

Thailand Energy Transition Plan and Policy

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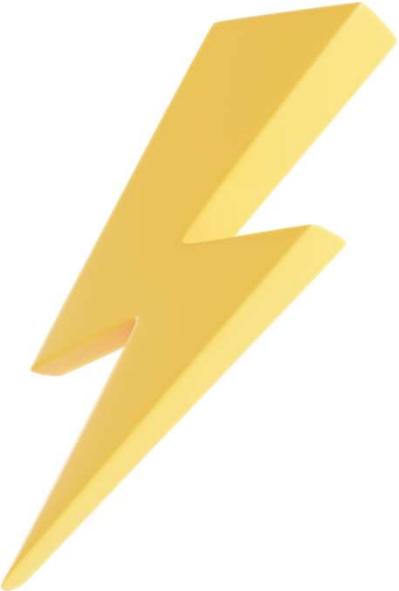
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Topics

- 01 National Energy Plan Framework
- 02 The target of clean energy power plants in PDP2018 REV.1
- 03 Smart Grid Development Action Plan Medium Term (2022 – 2031)
- 04 Guidelines, Goals and Measures to promote electric vehicles
- 05 Guidelines for the development of production and use of hydrogen



01

National Energy Plan Framework

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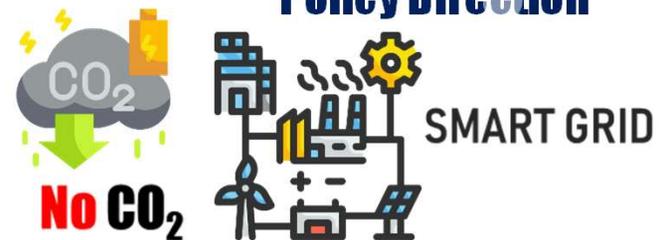
National Energy Plan Framework

The National Energy Policy Council (NEPC) has approved the Framework of the National Energy Plan with the goal of supporting Thailand towards clean energy use and reduce carbon emission to net zero carbon emission or carbon neutrality in 2065-2070



Support

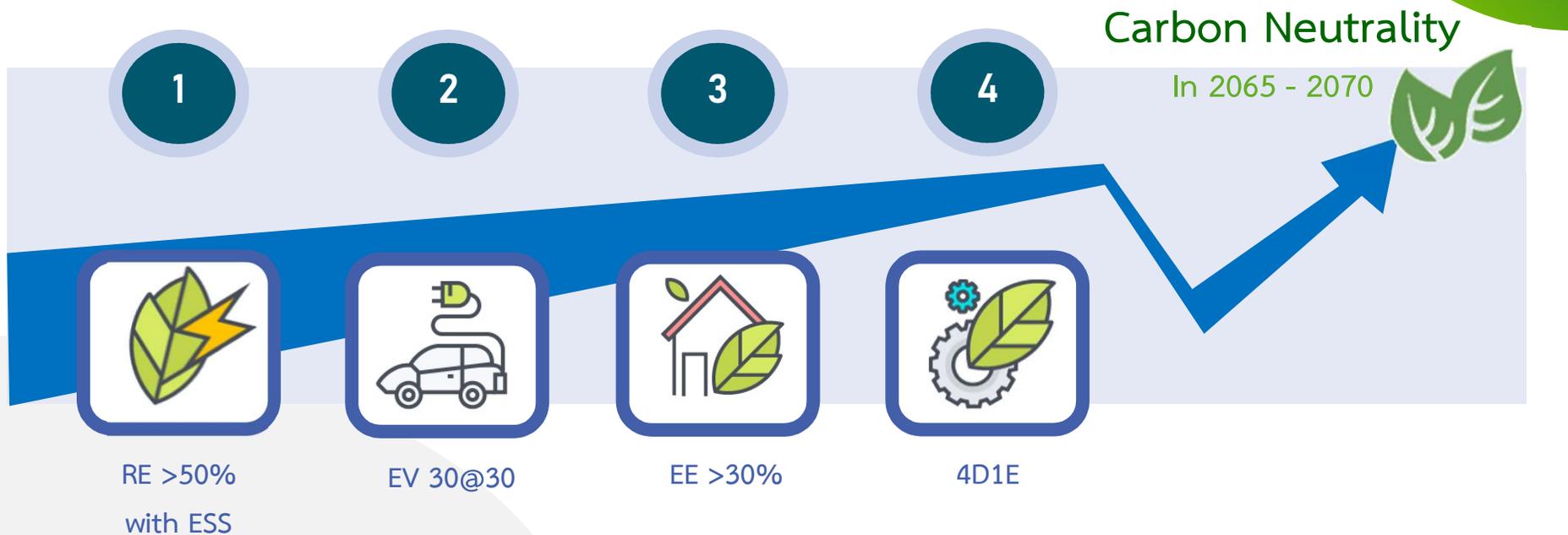
Policy Direction



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National Energy Plan Framework

Policy Direction to National Energy Plan



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National Energy Plan Framework



