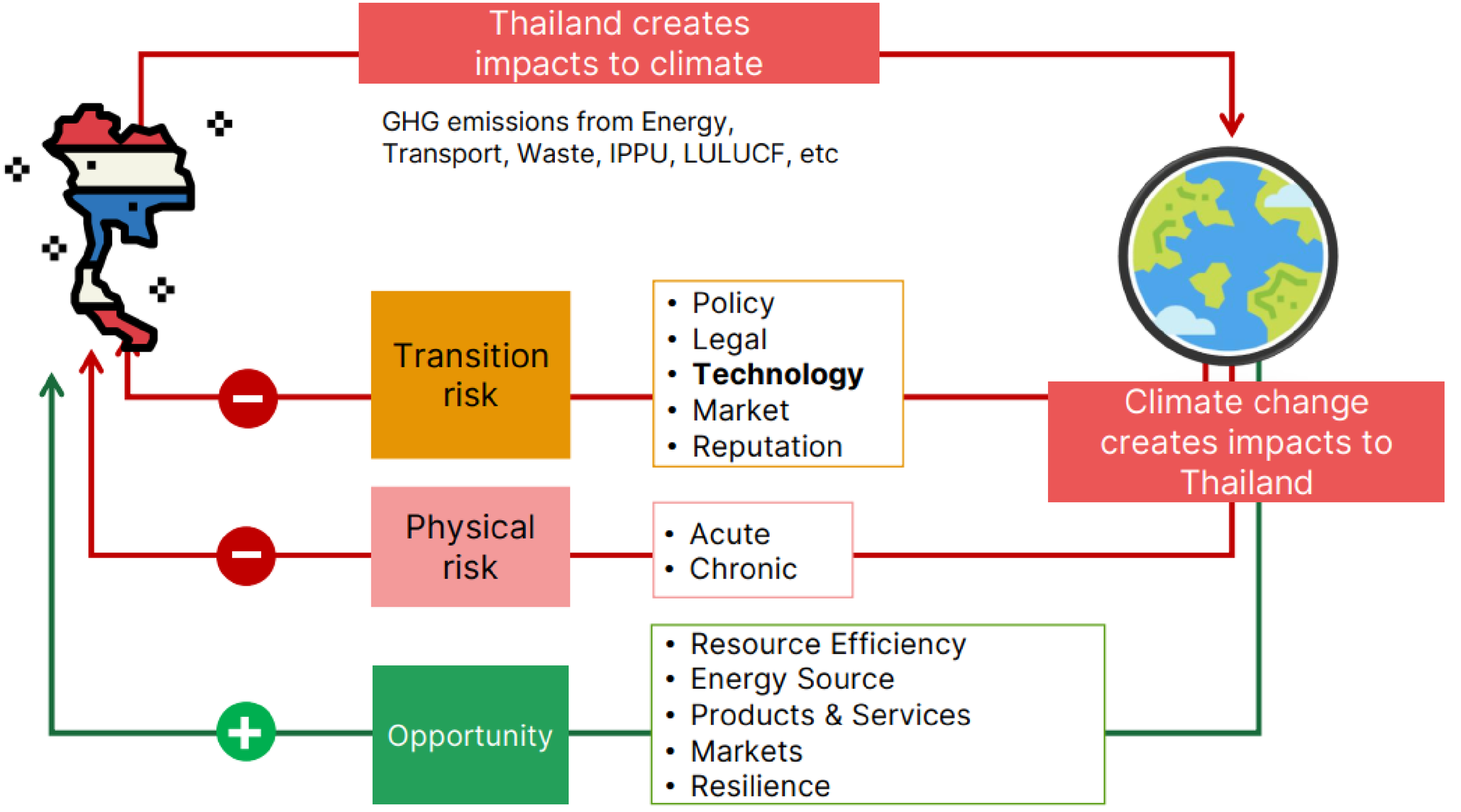
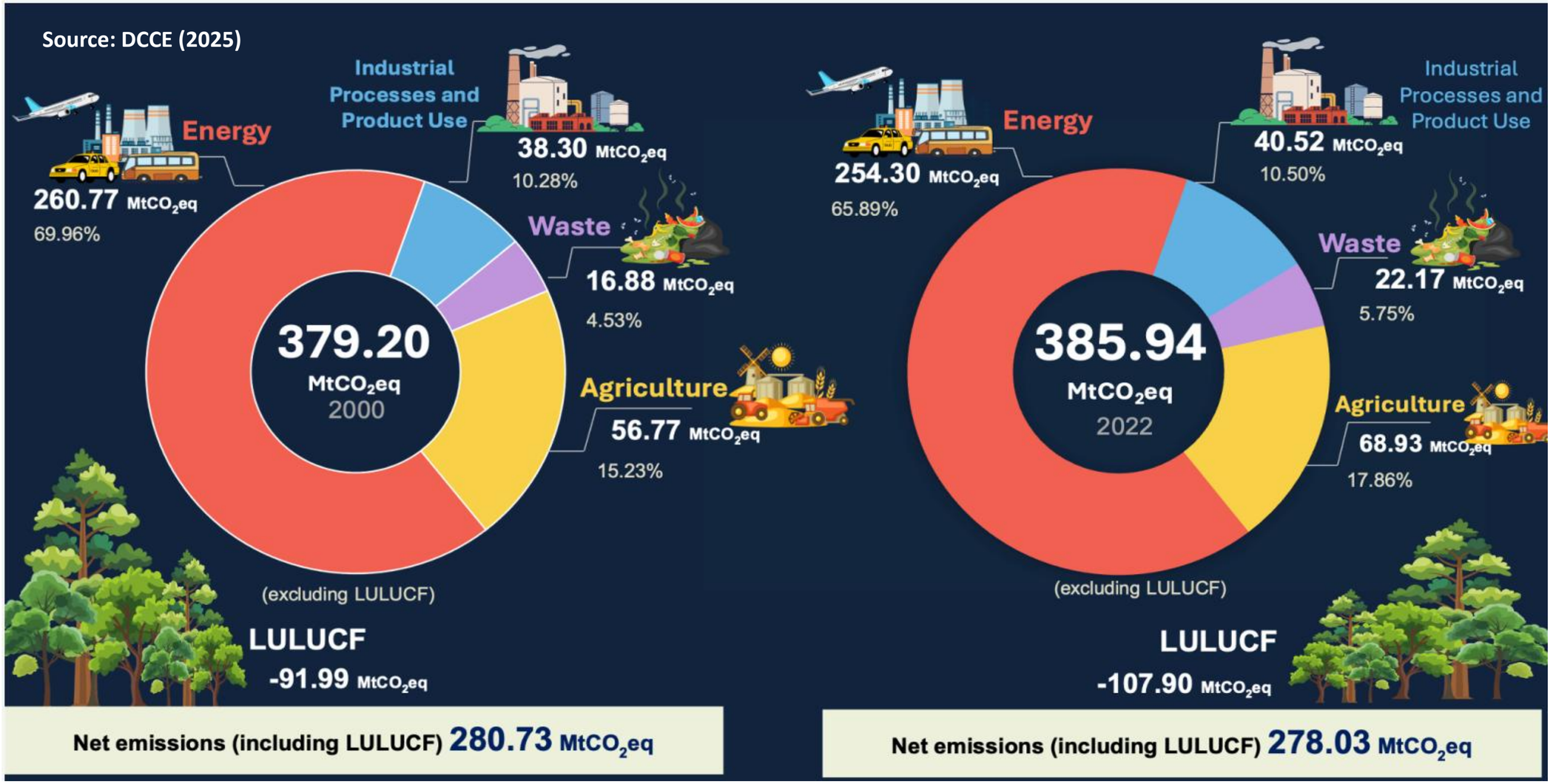
Thailand is facing climate-related risks and opportunities



