# “Regulatory – driven of Electricity System Transformation”

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# Regulatory – driven of Electricity System Transformation

Overview of Energy Management in Thailand and Energy Outlook

Energy Future Trends : challenges

ERC's roles to the new age of energy regulation:

Key factors to smart regulation in a digital paradigm

# Thailand's Energy Sector Management

## Cabinet

## National Energy Policy Council (NEPC)

**Prime minister as Chair**

Policy

**Energy Industry Act 2007**

## Minister of Energy

ERC provides comments or recommendations related to the energy industry operation to the Minister and the cabinet

## Ministry of Energy

- Electricity
- Natural Gas
- Oil
- RE/EE

**Electricity**

**Natural Gas**

# ERC Authorities and Duties under Energy Industry Act 2007

## Regulate through Licensing Schemes

### Electricity Industry
(5 License-Types)


### Natural Gas Industry
(4 License-Types)


### Energy Security

- Power Procurement as per PDP (IPP/SPP/VSPP - RE)
- Give opinions on energy development plans (e.g. PDP)
- Network systems & SO
- Promote competition

### Licensing & Standards

- One Stop Service Licensing
- Engineering & Environment (Code of Practice: COP)
- Quality of Services & Safety

### Tariffs

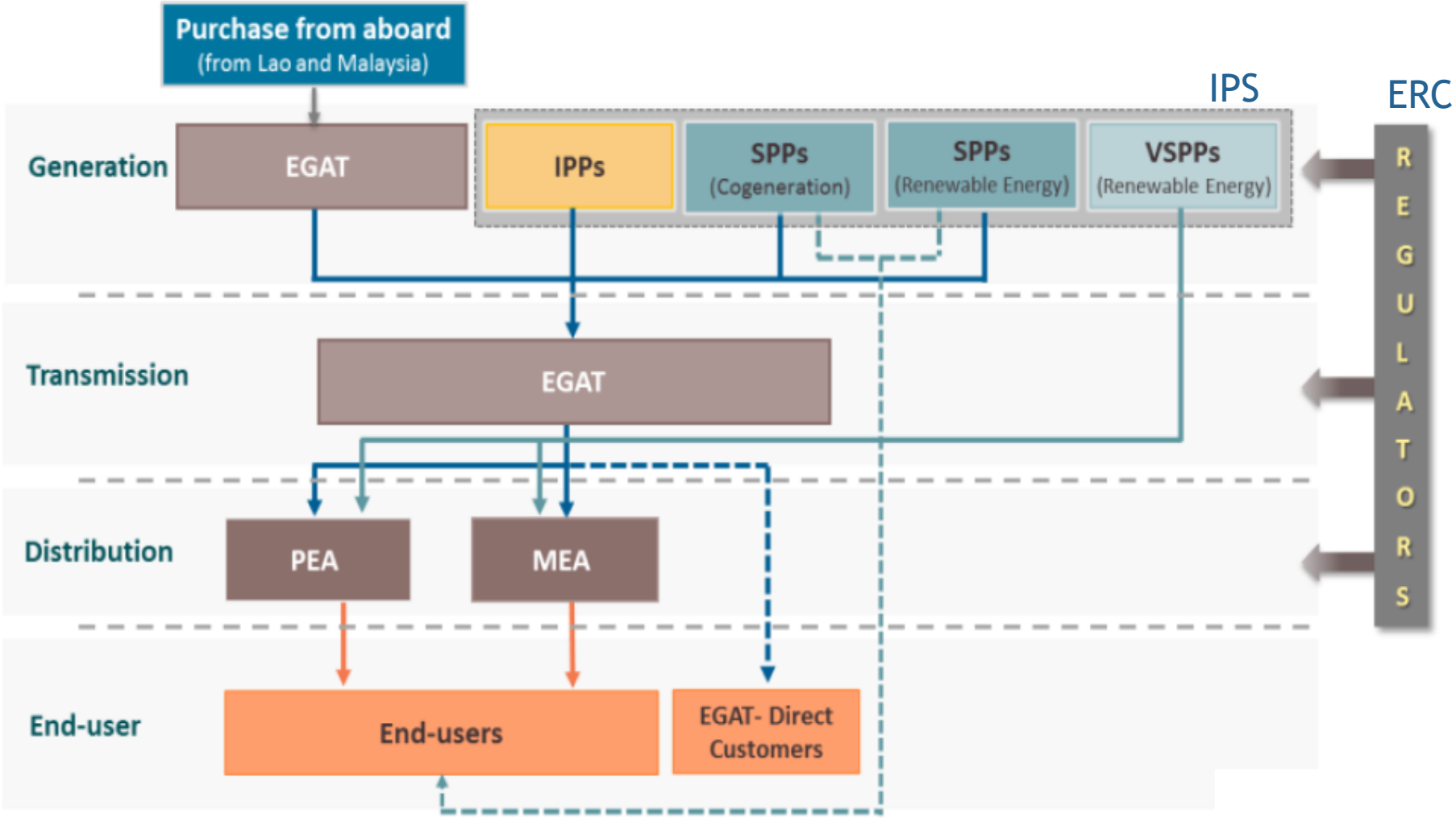
- Power tariffs & NG transportation service tariffs
- Power tariff structure
- $F_t$ formula
- TPA Codes & Electric Power Wheeling charge (Underway)

