Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

Economy Movement toward Carbon Free Electricity

The 58th Meeting of APEC Expert Group on New and Renewable Energy Technologies (EGNRET 58) and Associated Meetings

3 - 7 April 2023

Munlika SOMPRANON
Director of Policy and Strategy Section,
Strategy and Planning Division,
Department of Alternative Energy
Development and Efficiency (DEDE)

Content

- Energy & GHG Situation in Thailand
- Alternative Energy Development Plan (AEDP)
- Energy Efficiency Plan (EEP)

Energy Situation in Thailand

Electricity from Renewable Energy (As of Feb 2023)

24.70% (including large hydro)

Energy Intensity

(As of Sept 2022, Base year 2010)

Improving 18.74%, 8.01 ktoe/billion baht

Charging Station

(As of Sept 2022)

2,572 Stations

Electric Vehicle

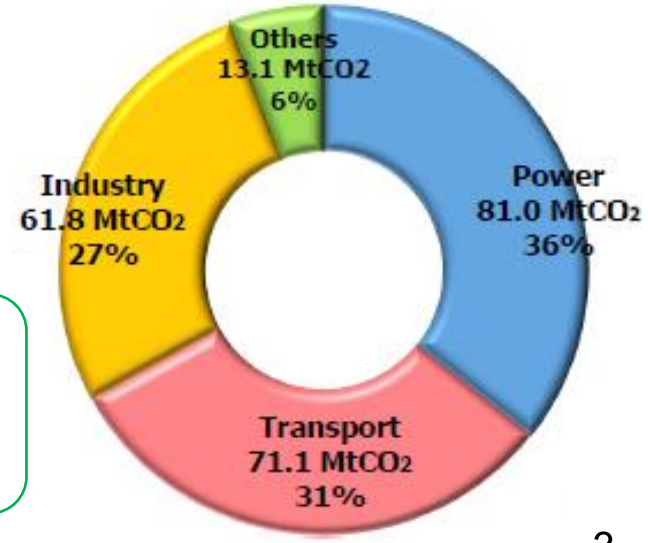
(Accumulated registered cars as of Dec 2022)