Thailand GHG Emissions 2000 & 2022



- Official data from Biennial Transparent Report 1 (BTR 1) by DCCE (2024)
- Thailand expects 2025 as the PEAK year of GHG emission at 395 $MtCO_2eq$.
- Even decrease trend, energy sector (include transport) still has highest proportion with 66%.

Key Technologies to Achieve Climate Goals

Clean electrons and electrification

SMR/MMR

Nuclear

Carbon capture and removal

Carbon capture utilization and storage (CCUS)

Nature based solutions

Engineered carbon removals

Renewable Energy

Power

Hydrogen

Others RE

Heat generation

Biofuels

(SAF) Sustainable Aviation Fuel

Hydrogen

End use

Household

Industry

Mobility

Circular technologies

Circularity and resources

IEA Tracking Clean Energy Progress

On track · More efforts needed · Not on track

Energy System Overview

- Energy Efficiency
- Behavioural Changes
- Electrification
- Renewables
- Bioenergy
- Hydrogen
- Carbon Capture Utilisation and Storage
- International Collaboration
- Digitalisation

Cross-Cutting Technologies & Infrastructure

- CO2 Transport and Storage
- CO2 Capture and Utilisation
- Bioenergy with Carbon Capture and Storage
- Direct Air Capture
- Electrolysers
- District Heating
- Data Centres and Data Transmission Networks

Electricity

- Coal
- Natural Gas
- Solar PV
- Wind
- Hydroelectricity
- Demand Response
- Nuclear Power
- Grid-scale Storage
- Smart Grids

Transport

- Cars and Vans
- Trucks and Buses
- Rail
- Aviation
- International Shipping
- Electric Vehicles

Oil & Natural Gas Supply

- Methane Abatement
- Gas Flaring

Low-Emission Fuels

- Biofuels

Industry

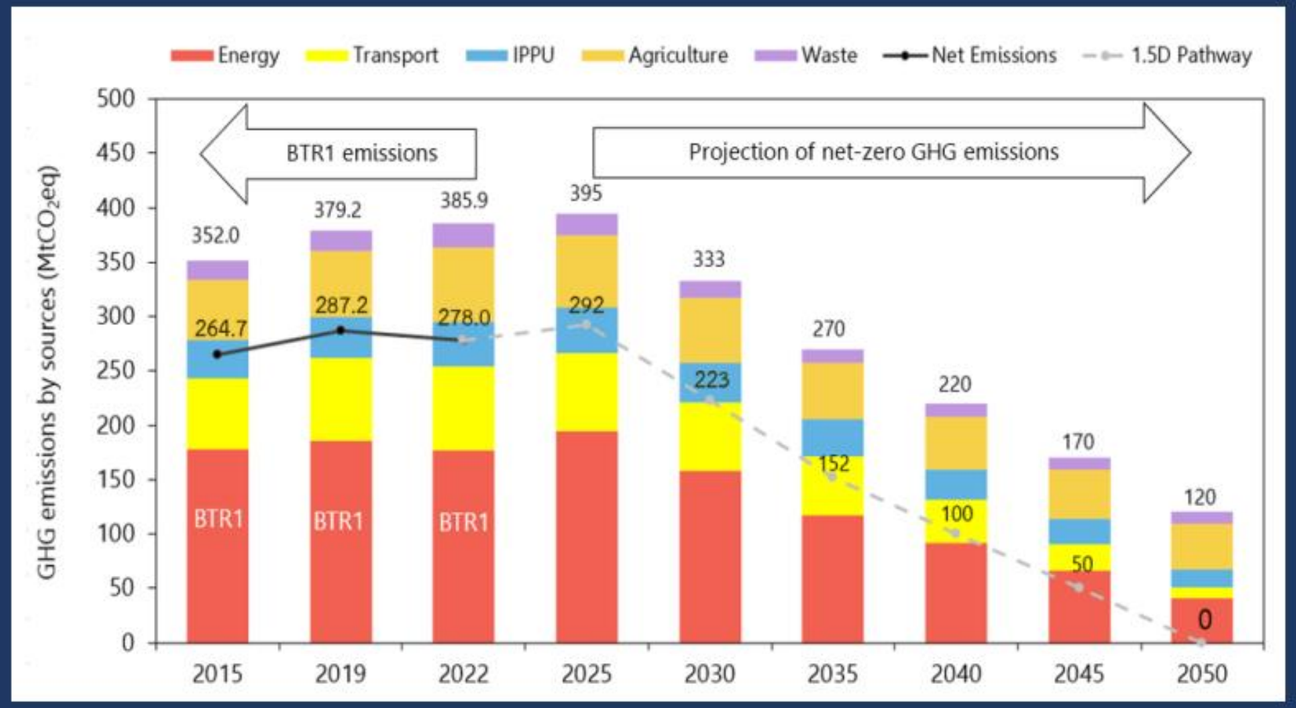
- Steel
- Chemicals
- Cement
- Aluminium
- Paper
- Light Industry

