

# Country Update: **Thailand**

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# OUTLINE

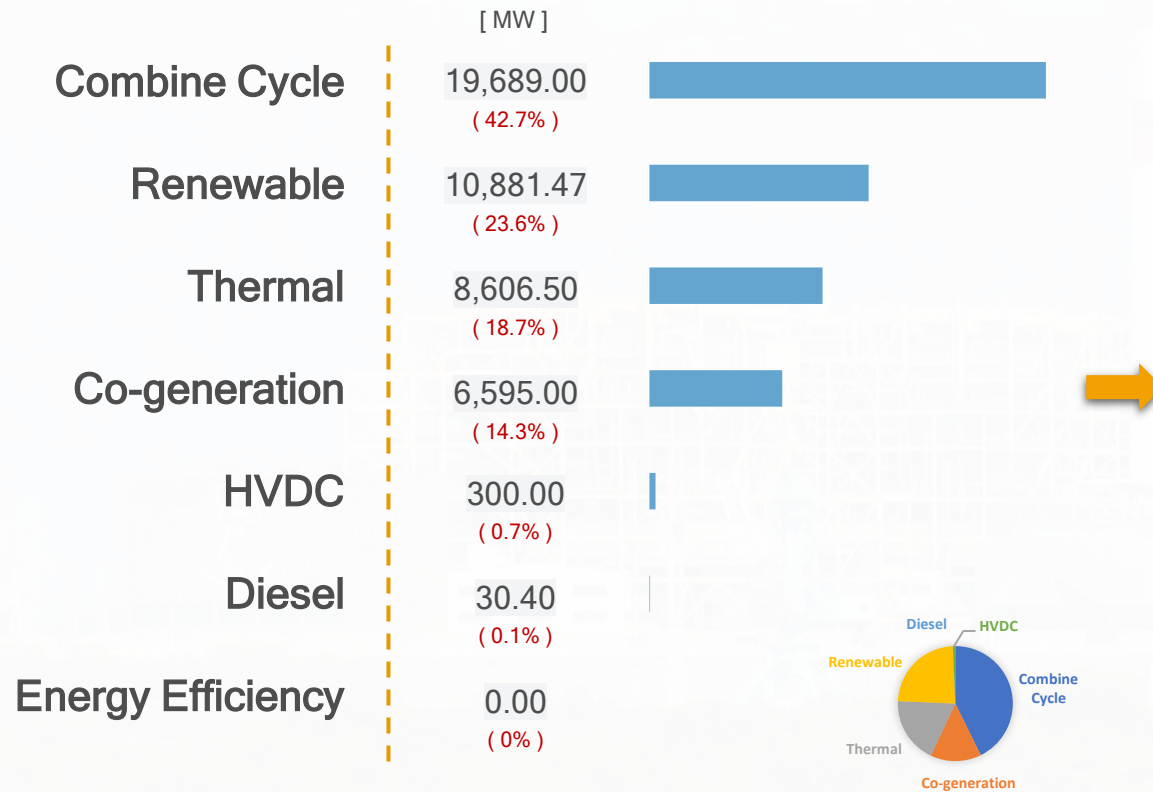
- ❖ **Status of National Generation, Transmission and Distribution Master Plans**
- ❖ **Cross Border Cooperation (Import and Export)**
- ❖ **New Development/Initiative for Renewable Energy, Energy Efficiency and Conservation, Demand Side Management**
- ❖ **Latest Policy Initiatives being taken by the Country**



