Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

THAILAND's
AI-Driven Energy Innovation

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Pos : Engineer

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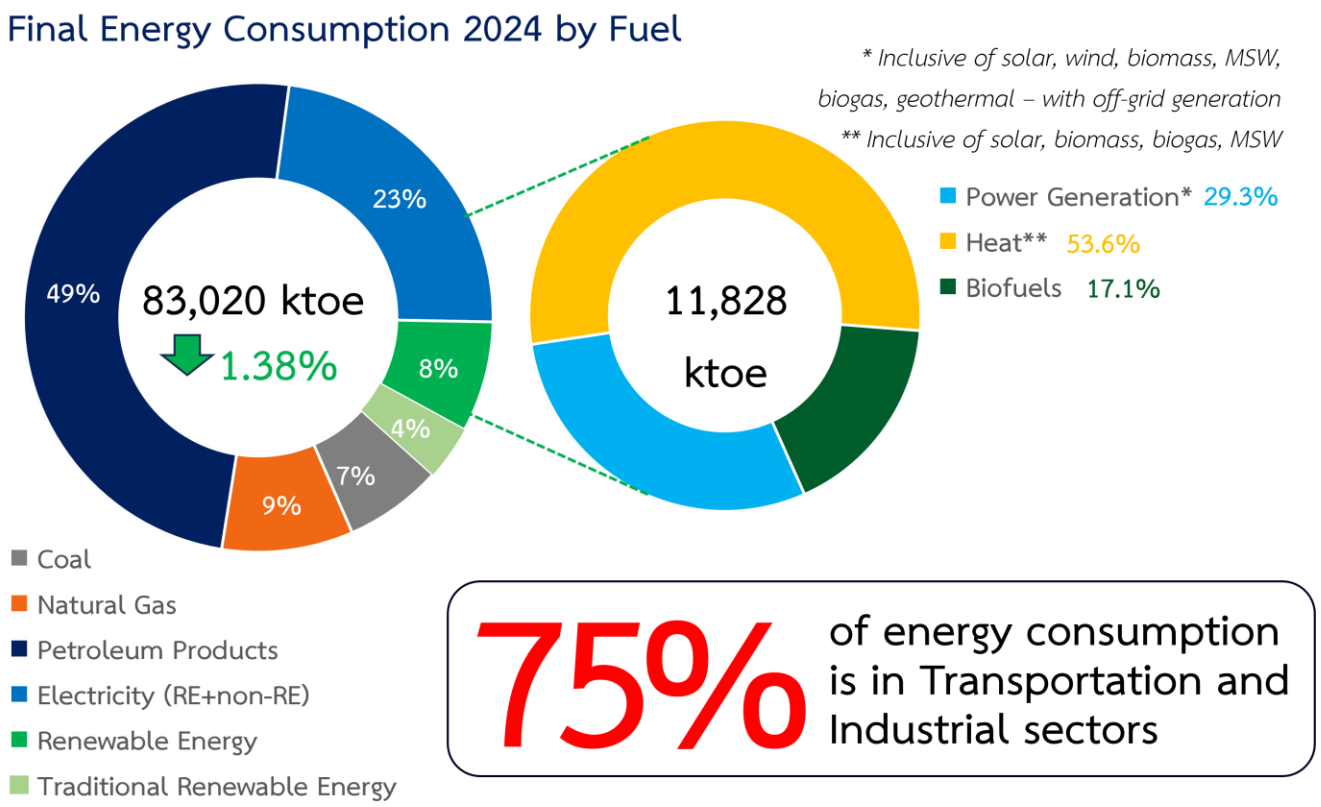
EGEEC65 and EGNRET63 Joint Meeting in Seoul, Republic of Korea

1. THAILAND Energy Situation

- ❑The **accelerated Net Zero target is now 2050**, fifteen years earlier than the original goal of 2065.
- ❑The **energy sector plays a central role**, with a strong focus on **increasing renewable energy** share, **improving energy efficiency**, and reducing fossil fuel dependence, particularly in power generation and transport.
- ❑While Transportation and Industrial Sector are the largest energy consumption sectors, **building sector is still play a crucial role** in reaching the national target.

