Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

Advancing Thailand's Energy Transition: Pathways to Renewable Energy and Energy Efficiency

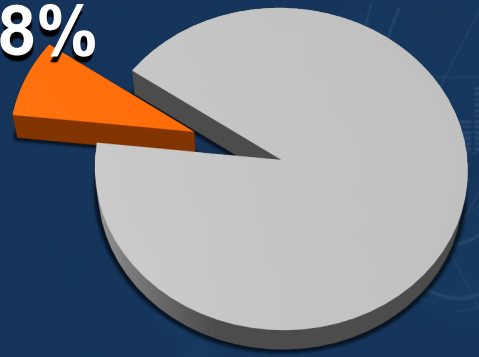
Department of Alternative Energy Development and Efficiency
Ministry of Energy

The Joint Meeting of EGEEC 66 and EGNRET 64
Bangkok, THAILAND

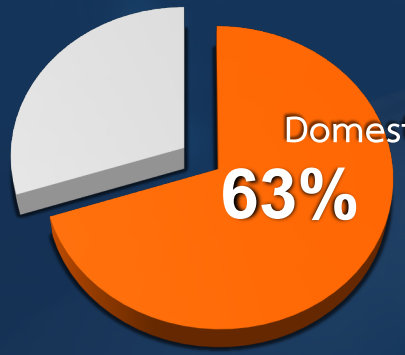
Thailand's Energy Situation Overview

Crude Oil

Domestic Production
8%



Natural Gas



Primary Energy Production

755 Thousand Barrel Oil Equivalent per day

Increased **2.8%**

Primary Energy Consumption

2,022 Thousand Barrel Oil Equivalent per day

Decreased **0.9%**

Primary Energy Import (Net)

1,502 Thousand Barrel Oil Equivalent per day

Decreased **0.4%**

Thailand is an energy-importing economy

Energy Import/ Energy Consumption

74 %

Comparable to the previous year

Remarks

1. Data from Jan. to Sept. 2025
2. %Growth are compared to the same period last year.
3. Source: Energy Policy and Planning Office, Ministry of Energy

Status on Renewable Energy in Thailand

Electricity

	Status 2025 (MW)	Target 2037 (MW)
Solar PV	7,095	12,139
Floating PV	69	2,725
Biomass	3,749	5,790
Wind	1,544	2,989
Biogas	557	1,565
MSW	396	900
Industrial Waste	34	75
Small Hydro	214	308
Large Hydro	2,918	2,920
Geothermal	0.3	-
	16,577	29,411

Heat

	Status 2025 (ktoe)	Target 2037 (ktoe)
Solar	9	100
Biomass	6,354	23,000
Biogas	669	1,283
Waste	208	494
	7,240	24,877

Transport

	Status 2025 (ML/d)	Target 2037 (ML/d)
Ethanol	3.44	7.50
Biodiesel	3.35	8.00
Pyrolysis oil	-	0.53
	6.79	16.03

The picture shows the RE production in 2025 comparing to its targets

AEDP: Alternative Energy Development Plan

In 2025

Electricity generation from RE accounts for **20.2%** of total electricity generation.

Heat use from RE accounts for **23.3%** of total heat use.