BEV 32,081 Cars

PHEV 42,415 Cars

CO_2 emission in energy sector

(Jan – Nov 2022) **227 $MtCO_2$**



References :
DEDE, EPPO, EVAT

GHG Situation in Thailand

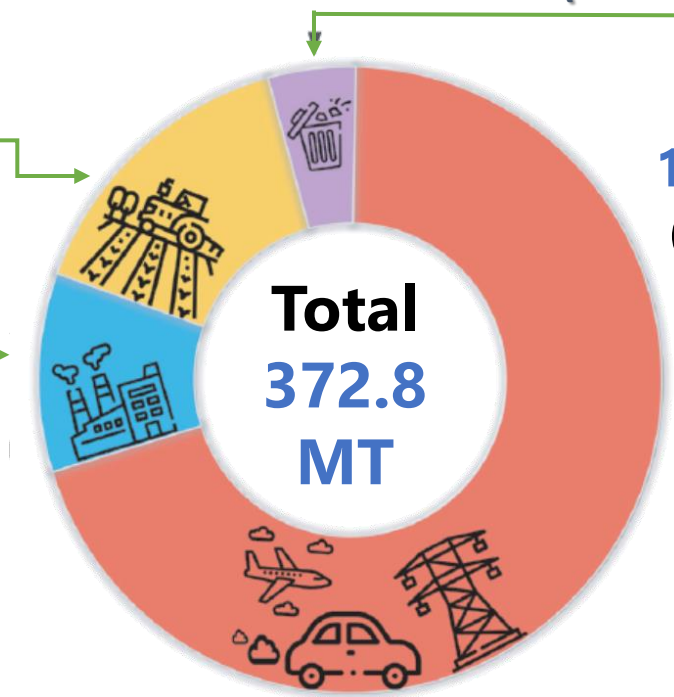
Climate Change Target in Thailand

Thailand Commitments for Climate Change

COP 26

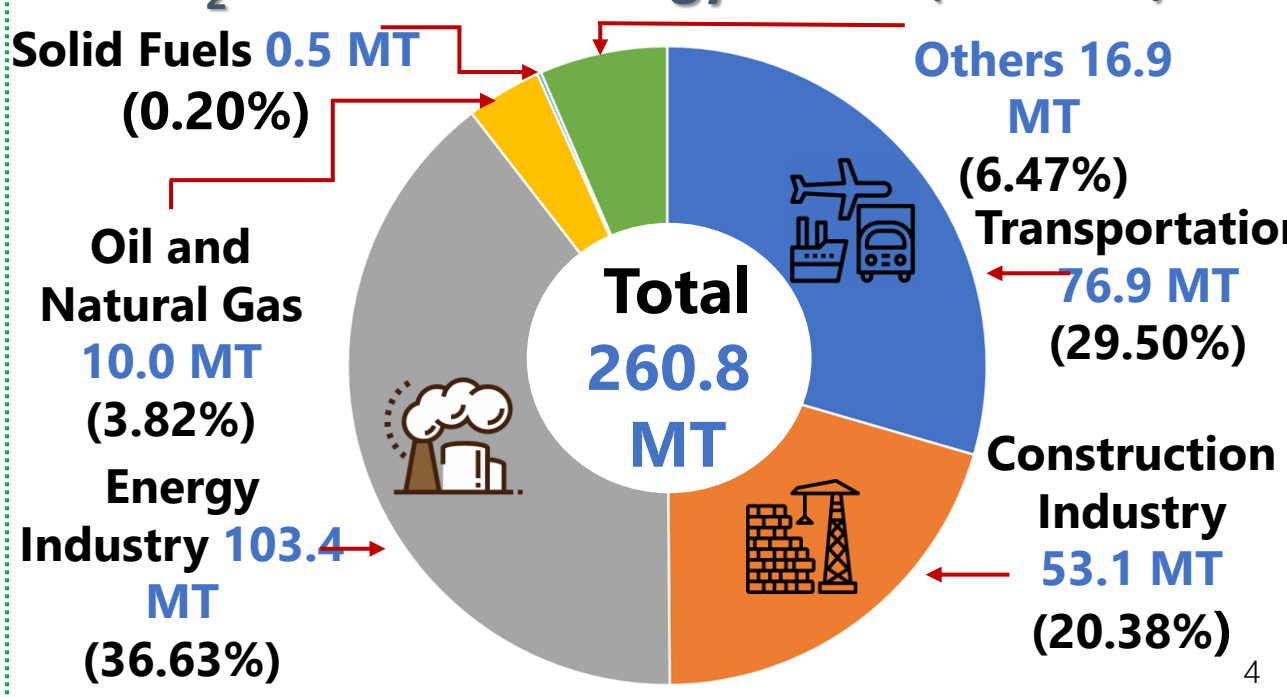
- ✓ Carbon Neutrality by 2050
- ✓ Net Zero Emission by 2065
- ✓ Nationally Determined Contribution (NDC) 30 - 40% (with International support) by 2030

GHG Emission in Thailand (As of 2019)