Figure 1 : THAILAND 2024 Final Energy Consumption



75% of energy consumption is in Transportation and Industrial sectors

Source: Thailand's Energy Situation Report 2024, DEDE

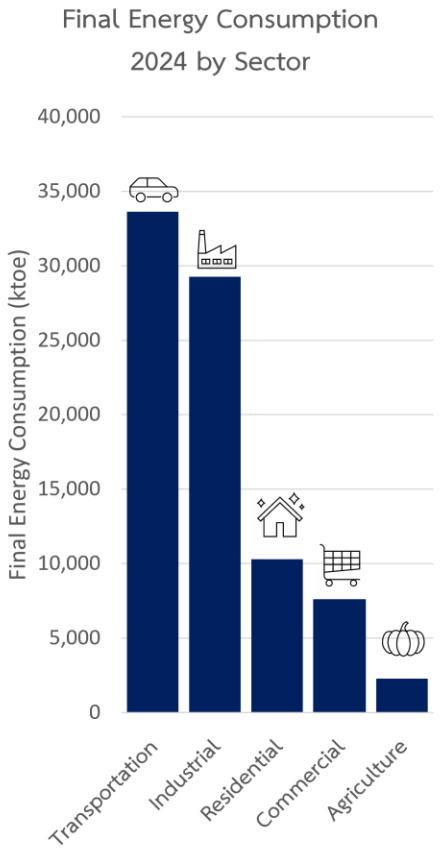
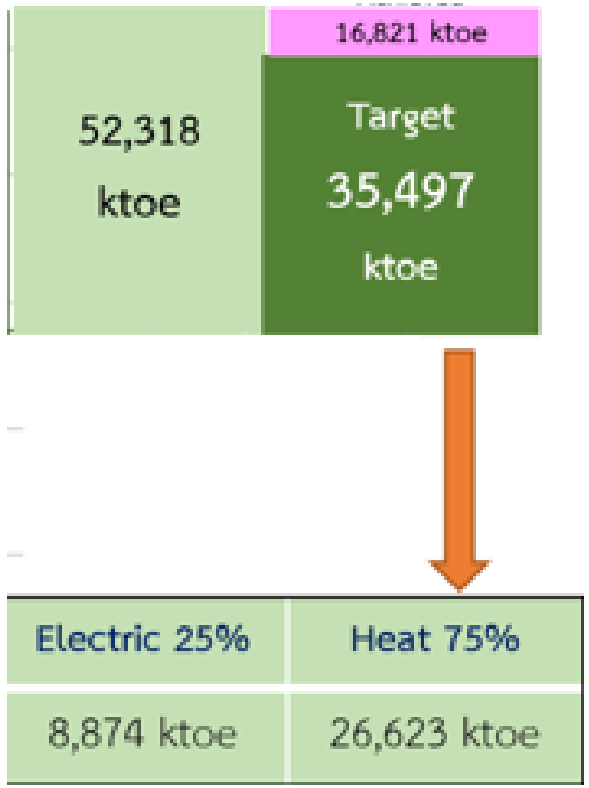


Figure 2 : EEP 2037 Target



2. Demand Response Control Center (DRCC)

DRCC Overview and Achievements

What is Demand Response ?

Grid Balancing

- Emergency situations such as power plant trip, disruptions in natural gas supply, etc.
- RE fluctuations, Demand curve change from EV.

National Control Center

Decision

- Cost
- Grid Reliability

Increase Power Generation

- Standby Reserve
- Spinning Reserve

Demand Response

Target

- Substitute new power plant construction as the PDP plan
- NCC can operate DR similarly to the power plant

DR Benefits

Manage the electrical system through DR

Sustainable approach with efficient investment

Enhance system flexibility, control efficiency, and reliability

Further expand to include New players such as EV, ESS, and Virtual Power Plant

DR Pilot Project 2022 - 2023

50 MW
Large C&I

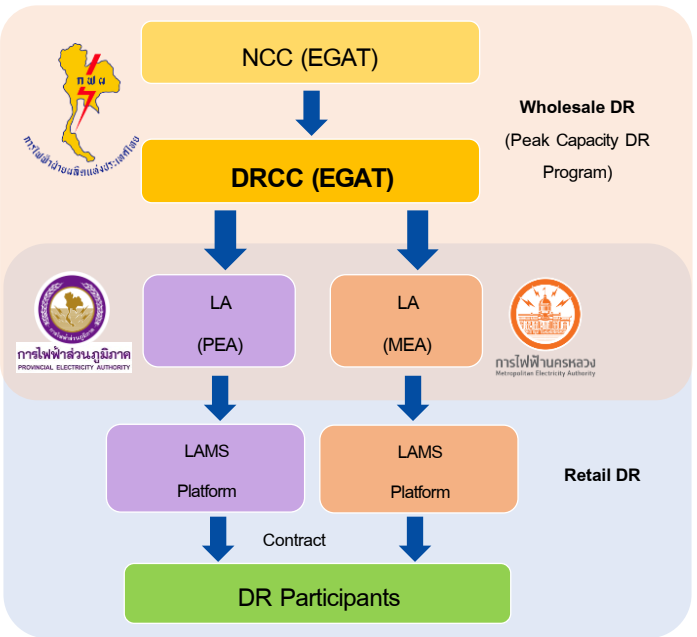
1:30 – 4:30 p.m.
7:30 – 10:30 p.m.