Biofuels account for **4.9%** of total transportation fuels

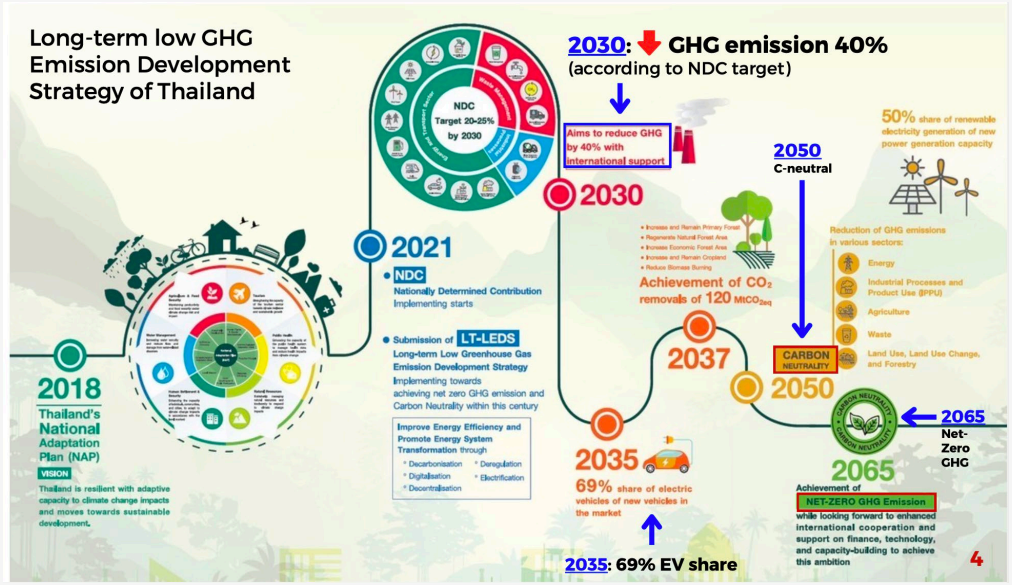
Energy Plan toward Net-Zero Emissions

Thailand's Commitment for GHG mitigation

2030: reduce 30% GHG compared with BAU (40% with international support)

2050: Carbon neutrality

2065: Net-Zero GHG emissions



Source: Global Compact Network Thailand.

2035: reduce 47% GHG compared with BAU with international support

2050: Net-Zero GHG emissions

Key enablers: renewables expansion, energy storage, green mobility, CCUS, hydrogen, and potential SMR deployment

Energy Plan toward Net-Zero Emissions

The Development of National Energy Plan (NEP)

The National Energy Plan (NEP) is built on key principles:

- Deliver benefits to the people
- Increase the competitiveness of the economy
- Drive Thai energy in line with world energy trends

NEP's Policy Direction

The National Energy Policy Council (NEPC) approved The NEP framework on the 4th Aug 2021

RE > 50% with ESS

- Reduction of RE cost
- Reduction of ESS cost
- Smart Grid development

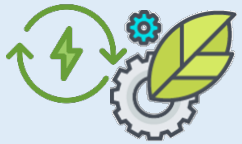
EV 30@30

- Promote clean energy in transport sector
- Promote EV utilization and battery industry
- Development of EV-related infrastructure

EE > 30%

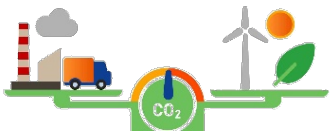
Promoting modern technology and innovation to enhance energy management efficiency

