

# TTICoS 2023 THAILAND X TAIWAN INDUSTRIAL COLLABORATION SUMMIT

## Road to Net Zero: What does Thailand need?

By

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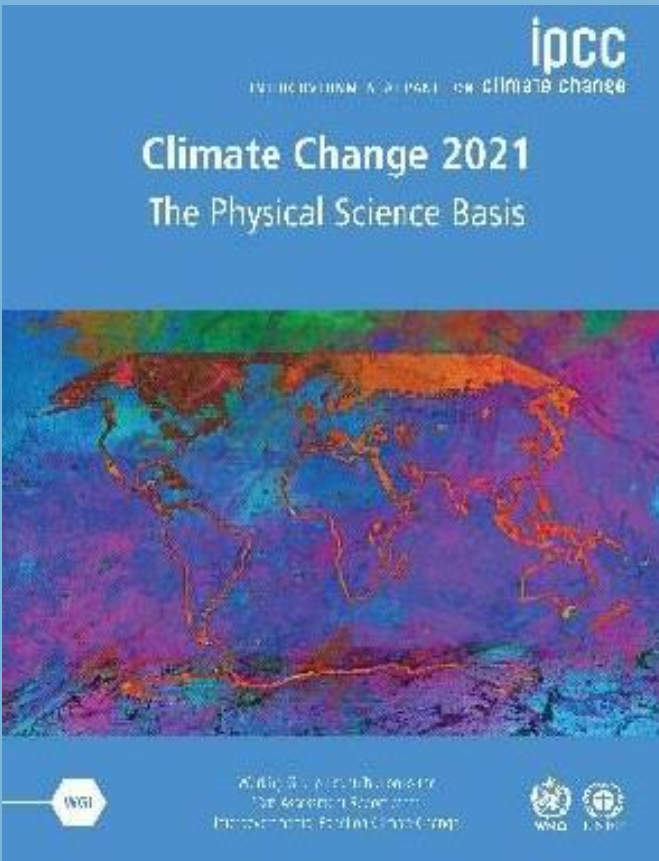
12 September 2023



# Unfolding the importance of climate change

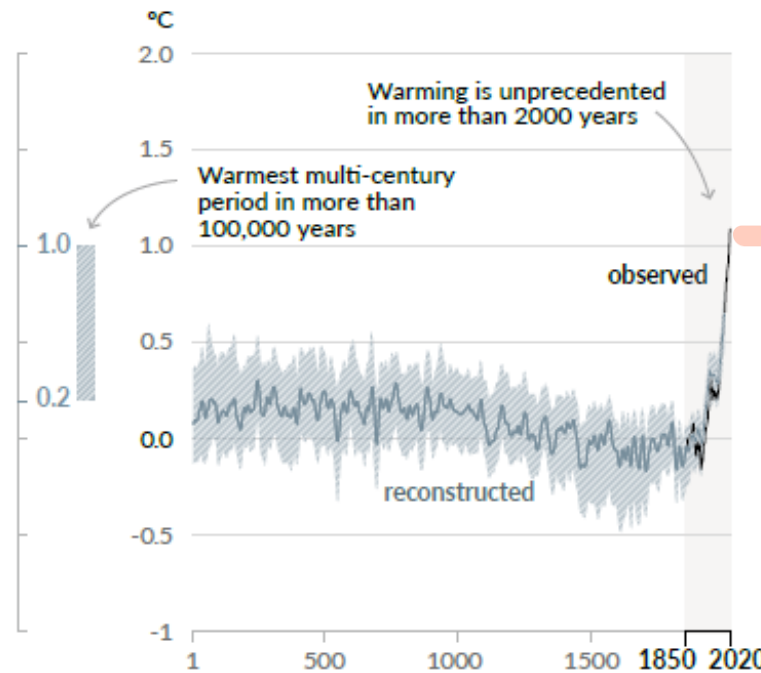


# Changes in global surface temperature

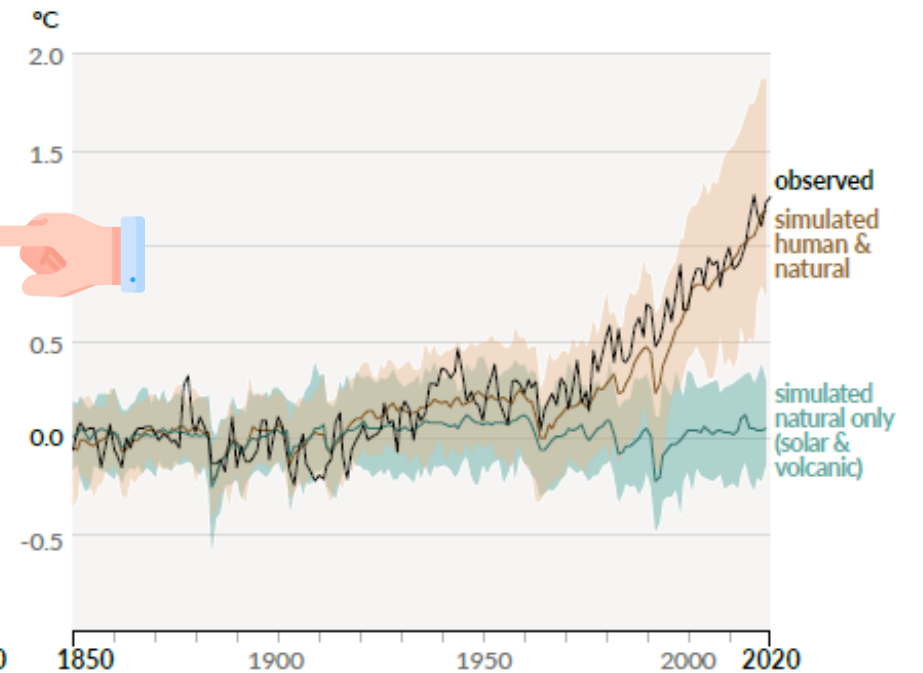


## Changes in global surface temperature relative to 1850-1900

a) Change in global surface temperature (decadal average) as reconstructed (1-2000) and observed (1850-2020)



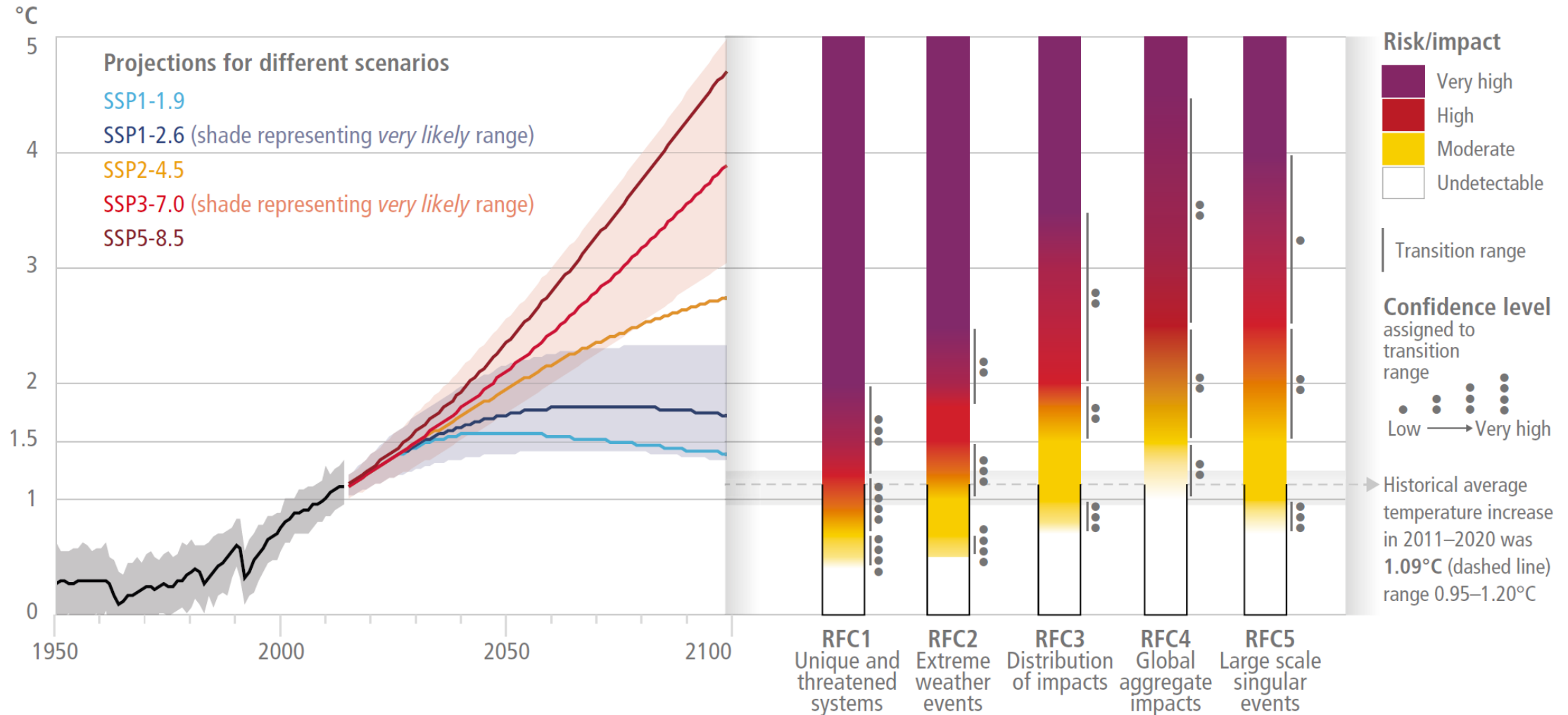
b) Change in global surface temperature (annual average) as observed and simulated using human & natural and only natural factors (both 1850-2020)