DIGITALIZATION

Distributed energy resources enabled by big data-driven alignment of supply and demand

Data-driven asset strategies including preventative and condition-based maintenance and

Smart grid and smart pipes allow automated controls to improve network resiliency, safety, and efficiency

Customer inter-actions governed by analysis of customer journeys, segmentation, and personalized communication

Platform supports distributed energy resources and marketplaces



DECARBONIZATION

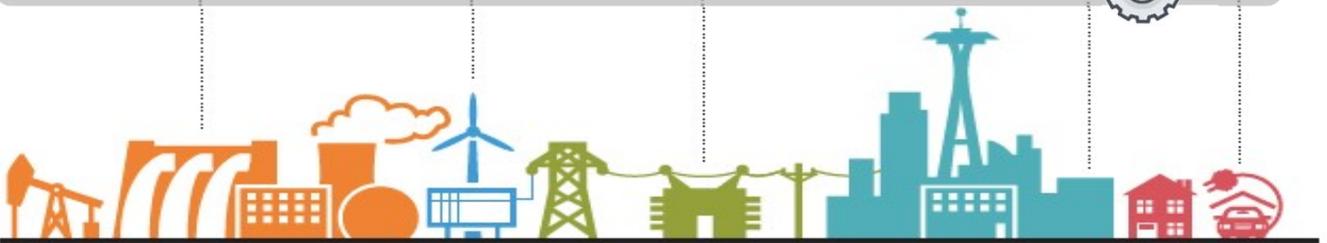
Policy 4D1E support Energy Transformation



ELECTRIFICATION



DECENTRALIZATION



Back-office automation and data-driven decision making



Field workforce with mobile access to maps, data, work-management tools, and real-time expertise