3 hrs/Event
2 Events/Day
6 Events/Month

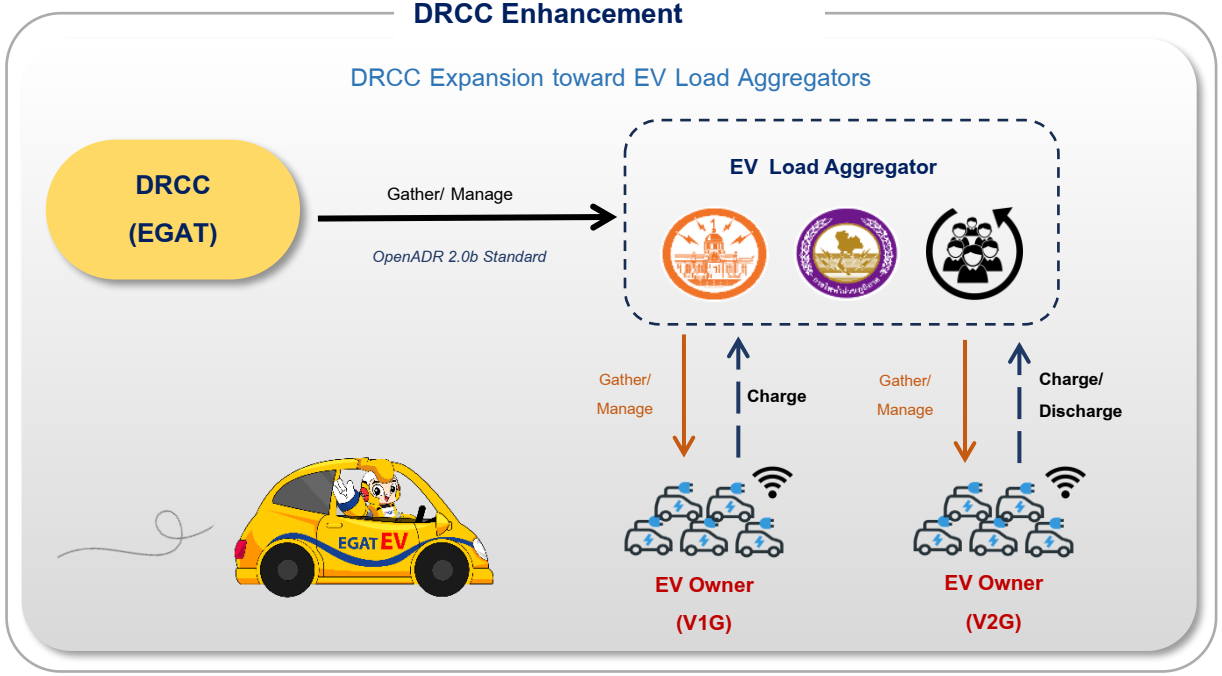
1 Day-Ahead
Before 5:00 p.m.

