"Effective Energy Pricing Framework"

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Chairman

Energy Regulatory Commission, Thailand

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Content

1. **Overview** of Energy Industry of Thailand and ERC Role
2. Component of the Electricity Price
3. Tariff Setting
4. Cross Subsidy Mechanism
5. Power Development Fund

Energy Industry Act 2007

Policy Maker | **Regulator** | **Operator**

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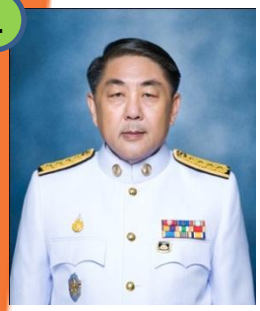


Duties

REGULATING (Quality service/Safety/Pricing)
:License for the Energy Industry Operation, Tariffs for the Energy Industry Operation, Energy Industry Reliability, Engineering Standard, The Energy Network System Operation

PARTICIPATION & CONSUMER PROTECTION
:Service Standards and Service Extension, Power Development Fund, Regional Energy Consumer Committees

Utilisation of Immovable Property: The Energy Network System Boundaries Annoucemnet, การเวนคืน, การรอนสิทธิการดูแลรักษาทรัพย์สินในเขตโครงข่าย

Redress of Disputes and Lodging of Appeals

Disclipnary Procedures & Punishment

Thai Energy Regulatory Commission's: Regulatory Structure

Cabinet

National Energy Policy Council (NEPC)

- **Committee on Energy Policy Administration (CEPA)**
- **Energy Conservation Promotion Fund Committee (ENCON Fund Committee)**
- **Ministry of Energy (MoEN)**

Energy Policy and Planning Office (EPPO)

- Electricity
- Natural Gas
- Fuel
- Other Energy

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

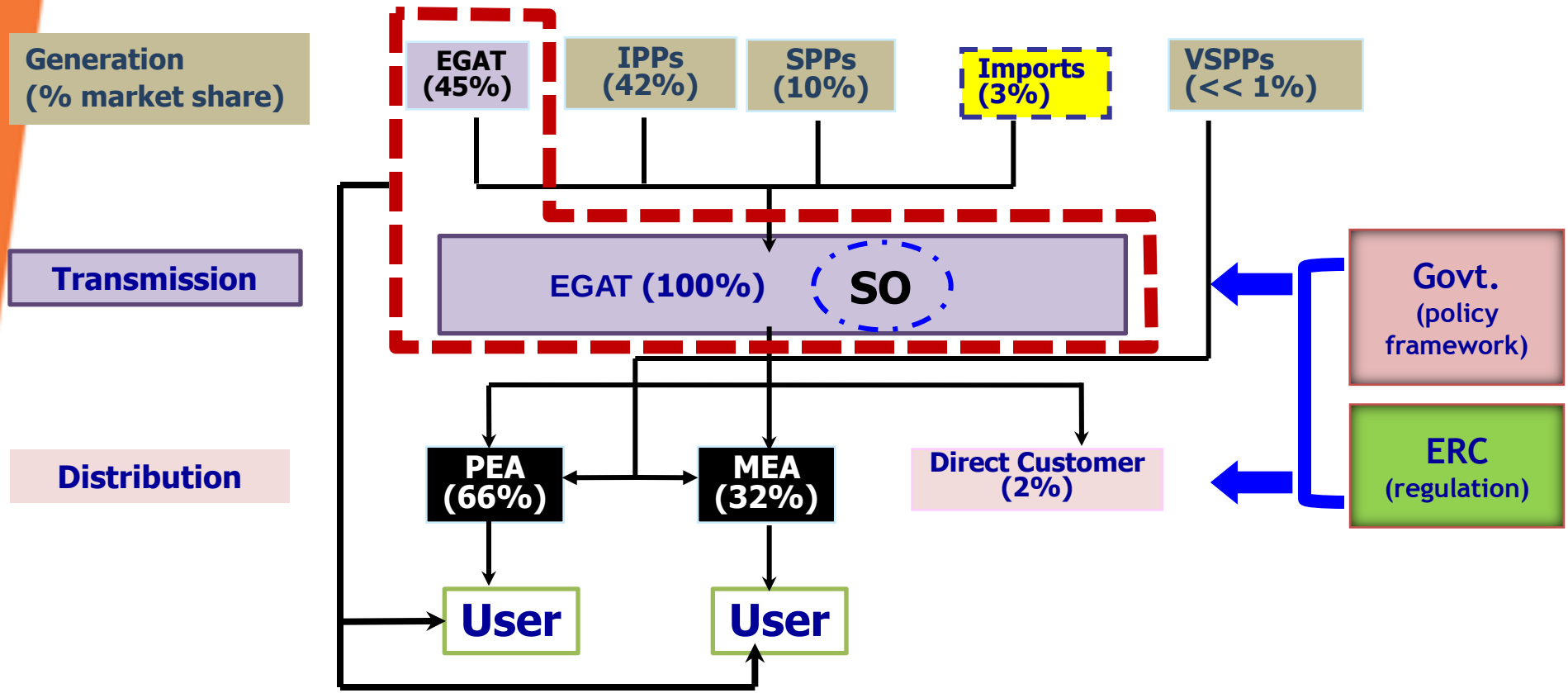
Policy Frameworks

- Electricity
- Natural Gas

Energy Regulatory Commission (ERC)

Office of the Energy Regulatory Commission (OERC)