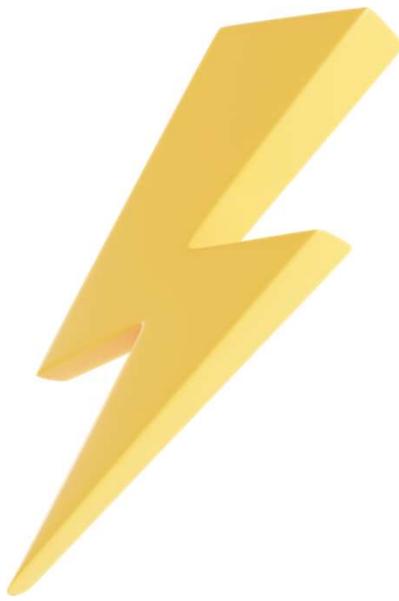


High level of situational awareness to enable energy balancing



DE-REGULATION

McKinsey&Company



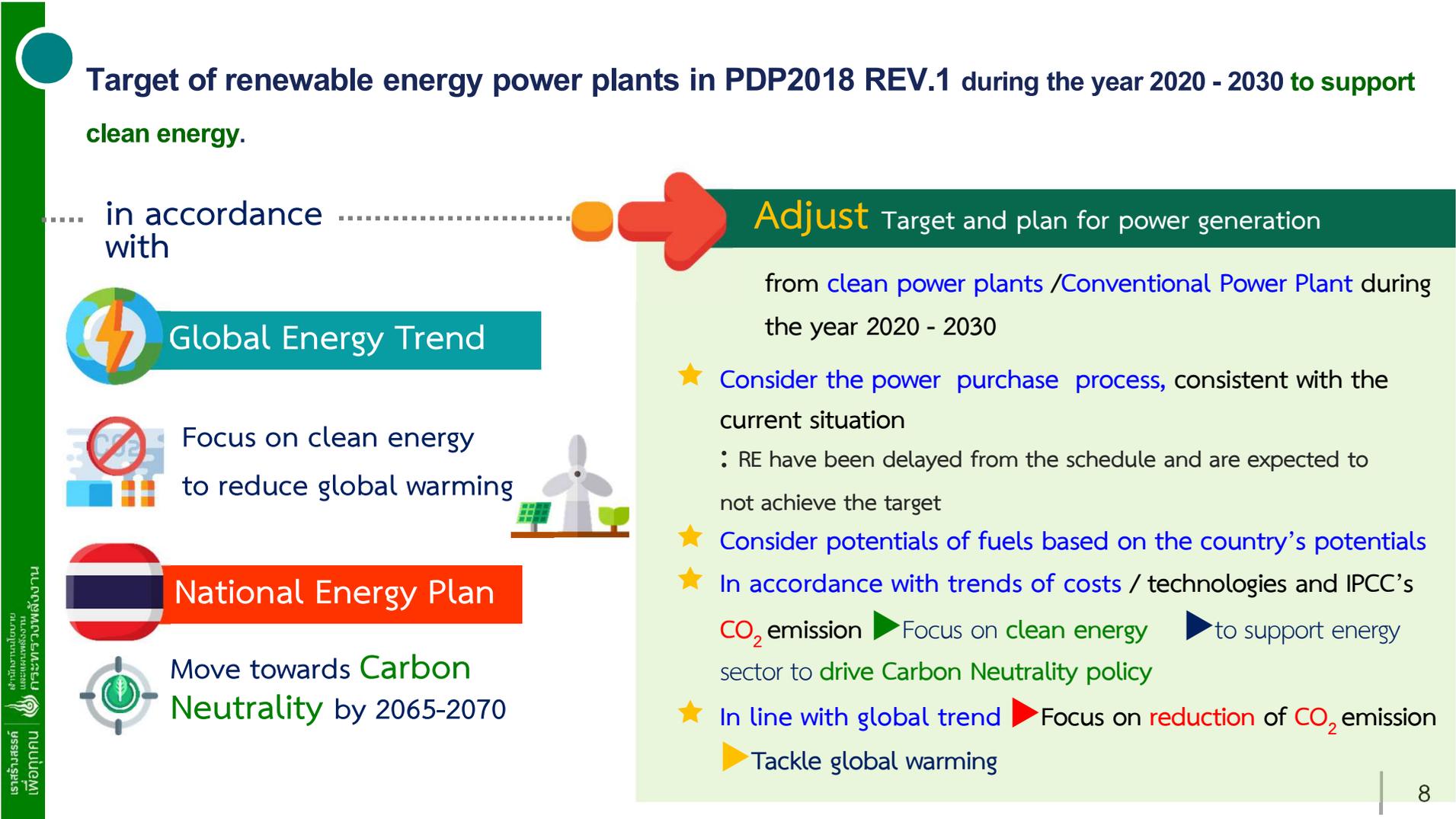
02

**The target of clean energy power plants in
PDP2018 REV.1**

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Plans to power generation from clean energy

under the PDP2018 Rev.1 Plan 2021-2030 (Additional Revised)

Unit : MW

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
 Solar	45	10	34	300	400	666	600	700	800	900	4,455
 Solar Rooftop, Public		10	10	10	10	10	10	10	10	10	90
 Solar Floating	45	0	24			298	50		280	300	997
 Solar Farm + BESS				100	100	100	100	200	200	200	1,000
 Solar Farm				190	290	258	440	490	310	390	2,368
 Wind					250	250	250	250	250	250	1,500
 Biogas						75	75	75	70	40	335
 Biomass						150	150	75	70	40	485
 Municipal solid waste					200	200					400
 Industrial waste						100	100				200
 Import						469		700		1,400	2,569
 Small Hydro		10.81	4.14	1.27	9.84	5.25	5.05	6.51	3.45	5.18	52
Total	45	21	38	301	860	1,915	1,180	1,807	1,193	2,635	9,996

Note: Energy Policy Executive Committee meeting on April 29, 2022

Guidelines for adjusting the new PDP plan

consider

MoE is in the process of preparing the PDP2022



Global Energy Trend



Clean energy to
reduce global warming



National Energy Plan



Move towards **Carbon Neutrality** by 2065-2070

NEPC approved **4D1E direction** on 4th August 2021



MoE sets **Policy Direction** to support Thailand to achieve the target continuously and without interruption

To **push** and **increase** clean electricity target In accordance with the global energy trend

To realize competitive potential and encourage investments in clean energy projects, utilize innovations to raise economic values, attract foreign investments

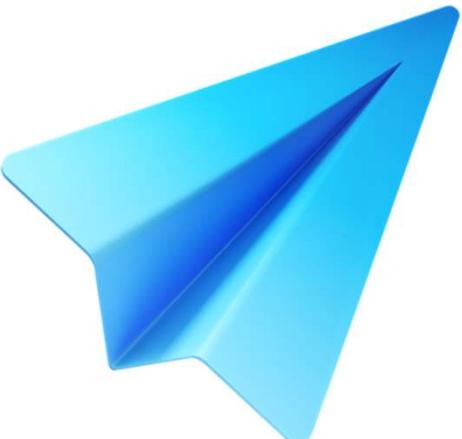
(especially during post COVID-19 economic recovery)



THAILAND's greenhouse gas reduction targets



The Prime Minister announced Thailand's aim to increase our NDC to 40%, and reach the Carbon neutrality 2050 and Net Zero Emissions in 2065



03

Smart Grid Development Action Plan

Medium Term (2022 – 2031)

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Smart Grid Development Action Plan : Medium Term

Thailand Smart Grid Development Master Plan 2015 - 2036



Smart Grid Development
Action Plan : Medium Term

- 20-Year National Strategy 2018-2037
- Global Energy Trend
- แผนพลังงานชาติ National Energy Plan