# Change in Global Surface Temperature and Impacts

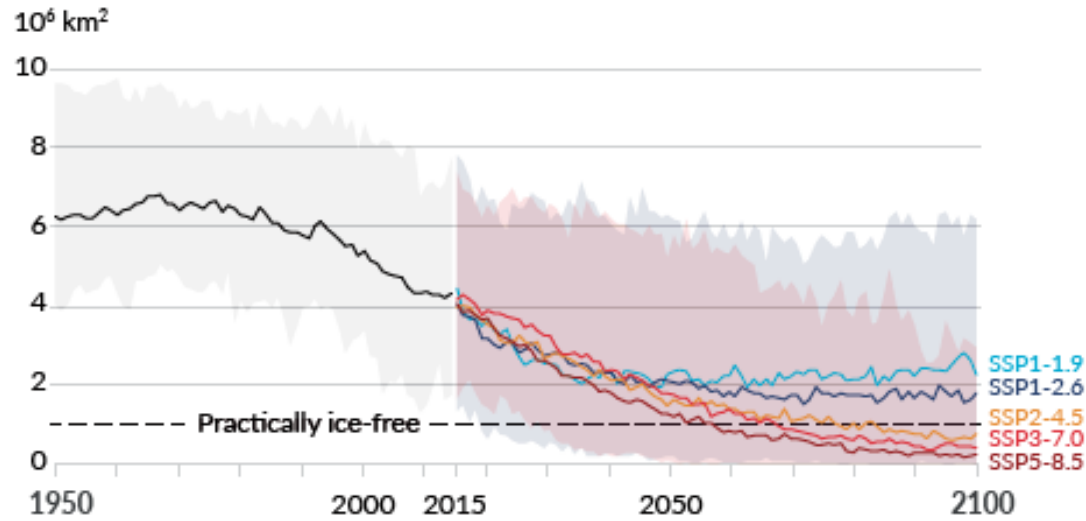
(a) Global surface temperature change  
Increase relative to the period 1850–1900

(b) Reasons for Concern (RFC)  
Impact and risk assessments assuming low to no adaptation

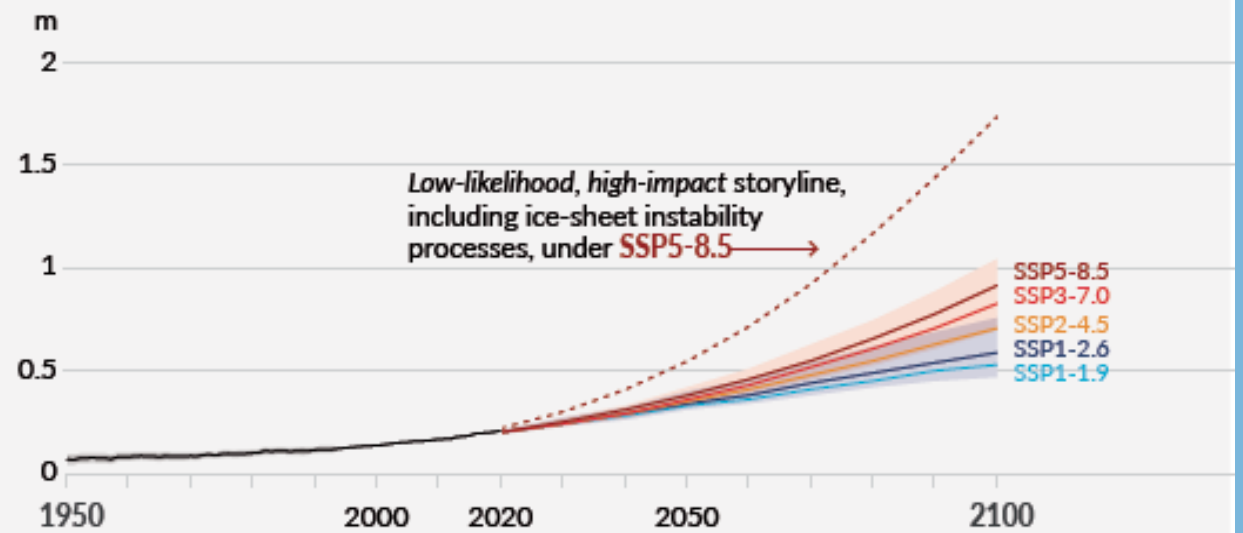


# Why increase in global temperature is an issue of concern?

September Arctic Sea Ice Area



Global Mean Sea Level Change Relative to 1900



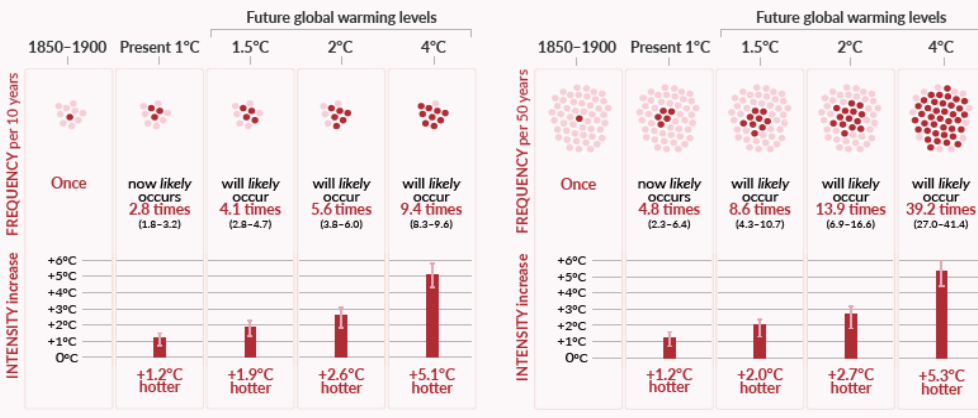
## Hot temperature extremes over land

### 10-year event

Frequency and increase in intensity of extreme temperature event that occurred once in 10 years on average in a climate without human influence

### 50-year event

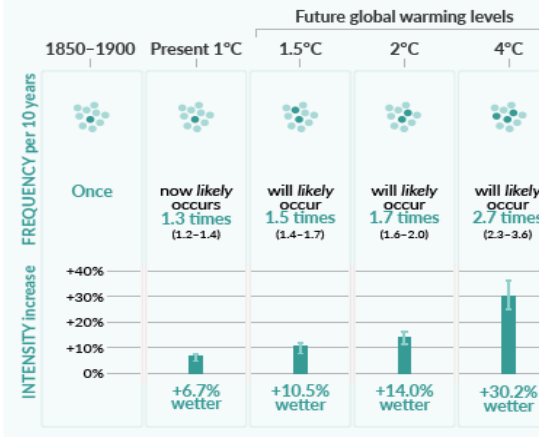
Frequency and increase in intensity of extreme temperature event that occurred once in 50 years on average in a climate without human influence



## Heavy precipitation over land

### 10-year event

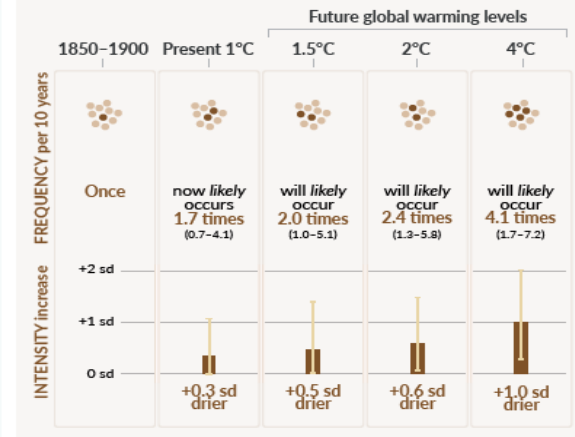
Frequency and increase in intensity of heavy 1-day precipitation event that occurred once in 10 years on average in a climate without human influence



## Agricultural & ecological droughts in drying regions

### 10-year event

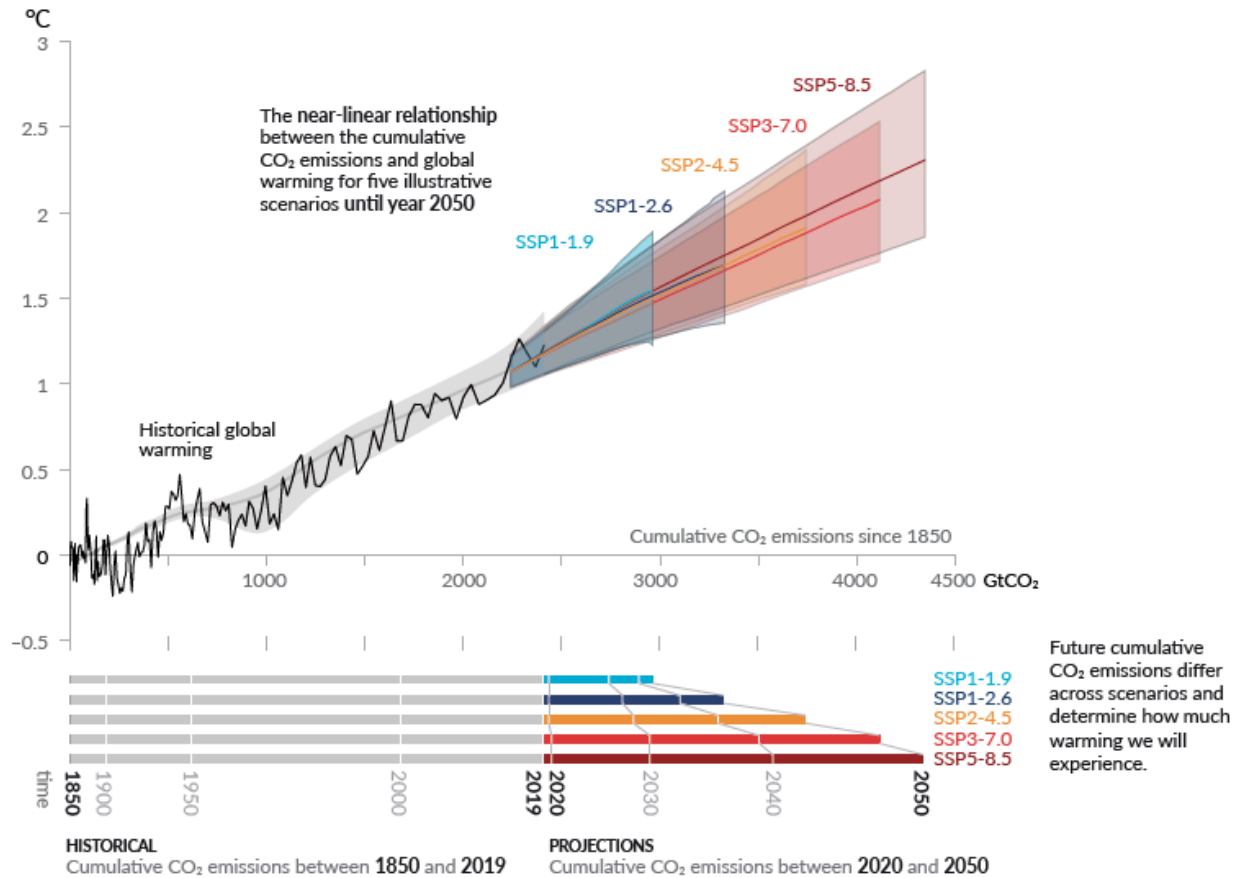
Frequency and increase in intensity of an agricultural and ecological drought event that occurred once in 10 years on average across drying regions in a climate without human influence