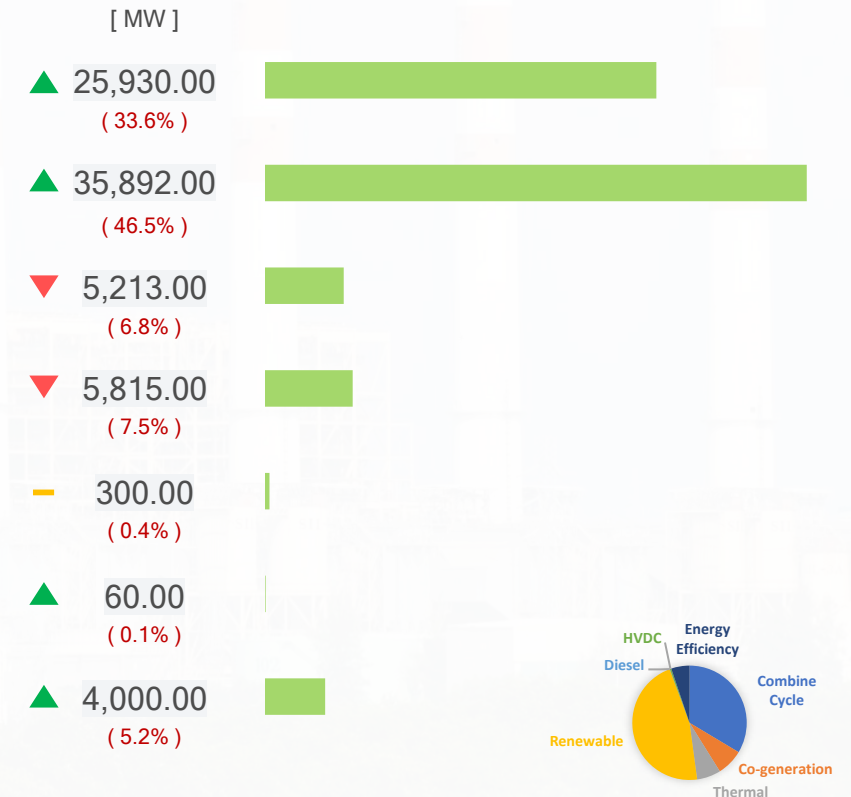
# **Status of National Generation, Transmission and Distribution Master Plans**

# Generation in Thailand

## August 2021



## In year 2037



Now Thailand have total Contract Capacity of **46,102.37 MW**

According to PDP 2018, the total Contract Capacity will be **77,210 MW**

# Existing Transmission & Distribution System in Thailand

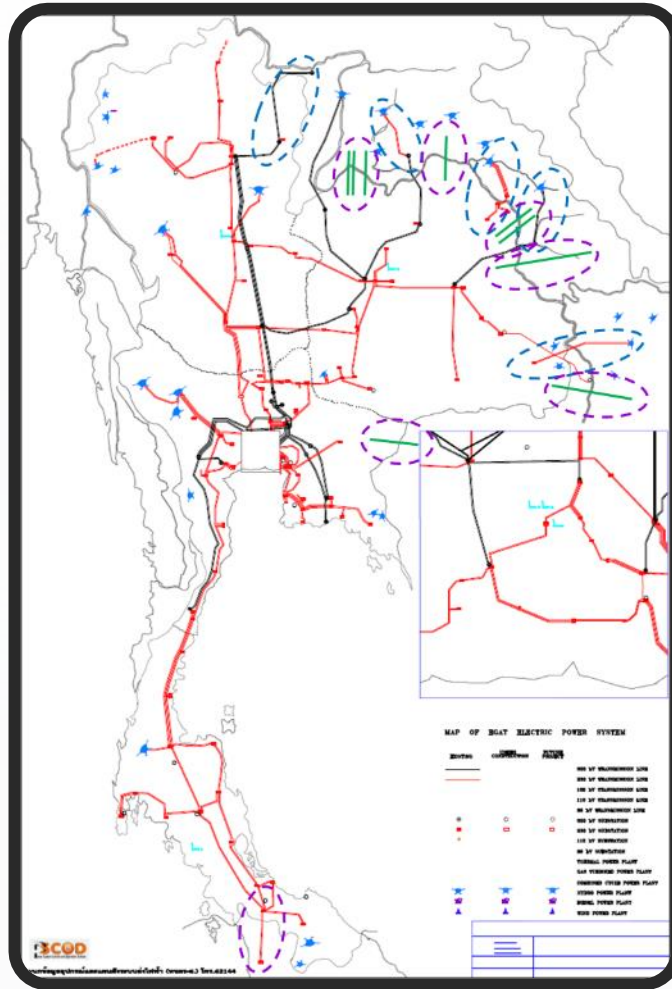
## Substation, Transformer Rated & Transmission Line Length (EGAT) July 2021