**building competitiveness
towards a Green economic society**



**Using clean energy
towards Carbon Neutrality**



Dec 23rd, 2021 EPEC approved the Smart Grid medium-term

JAN 6th 2022

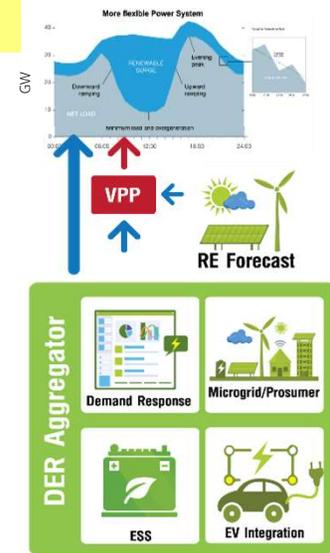
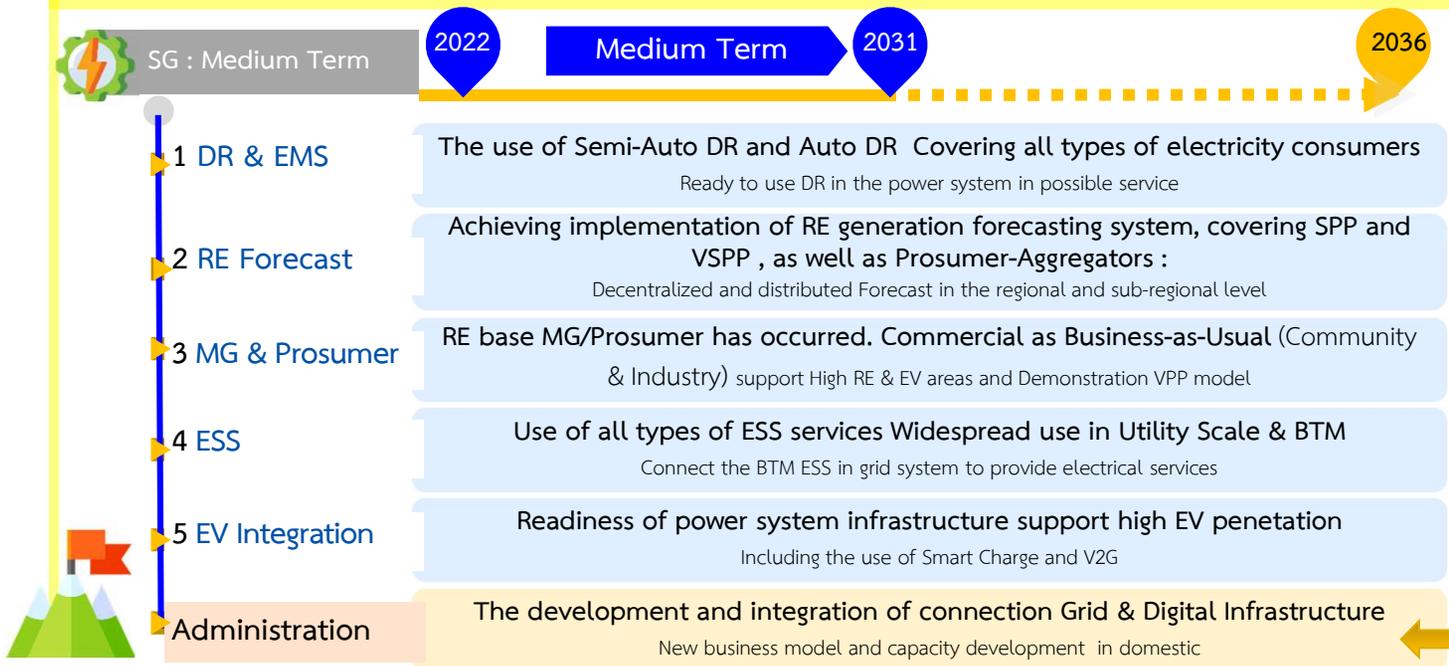
NEPC acknowledged the Smart Grid medium-term

Main point of the Smart Grid Development Action Plan : Medium Term



“Promote infrastructures development and management of necessary resources in the power distribution system. For support the energy transition to a modern grid system to be more efficient and environmentally friendly” **It is an important step to reaching Carbon Neutrality**

Summary of Key Milestone the pillars under the SG Development Action Plan : Medium Term



Grid Modernization

- Digital Substation Automation
- LBS/FRTU
- SCADA/EMS/DMS

Benefits of Smart Grid Development Action Plan : Medium Term (2022 – 2031)

Energy Trilemma

-  Energy Security
-  Energy Equity
-  Environment sustainability of Energy Systems