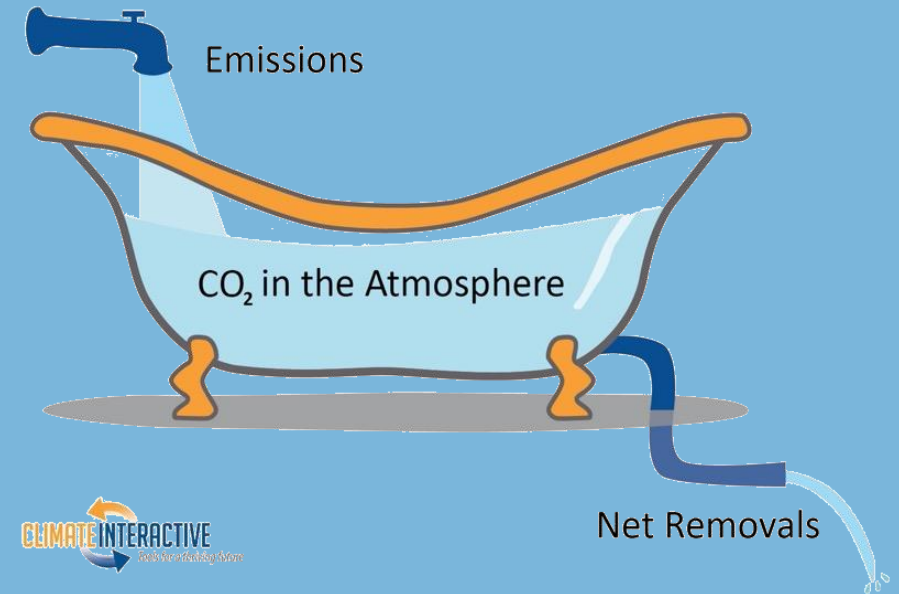
# Why greenhouse gas mitigation is necessary?

## Every tonne of CO<sub>2</sub> emissions adds to global warming

Global surface temperature increase since 1850–1900 (°C) as a function of cumulative CO<sub>2</sub> emissions (GtCO<sub>2</sub>)



## Bathtub Dynamics



Overall framing by Dr. John Sterman, MIT Sloan

# Remaining Carbon Budget: less than 10 years to keep global warming to 1.5°C

Approximate global warming relative to 1850–1900 until temperature limit (°C)* <sup>(1)</sup>	Additional global warming relative to 2010–2019 until temperature limit (°C)	Estimated remaining carbon budgets from the beginning of 2020 (GtCO <sub>2</sub> )				
		<i>Likelihood of limiting global warming to temperature limit*<sup>(2)</sup></i>				
		17%	33%	50%	67%	83%
1.5	0.43	900	650	500	400	300
1.7	0.63	1450	1050	850	700	550
2.0	0.93	2300	1700	1350	1150	900