Source : ONEP

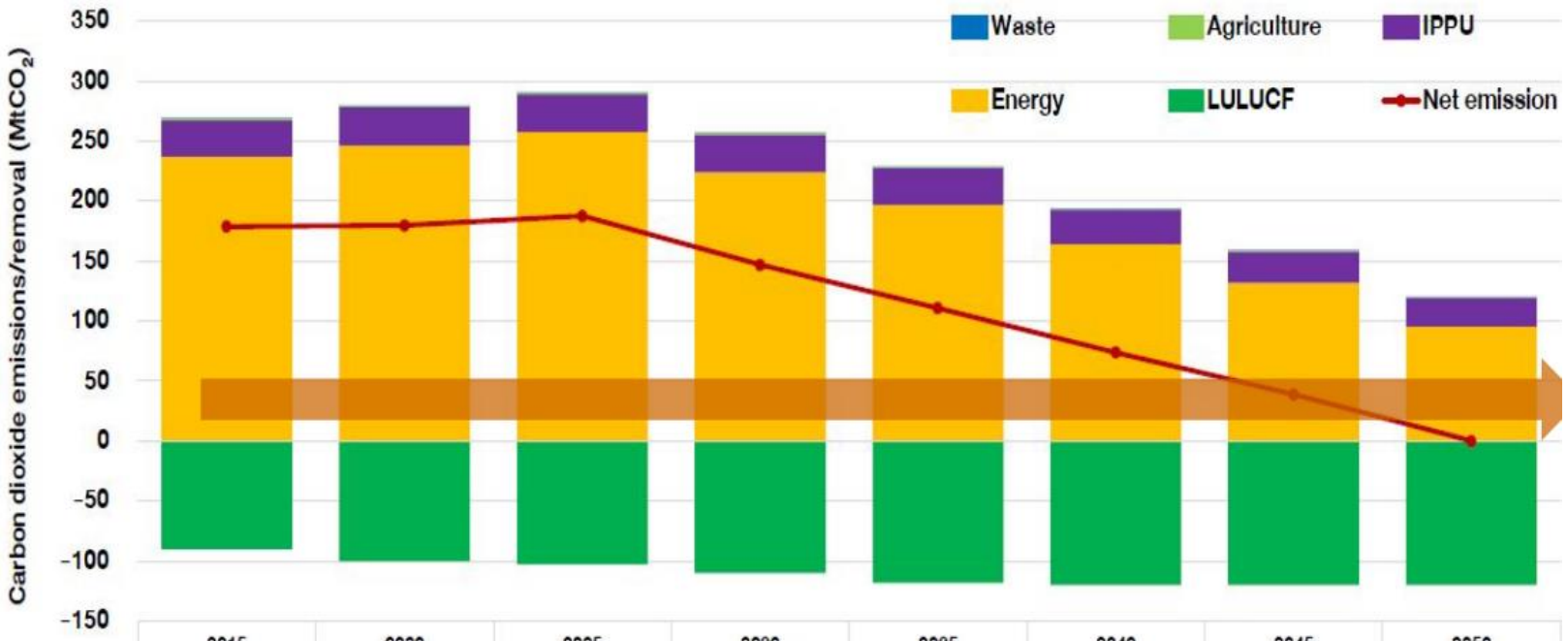
CO_2 Emission in Energy Sector (As of 2019)



Source: EPPO

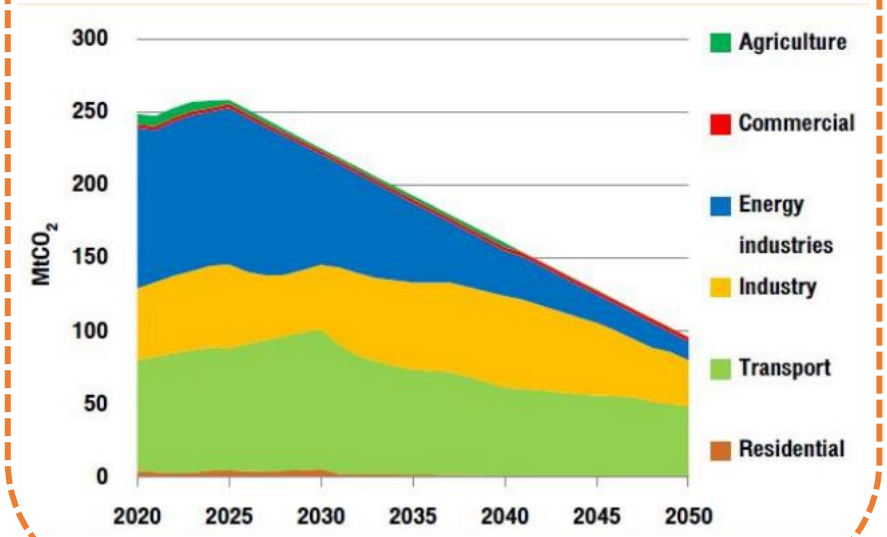
GHG and CO_2 reduction Scenarios from ONEP study

CO_2 Emission Scenarios to achieve Carbon Neutrality by 2050



	2015	2020	2025	2030	2035	2040	2045	2050
Waste	0.20	0.26	0.24	0.24	0.24	0.22	0.20	0.18
Agriculture	1.40	1.40	1.40	1.40	1.25	1.00	0.75	0.50
IPPU	30.32	31.43	31.43	31.16	30.31	28.19	26.03	23.82
Energy	237.00	246.56	257.44	224.00	196.89	164.30	131.80	95.50
LULUCF	-90.26	-100.00	-103.00	-110.00	-118.00	-120.00	-120.00	-120.00
Net emission	178.65	179.64	187.50	146.80	110.69	73.70	38.77	0.00