Voltage Level	Substation		Transmission Line Length (Circuit-Kilometers)
	Number of Substation	Transformer Rated (MVA)	
<b>500 kV</b>	23	42,949.68	7,097.103
<b>230 kV</b>	84	69,100.01	15,803.683
<b>115 kV</b>	125	15,360.66	14,484.497
<b>132 kV</b>	-	133.40	8.705
<b>69 kV</b>	-	-	18.800
<b>300 kV HVDC</b>	-	388.02	23.066
<b>Total</b>	<b>232</b>	<b>127,931.77</b>	<b>37,435.854</b>



# **Cross Border Cooperation (Import and Export)**

# Existing Foreign Generation, Interconnection & Transmission



Contract Capacity (MW)	Interconnection / Transmission Line	Circuits
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## FIPP

<b>Theun-Hinboun</b>	434	230 kV Nakhon Phanom 2 – Thakhek	2
<b>Houay Ho</b>	126	230 kV Ubon Ratchathani 2 - Houay Ho	2
<b>Nam Theun 2</b>	948	500 kV Roi Et 2 - Nam Theun 2	2
<b>Nam Ngum 2</b>	596.6	500 kV Udon Thani 3 – Nabong	2
<b>Hongsa Power</b>	1,473	500 kV Nan – Hongsa	2
<b>Nam Ngieb</b>	261	500 kV Udon Thani3 – Nabong	2
<b>Xaiyaburi</b>	1,285	500 kV Thali – Xaiyaburi	2
<b>Xe-Pain Xe-Namnoy</b>	390	230 kV Ubon Ratchathani 3 - Xe-Pain Xe-Namnoy	2