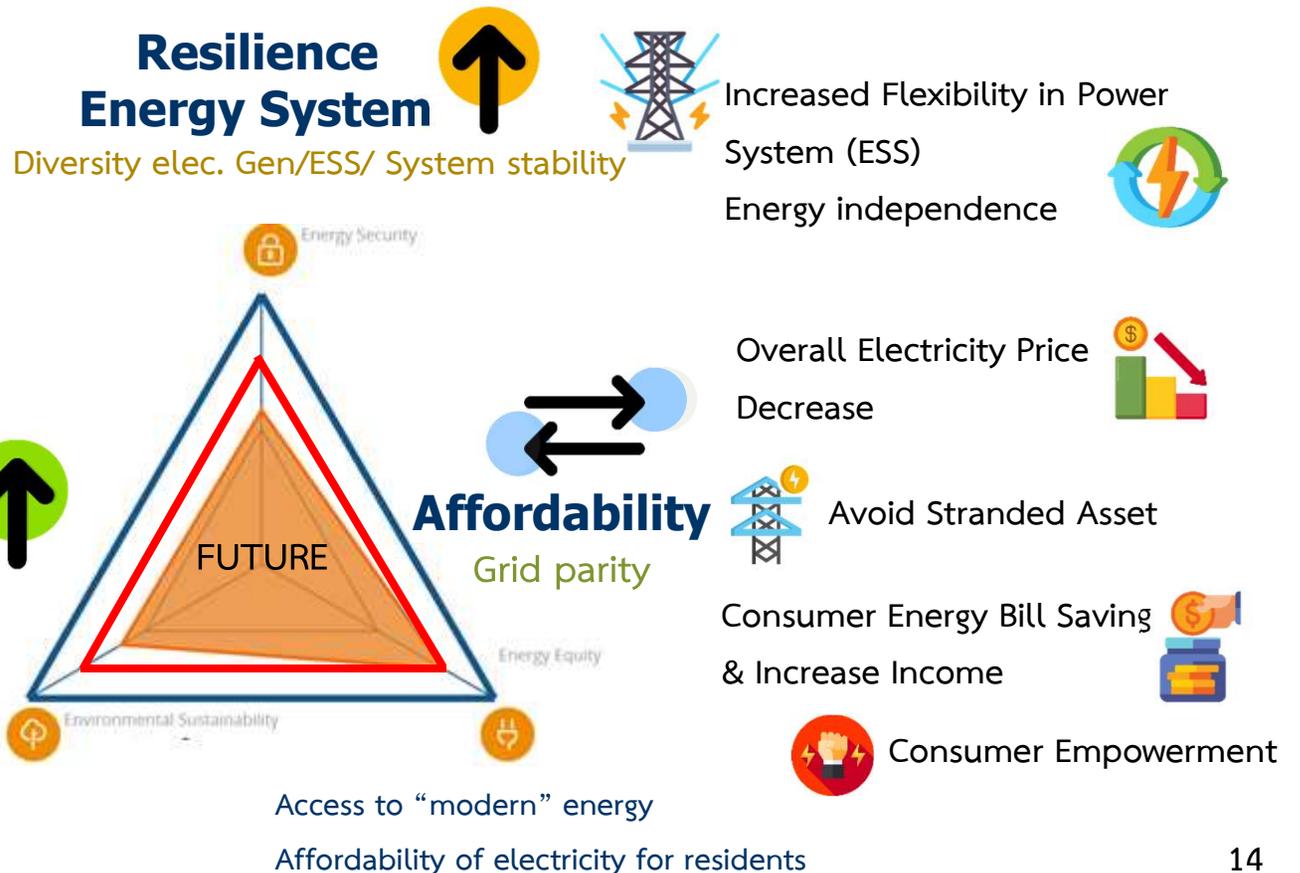
Decarbonization

- Renewable Energy
- Efficiency of power G, T&D



High RE Penetration

CO2 Reduction





04

Guidelines, Goals and Measures to promote electric vehicles

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Determining the Strategic Position of EVs in Thailand

Key Drivers	Air Pollution Reduction (PM2.5, NOx, SOx)		GHG Reduction	Building a new industrial base
Key Strength	High Demand for EVs	strong automotive industry base	Electrical stability Electrical infrastructure and High RE potential	Have Strategic Location for export
Thailand's Vision	World's major manufacturing base for EVs and parts.			
Key Objective	Manufacturing and exporting of EVs EV manufacturing is the main automotive industry	Usage and Infrastructure EVs are widely used and supported by infrastructure.		Sustainability Being sustainable in terms of finances and the environment
Key Initiatives	<ul style="list-style-type: none"> - Incentivize the production of EVs, parts, and batteries in Thailand - Setting the standards for EVs 	<ul style="list-style-type: none"> - Create marketing for using EV pilots in various sectors. - Preparing electrical systems and charging stations / set standards to motivate compulsory measures - Determination of the appropriate Electric pricing 		<ul style="list-style-type: none"> - Have Guidelines for waste management of EVs/batteries. - Create a balance in government revenue management.
Key Support	Financial and Monetary Promotion Measures / Regulatory / Research and development / HR Development / Information Technology management			

Production targets and use of EVs

Targets	Type of Vehicle	Amount of ZEV / year	
		2025	2030
Usage 	Passenger car/ Pickup	225,000 (30%)	440,000 (50%)
	Motorcycle	360,000 (20%)	650,000 (40%)
	Bus/truck	18,000 (20%)	33,000 (35%)
	Tricycle	500 (85%)	2,200 (100%)
	Passenger ship	130 (12%)	480 (35%)
	Railway train (cabin)	620 (70%)	850 (85%)
Production 	passenger car/truck	225,000 (10%)	725,000 (30%)
	Motorcycle	360,000 (20%)	675,000 (30%)
	Bus/truck	18,000 (35%)	34,000 (50%)
	Tricycle	500 (85%)	2,200 (100%)
	Passenger ship	130 (12%)	480 (35%)
	Railway train (cabin)	620 (100%)	850 (100%)