4D1E



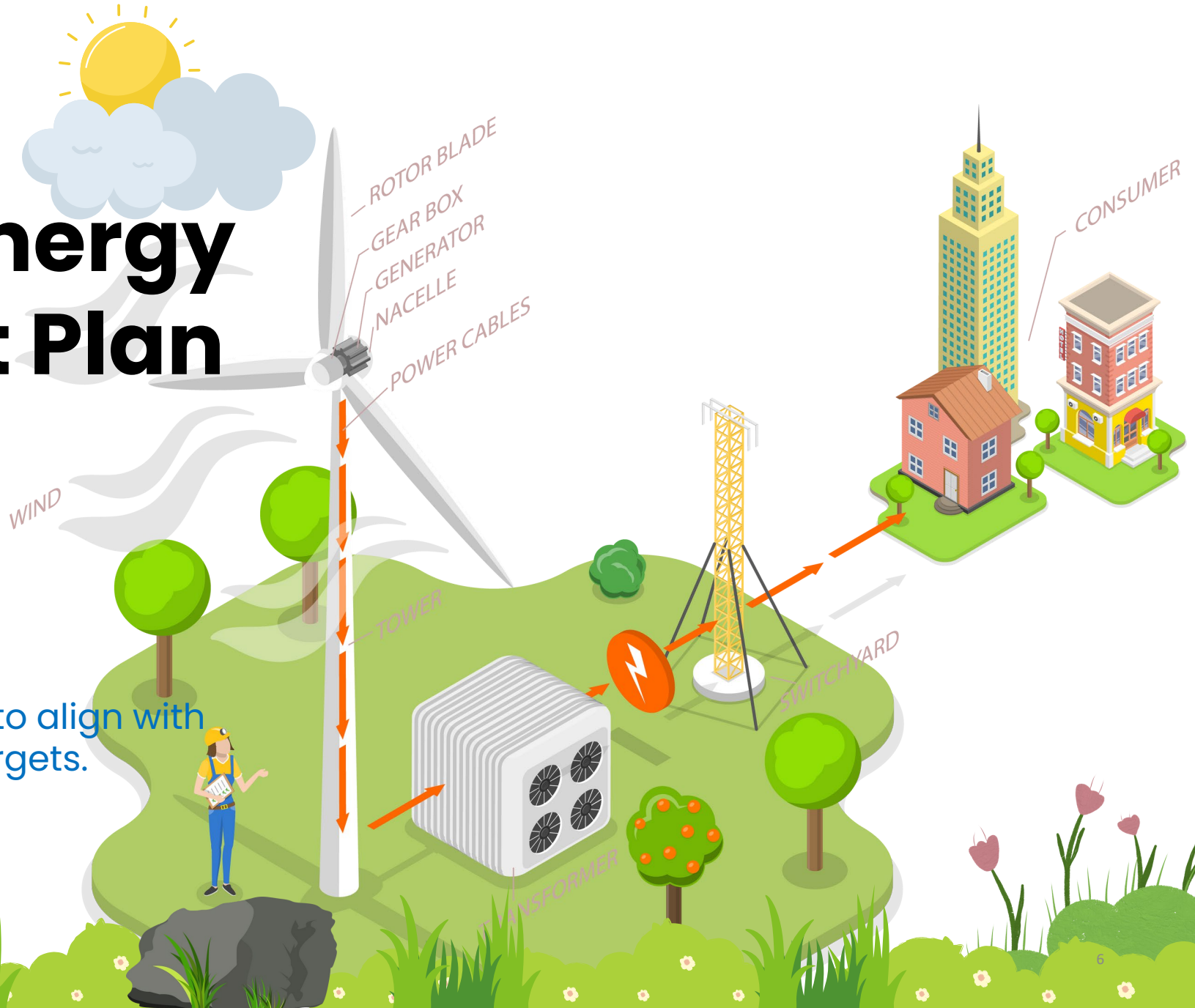
- DIGITALIZATION
- DECARBONIZATION
- DECENTRALIZATION
- DE-REGULATION
- ELECTRIFICATION

Net-Zero Emissions



Draft of the Alternative Energy Development Plan 2024–2037 (AEDP 2024)

Currently under revision to align with the country's Net Zero targets.

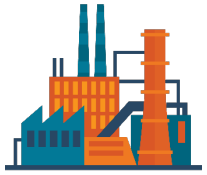


(Draft) AEDP 2024 Targets

Increase the Renewable Energy (RE) share in Total Final Energy Consumption to 37% by 2037.

Electricity
73,286 MW

- Solar
- Biomass
- Biogas
- Hydrogen
- Imported Hydro
- Wind
- Waste-to-Energy
- Small/Large Hydro
- Geothermal



Heat
17,360 ktoe

- Biomass
- Waste-to-Energy
- Hydrogen/Geothermal /Pyrolysis Oil
- Biogas
- Solar

Biofuels
1,939 ktoe

- Biodiesel (B7)
- Ethanol (E10/E20)
- Hydrogen
- Sustainable Aviation Fuel (SAF)

RE Target 37%

Electricity 16%

Heat 19%

Biofuel 2%

Expected Benefits

Economic Dimension

- Reduce fossil fuel consumption by 20,000 ktoe, equivalent to a value of at least THB 400 billion
- Generate income for farmers of no less than THB 41 billion per year
- Create investment value of at least THB 1.3 trillion

Social Dimension

- Improve quality of life through access to energy, particularly in areas with limited energy accessibility
- Strengthen energy resilience and enhance access to basic public utilities for communities
- Promote domestic knowledge development and support the creation of researchers and energy innovation

Environmental Dimension

- Reduce carbon dioxide (CO_2) emissions by at least 75 $MtCO_2$ by 2037, compared to 2022 levels
- Support the BCG Model (Bio-Circular-Green Economy)