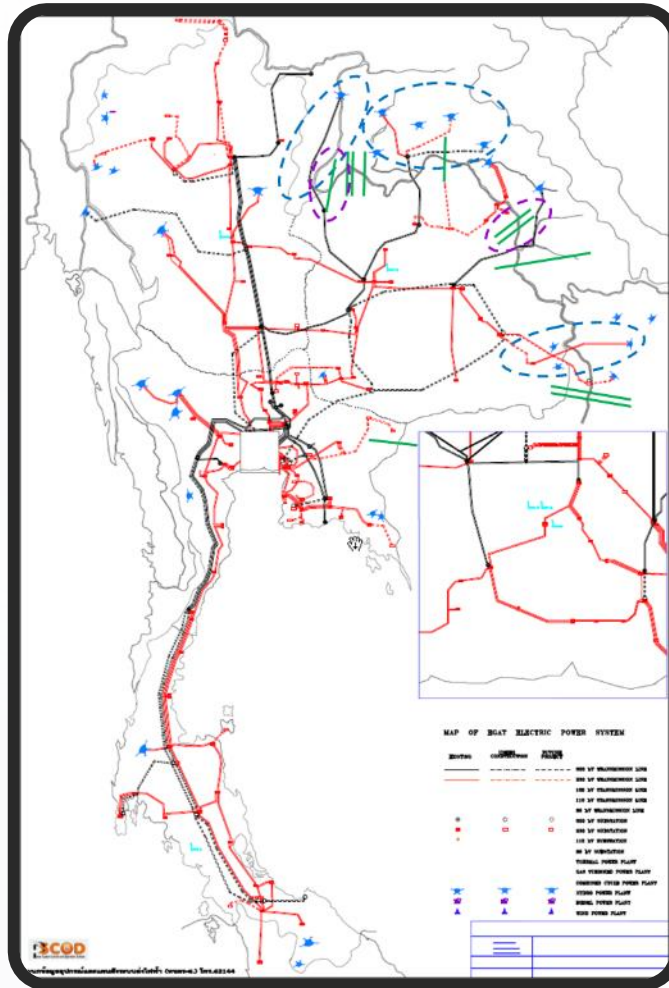
## Interconnection

<b>TNB</b>	300	300 kV HVDC Khlong Ngae – Gugun	1
		115 kV Nong Khai – Thanaleng	1
		115 kV Nong Khai - Phone Tong	2
		115 kV Bung Kan – Pakxan	1
		115 kV Nakhon Phanom – Thakhek	2
		115 kV Mukdahan 2 – Pakbo	1
		115 kV Sirindhorn – Bangyo	1
		115 kV Thali – Paklai	1
		115 kV Wathana Nakhon – Siem Preap	1
<b>EDL</b>	-	115 kV Nakhon Phanom – Thakhek	2
		115 kV Sirindhorn 2 – Bangyo *	1

## Thailand System

<b>North-Eastern Area</b>	-	500 kV Roi Et 2 - Ubon Ratchathani 3	1
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# Foreign Generation, Interconnection & Transmission



	Contract Capacity (MW)	Interconnection / Future Transmission Line	Circuits	Complete
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## FIPP

Nam Theun1	523	500 kV Udon Thani 3 – Nabong (existing)	2	23 MAY 2022
Nam Ngum3	440	500 kV Udon Thani 3 – Nabong (existing)	2	DEC 2026

## Interconnection

EDL	-	115 kV Sirindhorn 2 - Bangyo	1	Under construction
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## Thailand System

North-Eastern Area	-	500 kV Nakhon Ratchasima 3 - Ubon Ratchathani 3	2	SEP 2023
		500 kV Nakhon Ratchasima 3 - Chaiyaphum 2	2	SEP 2023
Metropolitan Area	-	500 kV Nakhon Ratchasima 3 - Khlong Mai	2	OCT 2023
		500 kV Tha Tako - Sam Khok	2	OCT 2022
Southern Area	-	500 kV Chom Bung - Bang Saphan 2	2	SEP 2021
		500 kV Bang Saphan 2 - Surat Thani 2	2	SEP 2021
		500 kV Surat Thani 2 - Puket 3	2	SEP 2021
		500 kV Surat Thani 2 - Thung Song	2	DEC 2022
		500 kV Thung Song - Hat Yai 3	2	DEC 2022





# **New Development/Initiative for Renewable Energy, Energy Efficiency and Conservation, Demand Side Management**

## RE Forecast Center



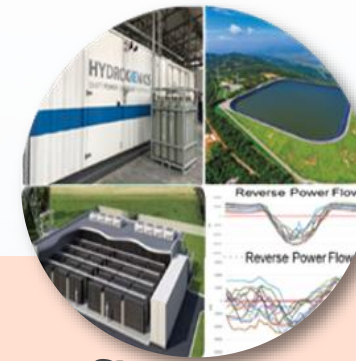
Forecast the electricity generated from RE for generation planning and power system control and operation by NCC

## Demand Response Control Center



Demand side management as a tool for more system flexibility that is controllable by NCC

## Energy Storage System



- ❖ Pump Storage
- ❖ Battery Energy Storage System
- ❖ Hydrogen Energy Storage



# RE Forecast Center

## Now

- ✓ Be able to forecast generation output (wind and solar) for all SPPs (total 29 plants)
- ✓ Establish RE Forecast Center at EGAT



## On going long-term projects

- ✓ Attempt to forecast generation output (wind and solar) for VSPPs
- ✓ Large events forecast
- ✓ Very short term forecast through satellite index and sky camera
- ✓ Develop ensemble forecast for improvement of the accuracy