Electricity Industry



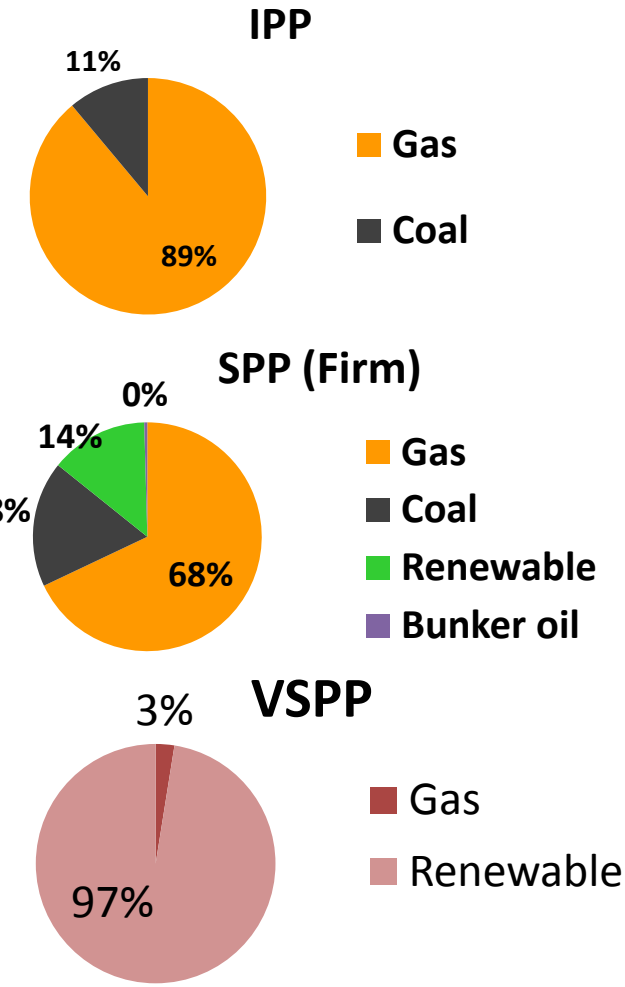
Remarks

EGAT= Electricity Generating Authority of Thailand
MEA= Metropolitan Electricity Authority
PEA= Provincial Electricity Authority

IPPs= Independent Power Producers (Cap. sold to EGAT ≥ 90 MW)
SPPs=Small Power Producers (Cap. sold to EGAT < 90 MW)
VSPPs=Very Small Power Producers (Cap. sold to MEA/PEA < 10 MW)

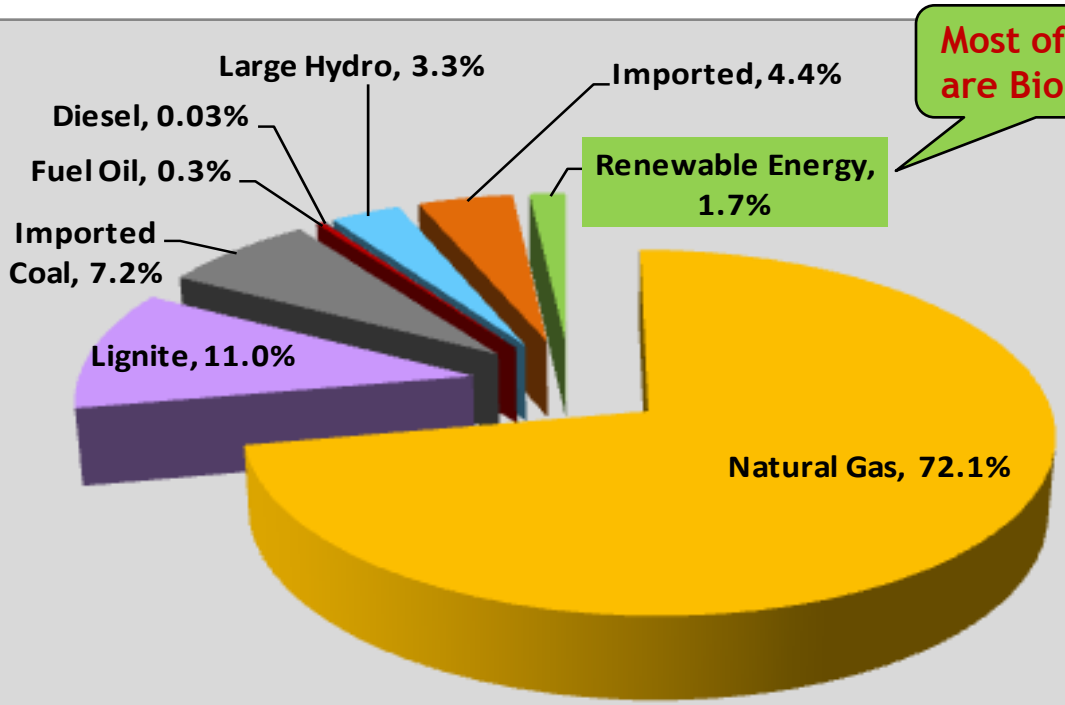
Private power producers in Thailand (2009)

Producers		Existing	New
IPP		12,151.6 MW (10)	4,400 MW (4)
		EGAT's 5,474 MW (3)	Private 6,677 MW (7)
SPP	Firm	2,079 MW (41)	~4,000 MW (~ 50)
	Non Firm	243 MW (19)	(> 10)
VSPP		238 MW (118)	> 5,000 MW (> 300)
		14,712 MW (188)	> 8,400 MW (> 341)