### Consumers' Right Protection & Public Participation

- Handle complaints, appeals, disputes
- Compensation for energy infrastructure construction
- Rights protection
- Power Development Fund

# Thailand Vertically Integrated Energy Structure - Current

Enhanced Single Buyer Model; ESB




**EGAT: Electricity Generating Authority of Thailand**
**IPP: independent power producers**
**SPP: Small Power Producers**
**VSPP: Very Small Power Producers**
**IPS: Independence Power Supply**

**MEA: Metropolitan Electricity Authority**
**PEA: Provincial Electricity Authority**
**ERC: Energy Regulatory Commission**

# Thailand's Vision (2037)

Thailand to become" a developed country with security, prosperity and sustainability in accordance with the Sufficiency Economy Philosophy "

**"Security, Prosperity, Sustainability"**

## Driving mechanisms

**"Productive Growth Engine"**

**Using Innovation and Technologies**

**High-income Country**

**"Inclusive Growth Engine"**

**Economic development**

**Distributing income, opportunity and wealth to the community**

**"Green Growth Engine"**

**Using environment-friendly technology**

**Focusing on renewable energy and "Green" Manufacturing Process**

# Thailand's Vision (2037)

The increasing power demand to correspond to the National Economic and Social Development Plan

## Thailand 20-Year Strategic Plan

**Vision:** **Security, Prosperity, Sustainability**

### 6 Strategies:

- The National Strategy on Security
- The National Strategy on Competitiveness Enhancement
- The National Strategy on Developing and Strengthening Human Capital
- The National Strategy on Social Cohesion and Equity
- The National Strategy on Eco-Friendly Development and Growth
- The National Strategy on Public Sector Rebalancing and Development

**Energy Related: Strategy 1, 2 and 5**

## Thailand Integrated Energy Blueprint (TIEB)

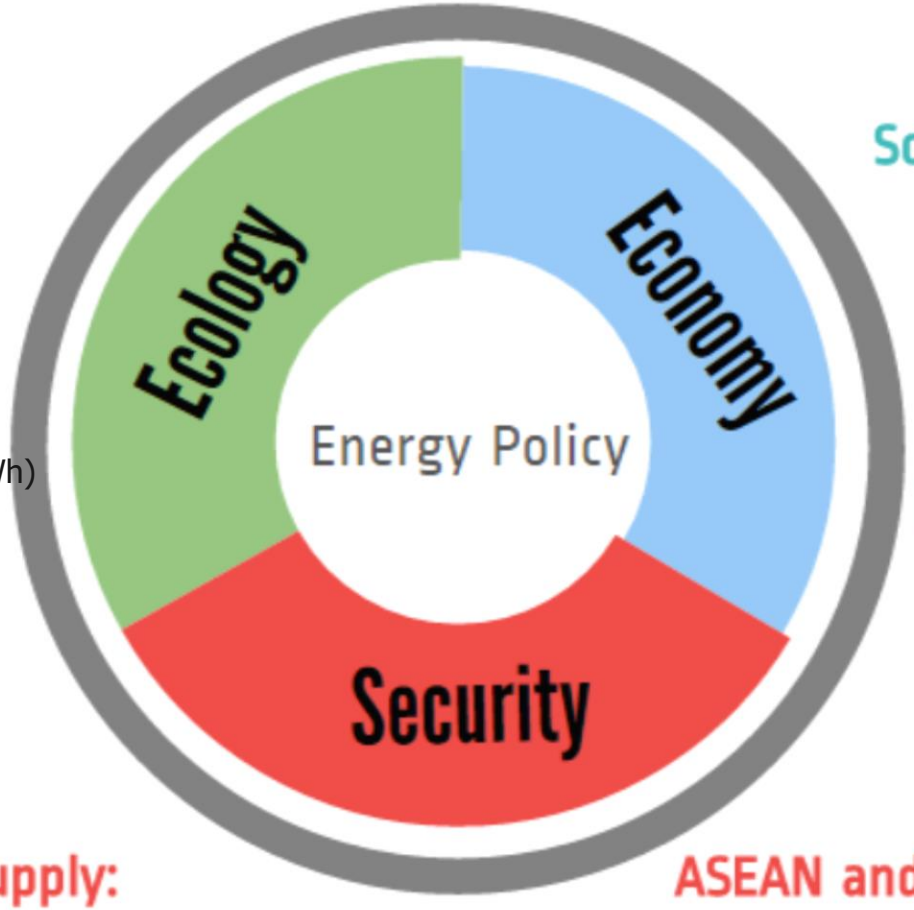
| | |
|---|---|
| PDP | POWER DEVELOPMENT PLAN<br>แผนพัฒนากำลังผลิตไฟฟ้าของประเทศไทย* |
| EEP | ENERGY EFFICIENCY PLAN<br>แผนอนุรักษ์พลังงาน* |
| AEDP | ALTERNATIVE ENERGY DEVELOPMENT PLAN<br>แผนพัฒนาพลังงานทดแทนและพลังงานทางเลือก |
| GAS | GAS PLAN<br>แผนบริหารจัดการก๊าซธรรมชาติ |
| OIL | OIL PLAN<br>แผนบริหารจัดการน้ำมันเชื้อเพลิง |

