

Climate Change			
Problems		Causes of Problems	
Greenhouse Effect		Greenhouse Gases - GHG	
Global Warming		Carbon dioxide 80%	
		Methane 10%	Nitrous oxide 7%
Climate Change		Hydrofluorocarbon	Perfluorocarbon
		Sulfur hexafluoride	Nitrogen trifluoride

Level 1: Global Pressure			
Solutions of Greenhouse Gas Reduction			
Present Market-based Mechanism			
Paris Agreement from 2021 onwards			
Original Target: <2 Degree C in 2100		Ambitious Target: <1.5 Degree C in 2100	
Greenhouse Gas Reduction Targets under Paris Agreement			
NDC-Nationally Determined Contribution 2021-2030			
Reduction Plan 20-25% of BAU-Business as Usual (Thailand)			
Energy + Transport / Waste Management / Industrial PPU (Thailand)			
Global Carbon Neutral & Net Zero Carbon Targets of <1.5 Degree C by 2100			
Target by	Carbon Neutral: Offset	Net Zero Carbon: Carbon Sink	Net Zero GHG: Carbon Sink
Majority of Developed Countries	2050 + -	2050 + -	2067-2073
Majority of Developing Countries	2060 + -	2060 + -	2075-2088
Thailand National Energy Plan	2065-2070	2065-2070	n.a.
Thailand's Carbon Neutrality	2065	2065	n.a.
Mechanism & Tools: Carbon Markets			
Compliance Market		Voluntary Market	
Cap & Trade: EU ETS, Shanghai ETS, Carbon Tax, etc.		CDM, JI, J-VER, K-VER, T-VER	
Mechanism & Tools: Offsets and RE Certificates			
Carbon Credit = Offsets (Must be 'Additionality')		RECs - Renewable Energy Certificates (Legal) and I-RECs	
Unit: MtCO2e		Unit: MWh	
Emission Reduction from any Projects		Only from Renewable Electricity Generators	

Level 2: Regional Pressure			
EU's CBAM, US's BCA = Non-Tarif Trade Barrier /Technical Trade Barrier			
Carbon Pricing embeded in product needed to recover CBAM Certificate that EU importers has to pay for			

Corporate's Scope of Emissions	Scope 1: Direct Emissions	Scope 2: Grid Emissions	Scope 3: Indirect Emissions
Sources of Emissions	Owned Opertions	Energy Purchase from Grid	Supply Chain
Instruments	Carbon Credit	RECs / I-RECs	Carbon Credit
		Carbon Credit	
Scope covered by CBAM	Covered	Not-Covered	Not-Covered

Level 3: Corporate Policy and Pressure (Thailand)			
RE100 and EE are keys to Success			
Decarbonization	Decentralization	Digitalization	Deregulation
Digital Trading Platfrom: Carbon Credit: T-VER++, RECs (EPPO), and RE VPPA-Virtual Power Purchase Agreement			
International Standard Required, i.e. ISO 14064, Gold Standards, and others for Carbon Footprint			
Reporting: SDG - ESG - BCG - DJSI			

Assumption to meet 'Corporate Policy' on Carbon Neutral/Net Zero Carbon Emission with Scopes

(Scenario 1) Carbon Neutral: With Carbon Credit Offsets

Scope	Emissions	E-Reduction	Offsets	Emission Target
Scope 3: Indirect Emission	Supply Chain, Travel 20 mtCO2e	Supply Chain, Travel 20 mtCO2e	Carbon Credit 20 mtCO2e	Carbon Neutral 0 mtCO2e
Scope 2: Grid Emission	Purchased Electricity, Heat, Steam from Grid 30 mtCO2e	RE VPPA 10 mtCO2e Purchase from Grid 20 mtCO2e	RE VPPA 10 mtCO2e RECs / I-RECs 20 MWh (10 mtCO2e) Carbon Credit 10 mtCO2e	
Scope 1: Direct Emission	Vehicles & Equipments, Wastewater Treatment Stationary Sources 50 mtCO2e	RE + EE 30 mtCO2e 20 mtCO2e	RE + EE 30 mtCO2e Carbon Credit 20 mtCO2e	

(Scenario 2) Net Zero Carbon: Carbon Sink

Scope	Emissions	E-Reduction	CCU/CCUS/REDD/LULUCF	Emission Target
Scope 3: Indirect Emission	Supply Chain, Travel 20 mtCO2e	Supply Chain, Travel 20 mtCO2e		Net Zero Carbon 0 mtCO2e
Scope 2: Grid Emission	Purchased Electricity, Heat, Steam from Grid 30 mtCO2e	RE VPPA 30 mtCO2e		
Scope 1: Direct Emission	Vehicles & Equipments, Wastewater Treatment Stationary Sources 50 mtCO2e	RE + EE 50 mtCO2e		
			Carbon Sink -20 mtCO2e	

(Scenario 3) Carbon Neutral/Net Zero Carbon: With RE100 and Without Offsets/Carbon Sink

Scope	Emissions	E-Reduction	Offsets/Carbon Sink	Emission Target
Scope 3: Indirect Emission	Supply Chain, Travel 20 mtCO2e	RE + EE 20 mtCO2e	RE100 + EE	Carbon Neutral/Net Zero Carbon 0 mtCO2e
Scope 2: Grid Emission	Purchased Electricity, Heat, Steam from Grid 30 mtCO2e	RE VPPA 30 mtCO2e		
Scope 1: Direct Emission	Vehicles & Equipments, Wastewater Treatment Stationary Sources 50 mtCO2e	RE + EE 50 mtCO2e		
			0 mtCO2e	