Key Measures to Drive Targets

Electricity Sector

Policy, Legal, and Regulatory Measures

- Promote electricity purchasing from renewable energy sources
- Encourage renewable electricity generation through tax incentives
- Support appropriate green electricity tariff structures
- Revise and improve relevant laws and regulations

Stability and Energy Security

- Promote and develop energy storage systems
- Support decentralized renewable energy (RE) generation
- Encourage off-grid renewable power systems in remote areas
- Develop digital-based RE forecasting systems

Development of New Renewable Energy Sources

- Conduct studies on hydrogen production and utilization in the power sector
- Promote green hydrogen production and utilization

Heat Sector

Promote green hydrogen production and utilization

- Promote systematic storage and aggregation of renewable fuels
- Support upgrading renewable fuels into primary or co-firing fuels (e.g., wood pellets, RDF)
- Encourage the use of alternative fuels from industrial waste streams
- Support business matchmaking initiatives

Entrepreneurial Mindset

- Publicize successful project outcomes
- Promote pilot projects in industries with low RE adoption

Investment

- Promote investment through tax incentives and low-interest financing
- Support fuel switching from fossil fuels to renewable or alternative energy
- Facilitate access to green finance under environmental conditions

Biofuels Sector

- **Promotion of Sustainable Aviation Fuel (SAF)**

Domestic Implementation

- Assess national potential and impacts of SAF utilization
- Develop carbon credit trading mechanisms to support SAF
- Establish domestic certification bodies

International Engagement

- Review Default Life Cycle Emissions values
- Negotiate SAF utilization criteria from feedstocks such as CSPO, molasses, sugarcane, and palm oil
- Engage in SAF carbon trading negotiations

- **Promotion of Hydrogen Utilization**

Preparation Phase (2024–2027)

- Study and develop regulatory frameworks for production, transport, and utilization
- Define investment promotion measures across the value chain, including infrasture and FCEVs

Pilot Phase (2028–2034)

- Initiate pilot projects in various sectors

Commercialization Phase (2035–2037)

Key Policy

Promote biomass-based power generation to address open-field burning of agricultural residues, thereby reducing $PM_{2.5}$ emissions.

- Consider promoting mechanisms through the establishment of appropriate feed-in tariff rates for electricity generated from **sugarcane leaves and tops.**

- Enhance integration and coordination among relevant agencies, such as the Ministry of Energy and the Ministry of Industry.

Key Policy

UGT in Thailand is divided into UGT1 and UGT2

UGT1 (non-source-specific)

Supply

EGAT hydro ~ 2,000 GWh/year

Hydro power

Demand

In 2025 services will be provided to tariff type 3, 4, and 5*
From 2026 onwards, services will be Provide to all tariff types

Electricity tariff

(annual contract)

UGT1

Retail electricity price by tariff types, including F_t + **Premium**
1. Market price of REC
2. Service charges

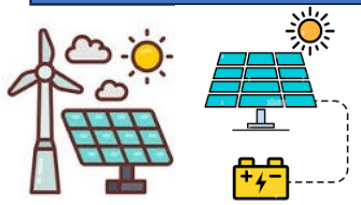
The pricing is calculated based on the standard electricity tariff plus a fixed green premium

UGT2 (source-specific)

Supply

Solar/Solar + BESS
Wind ~ 8,000 GWh/year

Big Lot 1: ~4,850 MW



Demand

tariff type 4 and 5*

Electricity tariff

(annual contract)

UGT2

Wheeling Charge
Transmission (T)
Distribution (D)
+ Energy Purchase + Dependable Capacity + Policy expenses (PE) and service charge or other expenses

The pricing is based on the actual cost of electricity from the chosen source, plus additional operational charges.

* Electricity tariff type 3: medium general services, Electricity tariff type 4: large general services and Electricity tariff type 5: specific bussiness

Key Policy

Solar Energy Promotion Policies Across Sectors

1: RESIDENTIAL SOLAR ROOFTOP TAX MEASURE

DETAILS: INCENTIVE & ELIGIBILITY

200,000 THB Incentive

Tax deduction for actual cost of solar equipment and installation, up to this maximum.