Reduction
~ 3,700,000 kWh

Performance
~ 104.24%



DRCC Enhancement



3. THAILAND ZEB Prototype

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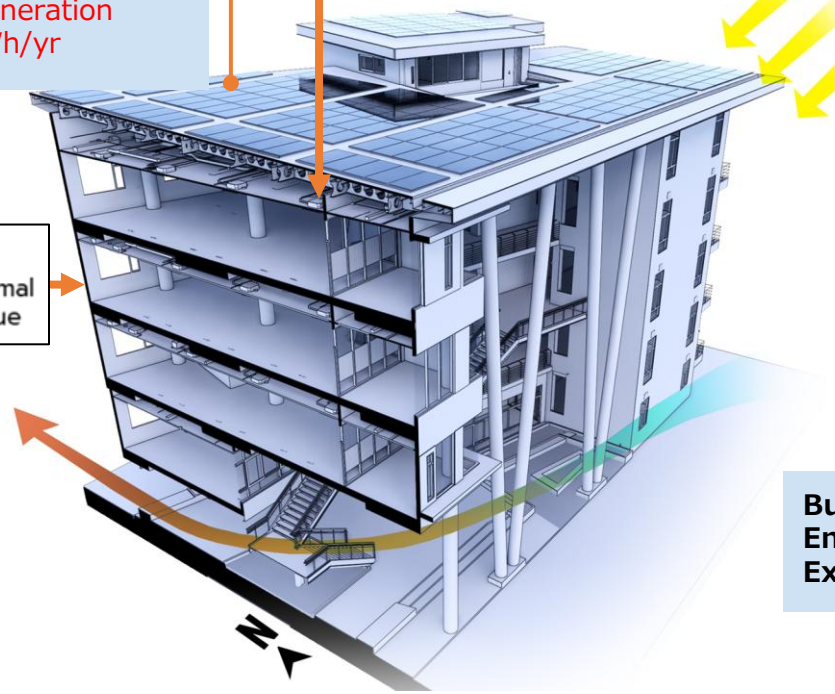
- **The 70th-anniversary DEDE building** is a **6-floor office building spanning 2,650 square meters**, constructed with a budget of 81.6 million baht (approximately 2.3 million USD), which translates to about 30,792 baht per square meter (**868 USD/m²**).
- It stands as Thailand's **pioneering government Zero Energy Building (ZEB),** designed in accordance with ISO 23764 standards. It serves as a pilot project, demonstrating ZEB feasibility through achieving over **70% energy consumption reduction** from its baseline and integrating a **100 kWp solar panel system.**
- The building accommodates 80 office workers daily during standard business hours, from 8:30 a.m. to 4:30 p.m.

RENEW Renewable Energy

Installed PV **100.04** kWp
(**410 W x 244 Panels)**
Projected Generation
146,000 kWh/yr