# Demand Response Control Center

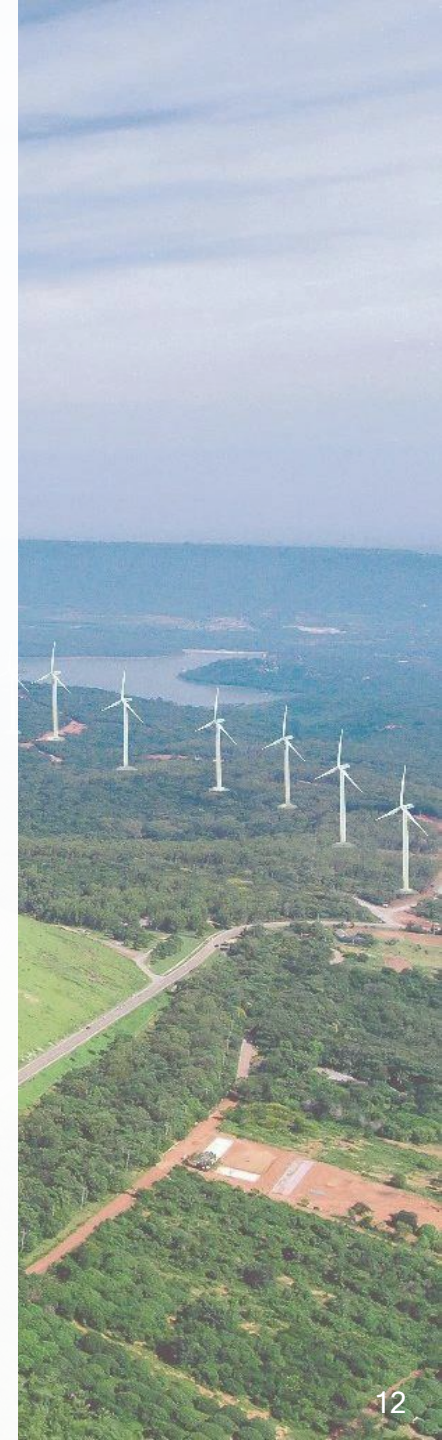
**2021**

- ✓ System installation has been already implemented (hardware and software).
- ✓ Testing for connecting between Load Aggregator (PEA and MEA).



**2022**

- ✓ The DR pilot project by EPPO ERC EGAT MEA PEA



# Battery Energy Storage System

2021

✓ The BESS Pilot project, it is constructing and is expected to commission in late 2021. (It is delayed from September 2020 due COVID-19 Pandemic)

➤ Batteries are installed at two substations:

- ❖ Chai Badan 21 MW
- ❖ Bamnet Narong 16 MW

➤ BESS will be use for ancillary service; frequency regulation.