Remark: ( ) = numbers of firms

Share of Power Generation by Fuel Type in 2010



	Gwh
Natural Gas	117,941
Lignite	17,988
Imported Coal	11,776
Fuel Oil	558
Diesel	42
Large Hydro	5,347
Imported	7,254
Renewable Energy	2,763

Installed Capacity: 30,920 MW
Energy Generation: 163,668 GWh

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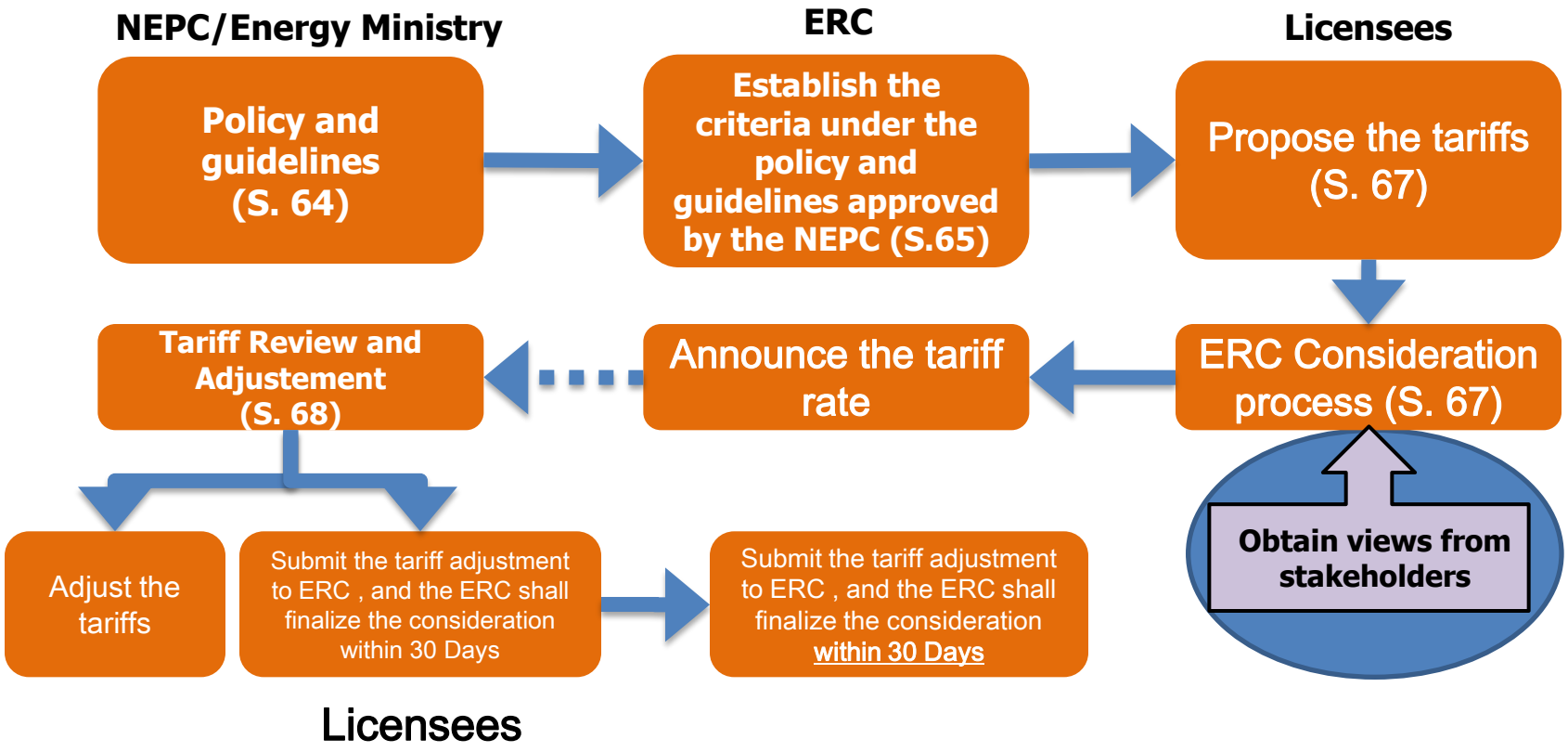
The guideline on the tariff determination in the energy industry operation under Energy Industry Act 2007



S. 26 Prior to issuing any regulations, rules, announcements or codes of the ERC, which will affect a person, a group of persons or licensees, the ERC shall disclose the essence of the regulations, rules, announcement or codes and shall provide the interested person, group of persons or licensees with the opportunity to make representation to the ERC, in accordance with the hearing process established by the ERC.

The criteria for determining the tariffs of licensees

under the policy and guidelines approved by the NEPC (S.65)

- reflect the actual costs of efficient energy industry operation;
- be at the rates that enhance efficient and adequate energy supply to satisfy the domestic energy demand;
- encourage efficiency improvement in the energy industry operation;
- take into account fairness for both energy consumers and licensees;
- take into account the assistance to the underprivileged power consumers in order to decentralize prosperity to provincial areas;
- have an explicit & transparent tariff calculation and make public the tariffs; and
- do not exert unjust discrimination against energy consumers or those who wish to use energy.