Guidelines and measures to promote electric vehicles



Promotion of the manufacturing industry EVs and parts

- Manufacturing base for EVs and parts
- Establish automotive and parts standards
- Transition to electric vehicles



Promotion of the using EVs

- Tax measures
- Non-tax measures

- Assessing the impact of fuels and greenhouse gases from the promotion of electric vehicles

Infrastructure development for EVs

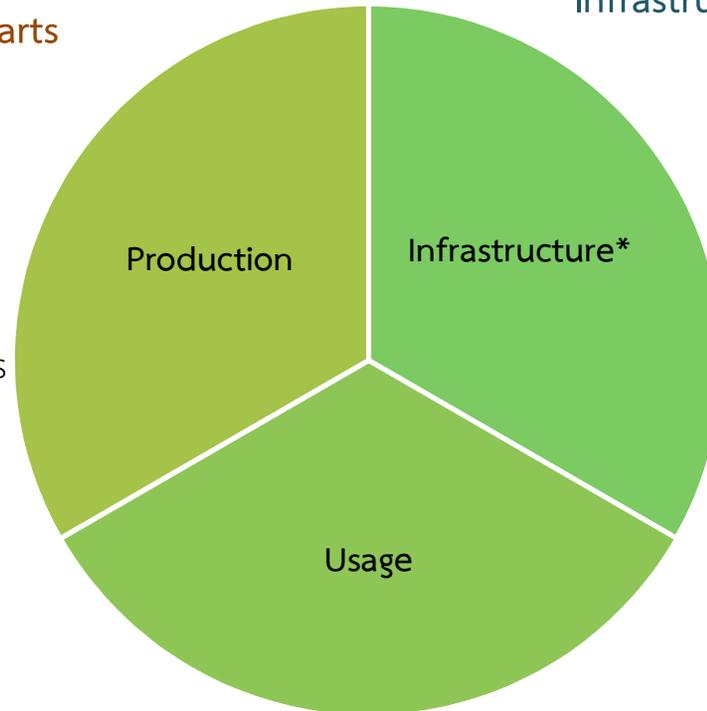


- Promote the development of an adequate charging station network
- Create rules, standards, and guidelines
- Promote smart grid technology to connect and manage



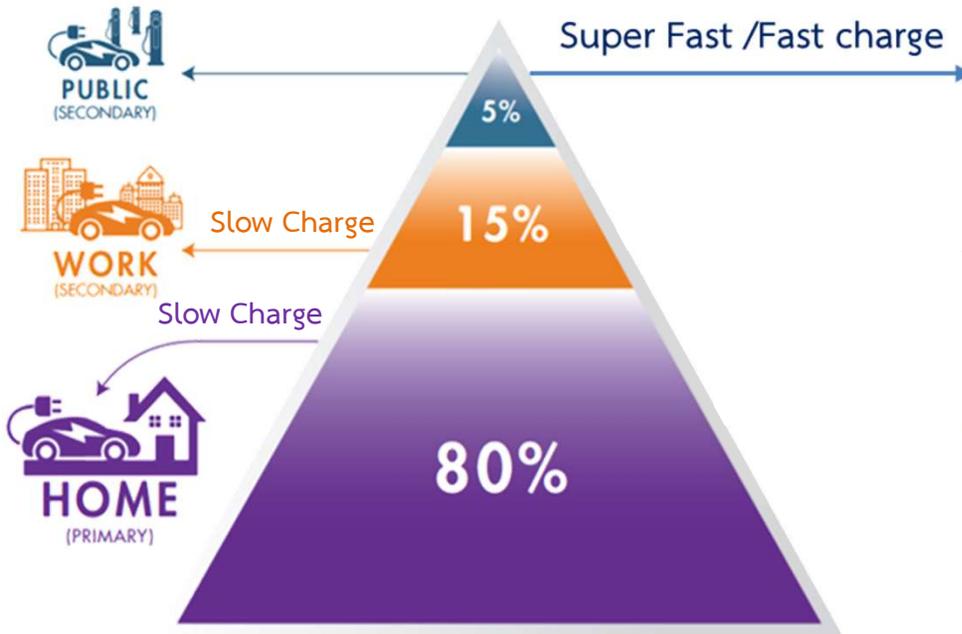
Promotion of EVs batteries

- Promote usability
- Promote the manufacturing industry
- Used battery policies and measures
- Manpower development and development of technology research and development capabilities



Promotion target for EVs charging stations

Targets of EVs Charging Station



Personal car/Truck		
Year	Cumulative target (million cars)	Fast Charge target
2025	0.4	2,200** - 4,400*
2030	2.0	12,000**