Buildings

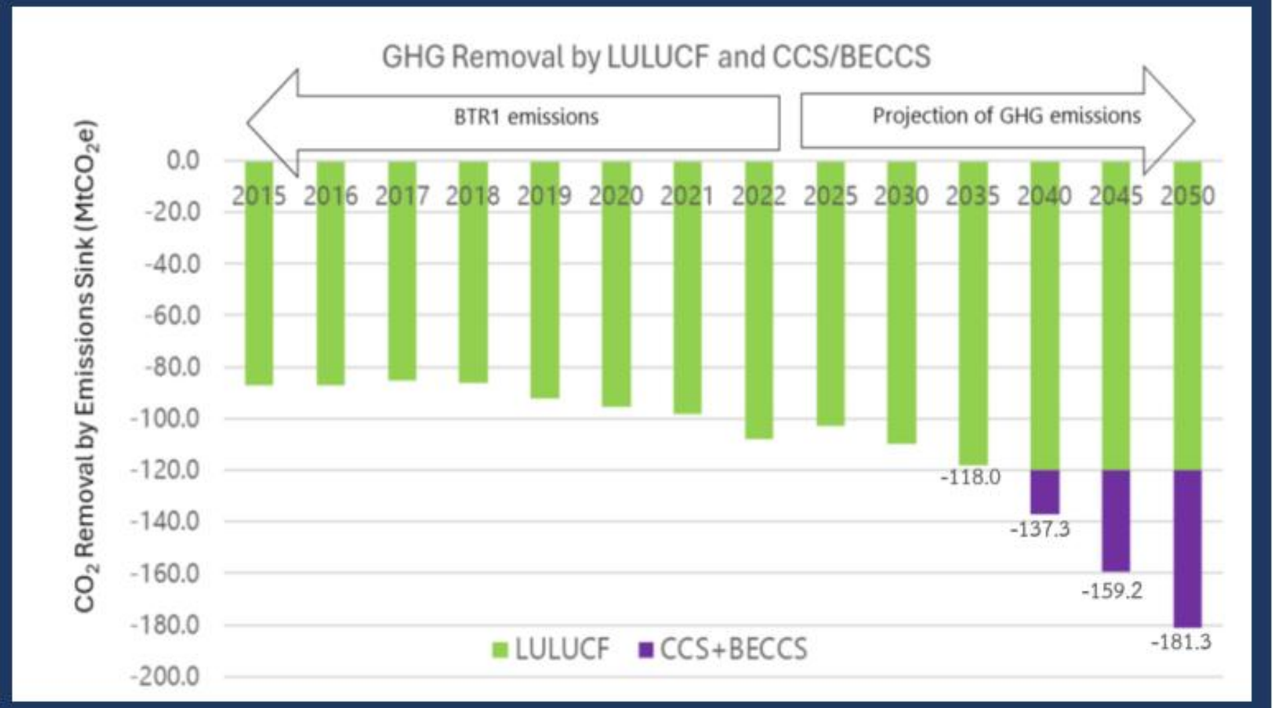
- Heating
- Space Cooling
- Lighting
- Appliances and Equipment
- Building Envelopes
- Heat Pumps

ที่มา: สัมมนา Kick off LT-LEDS ของประเทศไทย โดย บัณฑิต ลิ้มมีโชคชัย (20 มค. 2568)

Thailand's net-zero GHG emissions by 2050



Thailand's Net Zero GHG Emissions 2050: Economy wide



Removal from LULUCF and CCS/BECCS for Net Zero GHG Emissions 2050

Source: Thailand's LT-LEDS (lite version 2025)