*In process of revision –the NEW Energy Plan

# PDP 2018 Rev.1 (2018-2037) : Principles underlying Energy Policy

**NEPC** Appr. on 19 MAR 2020

**Cabinet** Appr. on 20 OCT 2020




## Environment:

- Renewable Energy
- Cogeneration Plants
- Energy Efficiency
- $CO_2$ decraesed
  (Year 2037 ≈0.283 kgco2/kWh)

## Social & Economic:

- Affordability
- Vulnerable consumers
- Public participation

## Effective Regulation:

- Competitive bidding
- Price Affordable

## Domestic Supply:

- Security in each region
- Fuel Diversification
- Adequacy/Quality of Supply

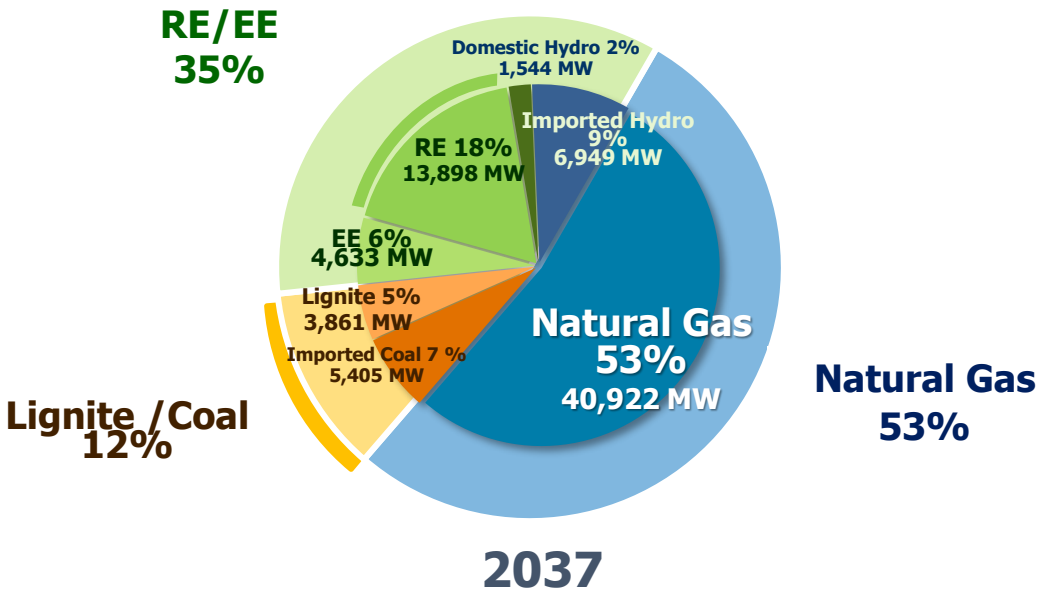
## ASEAN and GMS Interconnection:

- Harmonised rules
- International energy cooperation/ HUB

# PDP 2018 Rev.1

## Total Capacity under PDP2018 Rev.1* (MW)

| | |
|---|---|
| Installed Capacity as of 2018 | **46,090** |
| **Retired Capacity 2018-2037** | **-25,310** |
| **New Capacity 2018-2037** | **56,431** |
| **Total Capacity as of 2037** | **77,211** |