Target: 90,000 Households

New on-grid systems up to 10 kWp.

BENEFITS: ECONOMIC & ENVIRONMENTAL IMPACT

10.8 Billion THB Economic Stimulus

Projected significant investment, saving households evg. 585 electricity units/year.

Reduced CO_2 Emissions

Approximately **0.26 Million Tons Per Year.**

2: COMMUNITY SOLAR FARM

DETAILS: "1 SUB-DISTRICT 1 POWER PLANT" MODEL

Scaling to 1,500 MW Capacity

Individual ground-mounted sites capped at 10 MW each.

100% Private investment + 10% Mandatory Co-investment from PEA Affiliate

Power sold at a fixed rate of FiT: 2.1679 THB/unit for 25 Years.

BENEFITS: JOB CREATION & COMMUNITY SAVINGS

Over 30 Billion THB Investment & 1,785+ New Jobs Expected.

Direct Electricity Discount

Participating community households receive **40–80 Satang Per Unit** discount.

3: GOVERNMENT SOLAR ROOFTOP (PRIVATE PARTNERSHIP)

DETAILS: PRIVATE-PUBLIC PARTNERSHIP MODEL

Private entities invest in & manage solar installations on government buildings; currently pending final regulatory frameworks.

BENEFITS: FISCAL RESPONSIBILITY & NATIONAL GOALS

Reduced Government Budget Burden

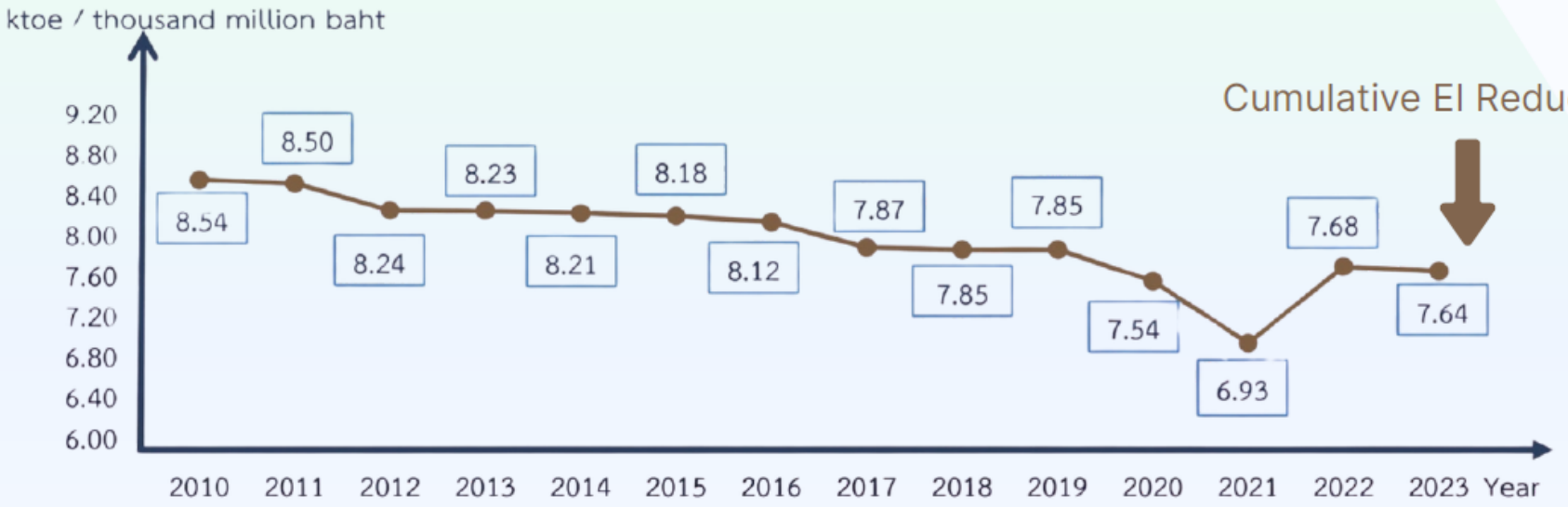
Lowers direct budget for electricity bills and long-term maintenance.