Net-Zero GHG Emissions in Details of Technology

Source: DCCE (2025)

GHG Inventory

385 $MtCO_2e$ (2022)

382.4 $MtCO_2e$ (2023)

Peaking ~395 $MtCO_2e$ 2025

GHG Inventory 333 $MtCO_2e$ 2030

GHG Inventory 270 $MtCO_2e$ 2035

2040

2045

2050 GHG Inventory 120 $MtCO_2e$

2021 2022 2023

NDC tracking

60.33 $MtCO_2e$ 65.23 $MtCO_2e$ 75.81 $MtCO_2e$

10 years: 125 $MtCO_2e$ mitigation required

15 years: 150 $MtCO_2e$ mitigation required

NDC 2.0

30-40% BAU

NDC 3.0

Cabinet approved 4 Nov 2025

NDC 4.0

NDC 5.0

Net Zero

Hydraulic cement

Renewable energy

Low CH_4 paddy fields

Manure Management

Electric Vehicle

Reforestation

CCUS/BECCS technology

Hydrogen technology

Phase out coal

Just Transition

A better, safer, healthier, greener, fairer and more prosperous future

NDC Action Plan 2021 - 2030

*Cabinet approved 11 Dec 2024

Domestic 184.8 $MtCO_2e$ (33.3%) | Support 35.7 $MtCO_2e$ (6.7%)

พลังงาน	ขนส่ง	IPPU	ของเสีย	เกษตร
124.6 $MtCO_2e$ (22.5%)	45.6 $MtCO_2e$ (8.2%)	1.4 $MtCO_2e$ (0.3%)	9.1 $MtCO_2e$ (1.6%)	4.1 $MtCO_2e$ (0.7%)

สำนักงานนโยบายและแผนพลังงาน กระทรวงพลังงาน | สนข. | กรมโรงงานอุตสาหกรรม DEPARTMENT OF INDUSTRIAL WORKS | กรมควบคุมมลพิษ POLLUTION CONTROL DEPARTMENT | สำนักงานเศรษฐกิจการเกษตร Office of Agricultural Economics

2023 GHG Mitigation tracking

30 Measures from 5 Sectors

Energy	Transport	IPPU	Waste	Agriculture
59.59 $MtCO_2e$	8.17 $MtCO_2e$	1.09 $MtCO_2e$	3.56 $MtCO_2e$	3.4 $MtCO_2e$