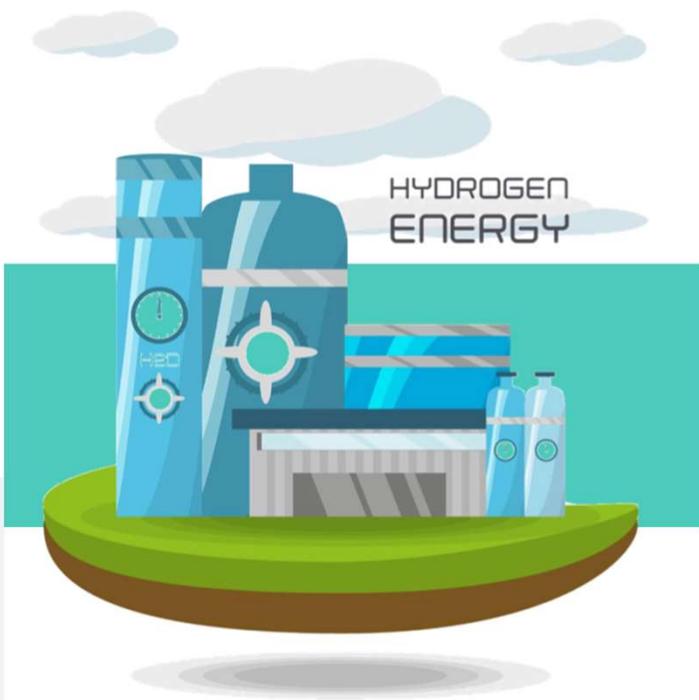
- It is an estimate of the distribution head, rated for 50 kW, %Share = 5%, Utilization = **10%, *5%.
- Calculated from current technology, Existing Apr 64 : Fast charge 771, Normal charge 1,338

Motorcycle taxi			
Year	Cumulative goals (million cars)	2% of total (thousand car)	Station target*
2025	0.58	12	260
2030	3.3	65	1,450

- It is an estimate of the rated power supply 0.5 kW, Utilization = 50%, %share = 22.5% , 1 station = 8 slots.
- Based on current technology, currently has 0.7% taxi share, targeting 2% from 1% taxi + 1% delivery.
- Energy consumption rate = 0.06 kWh/km, Battery size = 4 kWh, driving range = 80 km

05

Guidelines for the development of production and use of hydrogen



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Timeline of Hydrogen Preparation

Policy Recommendation for
Promotion of Commercial
Use of Hydrogen in Thailand
On process

2021

Guidelines for the development
of hydrogen production and use to
promote renewable energy in
Thailand

2022

2023

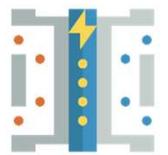
Hydrogen Utilization
Strategic Plan and
trial in EEC sandbox
Next step