# Latest Policy Initiatives being taken by the Country



# The Thailand National Energy Policy Framework



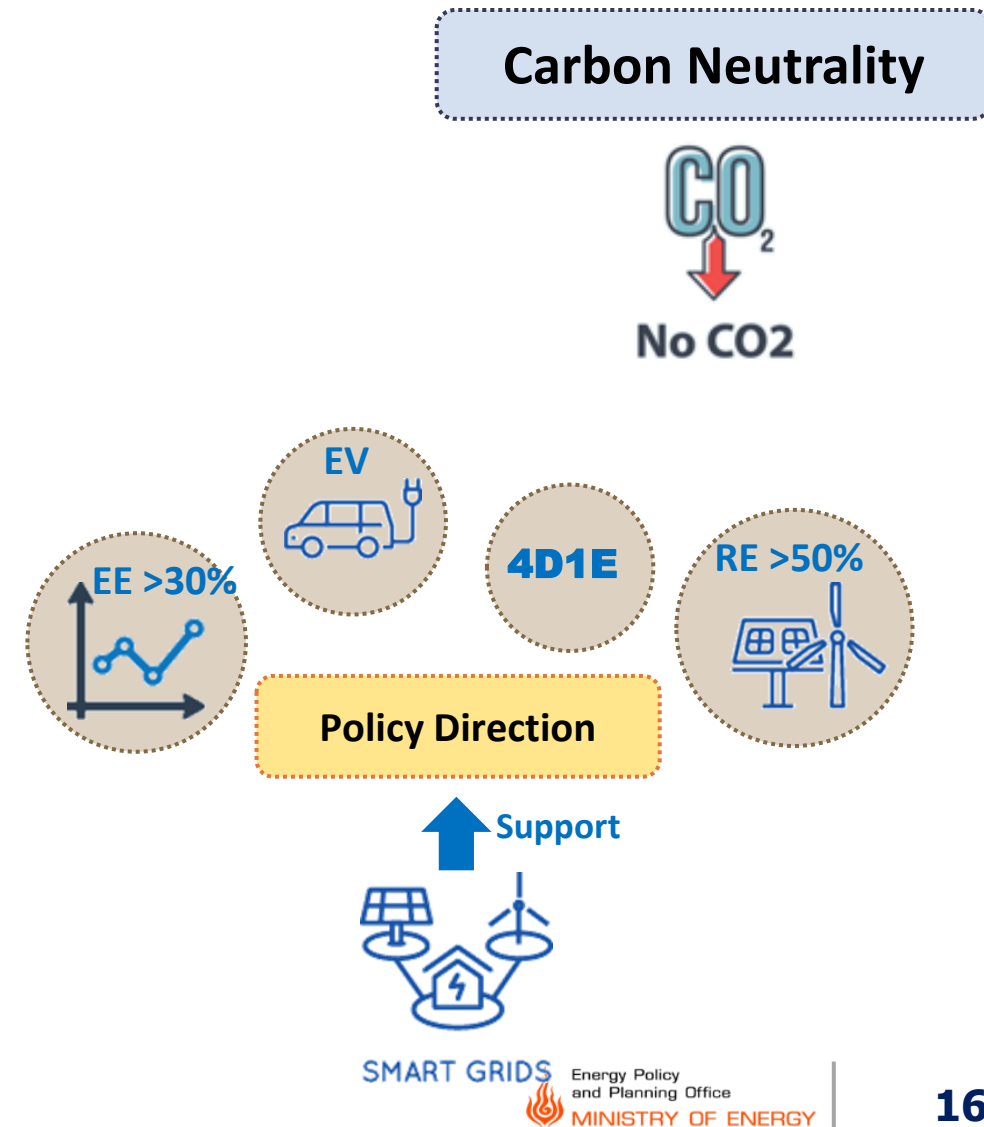
# The Thailand National Energy Policy Framework

(1) Increase the share of new electricity generation with RE ratio of not less than 50%, in line with the trend of lower RE costs, taking into account the cost of ESS, and will not increase the long-term cost of electricity generation.

(2) Change the use of transportation in the transport sector to green electricity through EV according to the policy 30@30

(3) Improve energy efficiency by more than 30%

(4) Restructuring the energy industry to support the energy transition trend (Energy Transition) according to the 4D1E guidelines.