Currently global GHG emission around 50 Gt per year



# Climate Clock is Ticking!



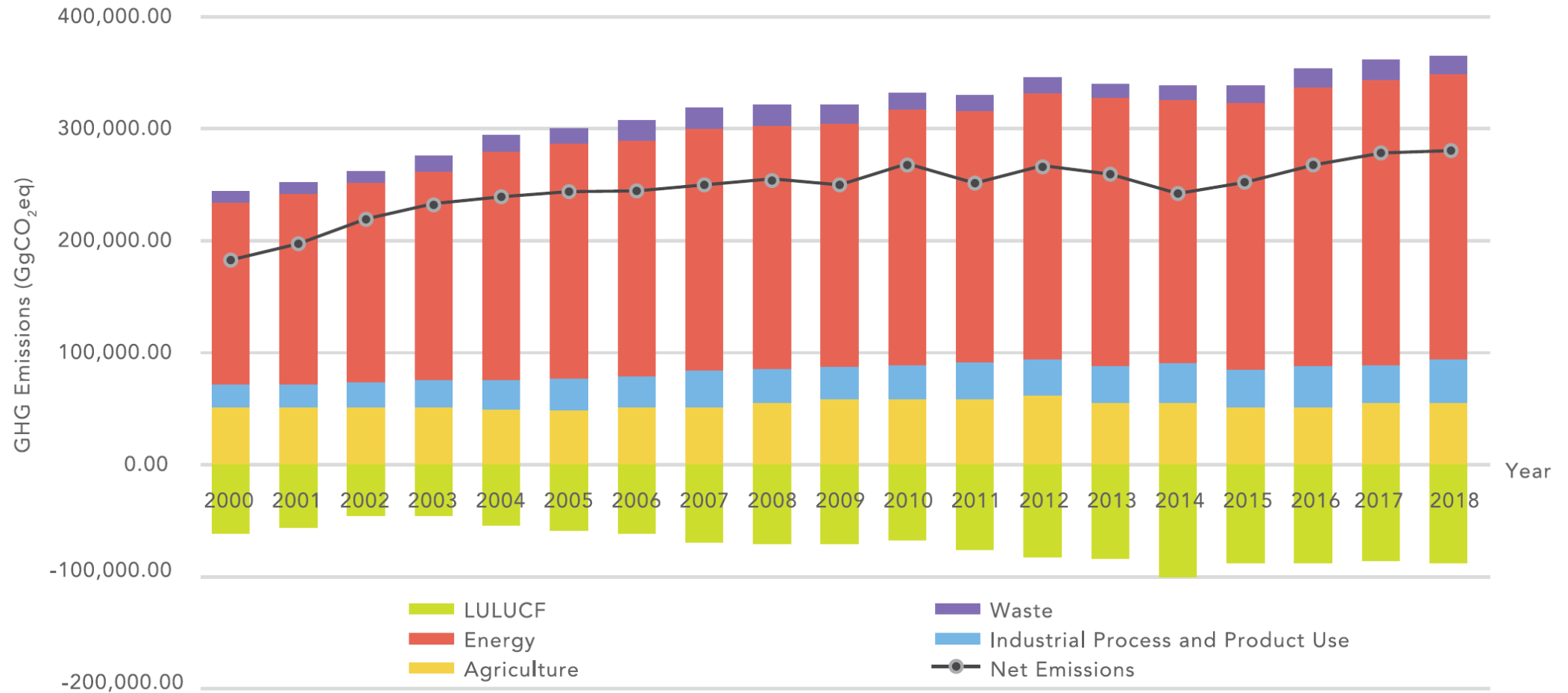
**CLIMATE**  **CLOCK**



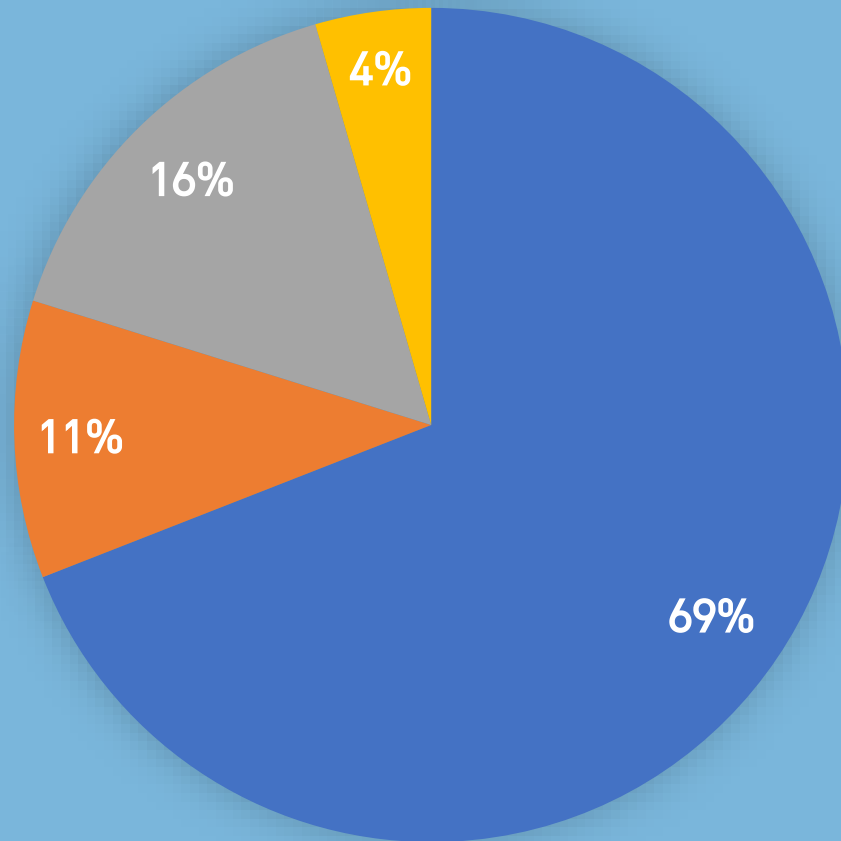
# Transitioning to a low-carbon economy



# Thailand's GHG Emissions/Removal by Sector during 2000-2018



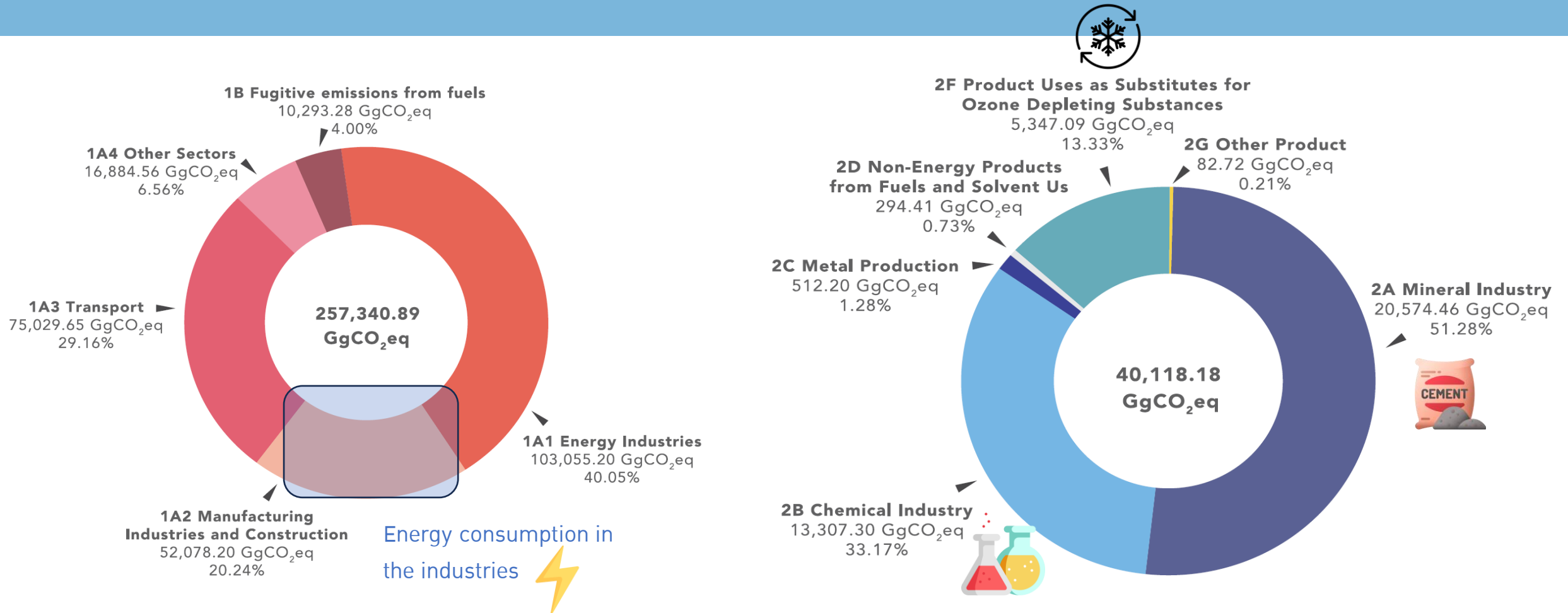
# Thailand's GHG Emission Overview as of 2018 (Excluding LULUCF)



■ Energy ■ Industrial Processes and Product Use ■ Agriculture ■ Waste



# GHG emissions in the Thai industrial sector



# Thailand's Key Milestones on GHG Emission Reduction

**2018**

## Thailand's National Adaptation Plan (NAP)

### VISION

Thailand is resilient with adaptive capacity to climate change impacts and moves towards sustainable development.

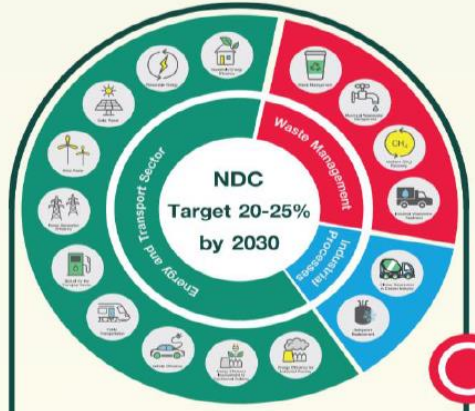


**2021**

- **NDC** Nationally Determined Contribution Implementing starts
- Submission of **LT-LEDS** Long-term Low Greenhouse Gas Emission Development Strategy Implementing towards achieving net zero GHG emission and Carbon Neutrality within this century

**Improve Energy Efficiency and Promote Energy System Transformation through**

- Decarbonisation
- Digitalisation
- Decentralisation
- Deregulation
- Electrification



**2030**

Aims to reduce GHG by 40% with international support

- Increase and Remain Primary Forest
  - Regenerate Natural Forest Area
  - Increase Economic Forest Area
  - Increase and Remain Cropland
  - Reduce Biomass Burning
- Achievement of CO<sub>2</sub> removals of 120 MtCO<sub>2</sub>eq**

**2035**

69% share of electric vehicles of new vehicles in the market

**2037**

**2050**

**CARBON NEUTRALITY**



**2065**

Achievement of **NET-ZERO GHG Emission** while looking forward to enhanced international cooperation and support on finance, technology, and capacity-building to achieve this ambition

50% share of renewable electricity generation of new power generation capacity

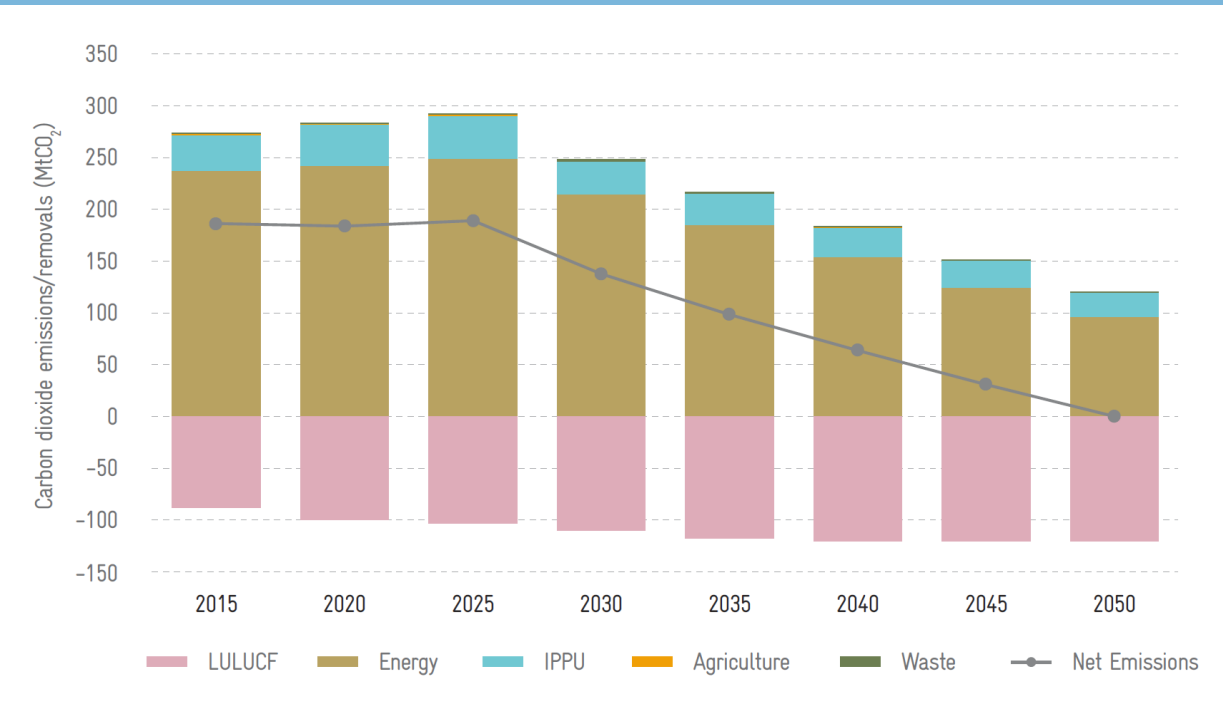


Reduction of GHG emissions in various sectors:

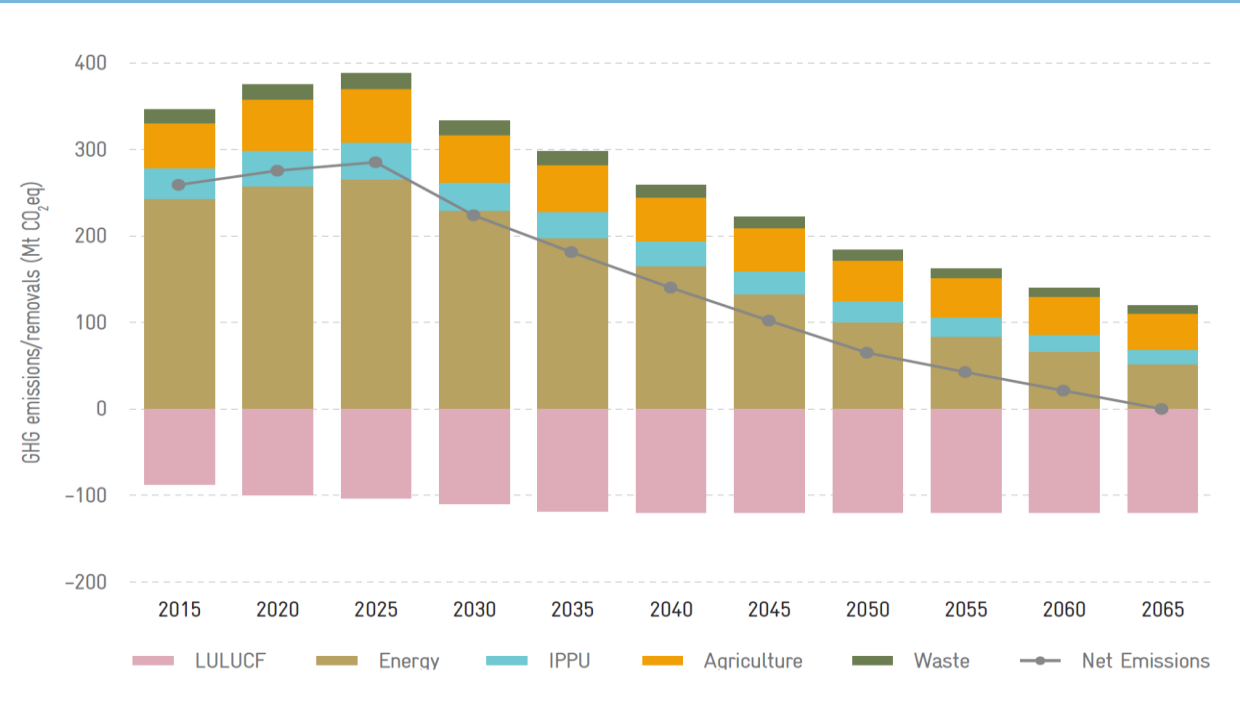
- Energy
- Industrial Processes and Product Use (IPPU)
- Agriculture
- Waste
- Land Use, Land Use Change, and Forestry