*approved by the Cabinet on 20 October 2020

# AEDP 2018

Unit: MW

| RE - New Project | AEDP 2018 |
|---|---|
| **1. Project under the Government Policy** | **2,453** |
| 1.1 Waste to energy | 400 |
| 1.2 Biomass for 3 Southern Border Provinces (Yala, Pattani, Narathiwat) and 4 districts in Songkhla province | 120 |
| 1.3 Community Power plant (boost the economy at a grassroots level) | 1,993 |
| (1) Biomass | 600 |
| (2) Biogas –crop | 600 |
| (3) Biogas-waste | 183 |
| (4) Solar- Hybrid | 550 |
| **2. RE Fuel type** | **16,243** |
| 2.1 Biomass | 2,780 |
| 2.2 Biogas | 400 |
| 2.3 Solar | 8,740 |
| 2.4 Floating Solar & Hydro | 2,725 |
| 2.5 New wind | 1,485 |
| 2.6 Industrial Waste | 44 |
| 2.7 Small hydro (EGAT) | 69 |
| **Total** | **18,696** |

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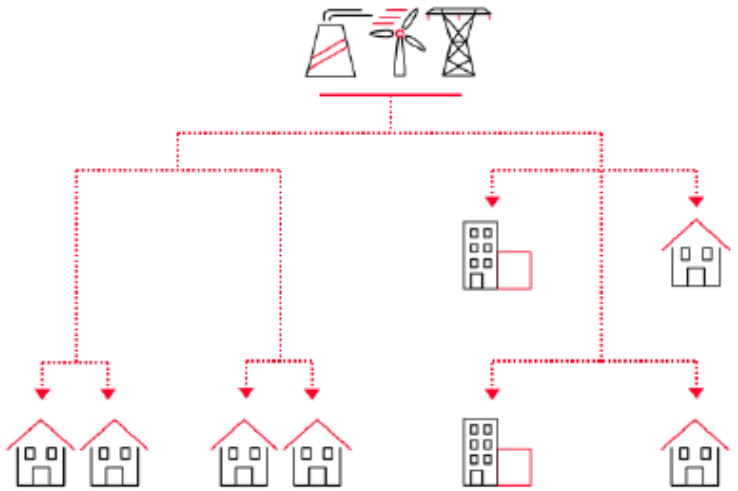
Energy Future Trends : challenges

ERC's roles :

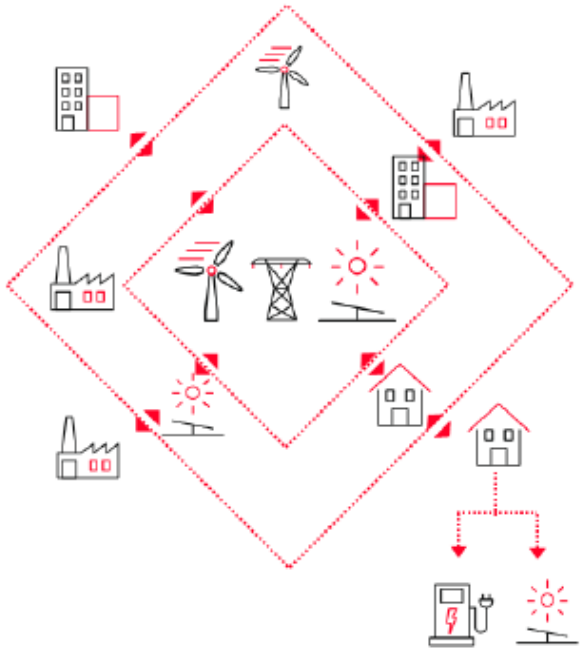
Keys driven of Electricity System Transformation