CO_2 From Energy Sector under Carbon Neutrality 2050 scenario



CO_2 emission in energy sector at 2050 **95.5 $MtCO_2$**

National Energy Plan (NEP)

Goals

- To use clean energy and **to achieve Carbon Neutrality by 2050 and Net Zero Emission by 2065**
- To increase **competition and investment capacity of Thai's stakeholders** in order to **adapt with low carbon economy and new innovation**
- To be in line with **Long-Term Low greenhouse gas Emission Development Strategies (LT-LEDS)**

Policy Directions

- **Increase Energy Efficiency more than 30% (~ 40%)**
- **Shift energy using in transportation sector to green energy by using EV 30@30 policy**
- **Increase RE share in new electricity production at least 50% (~ 70 - 80%)**
- **Improve energy infrastructures in order to support energy transition with 4D1E policy**
  (**D**igitalization **D**e-Centralization **D**e-Regulation **D**e-Carbonization and **E**lectrification)

BCG Model on Energy

- Higher Energy Security
- Better Well-being
- Higher Income
- Better Environment

BCG Model on Energy

Vision : Develop green energy according to BCG Model to achieve Carbon Neutrality by 2050

5 Action Plans for BCG on Energy

Action Plans on Green Energy

1. Adjust power and heat production portfolio to low carbon way
2. Adjust the energy consumption and production in transport sector to low carbon way
3. Increase energy efficiency
4. Biorefinery

Actions Plans on Carbon Sink

5. Increase CO_2 absorption

Expected Results

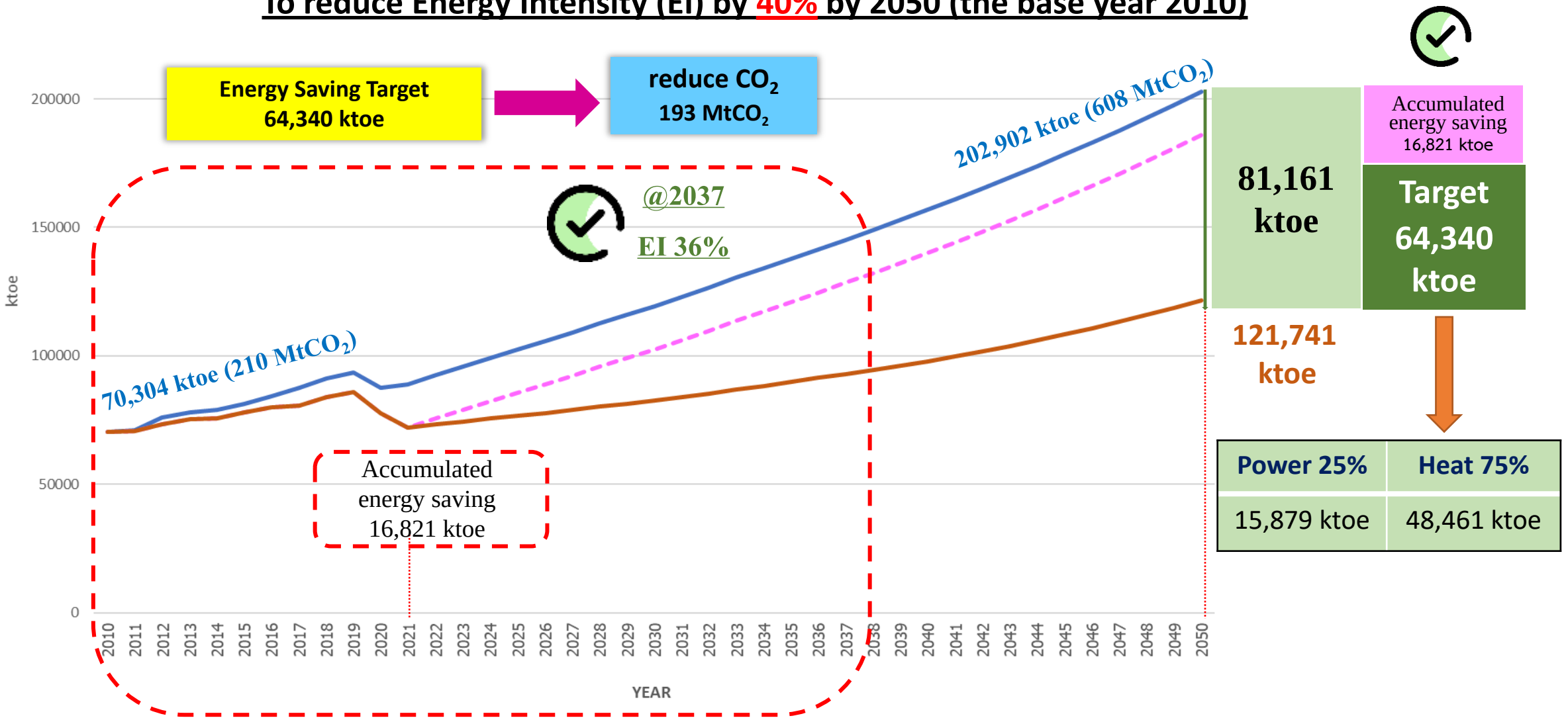
Job	35,340	Positions
Income	34.66	Million THB
CO_2 Reduction	43.13	$MtCO_2$