RTTV Roof Thermal Transfer Value

OTTV Overall Thermal Transfer Value



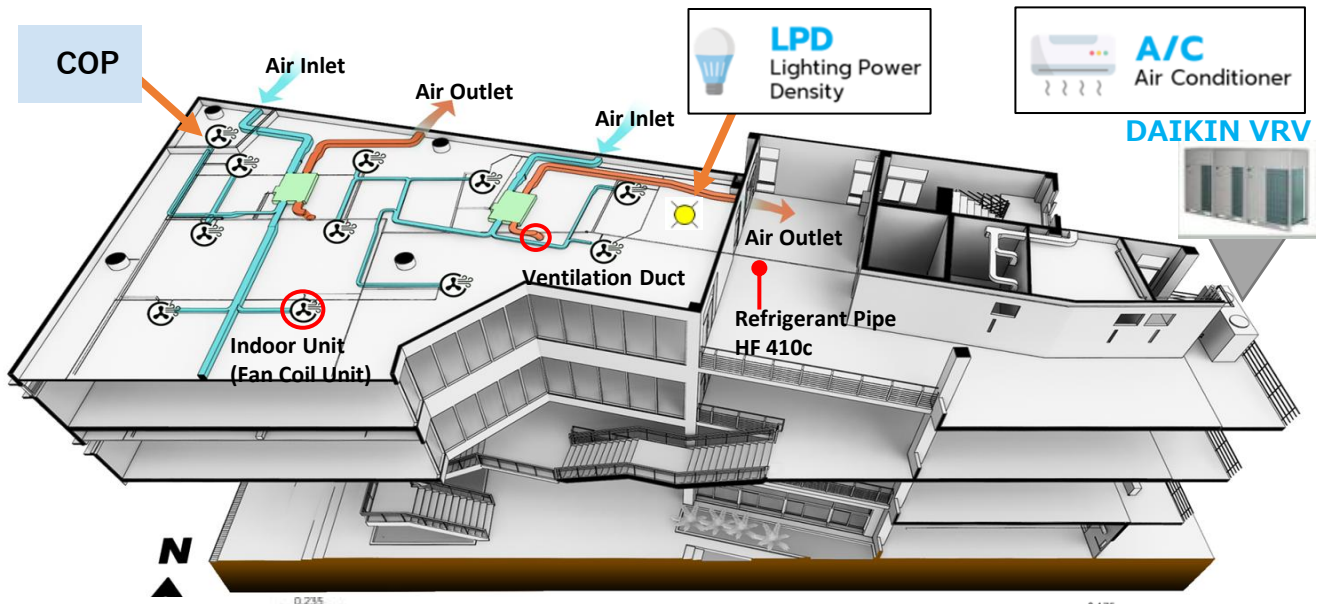
Building Envelope Example

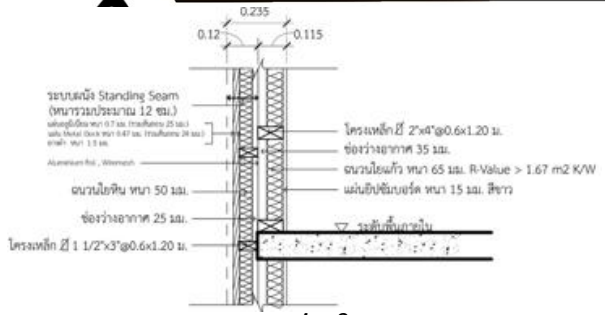
COP

LPD Lighting Power Density

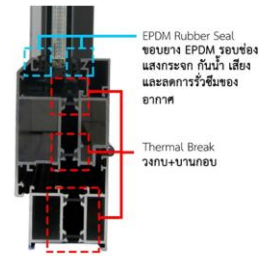
A/C Air Conditioner

DAIKIN VRV





U = 0.231 W/m² °C



U = 0.161 W/m² °C

= 0.725 W/m² °C

3. THAILAND ZEB Prototype

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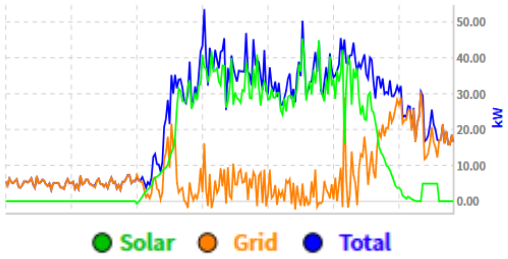
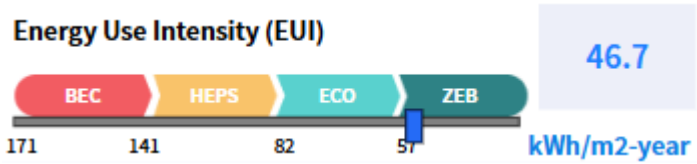
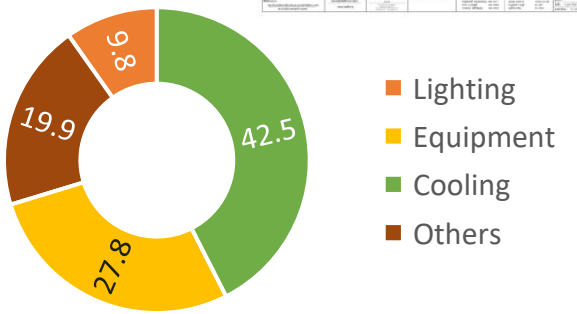
- **The building** features a Variable Refrigerant Volume **(VRV)** air conditioning system with a **Coefficient of Performance (COP) of 4.25-5.45 (SEER 14.5-18.6),** employs **Energy Recovery Ventilation (ERV)** that utilizes MERV 7 filters, and maintains CO_2 levels below the set threshold, intelligently managed by CO_2 sensors.
- The primary challenges include the **intermittent power generation from the solar PV system** and the **technological limitations of air conditioning and lighting systems for a mid-sized building with high ceilings.** These factors present significant obstacles to achieving consistent energy efficiency and performance.
- **DEDE is collaborating with JICA** on a feasibility study to convert an existing building into a Zero Energy Building (ZEB), with the aim of **establishing a pilot model for ZEB implementation in existing structures.**