Strategic Leadership & National Goals

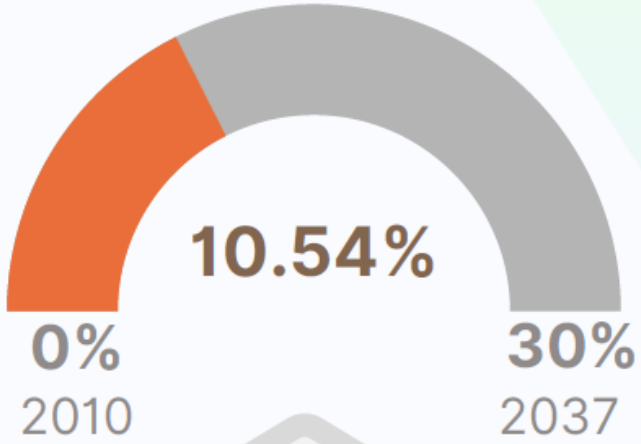
Agencies act as renewable energy leaders, encouraging others; critical for Carbon Neutrality and AEDP objectives.

Thailand's Energy Efficiency Situation

Energy Intensity (EI) in Thailand 2023



Cumulative EI Reduction



Decreasing of EI based on Thailand Energy Efficiency Plan 2018-2037 (EEP2018)

Revised Energy Efficiency Plan (In Progress)

Target EI Reduction (base year 2010)

EEP2018 — **30%** By 2037

New EEP

36% By 2037 and **40%** By 2050

Source: Thailand Energy Efficiency Situation 2023, DEDE, April 2025

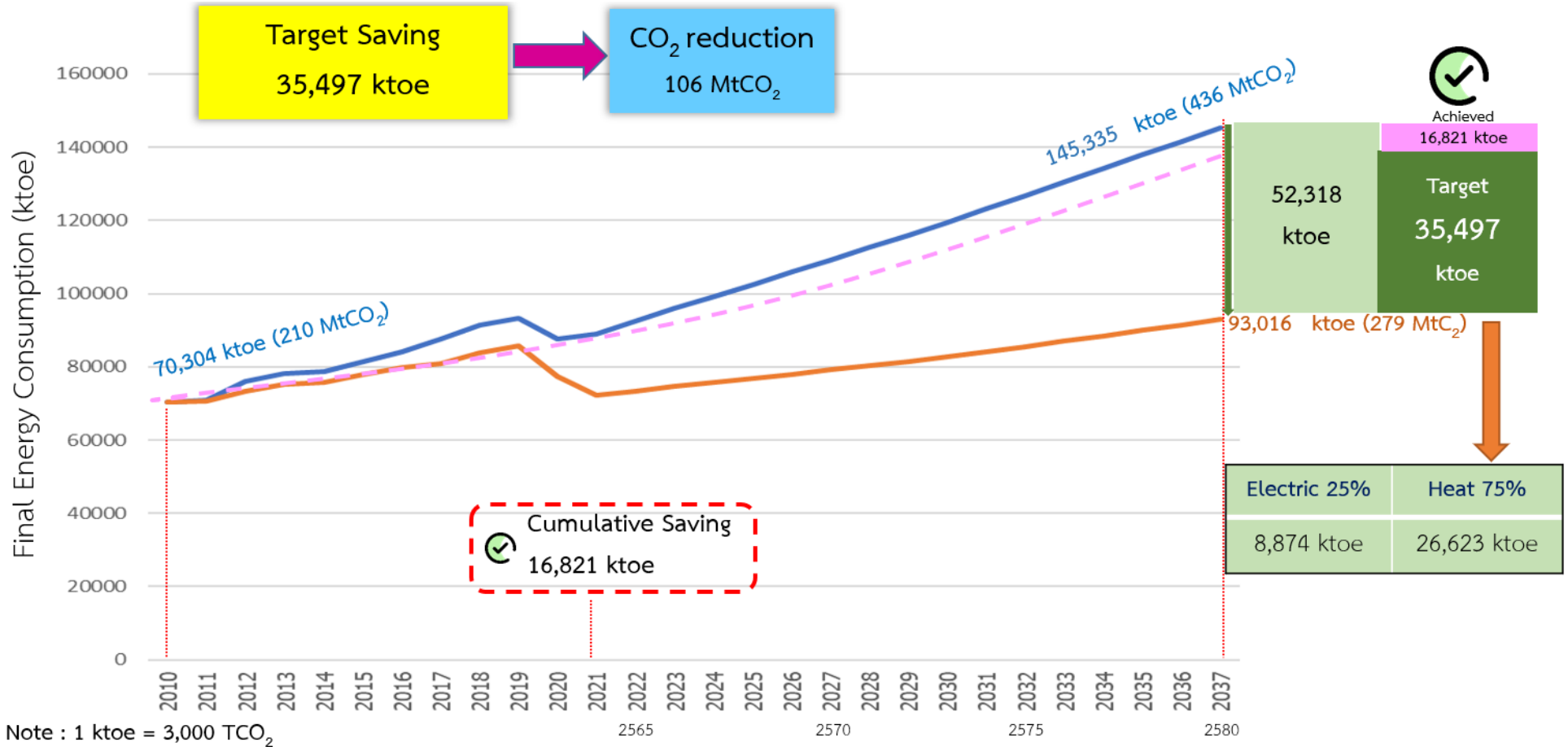
Thailand's Energy Efficiency Plan (EEP 2024)