Remark : The results are forecasted from BCG action plans of MOEN 2021-2027

Energy Efficiency Plan (EEP)

EEP Target by 2050

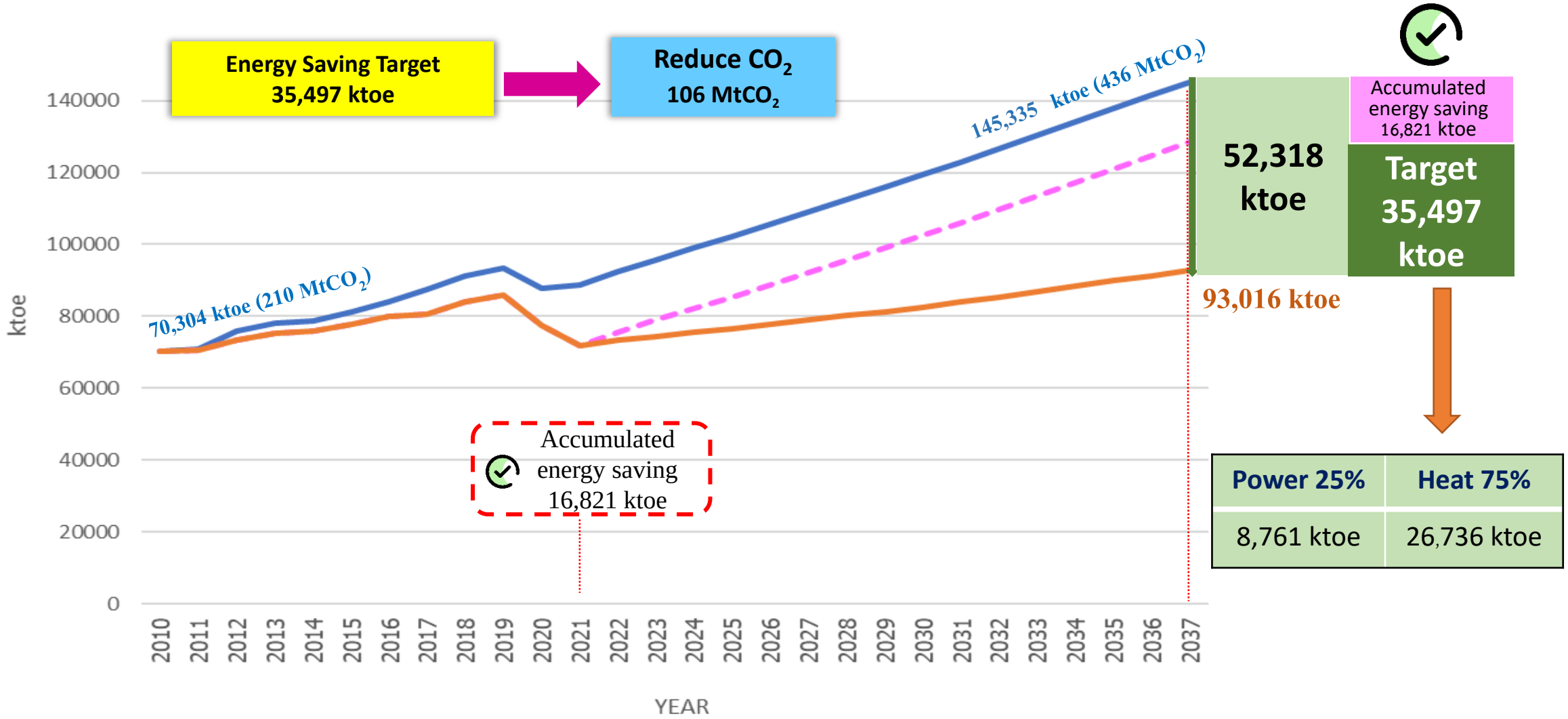
To reduce Energy Intensity (EI) by 40% by 2050 (the base year 2010)