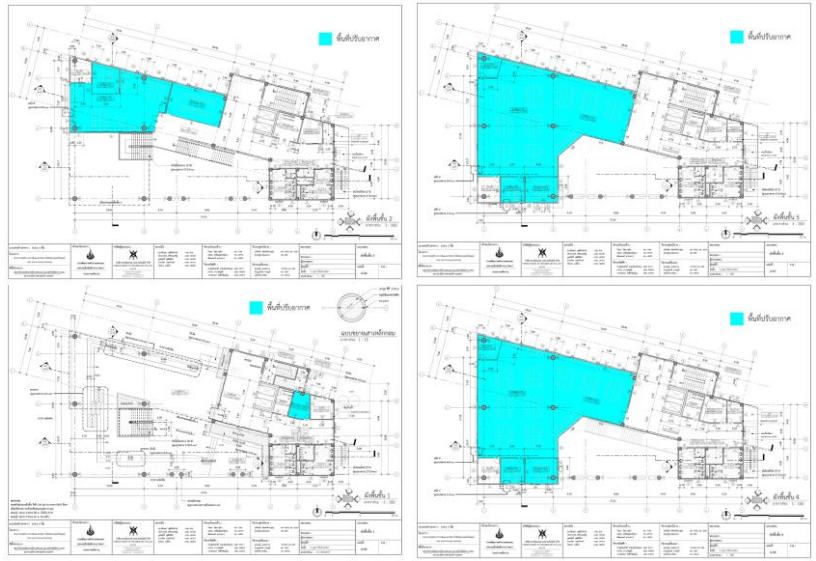
Table : DEDE ZEB prototype compare to ZEB and BEC criteria

Indicator	BEC	ZEB	70th Ann. DEDE
Overall Thermal Transfer Value (OTTV – W/m²)	⩽ 50	⩽ 20	18.08
Roof Thermal Transfer Value (RTTV – W/m²)	⩽ 15	⩽ 12	2.09
Lighting Power Density (LPD – W/m²)	⩽ 14	⩽ 2	3.87
Coefficient of Performance: Air Conditioning (COP)	⩾ 3.22	⩾ 5.45	4.25 – 4.95
Energy Use Intensity (EUI – kWh/m²-y)	171	57	59.08