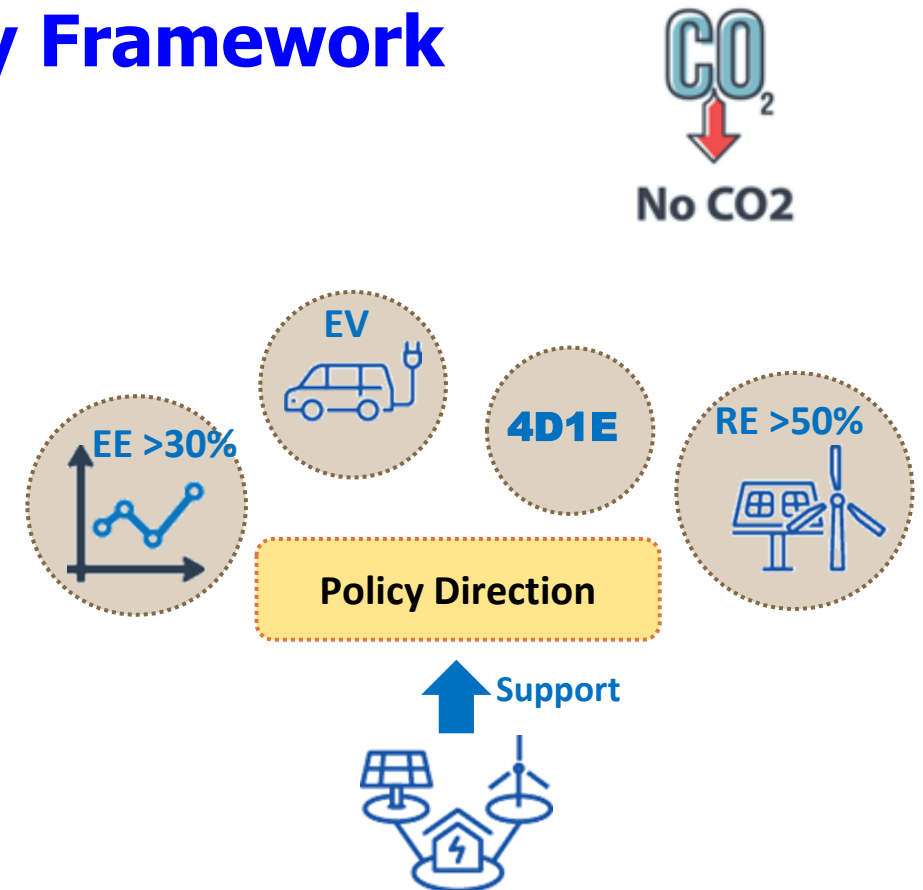


# On 4 August 2021 The NEPC approved :

Carbon Neutrality

## The Thailand's National Energy Policy Framework

Thailand has set policy guidelines for the energy sector. The goal is to promote Thailand to move towards clean energy and reduce carbon dioxide to net zero carbon dioxide emissions (Carbon Neutrality) within the year 2065 – 2070.



# Roadmap towards The Energy Transformation 4D1E



## Power

- **Increase RE share** in new power plants
- **Reduce production** from high emission fuels and low efficiency power plants
- Develop technology for utilization **and storage of carbon.**
- Develop a new electrical system infrastructure (**Grid Modernization**) **Manage the power system with Smart Grid technology**, improve forecasting and control of the power system up to date.
- **Decentralized power generation and infrastructure** Study the guidelines for improving the electricity business structure to support potential trading patterns. **Change the form of energy use to electrical energy**



## NG

- **Promote the use of LNG** in industrial and transport sectors instead of oil and coal.
- Manage natural gas in the country efficiently. **Develop a system for up-to-date potential assessment and supervision** of petroleum resources. Manage the import of LNG from abroad.
- **Develop natural gas infrastructure Supporting the use of decentralized natural gas** and supervise the quality of service and safety standards
- Liberalize the natural gas business by **improving barriers to regulations** and **developing a natural gas price structure.** and promote full competition



## Oil

- **Improve the refinery standards** to have oil quality equivalent to EURO 5 and 6 of Europe
- **Promote the proper use of low-carbon fuels and biofuels** in the transport sector and **adjust the oil price structure to reflect the cost** and not affect the burden of the people
- Developing a system for **controlling and collecting fuel information** with digital technology
- Promote the transformation of energy consumption in various economic sectors into electricity and oil infrastructure development. **Develop and promote the conversion of heat from LPG in the household sector to electric stoves.**



## RE

- **Assessing the renewable energy potential** of the country
- Promote and **develop decentralized renewable energy** generation mechanisms.
- Build **a platform and develop a data center to digitally control renewable energy.**
- Set up measures to **encourage more investment in renewable energy** by setting the purchase price for clean energy. and the improvement of regulations to have mechanisms to promote and motivate
- Promote investment in renewable energy technology market **Develop biomass market** for electricity and heat generation as a base country for **Bioeconomy.** Study and develop the use of **hydrogen.** Transforming Biofuels to Bio-Jet and Petrochemical Industry Applications



## EE

- **Set new optimization goals** Develop measures to promote energy efficiency improvement to cover all sectors. Improve regulations and set measures to create market mechanisms to promote energy conservation.
- **Promote investment in energy efficiency technology market** and promote green industry
- Develop technology to manage **energy efficiency** and support new energy technologies. Develop infrastructure to support energy efficiency in the future, **such as charging station infrastructure.**



**- Thank You -**