Potential of using hydrogen in Thailand

1 Electric power generation sector



Co-firing Powerplant



Fuel cell

2 Thermal power for industrial plants sector



Boiler in Industry

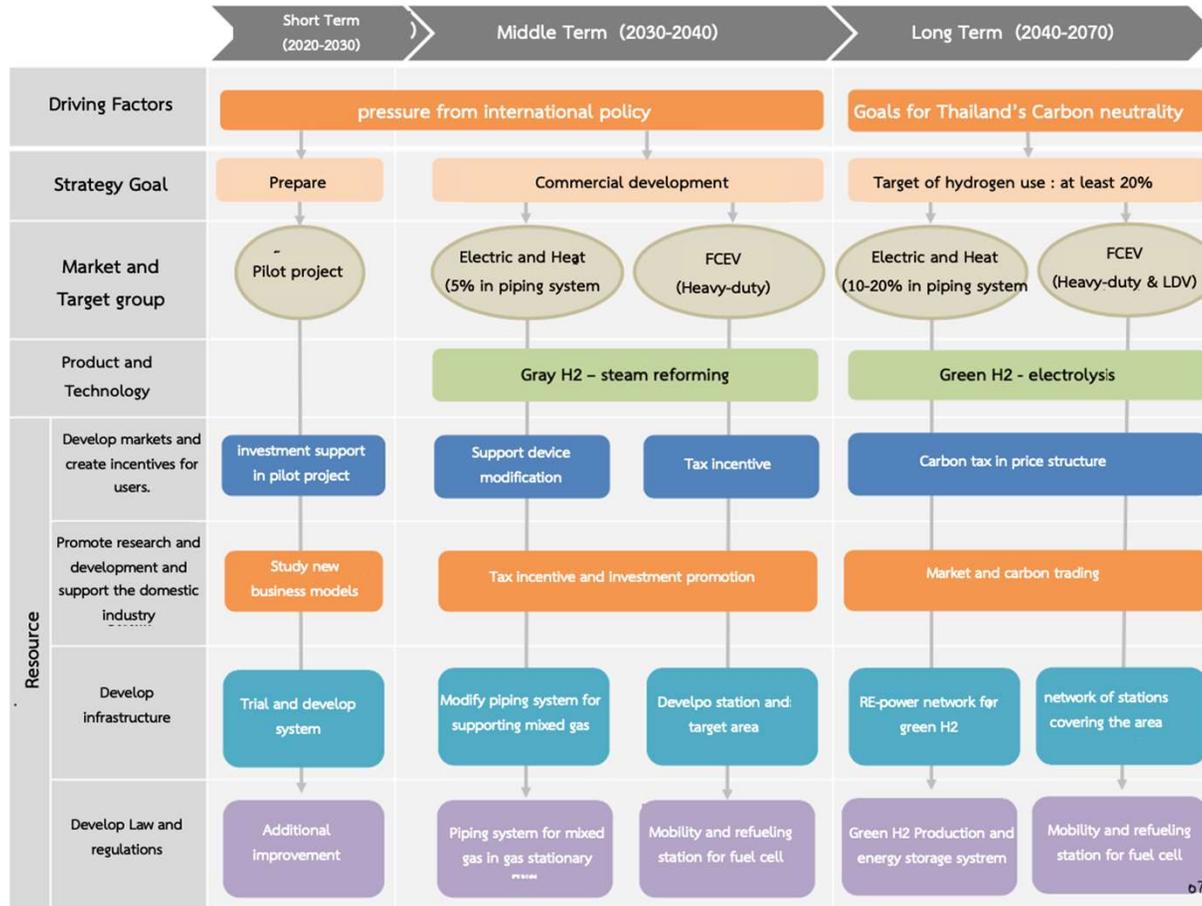
3 Transport sector



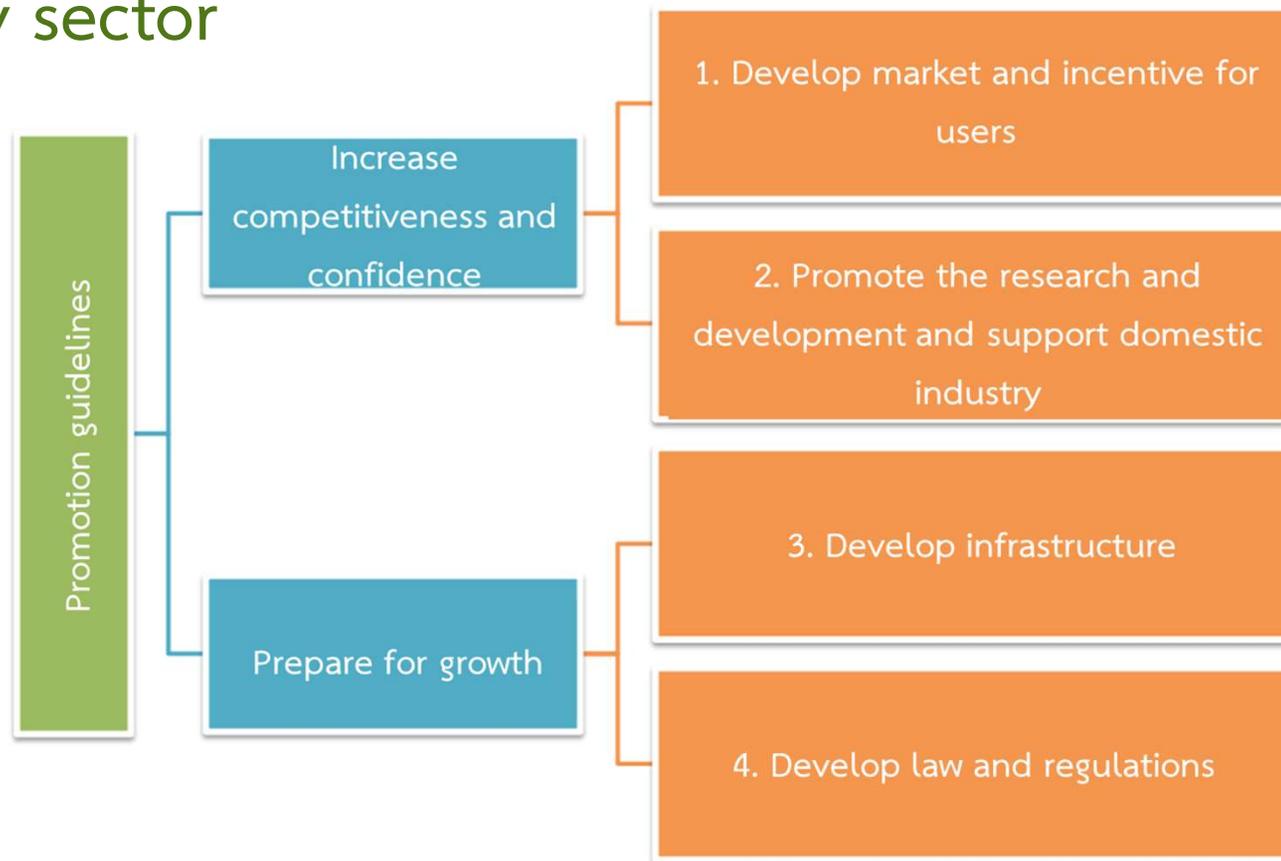
H2 Fueling Station



Roadmap for the development of hydrogen production and use to promote renewable energy in Thailand



Guidelines for promoting the use of hydrogen in the energy sector





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