By consider from following issues;

- Opening the sector to demand side participation to provide the opportunity to compete with energy production
- Offering demand response where a tariff paid to reduce consumption and load aggregation to competition
- Tariffs will be unbundled into generation, transmission, distribution, and supply, including the arious subsidies
- Subsidies will be paid through the Power Development Fund under clear rules and monitoring.
- The National Uniform Tariff will remain for customers as appropriate

Electricity Tariff Structure in Thailand

Tariff Setting' Principle

- **The tariff should reflect the underlying costs of eletricity provision and promote efficient use of eletricity**, particularly by reducing consumption during the peak period which will help reduce the need for long-term investment in the power sector.
- **The tariff should allow the utilities sufficient revenue** to efficiently cover the operation costs and to finance efficient investment in further expansion programs.
- **The tariff should be fair for various categories of customers** by phasing out cross subsidization.
- **The tariff should provide greater flexibility in the automatic tariff adjustment** in order that the tariff could reflect fluctuating fuel prices.

Electricity Price = Base Tariff + F_t + VAT (7%)

Fuel Adjustment Mechanism (Ft)

Base Tariff

- **CAPEX**: G | T | D | R
- **OPEX**: Fuel | Non-Fuel
- **Incentive**: Appropriated Return

Ft is the automatic adjusted fuel costs and purchased power costs from assumptions set in base tariff and also Adder, and to be adjusted every 4 months.

Base Tariff reflects investment costs of utilities in developing power plants, transmission lines, distribution lines and energy costs with certain assumptions related to fuel prices, inflation rates (or CPI), exchange rates. Base Tariff will be reviewed every 3-5 years.

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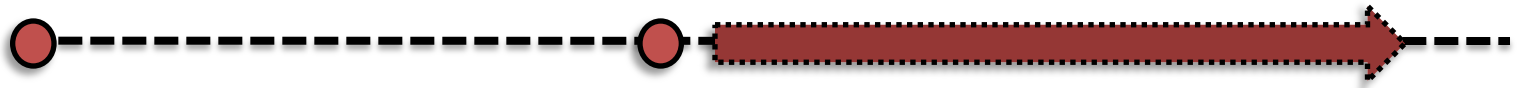
New Tariff Structure (1)



17 Oct 05 CEPA approved the New Tariff Structure and be effective from Oct 05 onwards

17 Jul 11 Start using "New Tariff structure"

Tariff Setting Criteria

1. The main Tariff Structure remains the same
   - Uniform Tariff : Electricity rates across the country in each type.
   - 2 major components as the original; Base Tariff and Ft
2. More separate the actual costs of operation to be more clearly; Generation, Transmission, Distribution and Retail, as well as reflect the fluctuation in fuel costs.
3. Create Tools in monitoring the actual costs in order to determine the costs;
   - Regulatory Accounting
   - Regulatory Accounting Information Disclosure (RAID)
4. Create the Mechanism to determine "Performance to comply with appropriate return on investment"
   - Efficiency Benchmarking/ Efficiency Review
   - Periodic Review
   - Claw Back
5. The Tariff Structure linked to the Power Development Fund Mechanism.

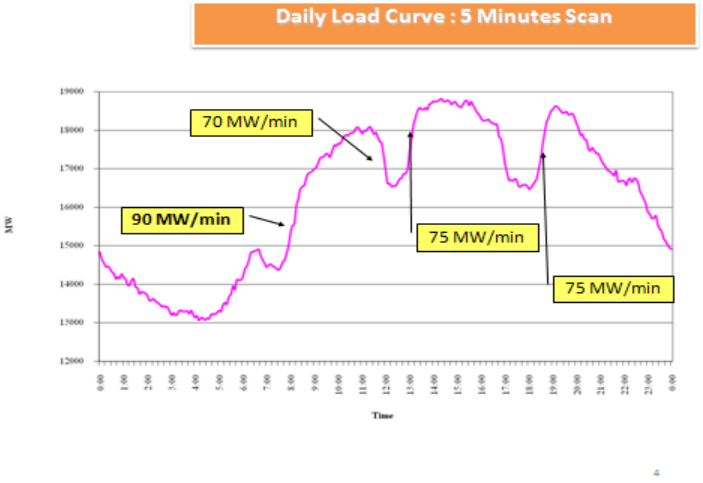
Consideration of Load Pattern

- **Load Pattern of the System before 1991**

Peak	**18.30 – 21.30 hrs.**
Partial Peak	**08.30 – 18.30 hrs.**
Off-Peak	**21.30 – 08.30 hrs.**

- **Load Pattern of the System after 1994**

Peak	**09.00 – 22.00 hrs. Monday-Saturday**
Off-Peak	**22.00 – 09.00 hrs. Monday-Saturday entire Sunday**



- **Current Pattern of the System for new Tariff Structure**

Peak	**09.00 – 22.00 hrs. Monday-Friday**
Off-Peak	**22.00 – 09.00 hrs. Monday-Friday; 00.00 – 24.00 hrs. Saturday - Sunday and official holidays**

Retail Electricity Tariffs

The structures of retail electricity tariffs will vary, depending on the **consumption amount and voltage level**.