Total of 75.81 $MtCO_2e$

Energy & Transport

IPPU

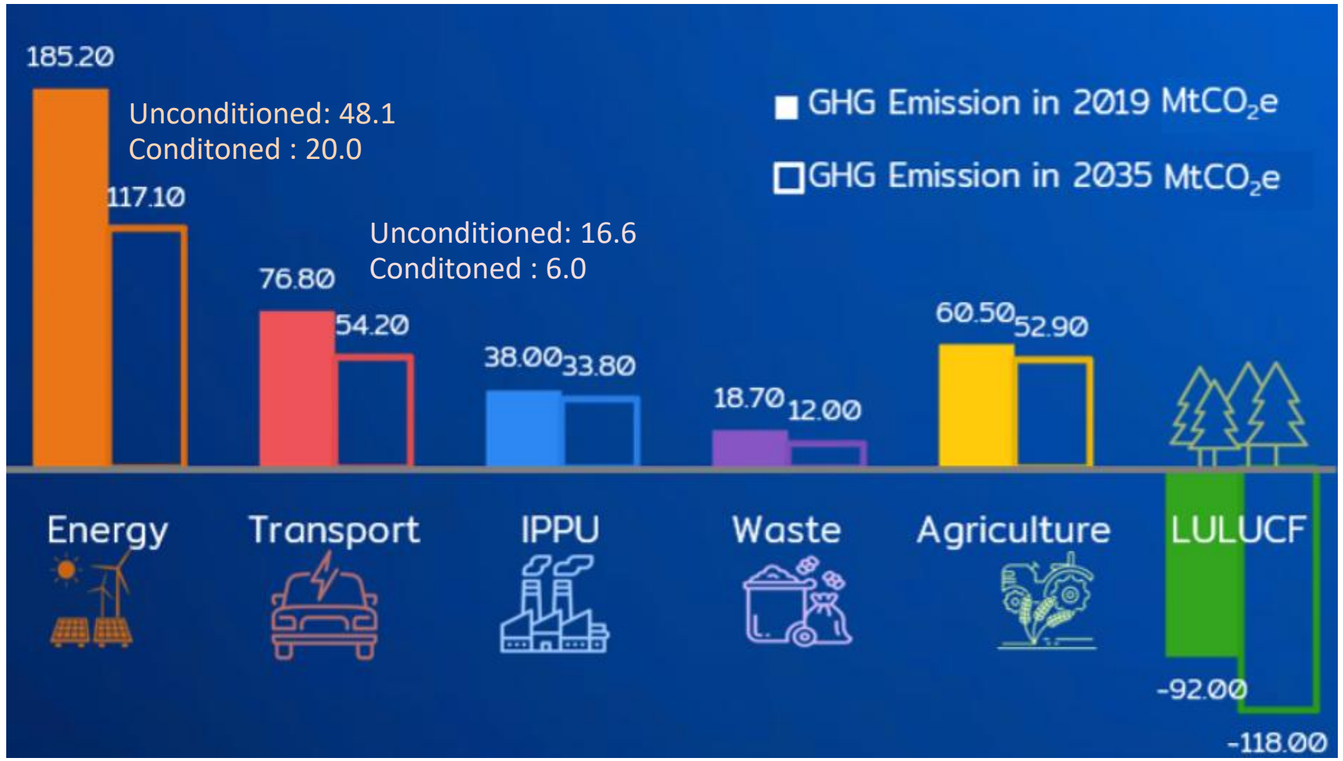
Waste

Agriculture

Forest

Emission 120 $MtCO_2eq$ ⟷ **Removal 120 $MtCO_2eq$**

Key technology for NDC 3.0 (2031–2035) "Absolute emission reduction" compared with Base year 2019



- GHG Inventory (MtCO2e): from 287.2 (Year2019) to 152 (by 2035)
- Mitigation target: 109.2 MtCO2e (76.4 Uncondition & 32.8 condition)
- Expected international supported (Conditional): 7,046.9 Mill US$

Unconditional mitigation measures @2035

Energy sector

- Energy efficiency & conservation
- Renewable/New energy promotion
- CCS: Natural gas (Arthit well)

Unconditional target 48.1 $MtCO_2eq$

Transport sector

- Electric vehicles promotion
- Urban transport development
- Inter-cuty logistic & transport development
- Sustainable aviation fuels (SAF) consumption
- Transport Infrastucture development & promotion
- Public transport system improvement/ Non engine powertrain transport

Unconditional target 16.6 $MtCO_2eq$

Conditional mitigation measures @2035

Energy sector

- CCS Technology Implementation/CCS Hub and clusters establishment
- Coal fired power plant phase out/Ammonia Co-firing with coal
- Hydrogen subsititute for fossil fuel promotion
- Hydrogen infrastructure improvement/construction
- Small nuclear power generation (SMR/MMR)
- Battery energy storage system (BESS) implementation

Conditional target 20.0 $MtCO_2eq$

Transport sector

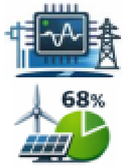
- Sustainable aviation fuels (SAF) consumption
- Hydrogen subsititute for fossil fuel promotion
- Electric vehicles (E-Bus. E-Truck, E-Boat) promotion

Conditional target 6.0 $MtCO_2eq$

Source: DCCE (2025)

(Draft) Thailand's Net Zero Emissions 2050 Transition Timeline Power Generation Sector

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



- Grid forming inverter (GFM)
- 68% share of RE electricity

Thailand net zero GHG

Phase down of coal power plants

Phase out coal power plants

2025 | 2030 | 2035 | 2040 | 2045 | 2050

- Phase down of coal power plants
- Solar/wind with battery storage BESS
- CCS
- Advanced renewable energy