# Thailand's Long-term Low Greenhouse Gas Emission Development Strategy

## Thailand's Carbon Neutrality Pathway



## Thailand's Net Zero Pathway



# Highlighted GHG Mitigation Strategies



Energy & Transport

- Increased use of renewable energy
- Improved energy efficiency
- Increased use of electric vehicles (EV)
- Green hydrogen



IPPU

- Hydraulic cement
- Substitution of refrigerant
- CCUS in cement industry
- Green hydrogen



Waste

- Community waste management
- Industrial and community wastewater treatment
- Waste to energy



Agriculture

- Biogas from livestock farming
- Reduced methane emissions from rice production



- Afforestation (natural and commercial forest)
- Increase green areas in cities
- Halting and reversing deforestation

**Removal 120 MtCO<sub>2</sub>eq**

# Factors driving a transition of Thai industries to a low-carbon economy



Carbon border  
adjustment taxes (e.g.  
CBAM)



Requirements from  
multinationals, foreign  
direct investors and  
capital market



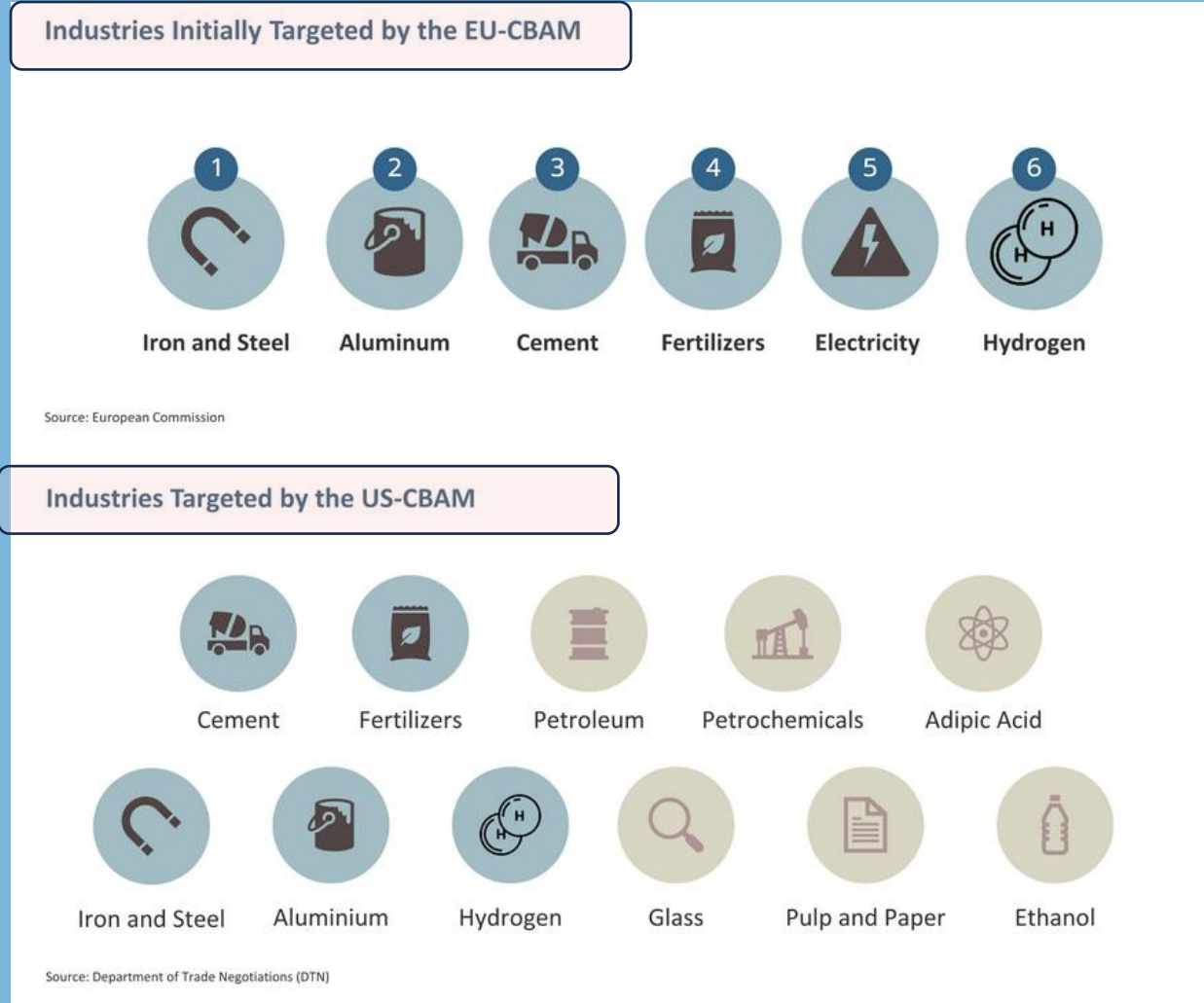
Shift in consumers'  
preferences and  
demand



# Cross border taxes pressure Thai exporters to reduce CO<sub>2</sub>



Carbon border adjustment taxes (e.g. CBAM)



The US-CBAM is broader than its EU equivalent, but importantly, while the EU measures impose a carbon tax on imports' total emissions, the US CCA will target only emissions in excess of the industry average.

# Impacts of CBAM on Thai Industrial Sector

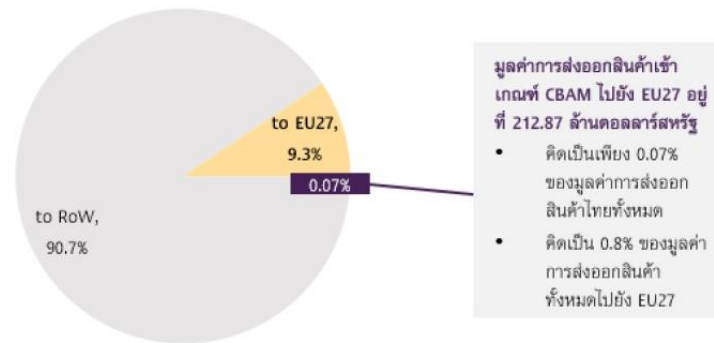


- The impacts of CBAM on the Thai manufacturing sector are expected to be only slight because of exports to the EU of goods covered by the CBAM regulations account for small portion by value of all Thai exports to the EU.
- Among the CBAM goods exported to the EU, the most important for Thailand are iron and steel and aluminium, while sales to EU customers of other CBAM goods are either very low or non-existent.
- While it is true that in the short term, the effects of the CBAM on Thai industry will be only slight, it is highly likely that over the longer term, other countries will introduce similar measures, and this will significantly amplify the impacts on Thai manufacturers and exporters.

Value of Thailand's exports to EU and RoW (million US\$, % of export value)



Value of Thailand's exports to EU (million US\$, % of export value)



มูลค่าการส่งออกสินค้าเข้า  
เกณฑ์ CBAM ไปยัง EU27 อยู่ที่  
212.87 ล้านดอลลาร์สหรัฐ

- คิดเป็นเพียง 0.07% ของมูลค่าการส่งออกสินค้าไทยทั้งหมด
- คิดเป็น 0.8% ของมูลค่าการส่งออกสินค้าทั้งหมดไปยัง EU27

Value of Thailand's exports affected by CBAM to EU in 2022 (million US\$)



# Multinationals and foreign direct investors require emission reduction

- TOYOTA, a Japanese automaker, aims to be carbon neutral at all global manufacturing facilities by 2035.
- TOYOTA plans to accelerate its decarbonization efforts by setting numerical targets, and asked 300-400 of its tier-one suppliers to reduce their emissions this year. As part of these updated requirements, TOYOTA's suppliers also join TOYOTA's efforts to reduce CO<sub>2</sub> emissions across the vehicle life cycle and are expected to commit to an annual 3% CO<sub>2</sub> reduction target.

Examples of responses by Toyota's suppliers:



**TOYODA GOSEI**  
Toyoda Gosei, air bags and other components manufacturer, has formulated a *plan to halve its carbon dioxide emissions by 2030 (2015 baseline)*.



**DENSO**  
Denso, another key TOYOTA's supplier, has set a goal to reach virtually zero carbon emissions by fiscal 2035 and is working to commercialize technologies that can capture carbon dioxide for later use as raw materials and fuel.



- PANDORA, a jewelry manufacturer, will reduce its GHG emissions 50% by 2030 from a 2019 baseline (Scope 1 + 2 + 3). To achieve this Pandora will:
  - become carbon neutral in its own operations by 2025, reducing emissions by at least 90% from a 2019 baseline (Scope 1 + 2). Carbon removal mechanisms and offsets will balance any remaining emissions.
  - reduce value chain emissions by 42% by 2030 from a 2019 baseline (Scope 3).
- Pandora will achieve net zero emissions by 2040.
- In 2020, Pandora switched to 100% renewable energy at its crafting facilities, and the company is also planning to purchase green power for its more than 1,300 stores and distribution centers, which requires green electricity.