Power consumers are divided into 8 categories;

1. Residential Service

- Small Residential Service: consumption ≤ 150 kWh/month
- Large Residential Service: consumption > 150 kWh/month

8. Temporally Power User

2. Small General Service

- demand ≤ 30 kW

3. Medium General Service

- demand 30 - 999 kW, or energy consumption ≤ 250,000 kWh/month

4. Large General Service

- demand ≥ 1,000 kW, or energy consumption > 250,000 kWh/month

5. Specific Business Service (Hotel)

- demand ≥ 30 kW

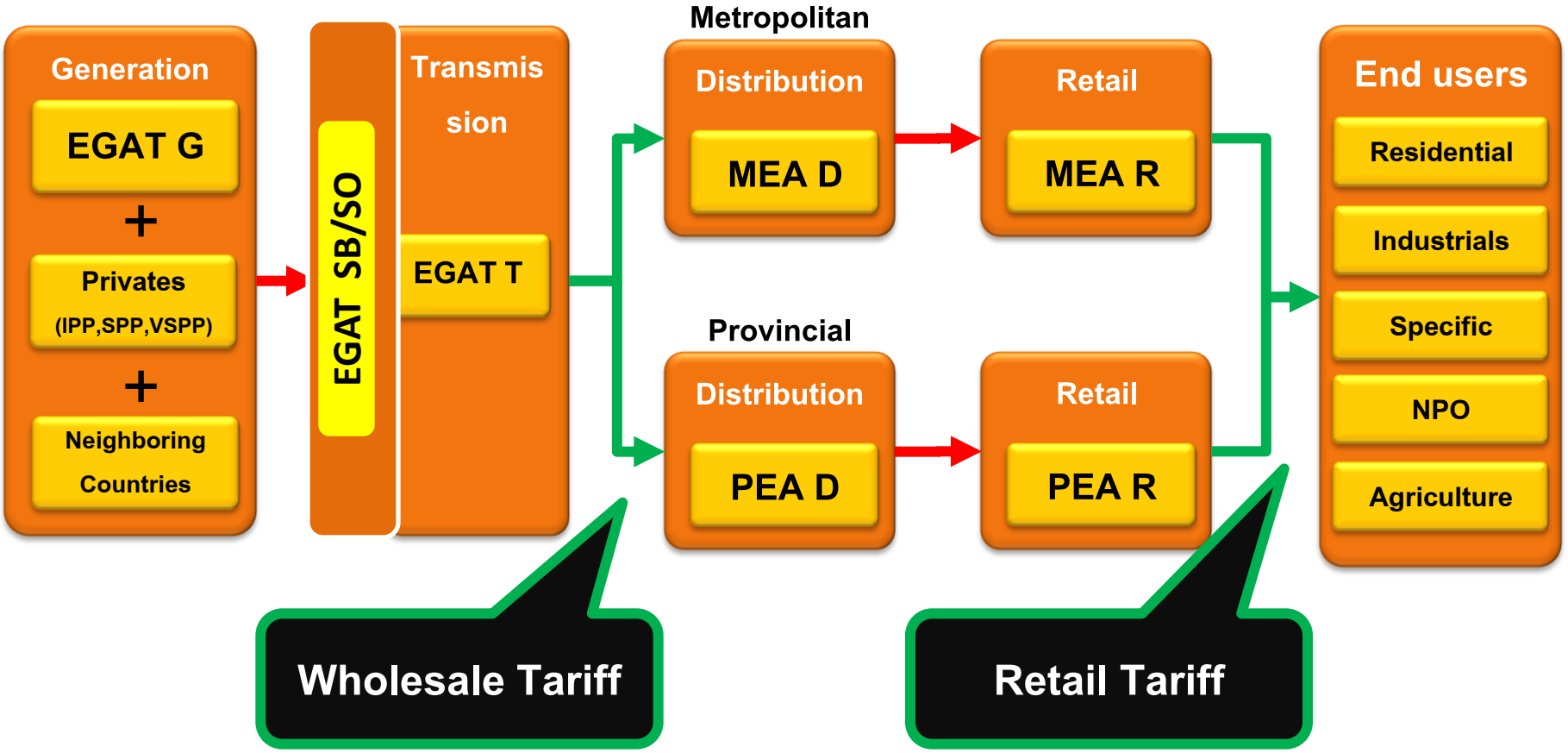
6. Non-profit Organizations

- demand < 1,000 kW, or energy consumption ≤ 250,000 kWh/month

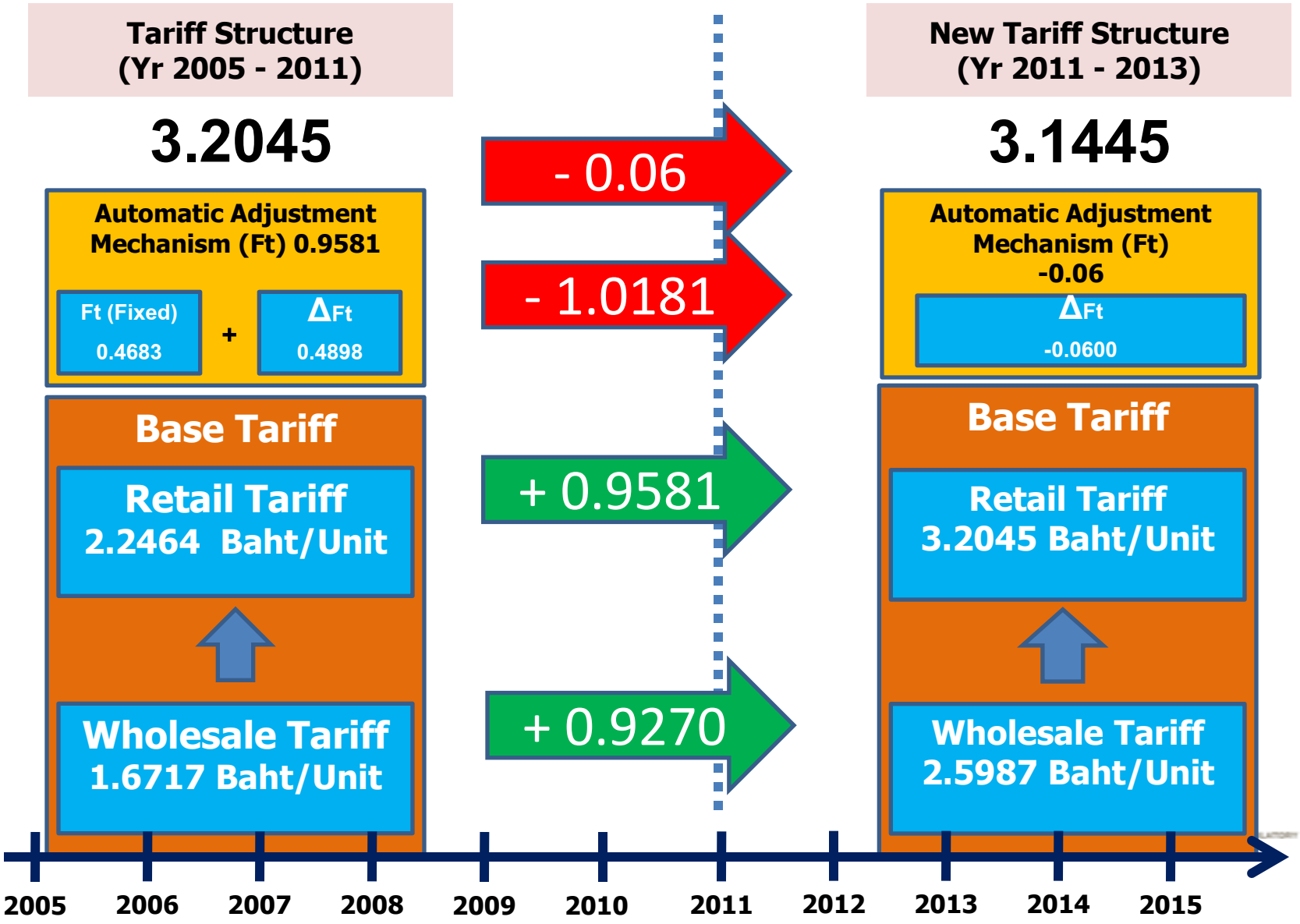
7. Water Pumping for Agricultural Purposes

- Use of electricity for agricultural water pumps belonging to government agencies, farmer groups certified by the government or agricultural cooperatives

Flow of Electricity Tariff-Base Tariff



Tariff Setting: New Tariff Structure (2)



Tariff Structure May-June 2011

EGAT Gen → **EGAT Trans** → **MEA PEA**