# Energy Future Trends : challenges

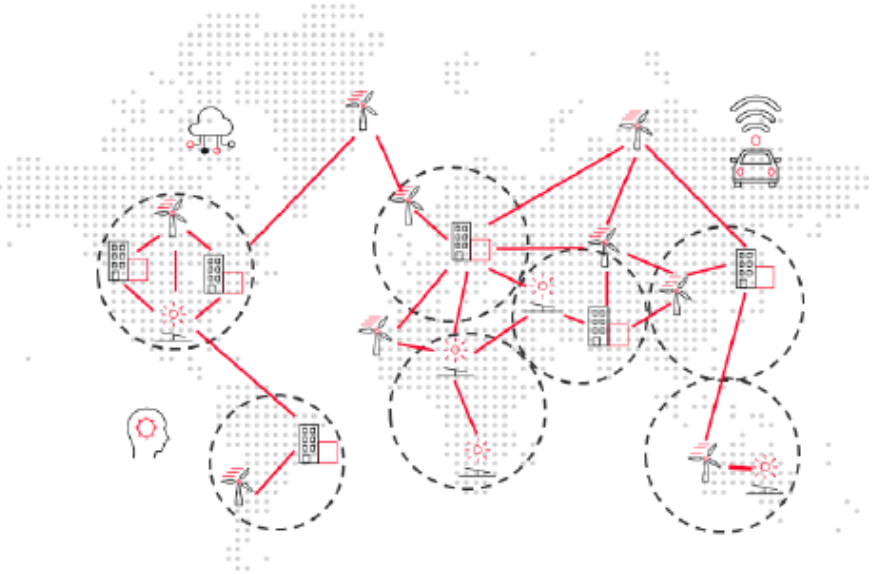
## Yesterday



## Today



## Tomorrow



**Renewables, grid edge technologies and digitalization drive the evolution of future power systems**

Source: IEEE

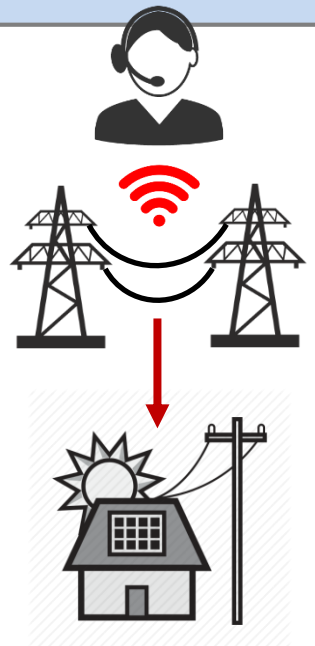
# Energy Future Trends : challenges

## The Future Electricity System = The Digital Utility

### SUPPLY

- Generation
- Market Operations / Trading

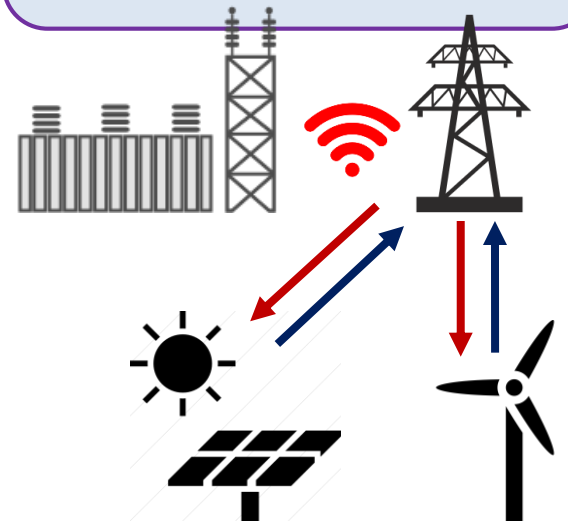
- Electric work package
- Engineering data management
- Resource management
- Remote operation



### NETWORK

- Transmission
- Distribution

- Substation automation
- Volt/VAR control
- Fault detection, isolation and restoration
- Intelligent grid devices
- Advanced meter infrastructure



### RETAIL

- Residential and Small & Medium Businesses
- Commercial and Industrial

- Energy information service
- Energy management
- Energy efficiency / conservation
- Digital channels

- E-Vehicle integration
- Demand response
- Distributed generation support

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ERC’s roles :

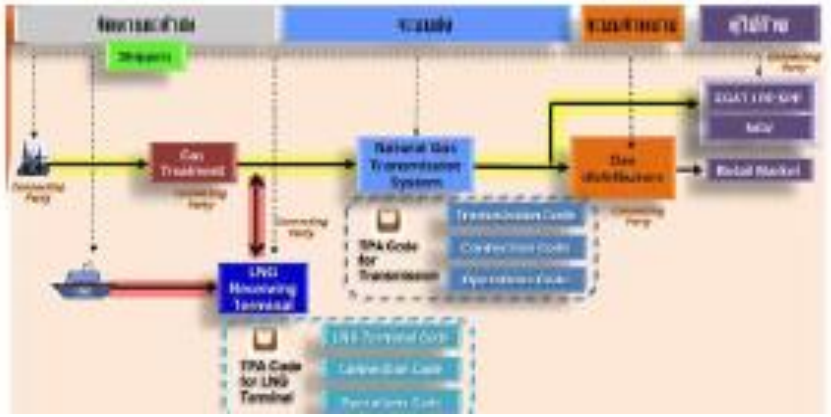
Keys drivers of Electricity System Transformation