- Early coal phase out
- Battery storage power plants (BESS)
- Hydrogen co-firing power plants
- Small modular reactors (SMR/MMR)
- CCS/CCS hub and cluster

- Combined cycle natural gas used best in class
- 74% share of RE electricity
- Net zero emission electricity

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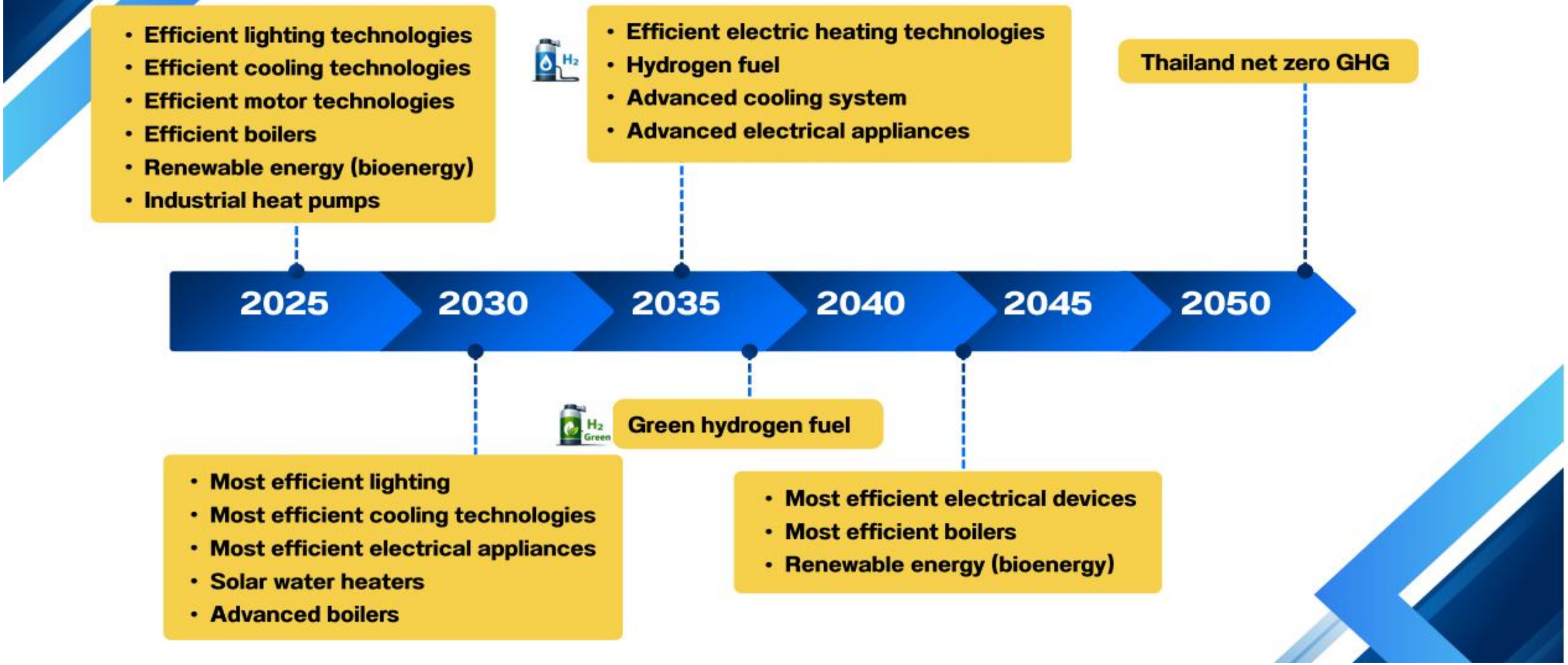
(Draft) Thailand's Net Zero Emissions 2050 Transition Timeline Manufacturing Sector