Power Plant	Transmission line	Distribution & Retail
Power Development Plan	Transmission Development Plan	Distribution Development Plan

* Service fee not included

1 Base Tariff	2 Fuel Adjustment Charge (Ft)	3 VAT 7%	TOTAL*
(2.2462 Baht/kwh) (7.46 UScent/kwh)	(0.9581 Baht/kwh) (3.18 UScent/kwh)	(0.2243 Baht/kwh) (0.745 UScent/kwh)	(3.4286 Baht/kwh) (11.39 UScent/kwh)

1 USD: 30 baht

PTT

Gas Pipeline

Gas Pipeline Development Plan

1 Fuel Cost	2 Power purchasing Cost				3 Adder	4 Power Development Fund
	IPPs	SPPs	VSPP	Int		
(27%)	(72%)				(1%)	

Tariff Structure July 2011 onward

1 2 3

New Base Tariff

Base Tariff	(Ft) พ.ค.- ส.ค. 2554	PSO 90 Unit for Free
(2.2462 Baht/kwh) (7.46 UScent/kwh)	(0.9581 Baht/kwh) (3.18 UScent/kwh)	0.12 Baht/kwh

Ft (Reset)

VAT

1 USD: 30 baht

PTT

Gas Pipeline

Gas Pipeline Development Plan

1 Fuel Cost (27%)

2 Power purchasing Cost (72%)
- IPPs
- SPPs
- VSPP
- Int

3 Adder 97(4)

4 Power Development Fund 97(3)

(1%)

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Cross Subsidy Mechanism (1)