# Third Party Access

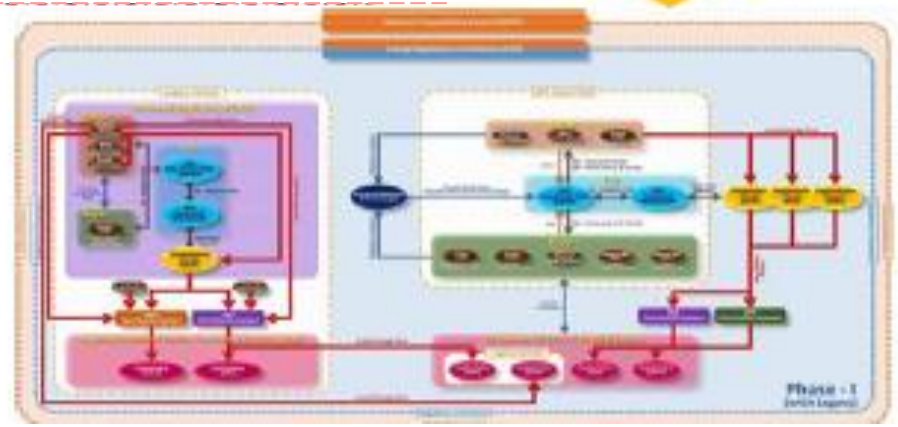
TPA

- More players to the market
- Enforce Competition
- Promoting Investment to the Industry
- Efficiency
- Infrastructure Utilization

TPA is a roadmap competitiveness in Gas/Electricity market



**GAS Sector**

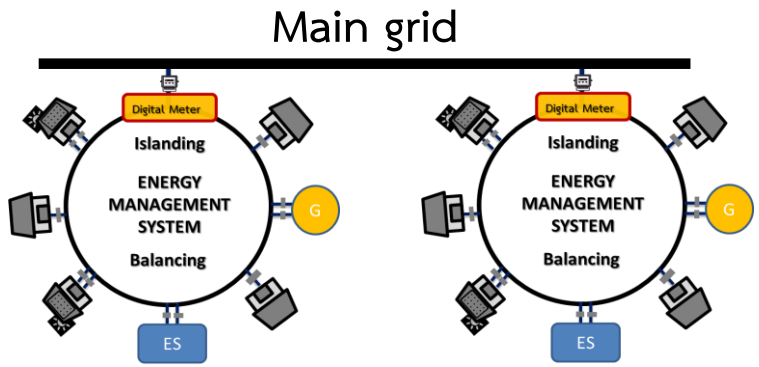


**Electricity Sector**

Source: ERC, EPPO

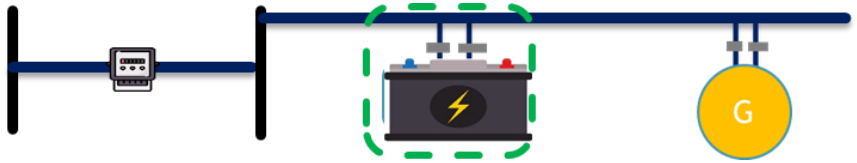
# ERC Sandbox 7 catalogues (2019)

1. Peer-to-Peer Energy Trading & Bilateral Energy Trading




2. Microgrid

3. Battery Storage




4. New Tariff Structure


5. NEW Business Model


6. New Approach to Gas Management

7. Other energy innovation

# ENERGY HUB

## Infrastructure

To serve as the hub for regional electricity transmission, the 500 kV power grid is connected from the north to the south and from the east to the west.

- **East-west corridor**
  Being connected from the east to the west borders
- **500 kV cross-country**
  Supporting Thailand as the hub for regional electricity transmission