**PANDORA**

# Investments in capital market favor companies with lower emissions

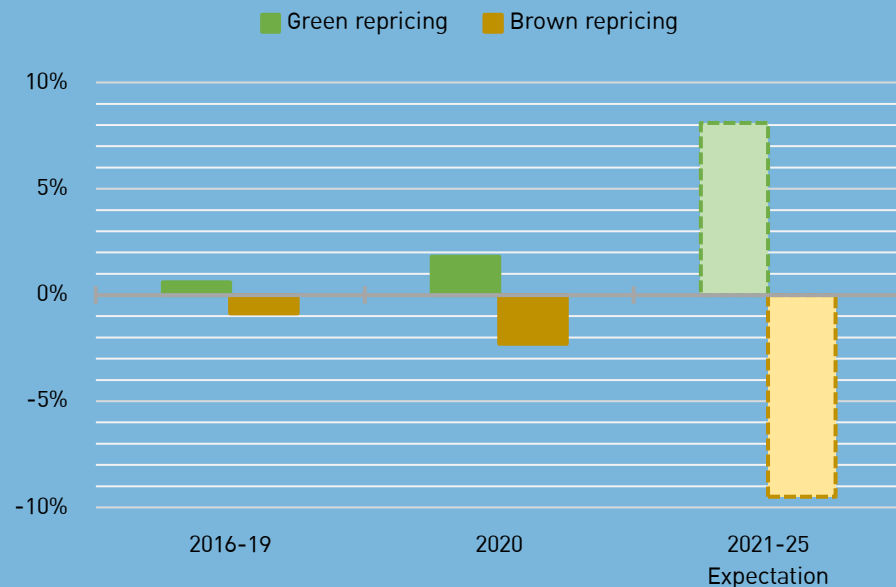
There has been a growing demand for ‘sustainable’ investments

*We are asking companies to disclose a plan for how their business model will be compatible with a net zero economy – that is, one where global warming is limited to well below 2°C, consistent with a global aspiration of net zero greenhouse gas emissions by 2050. We are asking you to disclose how this plan is incorporated into your long-term strategy and reviewed by your board of directors.*

*Larry Fink's 2021 letter to CEOs (Chairman and Chief Executive Officer of Blackrock)*

## Green repricing: It's happening

Relative return of green vs. brown sectors, 2016-25



Source: Blackrock

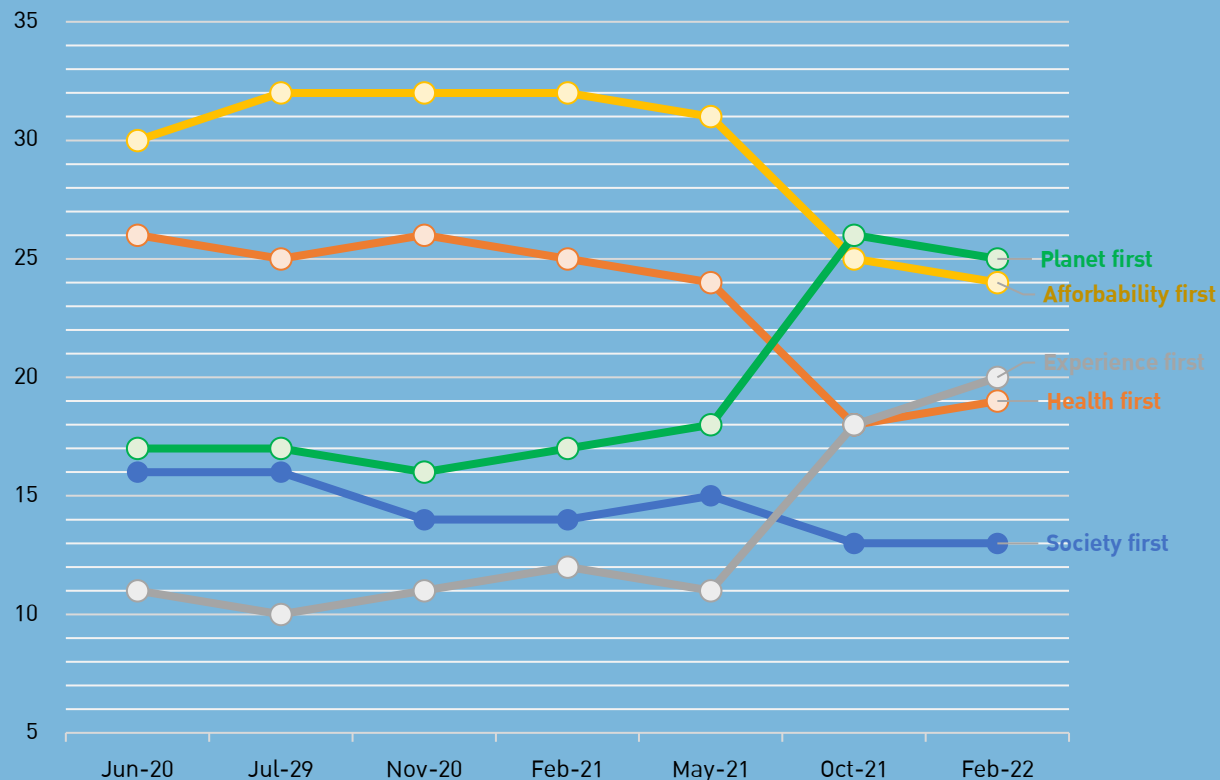
- ESG rating is important for companies to be included in ESG funds and will affect market activity and pricing.
- Companies that score well on ESG metrics are believed to better anticipate future risks and opportunities, be more disposed to longer-term strategic thinking, and focused on long-term value creation.
- Assets are repriced to capture the risks and opportunities from environmental impacts.
- Task Force on Climate-related Financial Disclosures (TCFD) highlights the impacts of climate change on corporate financial performances. This stimulates investors to integrate climate risks into their asset-allocation and portfolio-management decisions and firms to set emission reduction targets.

# Consumers give high importance to environmental impacts

- Consumers around the world are becoming more aware of the need to transition to a low-carbon economy.

## Consumers are increasingly in pursuit of experiences

% share of consumer segments, Global

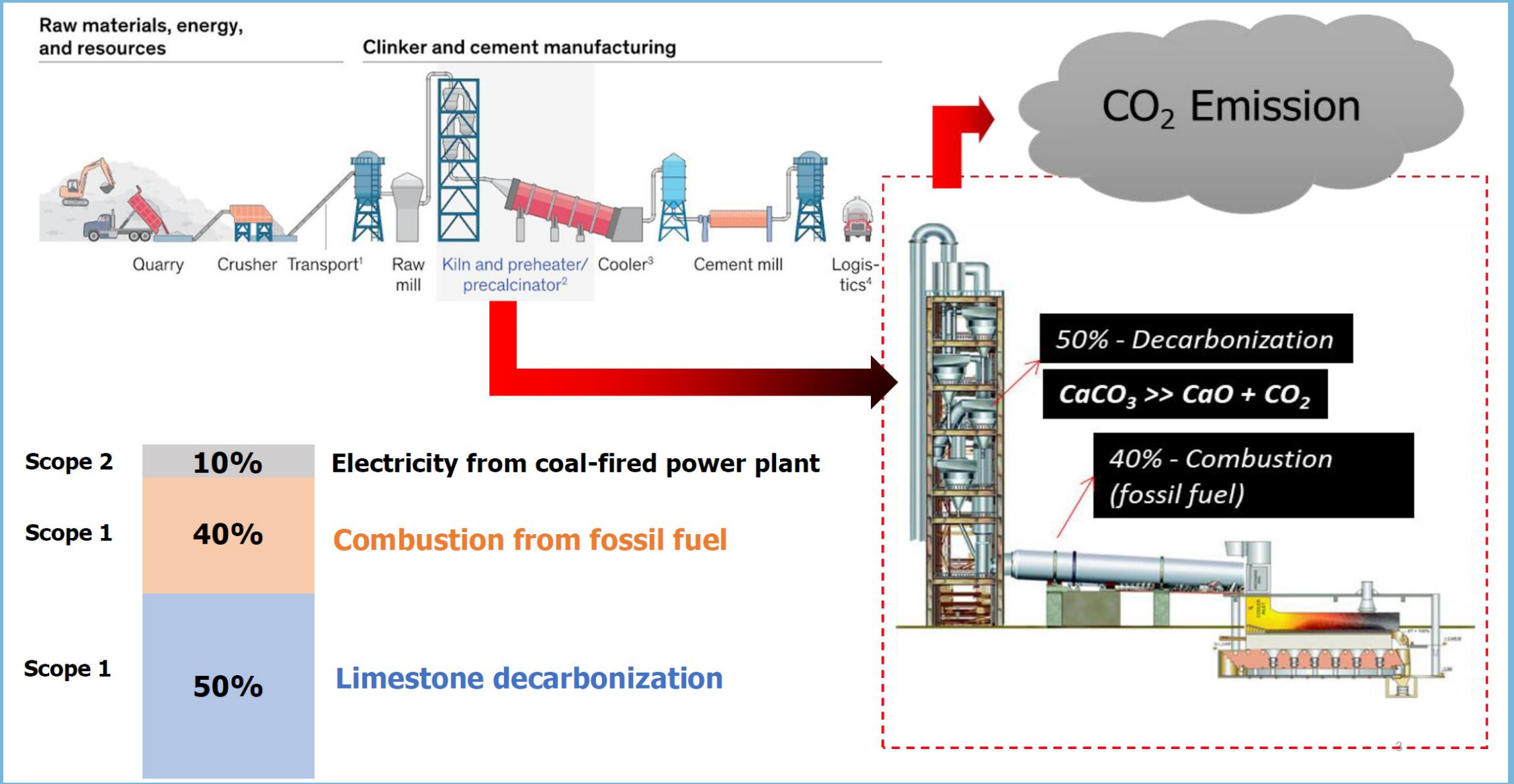


- The EY Future Consumer Index surveyed 18,000 consumers across the globe, including Thailand between January and February 2022.
- After the COVID-19 pandemic, consumers value impacts toward the planet over affordability.
- Consumers are highly aware of consumption impacts; they favor locally sourced products and expect transparency