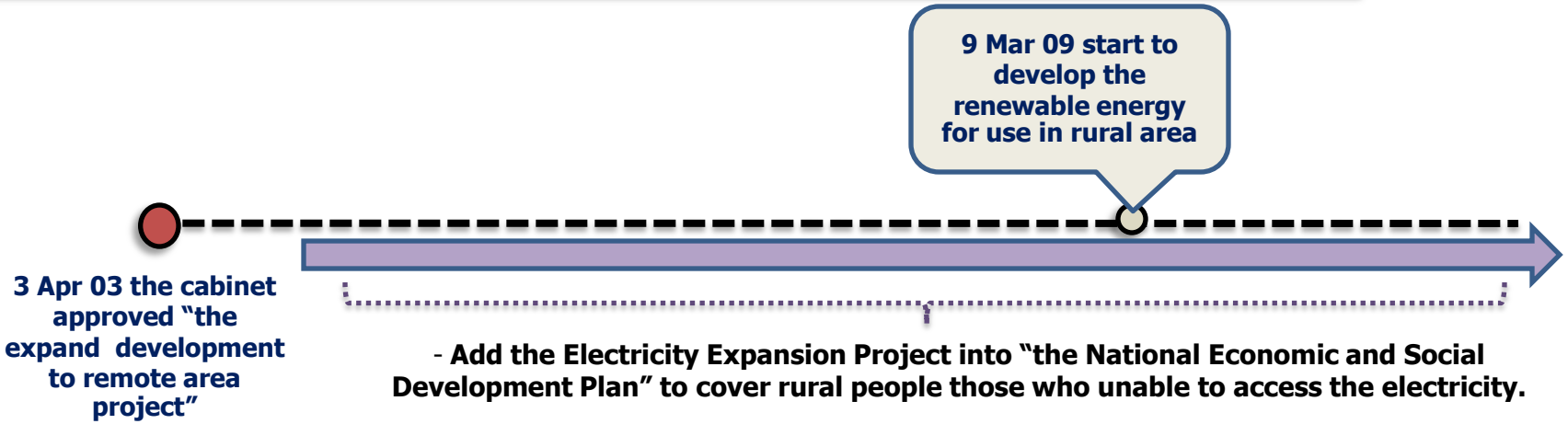
- Since the costs of electricity provision of the two Distribution Utilities (MEA & PEA) are different while the retail tariff structure is designated to be unified nationwide, there must be cross subsidization between MEA and PEA.
- Two approaches of cross subsidization are in use in Thailand:
  - Surcharge (Deduction) imposed on the Bulk Supply Tariff that EGAT sells to MEA and PEA.
  - Lump Sum Financial Transfer from MEA to PEA.

Lump Sum Transfer	2006	2007	2008
MEA to PEA (M. Baht)	10,507	10,728	11,014

  - **From 2009**, Lump Sum Financial Transfer from EGAT and MEA to PEA.

Lump Sum Transfer	2009	2010	2011
EGAT and MEA to PEA (M. Baht)	12,178	12,580	13,379

Cross Subsidy Mechanism: for Rural Electrification(2)



- The Thai government has a policy to expand development to all provincial areas, including remote rural areas. In this regard, PEA has been assigned to expand the power distribution areas to rural communities so that all households nationwide would have access to electricity.
- The costs incurred from the mentioned investment plan will be considered as an element for the estimation of PEA's financial status when determining the electricity tariff structure.

Revenue Requirement

- **The three power utilities make projections of their financial status and make an estimate of the average electricity tariff** that would yield the financial status pursuant to the established criteria. **The revenue in each year is called the "revenue requirement."**
- In order to estimate the financial status, **explicit assumptions are essential**, particularly assumptions on fuel prices, inflation rates (or CPI), efficiency improvement of the transmission system, distribution system and retail business.

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Lumpsum Transfer

Revenue Requirement 2006 - 2011	EGAT.	MEA.	PEA.
Return on Invested Capital : ROIC	8.39	4.80	4.80
Debt/Equity Ratio : D/E Ratio	≤1.5	≤1.5	≤1.5
Debt Service Coverage Ratio : DSCR	≥1.3	≥1.5	≥1.5

Million B

year	2005	2006	2007	2008	2009	2010	2011
MEA.	9,083	10,507	10,728	11,014	9,336	9,320	3,528
EGAT.					2,842	3,260	9,851
PEA.					12,178	12,580	13,379

Power Development Fund (USO)

Existing Mechanism: Gov. (2006-2009)

Policy → **Uniform Tariff**

EGAT **MEA** **PEA**

2006-2008

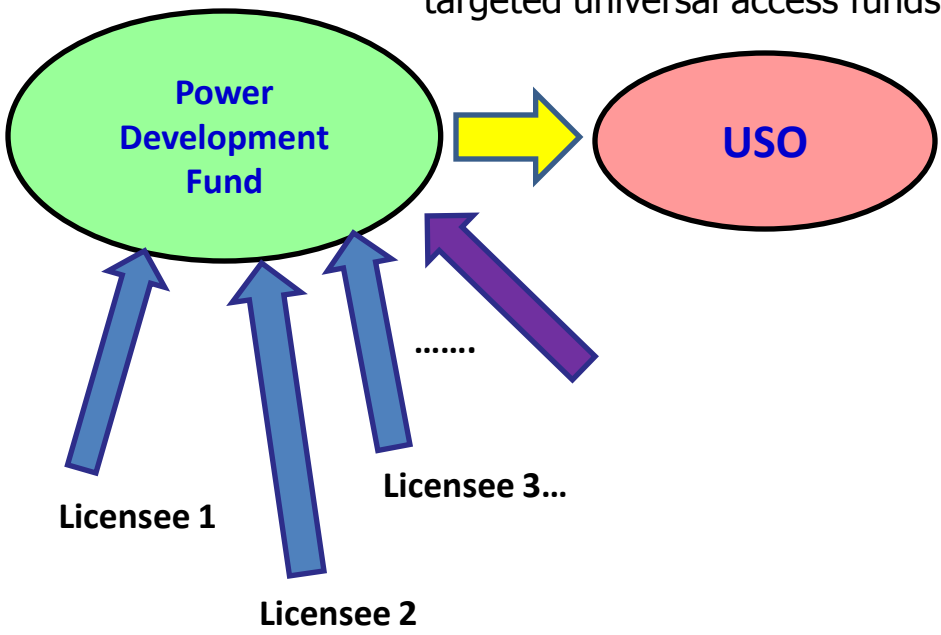
2009

Lump sum Transfer: Million USD				
Year	2006	2007	2008	2009
MEA to PEA	300	307	315	267
EGAT to PEA	-	-	-	81