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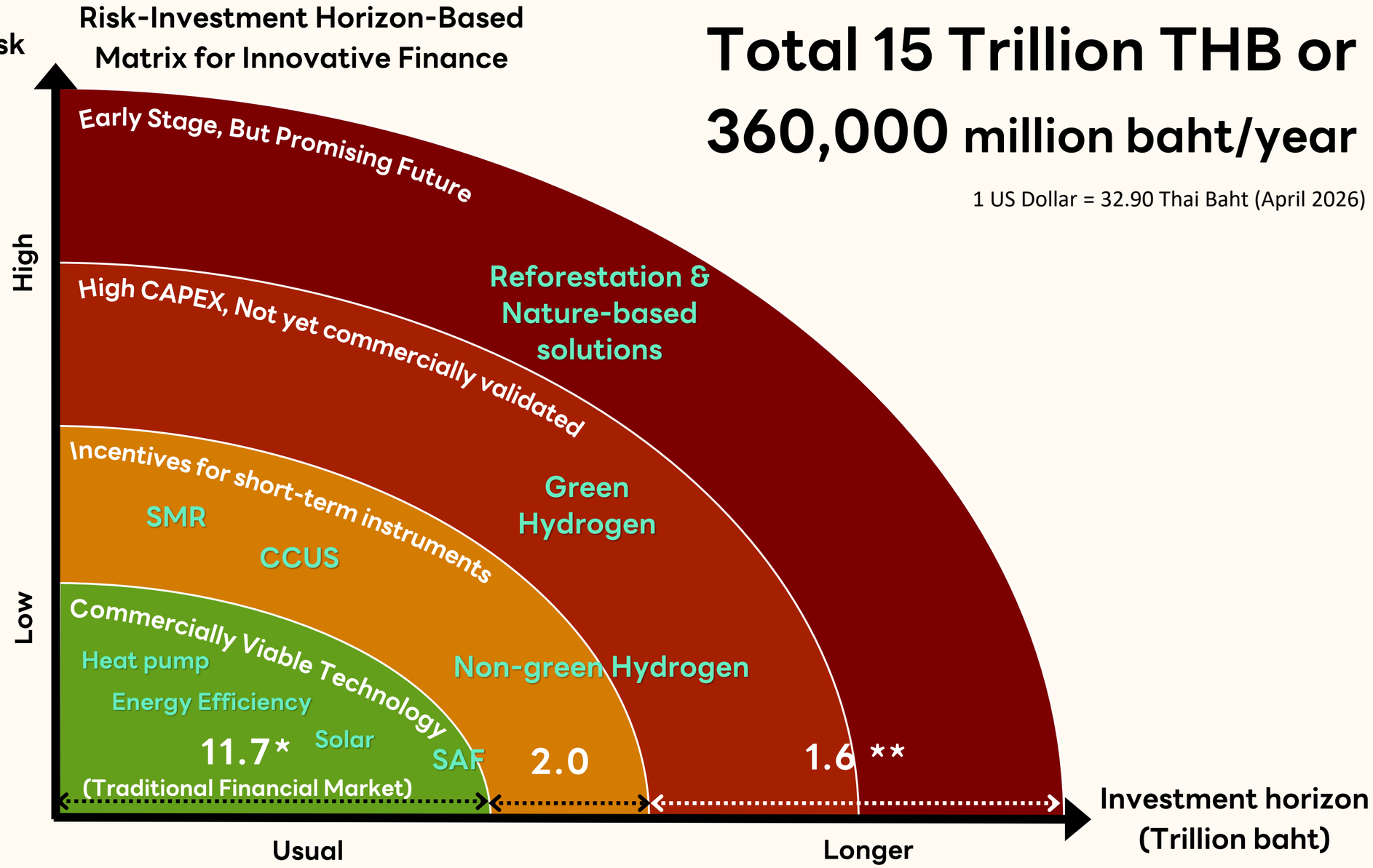
Thailand: Expenditure to achieve Net zero 2050

Climate-induced catastrophes

Physical risks

Transition risks

New global climate game (e.g, NDC, CBAM)



Total 15 Trillion THB or 360,000 million baht/year

1 US Dollar = 32.90 Thai Baht (April 2026)

Note: *The amount is inclusive of the owner's equity
** State-supported adaptation projects excluded
Source: Swiss Re, World Bank

Source: KBANK (Mr.Pipit Aneknithi) 2025

Office of National Higher Education
Science Research
and Innovation Policy Council

THANK YOU

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