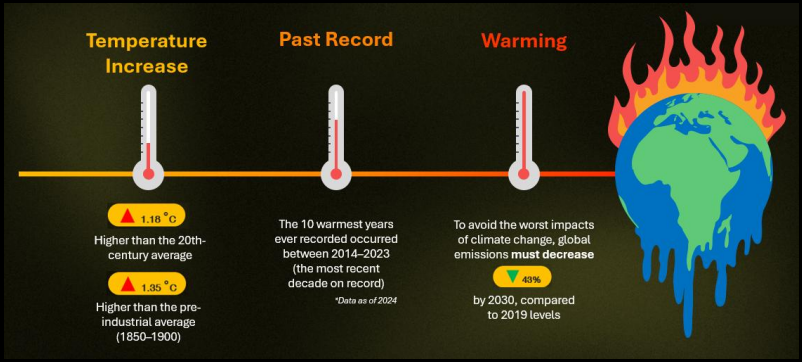




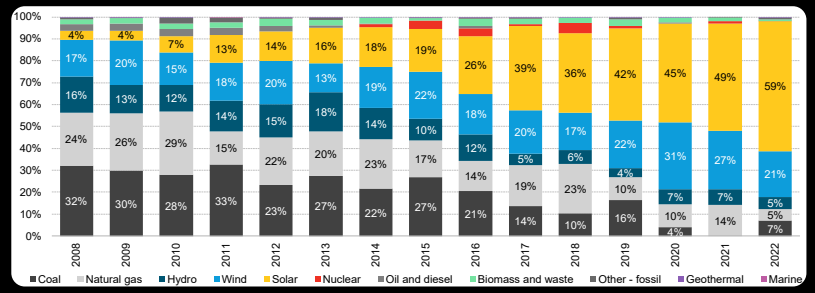


4. Renewable Energy Forecast Center (REFC)

Global Warming

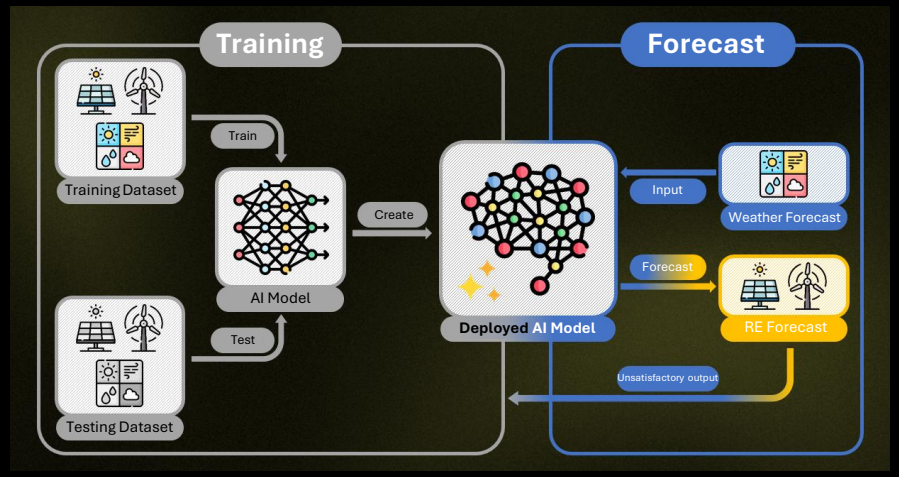


Share of global capacity additions

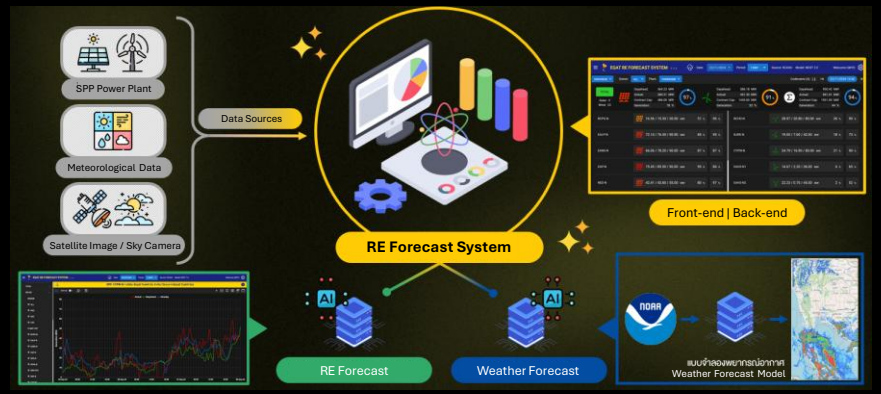


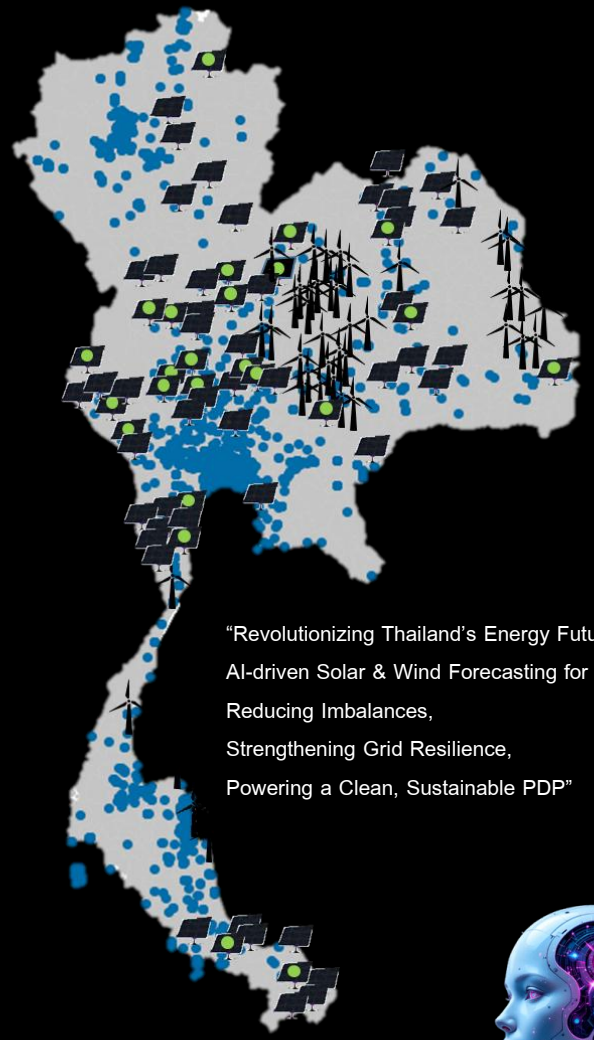
Global Net-Zero Targets

RE Forecast Process



RE Forecast with AI





"Revolutionizing Thailand's Energy Future
AI-driven Solar & Wind Forecasting for SPP & VSPP
Reducing Imbalances,
Strengthening Grid Resilience,
Powering a Clean, Sustainable PDP"

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Thank you