# Progress in low-carbon transition in the Thai Industrial sector

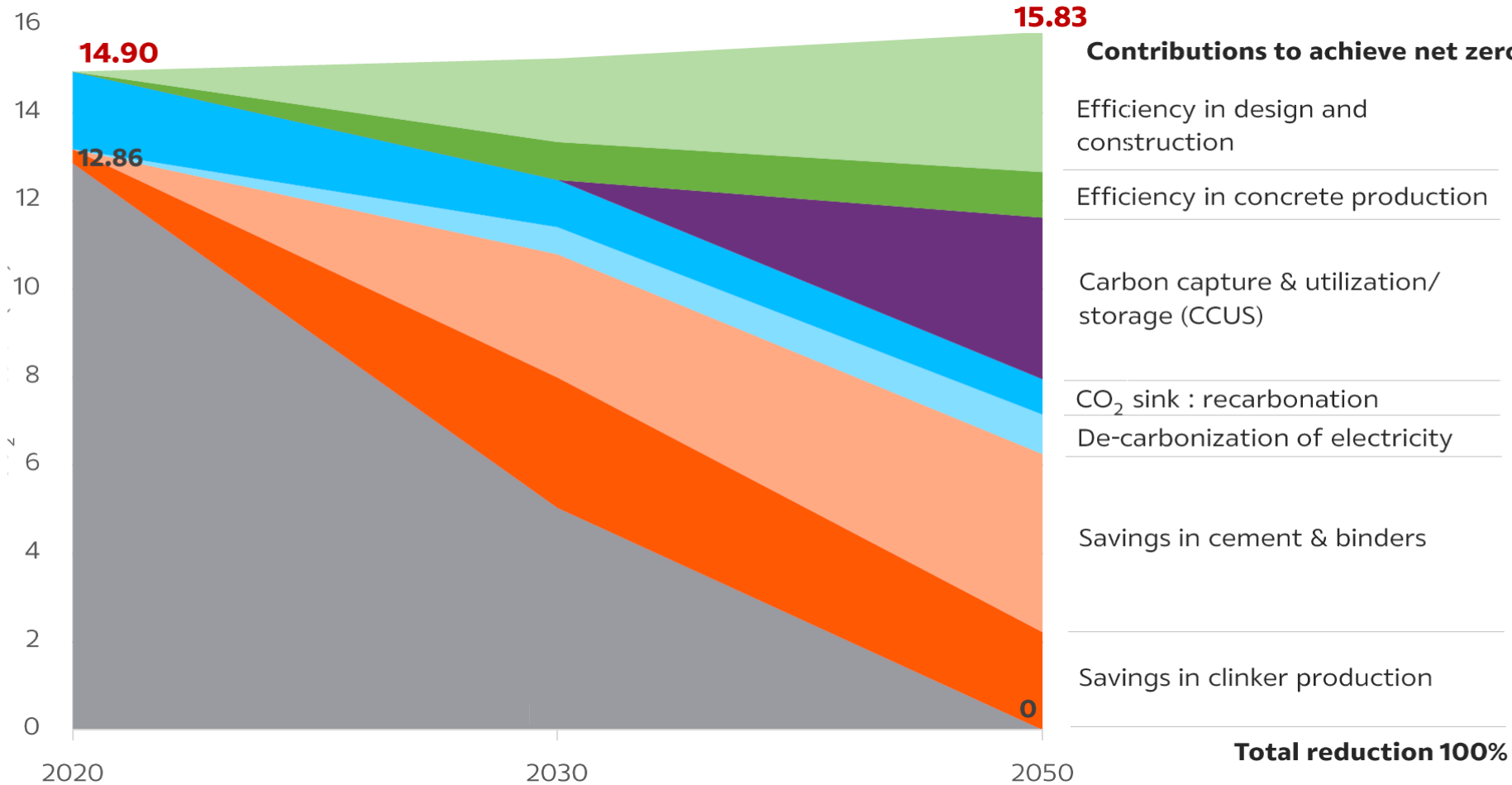


# GHG Emission in the Cement Industry



Source: Manasit Sarigaphuti (2023)

# Case Study: How SCG plans to achieve Net Zero?



**Low Carbon Construction** to Turn Waste to Value

Green Solution

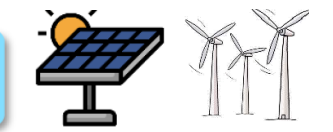
Low Carbon Concrete



CCU Decarbonization



Zero Power



Low Carbon Cement



Zero Coal

**Alternative Fuels** to Replace Solid Fuels



# Case Study: How SCG plans to achieve Net Zero?



Accelerate using of **hydraulic cement**, which is **low carbon product** through **procurement process for government construction**.



Ministry of Natural Resources and Environment



Ministry of Transport



Ministry of Industry



Ministry of Interior



Ministry of Agriculture and Cooperatives



Ministry of Commerce



Permanent Secretary, Director-General and high level authority join forces for achievement of GHG emission reduction target as set by improving the construction standard of each agency, enhancing product standard, educating stakeholders, and researching and development on low carbon product, etc.



TCMA together with 24 alliances (government agency, professional sector, industrial sector, and academic sector) announced **'MISSION 2023'** on greenhouse gas mitigation



**CEMENT** industry is the **FIRST** industry in **THAILAND** continuing announcement its **COMMITMENT** to mitigate greenhouse gas emission

## Thailand's Vision on Electric Vehicle

*“To be one of the most important EV production bases and component parts in 2035”*

The National Electric Vehicle Policy Committee, March 2021

### ZEV Cumulative volume target in 2030

*(Zero Emission Vehicle (ZEV) = BEV & FCEV)*

Vehicle type	Production	Use	Public Charging Station
Passenger cars & Pick-up trucks	2,935,000	2,050,000	12,000 (Fast charge)
Trucks & Buses	156,000	160,000	n.a.
Motorcycles	3,133,000	3,200,000	1,450 (1 Station = 8 outlet)

# Thailand's EV Promotion Measures



## 1. Supply side measures

- 1.1 Investment promotion scheme
- 1.2 EV and charger standards
- 1.3 Establishment of testing facility
- 1.4 Supply chain transition program
- 1.5 End-of-Life Vehicle (ELV) program