## Regional power market

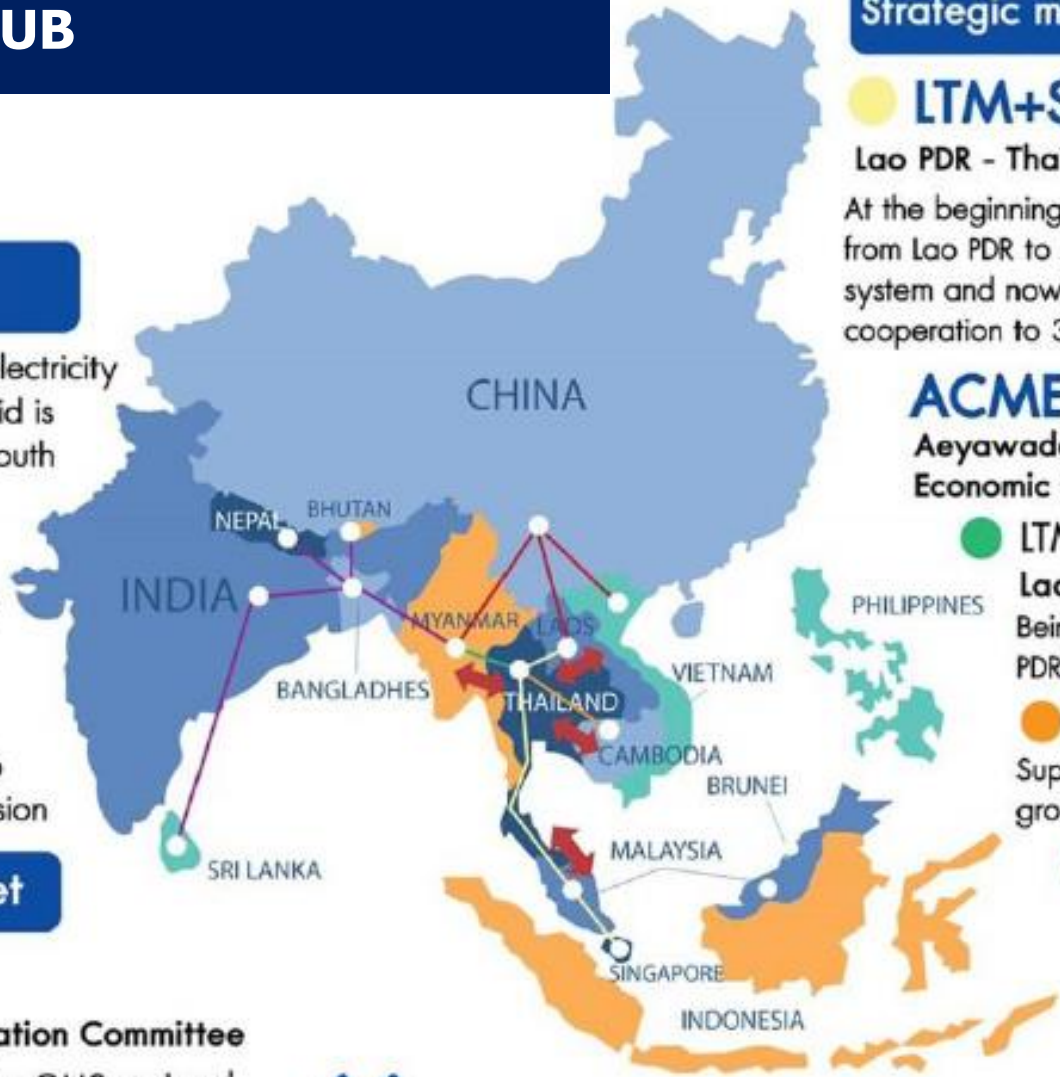
### RPTCC

**Regional Power Trade Coordination Committee**

EGAT is ready to be the center for GMS regional power trade coordination.

### ASEAN Power pool

EGAT is ready to be the center for ASEAN Power Pool.




> "to utilize the reserve margin for the utmost benefit, reducing electricity cost for Thai people"
>
> **An Opportunity**

## Strategic multilateral connectivity

### LTM+S

**Lao PDR - Thailand - Malaysia + Singapore**

At the beginning, Thailand is the power transmitter from Lao PDR to Malaysia via existing transmission system and now is ready to expand the cooperation to 300 MW and to Singapore.