Remark : 1 ktoe = 3,000 TCO_2

EEP Target by 2037

To reduce Energy Intensity (EI) by 36% by 2037 (the base year 2010)



Power 25%	Heat 75%
8,761 ktoe	26,736 ktoe

Remark : 1 ktoe = 3,000 TCO_2

Measure targets

Measure targets by sectors

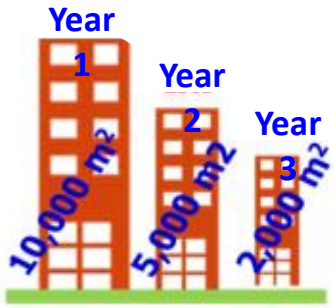
Unit: ktoe

Sectors	Mandatory		Promotion		Total	%
	Power	Heat	Power	Heat		
1. Industry	1,136	3,995	2,897	4,404	12,432	**35**
2. Business	1,473	28	1,491	550	3,542	**10**
3. Resident	20	-	1,546	208	1,774	**5**
4. Agriculture	50	-	148	512	710	**2**
5. Transportation		1,650	-	15,389	17,039	**48**
Total	2,679	5,672	6,083	21,063	**35,497**	**100**
	8,351		**27,146**			

Energy Efficiency Implementations

Building Energy Code (BEC)

9 types of Building



New or retrofitted buildings being constructed which have total area equal to 2,000 m^2 or more must be designed under the energy conservation requirements.

Standard and Labelling

- ✓ 4 Groups
- ✓ 19 Products

- ✻ Construction products
- ✻ Agricultural machines
- ✻ Business and industrial products
- ✻ Home products

Smart Farm

Subsidy to change/improve equipment or machines or materials for higher efficiency, to use RE technologies application and to apply technology/innovation for farm management

DEDE SMART FARM

Target groups

- Poultry
- Pig Farming
- Dairy
- Aquaculture Farm

Direct Subsidy to improve equipment/machine efficiency

Direct subsidy to stakeholders to change/improve equipment or machines or materials for higher efficiency

Results

Participants	457	
Measures	670	
Subsidy	377.5	MTHB
Investment	2,086.9	MTHB

Alternative Energy Development Plan (AEDP)

Alternative Energy Development Plan (AEDP)

Target to achieve Carbon Neutrality by 2050 :

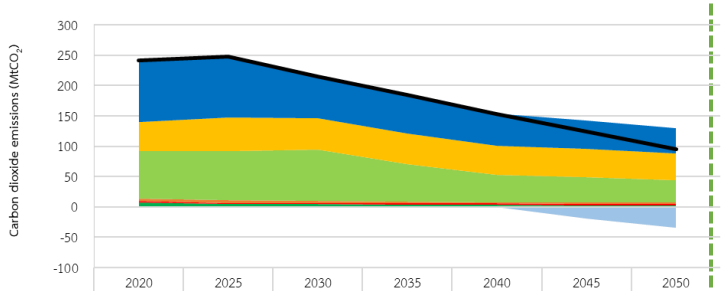
To increase RE share in Total Final Energy Consumption at least 50% in the form of electricity, heat and biofuel by 2050