	EGAT	MEA	PEA
ROIC	8.39%	4.80%	
DSCR	1.3	1.5	
D/E Ratio	> = 1.5		

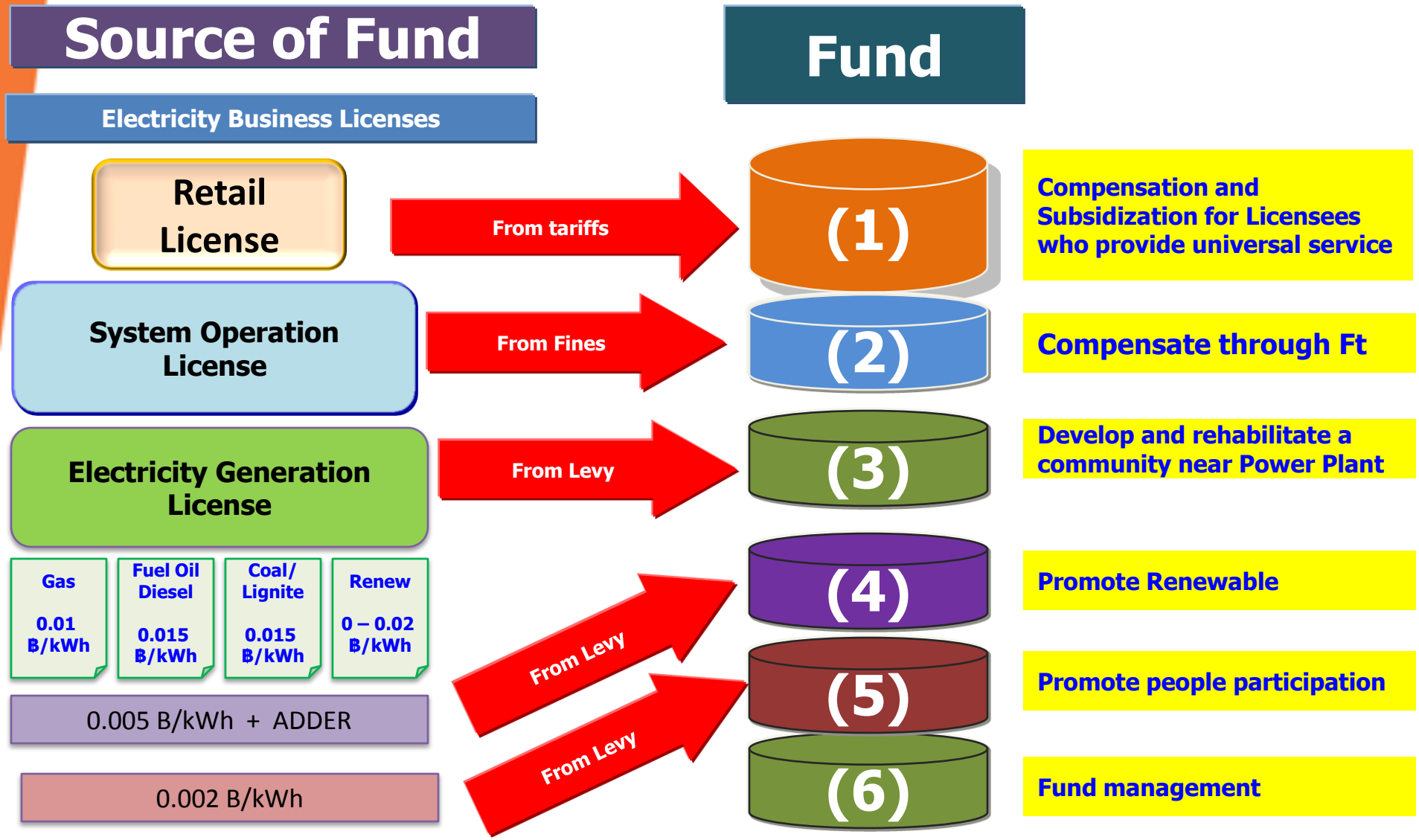
Way Forward: Power Dev Fund (2010 onwards)

targeted universal access funds



Remark: USO= Universal Service Obligation

The Power Development Fund



Concept of Existing Lifeline Rates

Small Residential Power Consumers

- **Since 1991** power consumers with low income and have only necessary electrical appliances in their household, and hence consuming electricity ≤ 150 unit/month, have been classified under the "Small Residential Service" category of power consumers. A low tariff rate is applied.

Electrical Appliance	No. of Electrical Appliances per Household with Power Consumption ≤ 150 Unit/Month
Refrigerator	1
Rice Cooker	1
Electric Fan	1-2
Iron	1
TV	1
Light Bulb/Fluorescent Tube	3-4
Air-conditioner	-

- **Jul 11:** Announced by the Thai Government , **starting from Jul 11** households using electricity do not exceed **90 units/month** will be free of electricity charge, **as permanent measures.**

Conclusion

- **the tariff structure should be balanced between :**

Return on Investment	should be directed to the appropriate justice.
Efficient Investment	to create incentives to invest efficiently.
Efficient Consumption	promoting efficient and effective : TOU, Demand Response
Affordability	To take into account the low income customer and consumption area far away.
Environment	Promoting renewable.

Thank you

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