### ACMECS

**Aeyawadee-Chaopraya-Mekong Economic Coorperation Strategy**

#### LTMM

**Lao PDR - Thailand - Myanmar**

Being the power transmitter from Lao PDR to Myanmar

#### Cambodia

Supporting the neighboring country's growth with high reserve margin

### GMS

**Greater Mekong Subregion**

Connection between ASEAN and China

### BIMSTEC

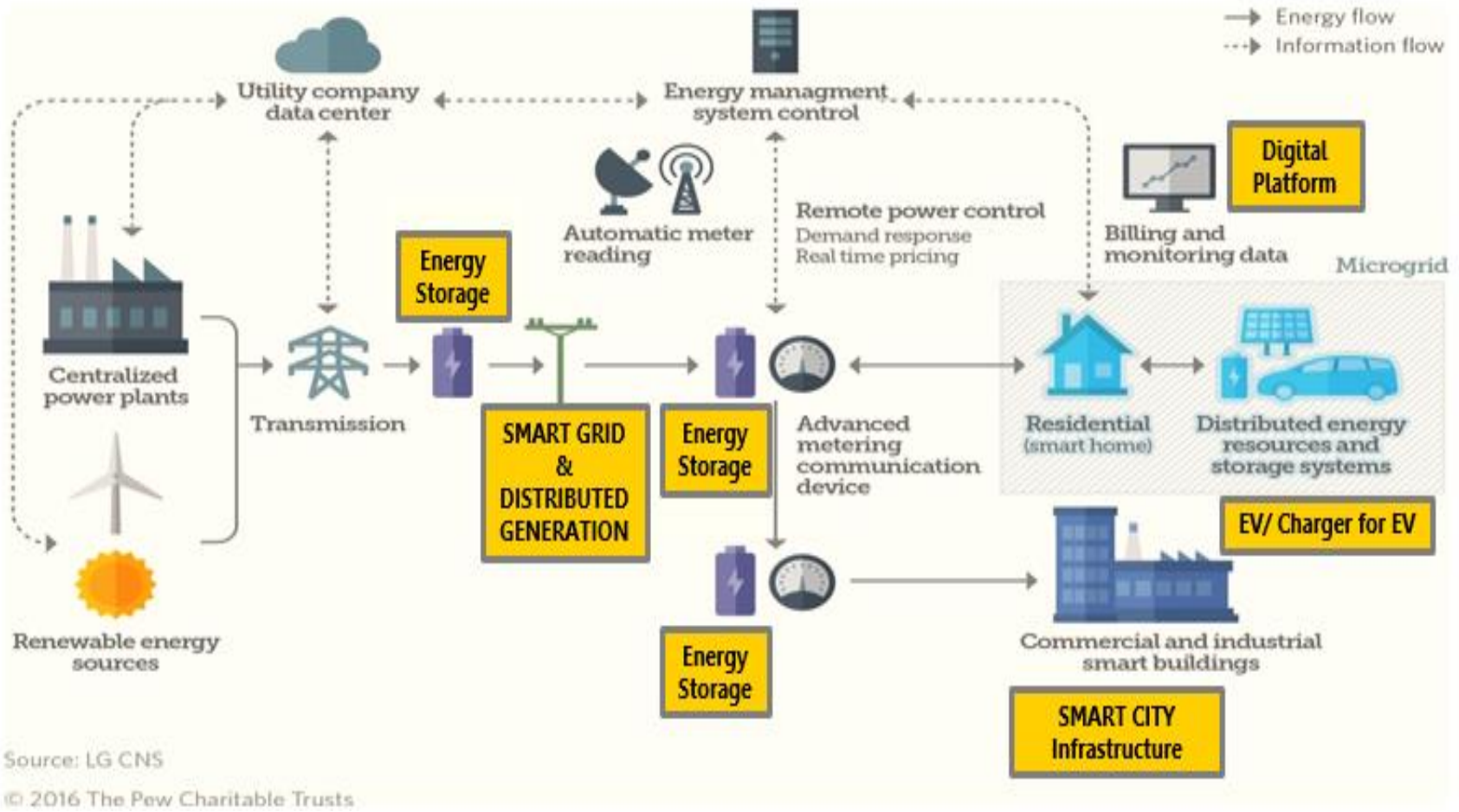
**Bay of Bengal Initiative for Multisectoral Technical and Economic Cooperation**

Electrical connection between South Asia and ASEAN

ที่มา: EGAT

# Keys driven of Electricity System Transformation

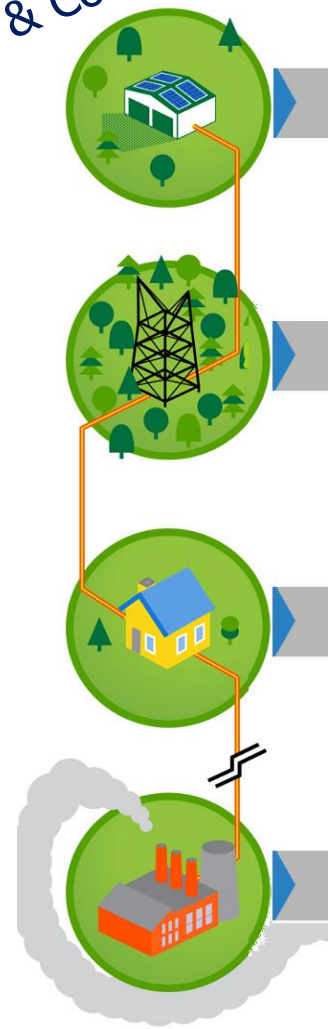
- Competitive market
- Distributed Generation/ Distributed Energy Resource
- Smart Grid & ESS
- Electric Vehicle
- Smart meter & Block chain
- ASEAN Power Grid/ Trading HUB
- Etc.




**Power Plant & Transmission** → **Distributed Energy System**

# SMART Regulation: ERC's ROLEs

Fair & Competitiveness



**Regulating Energy Sector**

- Local
- National (Energy Security)
- Regional (ASEAN Hub)
- supervise and regulated the energy price at appropriate, stable and affordable level

**Regulating Competition/ Scenario Planning**

- TPA
- SANDBOX
- Issue relevant regulations for the purchase of power generated from RE

**Information for Energy Consumer**

- Energy Facts/Info
- Consumer Protection

**Audit/Analyze/ Suggest Operators for performance improvement**

- Safety/ Standard
- Post Audit
- Monitoring Industry
- Energy R&D

# Thank you