AEDP development framework

- **Stability of national electricity system**
- **RE Potentials**
- **Carbon Neutrality target by 2050**

Electricity Sector

CO_2 emission in electricity by 2037
59.12 $MtCO_2$



	2020	2025	2030	2035	2040	2045	2050
Energy industries	101.6	100.9	67.7	63.2	53.0	47.4	41.5
Industry	47.8	54.9	52.3	50.4	48.4	46.5	44.6
Transport	79.0	81.8	84.6	62.2	44.5	41.0	36.1
Residential	3.7	4.2	3.4	3.0	2.5	2.4	2.3
Commercial	2.3	2.4	2.3	2.3	2.4	2.5	2.6
Agriculture	6.9	4.1	4.1	3.5	3.0	2.7	2.6
CCS+BECCS	0.0	0.0	0.0	0.0	0.0	-18.9	-34.2
Net CO2 emissions	241.4	248.2	214.5	184.6	153.7	123.6	95.5

Heat Sector

RE potentials in Heat (ktoe)

Solar	45
Biogas (waste water)	600
MSW	900
Biomass	18,000
Others (Pyrorysis, Hydrogen)	10
Total	**19,555**

Biofuel

- Main fuel blends : E20 and B10
- Sustainable Aviation Fuel (SAF) blend 1-5% by 2037
- Promote alternative biofuel ; Hydrogen

Biofuels	2022	2027	2032	2037
Ethanol Blend	E10 E20 E85	E20	E20	E20
Biodiesel Blend	B7	B7	B10	B10
SAF Blend	-	1-5	1-5	1-5
Other Biofuel (Hydrogen)	N/A	N/A	N/A	N/A

Alternative Energy Development Plan (AEDP)

Electricity Sector

(Draft)
Renewable Energy

Potentials

Renewable Energy	Potentials (as of 2037)
Solar (Grounded)	188,036
Solar (Rooftop)	3,509
Solar (Floating)	10,731
Biomass (Agricultural Residues)	8,492
Biomass (Energy Crops)	1,017
Biogas (Waste)	1,124
Biogas (Energy Crops)	1,314
Municipal Solid Waste	1,226
Industrial Waste	302
Wind	9,351
Small Hydro	347
Large Hydro	2,918
Others (Geothermal, etc)	22
Total	228,392

Renewable Energy Implementations

Community Power Plant

Current Implementation

Source: Biomass + Biogas → **41 Pilot projects** → Power Potential for PEA purchasing: **140.65 MW**, Average price 3.1831 THB/unit

Next Phase

17 December 2021 Ministry of Energy signed MOU with Ministry of Agriculture and Cooperatives, Ministry of Natural Resources and Environment and Federation of Thailand Industry to extend the stability for farmer by power and heat production from energy crop

Power Purchasing from RE

Power purchasing from RE (no fuel cost groups) in FiT type during 2022-2030

REs	FiT Rate (THB/Unit)	Duration (years)	Remark
Biogas	2.0724	20	Non-Firm contract
Wind	3.1014	25	Non-Firm contract
Solar Ground	2.1679	25	Non-Firm contract
Solar + BESS	2.8331	25	Partial-Firm contract

Principles

- Contract Capacity ≤ 90 MW
- Non-Firm contract for Solar Ground Wind and Biogas
- Partial-Firm contract for Solar+BESS

RE Heat Subsidy

Provide subsidy to invest in machines/equipment to produce heat from biomass and biogas in the form of Co-pay

Qualified applicants : 46

Budget support : 103,359,100 THB

Expecting result :
Increase RE in heat 62 ktoe

Solar Rooftop for People (Residential) project

Target 10 MW

การไฟฟ้านครหลวง Metropolitan Electricity Authority — MEA areas 5 MW

การไฟฟ้าส่วนภูมิภาค PROVINCIAL ELECTRICITY AUTHORITY — PEA areas 5 MW

Rate **2.20** THB/Unit

Purchasing duration 10 years (starting 2022 onward)

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Mahalo

DEDE,
Ministry of Energy,
Thailand