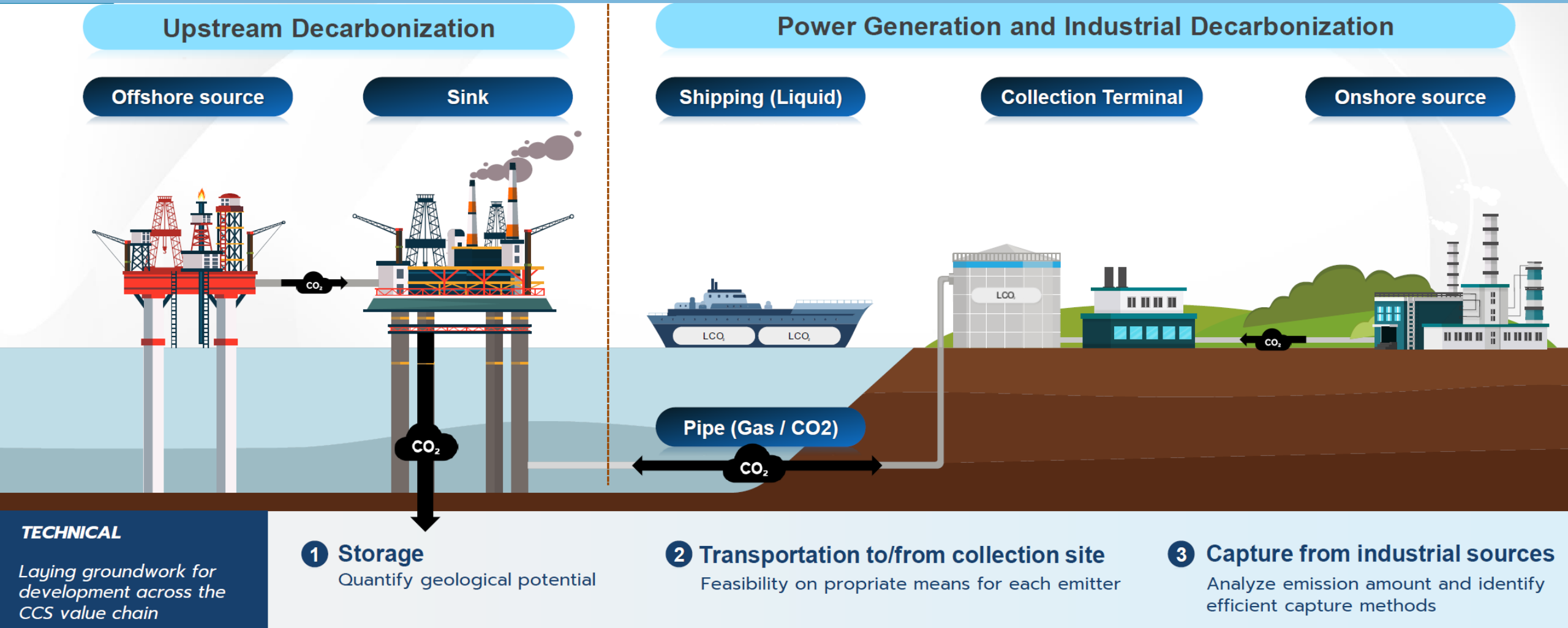


## 2. Demand side measures

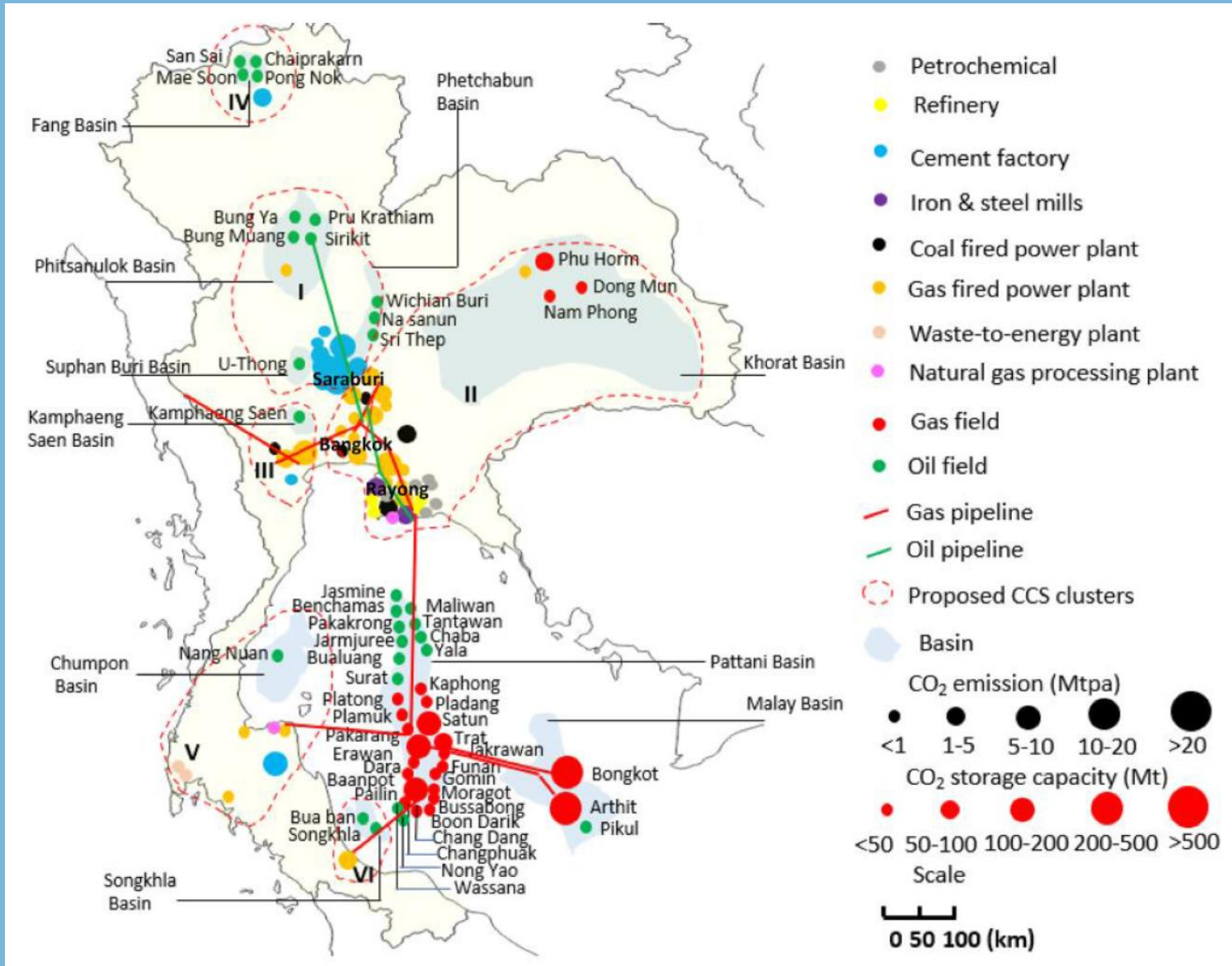
- 2.1 EV package of incentives
- 2.2 Registration tax reduction

## 3. Installation of public charging stations

# Decarbonizing Thai Industries Using CCS



# Thailand's CCS Clustering



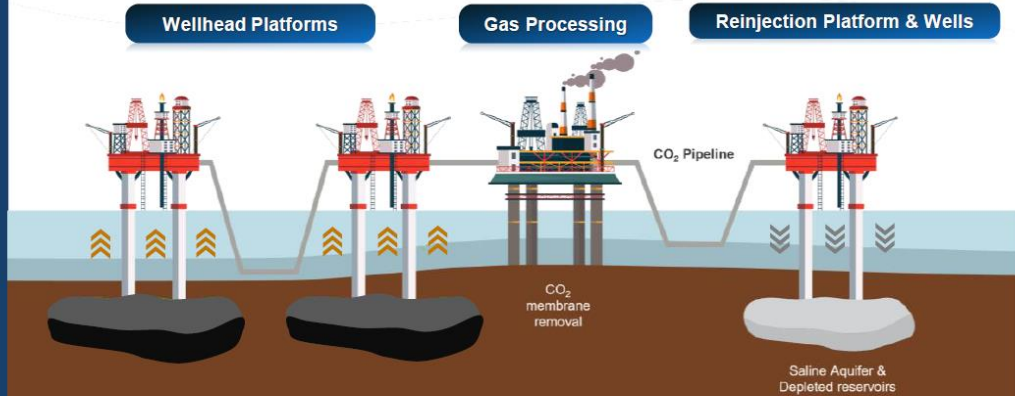
**Storage capacity = 79.4 Gt**

- **24 gas fields**
- **29 oilfields**
- **10 saline aquifers**

**CO<sub>2</sub> emission = 0.143 Gtpa**

- **37 power plants**
- **2 iron and steel mills**
- **4 refineries**
- **12 cement factories**
- **2 natural gas plants**
- **6 petrochemical plants**

## ARTHIT Upstream CCS Project

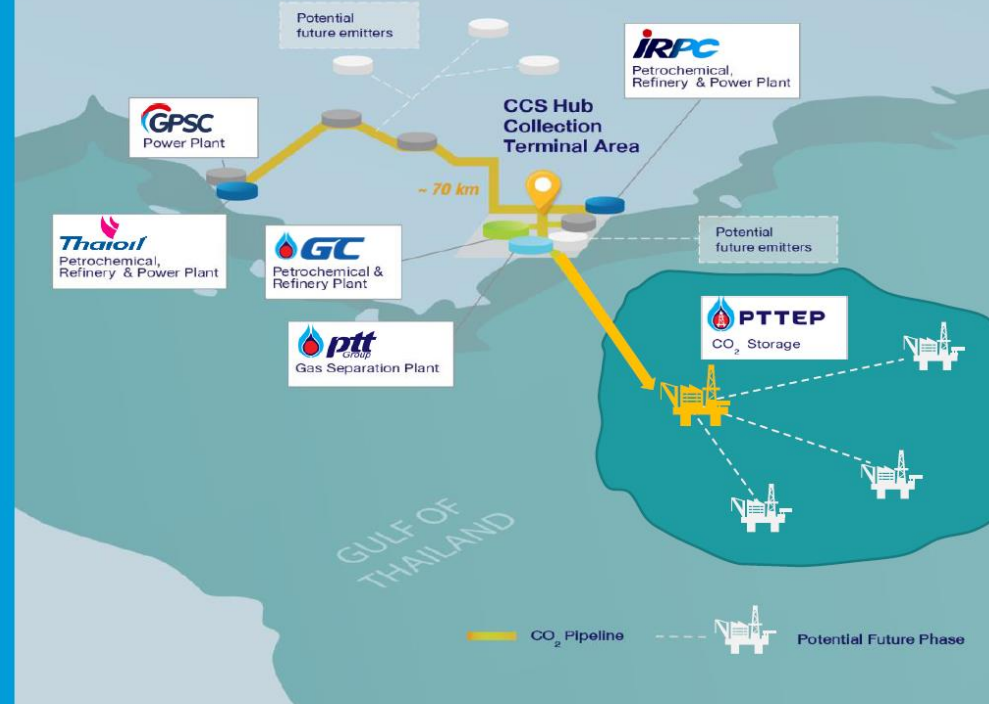


### OBJECTIVES



- Reducing emissions from upstream activities at Arthit gas field (Gulf of Thailand)
- 1<sup>st</sup> demonstration of CCS feasibility in Thailand and prove Gulf of Thailand's CCS potential

## Eastern Thailand Carbon Capture and Storage (CCS) Hub Initiative



4

# Barriers to low-carbon transition and Policy recommendations



# Fossil-fuel lock-in, infrastructure, and regulations may obstruct low-carbon transition

- **Lock-in of fossil fuel infrastructure:** Planned or grey energy projects in the pipeline, unabated coal power plant, etc. are costly to change due to sunk investment costs and can lead to future stranded assets. These present a challenge to the development of alternative clean energy infrastructure.
- **Regulatory risk:** policy discontinuity or stop-and-go policy, fossil fuel subsidies, etc.
- **Laws and regulations:** Under this existing regulatory structure, the peer-to-peer clean energy trading is still not supported. The third-party access (TPA) regime must be established to allow prosumers, or third parties, to access the grid.
- **Insufficient infrastructure:** inadequate charging stations for electric vehicles (EV)
- **Lack of access to finance:** both domestic (access to bank loan) and international (access to climate finance takes long time to develop proposals)
- **Technology costs:** costs of some technologies are still very high, especially CCS & CCUS, energy storage system, etc.





# Economic disturbances and energy insecurity slow down the transition

- **Economic slow down due to unexpected negative shocks** such as a pandemic leads to an reallocation of resources to support short-term stimulus plans and delay investment in low-carbon projects and technologies
- **Oil price crisis such as that stemming from the Ukraine-Russian War** causes disruptions in the energy market and create major energy security risks worldwide. Because of their variability, wind and solar cannot be the foundation of a dependable electricity grid they are less reliable than coal, oil or natural gases.

**IMF slashes global GDP forecast as economic outlook grows 'gloomy and more uncertain'**

PUBLISHED TUE, JUL 26 2022, 9:00 AM EDT | UPDATED TUE, JUL 26 2022  
Karen Gilchrist @KARENGILCHRIST

**The Ukraine war has upended the energy transition — and it's not good news for the planet**

PUBLISHED FRI, MAY 20 2022, 1:18 AM EDT | UPDATED FRI, MAY 20 2022, 5:07 AM EDT  
Sam Meredith @SMEREDITH

**Energy crisis prompts ESG rethink on oil and gas**

Investors are starting to look more favourably on energy companies because of their role in the transition to a decarbonised economy



Going up: energy prices have risen sharply since Russ

**Will the Ukraine war derail the green energy transition?**

As Europe scrambles to find alternatives to Russian oil and gas and global energy prices soar, coal could be the winner



Source: CNBC and Financial Time

- Transitioning toward a low-carbon economy will depend on the government making/introducing the following.
  - **New policy instruments** that incentivize businesses to reduce emissions and green their production:
    - Two commonly known external carbon pricing measures include carbon tax and cap-and-trade or emission trading scheme.
    - Emission trading scheme might be less costly for businesses and appropriate for targeting the sector or industry that is a big emitter; however, setting up carbon market is not an easy task, requiring allocation of allowed GHG emission units or “Cap”.
    - Carbon tax is relatively less preferred by business but the cost of implementation is less. The challenge is that carbon tax in Thailand is linked with the complicated structure of energy pricing. A carbon tax would increase the cost of burning fossil fuels, thus increasing the cost of producing goods and services that rely on those inputs, particularly for carbon-intensive things like electricity and transportation. In the future, there is thus possibility of having carbon tax on selected types of commodities that are high emitters.
  - **Power market reform:** Unlocking rigid laws and regulations by allowing for third party access to grid to allow for peer-to-peer energy trading are key in allowing for 100% green electricity to meet requirements of CBAM, multinationals and foreign direct investors.
  - **Provision of necessary infrastructure:** This includes putting in place accessible and affordable public EV charging stations, especially in areas that are not profitable for private sector to complement private sector efforts.
  - **Carbon credit certification:** Agencies that certify GHG emission reduction should reduce the time used in certifying and certifying costs and ensure compliance with international practices.



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