Key Consideration:

- GDP and Population Projection Update (GDP 2.6) – March 18th, 2022
- Consider Carbon Neutrality target in energy sector (95.5 $MtCO_2eq$)
- Electric Vehicle projection from EPPO
- Sector-specific measures and supply-side measures

Target energy intensity (EI) reduction of 36%

within 2037 compared to 2010 level



Thailand's Energy Efficiency Plan (EEP 2024)

Target Saving: 35,497 ktoe (NEW)

3 Strategies – 14 Measures

5 Target Sectors

Industry | Building | Residential | Agriculture | Transports

Compulsory

- Energy management standards in designated factories and buildings (5,764 ktoe)
- Enforcement of energy codes (Industry, Building, Residential, Agriculture) (937 ktoe)
- Energy efficiency in road transport (1,650 ktoe)

Voluntary

- Energy efficiency standards and labelling for equipment (3,568 ktoe)
- Financial Incentive (4,904 ktoe)
- Promoting Innovation (IOT, Smart Technology, Big Data, AI) (317 ktoe)
- Energy efficiency in transport sector (EV, All modes of transport) (15,341 ktoe)
- Energy efficiency in agricultural sector (Smart Farming, Agricultural Mechanization) (660 ktoe)
- Energy efficiency in residential sector (Efficient Home, Smart Home) (1,754 ktoe)
- Promoting energy efficiency in equipment utilizing renewable energy (Biomass boiler, biomass furnace, RE generator, solar thermal) (322 ktoe)
- Energy efficiency by the supply side – Generation, Transmission, and Consumption (280 ktoe)
  - Promoting Efficiency in generation and grid system
  - Energy Efficiency Resource Standards (EERS)

Complementary

- Human Resource Development
- Public awareness
- Research and Development of technologies and innovations

Building Energy Code

New Energy Conservation Building base of Thailand's BEC Criteria

9 types of new or retrofitted buildings (total area (all floors combined) ≥ 2,000 m^2) must comply with building energy code.

1. Building Envelope
2. Lighting System
3. Air-conditioning System
4. Water-heating System
5. Renewable Energy
6. Total Consumption

Starting enforcement: 24th January 2023

Thailand's Strategic Roadmap: Powering Low-Carbon Economy

- **Strategic Decarbonization** Actively driving the energy sector towards the economy's 2050 Carbon Neutrality and 2065 Net-Zero goals.
- **RE Deployment Excellence** Targeting a 37% renewable share by 2037 through AEDP execution and market-driven mechanisms like the Utility Green Tariff (UGT) and Direct-PPA.
- **Energy Productivity Leadership** Implementing EEP 2024 to achieve 36% Energy Intensity (EI) reduction.
- **Regional Synergy & Resilience**: Enhancing energy security through collaborative knowledge exchange and joint initiatives within the APEC framework.

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"We can power a sustainable and resilient future for our region."

Thank You for Attention

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